‘CORD’ ORNAMENTS ON POTTERY IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION: 5TH – 4TH MILL. BC

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Editor's Foreword

The issues outlined in the above volume of *Baltic-Pontic Studies* (BPS) presented here, can be said to generate several important and complex questions among which, one relating to the topogenesis of 'corded' ornamentation on the bio-cultural borderlands of east and west Europe, gave birth to an innovative research project. In this respect, specialist researchers of the Pontic-Baltic Eneolithic (from Middle and Late Neolithic contexts) chose 45 vessels (mostly fragments) originating from the Dnieper-Southern Bug drainage area and Vistula, dated to the 5th - 4th/3rd mill. BC for the purposes of microscopic analyses conducted with the aim of identifying 'corded' patterns of ornamentation. These laboratory tests were led by an archaeologist specialising in microscopic analysis to identify interdisciplinary, pre-historic and archaic techniques in the textile crafts.

The implications of the above tests would seem to warrant a manifold approach to possible conclusions on the basis of specialist (microscopic) criteria of differentiated - previously identified as macroscopic - in general terms as 'corded' motifs of ceramic ware ornamentation (part 1). This also concerns an outline of investigation drawn from hermeneutics, prompted by various contexts such as historical and cultural assessment of bio-cultural communities and related findings as well as attempts to generate a coherent framework of linguistic and cultural research for 'corded ornamentation on ceramic ware' (part 2).

In discussing further the 'main issues' presented in this publication of BPS 15 in respect to the hand manufacture of ceramic ware of the Vistula and Dnieper interfluvial region and its peoples, a modus operandi of investigation in the context of region has been proposed whereby researchers of this particular project have been given a free hand, as it were, in respect to the degree and forms of application in microscopic analyses and their findings. A series of commentaries has therefore arisen, from various points of view in so far as reflections on research conducted - possible future strategies for vital questions in this matter that are yet to be answered (part 3).

It is assumed therefore that this volume has in some measure initiated a process of the highest consequence, one introducing a new level of off-site investigation into the genesis of corded ornamentation development, which deserves to be supported in addition through a personal engagement in this research field.

Editorial comment

1. All dates in the B-PS are calibrated [BC; see: Radiocarbon vol. 28, 1986, and the next volumes]. Deviations from this rule will be point out in notes [bc].
2. The names of the archaelogical cultures and sites are standarized to the English literature on the subject (e.g. M. Gimbutas, J.P. Mallory). In the case of a new term, the author's original name has been retained.
3. The spelling of names of localities having the rank of administrative centres follows official, state, English language cartographic publications (e.g. *Ukraine, scale 1 : 2 000 000*, Kiev: Mapa LTD, edition of 1996; *Rèspublika BELARUS', REVIEW-TOPOGRAPHIC MAP*, scale 1:1 000 000, Minsk: *BYELORUSSIAN CARTOGRAPHIC AN GEODETIC ENTERPISE*, edition 1993).

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Aleksander Kośko, Marzena Szmyt

'CORDED' ORNAMENTATION ON CLAY VESSELS IN THE VISTULA AND DNIEPER RIVER REGION: 5TH – 4TH MILL. BC. RESEARCH PROJECT AIMS

The ornamentation of clay vessels through a process of cord impression can be said to be a multi-cultural phenomenon, varied throughout time and wide-ranging in geographic extent. These so called cord-marks or cord ornaments can be found on ceramics from the Neolithic, Eneolithic (Chalcolithic) and the Bronze Age in Europe and Asia from the Alps to the islands of Japan [e.g. Buchvaldek, Strahm (Eds) 1992; Roman, Dodd-Opriţescu, János 1992; Yasuda (Ed.) 2002; Furholt 2003; here older publications]. Moreover, there are times and places when such ornamentation was extremely frequent. This concerns above allcentral and eastern Europe from the 5th mill. BC to the 3rd mill. BC. Corded ornamentation in this context even became a type of distinguishing mark, allowing for the creation of a name for one of the important archaeological taxonomic cultures identified in the 3rd mill. BC, the Corded Ware culture (CWC)[1].

Corded markings take on various forms and nomenclature (see terms such as double-band/twofold cord, triple-band/threefold cord, twine cord etc.), being also an element used to create a variety of ornamental patterns and their designs. A common trait of these ornaments is their means of production, which according to archaeologists, was based on making an impression with a 'cord' on the surface of the vessel, before it was fired. In the main, this is a conclusion based on macroscopic observations complemented by laboratory experiments. Rarely, however, were attempts made of further analyses based for example on microscopic analysis [Michałowski, Sikorski 2005]. The results of the latter became an appropriate starting point for the research project devoted to the application of 'cord' designs in ceramic ware ornamentation, whose initial fruits are presented in this publication. Moreover, this research project constitutes a component of

[1] In this context it is a paradox that the oldest CWC ceramic was not ornamented with cord impressions but horizontal bands that were engraved (see beaker type A).

a wider programme of studies on bio-cultural systems of the eastern and western borderlands of Europe from the Eneolithic to the beginnings of the Iron Age.[2]

1. CORDED ORNAMENTATION IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION IN THE 5TH TO 4TH MILL. BC: RESEARCH PROJECT AIMS

The project in question, initiated in 2006, is devoted to the issue of 'corded' markings recorded in the above region – that is, in the borderlands of western and eastern Europe from the second half of the 5th mill. BC up to the second half of the 2nd mill. BC. The main focus of interest here lies mainly in the oldest findings, dated to the 5th and 4th mill. BC, a phase when these ornaments were used, a forerunner of the beginnings of the CWC circle.[3] In respect to the taxonomy [see the articles by Kośko, Sikorski and Szmyt..., in this volume] this meant initiating research into the 'corded' ornamentation present in 'pre-Yamnaya' cultures (Sredniy Stog culture – SSC; Lower Mikhailovka culture – LMC; Rogachyk culture – RC); early Yamnaya culture (YC); Tripolye culture (TC) and Funnel Beaker culture (FBC).

The main aim of the project was the creation of an integrated research platform on 'corded' ornamentation not only in terms of taxonomic traits but foremost as the result of known work on the part of artisans in whom knowledge and skills from several walks of life in prehistoric communities was encoded, in particular production of ceramic ware and textiles, the use of animal and plant fibres as well as the use of a system of signs. In this context, plans were laid for a complex analysis covering the fields of production itself, macroscopy, microscopy, chronometrics, topogenetics and semiotics.

The term 'corded ornamentation' is used in a general sense. The main issue is based therefore on the identification of what the general usage of 'cord' constitutes. In formalising the aims of the project it was assumed that several versions of what this term denotes shall be covered in this context. The above qualification can already be observed at the stage of macroscopic observation, which was pointed to in the first half of the 20th century. At that time Konrad Jażdżewski played an important role, identifying in the eastern FBC group ceramic ware the impressions of two distinct 'cord' negatives – that of the double-band and triple-band. The identification of the latter (as an ornament made 'by impressing plaited cord from smaller strings') was based on the experiment conducted by Władysław Maciejewski [see Jażdżewski 1936:250].

[2] Programme completed 2006-2010 in the form of grant N10901431/0900.

[3] To be precise before 2850 BC; see [Włodarczak 2007], for previous literature.

Regardless of the innovative nature of the above observation it is nethertheless necessary to underscore their initial, experimental macroscopic character. Moreover, the professional literature in East Europe has also for a long time been using the term 'twine cord', which has also found currency in other languages (e.g. German *Wickelschnur*). At this stage of research, before the available results, it is possible to assert that in essence the variation of materials and techniques applied in the crafting of 'corded' ornaments on clay vessels is greater than anticipated upon undertaking this project. Bearing this in mind it perhaps would be more accurate to use a more careful description such as 'cord' and 'cord-like' description.

2. CORDED ORNAMENTATION IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION IN THE 5TH TO 4TH MILL. BC – CHRONOLOGICAL AND TOPOGENETIC VIEWS TO DATE

Up to the 80's of the 20th c. in European studies of the beginnings of corded ornamentation there was a lack of comprehensive research on findings from the interfluvial region of the Vistula and Dnieper. Two separate topogenetic views at that time can be noted – the north in the case of cultures in the Odra and Vistula basins and the east, in respect to cultures of the Dnieper drainage area. The former took in the FBC where the above ornamentation was documented from the Wiórek phase, to be precise, from the Cuiavian IIIB and IIIB-C phase. In this context [see Chmielewski 1952:22-23; Rybicka 1991:72-73] there was an attempt to link this with the North-Elbe-Jutland-Scandinavian circle (north FBC group and the communities of the later Rőssen and Tiefstichkeramik cultures from the first half of the 4th mill. BC). Ceramic ware ornamented by means of cord impressions was admittedly recorded very early in the piece, namely from the end of the 5th mill. BC – already in Subneolithic communities [see Wyszomirska 1990:109ff], though to date there are no signs of its continued growth in later times. There is also a lack of evidence pointing to an expansion of territory in this regard for the production of ceramic ware in the direction of the Odra and Vistula basin [Wierzbicki 1999:170]. An illustration of this conclusion might be the earliest FBC findings in the basin of the Lower Odra and Warta, which do not boast corded ornamentation [see Wiślański, Czarnecki 1973; Krzyszowski 1997; Galiński 2005; Wierzbicki 2008:37-39].

In the case of the eastern context, the genetic phase of Dereivka ('corded') from the late SSC stage [Telegin 1986] is relevant here. Apart from pre-Yamnaya culture circles (steppe Eneolithic), the 'Dereivka' roots were seen also in Tripolye topogenetic analyses of corded ornamentation, either dated from the BIII phase or from the CI phase [see Kotova. . . , in this volume for the current view]. General

pre-Yamnaya links were also seen in Late Eneolithic Balkan cultures [see Roman, Dodd-Opriţescu, János 1992].

The turning point in an integrated view of the genesis of corded ornamentation on the scale of the bio-cultural borderland of the east and west of Europe can be said to be studies that point out the Tripolye domination of the FBC. In the so called set of its traits, understood in the broader sense as Pontic (Mątwy cultural component), among others, there were distinguished 'ornamental elements made with the use of a two-strand cord' [Kośko 1981:99-101; 1988:94-114]. The record of materials focused attention on the problems concerning the formation of a taxonomy for hypothetical (a) 'steppe prototypes', (b) Tripolye applications and their (c) hypothetical 'beaker replicas', to a negligible extent, however, in their comparative analysis.

It has been established that the process of accepting the 'cord' between links 'a' and 'b' took place at the turn of stages B and C of the TC (see the concept of phase BIII), ca. 3900-3700 BC and was not dynamic at the start [Passek 1949:144, Fig. 77:5; Videiko 2002:37]. From the 'steppe' view it is a period synchronic with the earlier phase (Dereivka) of the SSC culture. At that time the processes of the TC peoples migration were identified [Dergachev 1999; Kruts, Ryzhov 2000; Telegin *et al.* 2001; Kotova 2008]. The so called eruption of Tripolye 'cord' applications occurs in the CII phase, around 3400 BC and the marker of this phenomenon in the TC is the 'system' of stamp-and-cord designs [Passek 1949:163, Fig. 82; Movsha 1971:33ff; Jastrzębski 1985:79, Fig. 5; further: Kotova, Videiko..., in this volume].

The hypothetical 'replicas' of Pontic traditions in the use of the 'cord' in ceramic ornamentation in the Baltic basin are dated at the earliest to 3500-3200 BC (FBC, IIIB/IIIB-C and IIIC phase; for previous views see Kośko 2007). In respect to the TC this relates to the aforementioned period of boom in the application of 'stamp-and-cord' designs in the CII phase. The same traits can be observed in the oldest of the 'cord' FBC communities radiocarbon dated: Radziejów 1, pit A – 4710±40 BP, ca. 3500 BC [Rybicka 1991; 1995:63ff].

As far as the application of 'corded' ornamentation on the Polish Lowland is concerned at present it is possible to propose two horizons in which the culmination of 'Baroque ornamentation' was recorded in respect to these cultures (select sites no doubt linked to ceremonial acts such as perhaps locations for rites?): Late Radziejów/Epi-Wiórek (3500-3200 BC; investigation point Radziejów 1) and Late Radziejów (3100-2900 BC; investigation point Łojewo 4) [Kośko 1984; Rybicka 1991; Przybył 2008: Tab. 2] (Fig. 1). At present it is difficult to attempt putting forward corresponding observations in respect to early upland settlements such as the south-east FBC groups. Of key importance for an assessment of Małopolska strategies of reception for 'ornamental Baroque' with the participation of 'cord' designs are the latest research findings in respect to FBC settlements in the Ożarów region [see Kadrow, Olejarczyk..., in this volume].

As far as the genesis of 'corded' ornaments known from GAC ceramic ware, phase IIa [Szmyt 1996:34ff], ca. 3500 BC is concerned, no vast territorial models of explanation have thus far been proposed. This particular issue therefore, has been put to one side, with the intention of returning to it at the next planned stage of research.

3. PROJECT REALISATION: SOURCES AND RESEARCH PROCEDURES

In undertaking the aims of the research programme it was decided to conduct a manifold comparative analysis of ceramic ware from the 'corded' ornamentation in Poland and Ukraine. To this end, thanks to the international group of researchers including Barbara Bargieł, Olgierd Felczak, Sławomir Kadrow, Aleksander Kośko, Nadezhda Kotova, Jolanta Nogaj-Chachaj, Maciej Reszel and Mykhailo Videiko, a set of 45 ceramic samples was collected.

The vast majority of these were single vessel fragments and only rarely, entire objects embellished with 'corded' ornaments. Research of samples initially concerned the actual production, macro and microscopic analysis, chronology and the topogenesis of 'corded' ornamentation in regional or local contexts. Moreover, the entire series became the subject of a study of the semantics of this context [see Kowalski. . . , in this volume].

Every sample was fully recorded according to the relevant check sheet. The following information was given: region and site of the sample in question, context of the ceramic find (object and layer), research mode, taxonomic framework (culture and phase), absolute chronology, results of technological and stylistic analysis and finally, macroscopic record of ornamentation. In respect to absolute chronology, a definitive dating was gained for the site or object and in particular circumstances, 14C markings were made for the ceramic sample in question. Every sample was furnished with the relevant documentation with the aid of drawings and photographs. The complete documentation and attendant information can be found in articles of parts 2 and 3 of this volume [see the introduction to this in Kośko, Sikorski, Szmyt. . . – part 1, in this volume].

The 45 samples were subject to microscopic analysis by Andrzej Sikorski in regard to identification of differences in the construction of the 'cord' plait and the techniques of impressing the 'cord' on the surface of vessels [see Sikorski. . . , in this volume]. The research methods for microscopic investigation and its recording of results has been discussed in detail in the subsequent article [Kośko, Sikorski, Szmyt. . . – part 1, in this volume].

4. FURTHER RESEARCH

The fields of repeated analysis of the above findings as well as new directions of post-taxonomic studies in archaeological cultures relating to the significance of 'corded' applications and their meaning in ceramic ware, are at the heart of new research methods, namely microscopic identification of the features of the spinning and weaving crafts [see the initial presentation of its extent in Michałowski, Sikorski 2005, for other literature] as well as diagnoses in respect to the store of syntactical linguistics and ideo-semantics [see Kowalski 1998, for other literature].

The monographs in this volume can be seen to fit therefore into both aforementioned cognitive trends, though not in equal proportion. It is our hope that they come to constitute a catalyst for further discussion on the phenomenon of both 'corded' and 'cord-like' ornaments and their manifold significance.

Translated by Ryszard J. Reisner

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Aleksander Kośko, Andrzej Sikorski, Marzena Szmyt

'CORDED' AND 'CORD-LIKE' ORNAMENTATION IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION IN THE 5TH – 4TH MILL. BC. INTRODUCTION TO INTERDISCIPLINARY RESEARCH

The research project whose aims were set out in the previous article [see Kośko, Szmyt..., in this volume], is premised on the inclusion of laboratory analyses to the research of 'cord' and 'cord-like' ornaments. At the first stage, microscopic identification of organic material, technical and craft traits was made, as well as the series of 'corded' ornamentation impressions. In addition, the analysis and interpretation of results, required research at a new interdisciplinary level, taking into account the methods, language of recording and the store of experience from several disciplines and sub-disciplines in the sciences. In the broad context of archaeology as it is understood, the research was focused on techno-archaeology (to be precise, the process of crafting ceramic ware and textiles), taxonomy of ceramics, chronometry, as well analyses of how prehistoric communities based their domestic economy.

In the research conducted into the above fields of production, a broad view of work in ethnography was necessary, especially those studies regarding the crafts technology of archaic societies. To this end, the monumental work of K. Moszyński [Moszyński 1967] was mainly used, while for microscopic analysis and the interpretation of its results, research was based on earlier techniques of textile production [Broholm, Hald 1940; Hald 1950; Łaszczewska 1966; Schlabow 1976; Seiler-Baldinger 1994; Chmielewski 2009]. In one sense, the final fruits of work conducted thus far – and above all the construction of a general framework of cultural studies where our particular research aims were set in the respective cultures of prehistoric societies – can be said to be the cognitive and semantic interpretation of 'corded' ornaments, for the above research aims [further in Kowalski..., in this volume].

This article is an introduction to the following studies to be found in subsequent parts of this volume: (1) taxonomic and spatial (geo-cultural) description

Fig. 1. Location of sites from which ceramic ornament 'cord' i 'cord-like' samples originate under microscopic analysis: 1 – Dereivka; 2 – Mikhailivka; 3 – Khortitsa; 4 – Ihnatenkova Hora; 5 – Sandraki ; 6 – Troyaniv; 7 – Mayaki; 8 – Las Stocki 19; 9 – Karmanowice 35; 10 – Miłocin Kolonia; 11 – Tomice 12; 12 – Opatowice 3; 13 – Kościelna Jania; 14 – Łojewo 4. Catalogue numbers of samples according to Table 1 and Table 2

of analyses from the series of samples, (2) macroscopic detailing of 'corded' ornaments, (3) laboratory research methods, (4) classification of negatives recorded in microscopic research (detailing of results), (5) general nature of results gained as well as (6) the relating of research results to ethnographic study, and finally the present store of knowledge on Neolithic textiles. Moreover, the historical and cultural context of ceramic ware under investigation (especially economic) was discussed further in the subsequent article [Kośko, Szmyt… – part 1, in this volume].

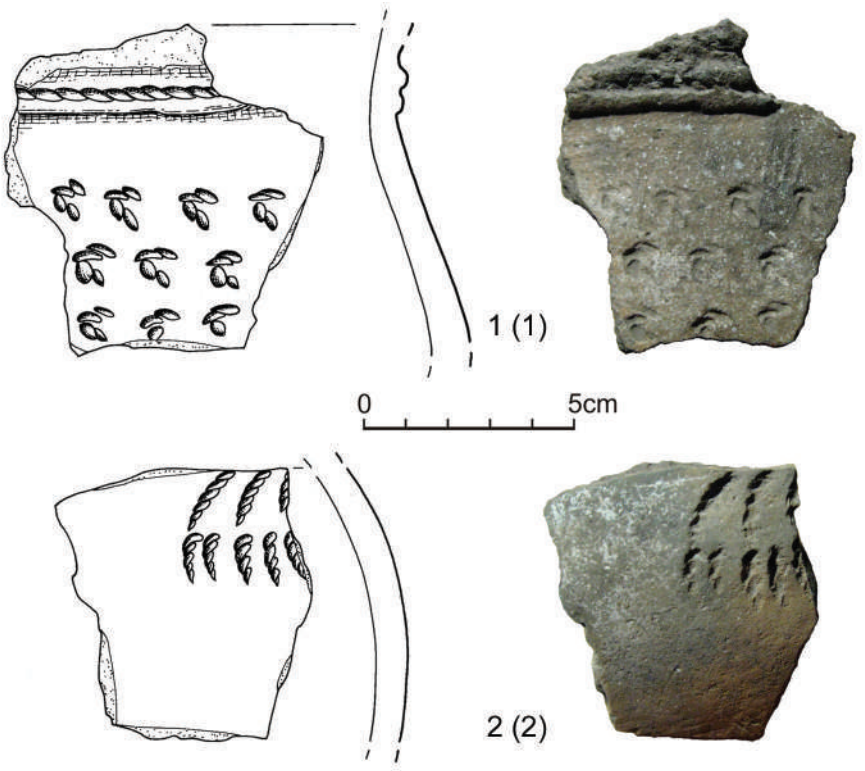

Fig. 2. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

1. TAXONOMIC AND CULTURAL TRAITS OF SAMPLES

For the purposes of this project, 45 samples of vessel ceramic ware were subject to microscopic analysis in the area of present-day Poland and Ukraine. The main information in this regard can be found in Table 1, while the location of related sites is featured in Fig. 1. The entire documentation, drawings and photographs of all objects where research was conducted into ceramic fragments or whole vessels is presented in Fig. 2 – 18.

The analysed collection of vessels details intentional (planned) differentiation in their location (proximity of sites in relation to regional variation of flora) and archaeological taxonomy.

In geographic terms the basic taxonomy assumes a division into the following sites: (***a***) east European forest steppe and steppe in the Black Sea basin and (***b***)

List of ceramic samples from 'corded' and cord-like' ornaments under microscopic analysis

Sample no.	Site	State and administrative district	Geographical zone and region	Taxonomical identification	Type of site
1	Dereivka	Ukraine, Cherkasy	PA: Dnieper steppe	SSC phase II	Settlement
2	Dereivka	Ukraine, Cherkasy	PA: Dnieper steppe	SSC phase II	Settlement
3	Dereivka	Ukraine, Cherkasy	PA: Dnieper steppe	SSC phase II	Settlement
4	Dereivka	Ukraine, Cherkasy	PA: Dnieper steppe	SSC phase II	Settlement
5	Dereivka	Ukraine, Cherkasy	PA: Dnieper steppe	SSC phase II	Settlement
6	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	LMC	Settlement
7	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	LMC	Settlement
8	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	RC phase 1	Settlement
9	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	RC phase 2	Settlement
10	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	RC phase 2	Settlement
11	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	RC phase 2	Settlement
12	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	YC	Settlement
13	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	YC	Settlement
14	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	YC	Settlement
15	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	YC	Settlement
16	Mikhailovka	Ukraine, Kherson	PA: Dnieper steppe	YC	Settlement
17	Khortitsa	Ukraine, Zaporizhzhya	PA: Dnieper island	YC-early	Settlement
18	Khortitsa	Ukraine, Zaporizhzhya	PA: Dnieper island	YC-early	Settlement
19	Ihnatenkova Hora	Ukraine, Cherkasy	PB: Forest-steppe	TC stage CI	Settlement
20	Ihnatenkova Hora	Ukraine, Cherkasy	PB: Forest-steppe	TC stage CI	Settlement
21	Sandraki	Ukraine, Vinnitsia	PB: Forest-steppe	TC stage CII	Settlement
22	Troyaniv	Ukraine, Zhytomyr	PB: Forest-steppe	TC stage CII	Settlement
23	Troyaniv	Ukraine, Zhytomyr	PB: Forest-steppe	TC stage CII	Settlement
24	Mayaki	Ukraine, Odesa	PA: Dniester steppe	TC stage CII	Settlement
25	Mayaki	Ukraine, Odesa	PA: Dniester steppe	TC stage CII	Settlement
26	Mayaki	Ukraine, Odesa	PA: Dniester steppe	TC stage CII	Settlement
27	Mayaki	Ukraine, Odesa	PA: Dniester steppe	TC stage CII	Settlement
28	Las Stocki 19	Poland, Puławy	BA: Lublin Upland	FBC, SE group	Grave

Table 1 cont.

Sample no.	Site	State and administrative district	Geographical zone and region	Taxonomical identification	Type of site
29	Las Stocki 19	Poland, Puławy	BA: Lublin Upland	FBC, SE group	Grave
30	Karmanowice 35, grave 29	Poland, Puławy	BA: Lublin Upland	FBC, SE group	Grave
31	Karmanowice 35, grave 12	Poland, Puławy	BA: Lublin Upland	FBC, SE group	Grave
32	Miłocin Kolonia, grave	Poland, Lublin	BA: Lublin Upland	FBC, SE group	Grave
33	Tominy 12	Poland, Opatów	BA: Kielce-Sandomierz Upland	FBC, SE group	Settlement
34	Tominy 12	Poland, Opatów	BA: Kielce-Sandomierz Upland	FBC, SE group	Settlement
35	Tominy 12	Poland, Opatów	BA: Kielce-Sandomierz Upland	FBC, SE group	Settlement
36	Tominy 12	Poland, Opatów	BA: Kielce-Sandomierz Upland	FBC, SE group	Settlement
37	Tominy 12	Poland, Opatów	BA: Kielce-Sandomierz Upland	FBC, SE group	Settlement
38	Opatowice 3	Poland, Radziejów	BB: Cuiavia	FBC, Eastern group, phase IIIC	Settlement
39	Kościelna Jania	Poland, Starogard Gdański	BB: Starogard Lakeland	FBC, Eastern group, phase settlement IIIC	Settlement
40	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement
41	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement
42	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement
43	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement
44	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement
45	Łojewo 4	Poland, Inowrocław	BB: Cuiavia	FBC, Radziejów group, phase V	Settlement

central European mixed forests in the Baltic drainage area [Kondracki 1967: Fig. 1]. This division also has further segmentations whose importance lies in terms of climate, flora, fauna and potentially economy. In particular, this concerns differentiation of the Black Sea region (Pontic) for the peoples of (***aa***) the steppe and (***ab***) forest steppe. In turn, the division of the Baltic Sea area is linked to the communities of (***ba***) old uplands and (***bb***) lowlands. In the series of sample finds under analysis, ceramic ware from Pontic sites (***a***) is more frequent with 22 samples representing ***aa***, the steppe cultures, whereas only 5 that of ***ab***, the forest steppe peoples. There are 18 samples from ***b***, the Baltic basin, from which 10 were found in ***ba***, old upland – and 8 from ***bb***, the lowland.

A taxonomy of sample finds shows the following division:

culture	**phase/stage**	**site**	**number of samples**
- **Sredniy Stog** (SSC),	**II**	Dereivka	5
- **Lower Mikhailovka** (LMC)		Mikhailovka	2
- **Rogachyk** (RC),	**I**	Mikhailovka	1
	II	Mikhailovka	3
- **Early Yamnaya** (YC)		Mikhailovka	5
		Khortitsa	2
- **Tripolye** (TC),	**C-I**	Ihnatenkova Hora	2
	C-II	Sandraki	1
		Troyaniv	2
		Mayaki	4
- **Funnel Beaker** (FBC):		**south-east group** – four sites	
		Las Stocki 19	2
		Karmanowice 35	2
		Miłocin Kolonia	1
		Tominy 12	5
	IIIC	**east group** – two sites	
		Opatowice 3	1
		Kościelna Jania	1
	V	**Radziejów group** – one site	
		Łojewo 4	6

It should be noted that the vast majority of samples (40) are from settlements, and only 5 from graves (Table 1).

2. MACROSCOPIC RECORD OF ‘CORDED’ ORNAMENTS

The ornaments identified under microscope in ‘cord’ ceramic ware are found in negatives that can initially be considered as the following impressions:

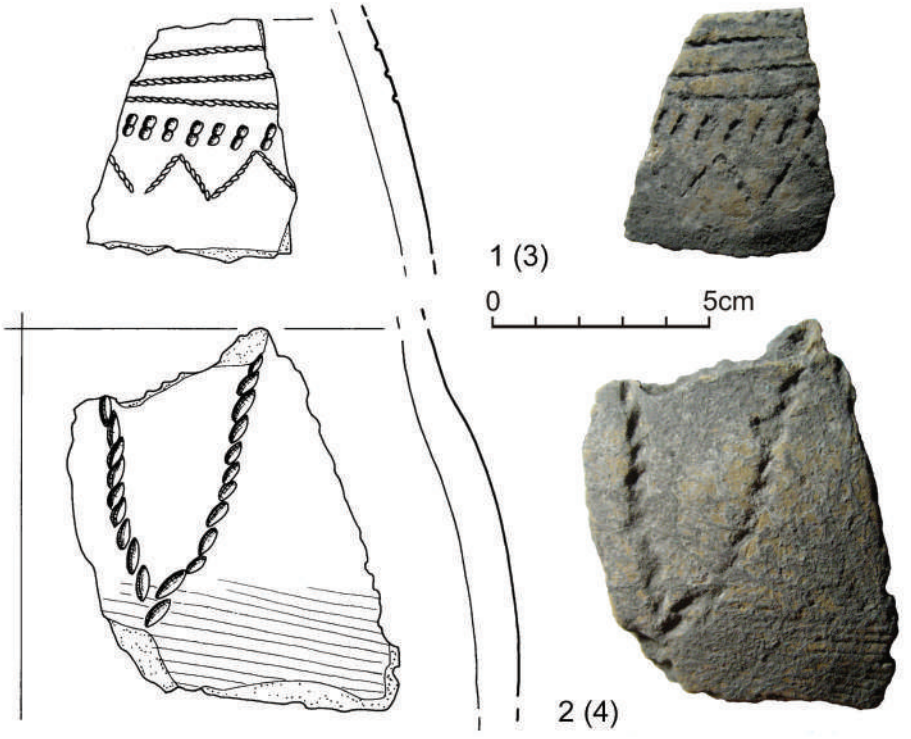

Fig. 3. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

(a) so called two-strand cord;
(b) so called three-strand cord;
(c) so called finger twine cord.

a. The vast majority of samples feature a so called two-strand 'cord' impression. These are mostly in the form of bands, which circle under its spout, in the upper sections of the belly or where the neck and the belly meet. This type of 'cord' is initially identified also as a fibre in the form of small vertical poles, zig zag, garlands, small bows, filled triangles, so called fish bones and so called wolf teeth.

b. The three-strand 'cord' negatives were found only on FBC ceramics from Łojewo 4. They feature vertical bands that circle the vessel under its spout, both outside the receptacle (samples no. 41 and 43), as well as inside (sample no. 42).

c. The impressions of 'finger twine cord' have been identified on 3 samples (no. 8, 10, 15, 16) from the site of Mikhailovka, linked with the RC and YC. In sample 8 the impressions measure approximately 1.5 cm in length, featuring a zig zag

pattern. In the case of samples no. 10, 15 and 16, vertical and horizontal bands are featured in a regular design.

3. MICROSCOPIC ANALYSIS METHODS

For the purposes of research, fragments of ceramic ware were chosen, and in 3 cases, entire vessels (samples nr 38-40), whose surface reveals traces identified under macroscopic (megascopic) analysis as ornaments made with the aid of impressing a 'cord'. Microscopic analysis was conducted by Andrzej Sikorski, based in this context on his earlier research in identifying textile negatives made among others, on vessel ceramic ware from various stages of prehistory and the early Middle Ages [Sikorski 1998; 2000; 2003; Michałowski, Sikorski 2005], conducted at the Institute of Prehistory, Adam Mickiewicz University in Poznań. Technical data of importance here relates to the use of a NIKON SMZ 800 and 1000 stereoscopic microscope and a total of 1,124 laboratory measurements and notations.

In this context, the research results for every sample can be found in articles in subsequent parts of this volume – though a general picture for the above is set out in Table 2.

This table and related information therein was drawn up for the purposes of comparative analysis on an inter-regional basis (see articles in part 3).

4. CLASSIFICATION OF MICROSCOPIC RESULTS (GLOSSARY OF TERMS)

In the section below, the definitions of terms used in recording microscopic observations are presented, though only in respect to the details revealed in the negatives of ceramics under analysis, in relation to: (A) textile type, (B) technical data of raw material (organic material type and metrical measurement), (C) technical data of textiles, (D) application means of ornament on vessel surface, (E) associated works, as well as (F) presence or lack of organic substances in the impressions (remains after firing).

Before discussing the above in detail it should be noted that the results of measurements presented below are not an exact model of the original textiles – in all its imperfections – that were used to embellish or fill out the relatively soft

Table 2

Results of microscopic analysis: identification of 'corded' and 'cord-like' ornaments on ceramic samples (see pages 29–32 for commentary)

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
1	Dereivka	1-plaiting	1- threaded yarn 2- 0,016-0,025/**0,020**	1- Z/2' - 48° 2- 0,579- 0,688/**0,645** 1 thread S 0,322 3- 6-8 eyes/1cm	3?	2- smooth out between impressions	1	
		2- macramé	1- threaded yarn 2- 0,025-0,050/**0,040**	1- Z/3S? - 35° 2- 1,804-2,214/**1,968** 1 thread S 0,656 3- 1 knot/1cm			1	
2	Dereivka	3- sprang (netting?)*	1- threaded yarn 2- ?	1- Z/2S? - 35° 2- 0,492-0,656/**0,574** 1 thread S 0,287 3- 6 eyes/1cm	1- ad hoc	2- polishing effect	1	*inner and outer sides
		4- fringes	1-yarn 2- ?	4- horiz.+vertical. 2- 2,25-2,50/**2,30** 3- 6 threads+3 threads (warkocz)	1- ad hoc	2- polishing effect	1	
3	Dereivka	5- needlework?*	1- yarn 2- ?	1- Z i S (?) - 40° 2- 0,361-0,492/**0,410** 3- 6 eyes/1cm	1- ad hoc	3?-glazing	1	*textile type IIIA and/or IIIC
4	Dereivka	5- needlework?*	1- threaded yarn 2- 0,013-0,024/**0,016**	1- S/2Z - 36° 2- 0,4920,558/**0,525** 1 thread Z 0,264	1- ad hoc	3- levelling out, using textiles *	1	*planing of sides before cord application
		6- plaited cord**	1- five-strand cord 2- 0,033-0,050/**0,041**	1- 5Z - 30° 2- 3,936-4,428/**4,155** 1 element Z 0,831	1- ad hoc	1	1	**impressed inexactly
5	Dereivka	5- needlework?*	1- threaded yarn 2- ?	1- S/2Z - ? 2- 0,688-0,787/**0,726** 1 thread? 0,363	1- ad hoc	1	1	*on external side

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
		6- turned cord*	1- three-strand cord 2- 0,016-0,025/**0,022**	3- 6 braids? /1cm 1- Z/2S - 35° 2- 2,624-2,952/**2,747** 1 element Z 0,915 1 thread S 0,457	1- ad hoc	3?- planing, using textiles	1	*with 3 threads Z/2S
6	Mikhailovka	1- plaiting	1- threaded yarn 2- **0,016**?	1- Z/2S - 22° 2- 0,754-0,902/**0,824**	3	1- rubbed with fat 2- partially planed on purpose	2- tar substances	
7	Mikhailovka	3- elaborate netting - similar to elaborate sprang? 3- simple netting - similar to elaborate sprang?	1- threaded yarn 2- 0,013-0,016/**0,014** 1- threaded yarn 2- 0,016?	1- Z/2' - 25° 2- 0,656-0,738/**0,683** 1 thread 0,341 3- 2,5 eye/1cm 1- Z/2S - 22° 2- 0,492-0,656/**0,615** 1 thread S 0,307 3- 6 eyes/1cm	3 3	2- partially planed 3- planing, smoothing out damp sides	1 1	
8	Mikhailovka	6- turned cord* 'finger twine'	1- two-strand cord 2- 0,016-0,020/**0,018**	1- Z/2S? - 32° 2- 0,984-1,480/**1,230** 1 thread S 0,615	1- ad hoc	2- external wall features planing with textile?	1	* two-strand
9	Mikhailovka	5- needlework	1- two-strand cord 2- ?	1- S/2Z? - 32° 2- 0,984-1558/**1,098** 1 thread Z? 0,549	1- ad hoc	1- on a strongly smoothed surface		* two-strand
10	Mikhailovka	1- plaiting (basket?)*	1- plaits/bands** 2- 0,250-0,270/**0,264**	1- Z - 30° 2- 1,640-1,804/**1,763** 3- 4 braids/1cm	1- ad hoc	1-2	1	*cross-rib technique ** from turned plaits
11	Mikhailovka	5- needlework?	1- threaded yarn 2- 0,013-0,016/**0,015**	1- Z/2S - 30° 2- 0,607-0,738/**0,685**	1- ad hoc	3- used for planing	1	

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
		6- plaited cord* + knots	1- wool? three-strand cord 2- 0,013-0,016/**0,015**	1 thread S 0,342 3- 6 eyes/1cm 1- Z/2S 2- 2,296-2,624/**2,501** 1 element Z 0,836 1 thread S 0,418	1- ad hoc	surface of sides	2- remains of a burnt cord and knots (burnt wool?)	*from 3 components
12	Mikhailovka	1/6- plaiting with knots? made out of cord*	1- five-strand turned cord 2- ?	1- Z/5S- 30-35° 2- 1,640-1,804/**1,591** 1 element S 0,318 3- 3 turns/1cm	3?- textile matrice	1-2 before and after application	2- traces of burnt organic parts (textiles)	*from 5 single threads
13	Mikhailovka	1- plaiting - tape (inkle?)	1- threaded yarn 2- ?	1- S/2Z - 35° 2- 0,492-0,738/**0,602** 1 thread Z 0,301 3- 6 braids/1cm	3- textile "matrice"	1-3?	1	
14	Mikhailovka	5- needlework	1- threaded yarn 2- 0,025-0,082/**0,051**	1- Z/2S - 26° 2- 0,820-1,394/**1,086** 1 thread S 0,543 3- 3 braids/1cm	1- ad hoc?	1	1	
15	Mikhailovka	1- plaiting (basket)	1 2- 0,150-0,220/**0,200**	1- Z - 40° 2- 1,640-1,804/**1,706** 3- 5 braids/1cm	3- spun around the matrice	1	1	
16	Mikhailovka	3- elaborate sprang (netting?)	1- threaded yarn 2- 0,016-0,018/**0,016**	1- Z/2S - 35°-45° 2- 0,656-0,820/**0,738** 1 thread S 0,359 3- 2 eyes "turned" /1cm 4 looped eyes 1cm	2- pin/knurl 3- spin-impression?	2- planing*	1	*slanted planing
17	Khortica	1- plaiting	1- two-strand cord/threaded yarn 2- 0,033-0,049/**0,041**	1- Z/2S? - 25° 2- 0,820-0,902/**0,850** 1 element S 0,425	2- pin/knurl 3- spin-impressed?	2- partially planed intentionally*	1	*lower part of negative

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
18	Khortica	5- needlework? 5/1 - needlework or plaiting*	1- threaded yarn 2- 0,025-0,033/**0,030** 1-single turned yarn 2- ?	1- Z/2S - 36° 2- 1,066-1,148/**1,111** 1 thread S 0,555 3- 3 braids/1cm 1- Z or S? - 36° 2- 0,492- 0,656/**0,591**	2/3 - pin/ knurl/ or spin	2- impression partially planed intentionally 2- planing of side and ornament fragment*	1 1	 * on the inner and outer sides
19	Ihnatenkova Hora	6- turned cord	1- two-strand cord 2- 0,030-0,033/**0,031**	1- Z/2S? - 30° 2- 2,310-2,970/**2,658** 1 element S 1,329	1- ad hoc	2- smoothing out plaiting or needlework*	1	*horizontal and slanted
20	Ihnatenkova Hora	5/1 needlework or plaiting?	1- threaded yarn 2- ?	1- S/2Z? - 20°-35° 2- 0,902-1,148/**1,025** 1 thread Z 0,512	1,3- spun and ad hoc	1- dried vessels smoothed and then impressed with a matrice	1	
21	Sandraki	1?/5 plaiting? needlework	1- three-strand cord 2- 0,025-0,033/**0,028**	1- S/2Z 2- 3,444-4,264/**3,772** 1 element S 1,257 1 element Z 0,628	1,3 - ad hoc and spun?	2-3 smoothing out plait impressions or needlework	1	
22	Troyaniv	6- turned cord	1- four-strand cord 2- ?	1- S/4Z? - 30° 2- 1,722-2,050/**1,886** 1 element Z 0,471	1- ad hoc	1-2-3 horizontal negatives planed	1	
23	Troyaniv	6- plaited cord* 1/5 plaiting or needlework?*	1- three-strand cord 2- ? 1- single yarn 2- ?	1- S 2- 2,624-3,444/**3,083** 1 element S 1,028 1- S 2- 0,984-1,148/**1,038**	1- ad hoc	2- negatives partially planed	1	Ceramic calender * from 3 strings and shallow impression of a textile (also on inner side)

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
24	Mayaki	3- netting*	1- string/threaded yarn 2- **0,025**?	1- Z/2S- 25° 2- 0,820-0,984/**0,836** 1 element S 0,418	3- spinning method	2- partially planed	1	* fastened a single or with multiple turn on the belly 'noose' impression
25	Mayaki	1- plaiting*	1- string/threaded yarn 2- **0,032-0,042**	1- Z/2? - 25° Z/2S- 25°-35° 2- 0,492-0,574/**0,529** 1 element 0,264 0,738-0,902/**0,830** 1 element S 0,415	3- spinning method	2- textile impressed before polishing	1	* made from turned cord
26	Mayaki	3- netting*	1- string/threaded yarn 2- ?	1- S/3Z? - 26° 2- 1,476-1,722/**1,585** 1 element Z 0,528	3- spinning method (spindle)	2- lower part of negative intentionally planed	1	* fastened with a single and multiple turn
27	Mayaki	3- netting*	1- string/ single yarn 2- ?	1- Z ? 2- **0,550** 3- 2-3 eyes/1cm	3- spinning with use of matrice	2- planing above and below negative	1	* fastened with a single and multiple turn
28	Las Stocki 19	5- needlework*	1- threaded yarn 2- 0,013-0,016/**0,015**	1- Z/2S - 32° 2- 0,820-0,984/**0,930** 1 thread S 0465 3- 6 eyes/1cm	2/3 - spinning technique or spindle/knurl	2- lower part of needlwork was planed	1	* with an open-work 'turn-buckle'
29	Las Stocki 19	1/5- needlework? or plaiting?	1- single yarn 2- 0,016-0,025/**0,020**	1- Z - 24° 2- 0,492- 0,604/**0,547** 3- 6 braids/1cm	2/3 - on spindle or knurl?	2-3- plaiting used for planing	1	
30	Karmanowice 35 (grave 29)	6- plaited cord	1- yarn* 2- 0,082-0,164/**0,114**	1- Z/2S? - 32° 2- 2,624-3,280/**2,924** 1 element S? 0,492	2/3 - spinning method with aid of spindle/knurl	1- applied before galzing and polishing	1	* bark strips

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
31	Karmanowice 35 (grave12)	6- plaited cord	1-fibre* 2- 0,230-0,246/**0,242**	1- S/2Z - 20° 2- 3,608-4,100/ **3,813** 1 element Z 0,635	1 - ad hoc	1-before cord impression	1	* bark strips or thicker fibres (roots) **single element S 1,148-1,312/**1,270**
32	Miłocin Kolonia	1/5- triangle needlework* or basket plaiting 5- needlework	1- single yarn 2- ? 1- single yarn 2- ?	1- Z -? 2- 0,492-0,574/**0,512** 1- Z - ? 2- 0,492-0,656/**0,574** 3- 6 braids/1cm	3- spinning method 3- spinning method	1-2 -before and after application of impression 1-2 - before and after application of impression	1 1	* triangle turn-buckle
33	Tominy 12	5- needlework	1- threaded yarn 2- 0,016-0,032/**0,021**	1- Z/2S? - 30° 2- 0,623-0,738/**0,653** 1 thread S 0,326	1/2 - ad hoc or spindle?/ knurl	1-2- before and after application of impression	2- burnt textile re-mainder in negatives - organic crust	
34	Tominy 12	5- needlework*	1- threaded yarn 2- 0,032-0,041/**0,035**	1- Z/2S? - 45° 2- 0,820-1,066/**0,943** 1 thread S 0,471	3- spinning method	1/2- applied after final vessel drying, though before glazing	1	* with a turn-buckle
35	Tominy 12	5- needlework	1- threaded yarn 2- 0,016-0,025/**0,021**	1- Z/2S? - 34° 2- 0,574-0,738/**0,636** 1 thread S 0,318	3- spinning method	2- part of the impressions planed before glazing and final polishing	1	

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
36	Tominy 12	5- needlework*	1- threaded yarn 2- 0,016-0,025/**0,021**	1- Z/2S? - 34° 2- 0,574-0,738/**0,636** 1 thread 0,318	3- spinning method	1/2- applied after final levelling out of vessel, before applying the glaze	1	* with a turn-buckle
		5- needlework or hosiery	1- threaded yarn 2- **0,016**?	1- Z/2S? - 38° 2- 0,492-0,656/**0,558** 1 thread S 0,279	3- spinning method	1/2 - jw.	1	
37	Tominy 12	5- needlework*	1- threaded yarn 2- 0,016-0,024/**0,020**	1- Z/2S? - 30° 2- 0,820-0,984/**0,888** 1 thread S 0,444	3- spinning method	1-2 -before and after applying impressions	1	* type IIIA or IIIB
38	Opatowice 3	1/5- plaiting or needlework? (outflow-outer side)	1 - yarn or fibre* 2- 0,050-0,164/**0,088***	1- Z - 36° 2- 0,820-1,066/**0,956**	2- knurl/ spindle	1-2 -before and after applying impressions	1	*bast
		1/5- plaiting or needlework? (outflow-inner side)	1- yarn or fibre** 2- 0,130-0,164/**0,140****	1- Z - 35° 2- 0,656-0,822/**0,750**	2-knurl/ spindle	1-2 - jw.	1	**bast
		1/5- plaiting or needlework? (belly)	1- yarn or fibre 2- 0,055-0,082/**0,072**	1- Z - ? 2- **0,610**	1- ad hoc	2- partially planed	1	
		6- plaited cord (“garland” belly)***	1- single string 2- ?	1- Z 2- 2,050-2,296/**2,152** 1 element Z - 30° 0,717	1- ad hoc	2- part of the impressions carefully planed	1	***plaited cord from 3 Z threads
39	Kościelna Jania	1/5- plaiting or needlework	1- threaded yarn or fibre* 2- 0,033-0,050/**0,040**	1- Z/2S? - 36° 2- 0,820-1,066/**0,956** 1 thread S 0,478	2- knurl or spindle	2- planed (glazed-polished)	1	* bast

Sample no.	Site	A Textile types	B Technical data of raw material	C Technical data of textile	D Application means	E Associated works	F Remains after firing	Remarks
40	Łojewo 4	6- plaited cord*	1- cord 2- 0,016-0,032/**0,028**	1- Z/2S 2- 1,476-1,886/**1,702** 1 thread Z 0,567 1 element S 0,282	2? -spindle or knurl**	2- planed and polished	1	* from 3 Z/2S elements **knurl from single wound cord
41	Łojewo 4	5- needlework?	1- threaded yarn 2- 0,025-0,033/**0,030**	1- Z/2S? - 35° 2- 0,902-1,066/**0,968** 1 thread S - 0,483 3- 3 braids/1cm	3- spinning method	2- partially rubbed after application	1	
42	Łojewo 4	5- needlework	1- threaded yarn 2- 0,025-0,050/**0,033**	1- Z/2S? - 30° 2- 0,738-0,984/**0,853** 1 thread S 0,427 3- 3 braids/1cm	3- spinning method or using a spindle	2- after applying impression carefully planed	1	
43	Łojewo 4	1- plaiting (vertical bands) 1- plaiting (“herring bone”)	1- fibre* 2- 0,049-0,164/**0,125*** 1- fibre* 2- **0,082**	1- Z - 30-40° 2- 1,640-1,722/**1,700** 1- Z? - 30° 2- 1,558-1,804/**1,695**	2- knurl/ spindle 2 - jw.	2-3 - side polished 2-3 - jw.	1 1	*bast, bark strips
44	Łojewo 4	1- plaiting (vertical impressions) 1- plaiting (“herring bone”)	1- fibre* 2- 0,164-0,229/**0,197*** 1- fibre* 2- ?	1- Z - 40° 2- 1,148-1,312/**1,253** 1- Z? - 45° 2- 1,640-1,804/**1,722**	2- knurl/ spindle? 2- knurl/ spindle?	1-2 -before and after applying impression	1	*bast?, straw *bast?, straw
45	Łojewo 4	1- plaiting (vertical impressions) 1- plaiting (“herring bone”)	1- fibre* 2- 0,082-0,197/**0,136*** 1- fibre* 2- ?	1- Z - 30° 2- 1,230-1,312/**1,291** 1- Z? - ? 2- 0,984-1,804/**1,279**	2- knurl/ spindle? 2- knurl/ spindle?	1-2 - before and after applying impression	1	*bast, bark strips?

sides of receptacles. In this context it is important to note that for the negatives gained, regardless of the process and means of 'finishing' the textile ornament, some contraction occurred during the drying, firing and finishing process (i.e. smoothing out of impressed textile) and usage of vessels.

A. TEXTILE TYPES USED FOR ORNAMENTATION

1. Plaiting – Hand-made out of thread, yarn, straw, hair, string or twigs, used for simple instruments or plaited 'without them, holding tensed threads on the toe or in some other way holding the thread still' [Michałowska 1995:188]. Usually the impressions of 'flat', three-dimensional (linen interlace), slanted or wound around plaiting have been found on ceramic wear. Most likely these were tapes, strips and plaited string.

2. Macramé – A textile tied by hand from string or yarn (threads), pin or crochet needle. 'Macramé is characterised by various strong, tensed knots tied, thus creating small ridges, festoons, loops and fringes' [Michałowska 1995:210ff], made out of tautened string as an elastic, openwork textile.

3. Sprang (Netting) – Made out of 'plaited threads of only one system' [Maik 1988:44-45, also see for further literature]. This can be viewed as a technique 'of forming flexible, linked 'eyes' that grow incrementally in a net or close-net pattern' [Michałowska 1995:189]. Sprang can either be fastened (single, double or multiple twist) [Łaszczewska 1966:37; Schlabow 1976: Fig. 1, 2], plaited (similar to linen 1/1 plait) and intertwined (from two plaited threads and lightly turned at the same time) [Michałowska 1995:189]. In the case of samples 2, 7, 16, 24, 26, 27 regular impressions of tautened fibre were retained on the side of the vessel.

4. 'Fringe' – a finishing element of turned, plaited or threads (yarn) tied in a loop.

5. Needlework – a time-consuming technique [Hald 1950:292-297] 'making it possible to create rows of elastic eyes of endlessly long thread with the help of two or more pins' [Turnau 1979:19] – or crochet needles. Traces remaining after the needlework can be observed in the negatives, which horizontally mirror the cord (filled 'eyes') with a characteristic 'lattice' between impressions [Michałowska 1995:245].

6. Cord (string) – turned (single or several 'thread-strands'), plaited ('pigtail') or wound around (twisted). Most often it was applied individually, which is indicated by differences in the concavity of negatives.

B. TECHNICAL DATA OF RAW MATERIAL (RAW MATERIAL TYPES AND METRICAL MEASUREMENTS)

1. Yarn – single or threaded. The former could be anti-clockwise (S) or clockwise (Z). Threaded yarn could be 'composed of two or several threads per se, intertwined into one' (i.e. Z/2S; S/2Z) [Michałowska 1995:38]. This was the basic element out of which such textiles were made.

2. Textile Fibre – bast, small hoops of bark, thin roots and straw.

3. Cord (string) – two-strand, three-strand (and n-strand), turned, plaited or wound around.

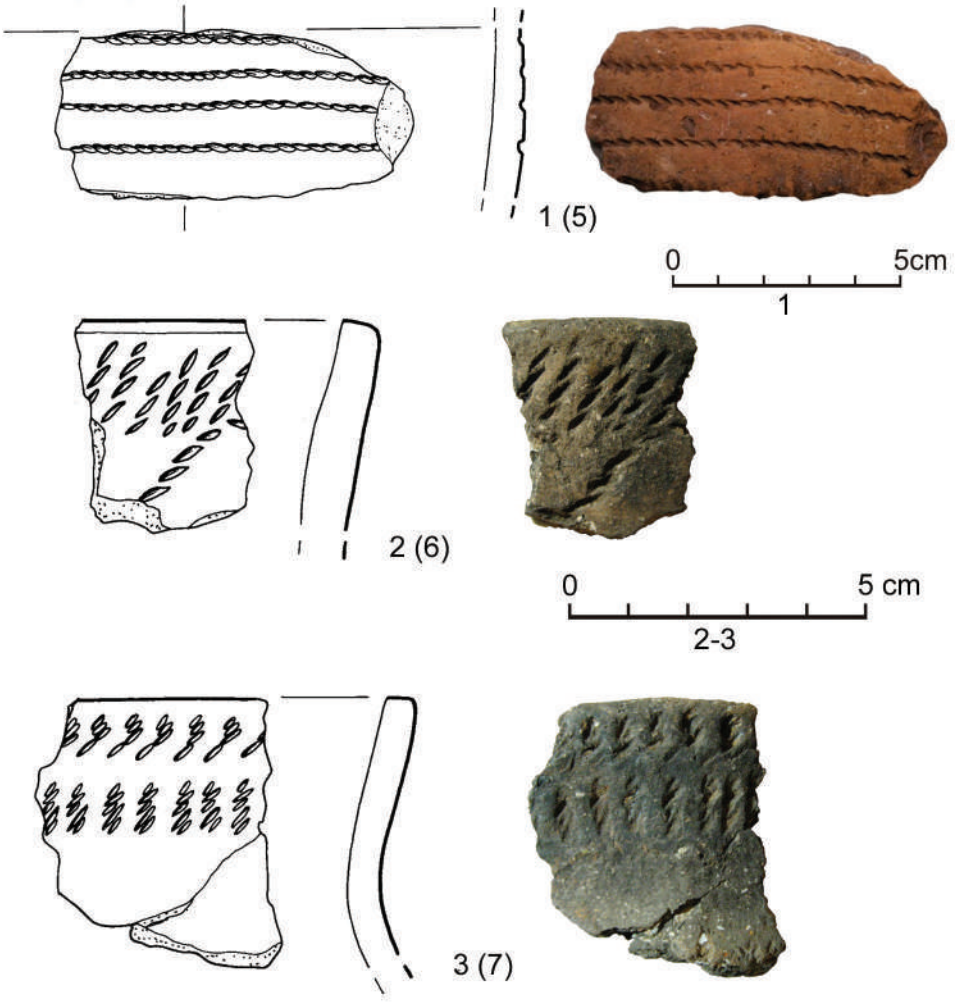

Fig. 4. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

Measurements – in each case the thickness of fibres is given from which, yarn, thread or cord is made; the diameter is marked in bold (mm).

C. TECHNICAL DATA OF TEXTILES

1. Twist of yarn, textile fibre or cord – right (Z) or left (S), the degree of fibre turn given (0).

2. Thickness of yarn/thread/cord – results of measurements (mm), with thickness given of contributory elements in the case of yarn thread or multi-strand cord; diameter in bold (mm).

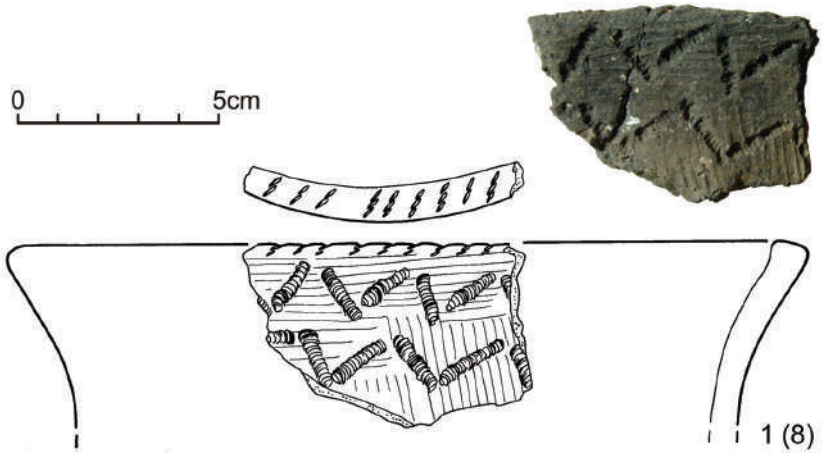

Fig. 5. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

3. Closeness – number of eyes (knots) or interlace for 1 cm.
4. Design – horizontal, vertical, slanting.

D. APPLICATION MEANS OF ORNAMENTS ON VESSEL SURFACE

1. Ad hoc – individual design, resulting in a lack of regularity and little precision in impressions.
2. Knurl – wound around (or turned) around a small cylinder.
3. Turning (matrix) – a textile fastened (stretched) across a surface, whereas the receptacle was turned. As a result, on the vessel surface the lack of join is marked from beginning to end of the impressed plaiting, etc.

E. ASSOCIATED WORKS

Traces of smoothing out and glazing have been identified as well as a glazing substitute where a fatty coat of clay was present on the vessel wall, as a result of intensive surface polishing.
1. Levelling out of the vessel surface (planing) before ornamentation is applied by hand or textile apparatus.
2. Partial erasure of fibre impressions (leaving only a 'readable fragment of the ornament in a horizontal position or other), after impression is applied.
3. Rubbing of the impression surface after firing (polishing, making it shine).

F. PRESENCE OR ITS LACK IN ORGANIC SUBSTANCES IN IMPRESSIONS (REMAINS AFTER FIRING)

1. Lack of an organic substance in negatives – more or less, deep impressions 'clean', rinsed.
2. The presence of an organic substance in negatives – flattened impressions, compressed tar substance (if not the remains of object filling or cultural layer, then the receptacles could have been fired along with a fibre around them).

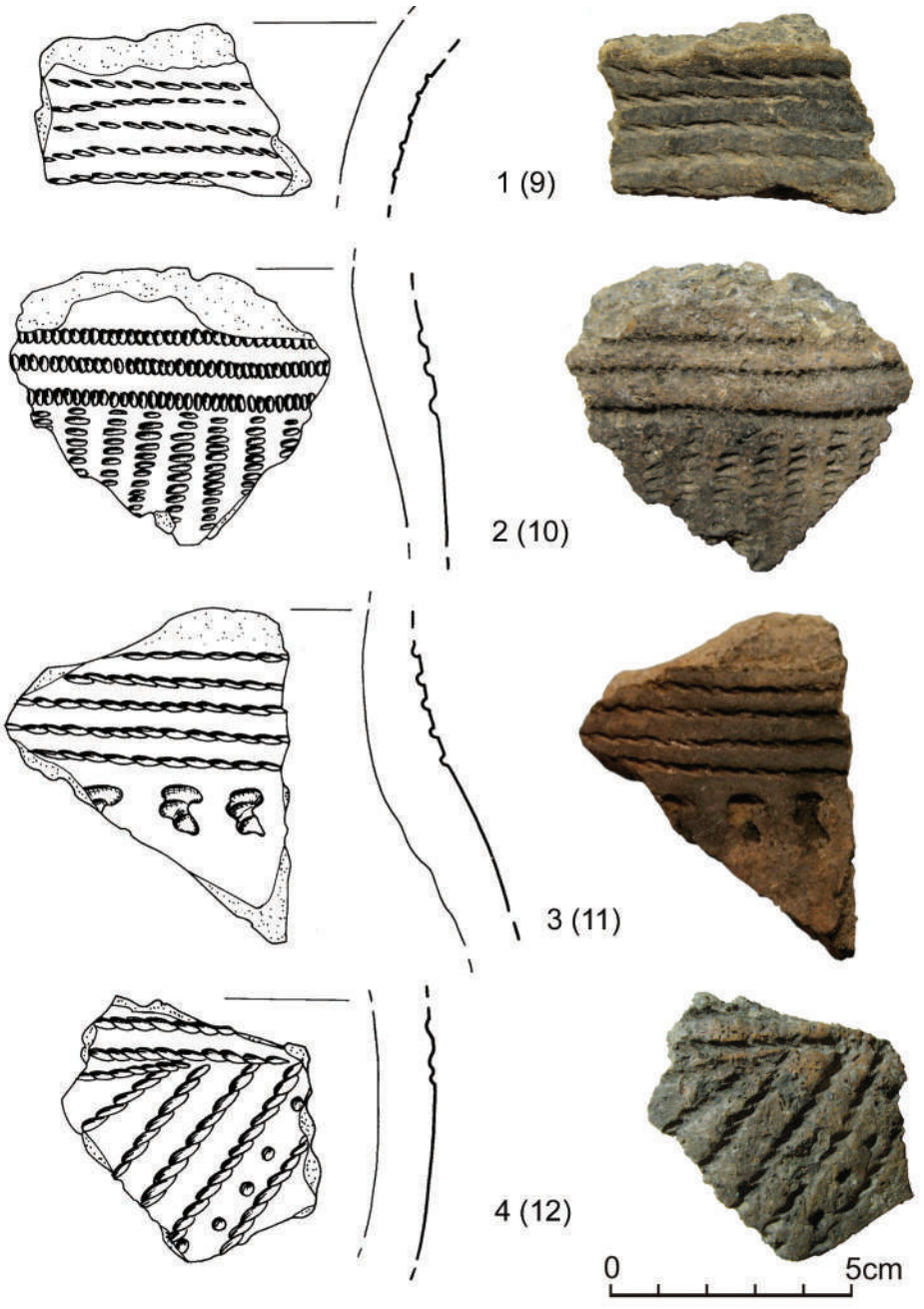

Fig. 6. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

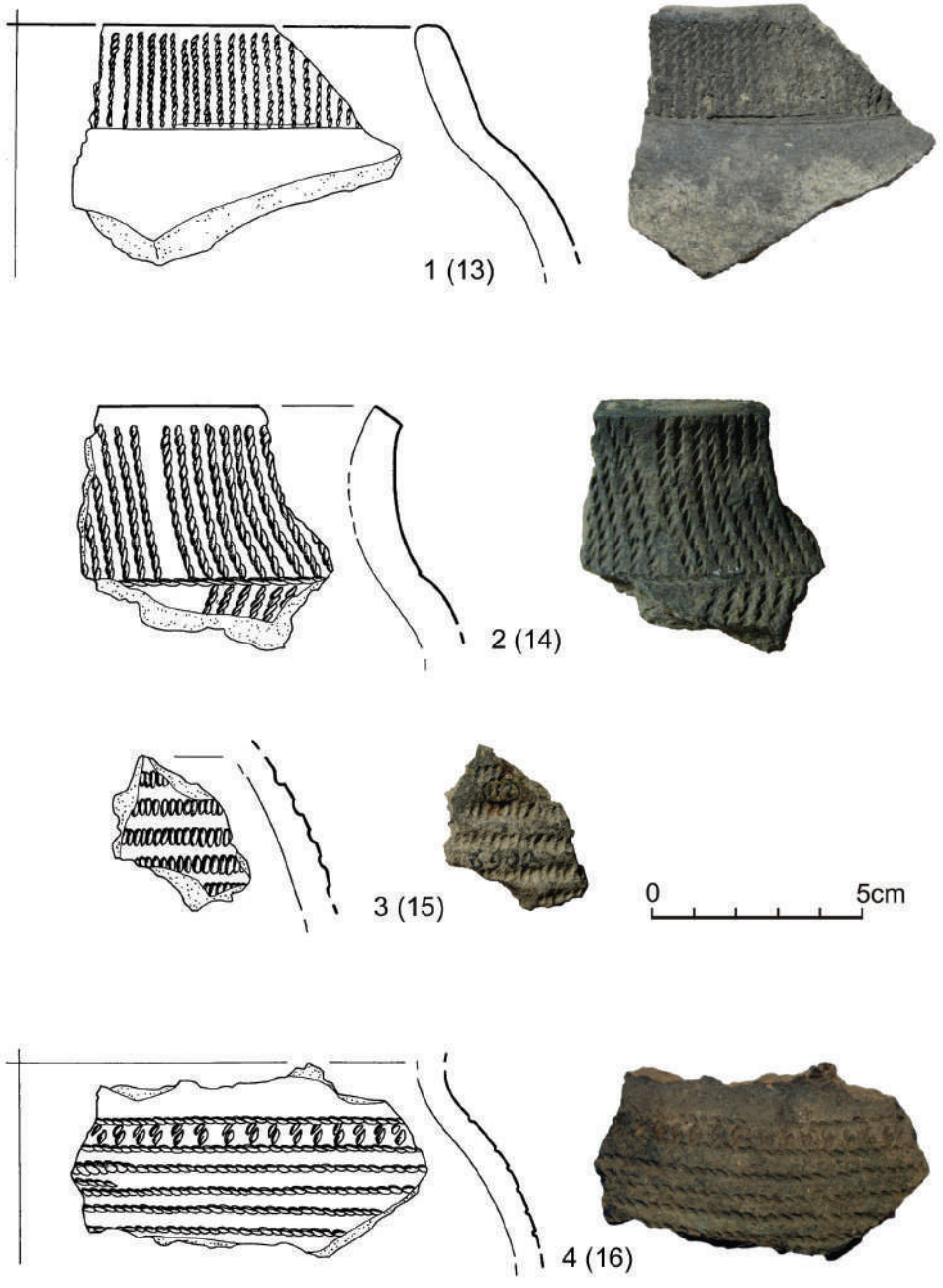

Fig. 7. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

5. GENERAL NATURE OF MICROSCOPIC RESEARCH RESULTS

Observations have revealed under microscope a differentiation of 'cord' impressions (categorised as 'one-strand-cord', 'two-strand cord', 'three-strand cord' and 'finger twine cord'), which has demonstrated to be much greater than first thought – as well as more complex.

First, in the vast majority of samples (both fragments of ceramic ware and entire vessels) impressions have been identified not only of cord, but also of other textiles (see Table 2:A). A review of results allows the view that on the sides of vessels for the most part 'simple' (from a technical point of view) non-woven textiles were impressed, which did not require practically any further tools. These were not only cords or strings [Jażdżewski 1936:250]; usually they were in the form of needlework (14 cases), plaiting (12), plaiting or needlework (5), netting (5) and to a much lesser extent, macramé (1) and fringes (1).

The impressed cords (11 in sum) also testify to the relative popularity of these negatives that once were a complementary element of embellishment. In several cases it is possible that impressions were identified of so called baskets, cross-ribbed technique of plaiting (sample nr 10 and 15). In the series of samples under investigation, however, no impressions have been noted of material (fabric) itself. This does not mean that the latter did not exist, for other findings have indeed suggested otherwise [Novitska 1960; Łaszczewska 1966:23ff; Grygiel 2008:1878, 1881, Fig. 1464]. One possible conclusion therefore is that the results of research discussed above testifies to the fact that in the 5th and 4th mill. BC, material was not used in the application of 'corded' ornaments on ceramic ware.

An important finding of the research conducted is the conclusion that a very similar visual effect was attained in the application of various textile techniques. One example of this could be ornaments that under macroscopic analysis are read as a 'two-strand cord' impression. Microscopic analysis was conducted with the use of various fibres such as plaiting (needlework), netting (sprang), needlework or cord (plaiting and turned). 'Finger twine cord', however, could in fact be the traces of applying fibres in the cross-rib technique (basket plaiting) or other 'matrices' (shells, closely set shell beads). It is only the ornaments associated with 'three-strand cord' (present in 3 samples) that were made by using plaiting.

The next aspect of differentiation concerns the means of applying embellishments. Three have been identified: ad hoc, so called knurl and matrix. The former two were applied in relatively straightforward ornaments, whereas for the more complicated ones that linked manifold, close impressions, a matrix was used. This usually took the form of a net upon which a layer was added (sewn?) that was the positive (original) of the intended ornament. In such cases impressions were

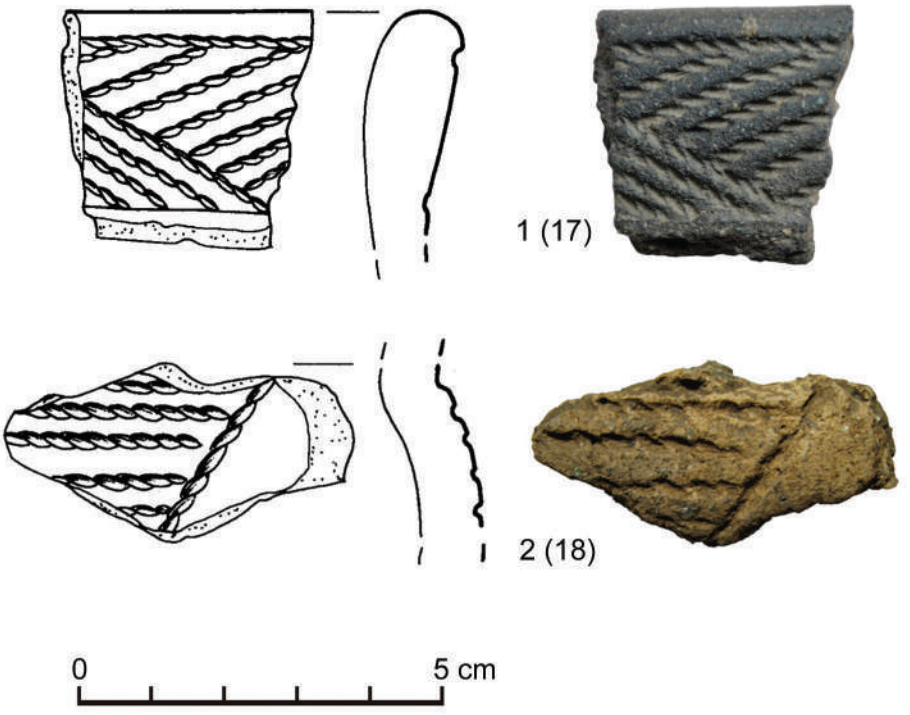

Fig. 8. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

gained by turning the vessel and at the same time, pressing it to the accordingly tensed matrix.

Moreover, microscopic analysis has revealed applications that have not been identified under macroscopic investigation such as partial planing of ornaments, which occurred when at first these were impressed on a larger set of vessels so as to finally leave only a selection. Traces of such procedure have been recorded in 9 samples (nrs 17, 18, 21, 22, 23, 26, 28, 35, 38).

6. RESEARCH RESULTS BASED ON KNOWLEDGE OF TEXTILE CRAFTS IN PREHISTORY (NEOLITHIC)

The store of knowledge to date in respect to archaic techniques of applying textile fibre in Europe can be said to embrace two groups of information. The

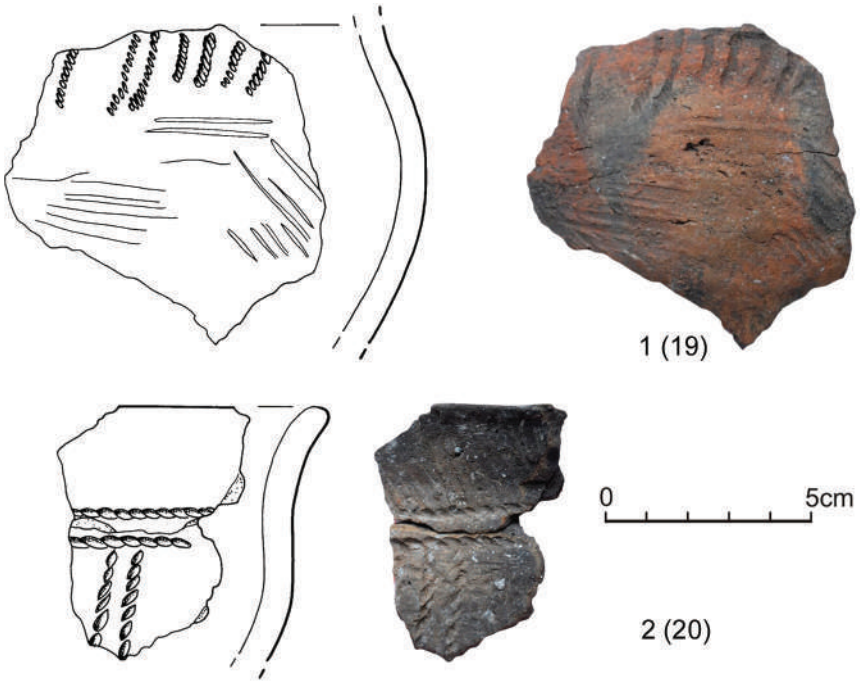

Fig. 9. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

first, (6.1), much wider and richer in source documentation is determined by ethnographic observations, whereas the second (6.2), is decidedly less numerous and detailed, and is informed by prehistoric findings of materials. Both of these groups have been used in the discussion below for the purposes of contextualising them in respect to the above (see part 2) categories of identified textiles. There shall be a focus therefore on issues tied to (a) types of fibres whose traces have been identified on ceramic ware as well as (b) the raw materials that were used for their creation. Here, the relevant context of technical data (closeness of application or thickness of thread), however, shall not be addressed.

6.1. RESEARCH RESULTS IN THE CONTEXT OF KNOWLEDGE ON ARCHAIC INDIGENOUS TEXTILE CRAFTS

Of particular significance is the sum of knowledge presented in the monumental study by K. Moszyński [Moszyński 1967], based on ethnographic materials

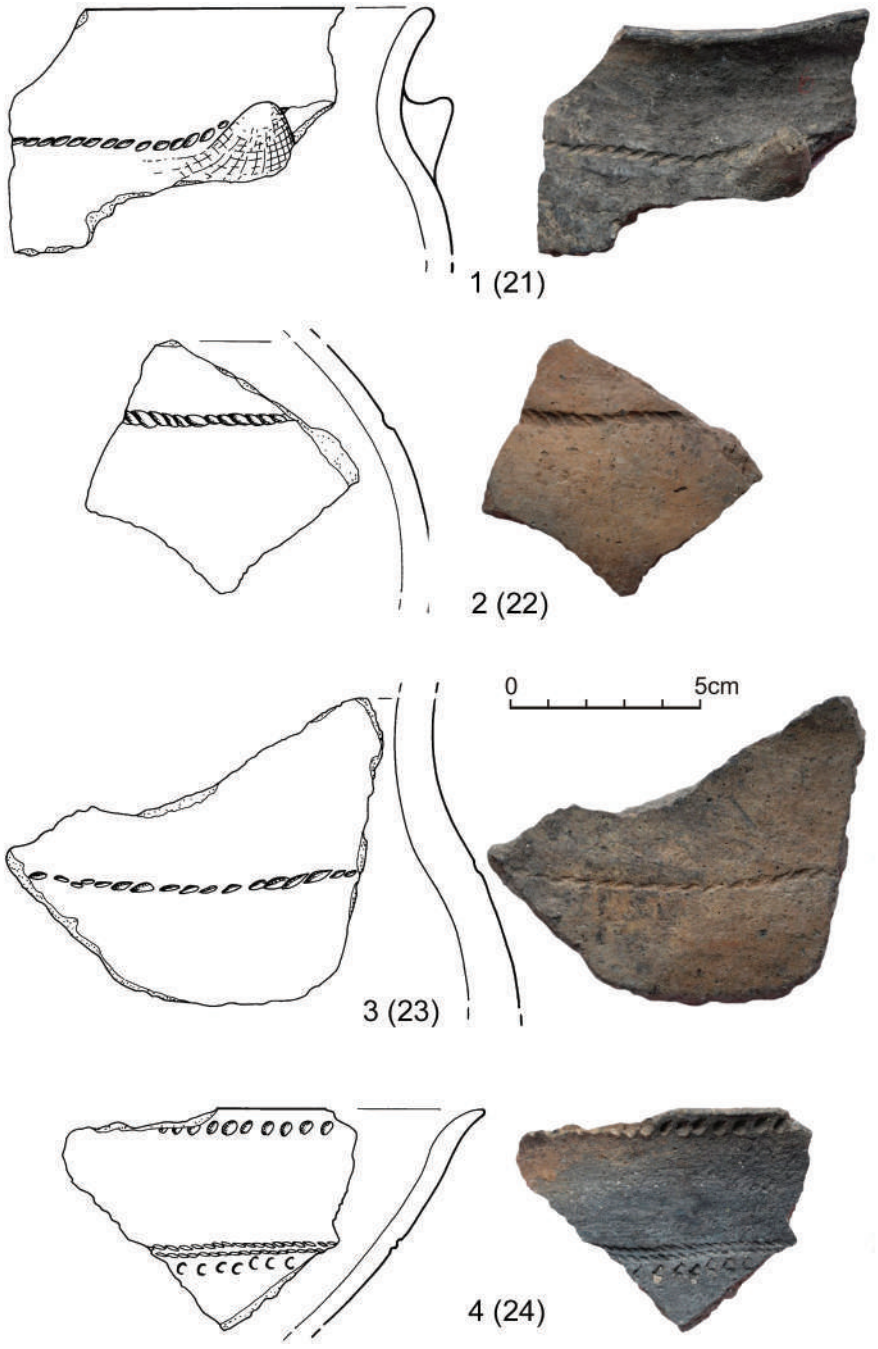

Fig. 10. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

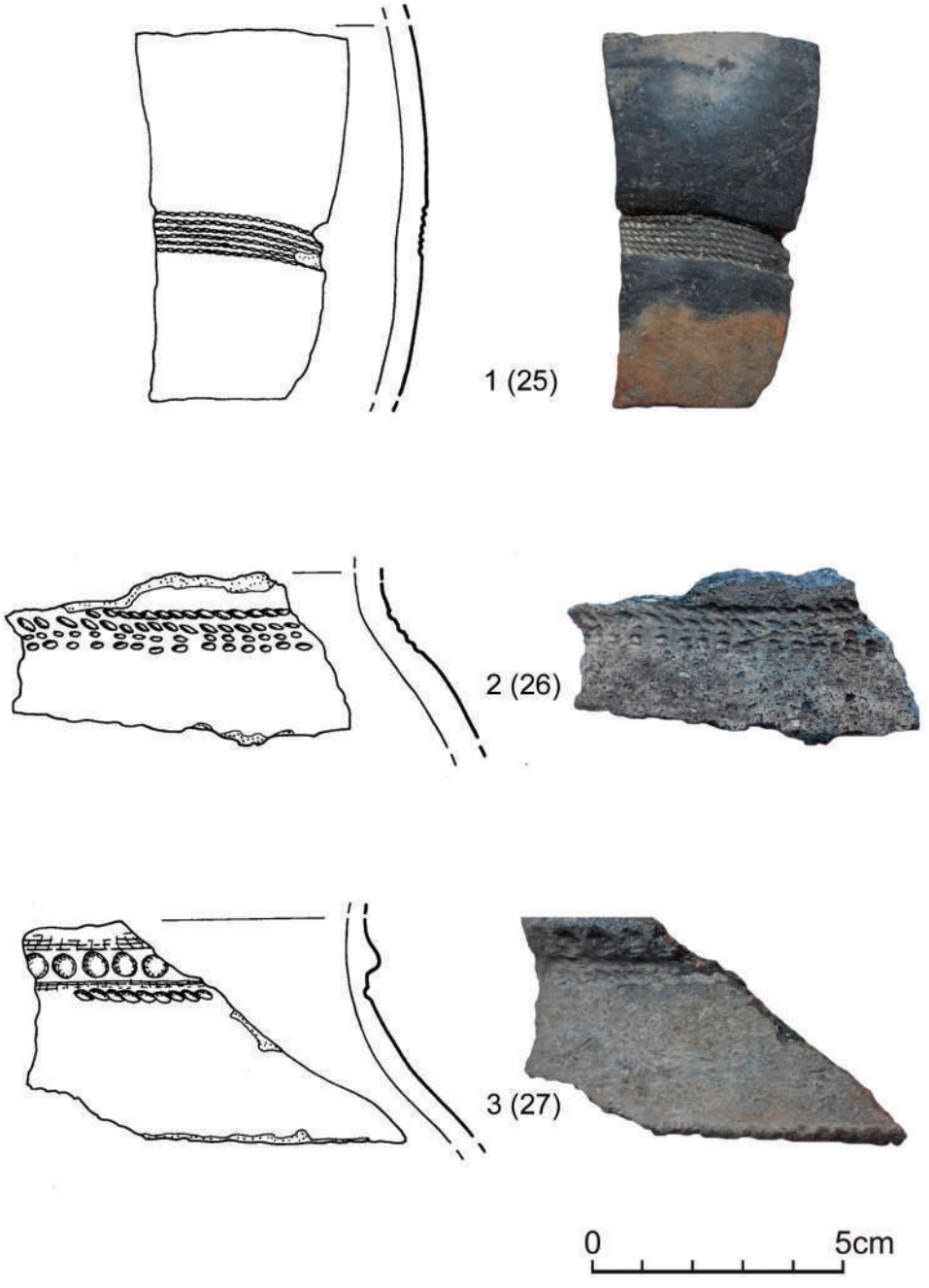

Fig. 11. Documentation of drawings and photographs of ceramics of ‘cord’ and ‘cord-like’ ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

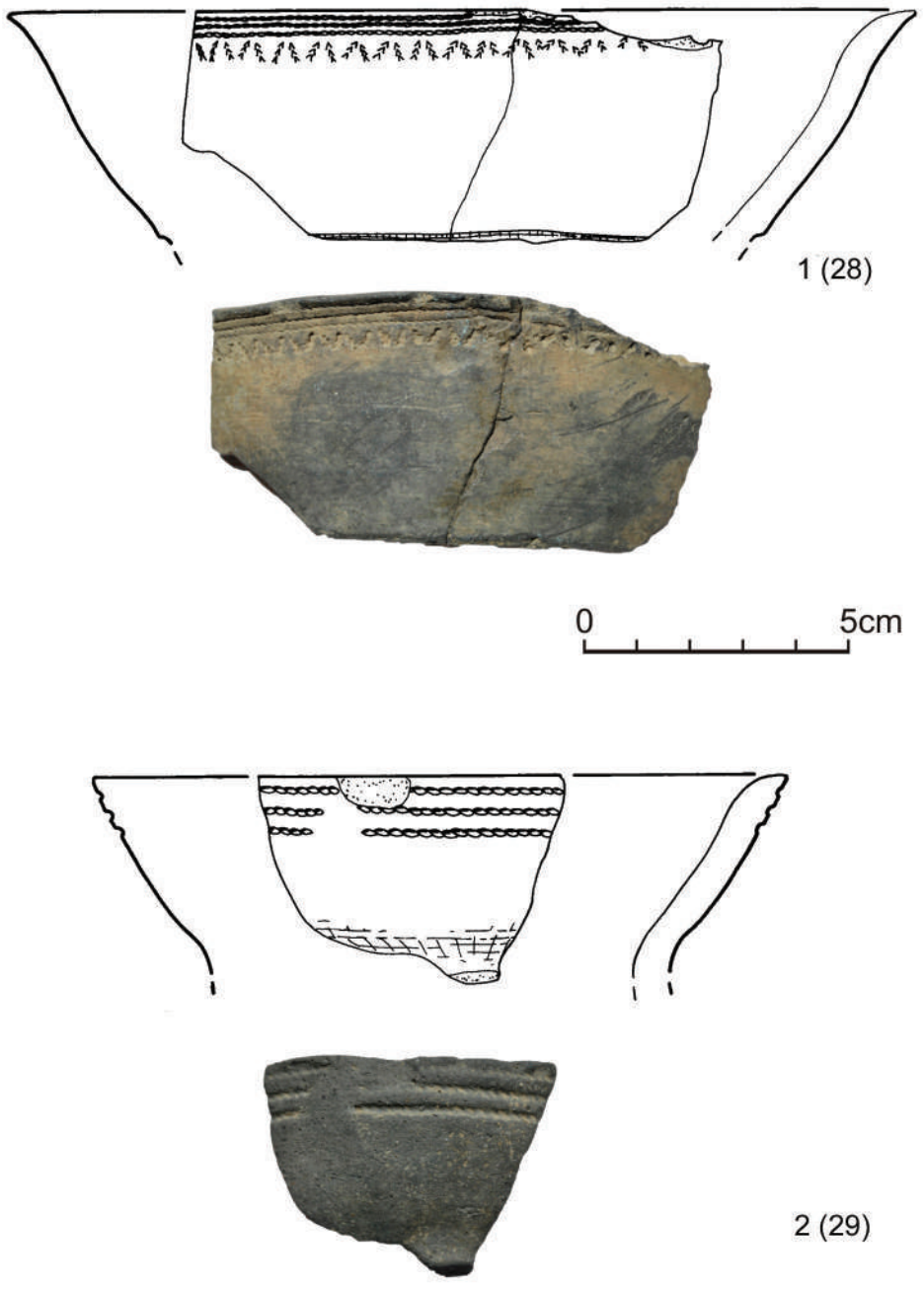

Fig. 12. Documentation of drawings and photographs of ceramics of ‘cord’ and ‘cord-like’ ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

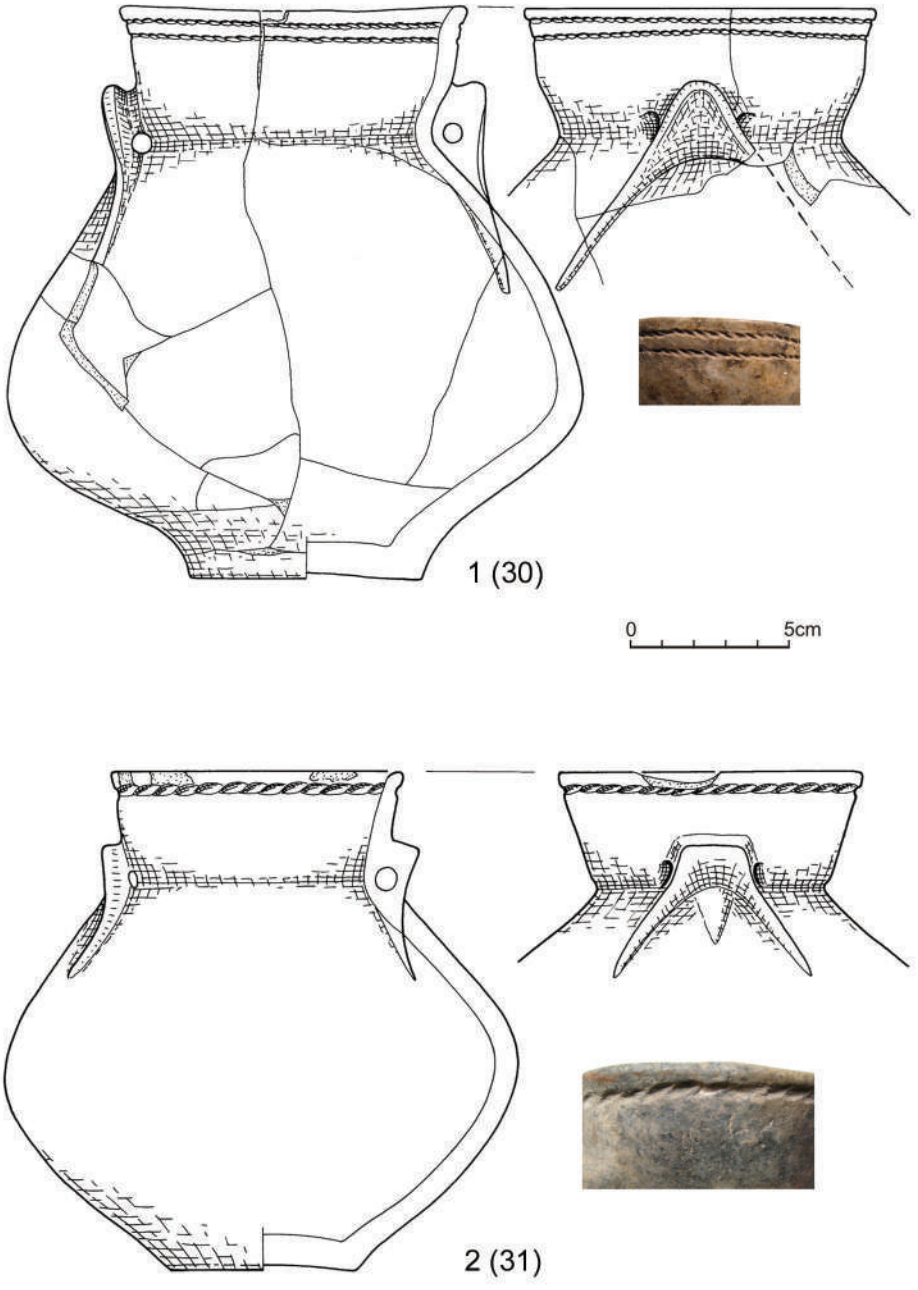

Fig. 13. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

from the 19th c. and start of the 20th, which was gained from the 'lands of relicts' in the territories of the Slavic peoples where the Polesie area proved to be particularly productive in terms of archaeological research.

a. Types of ornaments

The above quoted author in fact recorded all the basic techniques and non-woven textiles impressed on receptacles, which are presented below.

(1) 'Plaiting does not involve the use of knots and is based on joining the strands purely by turning the edges down, which usually finds a broad application in the domestic economy (...) Plaited textiles (...) are for example mesh-type fishing fences, blankets and bow-nets and other fishing products, shepherd whips as well as other objects for storing supplies or for transport (baskets etc.), some kitchen utensils (sieves, colanders), clothing (plaited belts, bast moccasins, hats); (...) One of the most common forms of plaiting is the so called pigtail (...), cross, (...), rib (...), cord (...) and cross-rib... technique' [Moszyński 1967:329, 332-334].

(2) 'Clearly less commonplace (...) is the net technique, which should not be confused with tying of mesh, for this concerns plaiting of mesh, not tying – the similarity of these is purely external. As a result of turning the edge of thread (secured row by row next to one another), the appropriate finger-work, a very beautiful stretched plaiting is made, one similar to netting without the knots'. From such 'netting', caps and belts were made (...). The netting technique is no doubt a very ancient one. In Egypt for example, it was used 2 mill. BC and not much later, archaeologists have proven its use in Jutland...' [Moszyński 1967:330-331].

(3) '... aprons in the archaic past (...) that in many Slavic lands were used for what later became skirts, and two highly unrefined small aprons, sometimes almost square, rather 'starched' with long fringes (...). It is also similar in shape to rugs and embellished with fringes at both ends a Latvian cape, in the shape of a long rectangle around 2 m, though just over 80 cm wide – a garment also common to Estonia. All of these capes belong to the last remainders of very primitive clothing, from time immemorial. Apparently a rug was found in Jutland among Bronze Age excavations' [Moszyński 1967:429, 430, 436].

(4) 'From the particular fibres taken separately, in general nothing is produced except for threads and cords, as well as felt because these are too weak. It is only through their strengthening by means of turning a larger number together – that in fact through the change into thread or cord, are these plaited threads suitable for use' [Moszyński 1967:309, 310].

b. Raw materials

According to K. Moszyński [Moszyński 1967:309-310]: 'Twigs in the broader sense of the word can be any organic material that autochthons use in the making of plait (plaited belts, straw hats, baskets, screens, fencing etc.), as well as ropes and various types of ties. They can be entirely organic or man-made. Examples

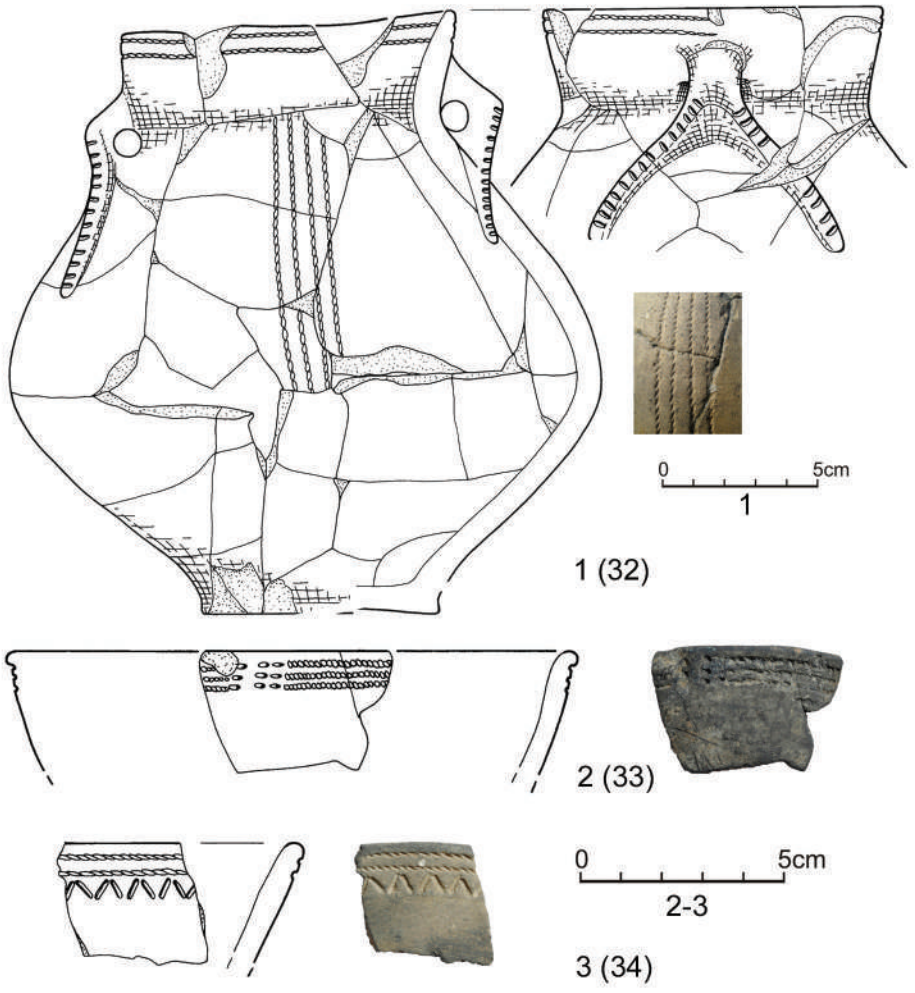

Fig. 14. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

of the former are roots, stems, blades and leaves of grass, willow shoots, slender tree trunks (up to the crown) of young trees and finally, thicker, flexible small branches.' Man-made plaits are among others, leather, bark belts or fine split wood, as well as thread and cord made out of fibre, which to make thread and cord used hair, wool, animal hair and most often, flexible, long, very thin strands in stems and other parts of some plants.

From particular, individual fibres as a rule nothing apart from thread, cord or felt is made, for fibre is too weak. It is only by a process of strengthening

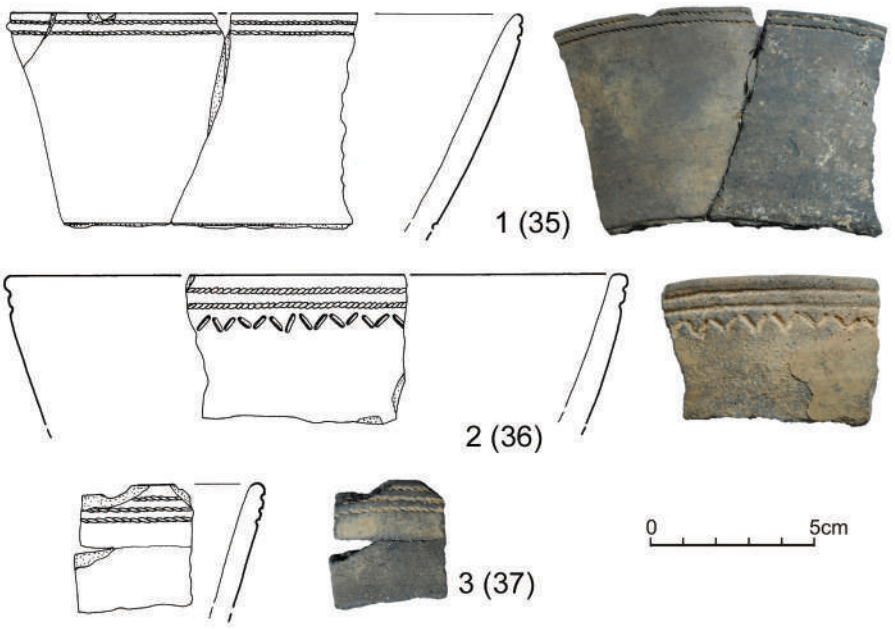

Fig. 15. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

through twisting a greater number together that through this change in thread or cord, a plait is produced suitable for use.'

In the ceramic impressions, on the basis of laboratory observation, there has been identified individual twisted threads of yarn and thicker, stronger elastic yarn thread (multiple thread, usually twined anti-clockwise Z/2S or S/2Z). Moreover, individual threads and strings (thread) were plaited to make a three-strand or multiple cord. Most often it was made out of linen, hemp, nettle, wool or animal hair. Belonging to another category were so called 'starch' yarns and plaits used to make baskets or mats [Moszyński 1967:310].

6.2. RESEARCH RESULTS BASED ON KNOWLEDGE OF TEXTILE CRAFTS IN THE NEOLITHIC

For the purposes of comparison, T.J. Chmielewski [Chmielewski 2009 here older literature] shall be referred to for the spinning and weaving crafts in the Neolithic.

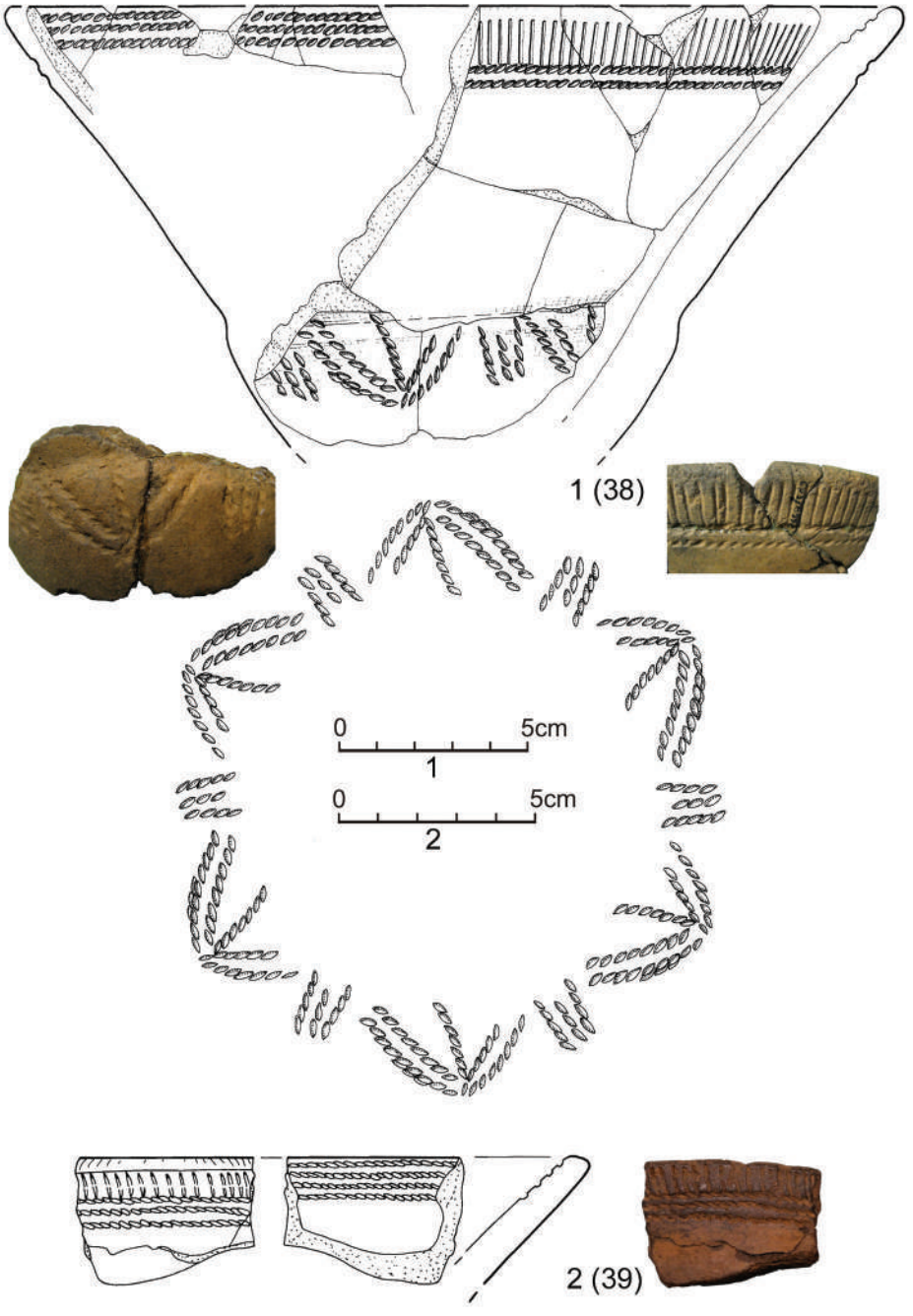

Fig. 16. Documentation of drawings and photographs of ceramics of ‘cord’ and ‘cord-like’ ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

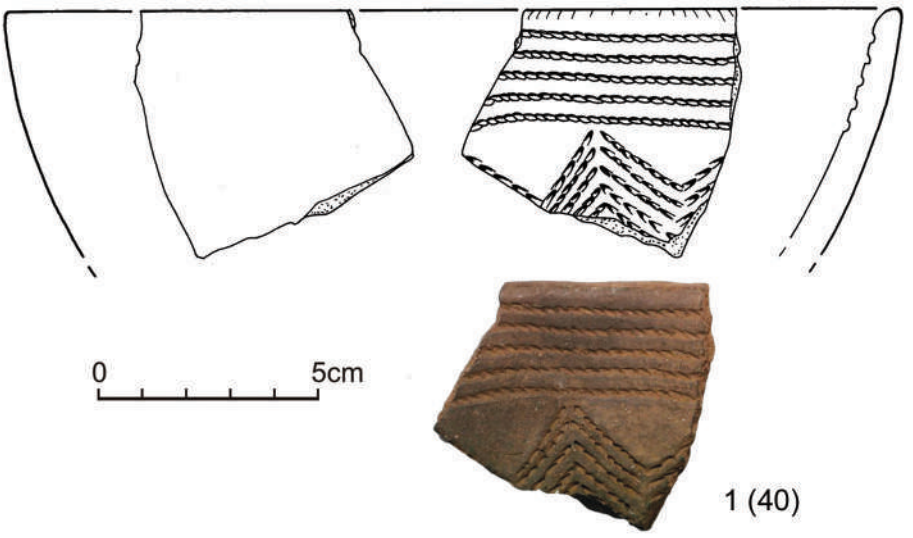

Fig. 17. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

a. Types of textiles

In general terms, among the categories referred to in part 4, the best evidence in the Neolithic is for the use of cords and plaits [Łaszczewska 1966:21-22; for earlier epochs cf. Adovasio, Soffer, Hyland 2005] and much less often, textiles made out of sprang netting, the latter identified among others on the basis of negatives preserved on ceramic ware from the Ritzmeck site [Schlabow 1960; 1976:26, Fig. 1, 2], where sprang was used as a complementary element in the production of ceramics. Goods such as clothing and shoes made out of cord and plait have been found among the accessories of the Iceman (3370-3100 BC), which were made out of grass [www.iceman.it]. Another illustration in the general context is the broad range of textile impressions found on TC ceramic ware, especially on vessel bottoms, where among others, there have been identified plaited textiles of thick yarn [Novitska 1960; Burdo 2004b]. Further, in materials dated for 3700-3200 BC in sites of the Maikop culture in the North Caucasus (Novosvobodnaya sites), there have been recorded, among others, textiles made on tablet looms [Shishlina, Orfinskaya, Golikov 2003:333-334].

b. Raw materials

In respect to the Neolithic the use of plants and animals for raw materials has been documented [Chmielewski 2009:16-51], though it ought to be noted that the former were in practice at an earlier time in prehistory. For the latter, the use of linen, hemp, nettle, grass, reeds as well as tree bast (in particular, lime) has been recorded. For the above quoted Maikop culture sites, there have been

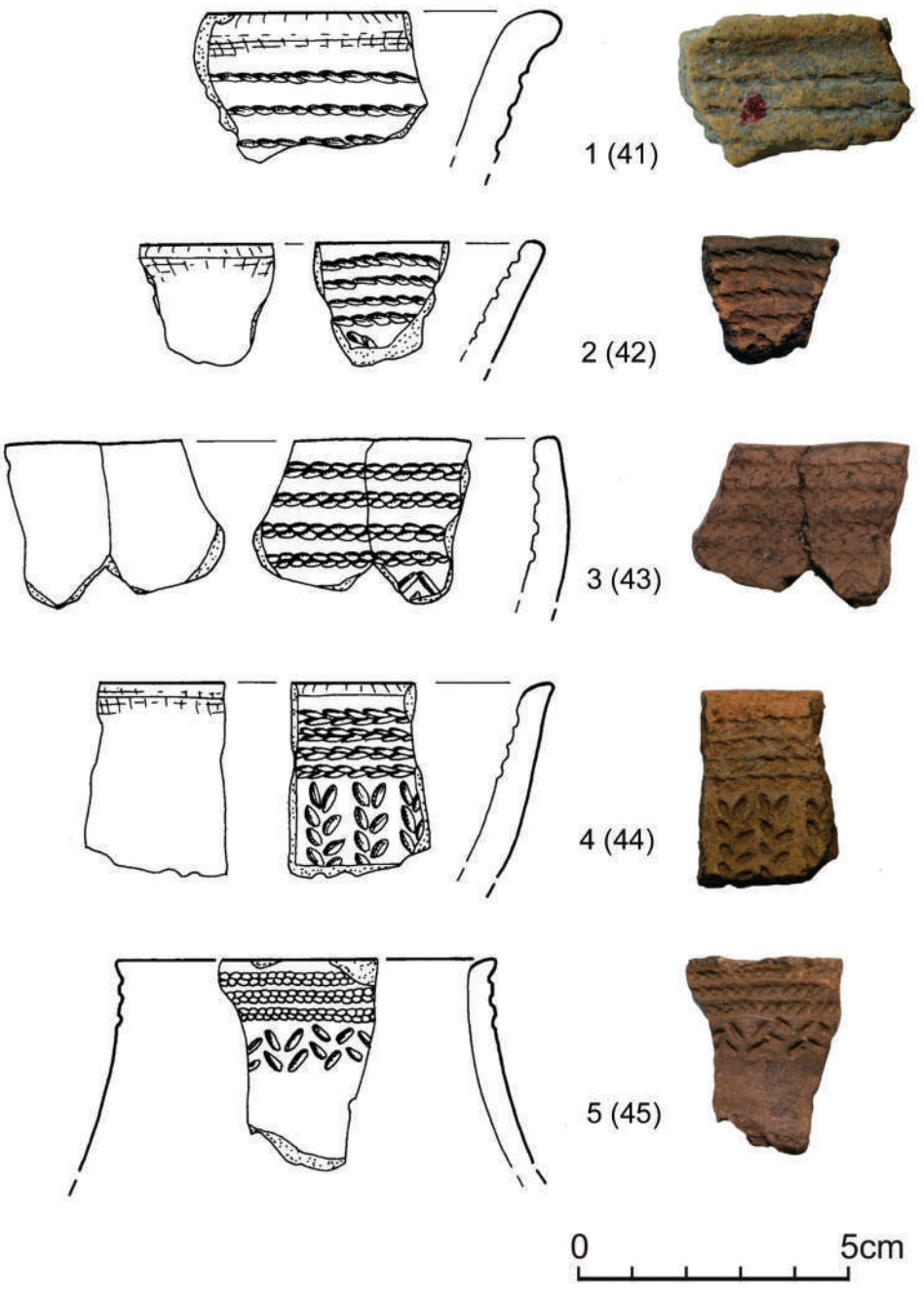

Fig. 18. Documentation of drawings and photographs of ceramics of 'cord' and 'cord-like' ornaments, under microscopic analysis. Catalogue numbers of samples (in brackets) according to Table 1 and Table 2

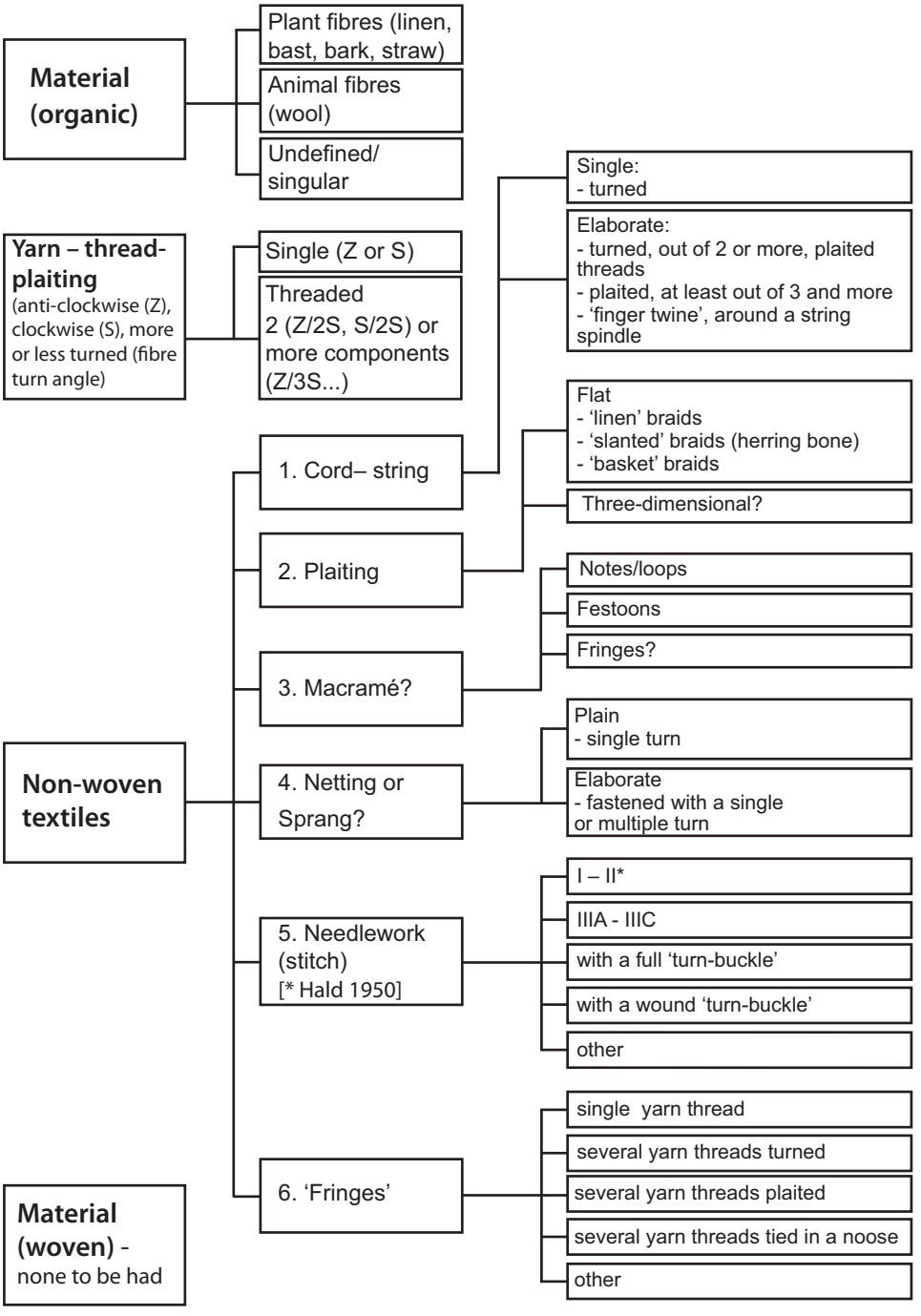

Fig. 19. Impressed textile elements on household ceramic ware – attempt at a framework of identification

identified mixed wool textiles with plant fibres as well as linen with plant fibres similar to cotton [Shishlina, Orfinskaya, Golikov 2003:333-336].

SUMMARY

Research to date on Neolithic textiles might be a good justification for a relatively high assessment of cognitive features in the area of 'stylistic observations' in relation to pottery. The series of specialist research findings focused on sources linked with one of the segments of such crafts – that is, 'cord' ornamentation, would seem to be an inspiring gateway into this field of research.

From the above point of view the main limitation in research terms of the series of ceramic samples under investigation should take into account, in particular the small proportion of intact vessels, which would enable a relatively complete analysis of the type and construction of the textile concerned. It is only as a matter of lesser priority that other limitations should be addressed, as a result of spatial (geographic), chronological or functional problems (division of objects and goods into 'daily' and 'occasional').

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MORE THAN JUST 'CORDS' ON NEOLITHIC CERAMIC WARE: AN OUTLINE OF MICROSCOPIC IDENTIFICATION FOR 'CORDED ORNAMENTATION'. SOME THOUGHTS ON RESEARCH METHODS

Corded ornamentation as one of the main markers in the 'ceramic ware stage' of prehistory, can indeed boast a comprehensive literature, though it may be argued, there is a lack of detailed analysis in respect to microscopic identification of the function and application of techniques – to take one pioneering study [Jażdżewski 1936] as an example, an early inspiration. This brief study therefore will document the above textile research in terms of a reduced scope of investigation to that of the above.

1. RESEARCH PROJECT AIMS

Since at least 1998 in the Institute of Prehistory, Adam Mickiewicz University in Poznań, research has been conducted on textile impressions on clay and other goods [Sikorski 2003:131ff]. Further, it is known that apart from their main function, non-woven and woven textiles were also an important tool in the pottery, where decorative (new) textiles as vessel ornaments were used or partially already used for matrices, planing surfaces or drying pots [Łaszczewska 1966:23-34]. At times occasional impressions are 'preserved', which also when for various reasons there is no 'excavation textile' (organic materials rarely are preserved in ancient archaeological sites and objects), in themselves complement the basic data on prehistoric textile crafts (if not erased during use in their epoch, and then washing and recording of surface crust by researcher). In this situation every textile impression is important for ceramic and textile research, in particular for 'older' cultures.

The main aim of investigation in this context was the verification of 'cord' ornaments, which apart from their appeal in a decorative and application sense, were also instrumental in determining the chronology of respective complexes of findings. In the context of mega and micro observations this has suggested an application on a greater scale of other non-woven textiles (and possibly woven), other than cord itself. Moreover, it would seem such decorative applications as household (flexible) 'textile matrices' were widely used (plaits, mats, string-embroided) tapes, which were quickly and faultlessly applied to embellish the sides of vessels [Michałowski, Sikorski 2005:180ff]. These observations to some extent have raised new possibilities of interpreting two and three-strand cord, without limiting this discussion to much earlier experiments on the part of W. Maciejewski [Jażdżewski 1936:250].

2. DISCUSSION OF SAMPLES AND RESEARCH METHODS

Microscopic analysis was undertaken for 45 ceramic vessel samples from settlements (40) and cemetery complexes (5) from Poland and Ukraine. Only small and very small fragments were to be found, as well as 3 intact receptacles with characteristic cord ornaments, which belong to various cultural groups and phases [Kośko, Sikorski, Szmyt… – part 1, in this volume]. The condition of ceramic fragments and size of samples (from 6 to 50 cm^2; intact vessels accordingly larger) determined the limitations in the precision of correct identification and classification of impressions on both sides of the receptacle. In addition, careful cleaning of vessel surface impressions often caused difficulties, resulting in erasure of negatives that were already shallow, as well as the bands between them – especially as far as ongoing analysis was concerned. Elements relevant to the above are: precision in ornament design, presence of a 'grill' between particular hollows left 'after cords', regular depth of negatives (single/repeated impressing), their closeness (every 0,8-2 mm horizontally, vertically or slanted), strategies for dealing with irregular sides when applying the ornament. Planing – at times with polish, of large surfaces where impressions were made at the same time or earlier of 'cords' – was one of the signs of impressing non-woven textiles, apart from cord itself.

Laboratory research was conducted at the Institute of Prehistory, Adam Mickiewicz University in Poznań, using a NIKON SMZ 800 (and 1000) stereoscopic microscope. In attempting to take into consideration the basic traits 'preserved' on the sides of vessels, over 1.000 measurements were made, which as it is, were underestimated. After the application of impressions, receptacles were dried, fired

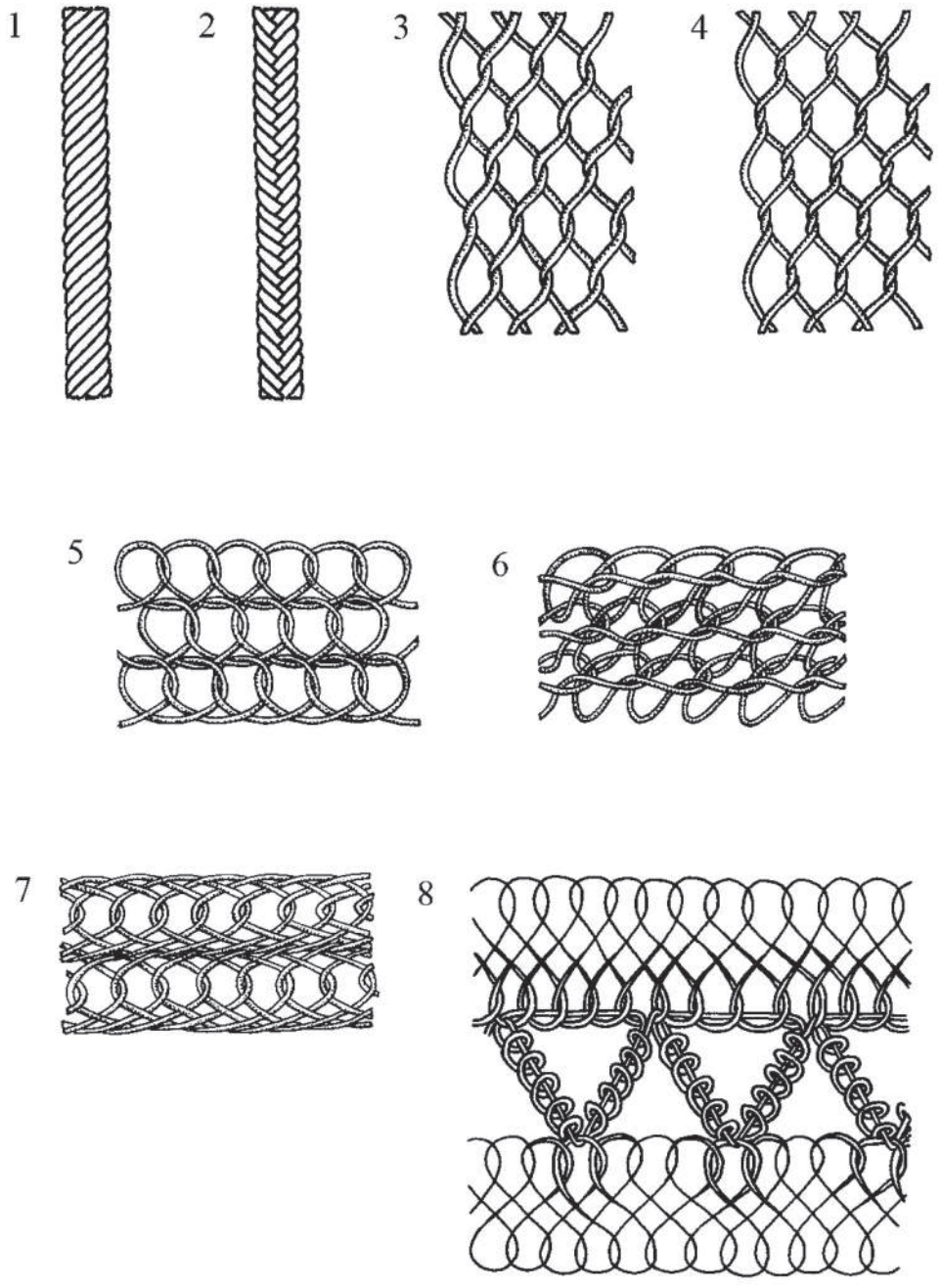

Fig. 1. Impressions of non-woven textiles on ceramic ware: turned cord (1), plaited cord (2), plain netting (3), elaborate netting (4), needlework (5, 7), 'hosiery' (6), turn-buckle 'triangles' (8), Drawing: O. Antowska-Gorączniak

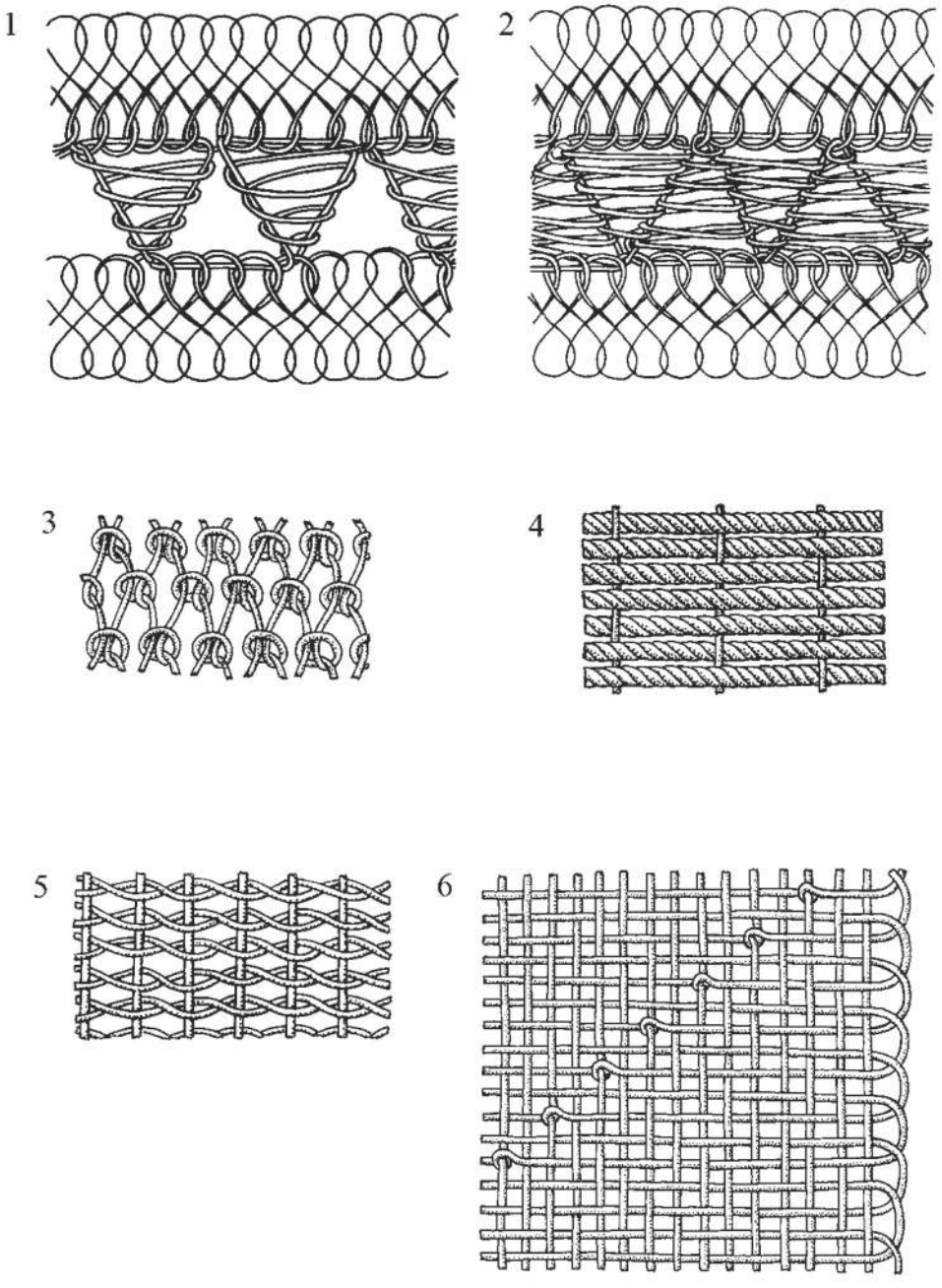

Fig. 2. Impressions of non-woven textiles on ceramic ware: full turn-buckle ‘triangles’ (1) and filled ‘triangles’ (2), macramé? (3), mat (4), basket plait (5), ‘elaborate’ plait (6), Drawing: O. Antowska-Gorączniak

(ceramic crust) and then put into use (surface abrasions of sides). To some degree, these traits not only 'mirror' the original's fine design, but also the defects of textiles [Sikorski 2003:132].

In this context the following were taken into account: thickness of 'readable' textile negatives and string or yarn (thread/yarn) and their components (for multi-strand cord and yarn thread) as well as direction (Z and S) and the angle of textile turn in string or yarn (assessment of preparation and degree of exploitation – stretching, tensing). At the stage of applying a textile in the pottery, which is ready to be applied, the following outline has been attempted: an impressed non-woven textile, reconstruction of this technique (Fig. 1, 2), counting the number of plaits (turns) over 1 cm (the more plaits, the better the quality), width of textiles and finally, sequence and means of ornament application. Moreover, an identification was attempted of 'production' traces for non-woven textiles that were used during the formation of the block, planing of vessel surface or finishing touches in adhering artwork to such (as in the case of the ornamentation of vessel sides inside and outside).

Further, a series of impressions were made using plasticine (over a hundred) on the basis of which it was easy to identify and compare in the light of samples researched, the use of strings, plaits, needlework and others. In general, it should be noted that during research on ceramics, impressions of several non-woven textiles were identified as the data shows below.

Cord

1. Turned [twisted] (2 – strand), Fig. 1:1; Table 2: samples 5, 19, 22
2. Plaited, Fig. 1:2; Table 2: samples 4, 11, 21, 23, 30, 31, 38, 40
3. Wound, 'traditional' or 'ornamental' [Nahlik 1958:181, 182, Fig. 8], Table 2: sample 8

Sprang (Netting)

1. Simple, Fig. 1:3; Table 2: samples 2, 7
2. Elaborate, Fig. 1:4; Table 2: samples 16, 24, 26, 27

Needlework

1. Type I – II [Hald 1950:292; Turnau 1979: Fig. 1; Seiler-Baldinger 1994: Fig. 12a], Fig. 1:5; Table 2: samples 4, 9, 14, 18, 28, 32, 33, 41
2. 'Hosiery'? [Seiler-Baldinger 1994: Fig. 40], Fig. 1:6; Table 2: samples 32, 36
3. Type III [Hald 1950:297-299], Fig. 1:7; Table 2: samples 3, 5, 33, 35–37, 42
4. 'Turn-buckle' 'triangles', Fig. 1:8; Table 2: samples 28, 32?, 34, 36
5. 'Turn-buckle' 'full triangles' assumed, Fig. 2:1
6. 'Turn-buckle' 'filled triangles' assumed, Fig. 2:2

Macramé? [Seiler-Baldinger 1994: Fig. 25], Fig. 2:3; Table 2: sample 1

Fig. 3. Contemporary needlework (sock). Photo: M. Sikora

Plaiting

1. Plain, including herring-bone [Podlewski 1960: Fig. 290], Table 2: samples 6, 25, 43–45
2. Plaited mat? – strings joined in a matrix?, Fig. 2:4
3. Basket [Podlewski 1960: Fig. 299], Fig. 2:5; Table 2: samples 10, 15, 32?
4. 'Ornamental', Fig. 2:6; Table 2: sample 17

Loops/knots/festoons [Seiler-Baldinger 1994:130ff], Table 2: samples 2, 11, 12, 30, 38

3. CONCLUSION

Obviously every outline of research findings in this context can be considered an attempt to draft potential turns (twists), braids and knots in ceramics. In no way

Fig. 4. Contemporary crochet work (glove). Photo: M. Sikora

does it, however, exhaust other, equally possible interpretations of impressions (i.e. sewing of cords as an 'application' over an underlay of material or non-woven textile). The group of plaited or needlework impressions is relatively large and cannot be placed into a specific category for the above discussion. It should also be noted that the impressions of mats or plaits [Lipińska 1963:309, Fig. 4, 5, 10-13; Łaszczewska 1966:22; Hensel 1980: Fig. 43, 56], although not 'certain' can be considered highly probable, producing (on vessel fragments most often found) regular horizontal or herring bone cord negatives [Fig. 2:4; Kamińska, Nahlik 1958:98, 222, Fig. 17, 43; Kośko, Sikorski, Szmyt... – part 1, in this volume, Table 2: samples 43–45].

Moreover, of particular interest are negatives with 'organic parts' [Kośko, Sikorski, Szmyt... – part 1, in this volume, Table 2: samples 6, 11, 12, 33]. This observation in fact can suggest the vessel was fired with a finished textile 'adhered' to it (if the impressions are not clogged with filling or layers in which crust had formed).

Finally, of particular significance is that the identified non-woven textiles did not require any complicated tools, though they proved to be more time-consuming and work-intensive than woven materials. It could be said that in fact the tradition of 'prehistoric' non-woven techniques has survived to this very day [Kaczmarek 1960; Podlewski 1960; Moszyński 1967:329ff; Turnau 1978; Seiler-Baldinger 1994; Michałowska 1995; Fig. 3, 4]. Moreover, these textiles were used and still are, during the adhesion and ornamentation of pottery vessel [Izak 1994]. Thus it is the intention that laboratory research and associate measurements will continue to be conducted, their results verified during the investigation – and as far as it is possible, compared with other textile-pottery elements in the Neolithic (tools such as whorls, loom weights, awls, needles, calenders and organic remains in objects.)

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'CORDED' ORNAMENTATION ON CLAY VESSELS IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION: 5TH – 4TH MILL. BC. AN OUTLINE OF HISTORICAL AND CULTURAL CONTEXTS

The discussion in the previous article of sample differentiation subject to microscopic analysis [see Kośko, Sikorski, Szmyt… – part 1, in this volume] can be said to gain particular significance in studies that present regional aspects of a determining nature (see part 3 of the volume). In what follows, an outline of the general cultural and historical context of finds and their research shall be given in respect to (1) time and (2) culture, in particular, its basis of economy.

1. CHRONOMETRIC AND CHOROLOGICAL CONTEXTS – A GENERAL OUTLINE

The vessels under investigation as presented in this research project originate from a long time-span, 4600/4500 – 3000/2900 BC. This is a period directly before the formation in Europe of a widespread culture circle (from the Rhine to the Volga) for whom corded ornamentation would become a key marker (Corded Ware culture circle – CWC) from ca.2900/2800 BC. The general nature of vessels researched demonstrates moreover, the beginnings of extremely important phenomena – both in terms of a possible taxonomy and culture studies – which for research purposes may be known as *archaeo-corded* ornamentation. The series of questions that arise in this context are in themselves highly complex and therefore the issue of topogenesis in respect to the *archaeo-cord* (initially in our aims, a dominant one) is but one of many.

The above mentioned period – around 1,500 years – is taken up in the Vistula and Dnieper interfluvial region by communities with strongly marked differences

in culture, economy, environment and social development. Thus it is possible to identify hunter-gatherers in the taiga (the forest zone), farmer-settlers in the forest steppe and loess plateaus as well as semi-nomadic-settlers on the borderlands of the forest steppe and steppe. It can be assumed therefore that the *archaeo-corded* ornamentation could have had in each of these bio-cultural communities a different environment governing its development. Moreover, taking into account the store of knowledge [see Kośko, Szmyt... – part 1, in this volume] on this very factor in respect to societies in the borderlands of west and east Europe, it is also possible to note that in the 'markers' under research, there are signs of wider interaction such as the exchange of experience on a pragmatic, technological and cognitive-semiotic level [see Kowalski..., in this volume].

2. CULTURAL AND ECONOMIC CONTEXT

The rationale of the so called 'context of finds' lies in searching for a solution in respect to hypothetical indicators of the most likely raw material out of which plaits [Kośko, Sikorski, Szmyt... – part 1, in this volume Table 2: B] were made as well as reasons for a given functional context, such as stimuli behind the corded 'steppe invention' (or else its further relations that happened to continue or to converge) or 'cord-like' ornamentation on ceramic ware. The questions raised in this context relate therefore to the correspondence of experience in so far as the nature of a community's development in manufacture, its development of artistic sensibilities or archaeo-sociological factors [Kowalski 1998 and in this volume].

a. PONTIC REGION

aa. Sites on the steppe (PA)

The ceramic samples (18) as part of the so called Steppe Eneolithic and the beginnings of the Bronze Age (4600/4500- 3000? BC [Kotova..., in this volume; Klochko, Kośko, Szmyt 2003: Fig. 1]) come from the 3 sites of Dereivka, Khortica and Mikhailovka [Kośko, Sikorski, Szmyt... – part 1, in this volume Table 2:1-18] and document 4 taxa: Sredniy Stog culture (SSC) – phase II, Lower Mikhocilovka culture (LMC), Rogachyk culture (RC) and early Yamnaya culture (YC). The sites in this context are located along the Dnieper valley or within its region (on the island of Khortica), in the river bar section. In terms of particular physiographic divisions, it is a northern steppe sub-region on the borderlands of the Dniester and Dnieper (south Dnieper mountain slopes) and the left banks of the Azov-Dnieper region.

According to paleo-economic research to date, in the 5th – 4th mill. BC this area belonged to typical breeder and hunter territories. The differences between

the sites in these regions related to the type of animals bred, such as cattle, sheep, goats and horses [Bibikova 1986; Kotova 2004]. V. Bibikova pointed out that only the horse played a role in the SSC (phase/culture Dereivka 4300/4200-3800 BC [see Kotova. . . , in this volume]), demonstrating the very strong differentiation of overall numbers for bred animals per se: Dereivka (Cherkasy region) 63.27%, Aleksandria (Kharkiv region) 27.04%, Molyukhov Bugor II (Cherkasy region) 18.99%, Sredniy Stog II (Zaporizhzhya region) 6.99% [Bibikova 1986:167, 169, Tab. 1]. N. Kotova provides moreover, data in respect to the proportions of animals bred in the consumption patterns of peoples in late SSC settlements in Semenivka, Donetsk region (layer 3, 3800-3600 BC): cattle 38%, sheep/goats 25%, horses 25% [Kotova 2004:63, Tab. 6.7] – 50% domestic in relation to wild animals. This is based, however, on an insignificant sample of bones (8 fragments).

A separate taxonomy of animal bone remains identified in the practice of breeding was indicated in relation to the effects of research into the eponymic LMC layer of the Mikhailovce site (4200-3800 BC [see Kotova. . . , in this volume]): sheep/goats 65.5%, cattle 16.3%, horses 7.3%, swine 7.3%; dogs 3.6%; domestic to wild, respectively 87% do 13% [Lagodovska, Shaposhnikova, Makarevich 1962:29, Tab. 1]. The hypothesis of an economic opposition among Eneolithic communities, between the SSC (Dnieper-Don areas) forest-steppe as breeders of cattle and horses, and that of the steppe LMC (Azov-Caucasus) as breeders of sheep and goats, is one of the significant elements in the overall understanding of the North Black Sea region cultures in the 5th to 4th BC [Kośko 1985:63-64, see for further literature].

The Mayaki site has also been recorded in the steppe ecotype, one which is related to the Balkan and Steppe Eneolithic borderlands, to be precise, the Usatovo group situated in the north Black Sea region, near a lagoon at the mouth of the Dniester [Kośko, Sikorski, Szmyt. . . – part 1, in this volume Table 2:24-27]. In this particular case it lies in the north steppe sub-zone on the borders of the Southern Bug-Dniester lowlands and that of the slopes of the south Podolia Upland.

According to current paleo-economic research, in the Usatovo group, to be precise in the Mayaki settlement (at the turn of the 4th and 3rd mill. BC) breeding of animals was clearly dominant. The proportion of each species that was bred is divided as follows: sheep/goats 76.2%, cattle 12.7% and horses 11.1%. The consumption of bred animals in proportion to wild was 96.5% to 3.5% [Zbenovich 1974: Tab. 1-3; Videiko, Burdo 2004: Fig. 16 – domestic 84.8%, wild 15.2%].

In the period under investigation in respect to potential raw materials for textile crafts, in both of the above mentioned steppe communities, no doubt characterised by a domestic economy, it can be assumed that animal hair was a dominant material. Setting this fact in the context of archaic textile techniques, such ‘most basic of textiles’ could be sheep wool, for ‘goat hair was used rarely and other animals only in exceptional cases’ [Moszyński 1967:310]. At the same time, it is

not possible not to notice the effectiveness of steppe plaits made from vegetation and their respective applications [Makohonienko 2009, also further literature].

ab. Forest steppe sites (PB)

The series of samples from the forest steppe of the Black Sea region is represented exclusively by the Tripolye culture (TC) and comes from 3 sites: Ihnatenkova Hora (Cherkasy region), Sandraki (Vinnitsia region) and Troyaniv (Zhytomyr region). All of these sites are dated to the CI – CII phase of the TC (3900-2750? BC [Videiko 2002:31]) and are in the east Tripolye territory [Kruts 1994; Tsvek 2000], between the upper Southern Bug and Middle Dnieper. In very detailed subdivisions of physiogeography and climate, it is a sub-zone that features a warm, insufficiently damp, forest steppe.

According to paleo-economic research, in the 4th mill. BC this area was characterised by 'appropriate natural environment suitable for a traditional – by the TC peoples – farming and breeding economy' [Kruts 1994:10]. Further, V. Kruts maintains that the interfluvial territories of the Southern Bug and Dnieper were characterised by 'very fertile black soils and brown forest earths, particularly suitable for farming' [Kruts 1994:10]. These views are difficult to corroborate because of difficulties in assessing the relationships between farming and breeding animals, as well as the nature of what variety of animals were used for such purposes. In this context therefore the recent study by M. Videiko and N. Burdo [Videiko, Burdo 2004] should be noted in respect to such practices by the communities of the TC, where animal bone remains from a TC settlement in Sandraki (1151 bone fragments) were analysed as follows: domesticated 47.4%, wild 52.6% – with 20% of bones from horses among animals bred [Videiko, Burdo 2004: Tab. 1].

Further, the variety of breeding strategies, wide range of forest steppe flora and cultivated plants, would seem to indicate a rich set of choices for materials that could be used to produce plaiting.

b. BALTIC DRAINAGE AREA

ba. Old Uplands zone (BA)

The series of ceramic samples from the old upland loess enclaves of the Baltic basin contains material only from the Funnel Beaker culture (FBC) and comes from 4 sites: Las Stocki 19, Karmanowice 35, Miłocin Kolonia and Tominy 12 [see Kośko, Sikorski, Szmyt... – part 1, in this volume Table 2:28-37]. In general terms this could be said to be in the region of the Małopolska Upland. In so far as a fine physiographic sub-division is concerned [Kondracki 1967:377ff], the former three sites (all cemetery complexes) are situated on the Lublin Upland (BA1). The latter, however, is a settlement in the Kielce-Sandomierz Upland (BA2).

According to current paleo-economic research, in the 4th mill. BC, a period where the above mentioned samples can be dated to, in the loess upland areas of Lublin-Nałęczów-Sandomierz there is recorded a growth in the role of breeding animals. This feature of domestic economy based however on a limited series

of bone remains. In the view of J. Kruk and S. Milisauskas [Kruk, Milisauskas 1999:150] 'the proportion of remains of the most important domestic species are very similar. Cattle is dominant (78-43%), second are pig (21-14%), third goats and sheep (about 13%).' The share in this context of wild animals (for hunting) is less than 10%. It is also worth noting the observation of the above authors that 'among sheep remains found in the Bronocice site, as much as 68% were mature adults, which testifies to the fact that these animals were used for the production of wool.'

BA1. The cemetery complexes of Stocki Las 19 (Lublin region, Puławy district), Karmanowice 35 (Lublin region, Puławy district) and Miłocin Kolonia (Lublin region, Lublin district) are associated with the Late Neolithic funerary centre identified on the Nałęczów Plateau [Nogaj-Chachaj 1991; Wiślański 1979:251; Nowak 2009:470]. According to a chronometric analysis, these complexes can be linked to the end of the first half of the 4th mill. BC [Nowak 2009:348-349; horizon 3 – ca. 'within' 3650-3500 BC]. It is argued that FBC cemetery complexes arose in the loess upland, without stabilised large settlements [for other views see Kruk, Milisauskas 1999:114-117].

BA2. The Tominy settlement (Opatów District, Świętokrzyski region) can be found in a zone where high quality flint (Ożarów type) is extracted. It is difficult to assess the actual influence of this location on the nature of daily life and the rather temporary FBC settlement, for research so far in recent years has been conducted in terms of conservation. The results of these studies carried out in the institution itself, detailed chronology and cultural context of findings, have alas, not been brought to light [see Kadrow, Olejarczyk. . . , in this volume].

bb. Lowland zone (BB)

Among the materials of the findings from the middle European Lowland in the south Baltic area, the most informative collections of 'corded ware' vessels were those found during field studies of settlements from the phases IIIB-C/IIIC – VB of the FBC in Łojewo 4 (Cuiavia-Pomerania region, Inowrocław district) and Radziejów 4 (Cuiavia-Pomerania region, Radziejów district) [Kośko 1984; 2007; Rybicka 1995]. A definitive chronology of the above settlements can be determined at the turn of the first and second half of the 4th mill. BC, mainly though in the latter half and end of the 4th mill. BC.

The series of vessels subjected to microscopic analysis is from three sites: Opatowice 3 (Cuiavia-Pomerania region; Radziejów district) (3240-3100 BC[1]), Łojewo 4 (3090-2910 BC) [Przybył 2008: Tab. 2] and Kościelna Jania (Pomerania region, Starogard Gdański district) [Kośko, Sikorski, Szmyt. . . – part 1, in this volume Table 2: 38-45].

In terms of detailed physiogeographic sub-divisions, the sites of Opatowice 3 and Łojewo 4 are located in the Cuiavia Plateau, while the Kościelna Jania

[1] Radiocarbon dating: Ki-14697 4520±70 BC (ceramic sample: Op3/XVII/87:S1)

site is situated in the Starogard lake district. These sites are linked in terms of topogenetics, thanks to which it is possible to relate them to cultures identified in the Cuiavia mezo-region of settlements, including the eastern group of the FBC (Opatowice 3, Kościelna Jania 1) and those of Radziejów (Łojewo 4).

Further, in terms of paleo-economic studies, in the 4th mill. BC, in particular towards its end, these territories show a dynamic growth in 'nomadic animal breeding', where it would appear that this phenomenon 'could have gained an internal impetus of growth from semi-pastoral communities from the north Pontic zone' [Kośko, Szmyt 2004:113]. The practice of animal breeding on the part of FBC peoples in the Cuiavia Plateau is as follows [after Kośko, Szmyt 2004: Tab. 1]: eastern group: cattle 74.2%; sheep/goats 17.7%; pig 8.0%; horses 0.1%; Radziejów group: cattle 70.9%; sheep/goats 17.3%; pig 10.5%; horses 1.3%. During the harvest of cereals the general data from Cuiavia in the 4th mill. BC indicate a decided preference of wheat over barley. The discussion of such cereals and their relationships in harvesting and farming has been detailed comprehensively as a result of the Radziejów Hills studies [e.g. Koszałka 2007].

3. SUMMARY

In summary, the extant knowledge of the potential store of raw materials in communities of the North Black Sea region (both steppe and forest steppe) set against the results of microscopic analysis do not allow for an identification of textile fibre that would have served for 'corded ware' impressions. Further, on the basis of negatives analysed, a relatively 'certain' description of materials used for textiles is not possible. Only in one case (sample 11) it is with a high degree of probability that the remains of a cord plaited from wool were recognised. The remaining samples could have been crafted from both of these materials. In this particular context it is important to note that plant fibres were more durable (resistant to wear) [Mogielnicka-Urban 2002:29]. The following provides an outline of relative applications where cords were impressed: plaiting (6), netting (6), needlework (5), plaiting or needlework (2), macramé (1), fringes (1) and cords/string (7), where plaited, turned and wound (sample nr 8 with differing thicknesses: 1.230 – 4.155 mm).

Moreover, in relation to such materials from the Baltic drainage area the investigation of negatives on ceramic ware does not give any grounds for definite conclusions in respect to textile fibres. The impressed textiles could have been therefore prepared equally from wool and plant fibres (bast, bark strips

as in samples 30, 38, 39, 43-45). The range of impressions on corded ceramic ware was as follows: needlework (9), plaiting (6), plaiting or needlework (3) and cord/string (4). Among the latter there were found plaited cords measuring 1.702-3.813 mm. In the 'Baltic' subset no negatives of macramé, netting or fringes were noted.

Despite the fact that the above brief outline of laboratory tests and their results – discussed in more detail in the third part of this volume – are not conclusive in respect to identifying raw materials (textiles), the observations in relation to formal and technical aspects of 'corded' and 'cord-like' ornaments nonetheless provide a modicum of hope for the formulation of hypotheses concerning the topogenesis of such ornamentation. One possible argument might be that there was present a high differentiation of such crafts in Pontic societies in terms of their rather limited repertoire in respect to communities from the Baltic basin in the 4th mill. BC. Further, as carbon dating analysis indicates, a higher degree of technical differentiation can be the result of, among others, a longer period of development. The early growth of 'corded' and 'cord-like' ornamentation among mostly pastoral communities allows for the hypothesis of the existence of dynamic growth in these territories (Pontic steppe/forest steppe) in a meeting of various crafts and their making, such as 'pre-pottery' (manufacture of vessels from organic materials) and pottery. Thus, the making of portable receptacles and at the same time, thanks to the actual production technique (i.e. shells mixed into ceramic mass as an organic surface coating – textile netting), it was most durable (in a given bio-culture, economy). The stylistic traits of such receptacles would seem to document therefore a synthesis of experience in respect to their application and semantic nature spanning across a sequence of long traditions.

The above thesis, at this initial stage of research, may perhaps be only partially confirmed in respect to paleo-economic and chronometric aspects, which are to be further discussed in subsequent articles. One irrefutable conclusion, however, is the urgent need for a continuation of such research, among others, so as to verify the arguments outlined in this place, in relation to the above topogenetic hypothesis.

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NEOLITHIC POTTERY ORNAMENTED WITH 'CORD' IMPRESSIONS: AN ANTHROPOLOGICAL – SEMIOTIC INTERPRETATION

1. INTRODUCTION

Cord-ornamented vessels emerged with the oldest known pottery attributable to the Jomon ('cord') Japanese culture dated back to as early as 13600 BC [Zhushchikhovskaya 2007] and with proto-/sub- Neolithic cultures spreading across a vast territory of the Asian part of contemporary Russia [Kuzmin 2002]. In east and central Europe that type of decoration became widespread in the subsequent Neolithic periods [see Kośko, Sikorski, Szmyt... – part 2, in this volume, for information about the identification of cord ornamentation techniques as per specific taxonomic units]. The above phenomenon has been viewed singular enough to encourage numerous hypotheses related to: a) ethnogenesis of prehistoric peoples in Europe (see old concepts linking the development of the Corded Ware Culture (CWC) to the expansion of the Indo-Europeans, b) symbolic functions and provenance of the corded pottery, c) cultural concepts and social structure of communities using that type of vessels. Furthermore, the anthropological interpretation of the discussed phenomenon focuses on two aspects. The first, more general in nature, is centred around the relation 'object / vessel' – 'ornament on the vessel' and thus pertains to the cult/worship status of objects in the culture dominated by realistic-magical experience and the genealogy of the analysed decoration technique. The second aspect focuses on a hypothetic set of concepts reconstructed, primarily, against the background of the "Indo-European model of culture" representing a presupposed storage of signs.

2. VESSEL AS AN OBJECT IN THE EXPERIENCE OF PRIMITIVE COMMUNITIES

The cultural existence of objects in the sphere of magical experience is unique in its nature. This is embodied mainly in the treatment of ornamented objects that most likely were not carrying meanings subject to a purely passive perception, and thus disengaged a reading of their meanings. Such an interpretation arises from the analyses of folk customs and religious studies – quoting van der Leeuw: 'For archaic man, an object is the means of power; an object can make something happen, lives its own life, which is reflected in quite an empirical form' [van der Leeuw 1997:31; Hultkrantz 1983]. That interpretation is also supported by cognitive grammar patterns underlying primitive languages, in particular, traces of ergative constructions identified in some of the Indo-European languages (for example, nondistinguishable animated and nonanimated or female and male categories, etc.) [Montaut 1997; Alexiadou 2001:185].

Within the cultural framework of the Neolithic communities, an organic receptacle and a ceramic vessel may have been viewed as a characteristic 'being of things'. Therefore, from the realistic-magical point of view, bulging leather skins, shrinking or breaking basket weave patterns and also pots full of boiling dishes were probably interpreted *dynamically* that is as centres of a quasisubjective latent force embedded in objects [for more information about the notion of *magic dynamism* in the context of religious studies based on the evidence of Roman religion, see Wagenvoort 1947]. Hence, in line with the cultural classification derived from this type of perception, a vessel is also anthropomorphised in an unprecedented manner. Consequently, many pottery vessels were subject to treatments similar to well known traditional medicine practices where for example in the Neolithic, pots were impregnated with wood tar, which has been used as a component of numerous pharmaceutical preparations until contemporary times [Langer, Kośko 1999]. Thus, it cannot be precluded that the walls of a vessel (both organic and clay) were identified as tantamount to a human body and skin. In conclusion, the *dynamic* perception consists in seeing 'an internal form of being or existence' that cannot be assimilated through the senses only and which represents an imperceptible feature of objects referred to as a so called still life. Yet, it is important to realize the scope of the 'object' and 'man' notions in the primitive culture which actually classifies the two types of existences as inseparable.

Therefore, a vessel can be used as a sign incorporating (not only in a substitutive and symbolic way but by all means realistically) the conceptual framework and connotations of concepts related to human beings. Actually, ethnological and archaeological data confirm the inner and mutual dependencies underlying the above phenomenon. For example, anthropomorphic vessels, in the form of canopic jars, reflect the *human* nature of pottery typical of mythical thinking. On

the other hand, ethnological data provide significant indications of human beings 'being transformed' into vessels/objects. For example, some Devanga clans from Madras bore the following names: 'coin', 'dam', 'house', 'scissors', 'boat', 'rob', 'old wooden plough' and, what is of special interest in the context of this study, 'cord/string to hang up pots'. In addition, amongst the Mid-Indian Bhil peoples there was 'broken pot' clan whose members were obliged to collect pieces of broken pottery (select types of vessels) and bury them in a ceremonial manner [Lévi-Strauss 2001:160-161]. The evidence supplied above enables a hypothetic evaluation of the role performed by vessels within a social system which distributed signs giving value, for example, to the sense of group identity shared by users of those signs. In addition, the symbolism of textile and cord patterns impressed into the Neolithic pottery as decorative elements may also testify to the great sociopragmatic significance of used signs.

3. TECHNOLOGICAL ASPECTS OF CORD-ORNAMENT ORIGIN

The typical middle-European Neolithic method of shaping and decorating pottery is presumed to originate from the tradition of hand manufactured organic receptacles. That view was advocated by A. Götze [Götze 1891] and M. Hoernes [Hoernes 1898:37ff]. The issue of origin was explored, in particular, by G. Wilke [Wilke 1906; 1910] who supported the concept of technological inspirations driving the spread of the ribbon and cord ornamentation on the Neolithic pottery. Wilke believed that the plaited ornament stemmed from the primitive method of covering the inner walls of a basket with clay. A basket insulated this way could have easily become a prototype of a piece of pottery given that even its accidental burning unavoidably resulted in the production of a piece of an earthen shell with plaiting impressions [Wilke 1910:2-3]. The 'technological' origin issues were raised also by C. Schuchhardt who made the effort to prove formal similarities of Neolithic pottery with organic receptacles such as hollowed out gourds and baskets. He attempted to prove that the vessels found in the northern regions of Europe bore the mark of the former 'basketry style' [Schuchhardt 1909].

Nevertheless, the ribbon or textile ornamentation on pottery only to a limited extent reflects primitive techniques applied to make organic receptacles. It seems though that both pure imitation and temporary replacement of some types of objects (for example the replacement of earthenware by pots/receptacles which were woven or made from hollowed out wood) could have resulted from the split of production tasks applicable at that time. Apparently, many specialised crafts did not bear separate names, as it transpires from Indo-European data. In particular, the analyses of pottery-related terminology have long ago highlighted its unique

references to carpentry as well as to plaiting and weaving crafts. The derivative forms of the lexeme *teks-*; *tetk-* 'make, produce, hew, plait', for example, the Greek *tektōn* meaning, amongst other, 'builder working with clay', the Latin *testa* 'pot, earthen pot', *texō* 'I plait, weave, make' testify to the coexistence of various production branches [Rix 2001:638]. All that fits well into the tradition of established iso-pragmatic activities, i.e. activities performed within a specific field which had their precise equivalents in related fields subject to similar classification criteria. Those findings provided the grounds for the reconstructed terminology of nonspecialised craftwork combining significant meanings related to plaiting, braiding, binding/tying and weaving with meanings typical of pottery and building [Kowalski, Witczak 2003]. Furthermore, it should be noted that the similarities between weaving and pottery were driven not only by the applied technical methods but were also sanctioned by a set of magical beliefs. This is confirmed by additional semantic references of the above mentioned lexeme *teks-* analysed in the context of the Indo-European culture, where the magic of knots related to the semantic field of *teks*, which also entailed the art of incantations and later, the art of sublime language and poetry, i.e. 'song weaving' [Gamkrelidze, Ivanov 1984:835].

Notwithstanding, the model of skills and competence reconstructed in this study, based on Indo-European data, would suggest it is worth making an attempt to interpret the rationale behind the use of cord impressions or even cords and textiles themselves, as decorative elements of Neolithic ware.

4. INDO-EUROPEAN TERMINOLOGY OF TEXTILE TECHNIQUES APPLIED TO HAND MANUFACTURE RECEPTACLES AND THEIR SIGNIFICANCE

The issues concerning hand manufacture of textiles in Neolithic Europe and related technical terminology, representing part of the reconstructed Indo-European lexicon, were raised by E.J.W. Barber [Barber 1991]. In addition, interesting comments on the use of textile techniques in hand production of receptacles were made by J. Puhvel who noted two separate archaic methods of preparing plaited objects. One method consisted of winding, twisting and tensing fibres, while the other used plaiting, interweaving and tying. The Indo-European tradition of manufacturing receptacles attached greater importance to strong twisting, winding and spinning rather than to interweaving and plaiting. That very opposition is illustrated by the Vedic *vayati* 'plait' as compared to *krt-* 'wind, twist'. What is more, the Greek term *kártallos* meaning a basket, related to the Vedic *krt-* is tantamount to 'something tightly wound, a strong durable receptacle' [Puhvel 1977:150-151; for similar suggestions, see: Barber 1975:301]. Independently of the above analyses, similar observations were made by W.P. Lehmann

who pointed out that the Gothic name of a receptacle *snōrjon* meant ‘a receptacle – a basket made of tightly wound cords’, while the term *tainjōn* < *tainaz* ‘twist’ referred to ‘baskets woven from withies [Lehmann 1986:317]. Indeed, the Gothic *snōrjo* ‘basket, net’ is related to the archaic Germanic *snōrō-* ‘cord, string’ which can actually be combined to create the Indo-European form *sne-wer-/n-* ‘twist, wind’ [Pokorny 1959:976; Orel 2003:359, 399].

The same analogies can be identified in the case of related Indo-Iranian and Germanic terms used to denote a basket: Indo-Iranian *graϑh-* ‘tie, twist, tighten’, archaic Iranian *granthi* ‘turn down the wick’, archaic Germanic *kratto* ‘basket’, archaic English *cradol* ‘basket’ < pre-Germanic *kraddō* < Indo-European *gret-* ‘basket, plaiting’ all of which emphasise the strength of a weave pattern [Pokorny 1959:386; Rix 2001:191; Cheung 2007:122].

Semantic analogies are also evident for the Hittite ^{GIŠ}*erhui* ‘basket’ (< het. arha-; irha ‘rope, cord, rim, something wound up’) and the related Latin term *ōra* ‘rim marked out by a cord’. That line of similarities is continued by the Indo-European *ōrhah-* ‘something wound by a rope’, ‘rim, cord’ [Puhvel 1977:152; 1984 I:283].

Additionally, the semantic features of the pre-Germanic lexeme *tauʒō* meaning ‘cord’ are also interesting. The word is often combined with the Indo-European *dewk-* ‘lead, guide’. According to Lehmann, that meaning of the word originated from the use of a cord by herding communities and can be explained in the following manner: the morpheme *dewk* refers to leading a herd of cattle by dragging them one after another as opposed to another word *aĝ-* ‘drive’ which means ‘driving a herd’ [Lehmann 1986:346; Seebold 1970:504; Orel 2003:403]. In that context, a cord would represent a tool characteristic of a person dragging a herd behind and could be associated with the herding power. Thus, a cord of that type would be tantamount to insignia worn by a leader of nomadic communities and could be viewed as a symbol of a person leading people and animals. That interpretation might also explain the great significance of a cord in the sacerdotal symbolism, for example, in ancient India [Eliade 1960].

5. SEMIOTIC COMPLEXES INSPIRED BY THE SYMBOL OF A CORD

5.1 CORD AS A NATURAL SYMBOL OF STRENGTH AND POWER

Linguists have identified unique significance attached to cords or yarn, viewed as strongly developed fibres with some tying potential, stemming from magical-

mythical thinking. Most of all, however, a cord symbolises and epitomises a strong, permanent and powerful element. Similar features were attributed to well prepared, tightly woven yarn and fabric. The above symbolism, though, is not based exclusively on the physical features of a cord and plaiting but on their supernatural power embodied in a magical experience. Therefore, the Greek term denoting a basket *kalathos* refers to the name of a mythical spinner *Klothō* < Indo-European *klō-dh-ō* 'cord, yarn' < *k'leh*$_3$*dh-* 'twist' [Pokorny 1959:611; Puhvel 1984 I:34-35; Rix 2001:362].

To give two other examples, in the archaic Indian tradition a cord named *yajñah pavita* had the power to purify an offering [Mayrhofer 1964 III:3-4], while another cord used in the Zoroastrian rituals epitomised the apotropaic power to ward off evil – a red cord paralysed the death demon *Nasu*. In addition, *dakhma* a place used by Zoroastrians for exposure of the dead was secured in a special manner. Its clay barrel-shaped skeleton was tied around with a cord to prevent any tainting of the divine earth element [Składankowa 1963:160, 200].

From that perspective, the apotropaic ritual which consisted of tying an object around with a cord represents an important part of analyses aimed at assessing the significance of cord impressions on pottery. In realistic-magical thinking, such an impression is not just a sign of a cord but rather (as a trace of the cord's physical contact with clay) a form of the cord's presence along with the whole set of its attributes. Hence, a cord or plaiting impressed into a vessel surface is metonymically present in the vessel's structure.

As a result, in the context of the discussed type of magical experience, the vessel, just like the cord itself, becomes an object of power and continuity and maybe even ensures protection against undesired forces.

5.2 CORD AS A WEAVING EMBLEM FOR DEITIES OF FATE AND CONTINUITY OF LIFE

Within the Indo-European mythopoeic conceptual framework, the notion of a cord or a thread has always been associated with tasks related to time-setting and continuity. Those associations transpire from the tactics and actions of commonly known and classic mythical characters, including: the Greek *Moira*, Roman *Parcae*, Germanic *Norns* and *Urd*, Hittite *Ištuštaja* and *Papaja* or Slovian *Mokoš* [Toporov 1989:79]. Undoubtedly, the traditional role of a weaving woman was reflected in mythical stories about goddesses manipulating threads and yarn either with a view to supporting or terminating life. To begin with, in the well documented Greek tradition, epic poetry and mythology, the spinning threads or unspoiled fabrics are tantamount to the continuity of existence and events. For

example, symbolic threads, yard and cords are the weaving tools of Ariadne, Helen and Penelope [Pentelia 1993].

Quoting another example, the Indo-European magic of knots was part of the powers attributed to a sovereign of the Varuna – Odin type. Under the three-functional theory of G. Dumézil, Varuna personifies a dark master who casts spells and uses his opening and closing powers to enforce verdicts against those who violated the divine order. Therefore, Varuna was viewed as a guardian of ethical integrity embedded in the ritual law and an upholder of moral correctness of human behaviour. Yet, in the case of a Varuna-type hero, the magic of knots symbolised the dominion over all forms of visible world. Therefore, Varuna is primarily a sorcerer, perfect performer who with the use of cords and knots can either stop specific forms or transform them freely. Varuna's magical skills are reflected in his name which contains the Indo-European lexeme *wer-* 'tie, plait'. In that context, a cord becomes an emblem of a consolidating power used in the art of shaping objects [Dumézil 1952].

Furthermore, it is worth noting two parallel phrases arising from the Indo-Iranian tradition: *tantum atatam* [Rigveda X, 56, 6] and *tantur a tayatam* [Avesta X, 2, 17] both of which can be translated as 'let his family line be continued'. This way, the motif of a stretching cord was combined with the concept of life continuity and sustainability. Such an interpretation is supplemented by two related Greek words *tonós* 'power, strength' and the archaic Indian word *tanas* 'offspring'. In addition, the mythical image equating a cord both with the life of a human being and the continuity of their family is confirmed by the following phrases: the archaic Iranian *tan* + *ayus* 'thread, prolong life' or <*pra*> *tar* + *ayus* 'cut (like a thread) life'. The abovementioned examples of forms retaining similar meanings, found in various texts, enable the hypothetical reconstruction of a ritual phrase *ten aywo-* 'thread = prolong life', 'continue from generation to generation' and in a wider context 'ensure the continuity of some existence'. That phrase represents the verbal illustration of magical actions performed in the field of plaiting and weaving crafts and maybe also when making textile decorations.

5.3 CORD AS A SIGN UNIFYING THE RITUAL COMMUNITY – CONNOTATIONS WITH NAMES OF VESSELS

Metaphoric phrases linking the tying activity with the strengthening of a human community (compare with *relationship, obligation, bonds of friendship*, etc.) are common in many Indo-European languages. For example, W. Seyers lists the following words originating from the Celtic culture: Irish *coisring* 'gather', 'tie',

'obligation'; *adragr* 'tied'; *adsuidi* 'ties', 'legalise'. All those words represent the coalescence of meanings related not only to rituals and law but also to the art of game and elocution which with time were symbolised by chains and knots [Seyers 1990]. That thesis is also supported by A. Bammesberger who identified numerous words within the Indo-European language family indicating that an identical meaning was carried by 'to tie' and 'something that became a traditional norm', 'divine law' [Bammesberger 1989].

Furthermore, in the oldest Anatolian sources the semantics of knots covers the notion of creating a ritual community and actions which are magical-juridical in nature. To see the relation, compare the Hittite *išhai-/išhi-* 'tie, twist, oblige (in a ritual sense), *išhul-* 'treaty, agreement' with the Luvian *hišhiša* 'magic' < 'something tied by magic' [Kloekhorst 2008:391-392]. Though disputable, the two aforementioned lexemes are also often compared with the Hittite *išhama* 'song' and Greek *hymnos* 'song'(< 'something tied'). Yet, it cannot be precluded that the reduplications of *hišhi-* typical of the Luvian language are the Anatolian phenomenon and reflect the archaic practice of repeating actions for their "magical strengthening". Thus, it may be assumed that *hišhi-* meaning 'tie – tie' originates from a formula referring to manipulating a cord by winding it around an object (the Indo-European reconstruction: *(s)h$_2$i – sh$_2$i-*). The discussed Indo-European group of morpheme *sh$_2$ey-* 'tie' includes also the archaic Nordic *seiðr* 'cord, magic' – the magic of knots applied by Odin (Rix 2001:544; for more information about the parallels of mythological gods and heroes using the magic of knots and ties, see Eliade 1998, chapter 3; Collins 2008, chapter 3].

Adding to the above, the semantic complex linking cult-related terms with the name of a woven basket comprises the Hittite *kaluti* 'circle of people, separated group of gods' linked with the Greek word *kalathos* 'basket' and *klōzis* 'rope, cord' [Puhvel 1977:151].

Another example of a morpheme whose derivatives include social references is the Indo-European *bhendh-* 'tie, plait' which can be compared to the German *Bund* 'union', 'association', *Band* 'tape'. Additionally, sacral meanings are reflected in the name of a Thracian goddess *Bendis*, while the social – juridical ones in the Greek *pentherós* 'father-in-law'. In the context of this study, it needs to be noted that the family of the above words encompasses the names of vessels and receptacles, for example the Greek *pithos* and the Latin *fiskus*. That semantic field covers also the Latin *fides* 'faith, trust' and archaic Irish *bés* 'custom, habit'. Therefore, based on the above deduction the Indo-European name for a receptacle *bhidhskos* would mean something 'tied tightly' 'something established, trusted'.

Cords representing decorative elements on vessels can be viewed as just an example of their many ritual applications [Kowalski 1998]. The strength and power of a cord, plaiting and other textile patterns was probably transferred onto cord-decorated objects. However, in that very case there is no contradiction between the act of conferring power and cohesion onto objects and giving them their aesthetic qualities. It seems that cord ornamentation retained these magical features, while carrying aesthetic values. That assumption is exemplified by a very specific semantic variation of the morpheme *peh$_2$k*'- / *pōk*'- meaning not only 'to strengthen' but also 'to beautify' (amongst others with the use of a cord) – compared with the archaic Germanic *faʒripō* 'ornament, beauty', the Tocharian B *pakri* 'visible, appearing' and the Umbrian *pacer* 'tied', the archaic Indian *pāša* 'cord, knot' [Orel 2003:89; Rix 2001:461; Cheung 2007:299; Pokorny 1959:797; Seebold 1970:185-186].

Thus, an ornament in the form of a ribbon or a cord impression could not only be admired but could also be used to create visual symbolic forms. The above lexeme *bhidhskos*, meaning a woven receptacle or a vessel with plaited elements has its numerous equivalents in the semiotic field. For example, the Celtic *bondyo* meaning 'armlet, bracelet' originally meant 'something plaited', the Germanic *banđwō* meant 'sign' and the Latin *offendix* 'knots, cords as a head cover and symbol of sacerdotal function' [Matasović 2009:70]. All the examples listed above indicate that the plaiting motives represented not only an element of clothing and a piece of decoration but were also a symbol of performed social function or social prestige.

However it should be emphasised that the archaeological interpretation of ornamentation found on pottery is based on modern analyses and understanding of the ontological nature of an object. Thus, an ornament is viewed as just one of many features of an object not being tantamount to the object's "being" but rather as a mere addition to the object. The act of ornamenting an adequately shaped vessel is usually, in a sense, understood as a complementary action. Therefore, from the perspective of the vessel's practical qualities, ornamentation is rarely functional in nature. Nonetheless, it seems that the presence of decorative elements is not always a prerequisite for an effective use of a given vessel. That viewpoint, however, may be seen to be incorrect with regard to the prehistoric communities in the case of which each and every element of an object is considered to be absolutely indispensable in the object's structure.

6. ORNAMENTATION AS A SYMBOL IDENTIFYING THE USERS OF CORD-DECORATED VESSELS

It is quite obvious that both the type, quantity and quality of vessels and the context behind their occurrence may provide data about the social structure of their users. Vessels can be viewed therefore as material emblems of a group identity and symbols of social hierarchy, etc. Most likely, they were also used strategically to facilitate the establishment of intergroup contacts. In addition, the practice of forming and, in particular, of decorating vessels was either sanctioned by tradition or was based on skills gained by some communities within a family or a tribe [Soudský, Pavlů 1966:106 and forthcoming]. Therefore, any achievements in that domain could be offered, exchanged or be treated as a family-owned storage of preferred skills and competence in the field of craft, art or technical abilities. In that context, the studies of stylistically changeable decorations found on pottery are of great significance for research into the prehistoric Neolithic cultures, while many aspects related to the distinctive function of ornamentation are increasingly often subject to in-depth critical analyses [Szmyt 1996:41-45].

Should the hypothesis where an ornament represents an integral part of an object's structure be accepted, it can be implied that the practice of decorating vessels with cord or textile impressions was inspired by magical-mythical meanings and as a consequence, it may reflect complex processes of accession to the discussed storage of symbols. In other words, the attractiveness of ornamentation was fuelled by the efforts of individual Neolithic communities to participate in a set of goods and concepts signified by the symbolism of cords and plaiting. The above symbolism would stem from a set of concepts reflected in adequate physical manifestations, which at a later stage of the symbiosis process were transformed into purely metaphoric meanings as per the matrix suggested below:

- physical manifestation: *cord*;
- implied meaning; *strength, stability, protection – apotropaic power, continuity of existence*;
- aesthetic qualities: *admired signs/symbols viewed as decorative elements*;
- dentifying objects: *objects/vessels, people as communities, family – ritual – juridical (ties.)*

In the practical dimension, however, the above developments occurred as part of partially limited codes, i.e. individual producers and users of cord-decorated vessels did not have to be aware of the complexity behind the semiotic links and contexts analysed here. Against that background, the sheer sense of a pattern underlying the use of specific symbols sanctioned ritually and socially, seemed to suffice [Douglas 2004:64-67]. It is difficult though, to assess to what extent the discussed ornamentation type evidences the formation in the Neolithic of an 'independent symbolic storage' [*external symbolic storage* according to Donald

1991]. Undoubtedly, cord ornaments are neither a pure outcome of traditional methods applied to make organic receptacles nor a consequence of spontaneous imitation. In contrast to other potential signs and symbols of social identity (for example, the T – shaped amulet of the GAC, bell beaker, early-Bronze dagger, etc.), the cord motif inspired an extensive and well marked cultural valorisation process, which was also significant in terms of mythological thinking (for example, the symbolism of fate). Therefore, it seems that another stage (compared to earlier traditions, including the linear ones of the Anatolian – Balkan circle) of strengthening the storage of concepts sanctioning cord-related symbolism can be presumed. In the long-lived symbolic genealogy that process is likely to date back to the Paleolithic plaiting crafts. Nevertheless, the Neolithic axiology behind textile techniques enabled the spreading of mythological aura onto other fields of production, including pottery. As a consequence, it was yarn, thread and cords that were attributed by the ancient mythical – ritual tradition the unique metaphoric power to bind communities and that also reflected both the continuity and fragility of human existence [West 2007:372-374].

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THE FIRST 'CORDED' CERAMICS ORNAMENTATION OF ENEOLITHIC STEPPE AND NEOLITHIC FOREST-STEPPE CULTURES[1]

Corded ornamentation was observed for the first time in the steppe area between the Dnieper and the Don rivers in the Sredniy Stog culture monuments of the early Eneolithic Age. Artefact ornamentation was represented by imprints of a coiled cord [Kotova 2008]. Classic 'corded' ornamentation appeared in the Middle Eneolithic in the monuments of the Dereivka culture and the lower layer of the Mykhailivka settlement. In this context, corded ceramics were most prolific in the steppe monuments of the Late Eneolithic, represented by the Rogachyk culture settlements in the Dnieper steppe and the Konstantinovka culture of the Don steppe area.

Dmitriy Telegin identified two periods of the Sredniy Stog culture and named the second period 'corded', thus having noted the emergence of classical corded ornamentation on ceramics produced in Dereivka and Molyukhov Buhor settlements. He assumed that those monuments had marked Europe's most ancient horizon of cord-ornamented monuments [Telegin 1973:155-156]. At present, however, the 'corded'-period monuments are viewed as a separate Dereivka culture [Rassamakin 1994; 1999; 2004; Videiko, Kotova 2004; Kotova 2008].

When dealing with the issue of the emergence of corded ornamentation in the Ukrainian steppe monuments, one should note that its various types emerged at different times. The earliest were the imprints of a twisted cord, i.e., a cord coiled over another cord or a stick, which first appeared in the steppe in the Early Eneolithic in Sredniy Stog ceramics.

[1] In this article the original version of town names etc. have been retained as per the author's wishes.

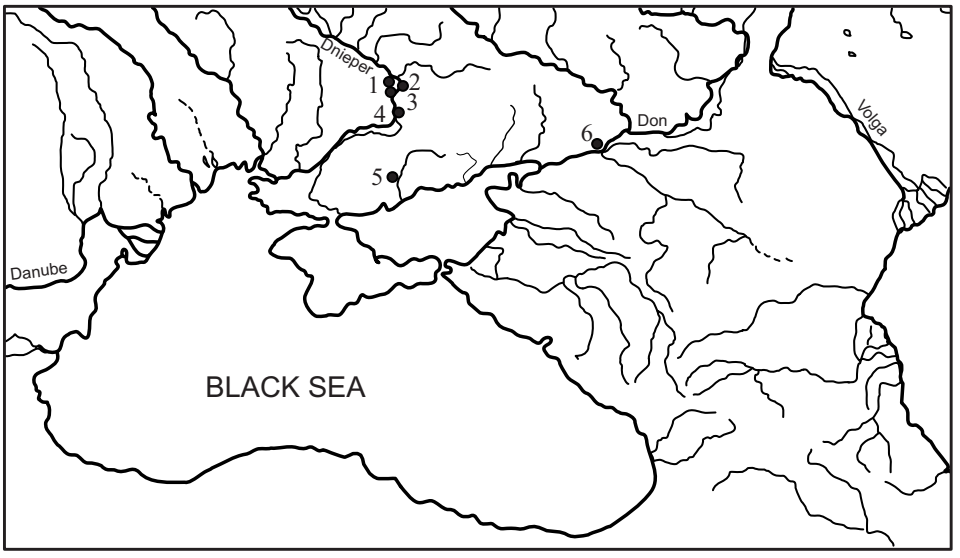

Fig. 1. Map of Sredniy Stog monuments containing cord-ornamented ceramics: 1 – Igren burial site; 2 – Strilcha Skelya; 3 – Kodachok Island; 4 – Sredniy Stog Island; 5 – Semenovka 1; 6 – Razdorskoe 1 settlement

1. CORDED ORNAMENTATION OF THE SREDNIY STOG CULTURE

Monuments of that culture have been studied in the steppe area from the Lower Don to the Dnieper. As of today, 25 settlements have been registered. In the Lower Don area where Sredniy Stog materials have been found in the fourth and fifth layers of Razdorskoe 1 settlement, Samsonovka, and Tsimlyanskoe. The settlements, studied in the Siversky Donets basin, include Oleksandriya, Serebryanskoe, and Chernikovo Ozero 1. The Razdolnoe settlement was explored in the Kalmius River basin, and Semenovka 1 and Kamyana Mohyla 1 were explored in the Molochna River basin. The Sredniy Stog materials found in the Dnieper area include the materials from Zolota Balka, Igren 8, Sobachky, as well as the finds from the Vinogradnyi, Sredniy Stog, Kizlevyi, Kodachok, Pokhylnyi, Strilcha Skelya, and Khortytsya Islands [Kotova 2008].

The oldest ceramics decorated with coiled cord imprints were found in the monuments of the second period of the Sredniy Stog culture in the upper layer of Semenovka 1, the lower horizon of the fifth layer of the Razdorskoe 1 settlement, and in grave 15 of the Igren burial site (Fig. 2:1-5). Generally, monuments of the second period of the Sredniy Stog culture date back to 4800-4350/4300 BC [Kotova 2008]. However, the emergence of a coiled cord-like ornament can be

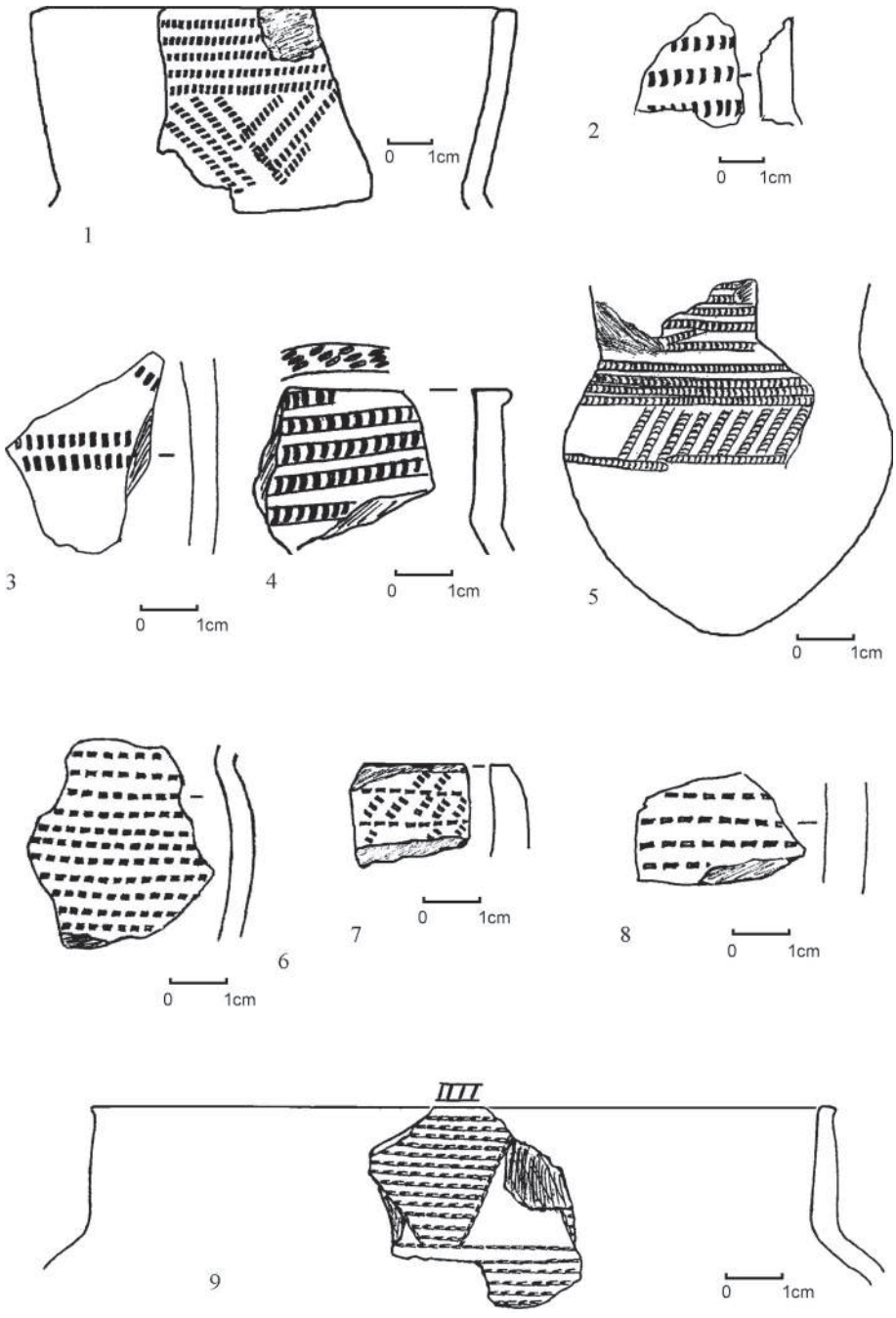

Fig. 2. Ceramics of the second period of the Sredniy Stog culture: 1 – 3, 7 – 9 – Semenovka 1; 4, 6 – Razdorskoe 1; 5 – grave 15 of the Igren burial site

Table 1

Radiocarbon dates of corded-ornament monuments: Sredniy Stog culture, western variant.

Monument, material	Lab. Index	BP	calBC [Weninger *et al.* 2005]
Second Period			
Igren burial site, grave 15	Ki-8304	5745±60	4595±74
Semenovka, trench 2, sq.6, depth100-120, animal bone	Ki-7674	5655±60	4484±72
Semenovka, trench 2, sq.4, depth 90-115, animal bone	Ki-7673	5525±70	4371±69
Semenovka, trench 2, sq.1, depth 90-100, animal bone	Ki-7672	5440±60	4277±59
Strilcha Skelya, sq.8, horizon 6, animal bone	Ki-8173	5630±70	4464±73
Third Period			
Strilcha Skelya, sq.6, horizon 5, animal bone	Ki-8172	5480±70	4325±72

probably linked to the middle of the second period. Its timing can be defined by the dates of the upper layer of Semenovka 1 and grave 15 of the Igren burial site at about 4600-4500 BC (Table 1).

Unfortunately, the Razdorskoe 1 materials have not been published in full, and one's judgement on the scope of dissemination of corded ornamentation at that time can be based only on the materials of the Semenovka 1 settlement. The third layer of that monument contained fragments of some 14 vessels. Only two or three had been decorated with imprints of a twisted cord (Fig. 2:1-3) where it consisted of one thread tightly coiled on a rod.

The predominant patterns of the time were prick marks, drawn lines and comb-shaped imprints. The only definitely recorded case is the use of long marks of a coiled cord. The imprints resemble the ornament made with a long 'comb' cliché, placed athwart the vessel's surface (Fig. 2:6-7). The ornamental compositions made with the cord are similar to compositions made with imprints and pricks, which consist of horizontal lines, or a combination of horizontal and diagonal lines, or horizontal lines and upside-down triangles (Fig. 2).

This kind of ornament was more commonly used in the third period of the Sredniy Stog culture about 4350/4300-4200 BC [Kotova 2008]. The vessels, decorated with coiled cord, were found in the second layer of Sredniy Stog, the fourth layer of Strilcha Skelya, and on the Kodachok Island.

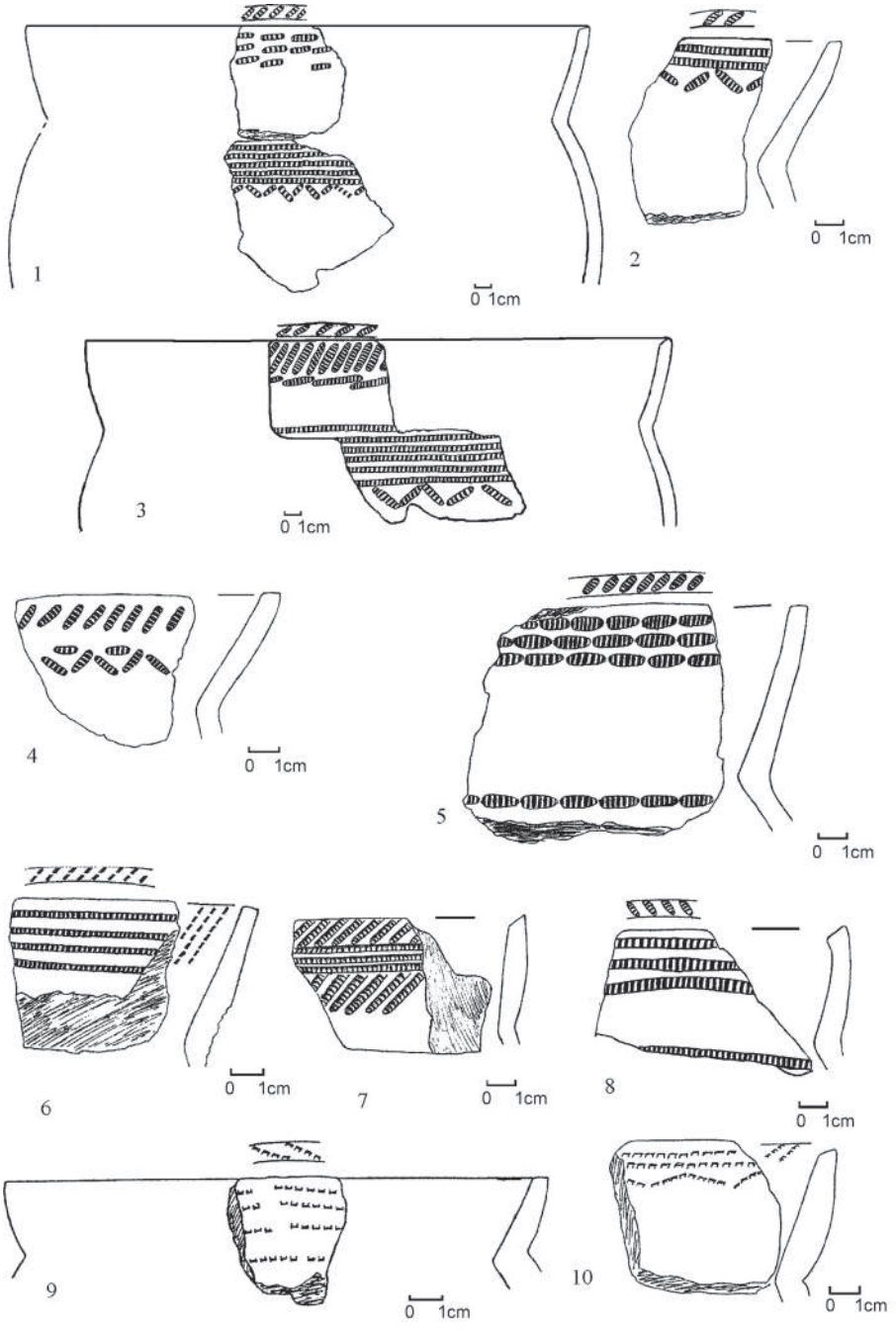

Fig. 3. Ceramics of the third period of the Sredniy Stog culture: 1 – 7, 9, 10 – Sredniy Stog; 9 – Kodachok Island

The preserved part of the second layer of the **Sredniy Stog** collection includes remainders of 45 vessels, seven of which were decorated with imprints of a 'caterpillar' and coiled cord. A. Dobrovolsky noted that coiled-corded pots had been found in the upper horizon of the second culture layer only [Dobrovolsky 1929:134]. Unfortunately, when registered the vessels were marked in a way that made it impossible to relate them to the lower or upper horizon.

The collection of the fourth layer of **Strilcha Skelya** included fragments of 19 vessels, of which three rims and two sides were decorated with imprints of a coiled cord (Fig. 4:1-5).

The third layer of a settlement located on the **Kodachok** Island produced fragments of eight pots, one of which had been decorated with coiled cord imprints (Fig. 3:8).

A vast variety of patterns was known as common for that period. While long imprints remain (Fig. 3, Fig. 4:1-5), short imprints appear, including those with a wider middle part and narrower ends, the so-called 'caterpillar' or 'plait' twisted cord pattern ('gusenichka') (Fig. 3:1-5; Fig. 4:3, 5).

As during the second period of the Sredniy Stog culture, ceramics of the third period with elements of 'corded' ornamental compositions coincide with elements made with 'comb' clichés. The cord and comb imprints make horizontal lines or horizontal lines with short diagonal imprints in the space between the lines or horizontal lines with zigzags or triangles, filled with horizontal lines (Fig. 3; Fig. 4).

2. CORDED ORNAMENTATION OF THE DEREIVKA CULTURE

The Dereivka culture was formed about 4300 BC in the southern part of the present-day forest-steppe Dnieper, based on traditions of the late Sredniy Stog people who had migrated from the South in the climate aridization period, and the local population that left the Kyiv-Cherkasy Neolithic monuments [Sanzharov *et al.* 2000; Kotova 2008]. Today, about 25 settlements that date back to about 4200-3800 BC (Table 2) can be referred to the Dereivka culture. Excavations have been performed on twenty of the settlements. The settlements studied in the Siversky Donets include Oleksandriya, Chernikovo Ozero 1, 2, 3; Serebryanskoe, and Minevskiy Yar. The studied sites in the Dnieper area include Vinogradnyi Island, Zolota Balka, Igren 8, the right-bank and left-bank settlements of Vovnyhy, Pokhylyi Island, Sobachky, Zolota Balka, Solovyina Roshcha, Molyukhov Buhor, Dereivka, and Uspenka. Individual monuments have been found in the western upper Azov area (Kamyana Mohyla 1) and the Southern Bug River (Novorozanovka). The explorations resulted in studies of the Kamyani

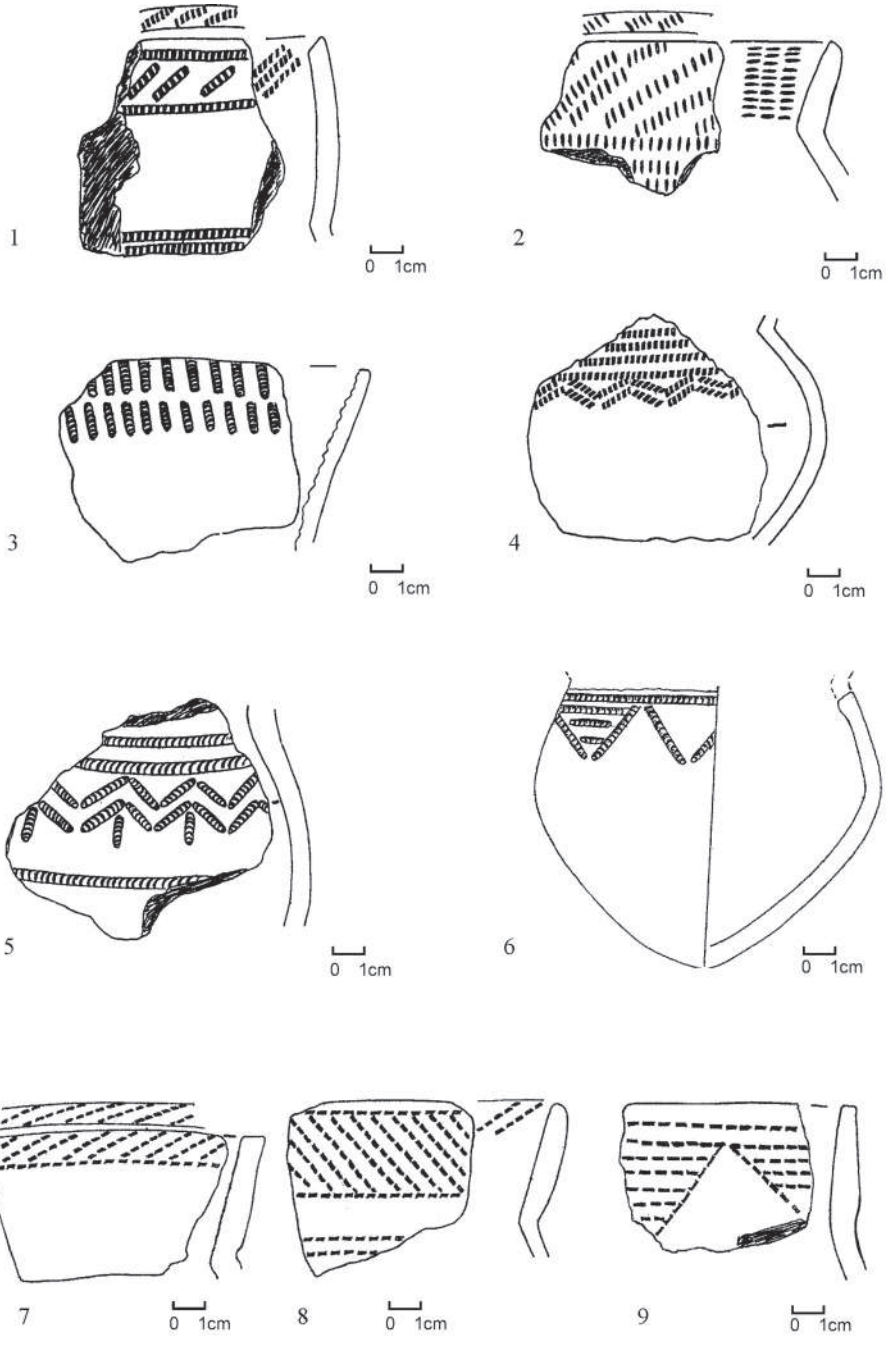

Fig. 4. Ceramics of the third period of the Sredniy Stog culture: 1 – 5, 7, 8 – Strilcha Skelya; 6 – grave 1 of the Igren burial site (excavations of 1930s); 9 – Sredniy Stog

Table 2

Radiocarbon dates of corded-ornament monuments of the Dereivka culture.

Monument	Lab. Index	BP	calBC [Weninger *et al.* 2005]
Dereivka 1, animal bone	Ucla-1466	5515±90	4354±91
Dereivka 1, animal bone	Ki-6966	5370±70	4195±103
Dereivka 1, animal bone	Ki-6960	5330±60	4158±85
Dereivka 1, animal bone	Ki-6964	5260±75	4104±100
Dereivka 1, animal bone	Ki-6965	5210±70	4056±91
Dereivka 1, animal bone	Ucla-1671	4900±100	3697±124
Molyukhov Buhor, trench 1, sq. 2a, depth 40-50, animal bone	Ki-7993	5330±80	4163±102
Molyukhov Buhor, trench 1, sq. 2a, depth.40-50, animal bone	Ki-7994	5270±80	4110±102
Buhayevo, sq. 15, depth 0-20, animal bone	Ki-8074	5320±60	4149±83

Potoky settlement and earlier destroyed settlements on the Khortytsya Island in the Dnieper area, encampments in the upper Sivash area, and Verevkine hamlets 14 in the Siversky Donest basin.

The most prolific materials came from Oleksandriya, Dereivka, Uspenka and Molyukhov Buhor only. The other monuments had been short-term encampments and produced scarce fragments of ceramics. Corded ornamentation was not found in all of the monuments and had been most commonly used by the population of Dereivka 1 and Molyukhov Buhor settlements in the southern part of the present-day forest-steppe Dnieper area. In the Siversky Donets basin, vessels with such ornament had been scarce and were found only in Oleksandriya, Serebryanske and Chernikovo Ozero 1 settlements.

The Eneolithic settlement of **Dereivka 1** is part of a complex monument excavated by D. Telegin in 1960-1967 near Dereivka village, Onufrieve district of the Kirovohrad region [Telegin 1986]. The monument comprised an Eneolithic burial site, individual graves of other epochs and a multi-layered settlement. The studied culture layers of the settlement are those of the Middle Ages, the Bronze Age, the Eneolithic, and the Neolithic.

The Eneolithic settlement consisted of a large yard, two huts and a barn. There were seven hearths, eight household pits and a cult complex around the yard [Telegin 1986:5-70]. The huts were dug in the soil 30 cm deep, were of

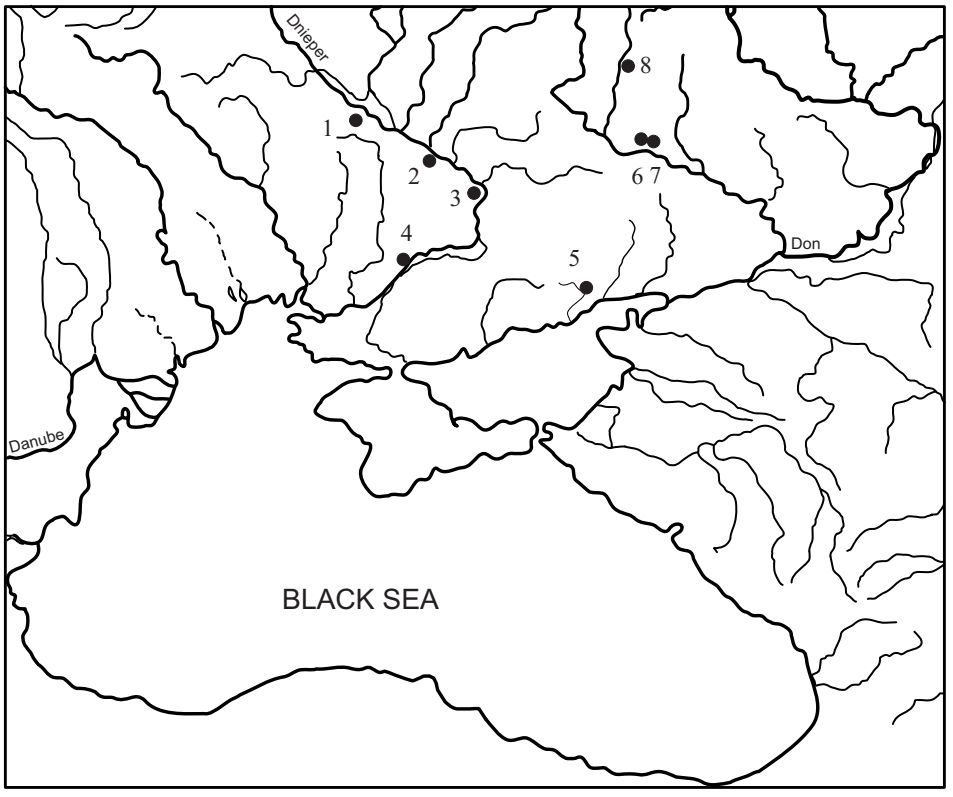

Fig. 5. Map of Dereivka culture monuments and the type of Mikhailovka lower layer, containing cord-ornamented ceramics: 1 – Molyukhov Buhor; 2 – Dereivka; 3 – Igren burial site; 4 – Mykhailivka; 5 – Buhayevo; 6 – Chernikovo Ozero 1-3; 7 – Serebryanskoe; 8 – Oleksandriya

rectangular shape and based on pile constructions. There has been a view that the Eneolithic layer of Dereivka consisted of two chronological horizons, the younger of which contained cord-ornamented ceramics [Movsha 1998]. That view has not been supported with any stratigraphic observations. When excavating and studying the materials, Telegin did not differentiate the Eneolithic materials either by the depth at which they lay or by their planigraphy. On studying the data from the collection and reports, the author did not manage to identify any stratigraphic horizons or observe specific pottery of specific construction objects and sectors of the settlement. These Eneolithic ceramics were found at different depths (from 0-30 to 120 cm); over the shell layer, within the layer and under it.

Researching the monument was made more complicated by the fact that it had multiple populations (Bronze Age, Early Iron Age and the Middle Ages), which had involved the construction of a variety of structures. As a result, the archaeological material in the culture layer is substantially mixed. In most of

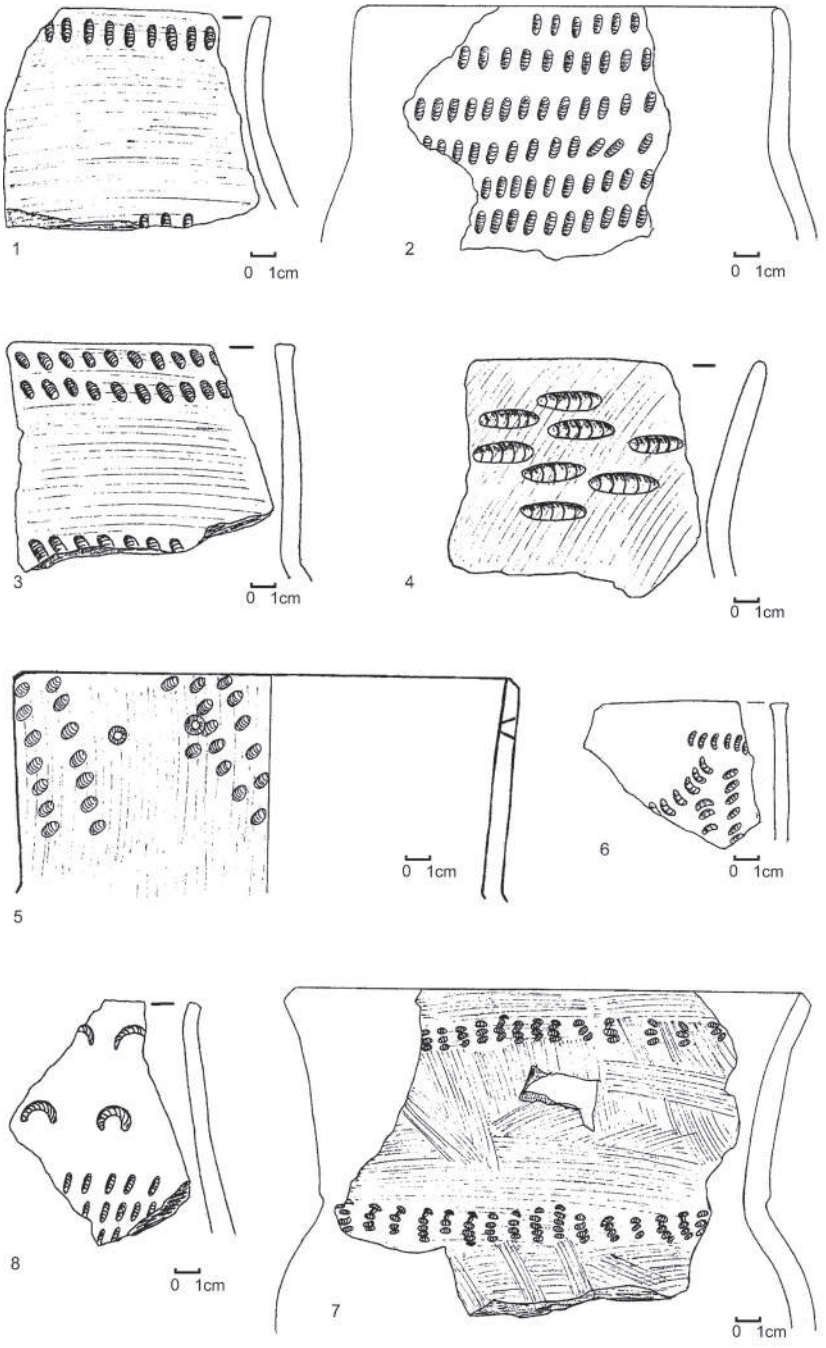

Fig. 6. Ceramics of the Dereivka settlement

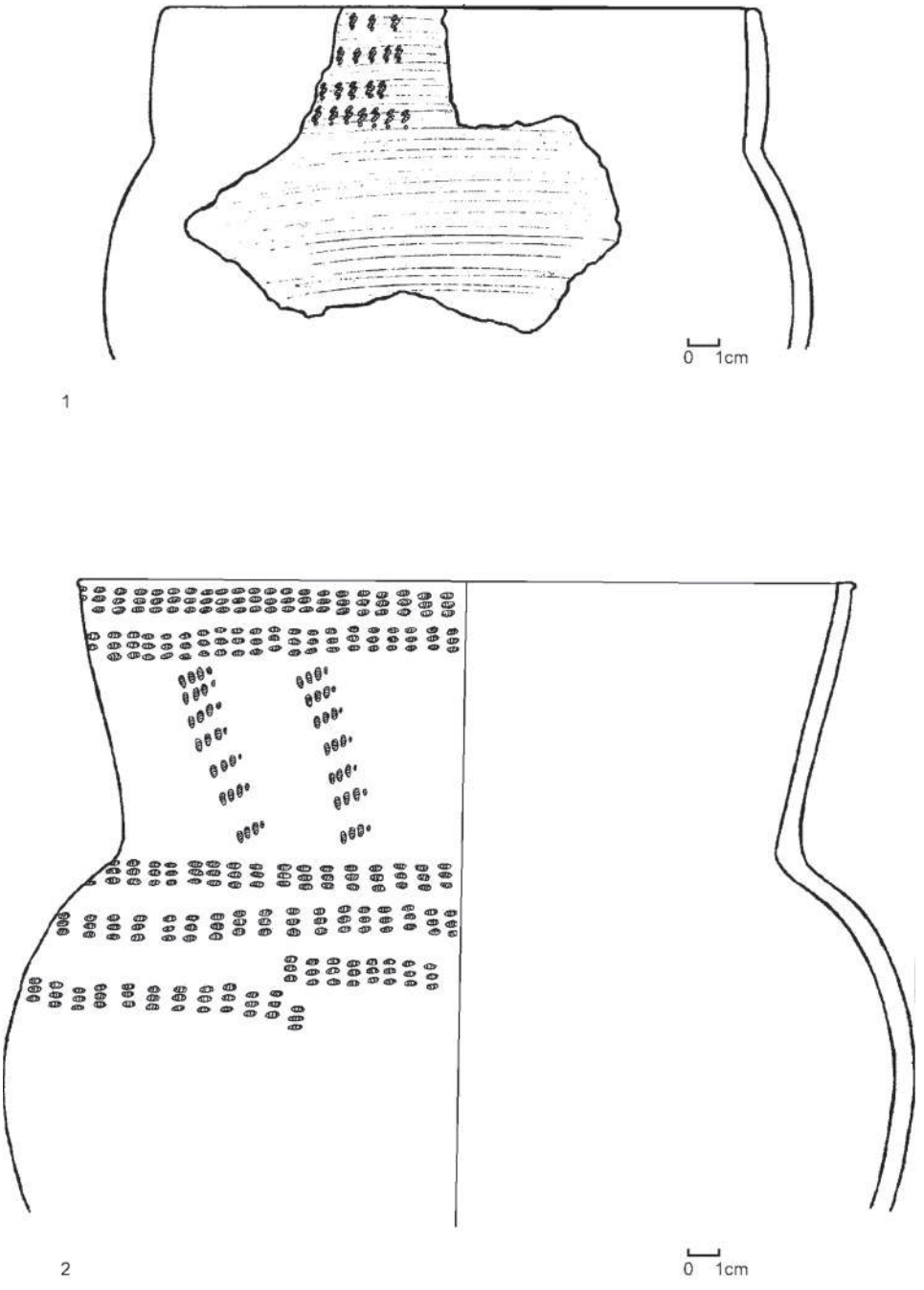

Fig. 7. Ceramics of the Dereivka settlement

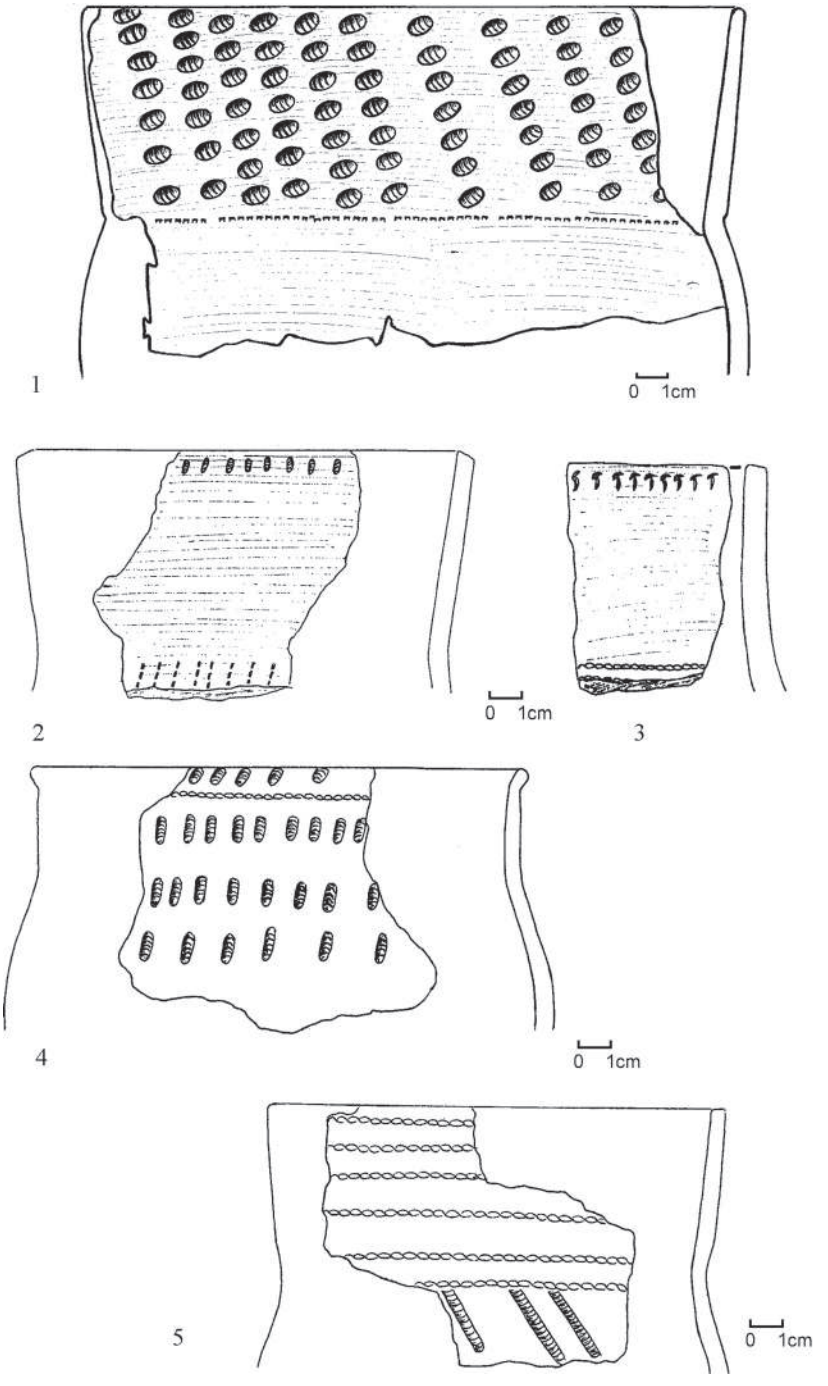

Fig. 8. Ceramics of the Dereivka settlement

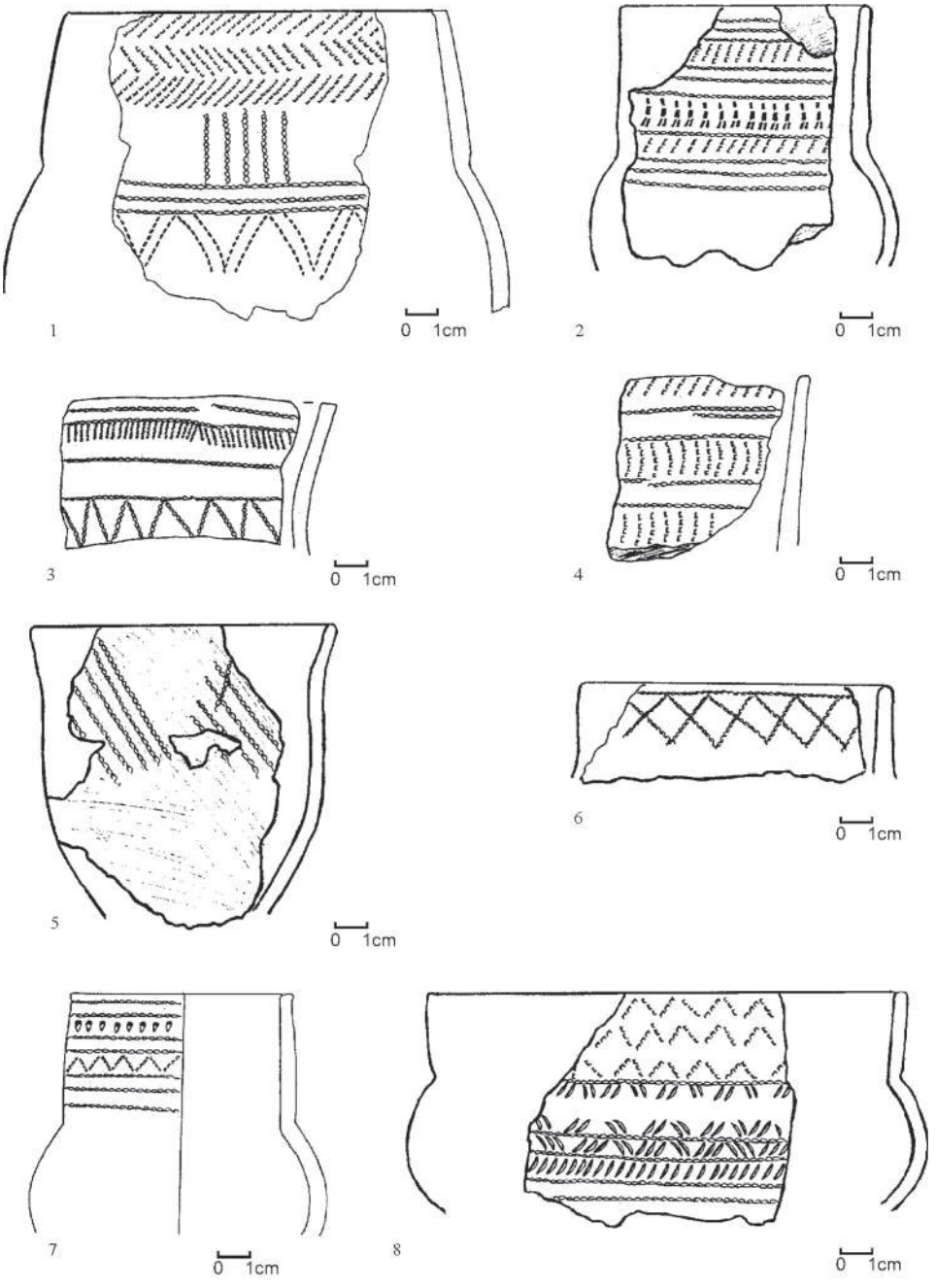

Fig. 9. Ceramics of the Dereivka settlement

the squares, the Late Bronze and Middle Ages ceramics occurred throughout the cultural layer. Ceramics were also found in the shell layer, which was probably related to the Eneolithic, and under that layer too.

The lower horizons of individual squares did not contain any late ceramics, which allows an assumption that their cultural layer had not been mixed (sq.129, 129, 133-136, 143, 146, 614, 621, 623, 624 etc.). However, those squares, too, contained corded Eneolithic ceramics together with those decorated with 'combed' and 'pricked' patterns in the lower horizon of the culture layer (under the shell layer), as well as under the shell layer and over it. The whole Eneolithic layer was probably about 30 cm thick. Meanwhile, regardless of these facts, a possibility that various chronological horizons exist within the Eneolithic layer but cannot be identified (based on the available material finds) should not be excluded.

The Dereivka 1 collection includes remainders of about 600 best-preserved vessels. The variety of the pottery is rather vast: bowls, cups, goblets, pots and jars. Pots and goblets refer to the profiled-top vessels; the goblets are between 6 and 12 cm in diameter; the diameter of the pots is over 12 cm. The non-profiled-top vessels, which are higher than their diameter, are referred to as jars.

The main kinds of ornament of the Dereivka ceramics were various-length imprints of 'comb' clichés. The second most commonly used ornament was the 'pricked' pattern. Combinations of 'comb' imprints and 'pricked' patterns were also widely used. Other kinds of ornamentation, including the cord, were scarce. Various kinds of cord ornamentation decorated one of the bowls (Fig. 10:5), a cup (Fig. 9:8), seven goblets (Fig. 9:1-7), and 25 pots.

Nine vessels were decorated with imprints of a coiled cord that differed in size and displayed two versions of the imprints. The first version featured short marks made with a tightly coiled thin or thick single-thread cord (Fig. 6:1-7; Fig. 21:1, 2). Such imprints are identical to those found on Sredniy Stog ceramics.

The second version featured marks of a loosely coiled cord with gaps between the coils (Fig. 6:8; Fig. 7; Fig. 21:3, 4). This version had not been known in the more ancient Sredniy Stog culture.

Ornamentation of two pots combines a coiled cord of the first version with the comb imprints (Fig. 8:1, 2). Another object was decorated with a combination of the first version of coiled cord imprints with a regular corded ornament (Fig. 8:4). Ornamentation of only one of the vessels features long imprints of a coiled cord, known by the ceramics of the third period of the Sredniy Stog culture (Fig. 8:5), combined with ordinary cord marks.

Part of the Dereivka ceramics was ornamented with imprints of an ordinary cord, which formed horizontal and vertical lines, a fishbone pattern, zigzags and grids (Fig. 9:5, 6; Fig. 10; Fig. 11). The imprints were of various lengths.

Some of the vessels were decorated with ornaments that combined cord imprints with comb marks (Fig. 9:1-4; Fig. 11:6), as well as with *pearls* (Fig. 11:1), holes or prick marks (Fig. 12:2-5).

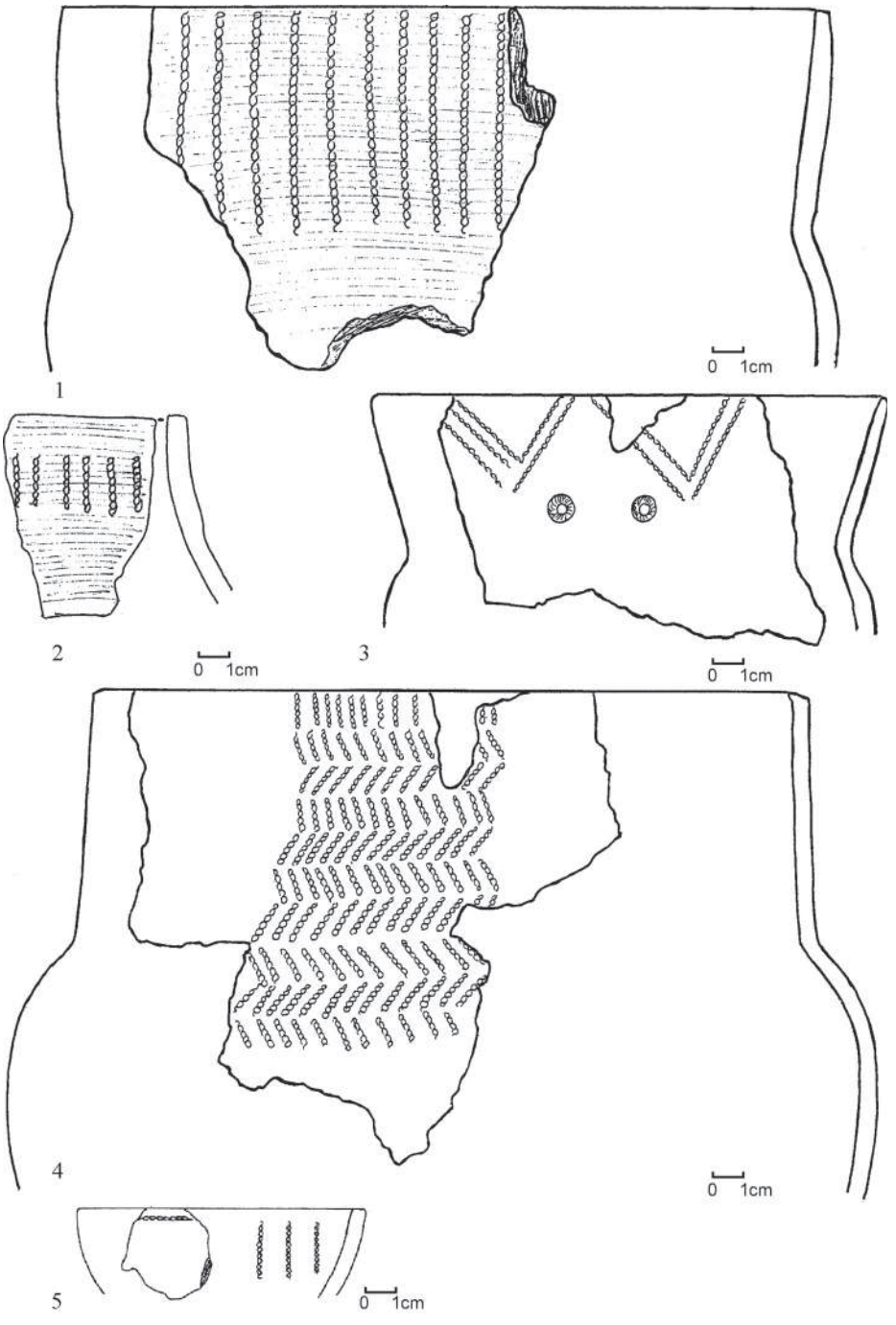

Fig. 10. Ceramics of the Dereivka settlement

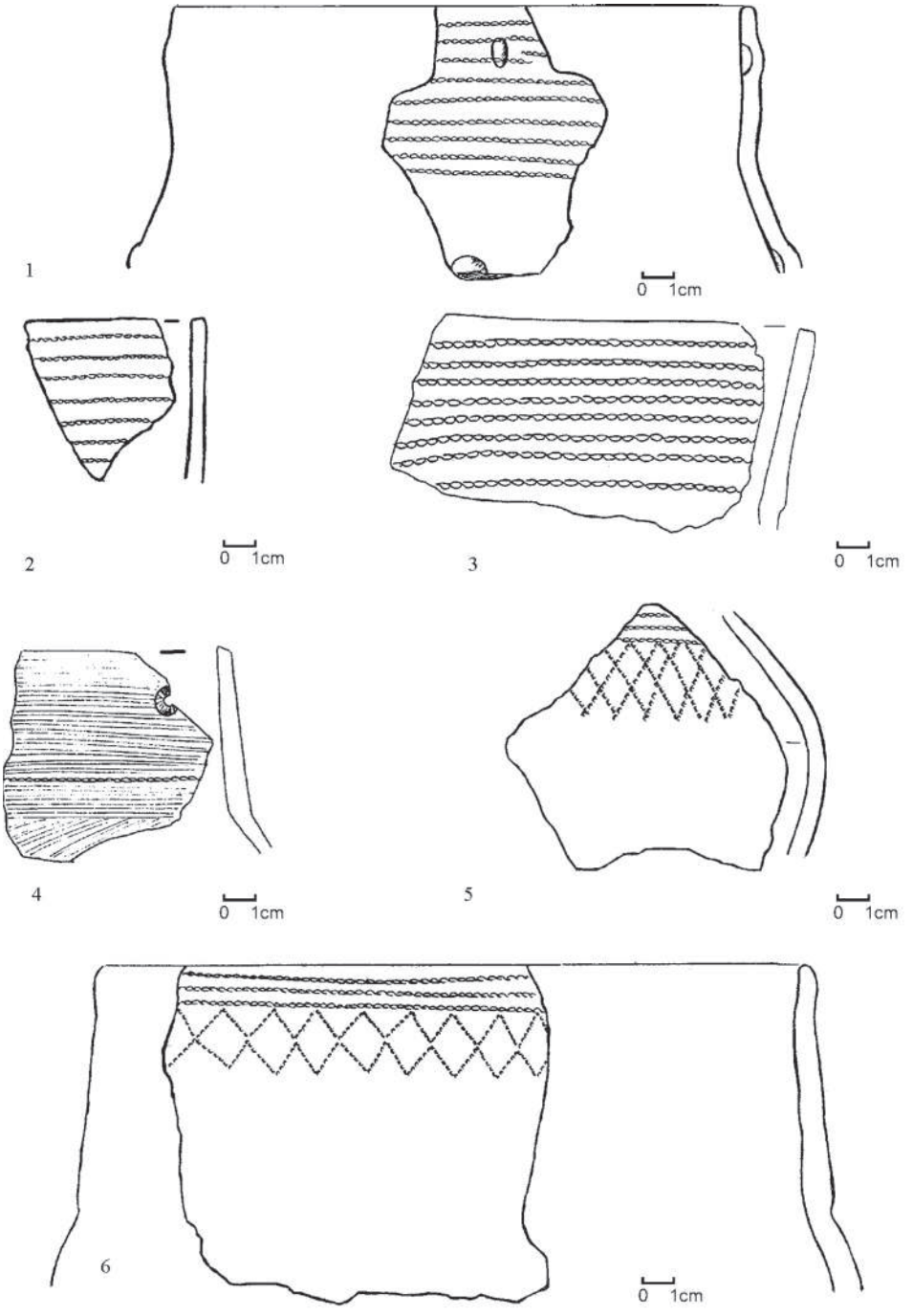

Fig. 11. Ceramics of the Dereivka settlement

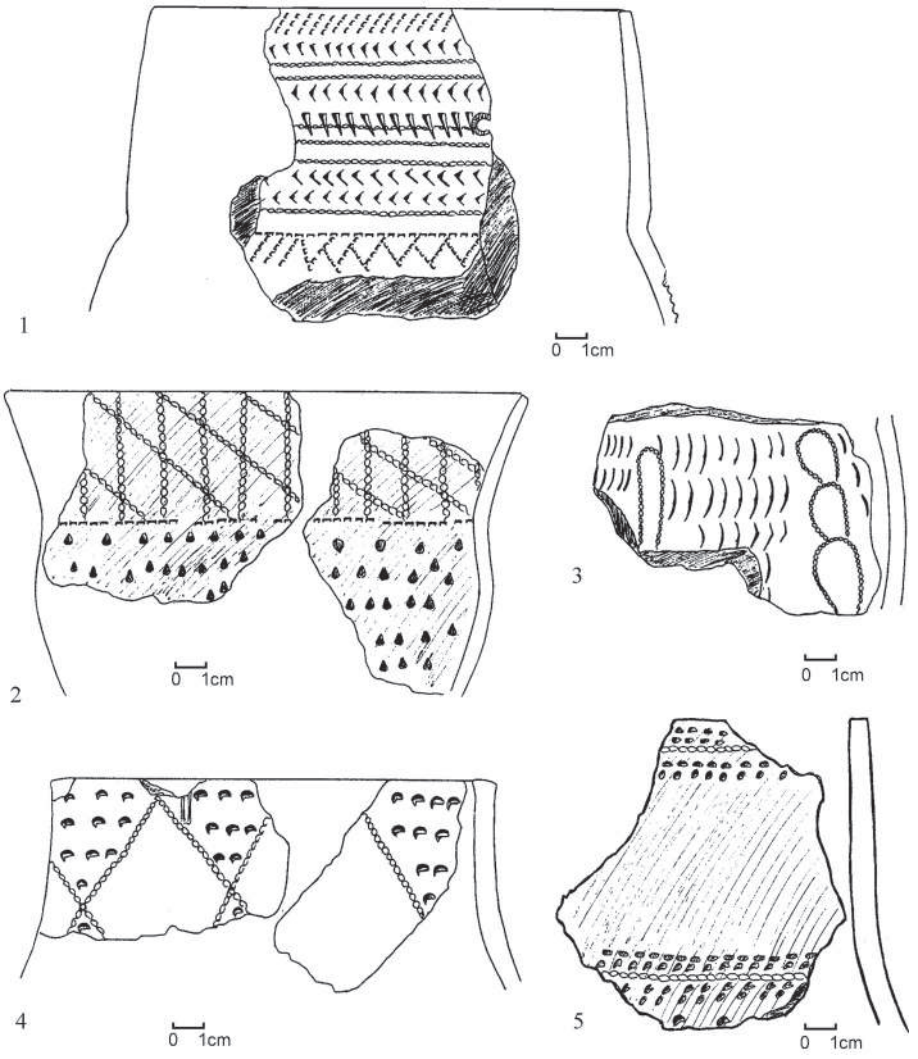

Fig. 12. Ceramics of the Dereivka settlement

Less often, ornamentation combines there elements, one of which is represented by cord imprints. Such a sophisticated ornamentation occurs on a goblet and a cup (Fig. 9:7, 8), as well as on a small pot (Fig. 12:1). The corded ornament on those vessels was combined with comb marks and various-shaped imprints.

Some of the Dereivka ceramics were decorated with a combination of cord and hole ornament (Fig. 12:2, 4). Alongside with the Dereivka culture ceramics, the same layer of that settlement contained pottery of the Pit-and-Comb Pottery culture [Kotova 2003b] that shares common features with the Eneolithic pottery,

i.e., the admixture of shell in the clay, a high chamfered neck, often with a 'collar' on it. Those features allow an assumption about co-existence of the populations of the two cultures in the same site, and dissemination of the 'hole' ornamentation under the influence of the Pit-and-Comb Pottery culture.

D. Telegin referred the Dereivka settlement to the early second period of the Dnieper version of the Sredniy Stog culture, and also synchronized it with the lower layer of Mykhailivka and Trypillia C1 [Telegin 1986:74, 107]. In this context, V. Danilenko argued that Dereivka had existed simultaneously with the B II Trypillia monuments [Danilenko 1974:76].

Based on animal bones, a series of radiocarbon dates have been obtained for Dereivka. Out of them, the ones to be used are probably the dates obtained by the California Laboratory and the new methodology-based dates of the Kyiv Laboratory (Table 2). The oldest of the dates, 5515±90 BP (Ucla-1466), most probably refers to the Neolithic layer of the monument. Other dates indicate that an Eneolithic settlement existed on the site about 4230-3700 BC. The large time interval suggests that the main part of the settlement, including the constructions, existed within the period from 4150 to 4050 BC. At other times the ancient population might have occasionally visited the site, using it for temporary encampment.

As part of the project of corded ornamentation study, dating was performed on a cord-ornamented fragment of ceramics from the Dereivka settlement collection. This produced a very young date of 4330±80 BP (Ki-14870), which does not correspond with the dates taken from the animal bones. Hence, two assumptions can be made. First, the experience of dating ceramics at the Kyiv Laboratory demonstrates that rather often, dates obtained can be made substantially 'newer' compared to the dates taken from the bone or coal. Sometimes the dates may be as much as 1000-1500 years 'younger'. It was due to such cases that it was necessary to stop using the radiocarbon dates obtained from ceramics in that laboratory.

On the other hand, one may try and explain that a specific date was obtained for the cord-ornamented piece of ceramics. The dating was performed on a fragment of a vessel (Fig. 22), which was somewhat different from the rest of the cord-decorated pottery. Most of the pottery from the Dereivka collection, adorned with a cord, resembles in its ornamental compositions, the 'combed' or 'pricked' ceramics. These share a common vessel shape with a high neck and a 'collar' on the rim, the positioning of the imprints of a comb or a cord in the herringbone pattern, horizontal rows, zigzag, a combination of comb and cord imprints, as well as the prick marks in one of the vessel ornaments (Fig. 8, 9, 11, 12). However, some of the vessels decorated with cord imprints have low necks (Fig. 9:5, 6; Fig. 11:4) and on one of the vessels the cord ornament is combined with pearls, which is not typical for Middle Eneolithic ceramics (Fig. 11:1) where a wall of one of the vessels is decorated with loop-shaped cord imprints (Fig. 12:3). The presence of such fragments of ceramics and the 'young' date of the cord-ornamented ceramic

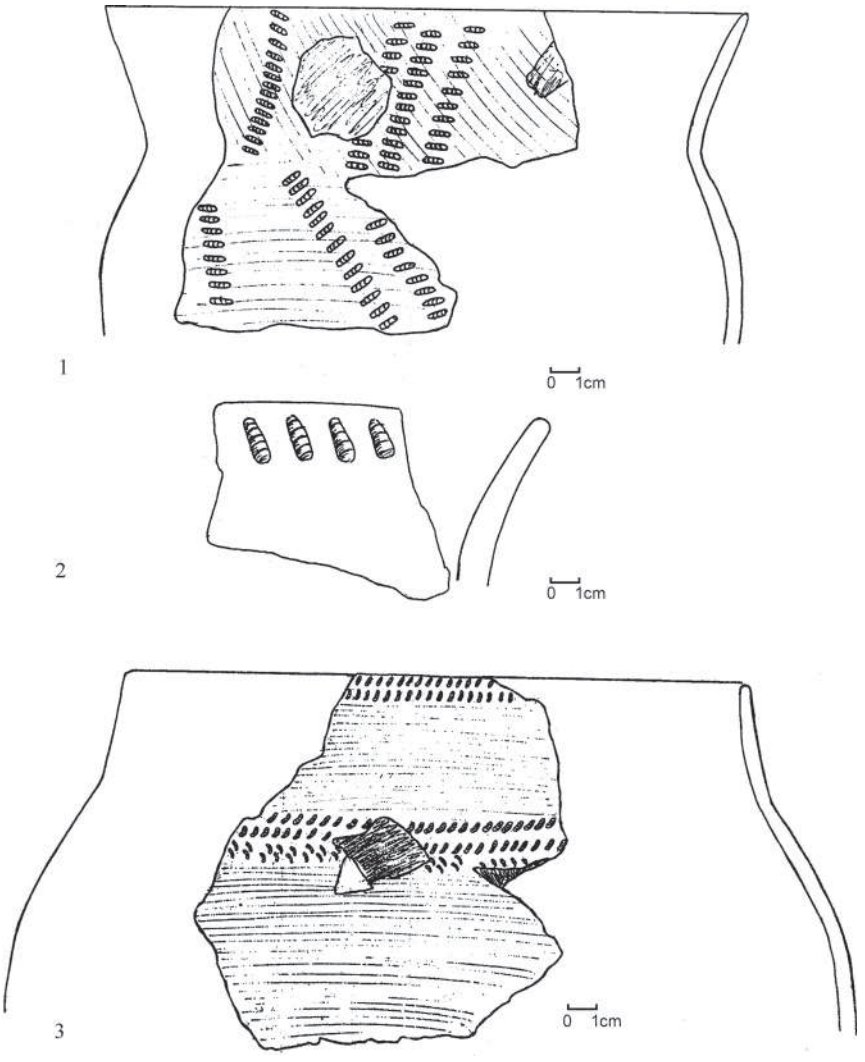

Fig. 13. Ceramics of the Dereivka settlement

fragment allow to assume that the Dereivka collection contains scarce materials of the Late Eneolithic – Early Bronze Age. Unfortunately, monuments of that period included by a number of researchers of the Pivikha culture, have been poorly studied and incompletely published, which complicates identification of that culture's materials in collections of such multi-layer settlements as Dereivka.

A rather prolific cord-ornamented pottery occurs in the **Molyukhov Buhor** settlement – excavated by Danilenko near Novoselytsa village, Chyhyryn district of the Cherkasy region in 1955-1956 [Danilenko 1974]. For several years, his ex-

cavation has been continued by T. Neradenko [Neradenko 1995]. This article uses only the materials from the excavation performed by Danilenko, who researched 100 sq. m and identified two Eneolithic layers, the lower of which contained a 6 m x 2 m construction without a hearth. Its floor had been dug in the ancient ground surface, probably 50 cm deep. The upper Eneolithic layer comprised the traces of a 15 m x 12 m rectangular spot with three hearths, which had been dug 15-20 cm deep in the ground.

The research of the archaeological collection showed all of the Eneolithic pottery to be homogenous. Its production technique, shape and ornamentation do not allow splitting it into two groups. Unfortunately, the insufficiently informative report and poorly preserved codes on the ceramics preclude relating the vessels to individual constructions. It is worth noting that the excavation performed by Neradenko at the remaining segment of the settlement proved the existence of only one Eneolithic layer in the settlement. Judging by the number of rims, fragments of about 60 Eneolithic vessels were found there in 1955-1956. The best preserved were fragments of 45 pots, which had been made of clay with an admixture of ground shells. Their inner and often outer surfaces had been smoothed with comb clichés horizontally and vertically. These vessels had sharp, slightly flattened or flat bottoms.

The highest proportion of ceramics ornamented with cord imprints has been registered in that particular settlement's collection. Eight pots were decorated with short imprints of coiled cord (Fig. 13; Fig. 14), seven pots with imprints of a plain cord (Fig. 15:2; Fig. 16:1-5, 7). Ornaments of four pots combined cord imprints with other imprints of various shapes (Fig. 15:1, 3; Fig. 16:7, 8).

Unlike in Dereivka, only one version of a single-thread twisted cord, coiled tightly on a flexible or straight base, was found in the site (Fig. 13; Fig. 14), which produced short imprints form horizontal and diagonal lines (Fig. 13; Fig. 14:1,2), and a herringbone pattern (Fig. 14:3-5).

Only one of the vessels displayed imprints of a long coiled cord in combination with ordinary cord imprints (Fig. 15:4).

The classical cord imprints formed horizontal lines and zigzags (Fig. 16:1-5, 6) and vertical lines of short imprints (Fig. 15:2; Fig. 16:7).

The three dates, obtained at the Kyiv Radiocarbon Laboratory from the animal bones taken from the Eneolithic layer at the settlement segment, excavated by Neradenko, indicate that the Eneolithic settlement had existed there about 4200-4050 BC (Table 2).

Cord-ornamented vessels also occurred in two Dereivka culture settlements of the **Igren burial site**. That earth burial mound in the vicinity of Dnipropetrovsk consisted of graves of different times, including the Sredniy Stog and the Dereivka culture [Kotova 2005].

One small flat-bottomed vessel from a washed-away grave was decorated with imprints of a coiled cord of the first version (Fig. 17:5). The second vessel was

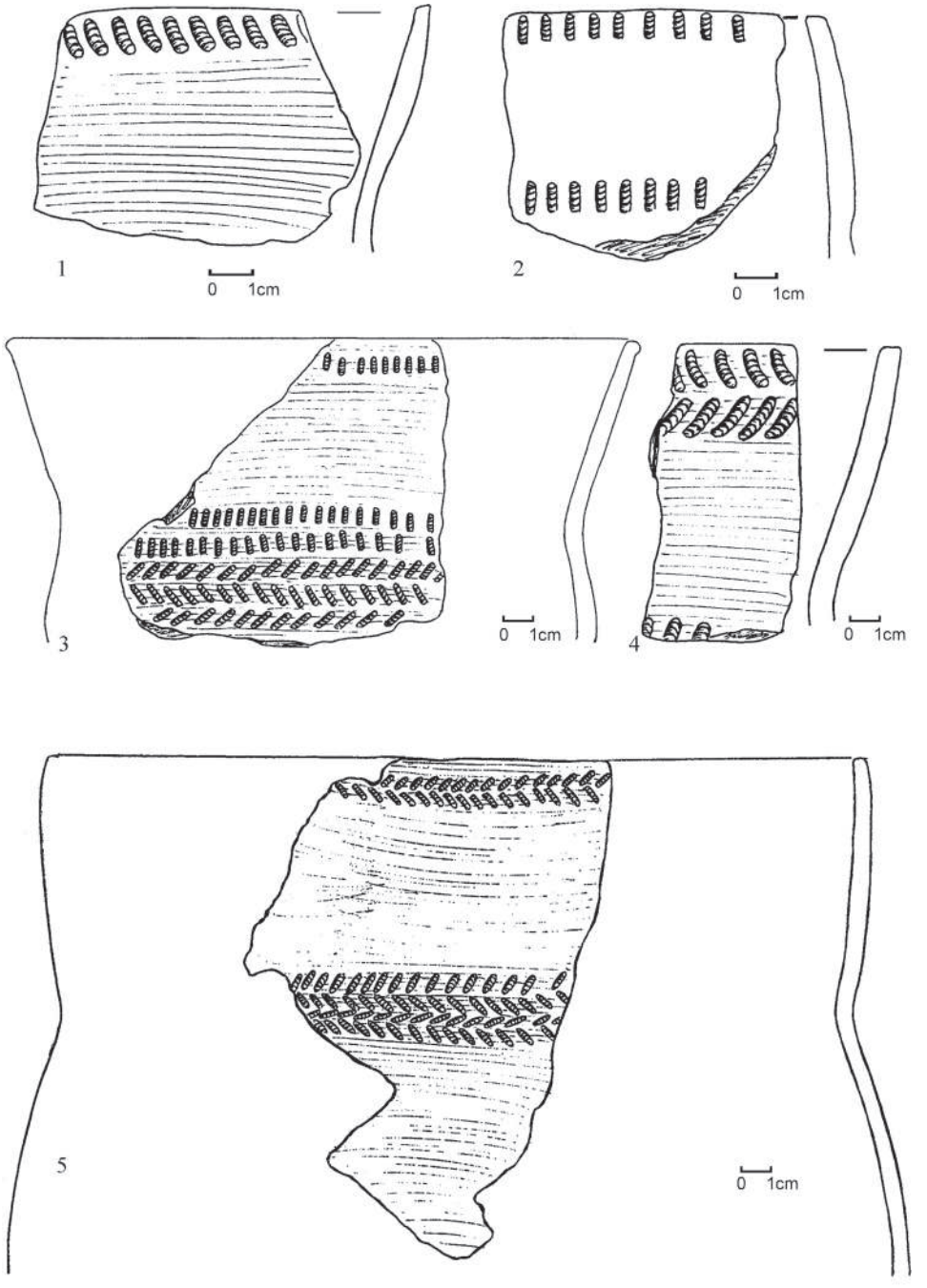

Fig. 14. Ceramics of the Dereivka settlement

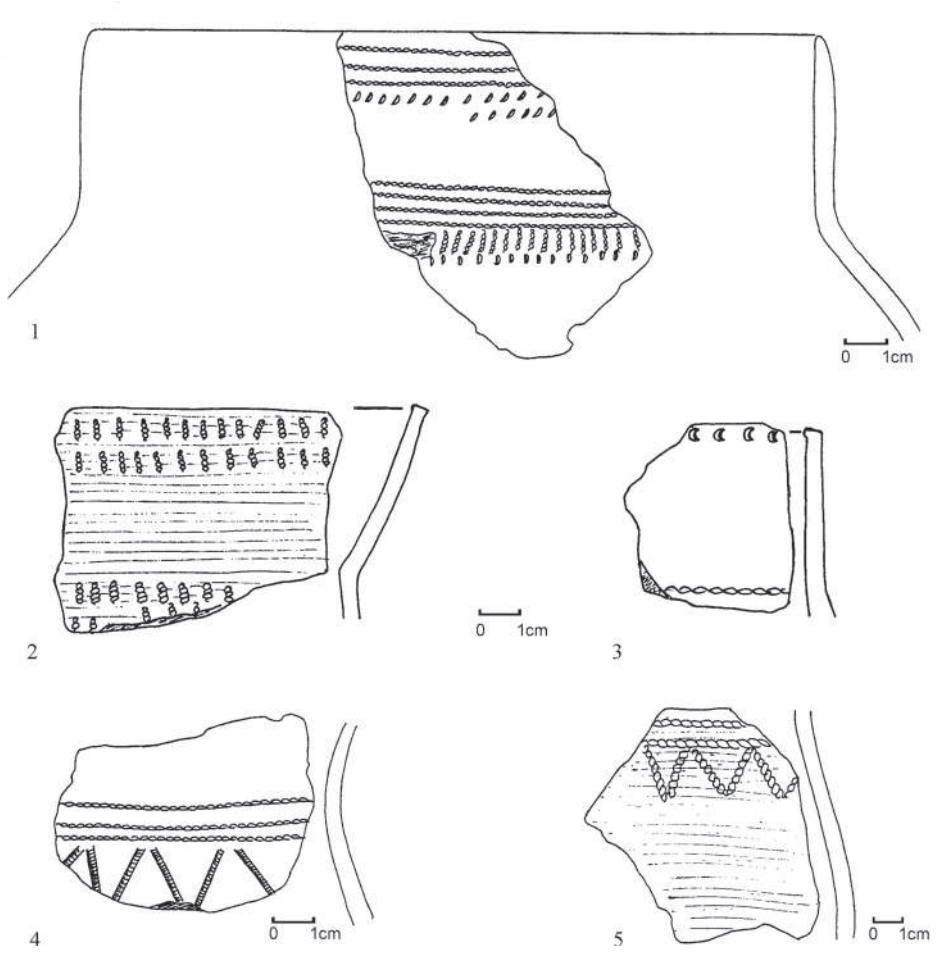

Fig. 15. Ceramics of the Dereivka settlement

found next to a skeleton, stretched on its back in grave 1 from the excavation of 1986. Its ornamentation contained lines of imprints of a classical cord with diagonal lines of short imprints of a coiled cord (Fig. 17:4).

One of the three vessels found in the **Buhayevo** encampment near Chereshneve of the Kuibysheve district of Zaporizhzhya region was also decorated with imprints of a coiled cord (Fig. 15:4). The animal bones from the 1999 digging were used to obtain the radiocarbon dates (Table 2), determining the age of the monument as ca. 4250-3980 BC.

A complex monument, which included a multi-layered settlement and a burial site, was located at **Oleksandriya** of the Kupyansk district of the Kharkiv region,

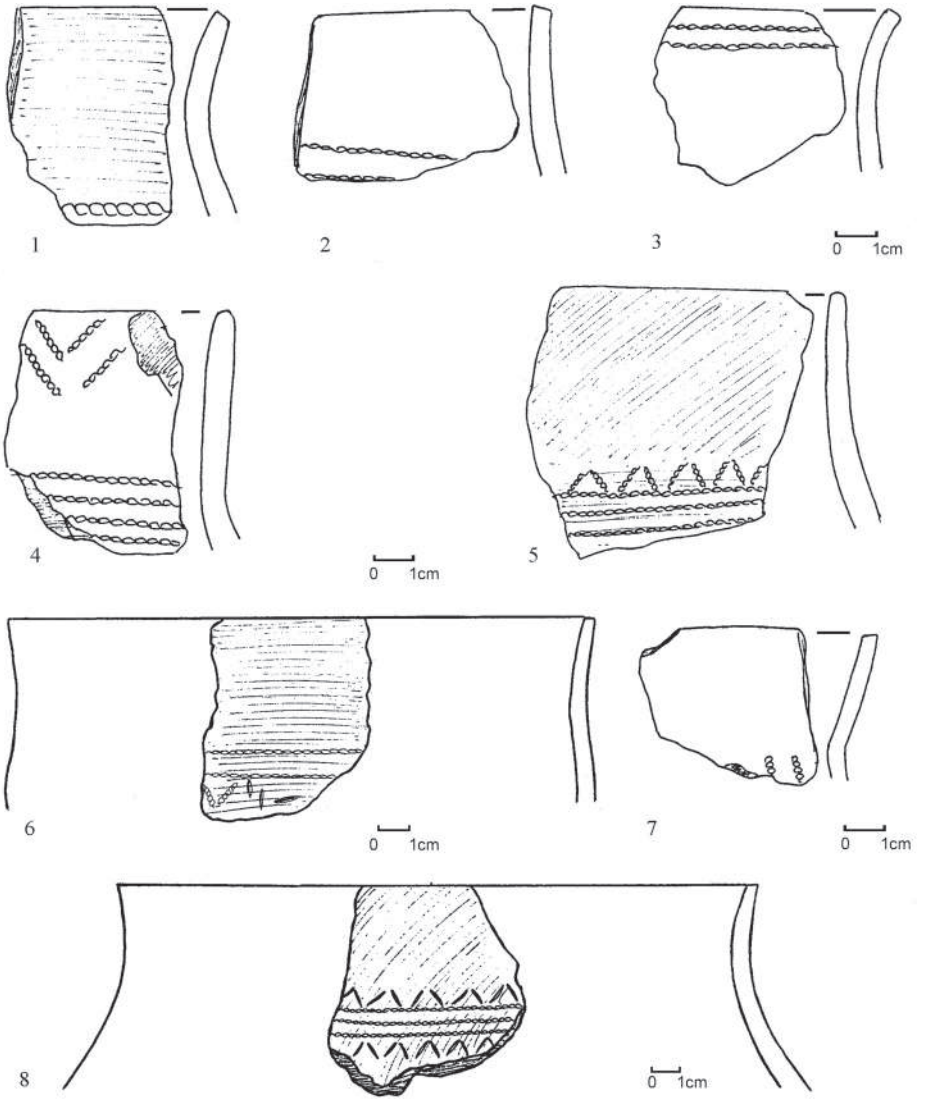

Fig. 16. Ceramics of the Molyukhov Buhor settlement

which D. Telegin studied in 1955-1957 [Telegin 1959]. Twenty pots, a bowl and eleven fragments of rims from his collection belong to the Dereivka culture [Kotova 2003a]. The predominant patterns in the ornamentation were comb imprints, and only one of the vessel walls was decorated with imprints of a coiled cord (Fig. 17:2, 4). These formed horizontal lines in the rim, lined with short diagonal rows from the bottom. The fragment from the shoulder of one vessel displayed

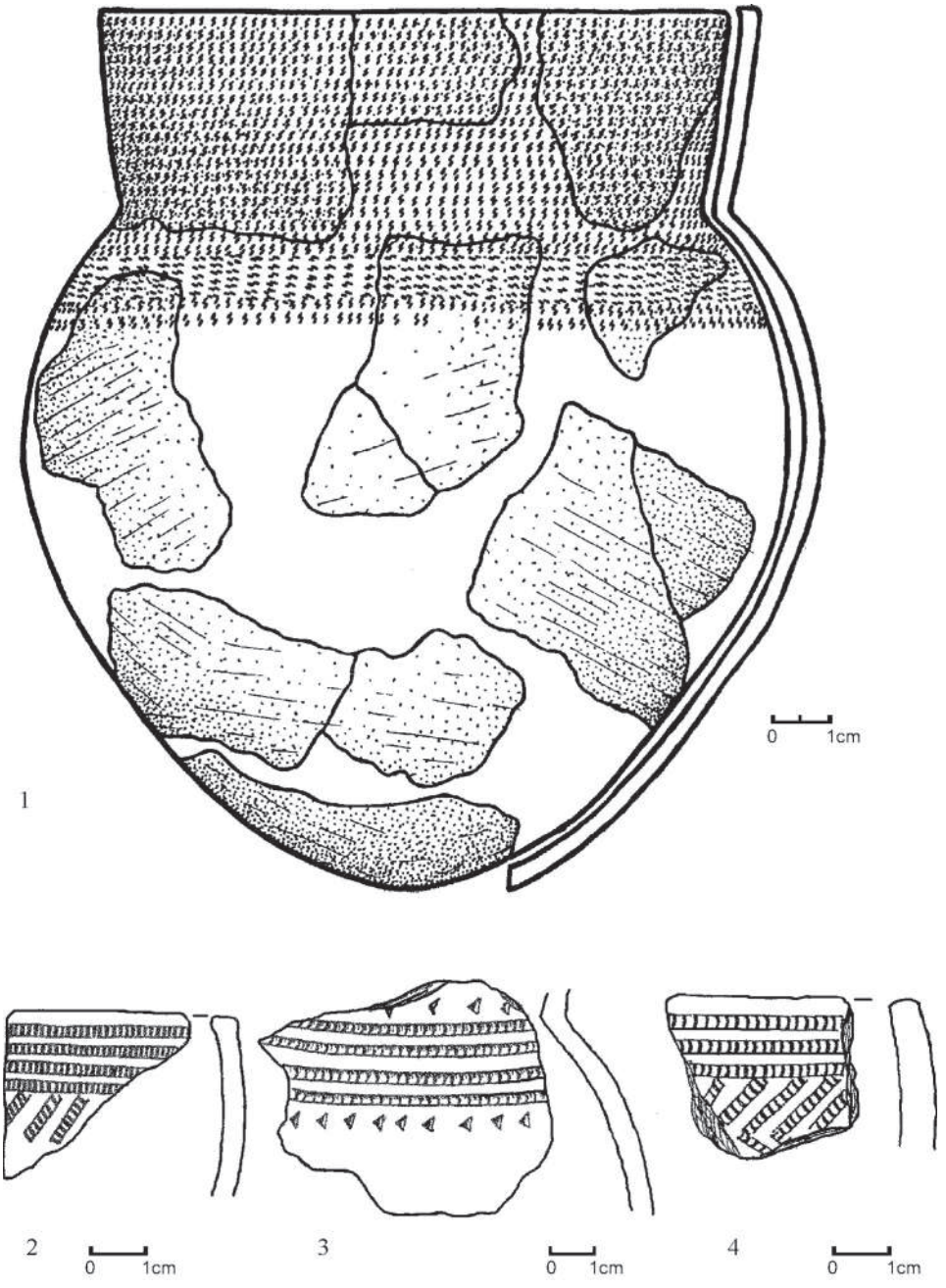

Fig. 17. Ceramics of the Dereivka culture: 1 – Serebryanskoe; 2, 3 – Oleksandriya; 4 – Buhayevo

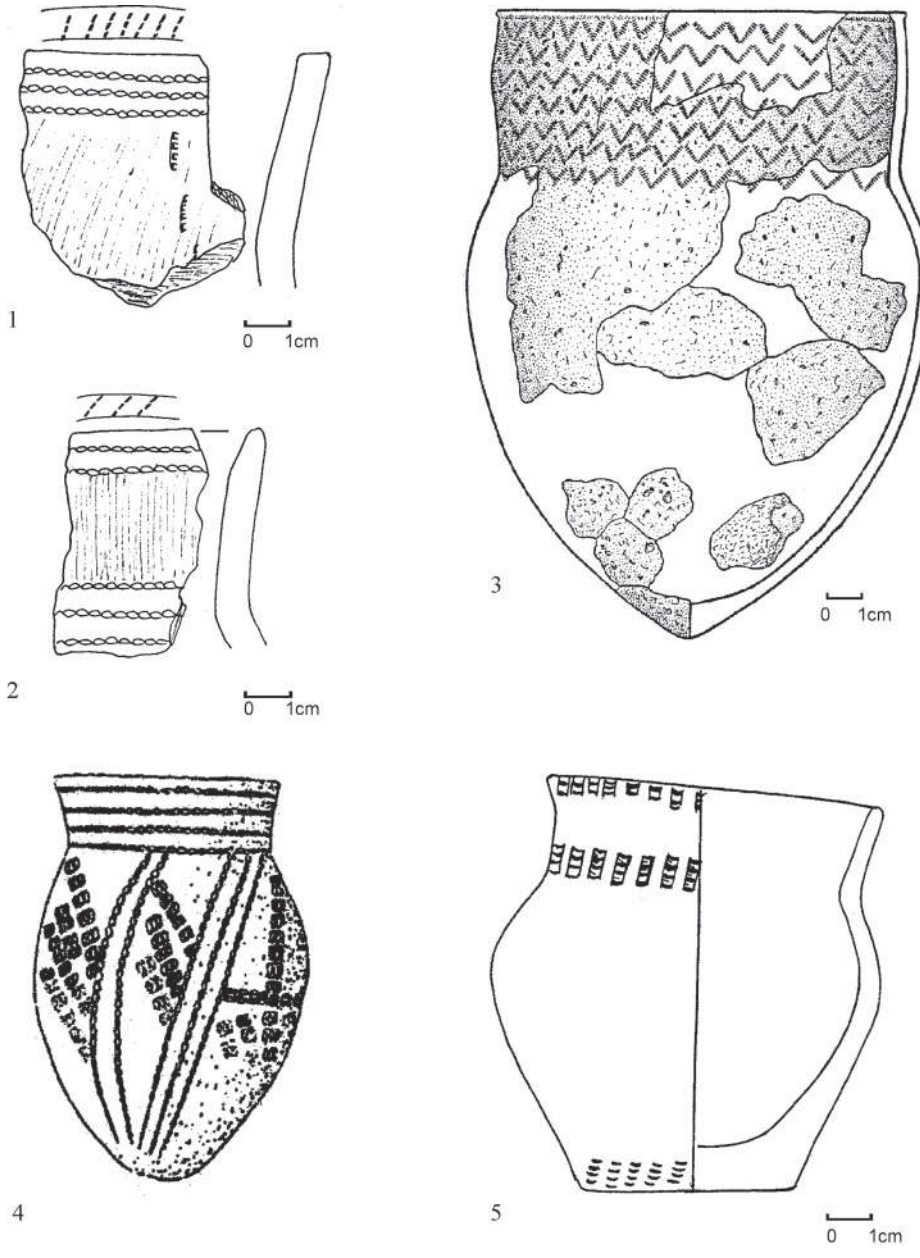

Fig. 18. Ceramics of the Dereivka culture: 1 – Chernikovo Ozero 1; 2 – Chernikovo Ozero 3; 3 – Chernikovo Ozero 2; 4 – grave 1 (1986) of the Igren burial site; 5 – washed-away grave of the Igren burial site

horizontal lines of long imprints of a coiled cord of the first version, framed with triangular prick marks.

The multi-layered **Serebryansko** settlement was located on a sand cape between the lakes of Chernikovo and Kleshnya, the latter 3.5 km from the village of Serebryanka, Kremensky district of the Luhansk region, which was studied by S. Sanzharov in 1997 [Sanzharov *et al.* 2000]. The finds in the settlement included the Bronze Age, Eneolithic and Neolithic materials, including five vessels of the Dereivka culture, which had been made of clay with a shell admixture.

Four of the vessels had been decorated with comb imprints. The ornament on one of the vessels included coiled cord imprints which decorated the neck and the shoulders. At the neck and upper parts of the shoulders they were organized in horizontal lines; below there were vertical lines, which were limited by two horizontal lines from the bottom (Fig. 17:1). Interestingly, the long imprints of the coiled cord on that vessel resembled short imprints of the second version. Apparently, the cord had been coiled loosely, there had been intervals between the coils, and the imprints of each of the coils displayed traces of a two-thread twisted cord.

In 1996-1997, S. Sanzharov studied three multi-layered settlements in the sand dunes near the Chernikove Island in the flood-lands of the left bank of the Siversky Donets River [Sanzharov *et al.* 2000]. Their collections include the Neolithic, Eneolithic and Bronze Age materials, including the Dereivka culture.

The **Chernikove Ozero 1** settlement contained five pots of that culture, one of which had been ornamented at the upper rim with three horizontal lines of cord imprints and vertical lines of short comb imprints (Fig. 18:1).

The **Chernikove Ozero 2** settlement also included a pot of the Dereivka culture, which had a high chamfer mouth, decorated with short coiled cord imprints of the first version that had formed zigzags (Fig. 18:3).

The **Chernikove Ozero 3** settlement produced fragments of three Dereivka vessels, one of which was decorated with horizontal lines of cord imprints below the rim, in the lower part of the neck and on the shoulders (Fig. 18:2). Other Eneolithic pottery of those monuments was decorated with comb imprints.

3. CORDED ORNAMENTATION OF THE MYKHAILIVKA LOWER LAYER TYPE MONUMENTS

The settlement is located 4 km to the south of the village of Mykhailivka, Novovorontsove district of the Kherson region and occupies a hill of the second terrace over the flood-lands of the right bank of the Pidpilna River, a right tributary of the Dnieper. That large settlement is unique for the steppe zone

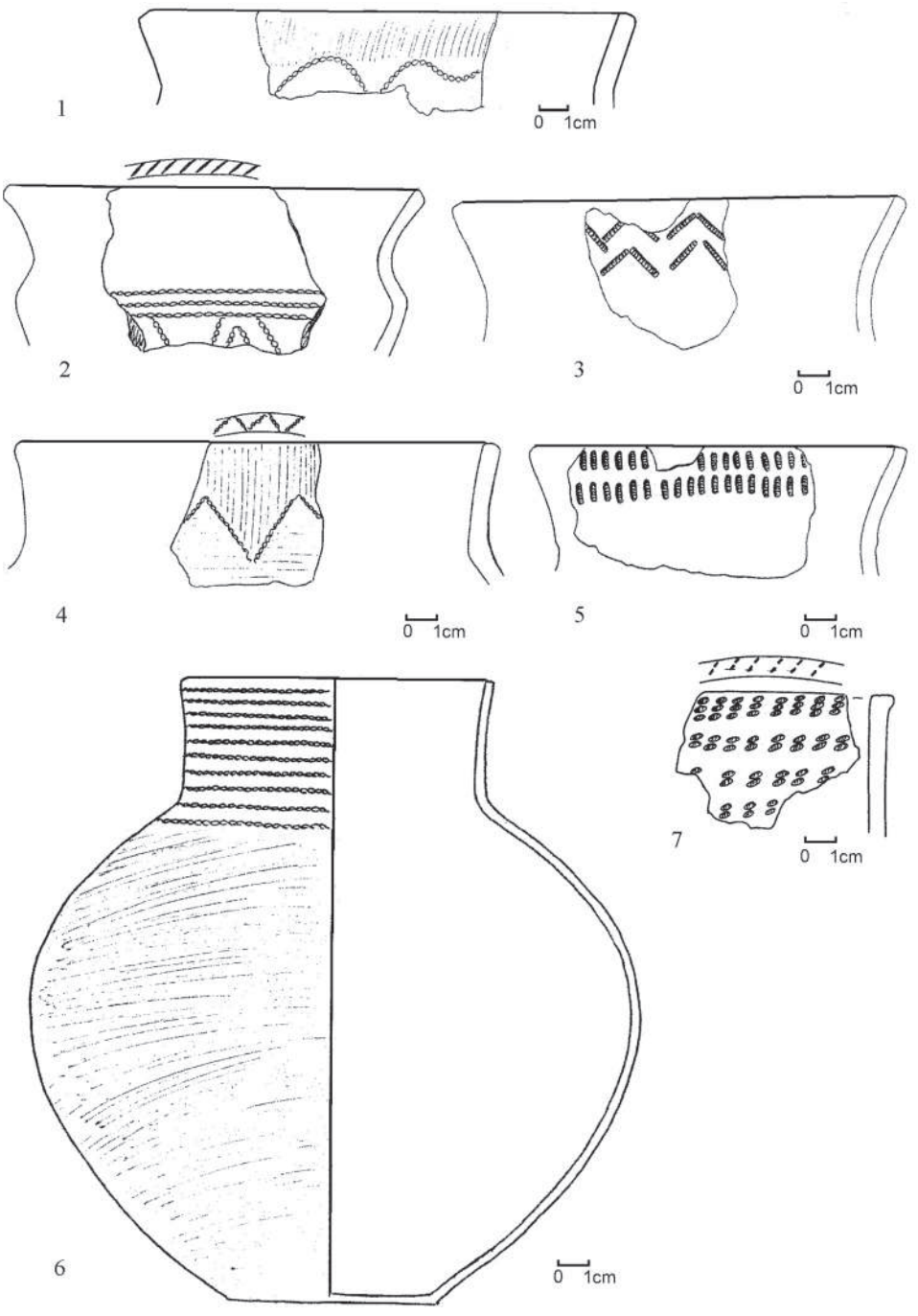

Fig. 19. Ceramics of the lower layer of the Mykhailivka settlement

and includes thick cultural layers of the Eneolithic and the Bronze Age. Unfortunately, over 50 years have passed since the end of the large-scale excavation of that monument, but the publication of its materials has not been completed yet. The excavation authors only managed to produce a preliminary publication [Lagodovska, Shaposhnikova, Markevych 1962] that indicated the existence of an original culture group in the Ukraine steppe, which had been most evidently represented by the monument's lower layer. The authors of the book on the Mykhailivka settlement believed that its lower layer belonged to a different archaeological culture, which had been based and developed on the traditions of the population that had come to the Lower Dnieper area from the Northern Caucasus, and of local tribes related to the Usatovo culture [Lagodovska, Shaposhnikova, Markevych 1962:201-202].

In the early 1970s, V. Danilenko identified monuments of the so-called Azov – Black Sea development line of the Steppe Eneolithic, to which he also included Mykhailivka's lower layer [Danilenko 1974]. However, when describing the layer's pottery, he noted its similarity with Dereivka ceramics. The common features included the same upper surface finishing technique, morphological similarity of upper parts of the vessels, as well as technical and compositional likeness of the ornament.

The originality of Mykhailivka's lower layer ceramics and the lack of a full publication of the settlement's materials led to a very broad search for analogues among the Eneolithic and Bronze Age monuments of the Eastern European steppes. The key features by which researchers related different materials to those of Mykhailivka's lower level were, first of all, their difference from rather well-known materials of the Sredniy Stog and the Trypillia circles, as well as the absence of ornament on the ceramics and their smoothly finished surfaces. The use of those features resulted in substantial expansion of the circle of monuments of the Lower Mykhailivka type [Telegin 1971; Shaposhnikova 1987; Rassamakin 1999; 2004].

The studied area of the lower layer of Mykhailivka settlement measures 500 sq km where four dug-in dwellings have been found. Fragments of some 50 vessels have been found inside the dwellings and next to them. The pottery was made of clay with an admixture of shell, which included pots and bowls. More than half of the ceramics had no ornament; other vessels were decorated with comb imprints, 'pricks', scratched lines, and combinations of those elements.

Seven of the pots were decorated with cord imprints, three of which were ornamented with short imprints of a coiled cord. The imprints on two of the pots belong to version 1 (Fig. 19:4, 5), forming a zigzag and horizontal rows.

A piece of a high rim was decorated with horizontal rows of imprints of a coiled cord of version 2: a coiled cord of several threads had been rolled onto the base of a stamp, and coiled threads were visible in imprints of each coil (Fig. 19:7).

Table 3

Radiocarbon dates for the lower layer of Mykhailivka settlement.

Monument	Material	Lab. Index	BP	calBC [Weninger *et al.* 2005]
Mykhailivka, dwelling 3	bone	Ki-8012	4890±80	3676±94
Mykhailivka, dwelling 4	ceramics	Ki-14869	4740±70	3511±100
Mykhailivka, dwelling 4	bone	Ki-9487	5260±60	4102±94

Four vessels were decorated with classical cord imprints (Fig. 19:1, 2, 4, 6), forming horizontal rows and a zigzag.

A fragment of ceramics from dwelling 4 of Mykhailivka's lower layer was dated (Table 3), which proved to be younger than a bone from the same dwelling. This fact confirms the above suggestion about the need to improve the ceramics dating methodology.

4. CORDED ORNAMENTATION OF VESSELS: PIT-AND-COMB POTTERY CULTURE

The cord was used for ornamentation of ceramics in the latest settlements of that Neolithic culture. The best-studied among them are the settlements of Hryshivka, Skunsovo-Rudoho and Pohorelovka-Kosa (Fig. 20).

The multi-layer Hryshivka settlement was studied by S. Berezanskaya in the 1970s near Hryshivka, Borzna district of the Chernihiv region [Berezanskaya 1975]. It was located on the bank of the Trubyn Lake and consisted of three layers containing materials of the Pit-and-Comb Pottery culture, and the Bronze Age upper layer. There, cord-ornamented ceramics were found in the second and third layers.

The second layer consisted of three horizons to which three dwellings had been linked that had existed for a short period of time and may be viewed within one cultural layer. The age of the lower dwelling can be defined by the radiocarbon date as ca. 3700 BC (4930±80 BP, Ki-8085). This date has been also confirmed by the find of a Trypillia C I imported bowl in this layer.

The kitchenware from the middle and upper dwellings had thick walls and had been well-baked – its entire surface decorated with holes. The hole sectors were divided with areas of comb imprints, holes of a different shape or parts without any ornamentation. The upper dwelling of the second layer contained vessels decorated with cord imprints [Neprina 1976:71].

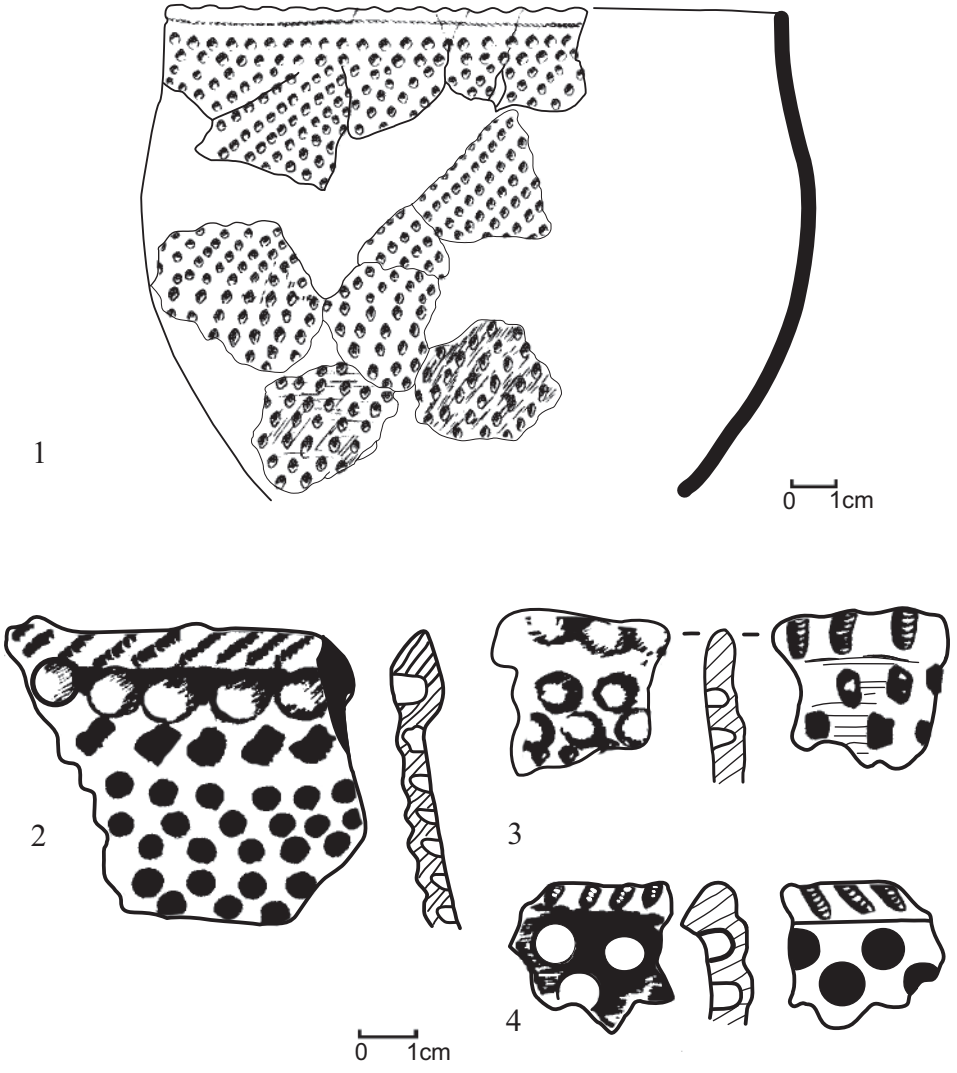

Fig. 20. Ceramics of the Pit-and-Comb Pottery culture: 1 – the third layer of Hryshivka; 2 – Pohorelovka-Kosa; 3, 4 – Skunsovo-Rudoho

The third layer of the monument also contained occasional cord-ornamented kitchenware; however, most of the ceramics were decorated with rhombic and round holes and rectangular stamps (Fig. 20:1).

Fig. 21. Pottery with the two types of turned cord: 1,2 – the first type – needle stitch twine cord; 3,4 – the second type – plaited cord. 1,2 – the lower layer of Mikhailovka; 3,4 – Dereivka

5. THE PROCESS OF CORD ORNAMENTATION AND ITS PROLIFERATION

Available materials demonstrate that the earliest kind of cord ornament was made with coiled cord imprints. Long cord imprints first appeared in the monuments of the second period of the Sredniy Stog culture about 4600-4500 BC. Those imprints resembled marks made with a large-teeth comb-like cliché perpendicular to the vessel's surface. The cord imprints formed ornamental compositions traditional for the Sredniy Stog culture. These two facts allow an assumption that the idea to make a long form for ornamentation, with a cord coiled on it, emerged subsequently to long comb-like clichés.

Fig. 22. Dated sherd from the Dereivka site, square 339, depth 40-60cm, No 10126

The monuments of the third period of the Sredniy Stog culture, dating back to about 4350/4300-4200 BC, contain short imprints of a coiled cord, in addition to long imprints. Often they are the widest in their middle part and narrow down to the ends. It may be assumed that such imprints were made with a cord that had been coiled on a flexible base, probably another piece of cord. Those imprints no longer resembled marks made by a comb stamp, but looked like a caterpillar, which is why they are often referred to as a 'caterpillar' pattern.

As before, the patterns made with a coiled cord throughout the third period of the Sredniy Stog culture, followed traditional ornamental compositions made by the comb stamps.

Probably, under the influence of the Sredniy Stog population, this kind of ornamentation proliferated in the Trypillia culture at its B I-II stage, which is synchronous with monuments of the third period of the Sredniy Stog culture [Kotova 2008]. Imprints of a coiled cord were found in the latest monuments of that period, for example, in ceramics of the Myropillia settlement [Kotova 2008: Fig. 130,1].

The ornamentation made with coiled cord imprints was further developed in the Middle Eneolithic ca. 4200-3800 BC in the monuments of the lower layer of Mykhailivka and the Dereivka culture. Both the Dereivka settlement

and Mykhailivka's lower layer contained finds with two versions of twisted cord imprints. The second version can be viewed as a Middle Eneolithic innovation.

Nowadays it is hard to identify, with a high degree of certainty, the first culture whose population started using 'classic' cord imprints for decorating their ceramics. Apparently, the most plausible hypothesis is that the first corded ornamentation was produced by the population of the TC. The earliest and single corded ornament currently known is the one on kitchenware ceramics from Veselyi Kut settlement (Trypillia B I-II, information by O. Tsvek).

The ornamentation made with coiled cord imprints was further developed in the Middle Eneolithic ca. 4200-3800 BC in the Trypillia B II monuments, e.g., the lower layer of Mykhailivka and the Dereivka culture type. It is noteworthy that in the Dereivka culture it was the most widely spread in the settlements on the right bank of the Dnieper (Molyukhov Buhor and Dereivka), located in the south of the present-day Dnieper forest-steppe in the immediate proximity of the territory that had been occupied by the Trypillia population. In other monuments, the pattern most commonly used was the coiled cord ornament that remained as a heritage of traditions of the ancestors, the Sredniy Stog population.

In addition to the presence of rather numerous cord-ornamented pottery, both Dereivka and Molyukhov Buhor contained a wide variety of bowls as well as anthropomorphous and zoomorphous modelled figurines, practically unknown in other monuments of that culture. Presumably, the Dereivka population of the right-bank Dnieper area had developed these kinds of ceramics, as well as the corded ornament, under the influence of the Trypillia.

The proliferation of corded ornamentation in the south of the Dnieper steppe in Mykhailivka's lower layer ceramics is linked to the influence of the Dereivka culture. This is proved by the similarity of ornamental compositions and the use of the second version of the coiled cord, present only in that settlement and the Dereivka settlement. Nowadays, there are found only occasional settlements of the lower layer Mykhailivka type that are represented by eponymic monuments and, possibly, by a short-term settlement near Novorozanovka village in the Southern Bug basin. Generally, the scarce monuments of that group represented a local phenomenon of the Lower Dnieper area in the Middle Eneolithic ca. 4150-3600 BC, which were synchronous with Trypillia B II settlements and the Dereivka culture. D. Telegin and V. Danilenko noted the similarity of the lower layer Myihailivka and Dereivka ceramics in their works [Danilenko 1974:76], having synchronized those monuments. Moreover, D. Telegin considered part of the Mykhailivka lower layer ceramics to be imports from Dereivka [Telegin 1973:127]. Such similarity of kitchenware can be also traced through the corded ornamentation.

As part of a project designed to study the most ancient corded ornamentation, Andrzej Sikorski studied, under a microscope, eight samples of ceramics of the Middle Eneolithic steppe cultures from the Dereivka settlement and lower layer Mykhailivka, aiming to identify the type of tool or tools used for making the

cord imprints on the ceramics. This study of cord imprints under the microscope allowed to identify several kinds of cord ornamentation.

Hence, judging by the five samples taken for analysis from the Dereivka settlement collection, ornamentation of the Dereivka culture ceramics of the Middle Eneolithic had been made with the use of a grid pattern, a needle stitch and a woven cord, as well as a coiled cord. Only one of the fragments was ornamented with a woven pattern and macramé net.

In the lower layer of the Mykhailivka settlement, synchronous with that of Dereivka, the ornament was made with a wicker pattern, a net-like and composite cord, and coiled cord.

It is noteworthy that without a microscope it is impossible to make a distinction between the kinds of cord imprints, identified by A. Sikorski. These are perceived as imprints of a 'classic' cord that can be distinguished only by the length and width of the imprints.

Scarce kitchenware with corded ornamentation has been found in monuments of the Pit-and-Comb Pottery culture in the north-east of Ukraine. This belongs to a major cultural – historic area of cultures sharing similar pottery ornamentation, which occupies vast forest spaces and part of the forest-steppe areas of Eastern Europe [Neprina 1976]. The most ancient settlements of Ukraine have been united by V. Neprina into the Vyrchischa type group of monuments [Neprina 1990], which occupy the Desna River basin and are close to the archaic and early Lyalov culture. Ornamentation of that group's pottery was dominated by alternating rows of comb imprints and lines of holes. In this context, cord imprints have not been found. The radiocarbon dates indicate that the settlements of that type existed ca. 4900-4200 BC [Kotova 2003b].

The second group of monuments includes settlements of the Cherkasy Dnieper area: Dereivka, Uspenka, and Buzky, which existed ca. 4300-3800 BC [Kotova 2003b]. Their typical kind of ceramics was ornamented with staggered holes where the hole ornament zones were separated with a few belts of comb marks. Materials of those monuments are similar to those of the developed stage of the Lyalov culture. In Dereivka, those ceramics lay together with the Dereivka pottery, and there were syncretic forms. However, no cord marks have been found on the kitchenware of the Pit-and-Comb Pottery culture.

The cord emerged in ornamentation of monuments of the third group, the Skunsovo type, dated ca. 3700-3200 BC [Kotova 2003b], which are located in the north-east of Ukraine in the Seim and Desna River basin (e.g., the second and third layers of Hryshivka, Pohorelovka-Kosa, Skunsovo, etc.) and were probably left by the migrant populations of the late Lyalov and Desna cultures, which had assimilated the previous Pit-and-Comb pottery population. Their ceramics were decorated with hole, pit-and-comb, or pit-and-prick ornaments, and holes made with a stick with a cord coiled onto it (the so-called 'lapchatyi' ornament), as well as imprints of a coiled cord on the rim. So far, only the ornaments made by

the coiled cord of the first version have been found with some vessels displaying imprints of a ‘classic’ cord.

That population had maintained contacts with the people of the TC of the Dnieper area, which had left monuments of the C I period. The evidence of that can be seen in the find of a Trypillia bowl in a dwelling of the Hryshivka settlement. Probably, it was under the influence of the Trypillia culture where imprints of coiled and regular cords spread among that Neolithic population [Smirnov 1991:78; Kotova 2003b]. Those residents of the Desna basin began to use cord imprints to replace, in a number of cases, the comb marks they had used for decoration of rims and necks.

6. CONCLUSION

From the above discussion it is clear that the earliest kind of cord ornament was made with coiled cord imprints, which were represented by long cord imprints and first appeared in the monuments of the second period of the Sredniy Stog culture about 4600-4500 BC. The ornamentation made with coiled cord imprints was further developed in the Middle Eneolithic ca. 4200-3800 BC in the monuments of the lower layer of Mykhailivka and the Dereivka culture. Scarce findings of pottery with corded ornamentation have been also found in monuments of the Pit-and-Comb Pottery culture (Skunsovo type), which are dated ca. 3700-3200 BC and located in the Seim and Desna River basin in the north-east of Ukraine. Further, there is some likelihood the imprints of coiled and regular cords spread among that Neolithic population under the influence of the Trypillia culture.

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'CORD'-ORNAMENTED POTTERY OF THE TRYPILLIA CULTURE. A MACRO ANALYSIS[1]

The most ancient ceramic objects with 'cord' marks, found in settlements of the Trypillia culture (TC), can be dated back to the BI-BII stages. These individual fragments were linked by researchers to imports from monuments of the so-called 'Eneolithic steppe'. Similar objects were also referred to the early BII stage; for instance, a fragment bearing four rows of 'cord' imprints was found in the Nemyrivske settlement (Kodyma River basin between the Dniester and Southern Bug rivers). The same settlement contained fragments of pottery typical for the Trypillia culture of that period, with heavily smoothed marks of a cord.

Most of the objects with corded ornamentation originate from BII-stage settlements of the Middle Dnieper area. Hence, several fragments of pottery were found in the Hrebeni settlement (Fig. 1). Such finds were more common in Chapaivka type monuments, in particular in the eponymic settlement [Kruts 1977:49, Fig. 19]. They were also found in the Kazarovychi settlement (Chapaivka type horizon), which is one of the most northern monuments of that type.

Traditionally, the occurrence of corded ornamentation on the Trypillia culture ceramics was seen as a manifestation of steppe culture influence, particularly that of the Sredniy Stog. Recently, some researchers have argued that the opposite was true, and that it was Trypillia that had established itself as one of the contributors to the prevalence of corded decoration on ceramics of the 'Eneolithic steppe' monuments [see Kotova..., in this volume].

[1] In this article the original version of town names etc. have been retained as per the author's wishes.

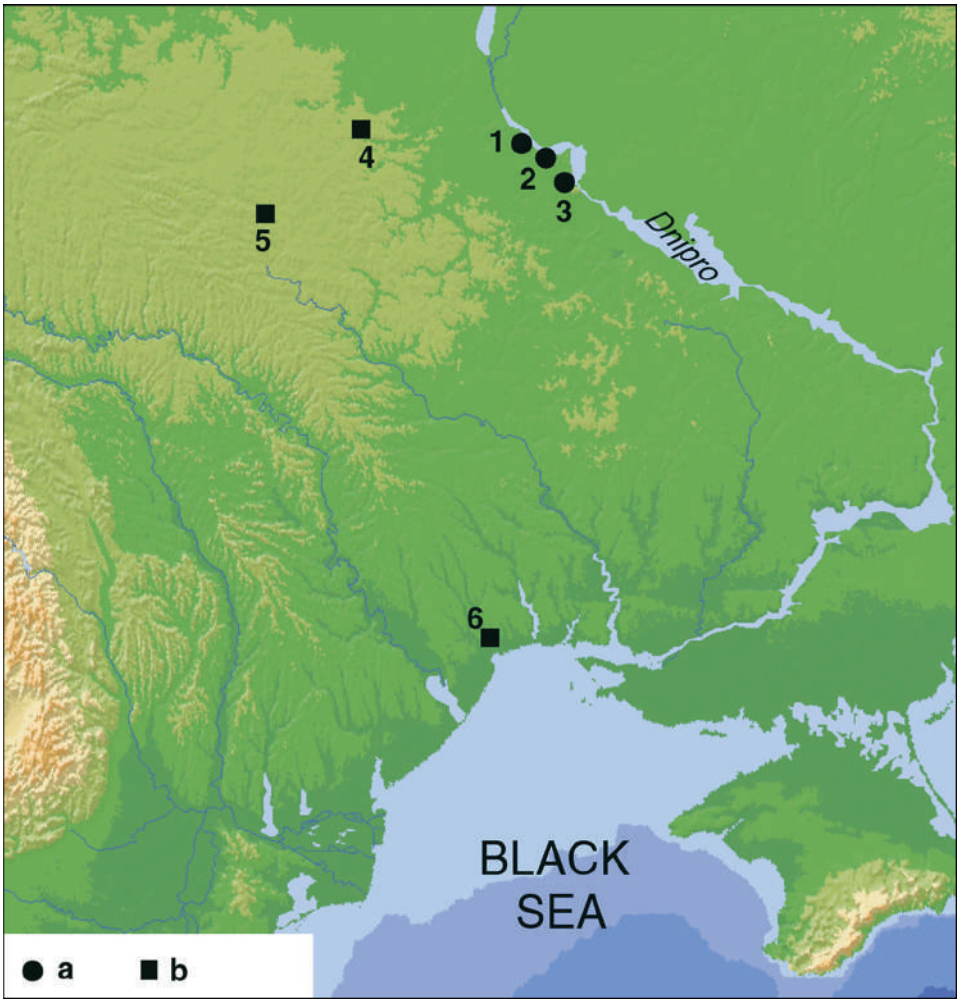

Fig. 1. Monuments of the Trypillia culture mentioned in the text: a – BII stage; b – CII stage: 1-Chapaivka; 2 – Hrebeni; 3 – Ihnatenkova Hora; 4 – Troyaniv; 5 – Sandraki; 6 – Usatovo

1. THE DIFFUSION STAGE OF DEVELOPMENT: CORDED ORNAMENTATION IN THE TRYPILLIA CULTURE (PHASES C I – C II)

The tradition of decorating pottery with a 'cord' remains in the region in the CI stage. Materials of that kind were found in excavations of the Ihnatenkova Hora and Khomyne settlements. It is noteworthy that those monuments were located further southward than Chapaivka and Hrebeni. The tradition of using

cord imprints for decorating pottery, dating back to the BII stage, had been interrupted in such settlements.

Throughout the CII stage a cord was used for pottery ornamentation in various groups (cultures) of the Trypillia area. There are certain differences between the two zones of the area, the northern and the southern. The latter includes complexes of the Usatovo type (culture), where vertical ribbons made by impressions of a braid could be observed, in addition to horizontal corded compositions. In the north, the predominant pattern was one to three rows of horizontal imprints under the vessel rim. Occasionally, more than three rows of cord imprints could be observed, a pattern typical for pots. Special attention can be paid to bowls with their outer surfaces decorated with several rows of cord imprints.

Occasionally, some vessels bear cord marks on their inner surfaces. Possibly, such vessels should be linked to influences of neighbouring cultures' traditions, while individual fragments ornamented with atypical compositions should be regarded as imports [Videiko 2000:44-61].

2. RESEARCH SITES FOR PARTICULAR (MICRO) ANALYSES OF TRYPILLIA CORD ORNAMENTATION

Studies were performed on samples of cord-ornamented ceramics that had come from the CI and CII Trypillia monuments in various regions, including the Volyn and Dnieper areas, as well as the North-Western Pontic region (Fig. 2). The monuments are described in the chronological order below.

IHNATENKOVA HORA [samples 19-20, see Kośko, Sikorski, Szmyt… – part 1, in this volume] is a Trypillia settlement referred to the CI stage. It is located near Hryhorivka village of the Kaniv rayon of the Cherkasy oblast, on a high hill constrained by ravines from the north and the north-west, over the Kaniv reservoir and belongs to the Hryhorivka type of settlements of the Kolomyischyna group discovered in 1960, then excavated in 1961 by M. Shmagliy and M. Videiko, 1993 [Shmagliy 1970:119-122; Videiko, Burdo 1997:23-26]. The excavation of 1993 covered an area of 1,200 sq m, providing a variety of corded materials and dates with seventeen household pits studied on the site. The pits were of irregular shape, funnel-like in section, located 0.5 – 1.4 m below the present-day surface. These pits were filled with animal and fish bones, shells, fragments of pottery, anthropomorphous figurines, flint, stone, bone and horn tools. The bones for dating were taken from two of the pits (# 15 and # 16).

The vessels found during the excavation can be classed into two groups: kitchen pottery and tableware. The pottery was of two types: some objects were made of clay with an admixture of shells, while others with an admixture of shells

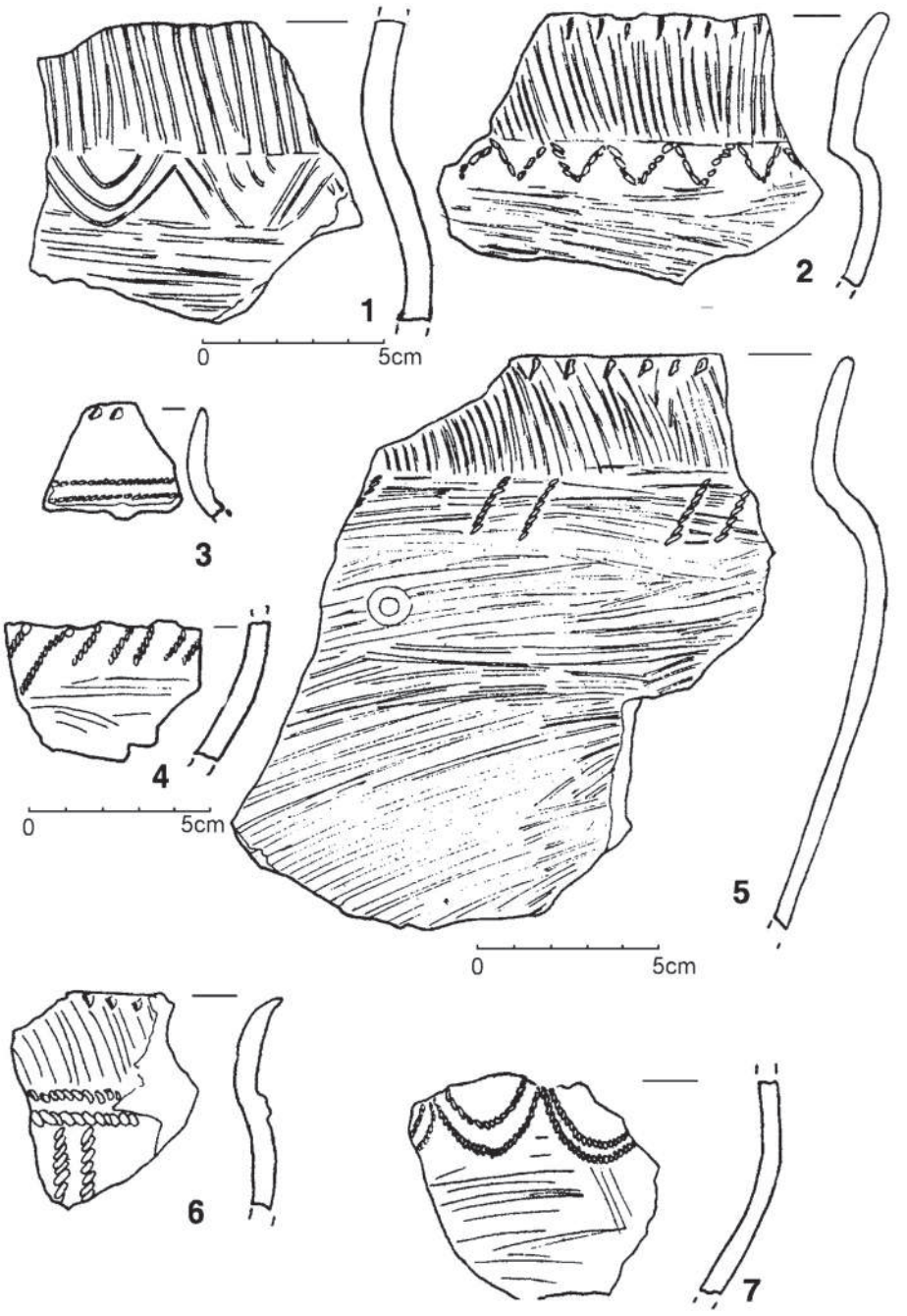

Fig. 2. Fragments of ceramics with cord imprints from Ihnatenkova Hora settlement (1993 excavation)

Fig. 3. Fragments of pots with cord impressions, Troyaniv settlement (excavation by M.M. Shmagliy)

and sand. Pots of various sizes with turned-back high rims were the most common kind of vessels featuring surfaces that were covered with a 'streaky smoothing-out' design. The ornamentation had been performed with various cuts, inlays, cliché marks and cord imprints placed below the rims on the upper parts of the vessels (Fig. 3). Occasionally, vessels have plaster work and so called eyes. On some of the fragments, ornamental compositions were made with scratches.

The tableware could be divided into three types: with an incised ornament (the least common), without ornamentation, with a smoothed surface (conical bowls, goblets, goblets with handles, biconical vessels), with monochrome painted ornament made with dark brown paint (fragments of conical and semi-spheric bowls, a zoomorphous bowl, goblets, biconical vessels).

Based on the manufacturing technique applied, two subtypes can be identified in the painted pottery group, likened to the Kaniv and the Tomashivka groups. Imports of painted pottery allow synchronizing the Ihnatenkova Hora settlement with the second and third phases of the Tomashivka group. Specific features of the ceramics complex (the second group of table ceramics) allow to assume contacts with a population that left monuments of the Lublin-Volyn Painted Pottery culture. In this context, anthropomorphous plastic modelling is represented by fragments of female figurines typical for the Kolomyishchyna group.

According to O. Zhuravliov [Zhuravliov 2004], the predominant parts of fauna remains were wild animal bones, which means that the settlement's residents

Table 1

Dated complexes from a Trypillia settlement in Ihnatenkova Hora

Object	Material	Lab Index	BP	BC
pit 15	bone	Ki - 9613	4520±80	1σ 3360-3090 2σ 3400-2900
pit 15	bone	Ki - 9614	4590±80	1σ 3240-3100 2σ 3650-3000
pit 15	bone	Ki - 9615	4570±80	1σ 3240-3100 2σ 3550-3000
trench 1, sq. 3, cut 1, depth: 0.56 m	ceramics	Ki-10856	4490±80	1σ 3345-3093 2σ 3367-2921
trench 1, sq. 3, cut 2, depth: 0.56 m	ceramics	Ki-10857	4515±90	1σ 3359-3093 2σ 3377-2921
pit 16	bone	Ki-9616	4650±90	1σ 3540-3340 2σ 3650-3100
pit 16	bone	Ki-9617	4530±80	1σ 3370-3090 2σ 3550-2900
pit 16	bone	Ki-9618	4500±80	1σ 3350-3090 2σ 3400-2900
pit 16	ceramics	Ki-1467	4430±90	1σ 3343-3203 2σ 3371-2915
pit 16	ceramics	Ki-11468	4630±90	1σ 3523-3333 2σ 3543-3255
pit 16	ceramics	Ki-11469	4520±90	1σ 3363-3093 2σ 3377-2921

obtained their meat foods predominantly by means of hunting. The absence of traces of permanent housing and the proximity to the Dnieper floodplain suggest the location of a seasonal camp on the site, where its residents grazed their cattle herds, went fishing and hunting. The excavation materials from that settlement are kept in the Science Reserves of the Institute of Archaeology of the National Academy of Science of Ukraine.

SANDRAKI [sample 21, Kośko, Sikorski, Szmyt... – part 1, in this volume] is a settlement of the CII stage of the Trypillia culture, located on a high cape plateau near Sandraki village (Pahurok Gorge) of the Khmelnytsk district, Khmelnytsk region discovered by Dobryansky and studied by the Verkhniy Bug expedition of the Institute of Archaeology of the Academy of Science of the Ukrainian Soviet Socialist Republic, led by E. Lagodovska in 1949 – 1950 [Lagodovska 1953:76-77; 1956:118-129]. One on-surface clay dwelling was excavated from which the ceramic materials for identification and dating were taken.

The remainders of dwelling places consisted of two layers of burnt clay. The upper layer was represented by clay, burnt to a red colour, with imprints of wood. The lower layer was represented by 50 sq m. of solid rectangular base of burnt

Fig. 4. Fragments of pots with cord impressions, Sandraki settlement (excavation by O.F. Lagodovska)

clay coating. Most of the clay mass was of reddish hue and lay in a solid layer up to 0.15 m thick. The total area of that later was about 28 sq m.; the clay contained a substantial admixture of chopped straw chaff and some of the pieces bore marks of log and sometimes of wood. At the south-eastern part of the rectangular base there were three layers of different shapes, made of pure clay and surrounded with a low edge, amorphous piles of burnt clay, which are also remainders of clay ceiling construction in wooden house structures. The objects found in the dwelling included a collection of five weights of various shapes and whorls, fragments of ceramics and anthropomorphous plaster modelling pieces. Also a cultural layer of fragments of pottery and animal bones was found under the base.

Other objects studied included five pits, some of which had been found under the layer of burnt clay. Pit # 1 was 0.75 × 0.65 m and 0.3 m deep. The filling of the pit consisted of a small number of ceramic fragments, including a vessel's bottom with a drawn cross on the inner surface, and animal bones. Pit # 4

Table 2

Dated complexes from Sandraki, a Trypillia culture settlement

Object	Material	Lab Index	BP	BC
Sq.3-7 - hearth	bone	Ki-6746	4175±50	2720±92
Sq.3-7 - hollow	bone	Ki-6747	4210±45	2790±92

contained a small number of finds. Pit # 9 was 1.1 m long, 0.9 m wide and 1.5 m deep, its walls narrowing down to the bottom. The filling, particularly its upper part, contained fragments of coating, an oval stone, fragments of pottery, a weight, animal bones, notably including stag antlers with traces of incision. Pit # 10 was 1.1 m long, 1 m wide, and 1.32 m deep with vertical walls. The filling included fragments of ceramics and animal bones. Pit # 11 was round, 0.78 m in diameter and 1.32 m deep, filled with large pieces of coating with marks left by log, and fragments of ceramics. The traced objects could probably belong to two building horizons dated within the CII stage.

A large number of flint tools were found in the settlement. The majority of the objects in this regard were tools and semi-finished large slabs and bars that had been further finished in the settlement, as suggested by the find of 67 splinters, found in one place and apparently produced in the process of making an axe. The flint tools included scrapers, knife-like plates, among which the Sandraki hoard contained axes, and arrow-heads. Ox rib bones served as the material for making numerous tools for picking up threads in spinning, piercing pieces, and smoothers. The horn was used for making hoes and spatulae. Ceramic tools included weights and whorls.

The majority of the finds were fragments of ceramics with most from ceramics with a red well polished surface. A small part of the ceramic complex included pots and cups decorated with a hollow ornament of cord imprints and holes (Fig. 4). The dough used for making the pots had an admixture of sand, quartz grains and finely ground shell. While in general the fragments bearing corded ornamentation were few, there was a significant variety [Videiko 2000: Fig. 25, 26, 27].

Painted ceramics were made of slit clay and featured rosy polished surfaces painted with black or dark brown, sometimes in combination with red paints. The painted pottery included bowls, cups, amphorae and tops (lids). A small number of fragments of the pottery contained plant admixtures in the dough. Anthropomorphous and zoomorphous sculptures included fragments of schematic female figurines and statuettes of oxen. The materials from the Sandraki excavations are kept in the Science Reserves of the Institute of Archaeology, National Academy of Sciences of Ukraine.

TROYANIV [samples 22-23, Kośko, Sikorski, Szmyt… – part 1, in this volume] is a CII-stage Trypillia culture settlement. An eponymic monument of the

Table 3

Dated complexes from Troyaniv settlement of the Trypillia culture

Object	Material	Lab Index	BP	BC
House 28	Bone	Ki-6748	4360±55	2967±64
Sq.XIII-19, house	Bone	Ki-6749	4410±50	3003±83
House 25	Bone	Ki-6750	4430±45	3013±105

Table 4

Dated complexes from the Mayaki settlement of the Usatove culture (new dates)

Object	Material	Lab Index	BP	BC
sq. 08. depth 1,07-1,24	bone	Ki-9751	4600±90	1σ 3517-3403 2σ 3537-3083
sq. 09. depth 1,34-1,61, # 8370	bone	Ki-9752	4490±90	1σ 3345-3089 2σ 3373-2917
Trench 4-5	bone	Ki-9753	4180±90	1σ 2819-2663 2σ 2921-2551
1970, sample 1,	ceramics	Ki-11463	4370±100	1σ 3100-2885 2σ 3355-2860
1970, sample 2,	ceramics	Ki-11464	4530±90	1σ 3363-3093 2σ 3377-2921
1970, sample 3,	ceramics	Ki-11465	4460±90	1σ 3337-3209 2σ 3365-2911
1970, sample 4	ceramics	Ki-11466	4360±90	1σ 3100-2880 2σ 3350-2855

Troyaniv type is located at the outskirts of the Troyaniv village (Horikhova Hora ravine), Zhytomyr region, on a high cape over the Hnylopyat River. The settlement was discovered by R. Vyezzhev in 1947, and studied by T. Belanovskaya and M. Shmagliy in 1956-1958 [Belanovskaya, Shmagliy 1959:125-128].

The dimensions of the settlement measure 150 m × 50 m. The remainders of 35 huts, arranged in two groups, were unearthed on a territory of 2,000 sq. m. Eleven huts were located in the south-western part of the settlement and 21 others stood in its south-eastern part. The huts were arranged in circles, with several huts standing outside the imaginary ring. On-surface huts were represented with piles of burnt coating that contained impressions of chopped wood and poles, being rectangular in plane and 6 m × 3 m in size. Semi-dug-outs, deepened in the soil to the level of 0.9 – 0.6 m, were oval in plane and had been heated with open bonfires. In addition to the huts, household pits were found on the site.

The cultural layer of the settlement was filled with fragments of ceramics, objects made of flint, stone and bone, most of which were found in the foundation pits of the semi-dug-outs and near the on-surface dwellings. Stone had been used

to make melling stones and pestles. An unfinished axe-hammer of note suggests that such kinds of weapons had been produced locally. A large number of other objects included flint wedge-shaped axes, knives, scrapers, and arrow heads, as well as bone tools (piercing pieces).

The settlement's ceramic complex includes kitchenware and tableware. The kitchenware had been made of clay with admixtures of ground shells, sand and organics. Some of the pots had been covered with red-coloured slipware. The vessels were of various shapes (bowls, goblets and amphorae) and included pots decorated with one or two rows of cord imprints on the shoulders (Fig. 4), cone-shaped clots, bowls and horn-handled amphorae, with some displaying impressions of clichés and prick marks. The tableware had been made of silt clay decorated with monochrome painting.

The finds also included a large number of fragments of anthropomorphous figurines made of the forming mass typical for production of kitchenware (i.e., clay with sand). Standing out among the finds is 'Troyaniv Venus', a standing schematic female figurine. The excavation produced a vast collection of ceramic weights – spindle whorls (conical, biconical), some of which were decorated with pictograms or ornamented with cut-in lines and prick marks. The objects found on the site also included the heddles of a vertical loom.

The materials have been housed at the Scientific Reserves and displayed at the Archaeological Museum, both at the Institute of Archaeology, National Academy of Science of Ukraine.

MAYAKI [samples 24 – 27, Kośko, Sikorski, Szmyt… – part 1, in this volume], a complex of monuments of the Usatovo culture, includes a CII-stage settlement, a barrow and earthen burial sites near the village of Mayaki, Bilyaivsky district in the Odessa region. The site was located on a cape of the third terrace of the Dniester River. The settlement was studied by V. Zbenovich in 1964–1965 and in 1970 and the burial mounds were studied by E. Patokova and K. Zinkovsky in 1974–1975, V. Petrenko in 1986, 1990 and in 2002–2003 [Zbenovich 1974:22-35; Petrenko *et al.* 1984:50-81]. The materials for dating and identification of the cord imprints were provided from the excavations performed by Zbenovich.

The Mayaki settlement was a ritual monument. The only types of objects found on the site were ash-filled ditches, 1.9-3.8 m deep and 2.7-5.5 m wide in their upper parts. A structure of six such ditches was located on an area of 130 × 40 m: the ditches lay straight, parallel to the precipice, were linked with crosscut sections, made turns and surrounded sectors without any cultural remains, 10-15 m in diameter. In ancient times, all of the ditches had been filled with various multiple layers, thick and thin, with up to 30 sections displayed. The fillings contained remains of camp fires, ash, and a large number of material culture remains, which included pieces of burnt coating bearing imprints of wood, pieces of grain grinders, statuettes, cubes, and individual bronze objects. The predominant finds were fragments of ceramics and animal bones. The burial

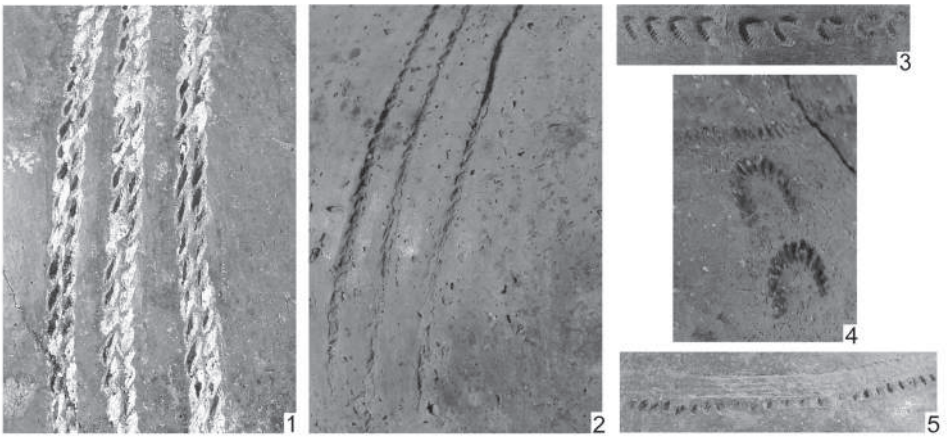

Fig. 5. 1-5 – Usatove culture pottery with 'cord' decoration (from burials); 1 – cord decoration with white paste incrustation

mound occupied an area of 300 × 150 m where 46 graves with 56 inhumations, mostly children, have been studied.

The burial rite involved simple pits and, less often, catacombs; the absence of 'ceilings'; bent (foetal) positions of the buried bodies, usually on their left sides, mostly eastward-oriented with the use of a small quantity of ochre, the presence of tools, mainly crockery, sometimes anthropomorphous plastic artwork, and other objects.

The ditches and graves contained painted pottery of the Vykhvatyntsi type, which allows, according to V. Petrenko [Petrenko 2003] classifying the Mayaki complex among the older stage of the Usatovo culture.

Ceramics with cord imprints comprise a minor part of the Usatovo ceramic complex, represented mostly in the pottery group and contained an admixture of ground shell. The necks and upper parts of the pots were decorated with corded compositions [Petrenko *et al.*, 1984:111-112, Fig. 37]. Sometimes the imprints made by a cord or a braid contained remainders of decorative inlays that had been made with white paste (Fig. 5). According to V. Petrun that paste had been made of ground fossilized bone material, in which the terraced deposits of the Lower Dniester had abounded [Petrun 2000:474-482; 2004:400]. The materials from the excavations of settlement, used in this study, have been kept at the Scientific Reserves of the Institute of Archaeology, National Academy of Science of Ukraine.

CONCLUSIONS

The emergence of corded ornaments on Trypillia pottery may be referred to the late 5th mill. BC. The next stage of its dissemination throughout the first half and the beginning of the second half of 4th mill. BC (BII-stage and CI-stage complexes) was linked to the Middle Dnieper region (monuments of Chapaivka and Kolomyishchyna types). The largest area of corded ornamentation spread is linked to the CII complexes (or post-Trypillia cultures) and may be dated to the period from the last quarter of 4th mill. BC to the first quarter of 3rd mill. BC.

The connection with the previous stage's traditions can be observed primarily at the level of techniques [see Kośko, Sikorski, Szmyt... – part 1, in this volume]. The explanation for this phenomenon can be found in the heredity of textile-making techniques in the Trypillia and post-Trypillia complexes, which proved to be noticeably distinct from those of the 'steppe' cultures traditions.

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TECHNOLOGICAL STUDY OF 'CORD' IMPRESSIONS ON MIDDLE AND LATE ENEOLITHIC POTTERY IN UKRAINE[1]

Ceramics with 'corded ornamentation' became widespread in multiple cultural complexes on the territory of Ukraine in the 5th and 3rd mill. BC [Fig. 1, 5, Kotova. . . , in this volume; Fig. 1, Burdo, Videiko. . . , in this volume]. This research programme alone covered eight cultural complexes: from the Trypillia and the Sredniy Stog to the Yamnaya communities. However, there had been others as well, which among others, determines the relevance of this study.

1. PONTIC BEGINNINGS OF 'CORDED ORNAMENTATION' – THE TRADITIONAL VIEW AS PER D. TELEGIN

The issue of the emergence and dissemination of corded ornamentation on the territory of Ukraine was studied and described in great detail by D. Telegin, when he outlined the characteristics of the Sredniy Stog culture (SSC) [Telegin 1973:154-158]. The scholar pointed out that corded vessels had emerged in the Sredniy Stog culture in the course of the transition from the early stage (Voloshske) to the later stage (Dereivka). It is noteworthy that the first patterns to emerge in the early period had been short imprints of coiled cord, the so-called 'gusenichka' ('caterpillar').

This kind of ornamentation, according to D. Telegin, had been disseminated under the Sredniy Stog influence among the BII Trypillia culture (TC) populations in Volodymyrivka-type monuments in the Syniukha River basin, and then further on. This view was also shared by T. Movsha [Movsha 1970].

[1] In this article the original version of town names etc. have been retained as per the author's wishes.

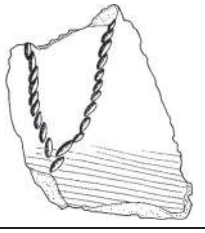
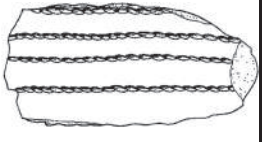
Sample no.	Taxonomic identification	Site	Archaeological descriptions	Microscope analysis	Figure
1	SSC phase II	Dereivka	cord + sickle impressions шнур + серпики	plaiting + macrame	
2	SSC phase II	Dereivka	short cord impressions короткие оттиски шнура	sprang (netting) + fringer	
3	SSC phase II	Dereivka	thin cord impressions тонкие оттиски шнура	needlework?	
4	SSC phase II	Dereivka	cord шнур	needlework + plaited cord	
5	SSC phase II	Dereivka	cord шнур	needlework? + turned cord	

Fig. 1. Comparison of archaeological descriptions of ceramic wear with associated laboratory research results of textile impressions made on ceramics of cultures in the 4th to the beginning of the 3rd mill. BC in Ukraine

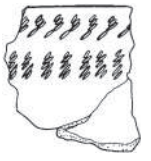
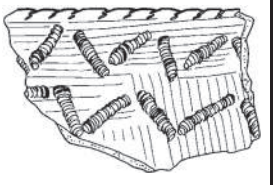
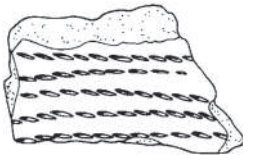
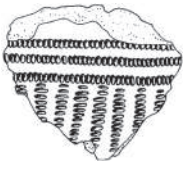
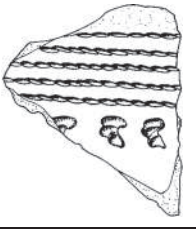
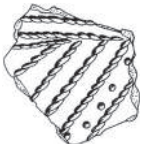
Sample no.	Taxonomic identification	Site	Archaeological descriptions	Microscope analysis	Figure
6	LMC	Mykhailivka	cord шнур	plaiting	
7	LMC	Mykhailivka	cord шнур	sprang-like thick netting + sprang-like simple netting	
8	RC phase 1	Mykhailivka	twine cord перевитый шнур	finger twine cord	
9	RC phase 2	Mykhailivka	cord шнур	needlework	
10	RC phase 2	Mykhailivka	twine cord перевитый шнур	plaiting (basket?)	
11	RC phase 2	Mikhailovka	cord + sickle impressions шнур + серпики	needlework? plaited cord + knots	
12	YC	Mykhailivka	cord шнур	plaiting cord with knots made out of cord	

Fig. 1. cont.

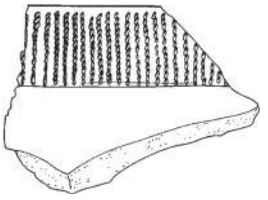
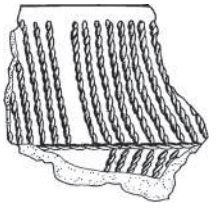
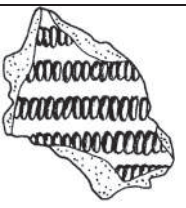
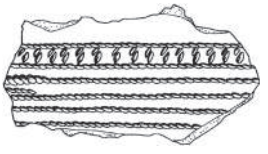
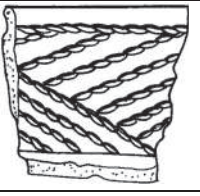
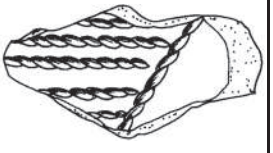
Sample no.	Taxonomic identification	Site	Archaeological descriptions	Microscope analysis	Figure
13	YC	Mykhailivka	cord шнур	plaiting	
14	YC	Mykhailivka	cord шнур	needlework	
15	YC	Mykhailivka	twine cord перевитый шнур	plaiting (basket)	
16	YC	Mikhailovka	cord + twine cord шнур + перевитый шнур	elaborate sprang (netting)	
17	YC-early	Khortitsa	cord шнур	plaiting	
18	YC-early	Khortitsa	cord шнур	needlework + needle-work or plaiting	

Fig. 1. cont.

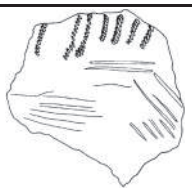
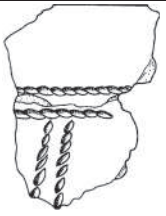
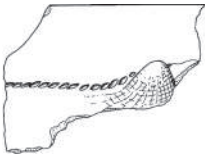
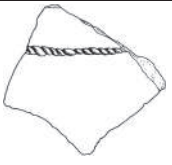
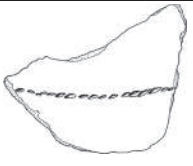
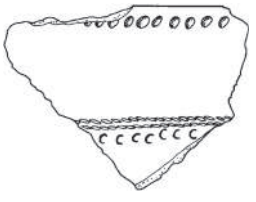
Sample no.	Taxonomic identification	Site	Archaeological descriptions	Microscope analysis	Figure
19	TC stage CI	Ihnatenkova Hora	short cord impressions короткие оттиски шнура	turned cord	
20	TC stage CI	Ihnatenkova Hora	cord шнур	needlework or plaiting	
21	TC stage CII	Sandraki	cord шнур	plaiting?, needlework	
22	TC stage CII	Troyaniv	cord шнур	turned cord	
23	TC stage CII	Troyaniv	cord шнур	plaited cord + plaiting or needlework?	
24	Usatovo Culture (TC stage CII)	Mayaki	cord + sickle impressions шнур + серпики	netting	

Fig. 1. cont.

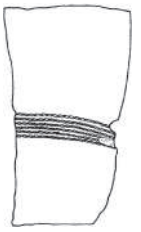
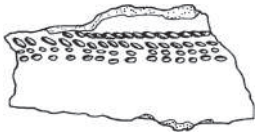
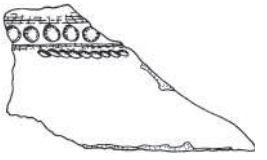
Sample no.	Taxonomic identification	Site	Archaeological descriptions	Microscope analysis	Figure
25	Usatovo Culture (TC stage CII)	Mayaki	cord шнур	plaiting	
26	Usatovo Culture (TC stage CII)	Mayaki	cord шнур	netting	
27	Usatovo Culture (TC stage CII)	Mayaki	cord шнур	netting	

Fig. 1. cont.

It should be noted that BII Trypillia ceramics displayed not only 'caterpillar' impressions, but also cord ones, which are particularly common on Chapaivka-type monuments in the Dnieper area, where they are also connected to the 'steppe influence' [Kruts 1977]. However, judging by the finds of painted ceramics, those Trypillia monuments have been synchronous for a long time with those of the Nebelivka-type in the Southern Bug area, where they had replaced the Volodymyrivka-type monuments.

It is also noteworthy that the Nebelivka group featured only 'caterpillar' patterns but not cord ornamentation. Since V. Kruts once considered the Chapaivka monuments to represent a transition to the CII stage, their 'aging' to the BII stage generally challenges his conclusions about the 'steppe influences' and gives cause to consider the origin of cord emergence in Trypillia complexes.

Furthermore, D. Telegin also noted that corded ceramics had emerged later in the Don and Volga areas and the Northern Caucasus than in the Dnieper area, and referred to the SSC people as the creators of that kind of ornamentation.

Archeological descriptions	SSC phase II	LMC	RC phase I	RC phase II	early YC	YC	TC stage CI	TC stage CII	UC
Cord+sickle impressions									
Short cord impressions									
Thin cord impressions									
Cord impressions									
Twine cord impressions									
Cord+twine cord impressions									

Fig. 2. Distribution of plaiting varieties in Eneolithic and Early Bronze Age archaeological cultures on the territory of Ukraine in accordance with visual definitions

2. DIFFICULTIES IN ARCHAEOLOGICAL IDENTIFICATION OF 'CORDED' ORNAMENTATION

It should be noted that the descriptive terminology applied by archaeologists to 'corded ornamentation' included in general about six entries (Fig. 1). Meanwhile, comparison of samples of ceramics from various cultures, which are described with the use of identical terms, shows that in some cases they describe different imprints. An example are the distinctions in the 'cord + sickles' entry in Fig. 2; this is not the only case when it is impossible in principle to compare the descriptions of the finds without illustrations. The same argument should be related to 'cord', the most common term in descriptions of ceramics of various cultural types.

It has been the formal comparison of the presence of certain kinds of combinations of types of 'corded ornamentation' in specific cultural complexes that has allowed individual researchers both to make their judgements about priorities in 'inventing' a specific kind of embellishment and determine the directions of its 'dissemination', as well as cultural and even ethnic processes. At a glance, such comparisons and the conclusions based on them appear convincing enough, even though individual issues were deemed debatable.

Indeed, the presence of various versions of 'corded ornamentation' in all nine cultural complexes, the materials of which had been provided for laboratory studies, initially seemed to give good reasons for such conclusions. For instance, based on the descriptive terminology, the plain 'cord' was present in all nine complexes, the 'twisted cord' and the 'cord with sickles' appeared in at least three of them. The latter's presence in the SSC, dated back to an earlier time than the Usatovo (UC) and the Rogachyk (RC) cultures, making it possible to assume that the older monuments had been the source of that particular kind of 'corded ornamentation'. Such conclusions, seemingly flawless from the perspective of purely archaeological methodology, proved to be not so obvious in the light of the undertaken archaeometric tests.

The research project of the most ancient corded ornamentation involved the study of ceramic samples from the 'steppe' cultures and the TC, dating back to ca. 5^{th} mill. – the first half of 4^{th} mill. BC. It should be noted that some of the dates were obtained directly from fragments of ceramics from the same settlements that gave samples for the study of textile impressions. When studied under microscope, the cord ornaments proved to be of many more various patterns: the balance was about 6:14, while the total number of samples was limited to 27. The correlation of archaeological descriptive terms and laboratory analyses results is presented in Fig. 2; the occurrence of various textile imprints in different cultural complexes can be seen in Fig. 3.

Results of microscopic analysis	SSC phase II	LMC	RC phase 1	RC phase 2	YC-early	YC	TC stage CI	TC stage CII	UC
1. Turned cord							+	+	
2. Plaited cord	+								
3. Plaited cord+knots				+				+	
4. Finger twine cord (wound)			+						
5. Plaiting	+	+		+	+		+	+	+
6. Plaiting (basket?)				+		+			
7. Plaiting with knots?						+			
8. Plaiting - ornamental ribbon (inkle?)						+			
9. Macramé?	+								
10. Netting									+
11. Sprang (netting)? + fringes						+			
12. Elaborate netting - similar to elaborate sprang		+							
13. Needlework/needle stiching?	+			+	+	+	+	+	

Fig. 3. Plaited textile types in archaeological cultures of the Eneolithic and the Early Bronze Age in Ukraine (laboratory results)

3. ‘CORDED WARE’ ORNAMENTATION INTERDISCIPLINARY RESEARCH PROGRAMME

The laboratory test results enabled the conclusion to be drawn that the steppe populations – Dereivka (DC) and Yamnaya (YC) cultures at their early and late stages and the monuments of the Lower Mykhailivka type – had used stamps (matrices) that had differed from those used by the TC population. Hence, judging by five samples taken for analysis from the Dereivka settlement collection, the Middle Eneolithic DC ceramics had been ornamented with the use of plaiting and turned cord. Only one fragment was ornamented with a woven pattern and macramé netting. Quite possibly that kind of ornamentation emerged as a result of the TC influence that can be also traced in the zoomorphous and anthropomorphous plastic modeling works found in that settlement [see Kotova. . . , in this volume].

The lower layer of the Mykhailivka settlement, synchronous to that of Dereivka, contained objects ornamented with the use of woven patterns, grid and composite cord, as well as twisted cord. The middle layer had been left by the population of the Late Eneolithic RC, which continued the traditions of its predecessor steppe population, using similar types of cord impressions such as needle patterns, woven baskets, interlacing and knots, for decorating its vessels. Finally, the upper layer of the Mykhailivka and Generalka Khortitsa settlement had been left by the Early Bronze YC population, which used a variety of corded ornamentation, including woven patterns, interlacing with knots, needlework, woven baskets, and grid stamps.

The plaiting impressions and needlework proved to be the most common and are present in the complexes of seven and five cultures, respectively (taking into account their chronological stages). The most ancient monuments featuring the plaiting entry belong to SSC and TC, for which archaeologists have traditionally registered a large number of contacts, based on research data of ceramic complexes. However, the issue of priority remains open, since earlier materials have not been studied for the TC and for its neighbour culture complexes.

Regretfully, cord-ornamented vessels from TC BII monuments, synchronous to the DC, were not available for analysis. The available materials allow an assumption that the differences in corded ornamentation of the TC and ‘steppe’ monuments result from independent development of that ornamental tradition. Possibly, after having emerged in some centre (either the ‘Trypillia’ or the ‘steppe’), the ‘corded ornamentation’ had been borrowed by the neighbouring population that subsequently used its own ways of making the imprints.

Hence, the study of the samples generally demonstrates a certain continuity of techniques in making ‘corded ornamentation’ by the steppe population throughout the Middle and Late Eneolith, as well as the Early Bronze Age. Moreover,

archaeological materials of the Steppe Eneolithic clearly demonstrate a genetic connection between the steppe cultures. In this context, the continuity of types of 'corded ornamentation' appears to be understandable. On the other hand, they demonstrate a disconnection, particularly between the 'steppe' and 'Trypillia' populations, including the UC.

4. RESEARCH POSSIBILITIES IN TECHNOLOGY OF NON-WOVEN TECHNIQUES APPLIED IN 'CORDED WARE ORNAMENTATION'

The use of the findings of this study opens up prospects for research into ancient techniques of making 'corded ornaments' to be precise, non-woven textile crafts (see Fig. 3) [Kośko, Sikorski, Szmyt... – part 1, in this volume, Fig. 19] which proved to be more varied within individual culture complexes than had been believed before (Fig. 1). Possibly, accumulation of research materials will make it possible to trace the history of the emergence and proliferation of individual techniques in this context.

Importantly, research shows the widest variety of textiles for one culture complex does not exceed four or five; the record number of five was reported for the YC, represented by samples for the Mykhailivka settlement. It is possible, though, this figure also depends on the number of studied samples.

Interesting insights may be offered by research into the issue of influence in respect to the 'textile' decoration technique on shaping the morphology of ceramic objects; for the 'natural selection' of vessels that are the best-shaped for covering them with textile imprints, typical for the community in question, appears to be inevitable. However, equally interesting is the prospect of studying the possibility of the reverse influence. Obviously, both the number and variety of samples available for laboratory testing are important for the validity and accuracy of the proposed research.

Another area of interest for future archaeological study is the origin of the 'corded' ornament idea, including its connection with the so-called 'comb', widespread already in the Neolithic period. Such research will require not only studying the most ancient samples, but undertaking certain experimental work. Yet, the latter may prove relevant for studying a wide range of issues connected to that type of embellishment.

Another important aspect of research in this context is the study of connections between corded ornamentation schemes and other pre-textile objects, methods of their finishing, including flower-patterned fabrics (the latter being woven as well as, probably, stamped. A separate question, in a way connected to issues of textile techniques, is research into the sacral aspect of textile ornaments,

for this kind of activity was adequately reflected in ancient populations' sacral and magical practices [see Kowalski. . . , in this volume].

5. CONCLUSIONS

Summing up the above, it should be noted that a fuller, more complex and systematic study of samples taken from a large number of monuments of various archaeological cultures from the territory of Ukraine is advisable in the future. Given that the total number of the 'steppe' settlement monuments with relevant ceramics is relatively small and does not exceed 16 sites (including, for 5th mill. BC: 4 SSC, 3 DC, 1 Lower Mykhailivka type; 8 settlements; for 4th mill. BC: 2 Pit-and-Comb Culture, 2 RC, 4 YC; 8 settlements), this kind of undertaking would appear to be quite realistic. Possibly, more effort will have to be dedicated to studying materials from YC and Catacomb graves, as well as monuments of the Corded Ware cultures.

The materials of the TC and UC, cultures that had had a rather highly developed textile production for over 2000 years, can be said to be more prolific in numbers and variety and its earliest traces are linked to the spindle whorls found in the monuments of the latter half of 6th-5th mill. BC. One example of such 'manufacture' is a bone crochet hook, decorated with a bird figurine, found in the Polyvaniv Yar settlement (BI horizon). The impressions on ceramics allow identification of a plain double-sided cloth knit with needles, and two types of knitting with a crochet hook, single crochet stitches and double crochet stitches [Burdo 2004a]

For 4th mill. BC, in addition to spindle whorls, there have been multiple finds of vertical looms (ceramic loom weights), starting from the BII stage. At the same time, imprints of woven and knit fabrics appear on ceramics, plastic modeling works, as well as drawings of bi-triangular figures on ceramics in clothes, scratching of clothes details on anthropomorphous plastic objects [Burdo 2004b; Novitskaya 1960; Kosakivskyi 1998; 2001; Kosakivskyi *et al.* 1998].

The finds of yarn and threads are rare in the TC; they have been known in the settlements of Polyvaniv Yar (stage BI) and Maidanetske, Stina IV (stage CI). A fine thread of yarn from Polyvaniv Yar had been made in the plain twisting technique with 14 twists in each cm. The yarn for threads from Stina IV had been made of two Z-twisted 0.9-1.2 mm threads [Passek 1951:54-57; Burdo 2004c:437]. Prolific whorls from late Trypillia settlements, including those decorated with pictograms and magic ornaments, indicate a special attitude to the process of thread- and yarn-making.

Summing up this overview, it should be noted that in the case of the TC the objects of study were primarily the imprints of fabrics and remains of looms, but not the items as such (woven or knit), the impressions of which were identified with the use of laboratory methods within the implementation of this research programme.

In our view, the most productive approach is the study of the entire corpus of materials, at least within regions/cultures; the development of specialized research programmes with the use of available laboratory research methodologies for textile products based on their impressions on ceramic objects.

For descriptions of finds, it appears more appropriate to use primarily the data and terminology that is common for laboratory testing, rather than the traditional terminology that was in use before by archaeologists. This traditional terminology would appear to be insufficiently accurate and, as shown by the studies undertaken within this programme, omits many important details.

Translated by Inna Pidluska

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'CORD' ORNAMENTS ON FUNNEL BEAKER CULTURE POTTERY AT TOMINY, SITE 12

Geographically, site 12 at Tominy is located on the Kielce-Sandomierz Upland, being part of the Central Poland Uplands (Fig. 1). It is situated in the southeast Iłża Piedmont, forming part of the Kielce-Sandomierz Upland [Kondracki 1978:356-360]. This mesoregion differs greatly in terms of terrain and soil types from the other regions of the Upland. What mainly sets it apart is sandy, argillaceous in places, substrate. Although strongly characteristic of the region, the loess cover does not reach site Tominy 12, with its range ending about 1 km southwest of the site.

Site Tominy 12 lies in the Wyszmontów Valley, on a slope descending slightly northwest. The terrain is rather monotonous. The central part of the site is located on a major prominence of moraine origin (Fig. 2).

Administratively, the site is situated in the Ożarów Commune, Opatów District, Świętokrzyskie Province. It covers a series of small hills, stretching along the southern edge of the Wyszmontów Valley, and the slope tops of the valley of a small watercourse. Local soils developed on a sandy, argillaceous in places, substrate.

1. GENERAL DESCRIPTION OF PREHISTORIC FEATURES AND MATERIALS

Rescue excavations on site Tominy 12 preceded the construction of a bypass around Ożarów. The area of 1.61 ha was excavated, while 4.5 ha were surveyed, unearthing in total 308 features (Fig. 3) and 64,188 artefacts. Most features are pits. The second largest category of features is postholes.

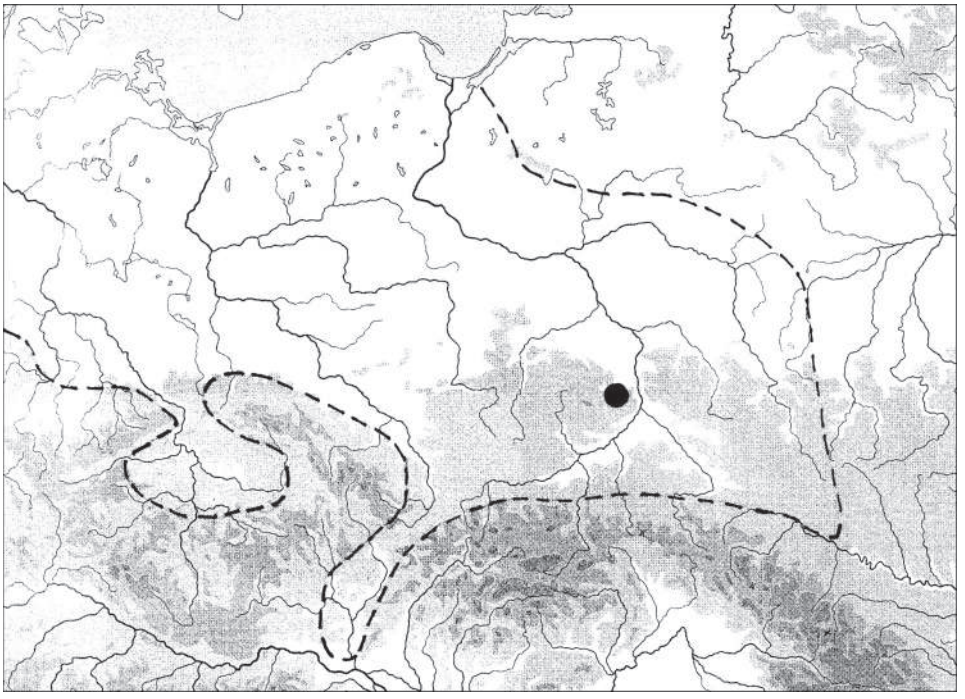

Fig. 1. Position of site 12 in Tominy, in terms of Funnel Beaker culture range

Almost the whole site was covered by a cultural layer. It supplied almost 70 per cent of all artefacts. The most numerous group of artefacts is made up of pottery. In total, 29,321 pottery fragments were discovered, including 3,260 distinctive and 26,061 indistinctive ones.

The flint inventory from the site includes 16,273 specimens while stone artefacts number 18,071. Other artefacts comprise 157 bone objects, 29 metal ones and 285 fragments of daub. In addition, 52 movable individual finds were recorded including axes, reaping-hooks and spindle bobs, etc.

The largest concentration of features was observed around a small terrain prominence, in the centre of the site (Fig. 3). The most numerous features are those attributed to the Funnel Beaker (52) and Linear Pottery cultures (26) while relatively rare are those associated with the activities of the populations of the Malice (6), Lublin-Volhyn (15), Globular Amphora (2), Mierzanowice (2) and Lusatian (16) cultures. There were also features recorded that were dated only generally to the Neolithic (6), the Bronze Age (9) and modern times (3). The chronology of 171 features could not be determined due to the absence of any dateable material or clear stratigraphic indicators.

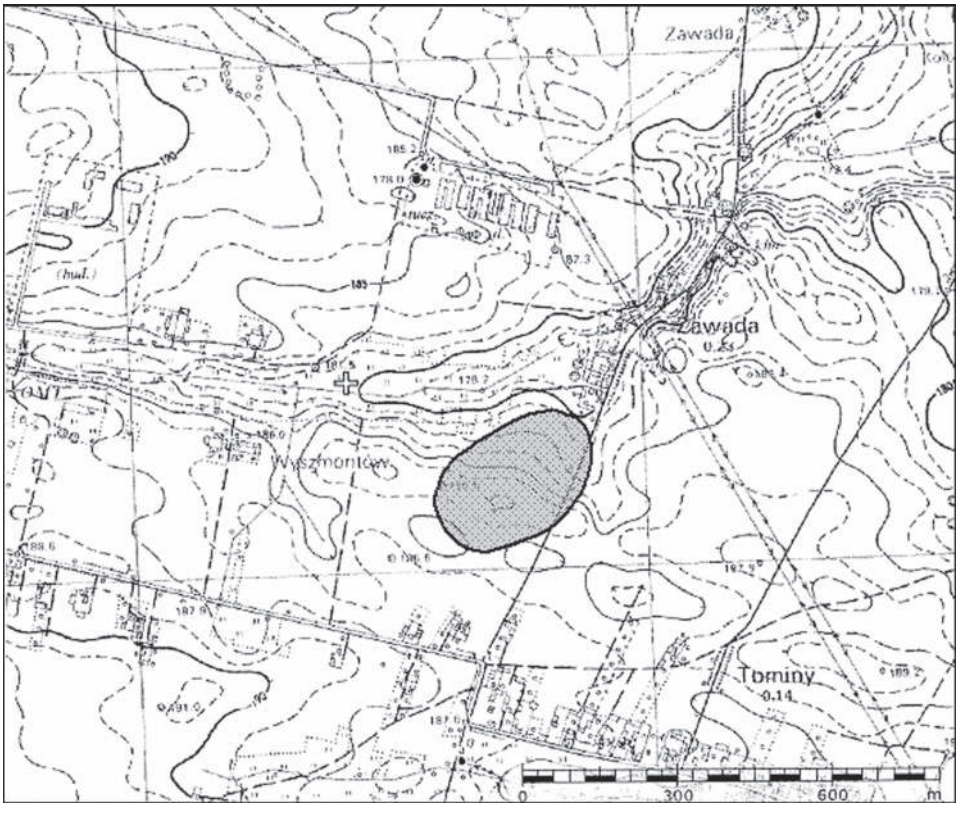

Fig. 2. Location of site 12 in Tominy on a topographical map

It must be added here that all the features, especially those situated at the prominence summit, were badly damaged due to strong slope erosion. In many cases, only bottom parts of features could be isolated.

The cultural layer, spread all over the site (except for the eroded prominence culmination), is made of loamy sand saturated with artefacts, in places 40-50 cm deep.

2. FUNNEL BEAKER CULTURE MATERIALS AND FEATURES

The Funnel Beaker culture (FBC) settlement is believed to have left behind 52 features which reflect almost a half of all the features that have been culturally attributed. The traces of the settlement are marked chiefly on the prominence

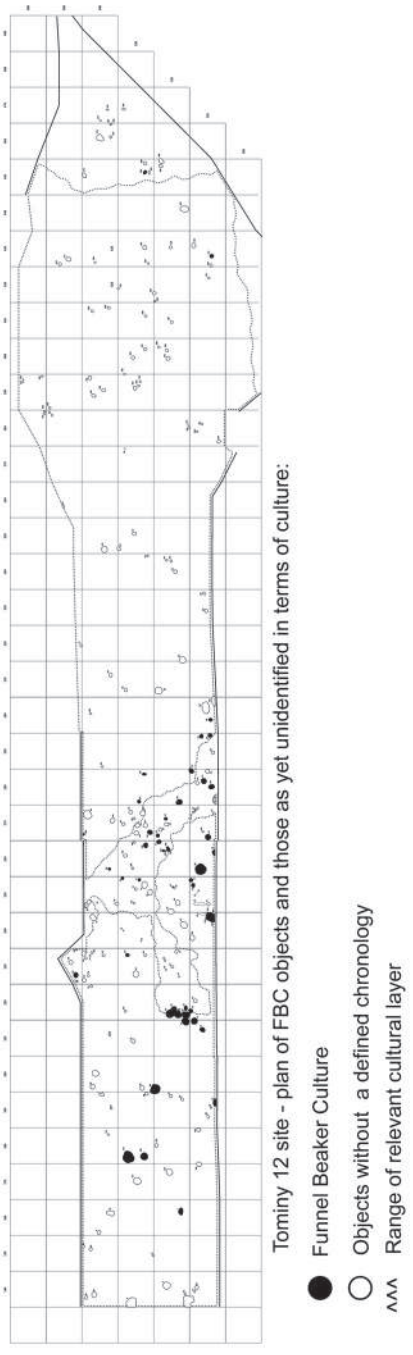

Fig. 3. Spread of prehistoric objects (immovable) on site 12 in Tominy

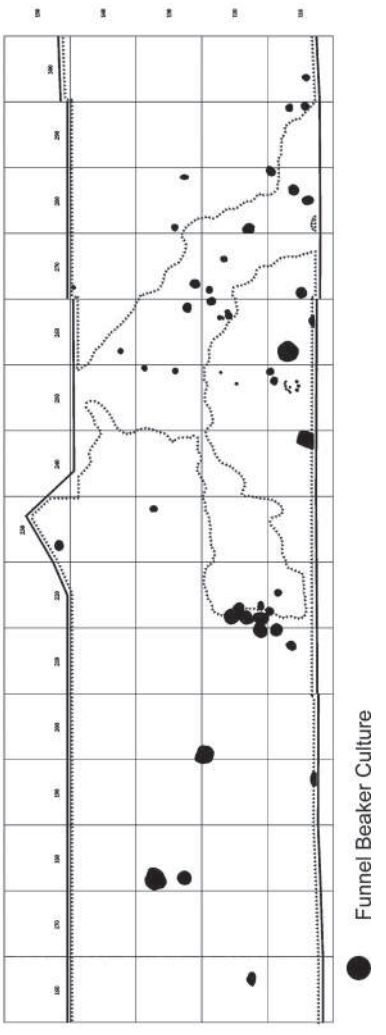

Fig. 4. Spread of Funnel Beaker culture prehistoric objects (immovable) on site 12 in Tominy

summit, both adjacent parts of the slope and on the lower portions of the south-west slope (Fig. 4). Only two features were identified in the lower portion of the northeast slope, at a considerable distance from the settlement centre.

In total, 6,262 pieces of FBC ceramic material come from features, of which from FBC features come 5,760 pieces. As many as 592 FBC pottery fragments were obtained from the fills of the features of other cultures.

FBC material in the cultural layer was found throughout the whole excavated space, in a belt 290 m long – from are 150 to are 430 – stretching east-west. The cultural layer yielded 8,038 fragments of pottery.

The inventory of FBC pottery under investigation includes 30 fragments bearing cord ornaments, accompanied sometimes by other ornamentation techniques (Fig. 5:4,6), and 3 fragments of lips with their rims obliquely cut off inwards (Fig. 6).

In terms of vessel forms, funnel beakers dominate, albeit of different varieties (Fig. 5:3-6,9), i.e. with short and tall necks. They bear varied ornament patterns made using varied techniques. Quite numerous, horizontal continuous rows of classic bars are sometimes doubled and impressed with a rectangular stamp under a rim. In addition, a wide variety of other techniques is encountered such as pinholes, impressions of an oval, round and square stamp, the use of which yielded an effect similar to that of the classic bar. Frequently, bars and their derivatives are accompanied, usually underneath, by rows of zigzag lines made with impressions of a rectangular bar, pinholes or impressions of an oval or square stamp. Occasionally, bars are replaced with rows of small arches. What is relatively frequently encountered is horizontal (double or triple) impressions of a cord of varied thickness (Fig. 5:4,6) or a single cord accompanied by a zigzag line.

Next in terms of numbers were saclike vessels decorated with a cordon under the rim. The cordons were usually corrugated using impressions of fingers or nails (Fig. 5:7). A quite large number of amphorae is evidenced by pottery fragments with handles, relief strips in the form of "drooping whiskers", and a ladder ornament. Single specimens of collared bottles (Fig. 5:2), cups with *ansa lunata* handles and cylindrical vessels were recorded as well.

In terms of technology used, all the vessels are quite uniform. The ceramic body was usually made leaner by using medium-size crushed pottery. The vessel surfaces are even, sometimes smoothed and polished. The fractures are usually two-coloured and compact.

'Cord' ornaments (Fig. 5:4,6) and the presence of lip specimens, having their rims obliquely cut off inwards (Fig. 6), testify to the fact that a substantial portion of the FBC ceramic material belongs to the culture's late phase. Whereas the presence of collared bottles, cups with high *ansa lunata* handles, ladder ornaments on small amphorae, and frequent classic bar ornaments under the rims of funnel beakers (Fig. 5:5, 9) show that the remaining pottery belongs to the classic phase of the culture.

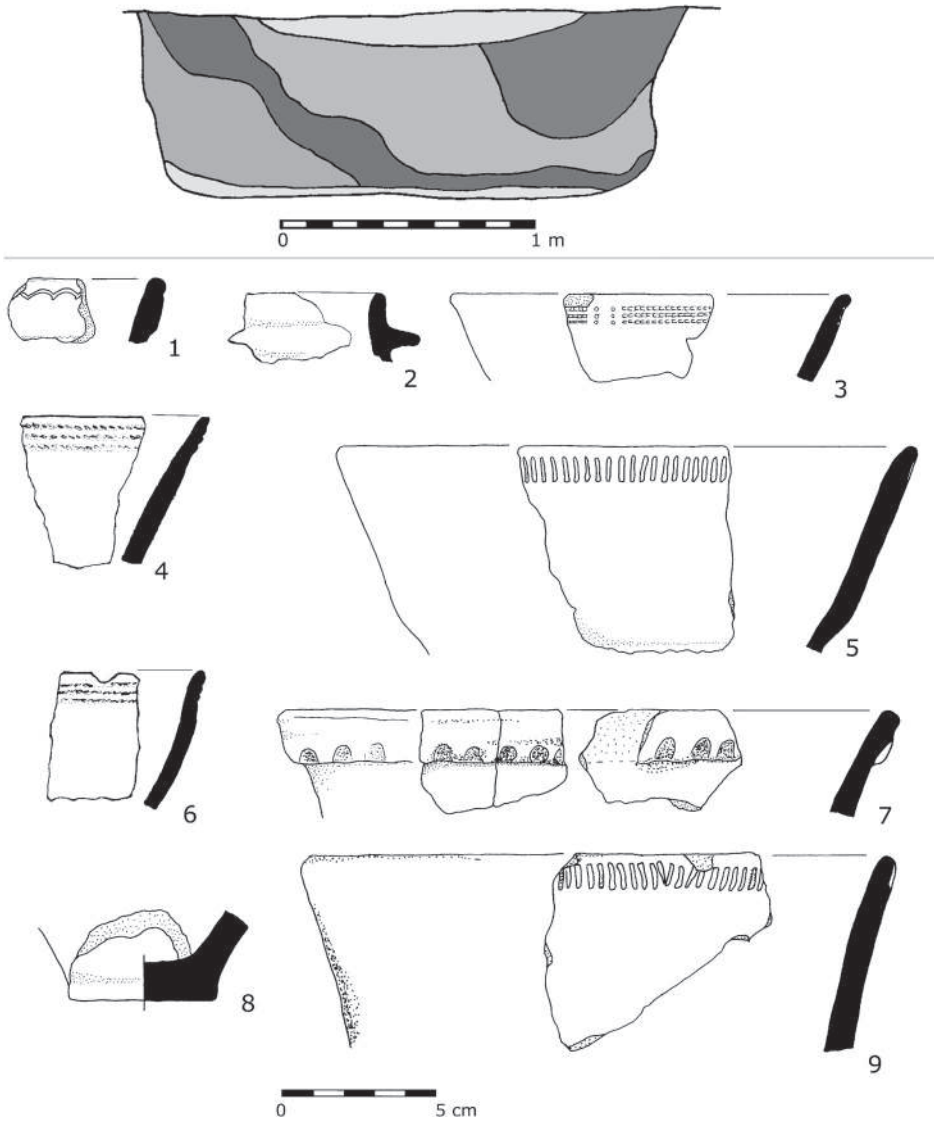

Fig. 5. Funnel Beaker culture object 33 on site 12 in Tominy

As a result of performed analyses [Kośko, Sikorski, Szmyt... – part 1, in this volume], we know now that 'cord' ornaments on pottery fragments from site Tominy 12 were made by impressing more or less complex needlework goods and not a hemp cord. 'Cord' ornaments were partially smoothed out in areas close to rims. The surfaces of the vessels were slipped (covered with engobe) and slightly

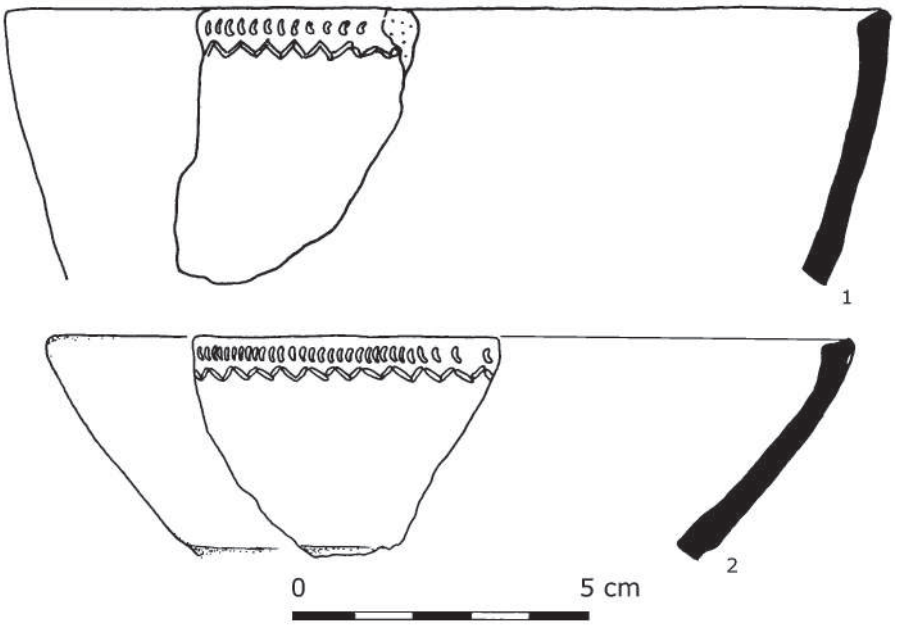

Fig. 6. Funnel Beaker culture ceramic ware from a cultural layer on site 12 in Tominy

polished. The consistency of technique used to make 'cord' ornaments, their partial smoothing out as well as slipping and polishing the surfaces of vessels thus decorated testify to the single technological and stylistic tradition of their makers.

The widespread use of needlework goods to make 'cord' ornaments [Kośko, Sikorski, Szmyt... – part 1, in this volume], found at Tominy as well, does not allow us to draw any conclusions as to the directions from which the ornaments, found on the FBC pottery from the site, were imported. To determine the time of import and inspiration centres of 'corded' ornaments on FBC pottery at site Tominy 12, one should refer to our knowledge of the chronology and origins of such ornaments in the FBC southeast group.

3. THE LATEST RESEARCH INTO THE CHRONOLOGY OF THE FBC SOUTH-EAST GROUP

In the south-east group of the FBC, the best constructed and verified empirically is the chronology of the settlement in Bronocice [Kruk, Milisauskas 1981; 1983; 1990; 1999]. The settlement's lifetime covered the period from 3800/3700

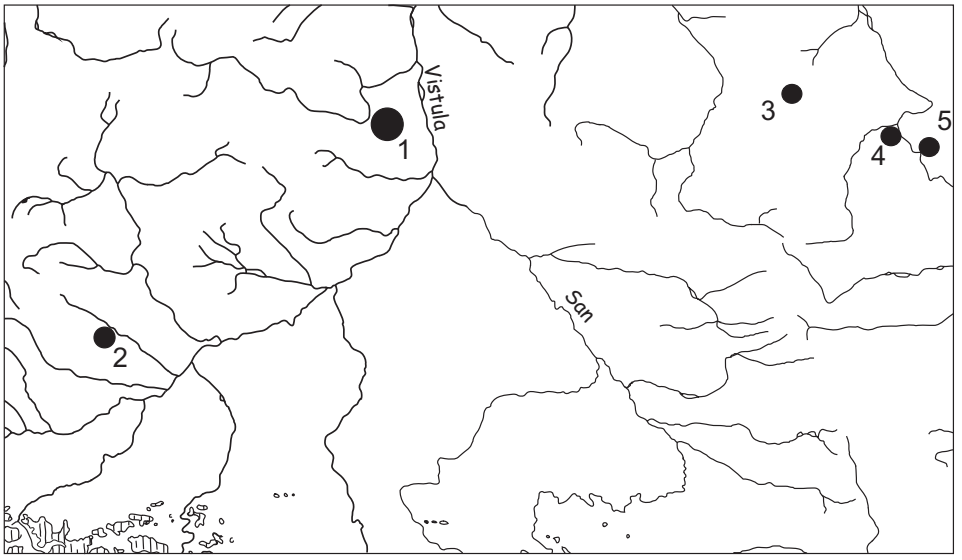

Fig. 7. Position of chosen Funnel Beaker culture sites, south-east group late phase (1 – Tominy, 2 – Bronocice, 3 – Majdan Nowy, 4 – Gródek Nadbużny, 5 – Zimno)

to ca. 2600/2500 BC. Of crucial importance was setting the beginnings of the stage of great settlement on this site at 3650/3600 [Kruk, Milisauskas 1999:120; see also Nowak 2009:339], which made it tantamount to and simultaneous with the emergence of the south-east group of the FBC on the loess areas of Małopolska [Kadrow 2009:140]. To the same period, the beginnings of the settlements in Gródek Nadbużny and Zimne are currently dated [Bronicki *et al.* 2003:31, 64, Fig. 27; 2004:107-109, 122, Fig. 4]. Equally important, the dating of the beginnings of badenization in Bronocice (ca. 3050/3000 BC) is related to the stage of reduction and concentration of FBC settlement in west Małopolska [Kruk, Milisauskas 1999:135]. The chronology of he beginnings of the process found confirmation in more recent studies [see e.g. Furholt, Machnik 2006:340-342; Furholt 2009:235; Zastawny 2008:184-186]. Other papers suggest that the beginnings of badenization be moved to a slightly earlier date, i.e. 3200/3100 BC [Włodarczak 2006:58, Fig. 21; 2008:251-252, Fig. 2].

The processes of badenization took place only on the loess area of western Małopolska [Kruk, Milisauskas 1999:174-176; Włodarczak 2008:251-252; Zastawny 2008:184-186]. They were not observed on the Sandomierz-Opatów, Lublin and Western Volhynia uplands. The study of 'classic' FBC materials from Gródek Nadbużny [e.g. Jastrzębski 1991] revealed the presence of older materials [designated as phase Gródek I, see Jastrzębski 1991:189, Fig. 3] and younger ones [designated as phase Gródek II; see Jastrzębski 1991:189, Fig. 4] with few Wiórek links and prevalence of vessels with short, funnel-like necks. What clearly

set apart the younger materials was supposedly the presence of relatively numerous imports of Late Tripolye pottery in their context [Burchard *et al.* 1991:98; Jastrzębski 1991, Fig. 5]. A re-analysis of settlement assemblages, radiocarbon dated, containing Gródek I pottery, made it possible to set the beginning of the phase contemporaneously with phase Bronocice II [or at ca. 3650 BC, see Bronicki *et al.* 2003:31, Table 2; Kadrow 2005:12] and not as suggested earlier contemporaneously with the beginnings of phase Bronocice I [Burchard *et al.* 1991:96-99, Fig. 2]. Hence, instead of a long term of persistence between 3900 and 3500 BC [Burchard *et al.* 1991: Fig. 2], phase Gródek I should be dated to a relatively short period of 3650-3500 BC [Bronicki *et al.* 2004:107-108]. A similar problem is posed by the dating of the end of phase Gródek II. Originally, the end of the phase was synchronized with the end of phase Bronocice III (or ca. 3100/3050 BC), admitting, however, of a possibility that it could have lasted longer [see Burchard *et al.* 1991: Fig. 2; Włodarczak 2006:45, Fig. 16]. In light of available radiocarbon dates, the end of phase Gródek II was dated to 2900/2800 BC [Bronicki *et al.* 2004:108, Table 2]. The presence of ceramic imports from the Gorodsk group of the Tripolye culture in the assemblages of that phase in Gródek Nadbużny [Jastrzębski 1985: Fig. 5; 1991: Fig. 5:6, 8, 10] justifies, however, moving the dating of the end of FBC settlement on site 1C in the town to 2700/2600 BC [Bronicki *et al.* 2003:49; 2004:108].

The late dating of the end of phase Gródek II is justified by the analysis of FBC ceramic materials and radiocarbon dates for artefact assemblages from site Grodzisko in the locality of Zimno [see Bronicki *et al.* 2003:32-63; 2004:111-121]. The lifetime of the settlement can be divided into two phases: Zimno I and Zimno II, which were separated by an interval of over 300 years. Zimno I lasted from 3650 to 3400 BC while Zimno II continued from 3050 to 2600 BC [Bronicki *et al.* 2004:122; Fig. 4].

For the questions of the origin and dating of ‘cord’ ornament on the FBC pottery on site Tominy 12, of crucial importance is determining its position in relation to other FBC inventories, containing similar ornaments. What is meant here in the first place is materials from the Neolithic settlement in Majdan Nowy [Kadrow 2005:15, 16], where ‘cord’ impressions on late FBC pottery were found to be relatively frequent (11% of all ornamented fragments) [Bronicki, Kadrow 1988:96; Table 6, 7; Figs. 9:11; 10:9; 11:6; 12:6; 13:8; 14:1, 10; 20:3, 11; 21:5, 6, 9; 23:5].

Special attention is deserved by the joint occurrence of ‘cord’ ornaments and vessel lips with their rims obliquely cut off inwards [e.g. Bronicki, Kadrow 1988: Fig. 19:5; 20:11]. Bowls with obliquely cut off rims are frequently encountered in southeast Balkan cultural groups, belonging to the horizon of Sitagroi Va – Radomir I-II – Junacite XIII-IX [Némejcová-Pavúková 1999: Figs. 1-4; 8:9, 10; 9:12], synchronized with the Folteşti and Usatovo groups and the Coţofeni culture [e.g. Raczky 1991:340]. Occasionally, such bowls bear a ‘cord’ ornament

[Kadrow 2005: Fig. 18:13, 14]. They are quite frequent in the assemblages of the Kasperivtsy group [e.g. in Bilcz Złoty; see Kadrow *et al.* 2003:73, 74; Fig. 24:11-13, 15; Kadrow 2005: Fig. 18; 3, 4, 6, 8] and the Gorodsk group [e.g. Kruts, Ryzhov 2000: Figs. 4:3; 6:3; 9:9] of the Tripolye culture.

It seems that the analogies cited [because of the chronological position of the Kasperivtsy group materials in Bilcze Złote; see Kadrow *et al.* 2003:120-128; Figs. 53-55] allow us to safely date late FBC materials in Majdan Nowy, comprising vessels with their lip rims obliquely cut off and occasionally bearing 'cord' ornaments, to the beginning of the 3rd millennium BC [Kadrow 2005:15; Fig. 19:2-4, 8].

The typological and stylistic peculiarities of pottery assemblages representing the late phase of the FBC [Bronocice – see e.g. Kruk, Milisauskas 1983; Gródek Nadbużny – see Jastrzębski 1991; Majdan Nowy – see Bronicki, Kadrow 1988; Kadrow 2005; Zimne – see Bronicki *et al.* 2003; 2004] show that at the turn of the 4th and in the early 3rd millennia BC the culture continued to develop local differences in south-east Poland (Fig. 7). The differences, as it seems, existed already in the beginnings of the south-east group [Kadrow 2009: Fig. 1], which must have been related to different cultural substrates in the different areas of its range.

The impact of the Tripolye culture on some FBC settlement regions in Małopolska continued over a longer period of time. It was the impact that contributed to the rise, especially in the late phase, of local typological and stylistic peculiarities in pottery. At the earliest, they are recorded already in phase Bronocice II as imitations of Tripolye painted ware [Jastrzębski 1985:88]. The imports of Tripolye painted ware are also known from the assemblages of phase Gródek I in Gródek Nadbużny [Jastrzębski 1985: Figs. 2-4; 8:3-6]. Quite numerous at the site, the imports of pottery belonging to the Gorodsk group of the Tripolye culture bear cord ornaments [Jastrzębski 1985: Fig. 5]. Whereas in Zimno, discoveries of pottery imports from the Horodiştea and Gorodsk groups were made [Bronicki *et al.* 2004:122]. It must be stressed in this context that the pottery bearing 'cord' ornaments and coming from the sites in Majdan Nowy and Tominy does not represent Tripolye imports or imitations. What it does represent, however, is a form of adaptation of the selected traits of the Tripolye culture pottery to local FBC pottery.

4. THE CHRONOLOGICAL POSITION OF FBC WARE, BEARING 'CORD' ORNAMENTS, FROM THE SITE IN TOMINY

At present no results of precise statistical analyses of FBC ware from the site in question can be given. The work on source processing of the artefacts is

still underway. What can be responsibly given, however, is their general description. The number of 30 pottery fragments bearing 'cord' ornaments is, so far, the highest of all known FBC inventories in Małopolska. It must be observed, however, that the incidence of the ornament in the settlement at Majdan Nowy [Bronicki, Kadrow 1988:91, 100, 101, Table 6, 7] is visibly higher than at site 12 in Tominy. In Majdan Nowy, there were recorded 14 FBC pottery fragments bearing 'cord' ornaments in the pottery inventory of 3,201 shards, whereas in Tominy, 30 fragments of vessels bearing such ornaments were obtained from an inventory of over 14,000 ceramic artefacts. Likewise, in the case of the number of pottery specimens with their lip rims obliquely cut off inwards, in Majdan Nowy two such artefacts were unearthed, while in Tominy – out of a much numerous inventory – only three were discovered.

On both sites, FBC settlement could have been divided into two phases. The materials that are encountered there belong to both the classic and late phases. A distinguishing trait of the latter is 'cord' ornamentation. Due to hardly legible nature of strata and feature fills as well as a lack of any clear stylistic-typological differences between most of the pottery from the two phases, no unambiguous classification of all the pottery can be offered. The ceramic materials of the late phase from Tominy should be dated similarly to those from Majdan Nowy on the strength of the presence of lips with their rims obliquely cut off inwards accompanied by cord ornaments. As it has already been mentioned, similar elements are recorded in the Kasperivtsy and Gorodsk groups of the Tripolye culture. Hence, they can be dated to the first centuries of the 3rd millennium BC [Kadrow *et al.* 2003:120-128; Figs. 53-55; Kadrow 2005:15]. As regards direct sources of inspiration for the use of 'cord' ornamentation, they are to be found in the late groups of the Tripolye culture, chiefly the Kasperivtsy and Gorodsk groups. Jointly occurring in them, specifically in the former, lips with their rims obliquely cut off inwards and cord ornaments are recorded in Majdan Nowy and Tominy. The origins of the former trait have their roots in Anatolia and the eastern Balkans, while the latter trait – cord ornaments – comes from Pontic steppes. The two traits may have merged in the late groups of the Tripolye culture at the mouth of the Danube.

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'CORD' AND 'CORD-LIKE' ORNAMENTS ON THE POTTERY OF FUNNEL BEAKER CULTURE SOCIETIES ON THE POLISH LOWLANDS IN THE 4TH MILLENNIUM BC

The present paper discusses the results of microscopic studies of 8 samples of Funnel Beaker culture (FBC) pottery against the background of its taxonomy and origins, and in connection to the cultural background against which 'cord' and 'cord-like' ornaments appeared.

1. POTTERY WITH 'CORD' ORNAMENTS IN THE FBC ON THE POLISH LOWLANDS – AN OUTLINE OF PROBLEMS

FBC pottery on the Polish Lowlands is occasionally ornamented with 'cord' impressions, beginning with phase IIIB according to the Cuiavia periodization [Kośko 1981:47ff; scale of general absolute chronology following Czebreszuk *et al.* 2000: Fig. 1]. The earliest examples of such ornaments were recorded at sites Radziejów 1 and Opatowice 34 (ca. 3650-3500) [Kośko 1981:99ff; 1988]. In phases IIIB and IIIC, 'cord' patterns were applied by a using a technique that on macroscopic inspection was identified as 'impressions of a two-strand cord' (code designation: J-121) [Kośko, Szmyt… – part 1, in this volume]. The ornaments became part of a cycle of Wiórek styles [for Wielkopolska component see Kośko 1981:49-50; Chachlikowski 1994:165ff] and were also found in Luboń styles.

Beginning with phase IVA (3500/3400- 3200/3100 BC), finds of impressions of the so-called three-strand cord are made (code designation: J-126) [Kośko, Szmyt… – part 1, in this volume], the presence of which becomes one of the distinguishing traits of the cycle of Luboń styles [Jażdżewski 1936:250; Kośko 1981:50; 1987:53ff]. Interestingly enough, in phases IVA, IVB, VA and VB, a simultaneous use of impressions of both cord types is observed (i.e. two- and

three-strand ones), with sometimes one type replacing the other. The most popular examples of ornaments made with one or the other 'cord' type are shown by M. Rybicka [1995; cf. Kośko, Szmyt... – part 1, in this volume: Fig. 1]. 'Cord' patterns seem to disappear in the decline (VC) phase of the Cuiavia FBC [Kośko, Łuksza 2007].

The findings hitherto made show that the incidence of the ornament patterns at FBC sites, phases IIIB-VB, varies greatly. Out of all Cuiavia FBC sites published so far, three stand out, owing to a particularly high rate of vessels bearing 'cord and cord-like ornaments' [Kośko, Sikorski, Szmyt... – part 1,2, in this volume]. These are FBC settlements on the Cuiavia Plateau. Two of them (Radziejów 1 and 4, Radziejów District) are situated among the so-called Pagóry Radziejowskie (Radziejów Hills), while the third one (Łojewo 4, Inowrocław District) is situated at the northern edge of the Lake Gopło valley, where Lake Szarlej lies today. The percentage of 'cord' patterns is 11,20% (Radziejów 1), ca 50% in pits (Radziejów 4) and 15,59% (Łojewo 4), respectively [Rybicka 1991; 1995, Kośko 1984]. All the three settlements have been explored only fragmentarily, making it impossible to assess in any greater detail whether behind the percentages stands any specific site function. This is especially true for site 4 in Łojewo. Therefore, the hypothesis about an exceptionally high share of 'cord' patterns being evidence of the special role of the settlements in the oecumene of the Cuiavia FBC – as places of occasional or 'ritual' acts – seems plausible, but right now it is not possible to either prove it or disprove it.

2. THE TAXONOMIC AND CHRONOLOGICAL POSITION OF THE VESSELS STUDIED

For detailed microscopic analyses [Kośko, Sikorski, Szmyt... – part 1, in this volume, Table 1 and 2, Fig. 16-18], pottery from site Łojewo 4 was selected (six samples). This set was supplemented by two vessels, one from site 3 in Opatowice, Radziejów District, and the other from site 1 in Kościelna Jania, Starogard Gdański District. The first of the sites (Opatowice 3) is located, similarly to the Radziejów site mentioned earlier, in Radziejów Hills, while the other (Kościelna Jania 1) lies northeast of Cuiavia, in the Lower Vistula drainage, specifically in the Starogard Lakeland. As in the case of Łojewo 4, the function of both settlements remains rather undetermined. However, a note should be taken of the stylistic uniqueness of a beaker form from Opatowice 3. It may be an argument in favour of considering the beaker a component of inter-settlement occasional or 'ritual' acts [Kośko, Sikorski, Szmyt... – part 1, in this volume: Fig. 16:1, Table 2; see Kośko 2006: Fig. 9.27, 192].

The vessels subjected to microscopic examinations represent, within the FBC, two units ranking as groups: east (Opatowice 3 and Kościelna Jania 1) and Radziejów (Łojewo 4).

The first of them, i.e. the east group, is predominantly interpreted as an effect of endogenous development with a gradual increase in the share of exogenous components in the 4th and 3rd millennia BC. The latter originated with the cultural circles on the Elbe, in the Carpathian Basin (Danube zone) and in the Black Sea basin [Jażdżewski 1936; Kośko 1981; 1988; Rzepecki 2004; Przybył 2009]. The other taxon, i.e. the Radziejów group, arose out of the east group in the middle of the 4th millennium BC under a strong influence of the Baden culture (BC) or badenized FBC groups, especially from the Saale and Elbe interfluve (and specifically the Salzmünde culture) [Przybył 2009, see there for older literature]. The dating of the vessels is rather uncontroversial. The two vessels linked to the east group (Opatowice 3 and Kościelna Jania 1) must be related to 'Cuiavia' phase IIIC of the FBC. This, in turn, according to a general regional chronology, justifies dating them to 3500-3200/3100 BC. On the other hand, the pottery inventory from Łojewo 4 represents the Radziejów group and, in terms of taxonomy, is one of the key sites for phase VB of the Cuiavia FBC. According to the general regional chronology, this translates into a dating between 3100 BC and 2700 BC, with a possibility of narrowing the interval down to 3100-2900 BC [Przybył 2009: Tab. III.6].

Independently of the typochronological assessments, the Radiocarbon Laboratory of the National Academy of Sciences of Ukraine carried out datings of the ceramic body [Kovaljuch, Skripkin 2007] of:

(a) a beaker from Opatowice 3,
(b) pottery accompanying the vessel fragment under investigation from Kościelna Jania 1,
(c) pottery accompanying samples from Łojewo 4.

a. A 14C measurement, obtained directly for a pottery sample from Opatowice 3 (Ki-14697, 4520±70 BP), corresponds with the general chronological assessment mentioned earlier by fitting into the following time intervals:

1 sigma 3360-3260 BC (25.5%), 3250-3100 BC (42.7%)

2 sigma 3500-3450 BC (2.7%), 3400-2900 BC (92.7%).

Hence, the most credible dating falls on the last quarter of the 3rd millennium BC.

b. A 14C measurement obtained for the ceramic body from Kościelna Jania 1 (Ki-14698:2629±90 BP) is definitely too young and must be considered a mistake. c. We have three measurements for the ceramic body of pottery items from Łojewo 4 [Przybył 2008:192, Table 2]:

Ki-12726 4450±90 BP
Ki-12727 4280±90 BP
Ki-12728 4320±90 BP.

When they are calibrated in combination, the most credible interval falls on 3020-2900 BC (1 sigma, 68.2%).

Generally speaking, the 14C measurements indicate a rather late chronology of the specimens of FBC 'corded' ornaments subjected to a microscopic analysis [Kośko, Szmyt… – part 2, in this volume]. From this point of view, their closest chronological counterparts in the examined series would be 'Tripolye' ornaments from phase CII [Fig. 10-11, Table 2:21-27, Kośko, Sikorski, Szmyt… – part 1, in this volume].

3. 'CORD' AND 'CORD-LIKE' ORNAMENTS ON FBC POTTERY ON THE POLISH LOWLANDS – MICROSCOPIC ANALYSIS RESULTS

As a result of a macroscopic inspection, on 8 samples of FBC pottery, there were found negatives of both a 'two-strand cord' ('classic') and a 'three-strand cord'. A microscopic examination identified mainly impres-sions of braids and needlework goods, and only in two cases a braided cord was identified. In the following description of the ornaments, dividing them into the pottery of the east group (3.1) and of the Radziejów group (3.2), we shall compare macro- and microscopic assessments and then we shall comment on the latter in terms of textile materials identified, manufacture techniques applied and raw materials used [Table 2:38-45, Kośko, Sikorski, Szmyt… – part 1, in this volume].

3.1. 'CORD' AND 'CORD-LIKE' ORNAMENTS IN THE FBC EAST GROUP (SAMPLES 38 AND 39)

On macroscopic examination it was found that both samples (no. 38 – Opatowice 3; no. 39 – Kościelna Jania) bore horizontal bands of a 'two-strand cord', the negatives of which were placed on the inner side of the lip, and – in combination with impressed bars – on its outer side [Fig. 16, Kośko, Sikorski, Szmyt… – part 1, in this volume]. Code designations:

– sample 38 – pw xJ-121:3
pz xA-1|xJ-121:2; b /x/ 121[186]|/x/J-121[31]
– sample 39 – pw xJ-121:4,
pz xA-1|xJ-121:3

On microscopic examination, the 'cord' negatives turned out to be in most cases impressions of non-woven goods: braids or needlework (re-corded four times). Only in a single pattern was a cord impression identified (braided from 3

dextrorotatory threads). The textiles identified as braids or needlework were made of yarn (in one case of twisted yarn) or spinning material. Interestingly enough, in three cases, bast fibre could have been used as elementary material. The average thickness of fibres was between 0.040 mm and 0.140 mm. Worth noting here is a difference between the pottery from Kościelna Jania 1 (average fibre thickness of 0.040 mm) and the beaker from Opatowice 3, where much thicker threads were identified (from 0.072 mm to 0.140 mm). The measurements argue in favour of the use of non-textile goods made rather of plant fibres than wool (higher hygroscopicity, lower resistance to breaking and rubbing). Hypothetically, this may suggest that raw material was selected at the stage of spinning material/thread preparation. Consequently, if it is assumed that it was bast fibre or other thick fibres that were used, which, being easily moistened (high hygroscopicity), stay durable (when wet they are more resistant to damage), then goods made from them could be used over long periods of time in forming and decorating pottery.

On the vessel from Opatowice 3, only dextrorotatory yarn (Z) was identified; a similar ornament was found on the pottery from Kościelna Jania 1, but in this case it was a 'stronger' twisted yarn, twisted left from two thinner component threads.

The ornaments were applied with a knurling wheel or a roller (which was recorded in 3 cases), and without the use of any instrument (in 2 patterns). Both vessels were smoothed out or slipped (in the cases of some patterns only partially) before and after making impressions (2 patterns) or only after making impressions (2 cases). The vessel from Kościelna Jania 1 was found to have been slipped and polished after applying the ornament. No organic remains were found in the impressions.

3.2. 'CORD' AND 'CORD-LIKE' ORNAMENTS IN THE FBC RADZIEJÓW GROUP (SAMPLES 40 – 45)

On macroscopic examination it was found that six samples of vessels from Łojewo 4 [Fig. 17,18, Kośko, Sikorski, Szmyt… – part 1, in this volume] bore horizontal bands of 'two-strand cord' impressions (samples no. 40, 41 and 42) and similar bands of impressions of a 'three-strand cord' (samples no. 41, 42 and 43). In four samples, ornaments were placed on the inner side of the lip; while in two, they were placed next to the lip, on the outer vessel surface. Code designations [see Kośko 1984: Tab. 6]:

– sample 40 – pw xJ-121:5|xB-19:5>
– sample 41 – pz xJ-121:3>
– sample 42 – pw xJ-121:4|?B-19>
– sample 43 – pw xJ-126:4|?B?-18:2>

– sample 44 – pw xJ-126:4|xL-171:5
– sample 45 – pz xJ-126:3|xL-161:2

On microscopic inspection it was found that the impressions had been made with braids of spinning material (6 patterns). The spinning material was bast fibre, straw (2 cases) or strips of bark (?) (2 patterns). In two instances, needlework goods (made of quite thick twisted yarn) and a braided cord were identified as well. The latter was made of three twisted strands (Z/2S). The ornaments were applied predominantly with a roller or a knurling wheel, identified in seven patterns, and by the turning method (2 patterns). In most ornament patterns, 'accompanying treatments' were carried out after impressing the ornament. The treatments used included burnishing-polishing (2 cases), partial burnishing (one pattern), thorough smoothing out (1), and smoothing over with polishing (1). In two instances, the treatments were applied both before and after making ornaments. No organic remains were found in the impressions.

What puzzles also in this group is the careful smoothing over of specific sections (bands) of impressions of a textile item made earlier and even their successive polishing. After shaping a container, its walls were also smoothed out with (the same?) thick needlework goods and braids. A cord, presumably, was used exclusively as an ornamentation 'tool'.

4. 'CORD' AND 'CORD-LIKE' ORNAMENTS ON THE POLISH LOWLANDS: A CULTURAL CONTEXT OF THE INVENTION

Certain hints to take up these issues follow from:

* 'technological climate' at the turn of the 4th millennium BC within the FBC, well manifesting itself, for instance, in the development of spinning and weaving (?) [Kośko, Szmyt 2007; Chmielewski 2009; Chmielewski, Gardyński 2009; see there for older literature] and
* prevalence of evidence of non-animal elementary materials of which goods, used in decorating vessels, were made.

The second of the above listed arguments should at the same time be weakened because of analytical difficulties in identifying textile raw materials of animal (wool) or vegetable origin. This discrepancy may, however, have some significance for the assessment of the cultural context of the invention, namely, the assessment of the genetic background. A case in point here is the use of spinning material-yarn for making non-textile goods (loom-less) – an idea 'originally characteristic' of forest societies. This, however, may concern both local societies, even Palaeolithic ones, and exogenous ones that migrated from the borderland between east European forest-steppe and the taiga [see the concept of the Mątwy

cultural component: Kośko 1981; 1988]. It must be observed, however, that the identified cord forms clearly represent forms of 'strings' and not 'quasi-ropes', which limits their strength as a possible piece of evidence in support of concepts arguing in favour of steppe origins (in the sense of links to the economic achievements of 'pre-Yamnaya' breeder societies).

Another question concerning the genetic background of the 'invention' touches upon a broader issue of the very function of 'cord' and 'cord-like' ornaments. There are two possible general explanations of their use on ceramic containers. The first one is purely pragmatic: they are traces of lacing up or protecting containers or even repairing them. The FBC pottery from the Polish Lowlands abounds in traces of hypothetical repairs [e.g. secondarily made holes or traces of tar binders; for more details see Pietrzak 2010]. The other explanation – ever more plausible owing to the results of microscopic examinations presented in this volume – draws attention to the treatment of 'vessel dressing'. The treatment could have had two functions: a symbolic one [see the ideosemantic concept as presented by Kowalski 1998:27ff] or a symbolic-pragmatic one, providing the vessel with an additional function of an insulated container (thermos).

CONCLUSION

The inventory of 'cord' and 'cord-like' ornaments, subjected to specialist analyses, on the vessels of FBC east and Radziejów groups is of limited significance for the study of the position of their societies in the geographical origins of the invention of the ornaments. A side effect, but a highly informative one, of the study is an outline of a broader project, concerning a local development line of the Neolithic weaving industry [Kośko, Sikorski, Szmyt… – part 1, in this volume]. There are two great advantages of studying pottery styles as a source foundation of such a project: their mass character and a possibility of time ordering. Such a project could thus be called: an introduction to the study of the weaving of the second half of the 4th millennium BC in the great valley zone of the Polish Lowlands. Perhaps, once the project is under way, the question of the geographic origin of the redefined 'cord' ornaments will find its new place in research.

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'CORD' ORNAMENTS ON POTTERY IN THE VISTULA AND DNIEPER INTERFLUVIAL REGION: 5TH – 4TH MILL. BC. RESULTS AND IMPLICATIONS

The articles presented in this volume of *Baltic-Pontic Studies* document the realisation of a research project devoted to the issues surrounding the autogenesis of 'corded' ornamentation on ceramic ware from the middle of the 5th to the turn of the 3rd mill. BC as applied by the peoples of the Vistula and Dnieper interfluvial region. In this context, research was focused on the oldest stage of corded ceramic ware crafts (*archaeo-cords*) dated to the 5th and 4th mill. BC, with the aim of testing so called traditional macroscopic data. Thus, the creation of an integrated interdisciplinary base of research fields in respect to 'corded' ornamentation' was envisaged whereby these crafts could be viewed not so much as important for archaeological taxonomy but rather, as a source of knowledge bordering on archaeo-technology (mainly in the hand manufacture of ceramics and textiles, as well as the use of animal and plant fibres) and a given culture's cognitive matrix of symbols (mainly the semiotics of ornamentation).

The overall research aim therefore became the question of identifying possibilities of loosening the 'taxonomic corset' in archaeological readings of 'corded' ornamentation' and reaching beyond, as well as putting a new research methodology to the test that would be based on specialist research into prehistoric and archaic textile crafts. As a result, multi-directional analyses were conducted, in which the most ground-breaking results were gained under microscopic observation. The research covered 45 fragments of ceramics, including intact vessels where macroscopic analysis (with the naked eye) showed 'cord' impressions.

One particularly inspiring newly found dimension in research findings is the conclusion that in the above mentioned tests of ceramic ware, apart from 'corded' ornamentation in its various patterns, a wide array of textiles was also used.

Most often, the sides of clay vessels were impressed with a 'simple' technique, practically not requiring any additional tools or non-weave applications. The most frequent such applications were as follows: needlework 14, plaiting 12, plaiting/needlework 5, netting 5 and much less often, macramé 1 and fringes 1. Cords that were impressed (11 in total) testify to the relative popularity of these negatives as well – which at times served as a complementary ornament. In several instances basket-like impressions were identified (cross-ribbed plaiting), though no material imprints were recorded.

The consequences of the research conducted were, in the first instance such that a general mortification befell all concerned. It transpired that that the 'corded ornamentation' that to date had been widely recognised (the 'ABC' of archaeology) as standard, had in fact now revealed a complex system of complex techniques and applications. There is therefore, no certainty that in future research, further means of ornamenting ceramic ware, previously unrecognised, will not be found.

The research results gained are, in our opinion, a very good basis for looking afresh at both research findings and their interpretation. At the same time, new insights in this context lend themselves to raising further questions and establishing new research aims. Moreover, venturing into the field of specialist laboratory analysis (microscopic) in addition to present research methodologies can be said to 'supersede' several so called traditionally held views that are based solely on macroscopic analysis, thus forcing a revision of important methodological approaches. One illustration, a priori, of the above state of research, remains the necessity of limiting the research scope in arguing for the 'role of corded ornamentation' ('corded' and 'cord-like') in a taxonomic outline of prehistory. The field of specialist 'corded' research also creates a rather exciting prospect of viewing the process of cultural growth in terms of the techniques and means of application in respect to the textile crafts.

Further, the weaknesses of such arguments can be said to be evident, especially when considering the limitations of conducting specialist investigations. Nonetheless it is our view that all difficulties notwithstanding, such laboratory tests are essential and initial steps need to be taken so they are commonly accepted as a necessary research tool.

The resulting research and its implications would suggest that in planning further projects of this nature, greater attention needs to be paid to the principles of creating a series of diagnostic findings. In this regard a preference for complete vessels is necessary, thus creating the possibility of conducting a relatively full analysis (systemic) of pottery techniques and applications, as well as textile ornaments that may demonstrate the variety of domestic and ritual applications.

The main field, it could be said, of the above research that might bear fruit in the future, ought to be, however, one of culture studies that are focused on a hermeneutic, interdisciplinary means of identifying the cultural codes of pre-

historic communities and expressions of their view of the world. In this light, recent research and its findings [Kowalski. . . , in this volume] provide a new, exciting 'starting point' for the above in terms of prehistoric archaeological cultures understood afresh.

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ABBREVIATIONS

AP URSR – Arkheologiczni pamiatky Ukrainskoyi Radianskoyi Sotsialisticheskoi Respubliky. Kiev.
BPS – Baltic-Pontic Studies. Poznań.
KSIA – Kratkiye Soobshcheniya Instituta Arkheologii. Moskva.
KSIA AN USSR – Kratkiye Soobshcheniya Instituta Arkheologii Akademiyi Nauk Ukrainskoy Sovetskoy Sotsialisticheskoy Respubliki. Kiev.
MIA – Materialy i Issledovaniya po Arkheologii USSR. Moskva. Leningrad.
SA – Sovetskaya Arkheologiya. Moskva.

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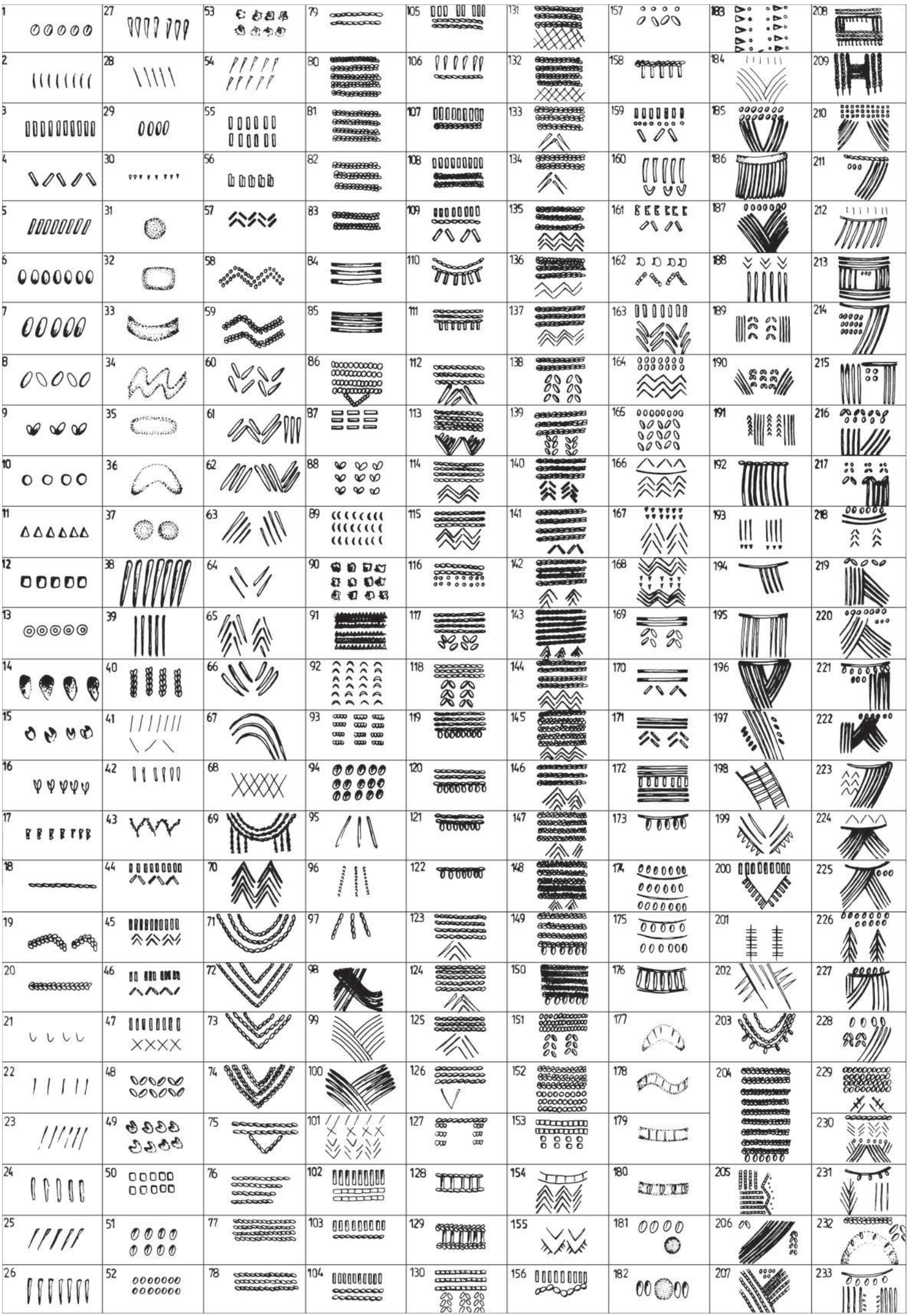

Fig. 1. Outline of FBC ornamental features in the Radziejów Hills – among others that of 'cord impressions' (two and three-strand), phases IIIB – V. After Rybicka 1995