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K-TYPE FLINT IN FINAL ENEOLITHIC LESSER POLAND

ABSTRACT

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Studies of artefacts from Corded Ware culture graves in western Lesser Poland have demonstrated that raw materials originating from the eastern Świętokrzyskie region take a leading role: Świeciechów flint (for the production of axes), and chocolate flint (for making flake and blade tools). New data obtained through the study of settlement sites in the vicinity of Kraków have highlighted the significant role of another hitherto little-noticed raw material: K-type flint (otherwise known as the Wielka Wieś type). This raw material was used mainly for the production of core tools. Workshops producing axes from this flint were discovered on the right bank of the Vistula River in the area between Kraków-Bieżanow and Zakrzów. Tools made from K-type flint appear in Final Eneolithic graves north of Kraków as well, and another production centre is known from this region, near Ojców. The provenance of the raw materials used in the vicinity of Ojców and in the Kraków-Bieżanów – Zakrzów area remains undetermined. Hypothetically, two deposits with different locations were used.

In light of new discoveries made during large-scale rescue research projects, the raw material preferences in Final Eneolithic Lesser Poland seem more complex than previously believed, and they varied from micro-region to micro-region.

Keywords: Final Eneolithic, Corded Ware culture, Lesser Poland, flint production, raw material
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1. INTRODUCTION

Until recently, research on the flint industry of the Corded Ware culture (CWC) communities in Lesser Poland relied primarily on materials from funerary contexts (*e.g.,* Balcer 1983, 226-233). The subject was also addressed in general studies of the Final Eneolithic (*e.g.,* Machnik 1966; Włodarczak 2006). Of the excavated flint mining sites, only the finds from the chocolate flint mine at Polany Kolonia II have been linked to the CWC (Schild *et al.* 1977), and data on settlement sites were almost completely missing. Consequently, the picture of flint-working appeared incomplete. It was justified to assume that what was deposited in graves were selected categories of artefacts that did not represent a full spectrum, and that there may have been selection in terms of raw material as well (*e.g.,* Gancarski and Valde-Nowak 2011). It has also sometimes been assumed that grave furnishings included objects with ritual functions, but not necessarily related to daily activities (*e.g.,* Osipowicz 2022). At the same time, the relatively rich grave inventories suggestively indicated the leading typological and technological features of the Final Eneolithic CWC flint industry, as well as the patterns of raw material supply. The assemblages from Lesser Poland highlight a tendency, characteristic of the 3rd millennium BC, towards attaching supra-utilitarian value to flint raw materials, manifested in the long-distance distribution of selected flint types (Włodarczak 2017, 315, 316). In particular, raw materials were selectively chosen for the production of core tools (axes) and knife inserts (including the cha-racteristic 'flame-shaped knives' – Valde-Nowak 2000). In the case of the Kraków-Sandomierz group of the CWC (*i.e.*, materials from sites located primarily in the Lesser Poland Upland), two raw materials were of particular importance: Świeciechów flint for the production of axes, and chocolate flint for the production of knives and (less frequently) arrowheads (Balcer 1983, 227). Such a preference was also documented in the loess areas of western Lesser Poland (the Kraków region), *i.e.,* in the vicinity of rich and varied Jurassic flint deposits, which nevertheless do not occur in grave inventories on the expected scale. Even in this area, there is an observed tendency to furnish the deceased with flint objects from the Świętokrzyskie region.

Already in the 21st century, numerous open-area rescue excavations conducted in various regions of Lesser Poland have resulted in the discovery of important materials linked to the CWC. Firstly, unique flint assemblages have been obtained from settlement sites and flint workshops, particularly in western Lesser Poland (Włodarczak 2013). Secondly, CWC materials have been discovered in areas previously less well recognised, such as the Wieliczka-Bochnia region (*e.g.*, Jarosz *et al.* 2010) and the south-eastern part of the Sandomierz Basin (Machnik 2011). In areas that are better recognised as well, studies have covered micro-regions from which no rich collections of Final Eneolithic finds were previously known. These discoveries make it possible to verify previous findings concerning CWC flint-working in Lesser Poland.

One of the results of the new research in western Lesser Poland is the recognition of a greater significance of what is known as 'Cretaceous flint of type K' than previously

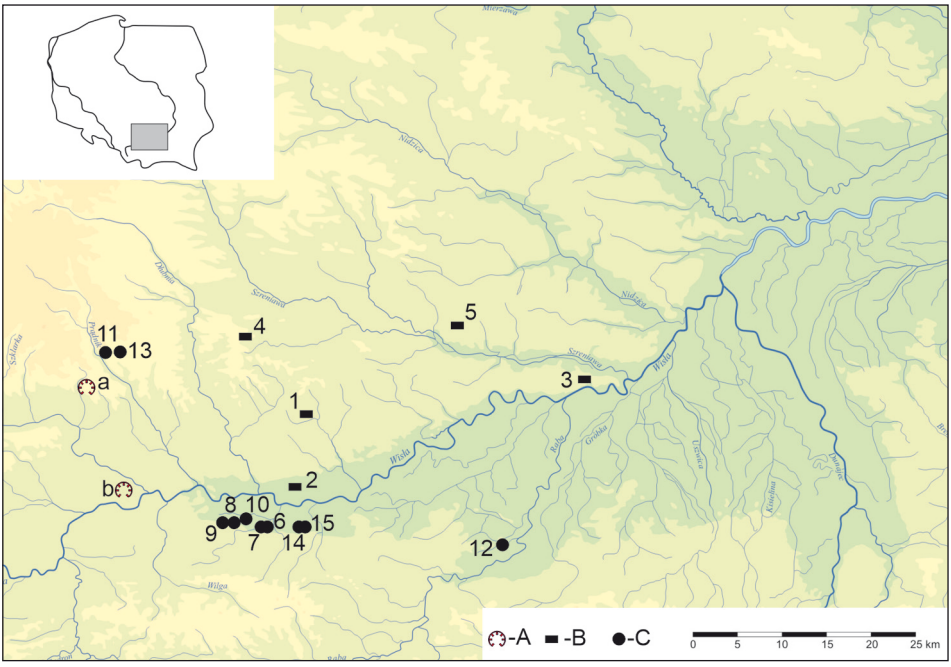

Fig. 1. Main outcrops of K-type flint and the Final Eneolithic sites mentioned in text.
A – outcrops of K-flint: a – Ujazd, b – Kraków, Sikornik Hill; B – Final Eneolithic graves with axes made of K-flint (1 – Kocmyrzów, site 17; 2 – Kraków-Pleszów, site 17; 3 – Książnice Wielkie, site 1; 4 – Polanowice, site 4; 5 – Teresin); C – Final Eneolithic settlement sites (6 – Kokotów, site 13; 7 – Kokotów, site 20; 8 – Kraków-Bieżanów, site 8; 9 – Kraków-Bieżanów, site 15; 10 – Kraków-Bieżanów, site 33; 11 – Ojców, site 12 ; 12 – Proszówki, site 10; 13 – Smardzowice; 14 – Zakrzów, site 1; 15 – Zakrzów, site 13).
Prepared by P. Włodarczak

thought (Kaczanowska and Kozłowski 1976, 207, 208). This raw material had been exploited from the Middle Eneolithic onwards, as evidenced by its presence in the Funnel Beaker culture settlements in the Kraków area (*e.g.*, Wilczyński 2011, 522). It also appears in the materials of the Baden culture (Late Eneolithic). However, a marked increase in its importance comes only in the Final Eneolithic period (after *c.* 2900 BC), when it began to be used primarily for the manufacture of tetrahedral axes. In the Kraków region, its importance in the production of core tools remained high into the Early Bronze Age, as noted as early as the 1970s in the context of materials from the site complex at Iwanowice (Kopacz 1976). The new large-scale rescue research mentioned above has uncovered assemblages with a high proportion of K-type flint at Final Eneolithic settlement sites from the south-western fringes of the Sandomierz Basin (Wieliczka-Gdów Plateau). These discoveries change the picture of the flint industry of the Lesser Poland CWC, indicating a greater micro-regional diversity than previously thought (Fig. 1). One of the differentiating factors was raw material preference, particularly regarding the production of core tools.

2. K-TYPE FLINT

In categorizing the varieties of flints from the Kraków region, Małgorzata Kaczanowska and Janusz Krzysztof Kozłowski distinguished a group of 'striated flints with light and dark stripes, admittedly relatively rarely used by prehistoric man, and Cretaceous flints' (Kaczanowska and Kozłowski 1976, 207, 208). They called this group the 'K variety' and distinguished two variants. The detailed characteristics of this group, both in terms of geological age and sites of occurrence, have not yet been clarified to the present day (see Lech 1980, 199, 200). Kaczanowska and Kozłowski indicated the presence of K-type flints in the basins of the Prądnik River (above all: in the vicinity of Wielka Wieś and Witkowice) and the Dłubnia River, *e.g.,* in the vicinity of Michałowice (Fig. 1; Kaczanowska and Kozłowski 1976, 209, fig. 1). The most spectacular outcrops were located in Wielka Wieś and in neighbouring Ujazd (Matyszkiewicz and Kochman 2020; Kochman *et al.* 2020), hence this flint was sometimes referred to as 'Wielka Wieś flint' (Přichystal 2009, 95). Macroscopic methods cannot precisely identify the place where this type of raw material was exploited (Matyszkiewicz and Kochman 2020). For the discussion of the distribution of K-type flint at Final Eneolithic sites, presented below, it is important to note its occurrence also at the quarry on Sikornik Hill (Sowiniec Range), within southern Kraków (Matyszkiewicz and Kochman 2020, fig. 3: b). Indeed, it is quite likely that flint from this zone was used in the workshops known from such sites as Kraków-Bieżanów, Kokotów or Zakrzów (the south-western margin of the Sandomierz Basin).

In geological terminology, K-type raw material is referred to as bedded chert, and its age is referred to the Oxfordian/Kimmeridgian stages, *i.e.,* the Late Jurassic epoch (*e.g.,* Matyszkiewicz and Kochman 2020). The geological systematics of Jurassic flints presents a complex issue, one going beyond the scope of this paper.

3. CWC CAMP SITES AND FLINT WORKSHOPS IN THE WIELICZKA-BOCHNIA REGION

The important role of K-type flint in the production of Final Eneolithic core tools was determined by discoveries made during archaeological research preceding the construction of the A4 motorway between Kraków and Bochnia, when numerous finds related to the Corded Ware culture were uncovered (Włodarczak 2013) along with even richer traces of Early Bronze Age occupation (for a summary: Górski and Jarosz 2015). K-flint artefacts, mainly associated with the manufacture of core tools, were discovered at most sites. Their larger collections published so far come from site 33 in Kraków-Bieżanów (Jarosz *et al.* 2010; 2012) and from site 20 in Kokotów, Wieliczka commune (Czerniak *et al.* 2015). At the latter site, the artefacts from the K-type flint of interest here are referred to as 'Jurassic flint of type X' and are in many cases erroneously linked to the settlement of the Funnel

Fig. 2. Axes of K-type flint from Kokotów, site 20.
After Czerniak *et al.* 2015. Photo by M. Wąs

Beaker culture (Czerniak *et al.* 2015, 27 ff.). The abundant collection of tetrahedral axes from Kokotów makes it possible to unequivocally link most of these artefacts (if not all) to the Final Eneolithic industry, despite the doubts expressed by the authors of the study (Czerniak *et al.* 2015, 28, 29). Indeed, these artefacts have good analogies in CWC grave inventories from Lesser Poland (Fig. 2). The flint artefacts from Kokotów were accompanied by a small number of pottery fragments (Czerniak *et al.* 2015, 18, figs 1-3) with characteristics of the older phase of CWC development.

Fig. 3. Kraków-Bieżanów, site 33. Examples of flakes (K-type flint). Photo by E. Włodarczak

From site 33 in Kraków-Bieżanów comes a collection of 192 flakes of K-type flint, representing the remains of a Final Eneolithic workshop producing tetrahedral axes (Fig. 3). In addition to these, a set of tools made from this raw material was found there, including tetrahedral axes themselves (Figs 4-6; Jarosz *et al.* 2010, 18-20, figs 7-9). In typological and stylistic terms, they fit the CWC standards. In addition to flint artefacts, the site also produced fragments of ceramic vessels from the older phase of this culture (Jarosz *et al.* 2010, 12, 13, figs 3-5). Similar but less numerous finds of K-type flint axes, as well as production waste, are also known from nearby sites, including Kraków-Bieżanów sites 8 and 15, as well as site 13 in Kokotów (unpublished research by the Kraków Team for Archaeological Supervision of Motorway Construction).

By analogy with the above-mentioned sites at Kokotów and Kraków-Bieżanów, the tetrahedral axe workshop from site 13 at Zakrzów, Niepołomice commune, a large part of which consists of K-type flint waste, should also be dated to the Final Eneolithic (Nowak 2015). In addition, numerous stray finds of tetrahedral and dihedral axes made from this type of raw material are known from the complex of sites near Zakrzów. A sizable collection of them, coming mainly from pre-war surveys (*e.g.*, Czapkiewicz 1910; 1930), is held in the Archaeological Museum in Kraków, and individual artefacts can also be found in the collection of the Cracow Saltworks Museum in Wieliczka (Fraś and Lajs 2015, 299, photo

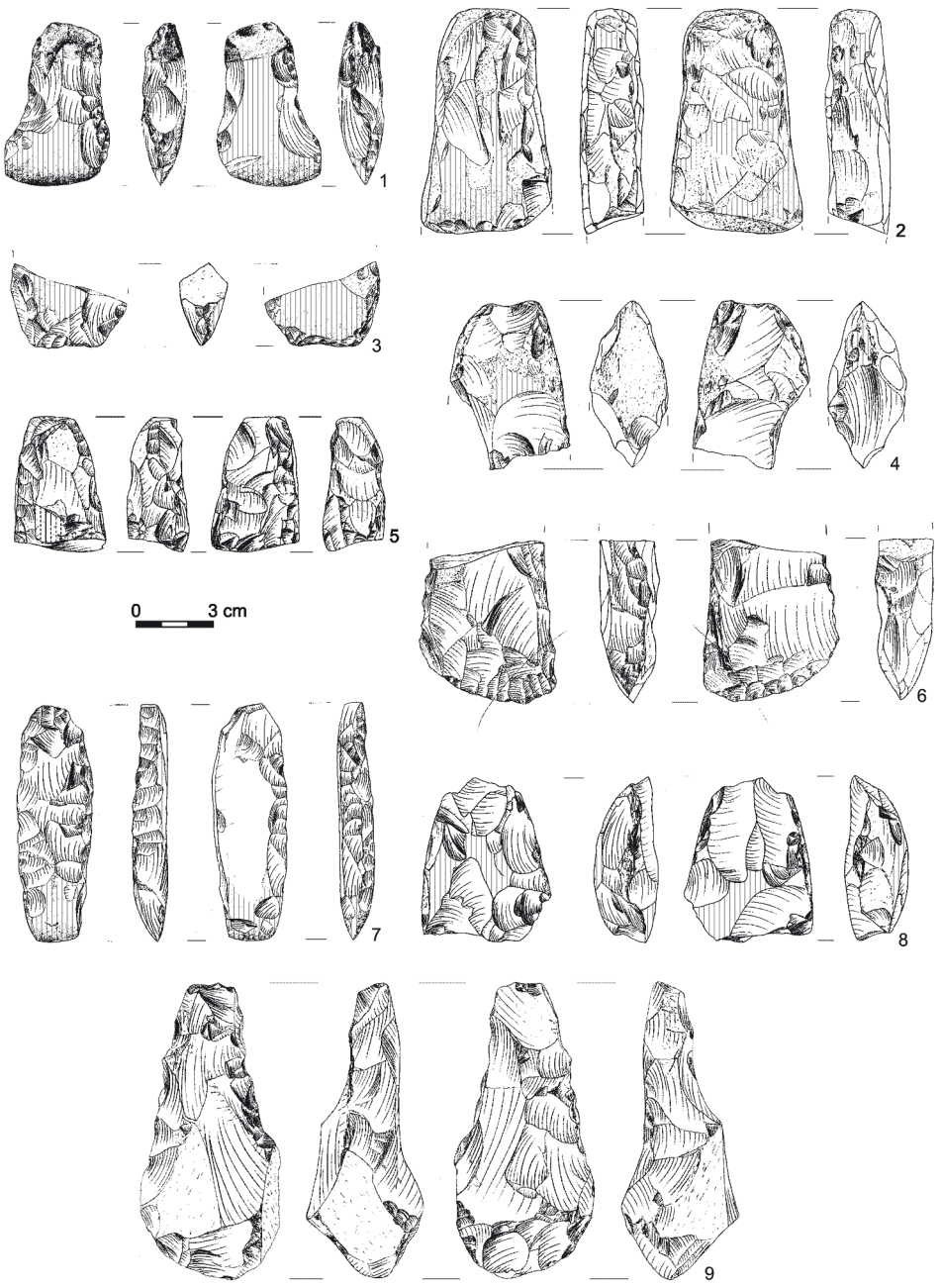

Fig. 4. Core tools from Kraków-Bieżanów, site 33 (K-type flint).
After Jarosz *et al.* 2010. Illustrated by A. Kukułka

Fig. 5. Kraków-Bieżanów, site 33. Axes made from K-type flint. Photo by E. Włodarczak

Fig. 6. Kraków-Bieżanów, site 33. Axe made from K-type flint. Photo by E. Włodarczak

25; 325, photo 38 *et al.*). This justifies a suggestion that a production centre existed on the right bank of the Vistula in the vicinity of Kraków, and that it specialised in the manufacture of tetrahedral core tools from K-type flint. This situation is thus analogous to that in the vicinity of Ojców. What remains unknown in the case of the finds from the Kraków-Bieżanów-Zakrzów zone is the provenance of the K-type raw material. One possibility is that it originated from the Sowiniec Range, as perhaps indicated by its similarity to flints from Sikornik Hill. This is, however, only conjecture and an indication of a promising direction for future raw material studies.

Artefacts made of Cretaceous flint of type K have been found at a number of sites rescue-excavated prior to the construction of the A4 motorway in the south-western part of the Sandomierz Basin. Their range towards the east reaches the vicinity of Bochnia (*e.g.,* Proszówki, Bochnia commune, site 10). A significant percentage of these sites are connected with the settlement of the older or younger phase of the Mierzanowice culture. Less evident there are forms connected with the Final Eneolithic settlement, and this is due to a small number of finds reliably identified with the CWC.

4. K-TYPE FLINT IN FINAL ENEOLITHIC BURIAL ASSEMBLAGES IN THE LOESS UPLANDS OF WESTERN LESSER POLAND

CWC graves from the Lesser Poland Uplands often contain axes, and they occur in burials of men, women, and children alike (Włodarczak 2006, 71). Axes made from Lower Turonian flints from the eastern edge of the Świętokrzyskie Mountains, above all Świeciechów flint, predominate (Balcer 1983, 227; Budziszewski and Włodarczak 2011, 60, fig. 7). What is striking in grave inventories from western Lesser Poland is the absence of core tools made from typical varieties of Jurassic Kraków flint, and only incidental presence of chocolate flint, whereas axes from flints described as types G and K are present (according to Kaczanowska and Kozłowski 1976). Visually, these are often similar artefacts made of beige, banded rock and, as a result, type K raw material has sometimes been erroneously identified as 'Jurassic flint of type G' in the past. Five axes made of K-type flint are known from CWC grave inventories in western Lesser Poland (Table 1), and all these finds come from sites located in the Kraków zone (up to the Szreniawa valley in the north). Their typological diversity is noteworthy: each specimen represents a different type (division according to Budziszewski and Włodarczak 2011, 58, fig. 4). They include two axes that are the leading forms for the Lesser Poland inventories of the younger phase of the CWC (*i.e.,* for the Kraków-Sandomierz group): a flat axe (Teresin – Fig. 7: 1) and a thick axe (Kocmyrzów, grave 3 – Fig. 7: 2). These finds emphasise the importance of K-type flint in the production of core tools in the western Lesser Poland zone. The fact objects made from this flint were placed to graves demonstrates its significant ceremonial rank. Indeed, when we look at the funerary ritual of the CWC from the perspective of flint inventories, a clear

Table 1. Axes made of K-type flint found in CWC graves in Lesser Poland

Locality, commune, site number	Grave number	Type (after Budziszewski, Włodarczak 2011)	Literature
Kocmyrzów, Comm. Kocmyrzów-Luborzyca, site 17	3	GS	Unpublished (research by K. Tunia)
Kraków-Pleszów, site 17	1058	BM	Górski and Włodarczak 2000
Książnice Wielkie, Comm. Koszyce, site 1	5/II	DM	Machnik 1964
Polanowice, Comm. Słomniki, site 4	4	MD	Prokopowicz 1966
Teresin, Comm. Proszowice	-	PS	Machnik 1962

raw material selection becomes evident. In the graves of the Kraków-Sandomierz group, one can notice the custom of placing axes made of opaque, dull, 'chert-like' raw materials, grey or beige in colour, next to the deceased. In addition to the most important tools made from Lower Turonian flint (mainly from Świeciechów raw material), there are also products made from flint types G and K, as well as from banded flint. On the other hand, axes made from chocolate or Volhynian flint are only incidentally found in funerary contexts, although the use of the former is confirmed by finds from mining sites (Schild *et al.* 1977).

The known graves with axes made from K-type flint have all been found in close proximity to the deposits of this raw material known from the Dłubnia, Prądnik and Kluczwoda valleys (including Ujazd near Wielka Wieś). Also noteworthy is the presence of workshop materials associated with the production of tetrahedral core tools at "Kopcowa Góra", *i.e.,* site 12 in Ojców (Trela 1998). These finds have been linked to the Baden culture on the basis of an assessment of typological features (Trela 1998, 35), and also due to the presence of pottery from this period at the site (Rook 1980, 68, Pl. 17). However, the Final Eneolithic lithic industry includes a tradition which refers to the previous period (Late Eneolithic) manifested, among others, by the production of axes characteristic of the Globular Amphora culture and the Baden culture (Budziszewski and Włodarczak 2011, 59, 60). These recent discoveries clearly indicate a spike in interest in K-type flint at the end of the Eneolithic and the beginning of the Bronze Age. Hence, it seems quite likely that at least some of the traces of core tool manufacture from "Kopcowa Góra" are actually related to the communities of the Corded Ware culture. Numerous stray finds of axes from Smardzowice, Skała commune, close to Ojców, also reveal features characteristic of this period (materials from the Archaeological Museum in Kraków, kindly indicated by Ms Barbara Drobniewicz). All these materials point to the existence of a production centre for core tools in the vicinity of Ojców, using raw materials from the valleys of the Dłubnia, Prądnik and Kluczwoda Rivers.

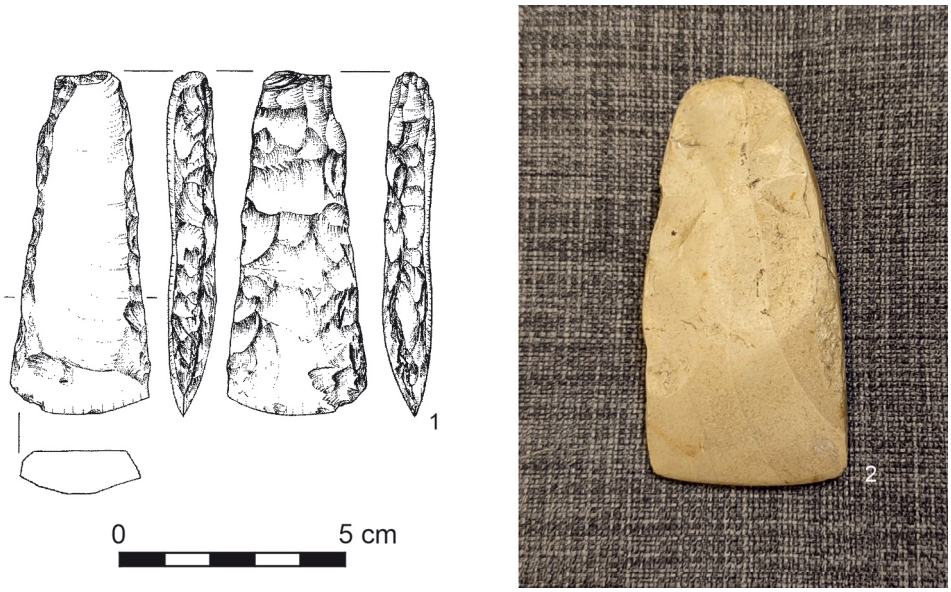

Fig. 7. Axes made of K-type flint from the Final Eneolithic graves.
1 – Teresin, Proszowice district (illustrated by E. Osipowa); 2 – Kocmyrzów, grave 3 (photo by E. Włodarczak)

So far, no grave with a K-type axe has been discovered north of the Szreniawa valley. However, research carried out in recent years on cemeteries in the Miechów Upland and the northern part of the Proszowice Plateau has uncovered relatively numerous graves with axes made from Jurassic flint of type G, which were found in Bronocice, Giebułtów and Smroków, among other places (materials from unpublished research by various authors). This, in turn, indicates that the significance of G-type flint in the manufacture of Final Eneolithic core tools in the northern part of the western Lesser Poland loess upland was greater than previously assumed. The better investigation of individual micro-regions reveals greater diversity in raw materials used for the production of the leading tools of the western Lesser Poland CWC. This revision does not negate the importance of interregional import of selected raw materials, a phenomenon characteristic of the economy of Final Eneolithic communities of the 3rd millennium BC.

5. CONCLUSIONS

The use of K-type flint was in the past often associated with the flint-industry of the Baden culture, not least on the basis of interpretations of the materials from Kopcowa Góra in Ojców (*e.g.*, Trela 1998; Nowak 2015). However, discoveries in the last 20 years

have clearly demonstrated a surge of interest in this raw material in the Final Eneolithic and Early Bronze Age periods. Unlike the flints from the margins of the Świętokrzyskie Mountains, the K-type raw material played a significant role only in the Kraków region, both in the loess uplands of western Lesser Poland and in the south-western part of the Sandomierz Basin (in the Vistula Plain and the Wieliczka-Gdów Plateau). It was used almost exclusively for the production of axes, mainly tetrahedral specimens in the case of the CWC.

At present, two centres of production of Final Eneolithic core tools from K-type flint are known: (1) in the vicinity of Ojców and (2) in the zone between Kraków-Bieżanow and Zakrzów on the right bank of the Vistula River. The word 'centres' in this case should be understood as accumulations of traces of flint production, as opposed to centres appearing in the Early Bronze Age specialising in large-scale production of specific artefacts. That the same raw material deposits could have been exploited in both zones is questionable. At the present stage of research it is impossible to determine the exact place of origin of Jurassic and Cretaceous Kraków flints discovered at archaeological sites (Matyszkiewicz and Kochman 2020). An interesting point to note is the possibility that the Final Eneolithic and Early Bronze Age workshops from the right bank of the Vistula River used raw material from the Sowiniec Range (now within the boundaries of Kraków).

The discoveries associated with the use of K-type flint in western Lesser Poland contribute to a series of new studies aiming to refine the picture of the CWC flintknapping. New possibilities in this respect are the result of the acquisition of a considerable body of evidence from the numerous large-scale rescue excavations carried out in recent years, mainly those preceding motorway construction. Thanks to these sources, it has become possible to demonstrate the micro-regional specificity of some areas of Lesser Poland, discernible, among other things, in raw material diversity. This diversity concerns first of all the preference for the production of core tools, one of the important categories of flint products (sometimes regarded as "insignia"). In the southern part of western Lesser Poland, on the border with the Carpathian forelands, the local character is defined by the use of selected types of Kraków flint (above all: K-type flint) for the production of tetrahedral axes.

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