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An outline of the history of research into Neolithic chipped stone industry in central Europe : with an emphasis on the origin of LBK chipped industry and its links to the local Mesolithic

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2. AN OUTLINE OF THE HISTORY OF RESEARCH INTO NEOLITHIC CHIPPED STONE INDUSTRY IN CENTRAL EUROPE
with an emphasis on the origin of LBK chipped industry and its links to the local Mesolithic

Although Neolithic chipped stone artefacts were gathered as early as the 19th century from the first systematic excavations, the actual beginning of research into Neolithic chipped industry in central Europe can only be dated to the early 20th century. It was at this time that the Warsaw archaeologist Erazm Majewski (1858–1922) became one of the first people in the eastern part of central Europe (in this case Poland) to seriously devote himself to chipped industry terminology, drawing above all on the experience of French researchers. He also assembled a rich collection of Neolithic stone tools, which he included in his proposed terminology (Majewski 1901; 1902; 1904; 1906). Majewski was the first teacher of both Stefan Krukowski (1890–1982) and Leon Kozłowski (1892–1944), who were to play important roles in the development of research into Neolithic chipped industry in the 20th century (Lech 1996, 59–68; 2000a, 175).

At the beginning of the development of prehistory as a science in the second half of the 19th and early 20th centuries, i.e. at a time when the evolutionist paradigm predominated, a common descriptive system for chipped tools was used for both the Palaeolithic and the Neolithic. In this field, French research was of decisive importance, its central figure being Gabriel de Mortillet (1821–1898). All those who were interested in chipped artefacts drew on de Mortillet's experience, including, amongst others, Majewski. At this time, chipped artefacts, being settlement remains, were above all used in the creation of phases of cultural development, rather like "type fossils" or *fossiles directeurs* in geology and palaeontology. For this reason, only a few categories of Neolithic chipped tools were held to be significant, in particular polished axes (Sackett 1968, 66; 1981; Lech 2000a, 175; 2000b 153–156).

In the following period of the development of prehistory, dominated by a culture historical orientation in ethnology, anthropology and prehistory, scholars became aware that the hitherto universally delimited culture (period) of the Neolithic was in fact composed of a whole series of successive or contemporaneous cultures.

The beginnings of this awareness can be traced to the outstanding work of Lubor Niederle (1865–1944) devoted to European prehistory (Niederle 1893). The differentiation of archaeological cultures was mostly based on ceramics, but even at this time L. Kozłowski (1923, 62–63; 1924, 50–52) was emphasising the importance of the study of chipped stone artefacts for the cultural classification of the Neolithic period. While the latter even described the chipped stone industry of the LBK, the characteristics he defined are of no value today, as they are based on mixed assemblages and assemblages from later cultures, including the Bell Beaker, Corded Ware and Baden cultures (Kozłowski 1924, 44–70). Five years later, a far more thorough division of cultures was introduced by V. Gordon Childe (1892–1957) with his *Danubian I* (Childe 1929, 36–67). In his work, Childe makes passing reference to the problem of Danubian I chipped industry, stating that "the flint work is poor and atypical" and suggesting that it clearly draws on the Mesolithic tradition (although not being bound to it), as in form it is reminiscent of the "Tardenoisian retouch". He also mentions the use of Hungarian obsidian in the LBK of Moravia and Lower Austria (Childe 1929, 41).

In terms of the further development of research into Neolithic chipped industry, the most important work was that of S. Krukowski on the beginnings of mining, transport and trade in Holocene Poland. Here for the first time was a description of the basic types of raw material used to produce chipped stone artefacts in the prehistory of the Vistula catchment, including Krakow Jurassic silicites and chocolate silicites (Lech 1992, 140–142). According to Lech (2000a, 176), Krukowski also highlighted the great – anthropological and processual – potential of the study of chipped industry, as he stressed

> "*...na doniosłość tych zagadnień nie tylko dla cywilizacji neolitycznych w ogóle, lecz szczególniej dla morfologii wyrobów z krzemienia, jako też łączności między współistniejącymi po sobie kulturami*."
>
> "... the importance of these issues not only for the Neolithic civilisations generally, but more particularly for the morphology of flint products, and also for establishing connections between contemporary and successive cultures." (Translated by M. Karwowski)
>
> S. Krukowski 1920, 185

In terms of studying Neolithic chipped industry, Krukowski also drew attention to the need for the following:

1) The identification of the primary sources of stone raw material used to produce chipped artefacts in the Neolithic and of the centres of stone working, the same also being required for products made of obsidian and schistous and crystalline rocks;
2) The identification and differentiation of chipped stone and ceramic assemblages that are culturally related from those assemblages obtained by way of exchange, which in the light of L. Kozłowski's work can be understood as Krukowski's proposal for a means of separating archaeological cultures;
3) The identification of the range of those products that spread through trade and the conditions in which they appear.

Krukowski attempted the first definition of the characteristics of Neolithic chipped stone industry on the basis of fragmentary sources and information (Krukowski 1922, 48–55). Even at this point, he drew attention to the fundamental significance of Krakow Jurassic silicites in the LBK of Little Poland and in Kujavia.

In the first half of the 20th century, a major barrier restricting opportunities for researching chipped stone industry was a lack of field archaeological methods that would make it possible – on Upper Palaeolithic stations identified on sand dunes, or on Mesolithic and Neolithic sites – to differentiate pure, monocultural assemblages of chipped artefacts. The cause for this state of affairs was the then generally accepted interpretation of mixed assemblages from various periods as homogenous assemblages, which indicates an insufficient awareness of the importance of this problem among researchers. Among the opinions that played an important part in clarifying the origin of the LBK was that of the leading Viennese archaeologist Oswald Menghin (1888–1973), who noted that the spirals and meanders characteristic of the ceramics of the earliest phase of the LBK in Moravia stem from the "geometric repertoire" of Upper Palaeolithic art in central and eastern Europe. This implies that the tradition was passed on to the creators of the LBK by the Epi-Palaeolithic population living on the sandy terraces of northern Hungary (Childe 1929, 66–67; Menghin 1940, 2–6).

Lothar Zotz (1899–1967), who worked as Professor of Prehistory at the German University in Prague during the Second World War (1939–1945), assumed that at the end of the Würm glacial, a stream of Palaeolithic inhabitants moved from the eastern Aurignacian area north-westwards, while another advanced along the Danube to unite with the Magdalenian population, living thenceforth among Mesolithic folk. Finally, in Zotz's view, the post-Palaeolithic and Late Mesolithic population gave rise to the LBK (Zotz 1941, 18–20; Filip 1948, 110). The weak foundations of this and similar views, as well as problems in explaining the genesis of the LBK from Mesolithic traditions (Campignian), were outlined in a classic work by Jan Filip (1900–1981), *Pravěké Československo* ("Prehistoric Czechoslovakia"; 1948, 108–111). On the subject of the LBK chipped stone industry, Filip writes:

> „*Nejzávažnější je skutečnost, že štípaná (»pazourková«) industrie probíhá paleolitem, mesolitem i neolitem; zde nepochybně je určitá tradice, nelze však říci, zda místní. Drobnotvará industrie někdy geometrických tvarů (šipky s příčným břitem a j.) vedla k předpokladu, že tardenoiské osídlení na středním Dunaji a na horní Visle bylo pohlceno lidem páskové keramiky (proto se mluvilo o tardenoiském charakteru neolitické industrie v severozápadním Rakousku a v jižní Moravě, tzv. wolfsbachien a j.).*"
>
> "Most serious is the fact that the chipped ('flint') industry runs through the Palaeolithic, Mesolithic and Neolithic; here undoubtedly there is a certain tradition, but it is impossible to say whether it is local. Small artefacts, sometimes with geometric shapes (arrowheads with transverse edges and others) lead to the assumption that the Tardenoisian settlement on the Middle Danube and Upper Vistula was absorbed by the banded ceramic folk (for this reason, one speaks of the Tardenoisian character of the Neolithic industry in north-western Austria and southern Moravia, the so-called Wolfsbachian etc.)."
>
> J. Filip 1948, 110

This absorption was, however, assumed to have occurred only in the later phase of the development of Danubian Neolithic society, since the "Tardenoisian" forms were unknown in the early phase of the LBK. In any event, in 1948 Filip was convinced that:

> *„Soustavné zpracování »pazourkové« industrie přinese v budoucnosti nejspolehlivější závěry, základem však musí býti bezpečné nálezové celky, nikoliv sběr, a problém se musí řešit v celém rozsahu.“*
>
> "The systematic study of 'flint' industry will in the future yield more reliable conclusions, but the foundation must be secure closed assemblages, not collections, and the problem must be tackled to its full extent." J. Filip 1948, 110

In those areas where the earliest phase of the LBK appeared, i.e. in Moravia, Lower Austria and Hungary, it would be a long time before such research was undertaken. The first large-scale comparative study of the chipped stone industry associated with the LBK and using typologico-statistical methods was carried out in Holland, within the framework of a wider investigation into the chipped stone industry of the Late Palaeolithic, the Mesolithic and the Neolithic. The results were published in 1956–64 by A. Bohmers and his colleagues in a series of articles in *Palaeohistoria*. Bohmers' work meant a new phase in the development of typologico-statistical methods, which began with François Bordes' (1919–1981) well-known work on the manufacturing techniques and artefact typology of the Lower and Middle Palaeolithic (Lech 1988, 280–283).

Bordes' typologico-statistical method was founded on the use of a list of tool types in a precise order, with definitions of the different shapes, statistical calculations/percentages, the application of an index of characteristic forms and graphic illustrations used for informed evaluations of similarities and differences between the assemblages compared. Bohmers considered the line diagrams used by Bordes to be inappropriate, as it was not possible to compare a large number of sites, and the precise estimation of the expressed values was difficult. Bohmers instead pointed out the advantages of bar graphs drawn on millimetre grid paper, which made exact percentage divisions possible. Bohmers' graph made possible the simple and exact comparison of analogous data from multiple sites. Together with A. Bruijn he analysed seven assemblages of chipped stone artefacts from four LBK sites that had been investigated in the Dutch province of Limburg (Gellen, Steijn, Sittard, Elsloo). The authors distinguished 18 tool types and the completed graph contained 83 items (Bohmers & Bruijn 1958–1959, tab. XXIII). In an analysis of 22 Mesolithic chipped stone assemblages from north-eastern Europe, 34 tool types were distinguished and five indices of tool group frequencies calculated; the completed graph contained 168 items (Bohmers & Wouters 1956, tab. II). This method of analysing and publishing Mesolithic and LBK chipped stone artefacts enabled further studies relating to the links between the Mesolithic and the LBK (Newell 1970). Bohmers endeavoured to create an "objective typology", i.e. one that could be used and tested by any researcher. A list of types without a careful description of their important features was, in his view, insignificant (Bohmers 1956, 4). Therefore, in his method an important element of analysis was the development of a classification system containing definitions and illustrations of each identified type, including those of the LBK chipped industry mentioned above. Bohmers' method is marked by exact typological descriptions and detailed metric analyses of the artefacts. His classification lists are shorter, so that even small assemblages of chipped artefacts from north-western Europe attain greater statistical correctness. A tendency to take account of the various metric properties of the artefact categories distinguished is also typical of him (Lech 1988, 281–282). Similar attempts are also emblematic of later work concerning the study of LBK chipped industry (J. K. Kozłowski 1970; Davis 1975; Dzieduszycka-Machnikowa & Lech 1976; Kaczanowska & Lech 1977; Zimmermann 1977; 1988; Kaczanowska 1985; Gronenborn 1997). This greatly increased the objectivity of comparisons of different assemblages and opened new trajectories for the study of LBK chipped industry.

In Poland, scholarly opinions and problems relating to the beginning of the Neolithic, similar to those expressed in the aforementioned work by Filip (1948), also arose. Until as late as 1961, for example, when R. Schild and H. Więckowska finally laid it to rest, researchers accepted the existence of a "Świdero-Tardenoisian", understood as being a cultural unit with Epi-Palaeolithic/Mesolithic traditions. The following year, J. Kowalczyk (1962) considered the most important research problems in the Polish Neolithic and arrived at the paradoxical situation whereby on the one hand there existed a respectable finds resource permitting the relationships between the Neolithic and Mesolithic to be studied, but on the other there was a lack of "archaeologists who would devote themselves to the systematic study of Neolithic chipped industry and its earlier links" (Kowalczyk 1962, 276). The situation in Poland began to change during the 1960s (Lech 2000a, 177–178). The first synthesis of these studies was presented in 1971 at an international symposium held at Krakow and given over to Neolithic and Eneolithic chipped industry (J. K. Kozłowski ed. 1971a). It was at this symposium that S. Vencl (1971) presented the state of research into post-Mesolithic chipped industry in Czechoslovakia.

The Krakow symposium defined the fundamental research problems in the field of Neolithic and Eneolithic chipped stone industry as follows:

1) Ascertaining the importance of chipped stone assemblages to the cultural classification of the Neolithic and Eneolithic;
2) The creation of a list of types of chipped stone tools; the delimitation of the relationship between the typology and function of artefacts, and the non-morphological classification criteria for chipped stone tools;
3) The study of the acquisition, processing and distribution of siliceous raw materials, i.e. the study of raw material extraction;
4) The study of the relationships between Mesolithic and Neolithic cultures, the problem of their coexistence and intercultural contacts (Lech 2000a, 178).

The latter issue, particularly important from the point of view of this study, had been tackled two years previously by J. Kowalczyk (1969), who had formed the hypothesis that the Mesolithic population made a certain contribution to the appearance of many Neolithic and Eneolithic cultures in Poland. His assumption was that southern Poland formed part of the territory in which the earliest phase of the LBK had its genesis, and where it was thus autochthonous (Kowalczyk 1969, 20–23). Moreover, influenced by the discovery of a pre-ceramic Neolithic in the Balkans and in central Europe (Lichardus & Pavúk 1963; Kowalczyk 1969, 47), he reached the conclusion that:

> „*...na całym obszarze wyodrębiania się kultury ceramiki wstęgowej rytej (LBK) neolit preceramiczny był faktem niewątpliwym*."
>
> "... in the whole area in which the Linear Pottery culture emerged, the pre-ceramic Neolithic was an undoubted fact." (Translated by M. Karwowski) J. Kowalczyk 1969, 47

Some years later, B. Balcer (1986, 95–105) attempted to bring this conception up to date. Shortly thereafter, on the basis of the archaeological investigation of the Janisławice culture site of Dęby 29, L. Domańska (1990a; 1990b; 1991a; 1991b) presented the hypothesis of a Caucasian/Black Sea phase of proto-Neolithisation even before the appearance of the LBK, supposedly related to Late Mesolithic society in Kujavia in the east of the Great Polish Plain and in the peripheral regions of eastern and central Europe. This hypothesis met with considerable criticism (J. K. Kozłowski 1971b; Lech 1989b; S. K. Kozłowski 1991). Ultimately, the accepted wisdom in Poland has for a long time been that the earliest agriculturalists came into the area north of the Carpathians and Sudeten mountains from Moravia and Bohemia. The assumption is that the earliest phase of this expansion took place in the period 5400–5300 BC (Kaczanowski & Kozłowski 1998, 103–110). As far as contacts with local Mesolithic groups are concerned, the predominant feeling among Polish scholars is that they may have existed, but that they were of only secondary importance (Lech 1979, 131; Bogucki 1996; Kaczanowski & Kozłowski 1998, 103–104).

Pioneering research into the question of links between the chipped stone industry of Late Mesolithic and Early Neolithic societies, including the LBK in Moravia and Hungary, was carried out in 1968 by R. Tringham (cf. also Tringham 1971). This research raised a question which is also important to the present study: did the LBK arise out of the acculturation of a Mesolithic hunter-gatherer population living along the Middle Danube, and under the influence of the agricultural cultures of the Early Balkan Neolithic, or was it rather the result of the colonisation of new lands by early farmers from the Lower and Middle Danube? Her research concluded that in the European temperate zone, no links between the chipped industry of the LBK and that of Mesolithic society "with its microlithic blades and trapezes" can be shown. This was not to rule out the existence of contact between the LBK and local Mesolithic populations – these simply had no particular effect on the culture of the migrating farmers. It must, however, be noted that at that time the state of the finds resource – accessible chipped stone artefacts – and the state of knowledge regarding the chipped stone industry associated with the LBK was very low. This fact is clearly demonstrated by the study of the chipped industry from the settlement at Bylany, conducted by Tringham, when compared to later work (Tringham 1972; cf. Přichystal 1985; Lech 1989a). J. K. Kozłowski, S. K. Kozłowski and M. Kaczanowska continued in Tringham's footsteps, their many important works casting considerable light on the genesis of the Early Balkan/Danubian Neolithic on the basis of studies of Mesolithic and Neolithic chipped stone from these regions (see e.g. J. K. Kozłowski 1974; 1981; 1987; 1989a; 1989b; 1994; Kaczanowska & Kozłowski 1987; 1997; Kaczanowska 1989; Kozłowski & Kozłowski 1978; 1984; Kozłowski, Kozłowski & Radovanović 1994; S. K. Kozłowski 1987). The questions raised by Tringham's (1968) work were revisited in the last decade of the 20th century by A. Tillmann (1993), D. Gronenborn (1994; 1997; 1999) and C. J. Kind (1998). These latest works are mentioned only briefly here because, due to their relevance and topicality, they receive considerable attention elsewhere in this study.

The Carpathian Basin occupies an important place in terms of the origin and development of the LBK. Given the great attention devoted to this problem in Hungary, one of a number of related conferences was organised in 1970 in Székesfehérvár (1972). It was here that two important papers on the subject of LBK chipped stone industry were presented (Newell 1972; Tringham 1972), along with a paper considering the relationship between the Mesolithic and the LBK (Nandris 1972). Despite all this, and with the exception of a dissertation by E. Bacskay (1975), attention to the study of LBK chipped industry was paid much later in Hungary than in Poland, Czechoslovakia and Germany (Bacskay & Siman 1987; Biró 1987; 2001). Of the results obtained to date, the most important in terms of this research problem are those aiming to distinguish individual siliceous raw materials in Hungary (Biró & Dobosi 1991; Biró, Dobosi & Schléder 2000), and in particular those concerning the localisation of primary sources of Szentgál radiolarite in the Bakony mountains and the determination of its importance to the LBK chipped stone industry (Biró 1995; Biró & Regenye 1991).

On the basis of an analysis of LBK chipped industry from the Dutch province of Limburg at the beginning of the 1970s, R.R. Newell of Groningen University arrived at conclusions which differed from Tringham's. He formulated a hypothesis of strong links to the Mesolithic Oldesloe culture visible in the chipped stone industry (Newell 1970, 157–171; 1972, 15–16). According to Newell:

> *"... the Younger Oldesloe culture possessed nearly all of the technological, morphological, and typological elements present in the industry of the Dutch Older Linearbandkeramik."*.
>
> R. R. Newell 1972, 33

Later, he writes that

> *"...the Dutch Bandkeramik flint industry... originated as the direct result of functional contact and acculturation by the indigenous Mesolithic population."* R. R. Newell 1972, 33

The results of Newell's research met with sharp criticism from a group of young archaeologists associated with research into the LBK settlement of the Aldenhovener Platte (Löhr, Zimmermann & Hahn 1977, 136). They criticised Newell for basing his conclusions mainly on intuition, and claimed that the analyses conducted contained serious methodological shortcomings. Zimmermann restated these objections many years later (Zimmermann 1995, 8), adding that Newell had relied on an insufficient finds base and committed grave methodological errors. M.E.T. de Grooth (1987, 37–38) also affirmed that there were no reasons to accept the conclusion that the LBK chipped stone industry in the Dutch province of Limburg resulted from contact between migrating LBK people and local Mesolithic groups of the De Leijen-Warten complex. However, with further study of the chipped stone industry, the possibility of surviving local Late Mesolithic traditions in the west European Early Neolithic became gradually more accepted (Gronenborn 1990a; 1990b; Löhr 1994).

In Bohemia and Moravia, one of the first people to consider the problem of the origin of the LBK on the basis of the chipped stone industry was M. Mazálek (1954). On the basis of similarities in microlithic tool types from central and western Europe, he concluded that there was settlement continuity from the Mesolithic through to the Neolithic and into the Eneolithic. This work was heavily criticised by S. Vencl (1960, 65–67) and W. Taute (1973/74, 72). In Moravia, it would be many years before the LBK chipped stone industry received any attention; only as an aside would V. Podborský and V. Vildomec (1972), express the opinion that:

> *„...neolitická štípaná industrie nenavázala na předešlý vývoj, nýbrž budovala svoje morfologické a technologické tradice na jiné, cizí základně."*
>
> "… Neolithic chipped stone industry did not stem from an earlier development, but built its morphological and technological tradition on a different, foreign basis."
>
> V. Podborský and V. Vildomec 1972, 48

In the 1980s the question of the origin of the LBK was intensively studied by S. Vencl (1982; 1986b), who after a detailed and extensive analysis of various sources concluded that:

> „...v době trvání starčevsko-krišského komplexu došlo nejspíše v prostoru *severozápadní periferie u nějaké skupinky celkem isolovaných komunit k vynálezu technologií, které učinily prostor na sever od rozšíření starčevsko-krišského komplexu zemědělsky využitelným."*
>
> "… during the existence of the Starčevo-Criș complex there occurred, probably in the area of its north-western periphery, in some small group of totally isolated communities, the discovery of a technology that made the area north of the range of the Starčevo-Criș complex agriculturally usable." S. Vencl 1982, 682

According to Vencl, the Mesolithic hunter-gatherer population did not contribute to the Neolithisation of central Europe, but was more likely exterminated by the early farmers (Vencl 1982, 975; 1986b).

In Bohemia, Vencl's treatment of the LBK chipped industry was followed by M. Popelka (1981; 1987; 1991a; 1991b; 1991c; 1995; 1999) who, however, did not tackle the question of the origin and genesis of the LBK culture in more detail.

In Moravia, too, after Vencl's work there was no one to seriously take on the problem of the transition from the Mesolithic to the Neolithic from the point of view of the chipped industry, and studies of LBK chipped industry *per se* only appeared in minor works (Ondruš 1975/1976; Lech 1983a).

In Lower Austria, the situation regarding the study of LBK chipped stone industry was until recently even more woeful. Other than the aforementioned contributions by Menghin and Zotz, the only attempt to find answers to the question of the transition was by A. Gulder, who on the basis of the small size of the artefacts from Etzmannsdorf assumed a link to earlier settlement (Gulder 1953, 30). The territory of Austria also comes into the important work of W. Taute (1973/74), which was for a long time fundamental for the study of the beginnings of the LBK. Taute brought together microlithic types from Mesolithic and Neolithic sites in Austria and southern Germany and attempted to define those types that appeared only in the Mesolithic or Neolithic, and those which appeared in both ages. For many years thereafter, the LBK chipped industry in Lower Austria was not treated in any more detail. It was only in connection with the *Ausgrabungen zum Beginn des Neolithikums in Mitteleuropa* project (1983–1993), led by J. Lüning, that a total of 12 sites of the earliest phase of the LBK in the region between Lake Neusiedel (Neusiedlersee) and the Rhine were assessed (Lenneis – Lüning 2001). For his doctoral thesis, D. Gronenborn (1997) studied the chipped stone industry from various excavations; among the sites considered were those at Neckenmarkt in Burgenland and Strögen in Waldviertel in Lower Austria. The results of Gronenborn's work will be considered in the chapters that follow.

The important questions and problems concerning the beginnings of the Neolithic in central Europe, and the results of research into the LBK chipped stone industry in other countries, justify a study of the LBK chipped industry in Moravia and Lower Austria, as this could shed new light on the whole issue.