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**DISPERSION OF SILICEOUS RAW MATERIALS
FOR THE PRODUCTION OF AXES ON THE CORDED WARE
CULTURE SITES IN THE CARPATHIAN BASINS
OF THE VISTULA, DNIESTER AND TISZA RIVERS**

ABSTRACT

P. Jarosz 2017. *Dispersion of siliceous raw materials for the production of axes on the Corded Ware culture sites in the Carpathian basins of the Vistula, Dniester and Tisza Rivers*, AAC 52:23–37.

The Corded Ware culture societies inhabiting the Carpathian zone used various outcrops of flints to processing axes: Volhynian, Turonian (the Świeciechów and the Gościeradów types), Jurassic A and G-type, cretaceous K-type as well as siliceous marl and radiolarite. From the analysed area 81 axes associated with the Corded Ware culture are known. Most of them come from funeral sites — from grave pits or burial mounds.

The predominance of the Volhynian flint is observable in the whole area to the east of Wisłok River, basins of the San River, and in the upper basins of the Tisza and Dniester Rivers. Axes from niche graves on the Rzeszów Foothills, where the Świeciechów flint prevails, are specific in this scope or raw materials distribution.

Dispersion of flints can be used indirectly as basis for reconstructing movements of human groups using these raw materials, as well as determining directions of their interactions. It can be noticed that communities of the Corded Ware culture from the Dniester Basin resembled in this respect their counterparts from the Roztocze and the Sokal Ridge, while those from the Rzeszów Foothills shows connections both with the “Volhynian zone” and the Lesser Polish Małopolska Upland.

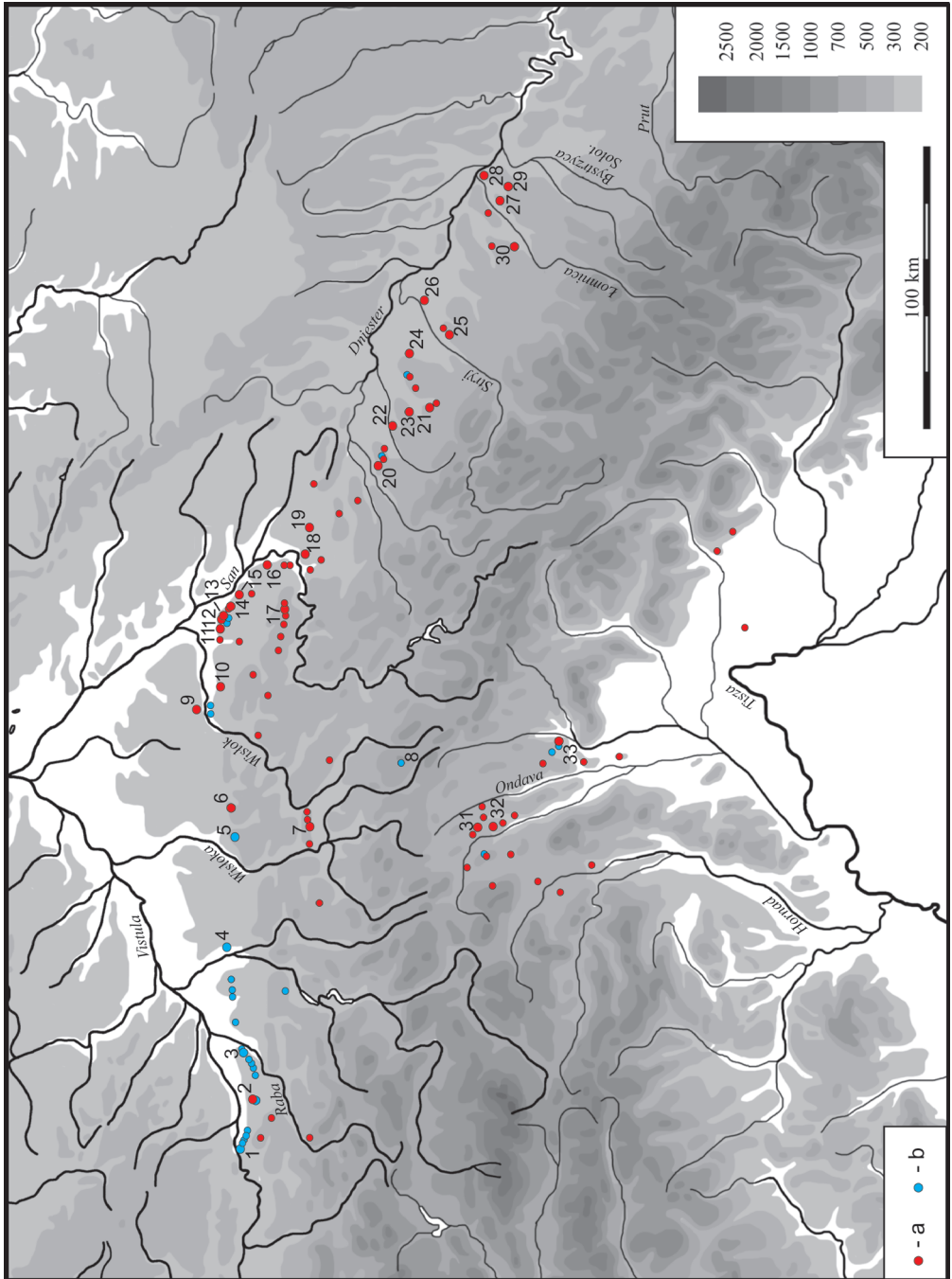
Key words: late neolithic; Corded Ware culture; Carpathian Mountains; raw materials; axes

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I. INTRODUCTION

The Corded Ware culture is primarily known from discoveries associated with burials and only a few settlement sites. Materials with no context are also often noted. They can be associated with this culture based on the distinctive features of their morphology.

The analysed area includes the basins of the upper Vistula, Dniester and Tisza Rivers, i.e. the Carpathian and the adjacent Sub-carpathian areas (Fig. 1). They are parts of the Carpathian mega-region (Kondracki 1989; 1996, 462, Fig. 2). Due to the mobile lifestyle of people of the culture in question, in order



to determine the potential zone of their penetration, it is important to analyse the differentiation of siliceous raw materials used for axe production from grave inventories of this culture in specific areas.

As so-far, the use of siliceous rocks by the people of the Corded Ware culture in the Carpathian area has not been widely reported. Most often, only a raw material composition is recorded, with no specific references to their source areas. In the present study, both dispersion of raw materials and their use for obtaining the final product — axes with specified characteristics, are analysed. The basis for this synthesis were materials from barrow graves, graves dug into mounds and flat pit burials, and also from graves of the niche construction (Jarosz 2011). Strayed axes discovered in mounds were also analysed. For comparison, materials from a few settlement sites discovered between Cracow and Bochnia in recent years (Czekaj-Zastawny, Jarosz, Kadrow 2002; Jarosz, Włodarczak, Włodarczak 2010; 2012; Włodarczak 2013; Jarosz 2015) have been also included.

The aim of the presented study is to verify the hypothesis that the people of the Corded Ware culture utilized mainly flint outcrops, supplementing their raw materials from local deposits. The consequence of these preliminaries is the assumption that Corded Ware people followed a certain “tradition” in utilizing raw materials intended for production of siliceous axes.

People of the Corded Ware culture inhabiting the Carpathian zone used various outcrops of flints (Fig. 2). The main source of raw material was the so-called Volhynian flint (previously also called south-east flint — e.g. Machnik 1966), originating from the areas of Podolia and Volhynia. Deposits of type A and G Jurassic raw materials from the Cracow-Częstochowa Jurassic Upland (Kaczanowska, Kozłowski 1976, 208, 209) were also used. Those of type A are located in the southern part of this Upland, and type G in its south-eastern part, around the Krztynia River (Kopacz, Pelisiak 1992, 109). Analogous location in the Cracow-Częstochowa Jurassic Upland near Ojców and Wielka



Fig. 1. Sites of the Corded Ware culture in the Carpathian zone containing axes and chisels (1–33) on the background other sites of this culture (without axes); graphic processing by author, background drawn by I. Jordan.

a — sepulchral sites, b — settlements

1 — Kraków Bieżanów, Kraków district, site 33; 2 — Brzezie, Wieliczka district, site 17; 3 — Damienice, Bochnia district, site 11; 4 — Tarnów, Tarnów district, site 98; 5 — Niedźwiada, Ropczyce-Sędziszów district, site 38; 6 — Zagórzycze, Ropczyce-Sędziszów district; 7 — Bierówka, Jasło district, site 1; 8 — Cergowa, Krosno district, site 3; 9 — Czarna, Łańcut district; 10 — Markowa, Łańcut district, site 3; 11 — Mirocin, Przeworsk district, site 24; 12 — Mirocin, Przeworsk district, site 27; 13 — Szczytna, Jarosław district, site 5; 14 — Szczytna, Jarosław district, site 6; 15 — Chłopice, Jarosław district, site 26; 16 — Święte, Jarosław district, site 11; 17 — Średnia, Przemyśl district, site 3; 18 — Siedliska, Przemyśl district, site 1; 19 — Balice (Balychi), Mostyska district; 20 — Kulczyce Szlacheckie (Kul'chytysi), Sambir district; 21 — Kołpiec (today within Drohobych), Drohobych district; 22 — Byków (Bykiv), Drohobych district; 23 — Wacowice (today Zaluzhany), Drohobych district; 24 — Kawsko (Kavs'ke), (Stryi) district; 25 — Łotatniki (Lotatnyky), Stryi district; 26 — Chromohorb (Khromohrob), Stryi district; 27 — Komarów (Komariv), Halych district; 28 — Kryłos (Krylos), Halych district; 29 — Wiktorów (Viktoriv), Halych district; 30 — Kałusz (Kalush), Kalush district; 31 — Kożany, Bardejov district; 32 — Kućin, Bardejov district; 33 — Brestov, Humenne district

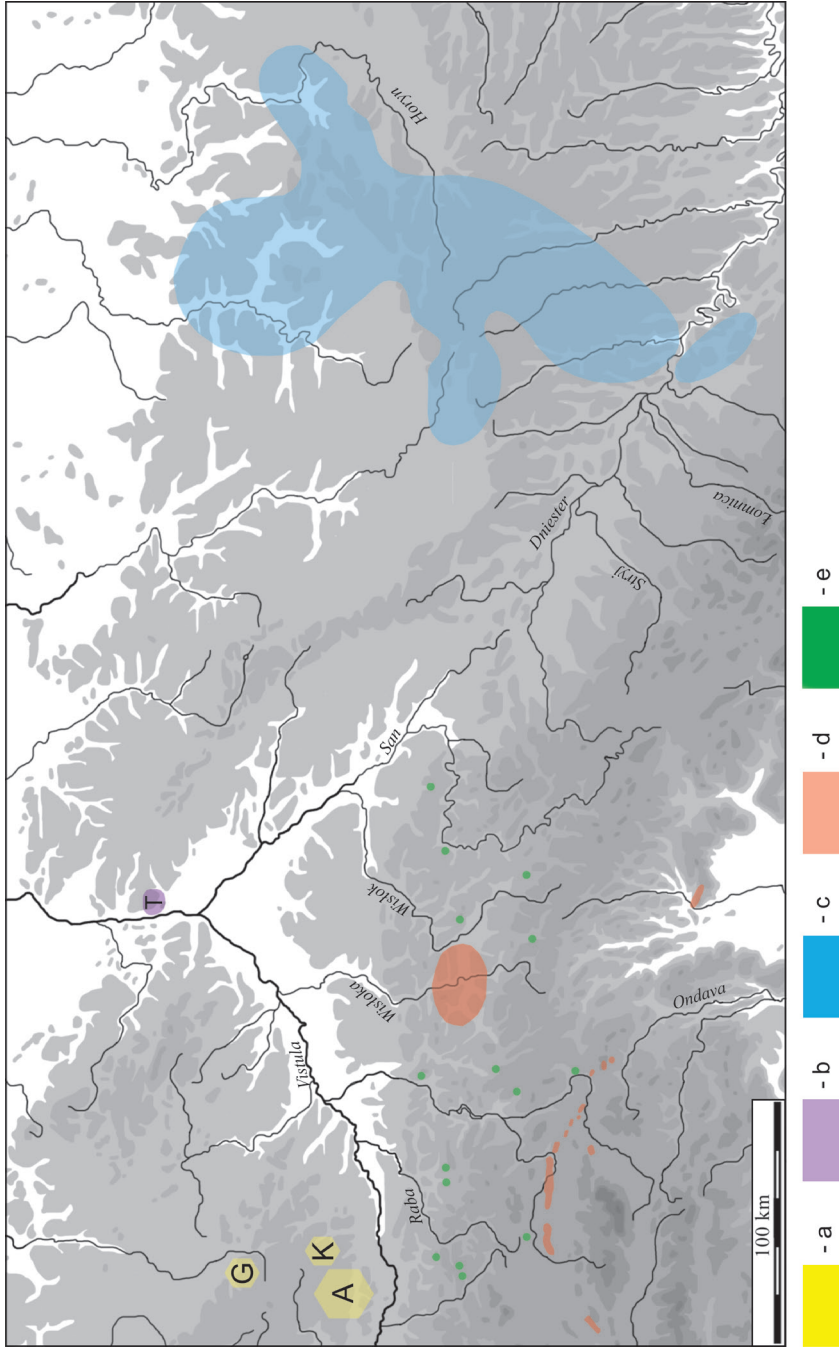


Fig. 2. Outcrops of raw materials from siliceous rocks used by the Corded Ware culture for processing axes in the Carpathian zone (acc. to Kaczanowska, Kozłowski 1976; Kopacz, Pelisiak 1992; Valde-Nowak 2009; Górniak 2011; Libera, Zakosćcielna 2013); graphic processing by author, background drawn by I. Jordan.

a — flints from the Kraków-Częstochowa Upland (Jurassic A- and G-type and Cretaceous K-type), b — Turanian flint (Świeciechów and Gościeradów), c — Volynian flint, d — radiolarite, e — siliceous marl

Wieś to the north of Cracow concerns Cretaceous K-type flint that was also called as the chert of Wielka Wieś type (Přichystal 2009, 95). Flints of the Turonian age (the Świeciechów and the Gościeradów types) come from deposits located in the Świeciechów area on the right bank of the Vistula river (Libera, Zakościelna 2002). Siliceous marl was obtained from the Carpathian foothills (Valde-Nowak 2009; Górniak 2011, 174, Fig. 2), similarly to the radiolarite (Valde-Nowak 2009; Přichystal 2009).

II. ANALYSIS

From the analysed area 81 axes associated with the Corded Ware culture are known (Fig. 1). Most of them come from funeral sites — from grave pits or from burial mounds. They were also discovered on settlement sites (Fig. 3), most of them (8 axes and their fragments) on site 33 in Kraków Bieżanów (Jarosz, Włodarczak, Włodarczak 2010; 2012). They were found in cultural layers together with the settlement potsherds of the Corded Ware culture.

Most of sepulchral features contained axes appear in single numbers only in some niche graves three of them (Mirocin, site 24, grave 54; Mirocin, site 27, grave 360; Szczytna, site 5, grave 220; Hozer, Machnik, Bajda-Wesołowska

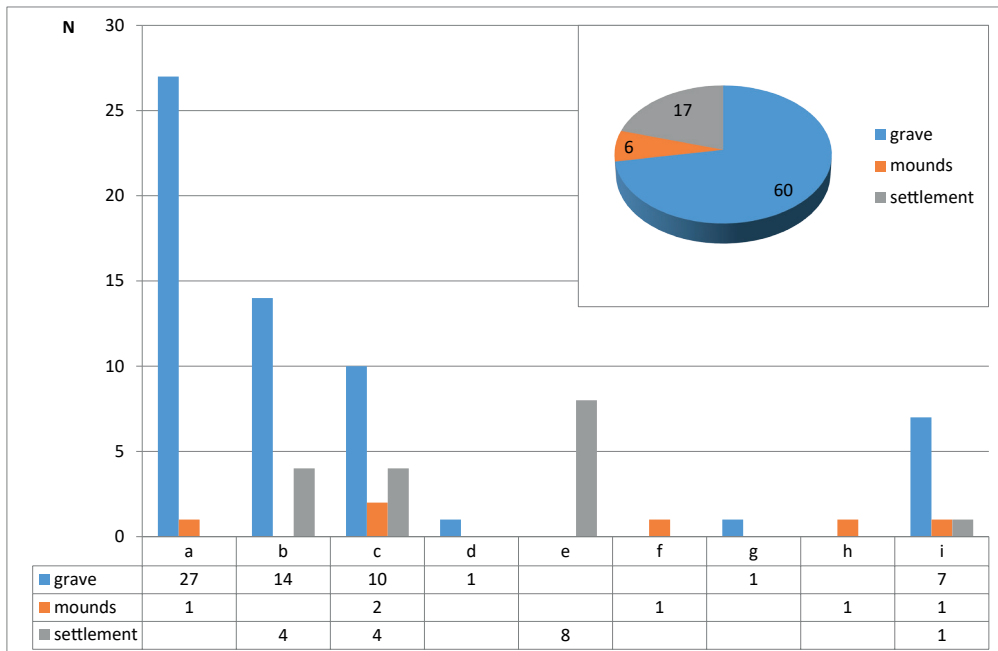


Fig. 3. Flint raw material, and the place of its discovery; prepared by author.

a — Volynian flint; b — Turonian flint — Świeciechów flint; c — siliceous marl; d — Jurassic flint G-type; e — Cretaceous flint K-type; f — Jurassic flint A-type; g — Turonian flint — Gościeradów flint; h — radiolarite; i — undetermined flint

2017; Pelisiak 2017) or two tools (Mirocin, site 24, graves 50 and 110, Szczytna, site 6, grave 56) were discovered. Two axes were also found in the barrow graves in Komarów, barrow 38 and probably in Kučin, barrow 3 (Budinský-Krička 1967; Sulimirski 1968, 112). In the mounds, axes of the siliceous rock were usually found individually, only in Brestov, barrow 1, two such tools were found (Gancarski *et al.* 2001).

The Volhynian flint was the main raw material for the production of axes in the investigated area (28 axes; Fig. 3). An analysis of its dispersion indicates that tools of this rock appear in graves in the San and the upper Dniester basin, but also in the Ondava Upland (Kučin, barrow 3). Its dominance is also observable in the Roztocze Range, e.g. in Brzezinki, barrow III, Łukawica, barrow J in the Lubaczów area (Machnik 1966, 243, 244, 249) and Ulów, Tomaszów Lubelski district, site 3, barrow 1 (Niezabitowska-Wiśniewska, Wiśniewski 2011, 337), on the Volhynian Upland, i.e. on the Sokal Ridge (Libera 2009, 287–291), and in the Hrubieszów Basin (Szychowice, Hrubieszów district; Jarosz 2016, 525). Exceptionally, the Volhynian flint was used by the people of the Corded culture in the Małopolska Upland, in a grave in Kleczanów, Sandomierz district (Buko, Scibor 1991, 120, Fig. 4:d). Remarkably, tools from the Volhynian flint have not been registered in graves from the Lublin Upland (Jarosz 2016, 525).

Flints of the Turonian age — the Świeciechów and the Gościeradów, will be presented together (18 axes; Fig. 3). Most of finds of these rocks come from niche graves from the Rzeszów Foothills, e.g. from Szczytna: site 5, graves 220 and 273, site 6, graves 56 and 84, from Mirocin: site 24, graves 50, 54 and 110, site 27, grave 360 (altogether 11 artifacts of the Świeciechów flint and one artifacts of the Gościeradów flint (Ligoda, Podgórska-Czopek 2011; Hozer, Machnik, Bajda-Wesołowska 2017; Pelisiak 2017). A few other finds are known from devastated graves in Czarna on the Tarnogród Plateau, and from Siedliska, site 1, on the Rzeszów Foothills (Machnik 1966). The easternmost find of such an axe was found in a grave 1 in Łotatniki, on the right bank of Stryj River (Sulimirski 1968, 137). Axes of the Świeciechów flint associated with the Corded Ware culture were also discovered on the workshop-settlement in Niedźwiada, located in the northern part of the Strzyżów Foothills (Mitura 2007, 313). Turonian flint was the basic raw material for the production of axes on the Lesser Poland Małopolska and Lublin Uplands (Budziszewski, Włodarczak 2011, 60, Abb. 7; Jarosz 2016, 524–526). One tool of that flint was found in Nedeżów, Tomaszów Lubelski district, site 22, barrow 2, grave 2 (Libera 2009, 291), on the Sokal Ridge.

The siliceous marl was also used as the raw material for processing axes (16 axes; Fig. 3). It was mainly noted in graves from the San River basin, i.e. from the Rzeszów and the Dynów Foothills (8 in total), and in one case in the upper Dniester basin — in Balice, barrow XVI (Jarosz, Machnik 2000). They were parts of inventories of both niche (Szczytna, Mirocin, Chłopice; Ligoda, Podgórska-Czopek 2011; Hozer, Machnik, Bajda-Wesołowska

2017; Pelisiak 2017) and barrow graves (e.g. Średnia, site 3, barrow 2; Jarosz 2002). They were also found in mounds to the south of the Carpathians, e.g. in Brestov, barrow 1, and Kučín, barrow 4 (Budinský-Krička 1967; Gancarski *et al.* 2001). Moreover, tools of that raw material were discovered near its outcrops on the settlement and workshop of axes in Cergowa, in the Lower Beskid Mts. (Budziszewski, Skowronek 2001). Outside the discussed area, two axes of marl were found in Łukawica, barrow K, on the Roztocze Range (Machnik 1966)¹.

Axes of raw materials from the Cracow-Częstochowa Jurassic Upland are also known from sites of the Corded Ware culture in the Carpathian zone (Fig. 3). The sole example of an axe of Jurassic flint type G in the discussed area was discovered in the grave 1252 in Brzezine on the Bochnia Foothills (Czekaj-Zastawny, Jarosz 2007). Axes of these raw materials are known only from grave inventories in the western part of the Lesser Polish Małopolska Upland, more exactly in the Nida Basin (Włodarczak 2006, 21). An exceptional find, due to raw material used and location of its source area, is the chisel from barrow B in Bierówka, made of the Jurassic flint type A (Gancarski, Machnikowie 1990, 118). This type of the Jurassic flint was not used for producing axes by people of the Corded Ware culture on the Lesser Polish Małopolska Upland (Włodarczak 2006, 21; see also Budziszewski, Włodarczak 2011, 60, Abb. 7). Another rock from the Cracow-Częstochowa Jurassic Upland — Cretaceous K-type, was discovered on the axe-producing workshop on site 33 in Bieżanów (Jarosz, Włodarczak, Włodarczak 2010; 2012). Tools from this flint were found only on loess soils near Cracow (Włodarczak 2006, 21).

Flint axes of the Corded Ware culture found in graves on the discussed area represent types I-IV, according to P. Włodarczak's classification (2006, 27, 28). Types I and II refer to axes with a rectangular or trapezoidal cross-section. Type I includes tools with flat, almost parallel facing surfaces, with a thickness not exceeding 20 mm. Type II axes are tools with clearly convex frontal sides and wedge-shaped longitudinal section, thickness usually over 20 mm (Włodarczak 2006, 28). Types I and II include also axes with triangular cross-section close to asymmetric trapezium. Type III, according to P. Włodarczak (2006, 28), encompasses axes with lenticular (symmetric, asymmetric) cross-section. Axes of type IV are slender, with length/width ratio of the blade exceeding 5/1 (Włodarczak 2006, 28). Due to such proportions they should be classified as chisels.

In the correlation of the raw material with the typological division of axes, some preferences in the selection of flint for the specific types of these tools processing have been observed (Fig. 4). Some axes of type I of the Volhynian flint were found in barrow graves and burials dug into the mounds in the Carpathian part of the upper Dniester river, among others in Komarów, barrow 38; Wiktorów, barrow 1 and 8, and in Krylos (Machnik 1961; Sulimirski

¹ The raw material was now determined by prof. J. Libera.

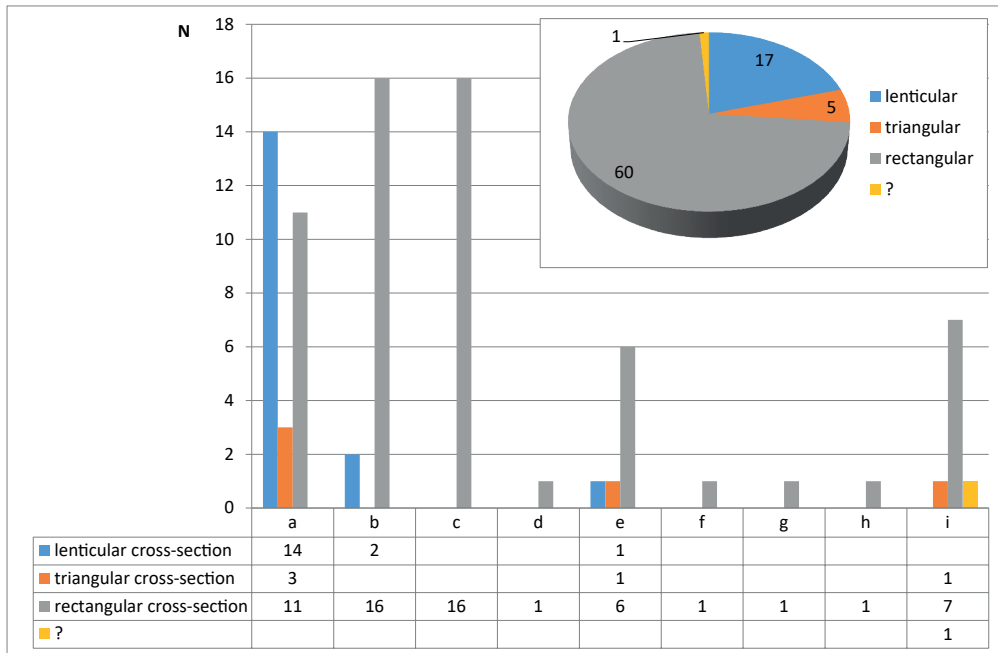


Fig. 4. Cross-section of the axes of the Corded Ware culture and their raw material; prepared by author.

a — Volynian flint; b — Turanian flint — Świeciechów flint; c — siliceous marl; d — Jurassic flint G-type; e — Cretaceous flint K-type; f — Jurassic flint A-type; g — Turonian flint — Gościeradów flint; h — radiolarite; i — undetermined flint

1968). One axe of this type was discovered in the barrow grave 3 in Kucin on the Ondava Upland (Budinský-Krička 1967). On the right bank of the Vistula River axes of that form have been recorded in barrow graves (Bierówka, barrow A; Gancarski, Machnikowie 1986) and in the niche grave No. 360 in Mirocin, site 27 (Ligoda, Podgórska-Czopek 2011). However, the Volhynian flint was used mainly for producing lenticular axes of type III (Fig. 4) after P. Włodarczak (2006). Such axes are known from all types of graves mentioned above. In barrow graves and graves dug into the mound they have been recorded mainly in the upper Dniester basin (e.g. in Łotatniki, grave 2, Komarów, barrow 5, Kulczyce Szlacheckie, barrow 3; Sulimirski 1968), and in niche graves from the Rzeszów Foothills e.g. in Szczytna (Hozer, Machnik, Bajda-Wesołowska 2017) and Mirocin (site 24, grave 50, site 27, grave 360; Ligoda, Podgórska-Czopek 2011).

Axes of the Turonian flints (the Świeciechów and the Gościeradów) with rectangular cross-sections (types I and II) are known from only three graves, including two niche graves from the Rzeszów Foothills with lenticular forms of type III (Szczytna, site 6, grave 84; Mirocin, site 24, grave 50). Type II axes were found only in niche graves in Mirocin and Szczytna (Hozer, Machnik,

Bajda-Wesołowska 2017), while type I, besides niche graves (Mirocin, site 24, grave 54 and 110; Szczytna, site 6, grave 220 and 273, Siedliska, site 1; Machnik 1966; Ligoda, Podgórska-Czopek 2011; Hozer, Machnik, Bajda-Wesołowska 2017) are known from a barrow grave from at Łotatniki on the Stryj River (Sulimirski 1968).

The siliceous marl was also used in processing rectangular axes (Fig. 4). As said above, the range of their occurrence in graves is limited mainly to the Rzeszów Foothills, with some occurrences in the neighboring Dynów Foothills and the San-Dniester Plateau (Kondracki 2000; the Sambor Upland; Starkel 1997, 33). Tools made from this material appear mainly in graves of a niche construction (Chłopice, site 22, grave 22, Mirocin, site 24, grave 53 and 110/112, Szczytna, site 6, graves 38 and 56, Święte, grave 1149; Ligoda, Podgórska-Czopek 2011; Kos'ko, Kločko, Ol'shev's'kij 2012; Hozer, Machnik, Bajda-Wesołowska 2017), and less frequently in barrow graves, e.g. in Średnia, site 3, barrow 2 (Jarosz 2002), Balice (Sulimirski 1968; Jarosz, Machnik 2000), or Byków, barrow 2, grave 1 (Czopek *et al.* 2016).

The rectangular axe from the grave in Brzezcie made of the Jurassic flint type G, is of type I, while the artifacts of the Cretaceous flint type-K from site 33 in Krakow Biezanów are classified as types I, III and IV (Jarosz, Włodarczak, Włodarczak 2010; 2012). The chisel from barrow B in Bierówka made of the Jurassic flint type A should be classified as type IV (Gancarski, Machnikowie 1990).

The analysis indicates that in the discussed area for the production of the rectangular in cross-section axes, prevailing in the Corded Ware culture, all the above mentioned raw materials were used, although the dominance of the Volhynian flint was significant (Fig. 4). This raw material was mainly used for processing of two sided axes (with lenticular cross-section). Święciechów flint was utilized for the manufacture of axes type I and II, and — in three cases — two-sided axes of type III (Fig. 4). Large, massive axes of type II were made entirely of the latter raw material, as confirmed on other areas of the Corded Ware culture in basins of the Vistula and Bug Rivers (Włodarczak 2006; Jarosz, Rejniewicz 2016; Libera 2016). Silicious marl was used only for the manufacturing rectangular axes (Fig. 3).

Considering the observed regularities significant are finds from the Rzeszów Foothills, twenty-five axes altogether (Fig. 5; sites Chłopice, Mirocin, Szczytna and Święte). All Axes discovered in niche graves on this very restricted area were made of the Turonian flints — the Święciechów (12) and the Gościeradów (1), the Volhynian flint (7), and the siliceous marl (5). The analysis indicates that the Turonian raw material prevailed over the other rock similarly to the lesser Polish Małopolska Upland (Włodarczak 2006, 20, Table 5).

In the part of the Carpathian zone of our interest, there have been registered settlement sites associated with manufacturing axes. On the settlement in Krakow Biezanów, located on a small elevation in the Vistula valley, Cretaceous K-type flint was utilized for that purpose. Sources of that rock are located about

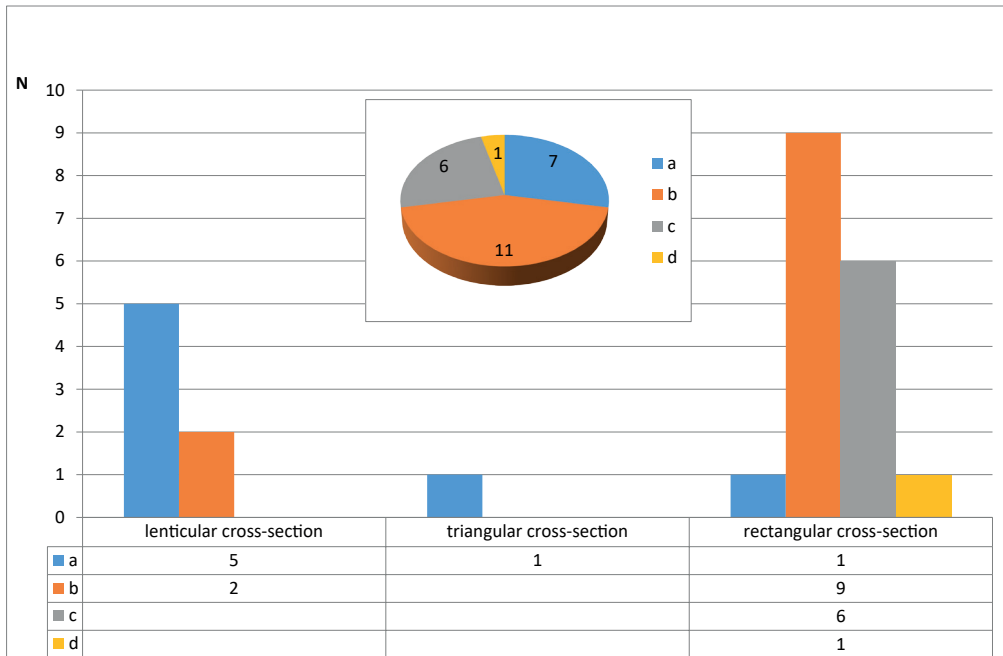


Fig. 5. Flint axes from niche graves of the Corded Ware culture and their cross section; prepared by author.

a — Volynian flint; b — Turanian flint — Świeciechów flint; c — siliceous marl; d — Turanian flint — Gościeradów flint

20 km to the north of Biezanów site. In Niedźwiada, the raw material for axe production — was rather unexpectedly — the Świeciechów flint, originated from the areas approximately 75 km to the south in a straight line (Mitura 2007). The local siliceous marl was the raw material in the settlement-workshop in the Cergowa (Budziszewski, Skowronek 2001).

III. CONCLUSIONS

The analyses of raw materials of axes of the Corded Ware culture, discovered in graves, mounds and on settlements sites indicate that rocks from local and more distant deposits were used (Fig. 2, 6). Local raw materials in the discussed area are siliceous marls and the Carpathian radiolarites. As already said, axes of such rocks were found mainly in the Dynów and Rzeszów Foothills and on the Ondava Upland (radiolarite; Kučin barrow 3). In the whole area to the east of Wisłok River, basins of the San River, and in the upper basins of the Tisza and Dniester Rivers, the predominance of the Volhynian flint is observable. It was supplemented by the Turonian flints (mainly the Świeciechów). In the western part of the discussed area, in the Cracow region, communities of the Corded

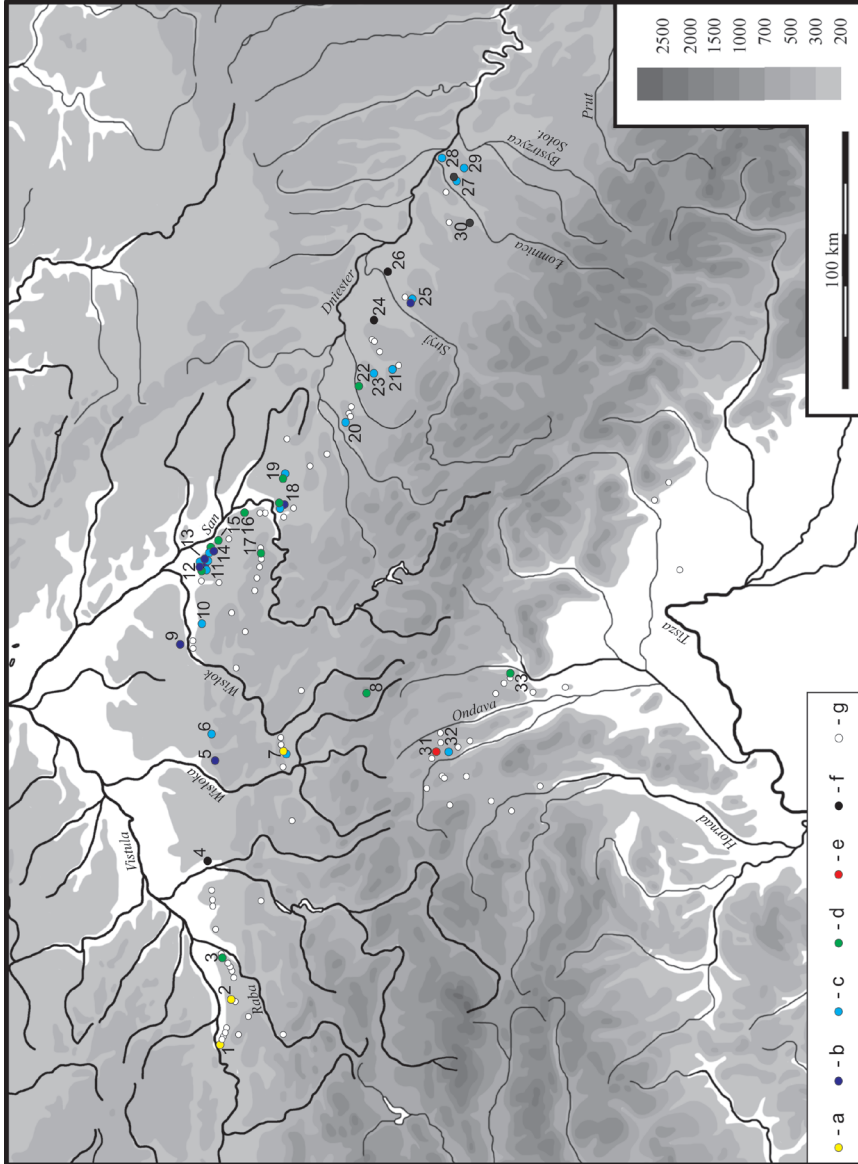


Fig. 6. The distribution of axes of the Corded Ware culture from different flint raw material (numbers see Fig. 1); graphic processing by author, background drawn by I. Jordan.

a — flints from the Cracow-Częstochowa Jurassic Upland (Jurassic A- and G-type and Cretaceous K-type); b — Turanian flint (Świeciechów and Gościeńradów); c — Volynian flint; d — siliceous marl; e — radiolarites; f — undetermined; g — other sites of the Corded Ware culture (without axes)

Ware culture used raw materials from the Cracow-Częstochowa Jura: Jurassic flint type G and Cretaceous flint type K (Fig. 6).

Axes from niche graves on the Rzeszów Foothills, where the Świeciechów flint prevails, are specific in the scope or raw materials (Fig. 5). An evident boundary in dispersion of Volhynian and Turonian flints can be used indirectly as basis for reconstructing movements of human groups using these raw materials, as well as determining directions of their interactions. It can be presumed that the Rzeszów Foothills was settled by people of different traditions of using flint deposits. Some of them, who came from regions located to the northeast and east, traditionally used the Volhynian flint. The presence of rectangular axes of the Świeciechów flint in graves from the Rzeszów Foothills may reflect interactions of local groups with communities using deposits of that rock. The current state of research and chronometry of burial inventories (see Machnik 2014) allow presuming that they were societies from Lesser Polish Małopolska Upland for whom the Turonian flint was the main raw material for axe processing. It can also be noticed that communities of the Corded Ware culture from the Dniester Basin resembled in this respect their counterparts from the Roztocze and the Sokal Ridge (Liber a 2009, 293), while those from the Rzeszów Foothills shows connections both with the “Volhynian zone” and the Lesser Polish Małopolska Upland.

The already-mentioned workshop for final axes processing in Niedźwiada, where the Świeciechów was utilized, differs from neighboring sites. Significant is also the artifacts of the Jurassic flint type A from barrow B on Bierówka and the axe of the Świeciechów flint from the barrow grave in Łotatniki. They are examples of distant imports either raw materials or tools into the area using mainly the Volhynian flint (Fig 6).

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