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## JURASSIC-CRACOW FLINT IN THE NEOLITHIC OF THE CHEŁMNO LAND

*Abstract.* This paper provides an overview of the empirical results on the Jurassic-Cracow flint use by the communities of the Linear Band Pottery culture, Late Band Pottery culture, and Funnel Beaker culture during the Neolithic in the Chełmno Land. The picture emerging at this moment is that the Chełmno Land did become a part of flint trading network established already in the early Neolithic by the Linear Band Pottery communities, and running from the southern and south-eastern flint mines located in the Holy Cross Mountains (Świeciechów flint, ‘chocolate’ raw material), Polish Jura (Jurassic-Cracow flint), and the Volhynian-Podolian Upland (‘Volhynian’ raw material).

*Keywords:* Neolithic, Chełmno Land, Jurassic-Cracow flint, distribution of flint raw materials.

### INTRODUCTION

The settlement of the Chełmno Land by the early agricultural communities of the Balkan-Danube tradition took place in the mid-6th millennium BC. Thanks to the research conducted since the end of the 1970s, it was established that the Chełmno Land was the most north-eastern area of intense early Neolithic settlement – the Linear Band Pottery culture (LBK) in its European range. As a result of surface surveys, tests and open-area excavations, about 300 sites of this culture have been discovered to date (Kukawka, Małecka-Kukawka, Wawrzykowska 2002, pp. 91–107; Małecka-Kukawka 2017; Kukawka, Małecka-Kukawka 2018; Fig. 1). The aforementioned research has revealed traces of intensive settlement of the area by chronologically later Neolithic cultures,

i.e. the Late Band Pottery cultures<sup>1</sup> (LBPC) with nearly 400 sites, and the Funnel Beaker culture (TRB) with around 1800 sites. The number and distribution of sites clearly indicate that there was a separate settlement region in the Chełmno Land. Today it can be considered one of the best examined regions in Poland. It is also worth emphasising that the Chełmno Land is considered to be the north-eastern frontier of the European Neolithic world for over 2500 years (Kukawka, Małecka-Kukawka 2018).

The Chełmno Land, like other regions of the Polish Lowlands, is devoid of high-quality natural silica deposits. Previous studies on Neolithic flint production have shown that this area was involved in the long-distance exchange of raw materials of silica rocks from the south, i. e. the flint bearing margin of the Holy Cross Mountains (Jurassic-Cracow flint, Świeciechów flint, chocolate flint) and the south-east, i.e. the Ukrainian Upland ('Volhynian' raw materials; Małecka-Kukawka 1992; 2001; 2002; 2008; 2017).

The identification of these macroscopically different raw materials usually does not pose any issues, especially in the case of the most characteristic ones – chocolate flints, Świeciechów flint and striped flint. Correct identification of the Jurassic-Cracow flint is much more problematic, especially in relation to the variations of the chocolate colour (in the 'Olszanica' type), sometimes mistakenly referred to as the 'chocolate' flint (see Lech 1980, p. 209; Małecka-Kukawka 2017, p. 67).

The aforementioned research on the Neolithic, commenced in the late 1970s, revealed a rich settlement of the Linear Band Pottery culture from the earliest horizon of this culture's settlement in Poland (Kirkowski 1994, pp. 57–99). From the perspective of the 'flint production', the results of the research at the sites 41 and 43a in Boguszewo were particularly spectacular, since the dominant raw material found was Jurassic-Cracow flint (Małecka-Kukawka 1992). These discoveries effectively challenged the then widely accepted vision of the neolithisation of the Polish Lowlands (Kirkowski 1994, pp. 57–99). One

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<sup>1</sup> In the text I use the term 'Late Band Pottery culture', introduced by Lech Czerniak (1980), to denote phenomena that took place after the disappearance of the Linear Band Pottery culture. We used this term consistently in many publications concerning the Neolithic period of the Chełmno Land. Contemporary proposals of the creator of this term introduce corrections, narrowing the LBPC phenomenon to the Kuyavian phases I–IIa (the stage with incised elements). L. Czerniak treats the later development stages separately, proposing to use the term 'Brześć Kujawski culture' (Czerniak 2017, pp. 199–236). Since the studies on the settlement structures after the disappearance of the LBK (for various, largely non-scientific reasons) have stalled in the Chełmno region, I do not see the possibility of applying this new taxonomic systematics to the sources obtained to date.

had to be wary to name these findings ‘an anomaly’ due to Jurassic-Cracow flint being discovered so far north from its point of origin. For that reason the inventories travelled several times to the South, so that they could be examined by the researchers of flint mines and experts in flint raw materials (I participated in this process myself, as a young ‘flint maker’ among the team of apprentices in Igołomia under the watchful and demanding eye of Jacek Lech and Władysław Morawski). Despite many consultations regarding the specimens from Boguszewo, and from the sites discovered in subsequent years, issues with unambiguous identification of raw material arose (some specimens had ‘mixed’ features – translucency, siliceous mass structure, fracture nature, cortex, etc., which made it impossible to categorically state whether the specimen is Jurassic-Cracow flint or chocolate flint). In such cases, I decided to place them in the ‘undefined raw material’ category, with the possible suggestion that it is of South Polish origin (see Małecka-Kukawka 2001, pp. 22–58).

After many years the issue of these ‘undefined’ products could be revisited thanks to the development of various archeometric methods in cooperation with other sciences (Werra, Siuda, Małecka-Kukawka 2018, pp. 211–224). Petrographic and geochemical analyses showed that some of the several specimens, which I included in the group of undefined materials, can be considered as made of Jurassic-Cracow flint. However, in some cases of the analysed specimens, the results are neither unequivocal nor satisfactory. It is hoped that further research will contribute to increasingly better identification methods of flint materials used in prehistory.

Researchers of Kuyavia, adjacent to the Chełmno Land, faced similar difficulties in identifying the Jurassic-Cracow flint. For example, in the publication regarding the flint materials from site Grabie 4 from 1995, Lucyna Domańska states that out of all 75 products, 38 (50.7%) were made of Jurassic-Cracow flint. The rest are Baltic erratic flint or burnt specimens. This information was repeated by Jacek Kabaciński (2010, p. 202) and me in 2017<sup>2</sup> (Table 1.46). In her paper from 2016, L. Domańska proposes a different raw material composition of the flint inventory from the site, with the presence of 31 Baltic erratic flint products, 31 of Jurassic-Cracow flint, 7 of chocolate flint and 6 burnt ones (pp. 32–33). Unfortunately, the author did not explain the reasons for the change of raw material determination. The updated data was later used in the

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<sup>2</sup> Unfortunately, the book by L. Domańska *Change and Continuity. Traditions of the Flint Processing from the Perspective of the Tażyna River Valley* came to me after the monograph was submitted for printing.

publication by Joanna Pyzel and Marcin Wąs (2018, pp. 181–194). This change is only seemingly trivial, as it concerns only seven specimens of the hitherto not determined chocolate flint on the site, which aims to represent the earliest stage of the Linear Band Pottery culture settlement in Kuyavia. However, it has quite significant consequences in the interpretation of the raw material distribution systems in the early Neolithic, which will be discussed later.

## SOURCES

This part of the text will present the information on the composition of the raw materials of the Chełmno Land inventories analysed up to date, in three main cultural horizons – the Linear Band Pottery culture (LBK), the post-Linear cultures (LBPC) and the Funnel Beaker culture (TRB).

In Table 1, concerning the LBK, not only the numbers of inventories, but also the size of the investigated area of the site is given, and there is a specific reason behind this, namely the difference between planned and ‘rescue’ research. I have discussed the quality of research, specifically the so-called ‘large line investments’, in my monograph from 2017. Here I will only indicate that ‘planned’ research (in the case of the Chełmno Land it is usually carried out on a small scale) provides many times more flint material in comparison to research performed during a ‘rescue’ excavation covering large areas. Of course, this does not only apply to research in the Chełmno Land.

In the tabular presentation of the raw material structure of the LBK flint materials, local erratic flints were treated jointly (varieties I and II – Pomeranian flint, due to the occasional use of this pebble flint). Burnt and undefined flints and other varieties of flints that occur incidentally (raw material from Świeciechów and Volhynian flints, which appeared in the discussed collection in the total number of three specimens, which constitutes about 0.1% of all the flints considered) were also excluded. In the ‘inventory quantity’ column, the number of all flints from a given site is provided, therefore the sum of products from the three raw materials included in the table may be lower than the entire inventory quantity in the last column. This procedure makes it possible to trace the dynamics of the inflow of southern Poland raw materials and the scale of use of local erratic flints. The goal is to maintain the analytical comparability of the presented assemblages (for example, 273 specimens come from site 2 in Stolno, but 144 of them are heavily burnt, hence only the set from feature 1 was taken into account, as only for this set the raw material analysis could be performed).

Table 1. Quantities of flint inventories of the Linear Band Pottery culture in the Chełmno Land (after Małecka-Kukawka 1992; 2001; 2017; Osipowicz et al. 2012; Werra 2013)

Tab. 1. Liczebność inwentarzy krzemiennych ze stanowisk kultury ceramiki wstęgowej rytej z ziemi chełmińskiej (za Małecka-Kukawka 1992; 2001; 2017; Osipowicz i in. 2012; Werra 2013)

No.	Phase*	Site, No.	Inventory quantity	Size of site's excavated area
1	Ib	Boguszewo, site 41	135	355 m <sup>2</sup>
2	Ib	Boguszewo, site 43a	34	200 m <sup>2</sup>
3	Ib	Gruta, site 52	57	6 m <sup>2</sup> (test trench)
4	Ib	Kłęczkowo, site 8**	60	38 435 m <sup>2</sup>
5	IIa1	Bocień, site 5**	167	9675 m <sup>2</sup>
6	IIa1	Lisewo, site 31	55	86 m <sup>2</sup>
7	IIa1	Annowo, site 7	253	10 m <sup>2</sup> (survey)
8	IIa2	Bocień, site 5**	73	9675 m <sup>2</sup>
9	IIa2	Ryńsk, site 42	98	100 m <sup>2</sup>
10	IIa2	Stolno, site 2, feature 1	81	160 m <sup>2</sup>
11	III	Wielkie Radowiska, site 22	82	237 m <sup>2</sup>
12	III	Wielkie Radowiska, site 24	394	155 m <sup>2</sup>
13	III	Małe Radowiska, site 17	83	213,5 m <sup>2</sup>
13	?	Nowy Dwór, site 9	866	1200 m <sup>2</sup>
Total			2420	

\* Division into phases according to Werra 2013.

\*\* Pre-construction excavations of the A1 motorway.

Table 2. Raw material structure of the flint inventories of the Linear Band Pottery culture from the first development phase in the Chełmno Land\*

Tab. 2. Struktura surowcowa inwentarzy krzemiennych z pierwszej fazy kultury ceramiki wstęgowej rytej na ziemi chełmińskiej

No.	Phase	Site, No.	nb	cz	jp	Inventory quantity**
1	I	Boguszewo, site 41	35	3	86	135
2	I	Boguszewo, site 43a	2	–	29	34
3	I	Gruta, site 52	18	2	32	57
4	I	Kłęczkowo, site 8	31	9	20	60
5	I	Nowy Dwór, site 9	60	50	280	405
<b>Total</b>			<b>146</b>	<b>64</b>	<b>447</b>	<b>691</b>

\* Burnt and undefined specimens were excluded from the table.

\*\* The inventory quantity takes into account all flints from a given site (including burnt and undefined in raw material terms).

nb – Baltic Erratic flint, cz – Chocolate flint, jp – Jurassic-Cracow flint

The first phase of the settlement of the Chełmno Land by the LBK population (Fig. 1), which is distinguished by the analyses of pottery materials and further supported by other analyses (including radiocarbon dating), is within the oldest horizon of settlement of Polish lands in general (Małecka-Kukawka 2017; Werra 2013). The most characteristic feature of flint materials, considering the earliest settlements, is a very high proportion of Jurassic-Cracow flint. Artifacts made from this type of flint constitute from about 60% to over 90% of all specimens from individual sites determined in terms of raw materials, which gives an average of about 70%. The second largest group of used flint in the analysed inventories is the local Cretaceous erratic flint (slightly over 20% on average), while the chocolate flints (of various provenance, see Małecka-Kukawka 2017, p. 45) constitute the least numerous group of products, on average a little less than 10%.

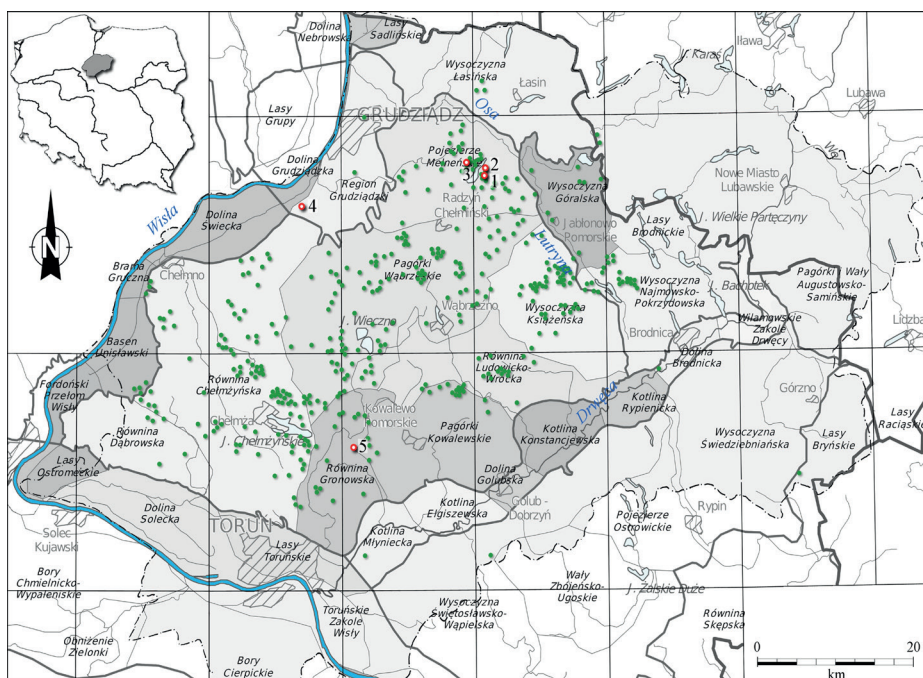


Fig. 1. Distribution of the Linear Band Pottery culture sites in the Chełmno Land. The sites of the stage I of development are marked in red: 1. Boguszewo, site 41; 2. Boguszewo, site 43a; 3. Gruta, site 52; 4. Klęczkowo, site 8; 5. Nowy Dwór, site 9 (based on Werra 2013, graphic design by Ł. Kowalski)

Ryc. 1. Rozmieszczenie stanowisk kultury ceramiki wstęgowej rytej na ziemi chełmińskiej. Na czerwono zaznaczono stanowiska I fazy rozwoju: 1. Boguszewo, stan. 41; 2. Boguszewo, stan. 43a; 3. Gruta, stan. 52; 4. Klęczkowo, stan. 8; 5. Nowy Dwór, stan. 9 (na podstawie Werra 2013, opracowanie graficzne Ł. Kowalski)

Table 3. Raw material structure of the flint inventories of the Linear Band Pottery culture from the second and third development phases in the Chełmno Land\*

Tab. 3. Struktura surowcowa inwentarzy krzemiennych z drugiej i trzeciej fazy kultury ceramiki wstęgowej rytej na ziemi chełmińskiej

No.	Phase	Site, No.	nb	cz	jp	Inventory quantity**
1	II (?)	Nowy Dwór, site 9	165	165	81	461
2	IIa1	Bocień, site 5	27	93	1	132
3	IIa1	Lisewo, site 31	22	17	4	55
4	IIa1	Annowo, site 7	16	168	4	253
5	IIa2	Bocień, site 5	43	42	2	90
6	IIa2	Ryńsk, site 42	30	39	1	98
7	IIa2	Stolno, site 2, feature 1	72	7	–	81
8	III	Wielkie Radowiska, site 22	4	74	–	82
9	III	Wielkie Radowiska, site 24	101	226	13	394
10	III	Małe Radowiska site 17	33	39	4	83
Total			513	870	110	1729

\* Burnt and undefined specimens were excluded from the table.

\*\* The inventory quantity takes into account all flints from a given site (including burnt and undefined in raw material terms).

nb – Baltic Erratic flint, cz – Chocolate flint, jp – Jurassic-Cracow flint

In the following, distinguished phases of settlement of the Chełmno Land (II and III) there is a clear change in the raw material composition of the analysed inventories, according to the source data. The most numerous are products made of chocolate flints (nearly 60% on average), the second most frequent is Baltic erratic flint (on average nearly 35%), and the share of products made of Jurassic flint is approximately 7% on average.

### *The Late Band Pottery culture*

Despite the discovery of a significant number of sites within the AZP (Archaeological Map of Poland), related to the LBPC settlements (about 400), further research is needed, since excavation research was carried out on only a few sites. Promising research on the multicultural site 12 in Zelgno, where traces of six or seven (depending on the interpretation of the ditch's direction) trapezoidal houses were discovered, was not published up to date (see Małecka-Kukawka 2017, pp. 13–15). Hence, the knowledge of flint production is modest, as it was based only on the results of analyses from a very limited



number of sites. Furthermore, the analysis considered only few selected features: Firlus, site 8; Radzyń Wieś, site 21; Linowo, site 20; Świecie nad Osą, site 26 (Małecka-Kukawka 1992; 2001); Trzciano, site 40 (Osipowicz et al. 2015, pp. 139–164); Małe Radowiska, site 17, feature 53 (Osipowicz 2016, pp. 237–258). There are numerous sites with pottery related to this horizon. However, the issue at hand is that they are usually multicultural objects, often in the palimpsest ‘Neolithic’ sequence of settlement. Hence, it is not possible to unambiguously assign flints to any of the cultures.

In general, on sites related to the LBPC, we can observe an almost complete disappearance of the inflow of southern Poland raw materials, including the Jurassic-Cracow flint. Only on the site 8 in Firlus, representing the early horizon of the LBPC with incised ornaments, chocolate flint products account for less than 20% of the total inventory (after excluding burnt and undefined specimens, Małecka-Kukawka 2001, p. 51). In addition, it is worth noticing that the LBPC population often used a pebble variety of erratic flint (‘swallow breads’).

#### *The Funnel Beaker culture*

The raw material structure of the vast majority of flint inventories related to the Funnel Beaker culture was published in the volume *Krzemień świciechowski w pradziejach* (Małecka-Kukawka 2002, pp. 155–175). Raw materials of southern Poland origins (chocolate flints, Świeciechowski flint, incidentally striped flint) and from the Ukrainian Upland (Volhynian flints) were discovered in the Chełmno Land. The products made from Jurassic flint were identified only on three sites: Wełcz Wielki, site 10B, Mgoszcz, site 2 and Niemczyk-Wrocławki, site 1. One type of specimen was found on each of the sites (Małecka-Kukawka 2002, Plate 1). In terms of morphology, these are blades (Wełcz Wielki 10B and Mgoszcz 2, Małecka-Kukawka 2001, Plates 26:5; 29:3) and a fragment of retouched blade (Niemczyk-Wrocławki 1, Plate 26:11).

Due to the popularity of this flint in the LBK, it cannot be ruled out that the products were made from material which was local for the TRB population, they could have simply been found on the surface (reuse). This remark may also apply to a number of products made of chocolate flints, which is difficult to estimate.



## DISCUSSION

The Jurassic-Cracow flint is an inseparable component of the material equipment of the oldest farmers in the Chełmno Land. The obtained source data shows that the first migrants (the fact that they were migrants, according to the latest research, including genetic studies, is undisputed) from the South (i.e. historical region of Lesser Poland, pol. Małopolska) came to the Chełmno Land bringing the Jurassic-Cracow flint, which was most probably necessary in their culture (everyday life). Site 9 in Nowy Dwór, Kowalewo Pomorskie commune, seems to be of the key importance for understanding the flint production phenomenon, to which I devoted a significant part of my monograph from 2017. The analyses show that the oldest part of the remains of the settlement is undoubtedly feature 26 with the richest inventory from the site. These are 185 products (several dozen chips below 10 mm in diameter have been omitted) and 82% of all products were made from the Jurassic-Cracow flint, 12.3% from chocolate flints. The remaining less than 5% is made up of erratic and burnt flint products (Małecka-Kukawka 2017, Plate 1.15.). The stratigraphy of this feature is also important: 95% of the discovered materials were found in the bottom layers, covered with an almost sterile layer with a laminated structure, which suggests a natural way of backfilling the feature after cessation of activity in its surroundings. This pit played the role of a 'dump' of waste from the processing of flint, mainly the Jurassic-Cracow one, as evidenced by the presence of flint cores and several dozen very fine chips, 113 flakes and waste, including 99 from Jurassic flint (Małecka-Kukawka 2017, Plate 1.28, pp. 42–43).

If the findings regarding the dynamics of the settlement of the site in Nowy Dwór are correct (and they were based only on the analysis of flint materials, planigraphy and features' stratigraphy, Małecka-Kukawka 2017, pp. 14–15), it can be suggested that the settlers brought the necessary flints, including the Jurassic-Cracow (which they processed, as evidenced by the materials from feature 26) and a few products made of chocolate flint. In the course of the settlement's growth, the raw material structure changed, the number of products made of the Jurassic-Cracow flint decreased significantly in favour of chocolate flints (from various outcrops), and the number of products made from local raw materials also increased (Małecka-Kukawka 2017, pp. 13–105).

Comparing the data on the raw material structure of the flint inventories of the oldest phase of the LBK settlement in the Chełmno Land, it can be stated that the Jurassic-Cracow flint was of a significant importance for the first settlers. However, in almost every case, products made from this flint were

accompanied, albeit in small numbers, by specimens made of chocolate flints. Local erratic flints were also used from the very beginning.

I will return now to the issue of raw material identification (especially the Jurassic-Cracow flint) in relation to the neighbouring Kuyavia region. According to previous publications, on two of the four sites, which are used to define the oldest horizon of the LBK settlement in Kuyavia, the only ‘imported’ flint raw material was the Jurassic-Cracow flint (site 4 in Miechowice, Grygiel 2004, p. 361 ff.; site 4 in Grabie, Domańska 1995). This could suggest that these first migrants did not know the chocolate flint outcrops yet, but were aware of the places where the Jurassic-Cracow flint occurred. The structure of the raw materials recently published (Domańska 2016) shows that, apart from the Jurassic-Cracow flint, these oldest LBK settlers had various southern Poland resources in their flint equipment.

Examples from the Chełmno Land, especially materials from Nowy Dwór, show that from the beginning of the LBK settlement, the settlers ‘preferred’ the Jurassic-Cracow flint, but they also knew and used other south Poland flint raw materials. They exploited local flints for their needs, which they collected in the places where they decided to settle.

Compared to the stage I of the LBK development in the Chełmno Land, chocolate flints clearly dominate in the subsequent stages of settlement, although their frequency is lower than that of the Jurassic-Cracow flint in the older phase. It is also worth paying attention to the constant presence of various products made of local erratic flints, from the oldest stage of settlement until the end of the LBK existence. The share of local raw materials varies from site to site. For example: in materials from site 2 in Stolno, the Baltic erratic flint accounts for about 91% of the inventory, and the chocolate flint is only about 9%, while in the case of the inventory from site 22 in Wielkie Radowiska the situation is the opposite – 95% of total products are made of chocolate flint, while 5% of specimens are made of erratic raw materials.

The indicated differences are probably a result of many factors, of which – I believe – the important role is played by factors related to the method of obtaining the material (circumstances of the research, soil type, weather conditions, etc.). However, in the case of the two sites in question, the excavations were conducted by one researcher, Ryszard Kirkowski, using the same methodology of excavation works. On both sites, small areas were examined (see Table 1), which may indicate the randomness of such studies. Perhaps features with different functions within the settlement were excavated. Unfortunately, we do not know the structure of the remains of the LBK settlement on these sites.

However, despite the aforementioned differences, based on the raw material analysis of flint sources, it can be concluded that the Jurassic-Cracow flint dominated during the earliest stages of settlement of the Chełmno Land, as well as the Kuyavia region, and was later 'replaced' by chocolate flints.

## CONCLUSIONS

The presented raw material structure of flint materials from sites associated with the Linear Band Pottery culture, Late Band Pottery culture, and Funnel Beaker culture allows for the identification of significant differences when it comes to the inflow of the Jurassic-Cracow raw material (and others, of southern Poland and south-eastern origin).

The most intense inflow of this raw material took place during the first agricultural communities, and, at least in the Chełmno Land, it refers to the early period of the LBK settlement (Table 2). It is worth noting that almost three times more specimens made from the discussed raw material (nearly 600) come from the sites located in the Chełmno Land than from Kuyavia (less than 250, Małecka-Kukawka 2017, Plate 1.46). Based on the unique flint cores found on site 41 in Boguszewo, with a characteristic black coating (Figs. 2 and 3), it can be assumed that the LBK communities began flint deposits exploitation in the area of the Jura Ojcowska (Lech 2006, pp. 400–401, 423).

In subsequent stages of development, until the noticeable disappearance of this culture, the intensity of the inflow of chocolate flints increases. Although the Jurassic-Cracow flint appears in materials from sites with later chronology, their number clearly decreases. On some sites only a single artifact made of the Jurassic-Cracow flint can be found, on other sites no presence of this flint was recorded at all.

After the disappearance of the LBK, the distribution of mine raw materials changed dramatically. Apart from a single site, from the early (incised) phase of the LBPC, where almost 20% share of chocolate flints was recorded, there are virtually no raw materials of southern origin on other sites. The collapse of the raw material distribution system after the disappearance of the LBK is observed not only in the Chełmno Land. A similar phenomenon took place in Kuyavia and Silesia (Kabaciński 2010, pp. 184–186, further references there).

In the Funnel Beaker culture, the Jurassic-Cracow flint was not distributed, the few identified specimens (two blades and a fragment of retouched blade)



Fig. 2. Boguszewo, Grudziądz district, site 41. Core made of Jurassic-Cracow flint (photo by W. Ochotny)

Ryc. 2. Boguszewo, pow. grudziądzki, stan. 41. Rdzeń z krzemienia jurajskiego podkrakowskiego (fot. W. Ochotny)



Fig. 3. Boguszewo, Grudziądz district, site 41. Slight close-up of the core of Jurassic-Cracow flint with visible black mine coating (photo by W. Ochotny)

Ryc. 3. Boguszewo, pow. grudziądzki, stan. 41. Niewielkie powiększenie rdzenia z krzemienia jurajskiego podkrakowskiego z widocznym czarnym nalotem pochodzenia kopalnianego (fot. W. Ochotny)

should rather be associated with the Linear Band Pottery culture. Most likely they were found on the surface and reused by the TRB communities.

The presented rhythm of changes in the distribution of the Jurassic-Cracow flint is of course a generalisation and, in a sense, a simplification. Probably, the system of exchange of raw materials was a much more complicated process. Nevertheless, it reflects the dynamics of changes that took place during the functioning of the early and middle Neolithic communities in the Chełmno Land. It also confirms the existence of an extensive and multidirectional Jurassic flint exchange network among the oldest agricultural communities (see Lech 2006, p. 402).

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## KRZEMIENŃ JURAJSKI PODKRAKOWSKI W NEOLICIE ZIEMI CHEŁMIŃSKIEJ

*Słowa kluczowe:* neolit, ziemia chełmińska, krzemień jurajski podkrakowski, dystrybucja surowców krzemiennych.

### *Streszczenie*

Artykuł prezentuje dane dotyczące materiałów krzemiennych z surowca jurajskiego podkrakowskiego w inwentarzach kultury ceramiki wstęgowej rytej, kultury późnej ceramiki wstęgowej i kultury pucharów lejkowatych. Dotychczasowe studia nad krzemieniarstwem neolitycznym wykazały, że obszar ten był włączony w dalekosiężną wymianę surowców ze skał krzemionkowych pochodzących z południa – z krzemienionośnego obrzeżenia Gór Świętokrzyskich (krzemień jurajski podkrakowski, krzemień świciechowski, krzemienie czekoladowe) i południowego wschodu – Wyzyny Ukraińskiej (surowce „wołyńskie”).

### *Kultura ceramiki wstęgowej rytej*

Pierwsza faza zasiedlenia ziemi chełmińskiej przez ludność KCWR mieści się w najstarszym horyzoncie zasiedlenia ziem polskich w ogóle. Najbardziej charakterystyczną cechą materiałów z tej fazy jest bardzo wysoki udział krzemienia jurajskiego podkrakowskiego. Wytwory z tego krzemienia stanowią od około 60% do ponad 90% wszystkich określonych surowcowo okazów z poszczególnych stanowisk. Drugą co do liczebności grupę wytworów stanowi lokalny krzemień narzutowy wieku kredowego (średnio nieco ponad 20%). Krzemienie czekoladowe (o różnej proveniencji) to najmniej liczna grupa wytworów, średnio niewiele poniżej 10%.

W kolejnych fazach zasiedlenia ziemi chełmińskiej (II i III) następuje wyraźna zmiana składu surowcowego analizowanych inwentarzy. Najliczniejsze są wytwory z krzemieni czekoladowych (średnio blisko 60%), drugi co do frekwencji jest krzemień narzutowy bałtycki (średnio blisko 35%), a udział wytworów z krzemienia jurajskiego wynosi średnio około 7%.

### *Kultura późnej ceramiki wstęgowej*

Stan rozpoznania tego etapu zasiedlenia ziemi chełmińskiej nie jest zadowalający. Badania wykopaliskowe przeprowadzono zaledwie na kilku stanowiskach. Stąd też i wiedza o krzemieniarstwie jest skromna, oparta na wynikach analiz materiałów z zaledwie kilku



stanowisk, a raczej kilku obiektów z nich pochodzących. Na stanowiskach wiązanych z KPCW obserwuje się niemal całkowity zanik napływu surowców południowopolskich, w tym także i krzemienia jurajskiego podkrakowskiego.

#### *Kultura pucharów lejkowatych*

W trakcie trwania kultury pucharów lejkowatych na ziemię chełmińską docierały surowce pochodzenia południowopolskiego (krzemienie czekoladowe, krzemień świciechowski, incydentalnie krzemień pasiasty) oraz z Wyżyny Ukrainińskiej (krzemienie wołyńskie). Wytwory z krzemienia jurajskiego zidentyfikowano w materiałach z zaledwie trzech stanowisk – są to dwa wióry oraz fragment wióra retuszowanego. Nie można wykluczyć, że wytwory z tego surowca dla populacji KPL mogły mieć charakter lokalny (wtórne użytkowanie).

Najbardziej intensywny napływ krzemienia jurajskiego podkrakowskiego nastąpił w czasie trwania pierwszych społeczności rolniczych i odnosi się do wczesnego okresu osadnictwa KCWR. W kolejnych fazach rozwoju KCWR wzrasta intensywność napływu krzemieni czekoladowych. Krzemień jurajski podkrakowski pojawia się w materiałach ze stanowisk o późniejszej chronologii, jednak jego frekwencja wyraźnie spada.

Przedstawiona struktura surowcowa potwierdza istnienie rozległej i wielokierunkowej sieci wymiany krzemienia jurajskiego wśród najstarszych społeczności rolniczych.