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The mechanisms of stone raw material distribution in Moravia, Lower Austria and neighbouring regions

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7. THE MECHANISMS OF STONE RAW MATERIAL DISTRIBUTION IN MORAVIA, LOWER AUSTRIA AND NEIGHBOURING REGIONS.

7.1. The main factors influencing the form of the distribution network in the Mesolithic and Neolithic.

The term “distribution network” is here taken to mean a system of ties and contacts between individual communities or between individuals from different communities. These ties may be social, economic and ritual in nature, and can for example take the form of marriages, kinship, ceremonies or trade transactions. These are recognisable archaeologically through, amongst other things, the movement of chipped stone artefacts, which can appear even in regions very distant from the source of the raw material from which they were made.

In this chapter, attention is focused above all on factors influencing the formation of a distribution network. An important role in their definition is played by ethnographic parallels from societies living in similar conditions to those of the Mesolithic and Neolithic. In some cases, these factors overlap with those that have an influence on the selection of a suitable site for settlement.

The factors that had a major influence on the form of Mesolithic and Neolithic distribution networks can be divided into four basic groups. None of these acted in isolation on the creation of the distribution network, but some may have been of greater importance than others. The main factors are:

- 1) the environmental factor;
- 2) the subsistence factor;
- 3) the socio-political factor; and
- 4) the mythological (symbolic) factor.

7.1.1. *The environmental factor.*

The area of central Europe across which the Linear Pottery culture spread can be divided simply into those areas with suitable conditions for settlement

and those with unsuitable conditions. Settlement was influenced in particular by the geomorphology of the terrain, the network of watercourses, soil conditions, climate and the related composition of local flora and fauna.

Georelief was a major influence on the form of settlement and the distribution network. In the plains, for example, where there is a minimum of natural barriers, the shape of the distribution network was not so strongly influenced by the configuration of the terrain as was the case in rocky areas or regions with dense forest growth, where the main axes of communication followed natural corridors (passes, gorges, river valleys, dales). In more rugged terrain, natural corridors could lead to physically distant regions being brought closer together, while by contrast contact between areas lying relatively close to each other could have been restricted or made impossible by the existence of natural barriers (mountain ranges, great rivers, marshlands). Differing climatic and soil conditions also became natural environmental barriers (Sümegei & Kertész 2001, 413). The form of the communication and distribution networks was, for example, also shaped by the reliance of early farmers on fertile chernozem soils (Sielmann 1971, 123–127; Kruk 1973; Bakels 1978; Kreuz 1990, 245; Kruk & Milisauskas 1999, 19–27).

In tracing the distribution of stone raw material in Moravia and Lower Austria, it is possible to identify several favourite natural corridors used in the study periods. The most important link between Moravia and Poland led through the Moravian Gate to the floodplains of the Oder and the Vistula. Both of these rivers were important communication arteries linking Moravia to Little Poland and Lower Silesia. Moravia

was linked to Lower Austria and south-west Slovakia by a natural corridor in the form of the river Morava, which flows into the Danube. The attached artefact distribution maps show the importance of the great rivers as communication channels. The advantageous locations of some raw material sources close to the big rivers eased and directed their spread into distant areas (e.g. along the Danube, Tisza and Vistula). Transportation using boats, the existence of which in the Neolithic and Mesolithic must be assumed, is plausible (Lech 1981, 215–216; Beát 1995, 25; Whittle 1996, 31; Tichý 1999). The great importance of rivers in forging contacts was further heightened by the dense forests of central Europe in the Late Mesolithic and Early Neolithic, when access to certain areas was possible only by river and the less overgrown river corridors (Opravil 1984, 170–171; Sümegi & Kertész 2001, 412).

The form of the communication and distribution network was also heavily influenced by the distribution of important natural resources in the landscape, as well as their accessibility, sustainability and quality. The selection of a site for settlement was already determined by the presence and accessibility of essential subsistence resources (proximity to water, suitable soil, building materials)⁴⁹. It was the distribution and sustainability of these that influenced the spread and density of settlement. Local shortages of certain resources might provoke more intensive communication directed towards those areas in which the required materials (e.g. stone raw materials) occurred in sufficient quantity.

Models of settlement distribution dependent on the distribution of important resources were developed by the geographer P. Haggett (1973, 119–120, Fig. 4.5). These objective examples can be applied here (fig. 8). The first illustration (A) shows the ideal distribution of settlements across a territory, assuming the optimal distribution of important resources. In figure B, the important resources are found in a particular area. This has influenced the siting of settlements, which attempt to gain access to it, and has also changed territorial boundaries. In the third case (C) the resource occurs along a line (e.g. a river), which again has influenced the choice of settlement locations. In the last case (D), the resource concentrates in a small area, leading to a concentration of settlements around it; territories also have a different shape.

⁴⁹ Decisive influences on the selection of sites for settlement were not always practical in the modern sense of the word (Neustupný 1998, 17).

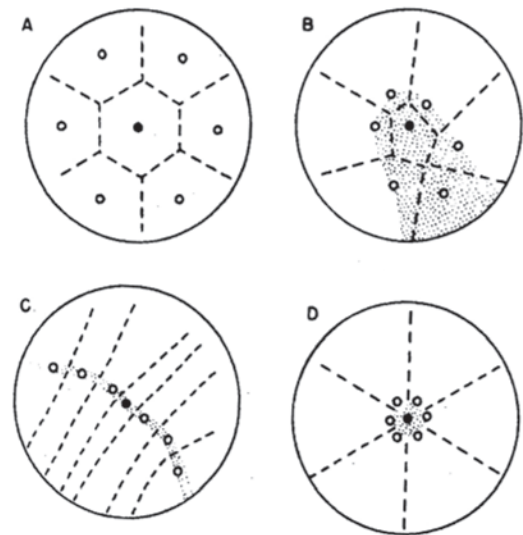


Fig. 8. The distribution of settlements as dependent on the distribution of essential subsistence resources (after Haggett 1973, Fig. 4.5).

7.1.2. The subsistence factor

The means of subsistence and the associated degree of mobility are also closely bound up with the form of the distribution network. The means by which subsistence is obtained can be divided into two main groups: the non-productive, i.e. the foraging way of life of hunters and gatherers which may be presumed in the Mesolithic; and the productive, whereby food is (to a certain extent) produced by society. The latter may lead to the production of a surplus that can be exchanged for other necessary products and which can also reflect growing social differentiation within the group.

Foraging societies living by non-productive means are for the most part mobile. Hunters and gatherers form small groups living off the hunting of animals and the gathering of plants. Their mobility is closely related to the movement of animals, as well as to the distribution and renewal of plant resources. The structure of these small groups is not fixed, and members may move between groups and may change their home base relatively frequently. At a certain time of year, multiple groups may congregate (Vivelo 1988, 71–88). These are self-sufficient communities among which a less stable distribution network may be presumed, reflecting above all the network of social ties and contacts.

Societies which sustain themselves in a productive manner are limited in their mobility and for the most part have a sedentary or semi-sedentary way of life. Early forms of the productive means of subsistence linked to tilling the soil, which can also be assumed for the beginning of the Neolithic, are referred to as basic farming or primitive farming in the cultural anthropological and ethnographic literature. Manual

tilling of the soil with the aid of a hoe is characteristic, without the use of a plough or of draught animals. The main form of cultivation is slash and burn or swidden cultivation (*Brandrodungsbau*, *Schwendwirtschaft*). In farming of this kind the soil is typically left fallow for a time to regenerate. This is known as extensive farming. In order to be successful, it requires a fairly extensive territory and implies that population density is low. Today it is to be found primarily in tropical regions (Vivelo 1988, 89–94).

For a population engaged in extensive farming, small villages comprising one or a few scattered homesteads are typical. Only in this way could subsistence for all their inhabitants be assured.

Intensive farming, by contrast, is marked by the tilling of a smaller area of soil at greater intensity. In such cases, the population lives a settled or semi-sedentary way of life and continuously occupies the same region, within which its settlement may sometimes move. The concentration of the population is greater. A greater tendency to a settled way of life is found in communities which also have alternative sources of subsistence, e.g. fishing, at their disposal within their given regions (Vivelo 1988, 90, 91).

Hunters and gatherers, mobile to varying degrees, move across a greater range than a population living a settled or semi-sedentary way of life, but the area from which they obtain their subsistence is not regarded as their property and may also be used by other groups. By contrast, a settled or semi-sedentary population will commonly regard the territory that it manages as its own. In such cases, the territory begins to have significance as the land that is the property of a certain group of people. The sedentary way of life demands that some raw materials or products be obtained through exchange, and thus has an influence on the formation of a stable distribution network with various degrees of organisation.

To this day, there is no clear idea of what form farming took in the LBK⁵⁰. The majority of researchers assume that early farmers lived in sedentary communities and tilled fields intensively (Lüning 2000, 9, 187, 188; Kruk & Milisauskas 1999, 34–52). Some believe that during a certain developmental period of the LBK, and in particular areas, the first farmers may instead have lived a semi-sedentary way of life, with some members of the agricultural community devoting part of the year to pastoralism, hunting and gathering (Bogucki & Grygiel 1989, 131; Whittle 1996, 153; Kruk & Milisauskas 1999, 40–52; Lüning 2000, 190, 191). A partially mobile or semi-sedentary way of life may be assumed during the early development of the

⁵⁰ On the intensity, duration and seasonality of early farming practice, see recently Bogaard 2004.

LBK. The low density of settlements from this period reveals a low population density; only in the middle phase of the LBK did it increase markedly in comparison with that of the Mesolithic. At the beginning of the LBK, many sites have just one to three houses. Only later do large settlements appear, the evolution of which can be traced in full (Whittle 1996, 157; Kruk & Milisauskas 1999, 34–39; Pavlů 2000, 181). In the earliest phase of the LBK, regular cemeteries are so far absent; they first appear in phase Ib (at Vedrovice, Kleinhadersdorf)⁵¹. It is the very establishment of cemeteries that is often taken as being closely linked to ownership claims over a particular territory and a certain degree of sedentism (e.g. Lepenski Vir). The non-existence of cemeteries at the beginning of the LBK may therefore indicate a certain degree of mobility and a not overly close bond to a particular territory. The arrowheads found on settlements (Tichý 1962, 9: 1, 2; Milisauskas 1986, 136, fig. 113, C, D; Gronenborn 1990b; 1997; Małecka-Kukawka 1992, Tab. 2. 6; Löhr 1994; Kaczanowska & Kozłowski 1997, 221; Mateiciucová 2001a) and in graves (Vedrovice, Brunn II, Kleinhadersdorf, Schwanfeld, Flomborn, Wettolsheim, Rixheim, Quatzenheim, Lingolsheim etc.) show the survival of a foraging way of life and perhaps also the ritualisation of some of its elements (Storch 1984/85, 41–42; Gronenborn 1997; Mateiciucová 1998). To what extent hunting had a protective function and to what extent it was an important element in subsistence is hard to determine, as faunal remains are not available from most early LBK sites. The game found at the settlement at Strögen was undoubtedly an important part of the diet (Pucher 1988). It may be assumed that hunting remained an important means for obtaining a certain social prestige, as it needed skills and knowledge that were prized.

7.1.3. The socio-political factor

Raw material distribution was heavily influenced by social structure and the political organisation of society. From ethnographic observations, it is known that the social structure of hunter-gatherer society is marked by a considerable degree of flexibility and instability. Hunters and gatherers form small communities with constantly changing membership, as individuals often detach themselves from one group and attach themselves to another. In these societies there is no vertical stratifi-

⁵¹ A group of eight graves with nine burials from Těšetice-Kyjovice (Dočkalová & Košťurík 1996) is probably the remainder of a larger cemetery destroyed by ploughing. The graves are preliminarily dated to phase Ib, but it cannot be excluded that burial began as early as during phase Ia of the LBK (Z. Čížmář – pers. comm.). This would make it the earliest known LBK cemetery anywhere.

cation; rather, they are egalitarian societies (Vivelo 1988, 75). Politically, there is no leader who, from a position of power and formal authority, can decide for the whole group and has control over important subsistence resources. While there are persons who enjoy particular respect and natural authority, their influence is limited. The foraging way of life is associated with the formation of small nuclear family units (*Kernfamilien*). Work within the framework of the family and the group is divided by gender and age. Hunting and the manufacture of weapons are primarily men's work, while the gathering of herbs, seeds and fruit, and care for children and the home, are predominantly women's work⁵². Coalitions of members of multiple families or even several groups form for tasks requiring co-operation between many people (e.g. the hunting of deer, mass collection of certain natural produce). This may be linked to celebrations. Most hunter-gatherer societies have a tendency to patrilocality (Murphy 1999, 106–107).

Productive societies undertaking low-intensity farming live for the most parts in extended families, which as independent units are more stable and more long-lasting in terms of organisation of the workforce than small family units (Bernbeck 1994, 36). Extended families form larger social and political units (lineages, clans, tribes), membership of which is based on kinship ties. In contrast to foraging societies they are structurally relatively stable, as their interests are tied to a particular territory into which they invest their work and energy. They gradually increase their control over some important sources of subsistence and raw materials. Kinship relations play an important role in providing access to some of these (Vivelo 1988, 94–96). Division of labour is primarily according to gender and age and takes place in particular within the framework of the household. More complex tasks demand the collaboration of the members of several families or a whole village. In some societies there is evidence of partial specialisation (e.g. in the extraction of stone raw materials). As among hunters and gatherers, societies based on low-intensity farming are egalitarian. Such egalitarian societies are marked by a restricted upper limit on the size and density of population in the settled area. R. Bernbeck estimates that the size of a village in an egalitarian system can be no larger than 1 ha. The number of inhabitants in such villages should not exceed 200. A greater density of population per hectare leads to more frequent conflict and stress, which results either in the appearance

52 From observations of some indigenous populations, it is known that the production of certain commonly used stone tools and the hunting of small animals and fishing were also undertaken by women (Gero 1991, 185–186; Torrence 2001, 91). Among some populations (e.g. the Toba of Argentina), women are also responsible for sheep and goat husbandry (Gordillo 1999, 110–113).

of a hierarchical structure, or the departure of part of the population to establish a new village (Bernbeck 1994, 35, 36).

Biological reproduction in simple, unstratified societies was assured by marriage alliances and residential rules, which in egalitarian societies also had a great impact on the form of the distribution network.

Ethnographic observations prove a direct relationship between settlement size and the proportion of exogamous marriages (Adams & Kasakoff 1976, 156–162, Tab. 2, Tab. 3). Indeed, it is in villages smaller than 1 ha and with a population of less than 200 that biological reproduction must be ensured through exogamous marriage. In settlements of this size and smaller, some 50% of marriages take place between different villages. An exogamous marriage alliance requires the existence of a stable network of communication between the different settlements. In unstratified, egalitarian societies, such as those of the Mesolithic and Neolithic, a well-functioning communication network formed the basis for the creation of distribution networks. In areas of low population density and with settlements or camps with small numbers of inhabitants, it may be assumed that reproductive links (marriages) took place over greater distances than was the case for larger settlements with greater numbers of inhabitants and in more highly populated areas. In the latter case, the majority of marriages would have been endogamous, and exogamous marriages would not occur over particularly great distances⁵³. On the other hand, it may be assumed that exogamous marriages were in the first instance arranged between those settlements that were the least far apart. The further apart villages were, the less often exogamous marriages would have occurred between them (Bernbeck 1994, 39–46). The distribution network was driven by similar mechanisms: the further apart particular settlements were, the less often contact between them would have occurred. In sparsely settled regions, contacts were not as frequent as in densely populated regions, but might occur over far greater distances (Adams & Kasakoff 1976).

In addition to marriage alliances, the final form of the distribution network was also influenced by residential rules. In patrilocal⁵⁴ or virilocal⁵⁵ societies, a wom-

53 Among societies in which settlements with central place functions existed, exogamous marriages between central places may be assumed alongside a preponderance of endogamous marriages (Bernbeck 1994, 66).

54 The term 'patrilocal' is used to describe the situation in which a married couple live in, or close to, the house of the husband's father (Vivelo 1988, 335).

55 The term 'virilocal' is used to describe the situation in which a wife leaves her home and moves to her husband's residence (Vivelo 1988, 347).

an moved to her husband's place of residence. In matrilocal⁵⁶ or uxoriocal⁵⁷ societies, a man moved to his wife's settlement. If the marriage took place between regions with different cultural traditions, then the departing members also took artefacts and their cultural tradition with them. Such marriages also created further opportunities for contacts, for example making access to new sources of raw materials possible (de Grooth 1994, 373–375). According to whether it was men or women that moved, items and approaches to work associated with the male or female sphere became geographically more widespread. From a range of ethnographic sources, it is clear that men would have been responsible for the production of stone weapons and most other tools. By contrast, women in unstratified societies would have undertaken the production of ceramics (Peacock 1981, 189). Male and female tasks are presented here in a very simplified form, in order to draw attention to possible predominant trends in the movement of individuals and groups, accompanied by the movement of only certain elements. In this way, I seek to highlight a fact that is usually forgotten in the search for evidence of intercultural contacts. In intercultural contacts, it was not necessarily the case, and indeed was often not the case, that all the elements by which such contacts could easily be revealed spread at the same time. For example, if women moved from an early agricultural population into a foraging one, this would hardly appear in the archaeological record at all, as a woman from a society with knowledge of ceramic manufacture and other new production techniques would probably adapt to the environment of her new home and local customs and rules, meaning that her knowledge would not be required. It may be that the forging of contacts is expressed primarily through the movement of stone raw materials that were prized and required by both parties (e.g. the export of Slovakian obsidian into the *milieu* of the Balkan Early Neolithic cultures). Contacts between the world of the foragers and early farmers through occasional exchange of raw materials, products and partners, including the occasional arrival of individuals (women) from the early farming *milieu* into the foraging *milieu*, probably had no initial visible influence on the foraging way of life, although foragers gradually became aware of a different economic system. Other possibilities are different residential rules on both sides (e.g. patrilocal foragers and matrilocal early farmers), which

would have enabled the diffusion of certain elements in only one direction.

R. Bernbeck (1994) has tackled this problem in detail, using the example of the spread of Samarra pottery (Samarra style of decoration) into the Hassuna and early Halaf *milieux*. In Bernbeck's view, the primary cause of the diffusion of Samarra pottery into the Hassuna culture, which took place without Hassuna ware spreading into the Samarra cultural *milieu*, was differing kinship and residential rules. The bearers of the Samarra culture were governed by patrilocal or avunculocal⁵⁸ rules, according to which women moved from their birthplace to the residence of their partners. This had an effect on ceramics, as the women in their new places of residence continued to produce pottery as they had been taught where they grew up. In matrilocal societies, such as Bernbeck assumes the Hassuna culture to be, women remained in the place where they had learned to make pottery, and the ceramic tradition thus remained unchanged. Given that matrilocal societies are more prone to crises due to a lack of women, a crisis of this kind may also have occurred in the Hassuna cultural *milieu*. A way out of this crisis was to secure Samarra women. Along with the latter, a new tradition of ceramic production penetrated into the Hassuna *milieu*, which was then probably further copied by the Hassuna women themselves.

In an archaeological context⁵⁹, a patrilocal society can be considered likely if the ceramic style of a certain region is rather uniform, since if a certain proportion of women changed their place of residence, there would be a continuous mixing of the traditions of individual manufacturers thereby reducing marked differences amongst adjacent ceramic styles/conventions. By contrast, in matrilocal societies, where the tradition of ceramic production was handed down from mother to daughters who remained in the same place, local stylistic differentiation is expressed far more rarely (Bernbeck 1994, 331–335).

7.1.4. The mythological (symbolical) factor

The last, but very important, factor influencing the form of the distribution network is the symbolic, or rather mythological, factor. This factor, like the others, cannot be understood in isolation, but must be seen as an organic part of all the other influences. According

56 The term 'matrilocal' is used to describe the situation in which a married couple live in, or close to, the house of the wife's mother (Vivelo 1988, 331).

57 The term 'uxoriocal' is used to describe the situation in which a husband leaves his home and moves to his wife's residence (Vivelo 1988, 346).

58 The term 'avunculocal' is used to describe the situation in which a married couple live in, or close to, a maternal uncle of the husband (Vivelo 1988, 311).

59 Here I have in mind prehistoric, unstratified societies with a simple division of labour, where ceramics are produced only for own needs. Only in stratified societies, in which specialisation develops, can pottery become the domain of men.

to M. Eliade (1989; 1993, 25), the archaic world knows no profane activity, as every action (hunting, fishing, farming, games, conflicts, sexual acts) contributed in some way to the sacred. As a result, in the understanding of the archaic world, all dealings with a particular intent related to their mythical basis. Therefore, the form of the distribution network also reflects mythological (and ritualized) behaviour, and the distributed artefacts are bearers of symbolic content.

The mythological factor is to a considerable extent linked to the synchronistic way of thought in archaic society, which stands in contradiction to the causal way of thinking so widespread in industrial societies. A synchronistic way of thinking is based on the mutual reflection of spirit and matter and assumes a relationship between body, soul and environment that is perceived as a dynamic balance (Capra 1983, 404; von Uexküll 1986; Kast 2000, 133). C.G. Jung similarly devoted himself to this topic (1996a; 1996b).

The dynamic unit of the body, soul and environment is the fundamental precondition for symbolic behaviour. Thus, a change that occurs on one level (e.g. the mental) is also expressed at the level of others (the physical and collective). Magic, too, works on a similar principle; everything is connected to everything else. Thus, the distribution of certain items, impossible to explain from the economic perspective and difficult to explain from a social standpoint, can also be understood at the symbolic level – as imitation and repeated re-enacting of a mythological model. The distribution of certain artefacts that at first sight seems senseless and irrational hides within it a symbolic significance. The act of distribution itself thus makes visible processes which are played out at the invisible, non-material level, but penetrate the material level. The artefacts that participate in this process are the bearers of mythological content expressing the radiation of magical power, energetic charge, *mana*. Generally, they symbolically represent their owners or makers; often, they are completely identified with them or carry a certain part of their character. In some cases, on the other hand, they lend their possessors their own exceptional properties (Mauss 1990; 1999, 43, 84–91)⁶⁰.

According to I. Hodder (1982, 152), artefacts are the bearers of emotional and ideological forces, and have their own place in the cultural, ideological and historic contexts. As carriers of *mana*, they are living

60 Among the Khanti people, men produce all their personal belongings (e.g. knives) themselves and regard them as imbued identification symbols, i.e. as part of themselves (Nemysova 1999, 162; Schweitzer 1999, 137–141).

symbols⁶¹ that have both sacred and profane functions, which apply with varying degrees of intensity in a given context (Eggert 2001, 289).

“Neither the objects of the external world nor human acts, properly speaking, have any autonomous intrinsic value. Objects or acts acquire a value, and in so doing become real, because they participate, after one fashion or another, in a reality that transcends them. Among countless stones, one stone becomes sacred – and hence instantly becomes saturated with being – because it constitutes a hierophany, or possesses mana, or again because it commemorates a mythical act, and so on. The object appears as the receptacle of an exterior force that differentiates it from its milieu and gives it meaning and value. This force may reside in the substance of the object or in its form; a rock reveals itself to be sacred because its very existence is a hierophany” (Eliade 1989, 3–4).

In every society, the freeing of *mana*⁶², the original, creative energy, is accomplished by a whole constellation of ceremonies and rituals. Everything and everyone that takes part has their role and becomes part of the game. It is a mythic game, in which a mythological model is re-enacted again and again. The playing out

61 I use the term ‘symbol’ as defined in Jungian-oriented (analytical) psychology by V. Kast (2000, 23, 24, 43):

“A symbol is the visible marker of some kind of invisible reality. A symbol always indicates a surplus of meaning, while this richness of meaning can never be exhausted. Symbols may appear and show themselves spontaneously. Complexes are the points of departure for the appearance of a symbol. For this reason, symbols are emotionally charged content. They are a focus of human development. Symbols contain existential questions in condensed form. The symbol and that which it represents are linked together internally, and cannot be separated from each other. It is this that differentiates a symbol from a sign. Signs are established on the basis of convention, they are intended for declaration, they do not contain a surplus of meaning, but of course represent something. A sign does not depict anything hidden, it is merely representative in function, it indicates something. Signs can be replaced. By contrast, symbols cannot on the basis of convention acquire new meaning, as the meaning is immediately related to the symbol. [...] Even a sign can take on the nature of a symbol”.

The explanation of a symbol given above differs from that used by symbolic anthropologists. The leading proponent of symbolic anthropology, C. Geertz, regards any object, act or event serving the transmission of a thought or meaning as a symbol (Geertz 2000, 107). Symbols and signs are not differentiated in this case.

62 According to the beliefs of Melanesians and Polynesians, *mana* is the secret, supernatural quality granted by a god to certain places, persons and things. In society, it is linked to rank and unusual achievements (Becker 1992, 180–181). Everything that really is, has a *mana*; i. e. everything people find effective, dynamic, creative and perfect (Eliade 1998, 108–113; 2004, 40).

of this mythological model is particularly important at times in which the role of some members of the society changes (e.g. when youths are accepted among the men, women become mothers, or other rites of passage; van Gennep 1996). Ritual identification with the relevant mythological role⁶³, which lends individuals a magico-religious power, makes identification with higher, overarching principles possible and makes the adoption of new models of behaviour easier. This process has a curative, integrating and self-regulating effect.

Items charged with special energy are used among indigenous peoples to confirm contracts:

“...in Maori law, the legal tie, a tie occurring through things, is one between souls, because the thing itself possesses a soul, is of the soul. Hence it follows that to make a gift of something to someone is to make a present of some part of oneself. In this system of ideas one clearly and logically realises that one must give back to another person what is really part and parcel of his nature and substance, because to accept something from somebody is to accept part of his spiritual essence, of his soul. To retain that thing would be dangerous and mortal” (Mauss 1990, 16).

The classic example of the influence of magical practices on the form of the distribution network is the Kula ceremonial exchange of the Trobriand Islands in Oceania, the mechanisms of which were described in the early 20th century by B.K. Malinowski (1922). Kula ceremonial exchange was practised by the inhabitants of a ring of islands close to the eastern tip of New Guinea; it took the form of a ceremony during which participants paddled in canoes from island to island, exchanging white, carved and polished *mwali* shell bracelets and red *soulava* necklaces made from Spondylus. According to traditional rules, the exchange of these items formed a circle by which bracelets were transferred from west to east and necklaces from east to west. The individual necklaces and bracelets had their own names, individuality, history and legends. Their present owners took on their properties merely by touching them. At the same time, bracelets were regarded as a female symbol and necklaces as a male symbol (Malinowski 1967, 113–129; Mauss 1990; 1999, 40–49). Similar ceremonies are known to have taken place among other peoples, too (Mauss 1990). The bracelets and necklaces in the Kula ceremony were the bearers of symbolic content and

for this reason were treated according to strict rules. Their temporary owners were required to pass them on after a certain time, as it was not possible to enrich oneself through ceremonial trade. The exchange of normal goods to meet the basic needs of the inhabitants took place in parallel with the ceremonial trade (Malinowski 1967, 129).

In this example, it is possible to see two types of distribution influenced by symbolic factors. The Kula ceremony with its rules governed by a mythological model has a direct influence on the distribution of those artefacts that are its main subject, the primary symbols of the Kula ceremony itself, i.e. bracelets and necklaces. The Kula ceremony also had a secondary impact on the distribution of other items (raw materials and products; Malinowski 1967, 431–432), as the regular exchange network copied the network of ceremonial ties and thus also acquired a mythic dimension.

7.2. The distribution of some stone raw materials in the Mesolithic and Neolithic

Before attempting to outline the distribution of different chipped stone materials during the Mesolithic and Neolithic, it is necessary to clarify some of the terminology to be used.

The stone raw materials used to produce chipped artefacts are divided into three categories according to the distances between the site where they were found and their natural sources. Thus, stone raw materials are divided into

- a) *local* raw materials – coming from up to 30 km away (a single day’s walk in each direction)
- b) *regional* raw materials – coming from distances of between 30 and 80 km
- c) *supra-regional* raw materials, the sources of which are at least several days’ travel away and for which exchange was of greater importance (Bakels 1978, 7–9; Heinen 1986, 20; Zimmermann 1995, 36). Within this group, raw materials supplied over very great distances (i.e. over 200 km) hold a special place; these are termed *imported* raw materials.

For the individual raw material types, a distinction is drawn between raw materials that predominate at a given site, and those which appear in only limited quantities (up to 30%).

⁶³ The term ‘mythological role’ as I understand it is closely linked to the term ‘archetype’ as defined and developed by Jung (1976, 73).

7.2.1. Szentgál, Hárskút and Úrkút-Eplény radiolarites (Transdanubian radiolarites)

The Mesolithic

Radiolarites from the Bakony mountains, especially the Szentgál type, travelled over considerable distances even during the Mesolithic (**maps 5 & 19**). They have been identified at the Moravian Mesolithic sites of Smolín, Přibice and Dolní Věstonice (Mateiciucová 2001a), where, however, their proportion in the assemblages does not exceed 1%. They appear in the form of tools, blades and small preparation flakes. At Smolín, technical flakes were found along with a small core of Szentgál radiolarite, providing evidence for the manufacture of blanks directly on site. Radiolarites of the Bakony mountains have not been found at either the Mesolithic sites at Mikulčice and Šakvice, nor at the Lower Austrian sites of Kamegg, Burgschleinitz, Limberg-Mühlberg and Wien-Bisamberg, which lie in the area dominated by such radiolarites in the earliest phase of the LBK.

It is difficult to assess the distribution of Bakony radiolarites during the Mesolithic, because greater attention has yet to be devoted to this subject. It is highly likely that Transdanubian radiolarites also lie hidden among the other radiolarite artefacts from Mesolithic sites in south-west Slovakia. Several examples occur in the late Early Mesolithic and Late Mesolithic contexts at Jásztelek I (layer B, feature 1; layer A – topsoil), Jászberény II (surface) and Jászberény III (surface) in northern Hungary; these were previously assumed to be hydrosilicites or jaspers (Kertész *et al.* 1994, 30). At these sites, Transdanubian radiolarites occur in the forms of blades, microlithic tools and small flakes.

It may be assumed that the Szentgál, Hárskút and Úrkút-Eplény radiolarites were the main raw materials used at the Mesolithic surface sites closest to the primary sources (Vörös-tó, Mencshely, Bakonytamás, Koroncó-Bábota, Rómand); unfortunately, this is not discussed in publications. In addition, the dating of some of these assemblages is made more difficult by finds of LBK pottery together with microlithic chipped artefacts (Vörös-tó, Mencshely; Dobosi 1972, 41). Szentgál radiolarites predominate at the Late Mesolithic site of Kaposhomok at the northern edge of the Mecsek mountains (Bánffy 2000, 174; Marton 2003).

During the Mesolithic, Bakony radiolarites were of local and regional importance. Occasionally, they travelled over great distances – up to around 230 km to the north-west, and up to around 160 km to the north-east.

The Starčevo and Körös cultures

In the Starčevo culture (**maps 6 & 20**), the appearance of Bakony radiolarites – again predominantly

the Szentgál type – has been confirmed at the sites of Vörös-Máriaasszony-sziget and Gellénháza-Városrét.⁶⁴ The radiolarites here had been transported over distances of around 70–80 km, and predominated at both settlements (Kalicz, Virág & Biró 1998, 25, 181). Both settlements are dated to the late phase of the culture and lie at the northern edge of its distribution, in territory that was later also settled by the LBK. These radiolarites either do not occur or have not been recognised at other sites of the Starčevo culture.

Isolated examples also occur at Körös culture sites in eastern and north-eastern Hungary (Ecsegfalva 23, Tiszacsege-Homokbánya, Méhtelek-Nádas), to which they had been imported from up to 400 km away (Méhtelek-Nádas). Here, too, they appear only in the later or late phases (Starnini 1994, 102–103; Mateiciucová 2007).

In the Starčevo culture, Transdanubian radiolarites were of regional importance. They were only occasionally imported into the Körös culture area.

The early phase of the LBK

It was at the beginning of the LBK that radiolarites from the Bakony mountains reached the peak of their distribution (**maps 6 & 20**), and they are closely linked to the Neolithisation of central Europe (Gronenborn 1994; 1997). During this period, Bakony radiolarites predominated at settlements as much as 110 km from the primary sources (Neckenmarkt, Hidegkut, Veszprém-Nándortelep, Budapest-Aranyhegyi út, Bicske-Galagonyás, Szentgyörgyvölgy-Pityerdomb; Biró 1987, 145–146; 1998, 46, 48; Makkay, Starnini & Tulok 1996, 158; Gronenborn 1997, 20).

Even at sites 250 km away from the primary sources, Bakony radiolarites make up 40–60% of assemblages. However, they were distributed in such quantities only in a north-westerly direction (Brunn IIa, Brunn IIb, Perchtoldsdorf, Rosenberg I, Strögen; Gronenborn 1997, 110; Mateiciucová 2001b; 2002b). Beyond the 250 km barrier, they appear in only limited, economically insignificant quantities.

Radiolarites spread along two main routes. The first followed the river Morava and its tributaries upstream into the interior of southern Moravia (Vedrovice “Za dvorem”, Brno-Ivanovice), and from there led further to the north (Žopy I, Kladníky, Mohelnice; Mateiciucová 2000; 2001a; 2001b). It was most likely from here that the materials also penetrated as far as the east Bohemian Labe valley (Elbe; Bylany I, ca 350 km; Lech 1989a, 112).

The second route followed the Danube (Mintaching, Langenbach-Niederhummel) and the Main

⁶⁴ I thank Katalin T. Biró (National Museum, Budapest) for the opportunity to study the chipped stone artefacts from Gellénháza-Városrét.

(Schwanfeld; Tillmann 1993, 160; Gronenborn 1997, 110). The westernmost site at which Szentgál radiolarite has been found is Ostheim-“Mühlweide”, not far from Frankfurt am Main. Ostheim lies 800 km as the crow flies from the primary source of radiolarite and forms the furthest limit of its distribution anywhere.

In the Carpathian Basin, the Danube is the eastern boundary of Bakony radiolarite distribution. Beyond this line, radiolarites are replaced by limnosilicites and above all obsidians, the main raw material of the Alföld LBK (AVK). To the south their distribution has yet to be documented, although it seems to extend to the southern edge of the earliest LBK distribution.

The end of phase I and the middle phase of the LBK

At the end of phase I of the LBK, the long-distance contacts to the west and north-west were disrupted (**maps 7 & 21**).

This decline is visible above all in Lower Austria. At Mold, Bakony radiolarites make up a mere 2.6% of the assemblage, despite having been predominant in the region at the beginning of phase I (Rosenburg I – 52.8%, Strögen). At Brunn I, too, they account for just 12.4% of the assemblage, while in earlier phases they had been the primary raw material here.

Szentgál radiolarites have been identified in cemeteries dated to LBK phases I/II and II at Vedrovice “Široká u lesa” and Kleinhadersdorf. At Vedrovice, they were found in the form of transverse arrowheads in the grave of a perhaps 40-year old man (grave 46). At Kleinhadersdorf, three trapezoidal forms (Verf. 79) and a blade with gloss along its edge (Verf. 17) were made from Szentgál radiolarite.

In the middle phase, Bakony radiolarites were mainly used in settlements close to the primary sources (Bakonyjakó-Disznóállá, Pápateszér, Veszprém-Nándortelep, Mencshely-Murvagödrök). Only at Bicske-Galagonyás, where they had also predominated in the earliest phase (Makkay, Starnini & Tulok 1996, 158, 163), do they persist despite the existence of preferred raw material sources closer to hand. Only very rarely did they reach more distant regions, and then only in limited quantities. The most distant find known is from Přáslavice-Kocourovce in north Moravia, in a feature dated to LBK phase IIb (Mateiciucová 1997a, 100). Several pieces also appear at the Vedrovice “Široká u lesa” settlement.

It is not yet clear whether all of the Bakony radiolarites found at Mohelnice date to the earlier or the late phase of the LBK. Some may, perhaps, also come from the middle phase of the LBK.

The settlement at Asparn-Schletz also contains archaeological material dated to LBK phase II. It can hence not be ruled out that some of the artefacts made from Szentgál radiolarite could come from this

chronological horizon, although the majority probably arrived at the site at the end of the LBK along with other eastern and south-eastern influences, visible in particular in the ceramics (Želiezovce group, Szakálhát group; Windl 1996, 16–21).

The late phase of the LBK

At the end of the LBK, Bakony radiolarites were not only intensively used in local settlements, but also at sites up to 100 km away (**maps 8 & 22**). Together with the Želiezovce group, they mainly spread to the east and north-east (Budapest-Aranyhegyi út). They crossed the Danube (Kunszentmiklós-Középszenttamás) and occasionally penetrated into the Great Hungarian Plain (Alföld Plain). They also travelled west and north-west, where they mark the contacts that developed in the Late Neolithic in particular. They also occasionally appear in Lower Austria (Asparn-Schletz) with imports of Želiezovce ceramics. Their presence in Moravia is uncertain in this period, although it seems likely that some of the Bakony radiolarite artefacts at Mohelnice might date to the late phase, as they appear with Želiezovce and even Bükk ceramics (Tichý 1962).

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic, the Sopot-Bicske culture appeared in Transdanubia and the Lengyel culture formed, also influencing the appearance of the Austrian/Moravian Painted Ware culture (Mährisch-Ostösterreichische Gruppe; **maps 9 & 23**). During this period, Bakony radiolarites were primarily of local and regional importance. They did, however, occasionally travel relatively great distances.

The early Moravian Painted Ware culture, which originally only extended over south Moravia, later spread further north and west and put pressure on the Stroke-Ornamented Ware culture, from which imports of painted ceramics are known, especially in its later phase (Čižmář & Šmíd 1997; Kazdová 1998, 166). Bakony radiolarites have also been recovered from the sites, or even from within the same features, which yielded these ceramic imports. At Určice-“Záhumení” in central Moravia, a Moravian Painted Ware culture cup was found in the same pit as a collection of nine bladelets made from Úrkút-Eplény radiolarite, which was used preferentially in the Sopot-Bicske culture (Makkay, Starnini & Tulok 1996, Table 17). The most northerly occurrence of Bakony radiolarites in this chronological horizon is at Olomouc-Slavonín, where they appear in a Stroke-Ornamented Ware culture context (Kazdová, Peška & Mateiciucová 1999, 139).

To the west, radiolarites penetrated as far as the Waldviertel area in Lower Austria, where they have

been identified both in connection with the Stroke-Ornamented Ware culture (Poigen) and later the Lengyel culture (Austrian/Moravian Painted Ware culture) (Kamegg, Eggendorf am Walde, Mörtersdorf, Michelstetten⁶⁵; Mateiciucová & Trnka 2004, 90). Unfortunately, the distribution of these radiolarites has not been given any great attention within the framework of the early Lengyel in either Lower Austria or Moravia (early Austrian/Moravian Painted Ware). However, their appearance in the Stroke-Ornamented Ware culture is indirect evidence for their occurrence in phase I of the Moravian Painted Ware.

In addition to the western and north-western directions, radiolarites also spread southwards within the framework of the Lengyel culture. Evidence for intercultural contact comes not only from their appearance in the Stroke-Ornamented Ware *milieu*, but also their presence further east in Tisza culture contexts. At all of the more distant sites, however, they appear in negligible quantities and are therefore evidence of contact of a social nature.

Summary: the distribution of Szentgál, Hárskút and Úrkút-Eplény radiolarites

1) In the Mesolithic, Bakony radiolarites were of local and regional importance. In isolated instances, they could also cover large distances – north-westwards to a distance of around 250 km, and north-eastwards to a distance of around 160 km.

2) In both the Starčevo and the Körös cultures, these radiolarites have been identified primarily at sites of the later and late phases. In the Starčevo culture, Transdanubian radiolarites were used intensively at sites 70–80 km from their source. In the Körös culture *milieu*, they are occasionally present at distances of up to 400 km.

3) The distribution of Bakony radiolarites reached its greatest extent in the early phase of the LBK. During this period, Bakony radiolarites predominated at sites up to 250 km from their primary sources, even when there were other raw material sources in the area. The westernmost boundary of their distribution is at Ostheim, some 800 km away. The major routes by which this material spread were the Main and the Danube with its tributaries. The intensity and the extent which the distribution of Bakony radiolarites reached at the beginning of the LBK were never again attained in later Neolithic periods.

4) At the end of LBK phase I, the distribution of Bakony radiolarites decreases at greater distances, and the settlements previously supplied now begin to orient themselves towards raw material sources closer at hand.

5) In LBK phase II, settlements that preferentially use Bakony radiolarites are found up to 80 km from their sources, and the majority concentrate within a radius of some 30 km. More distant imports are extremely scarce.

6) The situation is similar in the late phase of the LBK. In comparison to the middle phase, there is an eastward expansion. The range within which well-supplied settlements lie increases to a 100 km radius.

7) The situation remains substantially unchanged at the end of the Middle Neolithic and in the Late Neolithic. Bakony radiolarites are used to supply settlements up to 80 km distant from their sources. In contrast to the preceding period, however, the spread of occasional artefacts may be observed over distances of up to 280 km. The far greater dispersal is probably linked to the nascent Lengyel culture and its expansion into more distant regions. The appearance of Transdanubian radiolarites in the late phase of the Stroke-Ornamented Ware and Tisza cultures is evidence for intercultural contacts.

7.2.2. Mauer radiolarite

The Mesolithic

At Wien-Bisamberg, which lies some 20 km from the primary source of Mauer radiolarite, there was a preference for radiolarites with a pebble surface coming from Danubian gravels. These could be found close to the site. Mauer radiolarites appear only occasionally (**maps 5 & 33**).

Mauer radiolarites have not been identified at any other sites in Lower Austria and Moravia. That said, because they are extremely difficult to differentiate from other radiolarites at first sight, their occurrence elsewhere cannot be entirely ruled out.

The Starčevo and Körös cultures

Mauer radiolarites have not yet been identified within either the Starčevo or the Körös cultures.

The early phase of the LBK

During this period, there was a dense settlement concentration in the immediate area of the primary source of Mauer radiolarite (**maps 6 & 34**). Brunn IIa and Brunn IIb are regarded as the earliest sites, but surprisingly show a preference for Bakony radiolarites, the sources of which are 150–160 km distant. At both sites, Mauer radiolarites were something of a complementary raw material. A comparable situation, albeit one that has yet to be carefully investigated, occurs at Perchtoldsdorf, which is immediately adjacent to the settlements at Brunn. The somewhat later settlements at Brunn III and Brunn IV made use

⁶⁵ The sites of Mörtersdorf and Michelstetten are, however, dated to phase II of the Moravian/Austrian Painted Ware.

of local radiolarites in far greater quantities, at the expense of the Transdanubian radiolarites.

Mauer radiolarites have yet to be recognised at more distant settlements. However, it is clear that they could only have formed a minimal proportion of the assemblages at other sites, as the dominant raw material types are relatively well known.

The end of phase I and the middle phase of the LBK

Mauer radiolarites predominate at Brunn I, dated to the end of phase I of the LBK (**maps 7 & 35**). In contrast, the proportion of Transdanubian radiolarites fell markedly. A similar trend can also be observed in other areas (e.g. Waldviertel).

From the middle phase, there are no reports regarding the distribution of this raw material. It is, however, highly likely that it retained a purely local character.

The late phase of the LBK

Only the settlement at Asparn-Schletz can be considered here, but it must be borne in mind that it lies at a distance of some 55 km from the raw material source. Mauer radiolarites were not identified at the site, or have been overlooked and classed as “radiolarites – undefined sources” (radiolarites from nearby undefined sources).

The end of the Middle Neolithic and the Late Neolithic

To date, Mauer radiolarites have not been recognised in either the Stroke-Ornamented Ware culture or in the early phase of the Lengyel culture (Moravian/Austrian painted ware). The study of their distribution is hence a task for the future.

Summary: the distribution of Mauer radiolarite

- 1) Throughout the Mesolithic and Neolithic, Mauer radiolarites retained a purely local character.
- 2) Mauer radiolarites occur only sporadically in the Mesolithic. At this time, other local raw materials were of greater importance and significance, especially radiolarites from Danubian gravels.
- 3) In early LBK settlements, Mauer radiolarites regularly appear as a raw material, but are of lesser importance than the supra-regional Transdanubian radiolarites.
- 4) The significance of Mauer radiolarites only increases at the end of LBK phase I, in conjunction with the limited movement of Transdanubian radiolarites. Even in this period, however, they never attain more than a local character.
- 5) No attention has yet been paid to the distribution of Mauer radiolarites in later phases of the Neolithic.

7.2.3. Krumlovský Les chert

The Mesolithic

In the Mesolithic, Krumlovský Les cherts (KL) were highly favoured as a raw material, mainly because they are relatively easily accessible (**maps 5 & 14**). The fine-grained KL II variety was used most often. Unlike the more coarsely grained KL I variety, KL II occurs in greater concentrations, and thus the predominance of KL II chert in Mesolithic assemblages is evidence for selective collection from the sandy Miocene sediments (Oliva, Neruda & Přichystal 1999; Mateiciucová 2001c).

Krumlovský Les cherts are the main raw material at all Mesolithic sites in south Moravia, with the exception of Šakvice. The sites where this material predominates occur up to 50 km from its primary source. The main axis of communication in the region was the river Morava, as is shown by the predominance of Krumlovský Les cherts in assemblages from Břeclav-Pohansko (45–50 km distant), Mikulčice (50–55 km) and even Bratislava (110–120 km; Hudec 1996; Mateiciucová 2001a; Škrdla, Mateiciucová & Přichystal 1997, Tab. 1; M. Oliva pers. comm.).

Krumlovský Les cherts have also been identified in Bohemia, uniquely at Hořín near Mělník. To date, this is the greatest distance over which they are known to have travelled (200–205 km; Oliva, Neruda & Přichystal 1999, 257). They have also been found at Sered' in the Váh valley (125–130 km; Hudec 1996). In Lower Austria, Krumlovský Les cherts are a common raw material at Mesolithic sites in Waldviertel (Limberg-Mühlberg and Burgschleinitz), and at some are even predominant (Horn-Mühlfeld, Kamegg). They are also known from Wien-Bisamberg. They have not yet been recognised from Hungarian Mesolithic sites, although obsidians and Transdanubian radiolarites appear at Moravian Mesolithic sites.

The Starčevo and Körös cultures

To date, Krumlovský Les cherts have been identified neither in the Starčevo nor the Körös cultures.

The early phase of the LBK

In the early phase of the LBK, and in contrast to the Mesolithic, the more coarse-grained variety of Krumlovský Les chert came to be preferred and subsequently predominated throughout the LBK period (**maps 6 & 15**). The more fine-grained KL II variety is, however, still fairly frequent when compared to the later phase.

Unlike in the Mesolithic, when Krumlovský Les cherts were used intensively at distant sites, only settlements close to their source now devoted attention to them (Vedrovice “Za dvorem”). Even here, howev-

er, they make up less than 80 % of the assemblage and are accompanied by other raw materials (Olomučany chert) which would come to be essentially insignificant in the later period (Mateiciucová 2001c). Only occasionally, Krumlovský Les cherts were distributed over greater distances of up to 120 km (Bylany I, Žopy I, Mohelnice, Rosenberg I, Strögen?).

At Brunn am Gebirge in Lower Austria, Krumlovský Les cherts appear at the Brunn IV settlement, but are absent from Brunn IIa and Brunn IIb, the sites assumed to be the earliest. They also appear at Rosenberg I and also perhaps at Strögen, where they may be concealed under the heading “chalcedony-like raw material”, as described by D. Gronenborn (1997, 24). According to Stadler, the settlements at Rosenberg I and Strögen fall into the same chronological horizon as Brunn IV (Stadler *et al.* 2000).

The most distant occurrence of Krumlovský Les chert in this period is in east Bohemia, at Bylany I (Přichystal 1985). Alongside Krumlovský Les chert, Transdanubian radiolarites were also transported to Bylany from the south-east in the early phase of the LBK.

Unfortunately, nothing is yet known regarding the distribution of Krumlovský Les cherts elsewhere in Bohemia, in Poland, in Slovakia or even in Hungary.

The end of phase I and the middle phase of the LBK

At the end of phase I of the LBK, Krumlovský Les cherts were used in even more distant regions (**maps 7 & 16**). At Mold, for example, which lies not far from the primary source of siliceous weathering products of serpentinites of the Japons type, priority was given to Krumlovský Les cherts (which came from some 70 km away). By contrast, in the early phase of the LBK the material most used in this region had been imported Transdanubian radiolarites.

Another chert that could be described as a Krumlovský Les chert (specifically the KL III variety), but which is marked by its very poor quality, is abundantly represented at the settlement with enclosure of Brno-Nový Lískovec. The low quality and form of the pebbles in which it most often occurred perhaps show that it came from shorter distances, probably from the Brno Basin, where similar cherts are also known (Mateiciucová 2004a, 113).

In the middle phase of the LBK, the area immediately around the sources of Krumlovský Les cherts featured a concentration of settlements oriented towards their exploitation (Vedrovice “Široká u lesa”, Nové Bránice). In both of the settlements mentioned, the coarse-grained KL I variety clearly predominated. Although it occurs in greater concentrations than the KL II variety, relatively high quality raw material

probably had to be obtained from greater depths. It is not impossible, therefore, that the inhabitants of some of the settlements close to the sources obtained the raw material through mining. However, convincing evidence of this has not yet been recorded. In the middle phase, the fine-grained KL II variety disappears from the settlements in the immediate environs of the sources, as do the other raw material types that accompanied the predominant raw material in the early phase. In other words, the chipped industry essentially came to be made exclusively from KL I chert, with the exception of just a few imported raw materials. In the case of the settlement at Nové Bránice-“V končinách”, a certain specialisation in the production of blade blanks can be observed (Mateiciucová 1992; 1997b).

Krumlovský Les cherts also predominate at Těšetice, where they arrived at least in part in the form of finished blade blanks (see chapter 6.5.).

It is interesting that at the cemetery of Vedrovice “Široká u lesa”, where a preponderance of the local Krumlovský Les cherts might be expected, the majority of artefacts were actually made of imported raw materials (mainly Krakow Jurassic silicites, but also Szentgál radiolarites). Krumlovský Les cherts were only of secondary importance here, and the artefacts made from them appear mainly in women’s graves (Mateiciucová 1998; 2002a). Graves at the Kleinhadersdorf cemetery in Weinviertel also contain artefacts made from Krumlovský Les chert.

Only occasionally did Krumlovský Les cherts travel further afield (Močovice, Přešlavice-Kocourovce). In some cases, they were distributed in the form of finished blades (Kuřim, Přešlavice-Kocourovce; Mateiciucová 1997a).

The late phase of the LBK

Few late LBK sites have been investigated in Moravia and Lower Austria (**maps 8 & 17**). Sadly, detailed stratigraphies were not recorded during the earlier excavations (Mohelnice, Nová Ves u Oslavan).

In this period, a settlement where Krumlovský Les cherts were used intensively existed close to the raw material source at Nová Ves u Oslavan. In addition to Šárka ceramics, the site has yielded a large selection of ceramics dated to the Stroke-Ornamented Ware culture. The site has not yet been sufficiently studied to provide a detailed chronology, and it is therefore only mentioned in passing here.

In this period, Krumlovský Les cherts were of regional significance. As previously, and as in the late phase, they spread primarily to areas lying to the south. At Asparn-Schletz in the Weinviertel region, some 50–55 km from the sources, they are the most common raw material (accounting for around 40 %

of the overall assemblage). The preference for Krumlovský Les cherts is probably linked to a lack of local raw material sources; it retained its importance in the Weinviertel area until the Late Neolithic.

Several examples of Krumlovský Les cherts have also been identified at Kuřim, unfortunately in features with ceramics dating to both middle and late phases. Some of the Krumlovský Les artefacts from Mohelnice may also date to the late period, when Šárka and Želiezovce ceramics appear at the site. The most distant occurrence of Krumlovský Les cherts known is from Bylany III (Přichystal 1985).

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic, when the Stroke-Ornamented Ware culture developed in Moravia, several changes occurred in the distribution of Krumlovský Les cherts (**maps 9 & 18**). They began to spread more intensively over greater distances and, in contrast to the preceding period, when they had mainly gone south, they now moved primarily to the north and east. Here, they even managed to displace raw materials from closer sources that had predominated during the LBK period. From the density of settlements it would seem that population density declined and that settlements shrank in size. This could be the reason for the more intensive use of Krumlovský Les cherts, which could be obtained through simple collection. This may also be attested by the preference for the more fine-grained KL II variety.

In the Stroke-Ornamented Ware culture, Krumlovský Les cherts were used primarily in phase III, when the bearers of this culture were settled in south Moravia. In the later Neolithic, they were then pushed out by the Moravian Painted Ware society, a process also expressed in the more intensive distribution of the raw material along natural corridors further to the north. These cherts predominate at Vyškov and Křižanovice near Vyškov, some 50–55 km distant, while the closer sources of Olomučany chert (some 25–30 km distant) were neglected. Krumlovský Les cherts ultimately penetrated even into the primary source area of Olomučany chert (the settlement at Kuřim), replacing about half of that material (Kazdová 1994, 30; Oliva 1996, 103).

In phase IV of the Stroke-Ornamented Ware culture, when south Moravia was already home to the Moravian Painted Ware culture, further influx of Krumlovský Les cherts to the more northerly areas ceased. In this period it occurs only sporadically (at Určice-“Záhumení”, Náměšť na Hané, Olomouc-Slavonín (Čižmář & Oliva 2001; Kazdová, Peška & Mateiciucová 1999, fig. 23).

Further, isolated imports of Krumlovský Les cherts appear mainly in Stroke-Ornamented Ware

culture contexts in Bohemia (Mšeno u Mělníka, Bylany; Přichystal 1984, 207; Lička 1993, 7).

In the Late Neolithic, the area around the source of Krumlovský Les cherts was settled by the people of the Moravian Painted Ware culture. Krumlovský Les cherts were used intensively at this time, but their distribution was never more than local in character (Vedrovice, Nové Bránice b, Moravské Bránice-“Ve starých”, Jezeřany-Maršovice, Pavlov and Dolní Věstonice; Kaczanowska 1985, 81; Oliva, Neruda & Přichystal 1999, 270–271). In the Moravian Painted Ware culture, the fine-grained KL II variety was still preferred. The question remains as to whether this was still obtained through careful selection, or whether more abundant concentrations were found in the Tertiary sediments.

Just as in the middle phase of the LBK, processing centres appeared in phase I of the Moravian Painted Ware culture (Jezeřany-Maršovice, Nové Bránice b, Vedrovice “Za dvorem”). At the beginning of the Eneolithic, such sites also existed outside the source area (Hradisko u Kramolína; Přichystal & Svoboda 1997; Oliva 2001).

To the north, the distribution of the earlier phase of the Moravian Painted Ware culture was bounded by the Brno Basin, which was also simultaneously the boundary of the distribution of Krumlovský Les cherts (Brno-Žebětín, Brno-Bystrc, Prštice, Ořechov “Zahrádky”; Oliva, Neruda & Přichystal 1999, 270). In isolated instances, the cherts also penetrated into the territory of the Stroke-Ornamented Ware culture and are valuable evidence for intercultural contacts (Olomouc-Slavonín and Určice-“Záhumení”; Čižmář & Oliva 2001; Kazdová, Peška & Mateiciucová 1999, fig. 23).

In the early Moravian/Austrian Painted Ware culture, Krumlovský Les II chert was also used widely in Lower Austria (Kamegg, Schletz, Falkenstein-Schanzboden⁶⁶ – some 35–40 km distant; Neugebauer-Maresch 1981, 16; Mateiciucová & Trnka 2004, 90; 2005, 164).

Within the framework of the earlier phase of the Lengyel complex, the most distant occurrence of these cherts known so far is at Budmerice in western Slovakia (Kaczanowska 1985, 81).

Summary: the distribution of Krumlovský Les chert

1) In the Mesolithic, there was a preference for the fine-grained KL II variety. At this time, it spread primarily to the south and south-east and was the main

⁶⁶ KL II chert is probably also included under the designation ‘H1 chert’, which makes up 56% of the assemblage. Some other cherts may also be of the same provenance. When I had the opportunity to see the collection in 1997, it was clearly dominated by KL II chert.

raw material even at relatively distant sites (Pohansko u Břeclavi, Bratislava – 115 km).

2) In contrast to the situation in the Mesolithic, in the early phase of the LBK the coarse-grained KL I variety predominates. In this period, Krumlovský Les cherts are local raw materials; in isolated instances, however, they travel 110–120 km in all directions.

3) At the end of phase I, Krumlovský Les chert attains a regional significance. In Waldviertel, where it had appeared only rarely at the beginning of the LBK, it is now predominant.

4) At the Vedrovice “Široká u lesa” and Kleinhadersdorf cemeteries, artefacts made of Krumlovský Les chert form part of the grave goods. As a local raw material, it appears in particular in the graves of women and children at Vedrovice (Mateiciucová 1998; 2002a).

5) During the middle phase of the LBK, settlements in the immediate area of the raw material source are used intensively. At these sites, the KL II variety is almost entirely absent; the possibility that the raw material was obtained through mining cannot be ruled out.

6) At the end of the LBK, Krumlovský Les cherts were also used in Weinviertel in areas lacking local raw materials (Asparn-Schletz).

7) In the Stroke-Ornamented Ware culture and in the early Moravian/Austrian Painted Ware (Lengyel) culture, there is once again a preference for the fine-grained KL II variant.

8) In the earlier phases of the Stroke-Ornamented Ware culture in Moravia, Krumlovský Les cherts spread to the north and north-east, while other, nearer sources are systematically ignored (Olomučany chert).

9) After the settlement of south Moravia by bearers of the Moravian Painted Ware culture, the diffusion of Krumlovský Les cherts north of this culture’s range ceases almost entirely.

10) In the early Moravian/Austrian Painted Ware (Lengyel) culture, the distribution of Krumlovský Les cherts is local in character. Manufacturing centres processing Krumlovský Les cherts are established in the actual source area. The cherts are distributed over greater distances, mainly southwards into the Weinviertel and Waldviertel regions.

7.2.4. Olomučany chert

The Mesolithic

Thus far, no Mesolithic sites are known from the immediate surroundings of the primary source of this raw material (**maps 5 & 29**). Overall, Olomučany chert was used regularly during this period, albeit

in limited quantities. The smooth surfaces of some examples show that they were obtained through simple collection from gravels. Its distribution is regional in character (Smolín, Příbice, Dolní Věstonice, Mikulčice). So far, this chert has not been identified at sites more than 70 km from the source (Hudec 1996; Škrdla, Mateiciucová & Přichystal 1997, 55; Mateiciucová 2001a).

The Starčevo and Körös cultures

To date, Olomučany chert has not been identified in either the Starčevo or the Körös cultures.

The early phase of the LBK

At the beginning of the LBK, the importance of this raw material began to increase in the immediate vicinity of its source (**maps 6 & 30**). Processing of Olomučany chert has been identified at Brno-Ivanovice, some 10 km from the primary source (Mateiciucová 2000, 229). The relatively significant proportion (around 18%) of this material in the assemblage from Vedrovice “Za dvorem”, which lies within the source area of Krumlovský Les cherts, is surprising. Olomučany chert also appears in early LBK contexts at Mohelnice; otherwise, much as in the Mesolithic, the material does not seem to have spread over longer distances.

The end of phase I and the middle phase of the LBK

At the end of phase I, Olomučany chert appears in the form of several artefacts – particularly sickle blades – at Brno-Nový Lískovec (**maps 7 & 31**).

In phase II, Olomučany chert was of local significance (Bořitov “Býkovky”, Bořitov “Písky”, Holubice, Kuřim; Geislerová 1985, 372; Čižmář 1995; Mateiciucová 2000, 229). At this time, an extensive processing centre appeared at Kuřim, from where some of the chipped industry was distributed to more distant settlements, probably in the form of completed blade blanks (see chapt. 8.5). The large quantity of raw material, its relatively good quality and the standard sizes make it impossible to rule out the possibility that it was also obtained through mining⁶⁷. In isolated instances, Olomučany chert was distributed at only the regional level (Vedrovice “Široká u lesa”, Mohelnice, Mostkovic; Mateiciucová 1992). At Vedrovice, where this chert accounted for around 18% of the assemblage in the earliest phase, it now completely displaces the local Krumlovský Les chert.

⁶⁷ In addition, mines were found in the Olomučany area in 2002 and 2003 (Přichystal & Přichystal 2005).

The late phase of the LBK

The distribution of Olomučany chert has not been documented in this period. Apparently little changed, and it continued in purely local usage (Kuřim).

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic and in the Late Neolithic, the distribution of Olomučany chert was bound up with the Stroke-Ornamented Ware culture and was limited to the immediate area of its occurrence (**maps 9 & 32**). Nevertheless, it was later substituted even here by Krumlovský Les chert (Kuřim). Only rarely did it spread over greater distances. It appears at central Moravian settlements (at Olomouc-Slavonín, Určice “Záhumení”, Náměšť na Hané) in the later phase of the Stroke-Ornamented Ware culture. A few artefacts have also been found in south Moravia, in the *milieu* of the earliest phase of the Moravian Painted Ware culture (Těšetice, Vedrovice; Přichystal 1984, 207; Mateiciucová 1999, 221–222).

The very limited distribution is probably linked to the movement of the Stroke-Ornamented Ware culture northwards from southern Moravia, caused by pressure from the Moravian Painted Ware culture. The loss of importance of Olomučany chert was probably associated with the location of the primary source, which in the Late Neolithic was close to the border between the two cultures (Kazdová 1998). At the same time, it is impossible to rule out the exhaustion of the source, as this chert is almost entirely absent in later periods. At Kuřim, for example, the predominant raw material in the late (phase II) Moravian Painted Ware culture was Stránská Skála chert. .

Summary: the distribution of Olomučany chert

- 1) In the Mesolithic, Olomučany chert was present in limited quantities and only at a regional level.
- 2) Throughout the Neolithic, Olomučany chert was only of local significance.
- 3) The only instances of Olomučany chert appearing at greater distances from its source are known from the beginning of the LBK period. Even at this time, processing was concentrated near the source.
- 4) In the middle phase of the LBK, Olomučany chert was used intensively at a local level. The distribution of isolated artefacts did not exceed 55 km.
- 5) At the end of the LBK, the distribution of Olomučany chert was practically unchanged in comparison to the middle phase.
- 6) In the earlier phase of the Stroke-Ornamented Ware culture in Moravia, Olomučany chert is replaced by Krumlovský Les cherts. In the later Neolithic, it occasionally occurs in central Moravia. It is absent from Stroke-Ornamented Ware contexts in south Moravia. It first appears in connection with the early phase of

the Moravian Painted Ware culture, where its proportion in assemblages is negligible.

7) In the Eneolithic, in phase II of the Moravian Painted Ware culture, Olomučany chert is replaced by other types of raw material even in settlements close to the source (at Kuřim by Stránská Skála chert).

7.2.5. Krakow Jurassic silicite

The Mesolithic

In studying the distribution of Krakow Jurassic silicites in the Mesolithic, I have not devoted major attention to the distribution of this raw material in Poland (**maps 5 & 24**). These silicites must, however, have been an important raw material in this period as well (see Cyrek 1981), as small quantities penetrated as far as south Moravia (Smolín, Přibice, Dolní Věstonice; Mateiciucová 2001a) and south-western Slovakia (Sereď, Tomášikovo, Bratislava; Hudec 1996). They have not yet been identified in the Mesolithic assemblages of Lower Austria or Hungary (Jásztelek I, Jászberény I, II, III).

The Starčevo and Körös cultures

To date, Krakow Jurassic silicites have been identified neither in the Starčevo nor the Körös cultures.

The early phase of the LBK

It was at the beginning of the LBK that Krakow Jurassic silicites attained their greatest active radius (**maps 6 & 25**). In this period they predominated at sites that lay at distances of 360–365 km from their primary sources, despite the fact that local raw materials were available in those areas and that closer sources were known in this period. This situation is somewhat similar to the distribution of Transdanubian radiolarites, and as in the latter case Krakow Jurassic silicites highlight the main corridors along which Neolithisation took place.

These silicites spread in two main directions. The first was along the course of the Vistula (Kazimierza Mała, Samborzec) northwards to Kujavia (Grabie 4) and Chełmno-land (in the Toruń area; Kaczanowska 1987, 175; Małecka-Kukawka 1992, 37; Czerniak 1994, 18, 185, Ryc. 43). In the Chełmno-land region, Krakow Jurassic silicites occur up to the northern edge of the early LBK distribution. In addition to Krakow Jurassic silicites, a certain proportion of chocolate silicites appear at some settlements (Boguszewo 41, Nowy Dwór, Linowo 6).

The other direction in which Krakow Jurassic silicites were distributed was to the south-west. These silicites travelled through the Moravian Gate and into what is now Moravia, where they supplied settle-

ments that lay up to around 200 km from the primary sources (Žopy I, Kladníky, Šišma, Mohelnice; Mateiciucová 2000, 219). Here, too, other sources of raw material were available more closely to hand. Krakow Jurassic silicites were distributed in the form of prepared cores, as evidenced by core remnants and fragments, technical flakes created during the preparation of cores, and flakes and blades with cortex remnants.

Krakow Jurassic silicites were also used in the form of natural pieces and their smooth surface is evidence for their origin in fluvial and glacial gravels (Kazimierza Mała, Kladníky, Kraków-Mogiła 62; Caspar, Kaczanowska & Kozłowski 1989, 159; Mateiciucová 2000, 219).

To the south and south-west, the material penetrated even further in isolated instances. Several examples have been found at Bylany I in east Bohemia (Lech 1989a). They also appear in south Moravia at Brno-Ivanovice and at Vedrovice “Za dvorem”, as well as in Lower Austria at the settlement of Rosenberg I (Mateiciucová 2000; 2001a). The most southerly occurrence known to date is at Budapest-Aranyhegyi út⁶⁸ (Biró 1998, 46, 145–146).

In Eastern Slovakia, Krakow Jurassic silicites do not occur in the earliest phase of the Eastern LBK (AVK) (Kaczanowska & Kozłowski 1997), even though the obsidian that dominates this region was already being distributed into Little Poland at this time (Kazimierza Mała).

The end of phase I and the middle phase of the LBK

At the end of phase I of the LBK, Krakow Jurassic silicites travel ever more often to the south-west (**maps 7 & 26**). They appear for the first time in the Vienna Basin at the Brunn I settlement and have also been found in the Waldviertel region (Mold; Mateiciucová 2001b). Krakow Jurassic silicites make up a considerable proportion of the assemblages from the cemeteries at Kleinhadersdorf and Vedrovice “Široká u lesa”. In both cases, they appear mainly in the form of blades and transverse arrowheads and were deposited primarily in male graves (Mateiciucová 1998; 2002a).

The distribution network stabilised during the middle phase. On the one hand, the distribution of Krakow Jurassic silicites to distant areas to the north, where they had predominated at the beginning of the LBK, died away. In the Chełmno-land and Kujavia, they were replaced by local erratic silicites and chocolate silicites, the sources of which were closer. On the

other hand, Krakow Jurassic silicites became the most important raw material in the eastern part of central Europe and supplied settlements up to 250–330 km distant. It seems likely that this mass distribution is directly linked to the mining of these silicites, although direct evidence of this is lacking (Lech 1981; 2003).

Krakow Jurassic silicites predominated in five major settlement regions. To the east, they supplied settlements in the catchment of the San in south-east Poland (Rzeszów-Staromieście, Kraczkowa) and in the Sandomierz Basin (Trebisławice; Kaczanowska & Lech 1977, 9; Caspar, Kaczanowska & Kozłowski 1989, 172). In Lower Silesia and east Bohemia they displaced the erratic silicites that had predominated in the early period (Muszkowice, Niemcza, Skoroszowice, Močovice, Bylany II; Kaczanowska & Lech 1977, 9; Caspar, Kaczanowska & Kozłowski 1989, 166; Lech 1989a, 112, 117; Pavlů 1998a, 65). Krakow Jurassic silicites also held a dominant position in north Moravia, along the Morava and its tributaries (Mohelnice, Práslavice-Kocourovce, Žopy II, Domaželice, Količín; Mateiciucová 1997a; 2001b).

As in the early phase of the LBK, Krakow Jurassic silicites were distributed in the form of prepared cores in particular (Lech 1981, 218). This form of distribution has been demonstrated in Moravia, even to distant settlements (Mateiciucová 1992; 1997a). It is possible that these silicites were also distributed in the form of blade blanks (Kaczanowska 1985 55; Lech 1997, 225).

In the middle phase, Krakow Jurassic silicites even travelled to very distant regions. To the south, the most distant occurrences are recorded at the settlements of Bicske-Galagonyás and Mentshely-Murvagödrök in Transdanubia (Makkay, Starnini & Tulok 1996, 160–163; Biró 1998, 47, 149–152). They have even appeared in the Vinča culture in Romania. At the site of Satchinez, some 480–490 km distant, they were found in horizon A2–A3, which is roughly contemporary to the middle phase of the LBK (Biró 1998, 49). However, the most distant points to which Krakow Jurassic silicites are known to have been distributed are the settlements of Żelecin and Żukow in western Pomerania, some 750 km from the primary source (Caspar, Kaczanowska & Kozłowski 1989, 168–169).

The late phase of the LBK

At the end of the LBK, the development known from the middle phase continued. However, in the majority of the more distant sites the proportion of Krakow Jurassic silicites in assemblages decreased by around a third, while there was an increase in the use of other raw materials from nearer sources

68 At Budapest-Aranyhegyi út, the settlement of the earliest phase of the Linear Pottery culture was accompanied by settlements of the Želiezovce group and the Lengyel culture. As the chipped industry from the site was analysed as a single unit (Biró 1998, 46, 145–146), the presence of artefacts made from Krakow Jurassic silicites in the earliest phase of the LBK should be regarded as uncertain.

(maps 8 & 27). It is possible that the acquisition of raw materials and their movement became less regular, creating a need to ensure that raw materials from other sources were also available.

A peculiar feature of this period is that Krakow Jurassic silicites were not distributed solely within the framework of the Želiezovce group, which also existed around Krakow (Kraków-Mogiła; Caspar, Kaczanowska & Kozłowski 1989, 159), but also spread into areas in which Šárka ceramics had appeared and even into the *milieu* of the Bükk culture (Humené, Šarišské Michaľany, Borsod-Edelény, Balsa-Fecskepart) (Biró 1998, 38, 43, 48, 49; Kaczanowska 1985, 47, 57). At Strachów, a settlement of the Šárka group in Lower Silesia, the proportion of Krakow Jurassic silicites remained relatively high. Even here, however, they were ever more often replaced by erratic silicites (Lech 1997).

At Bylany III in east Bohemia, raw materials from areas to the west began to take an important place alongside Krakow Jurassic silicites and erratic silicites (Přichystal 1985; Lech 1989a). Krakow Jurassic silicites are still distributed to north Moravia, but are only known from a small number of assemblages of this period (Řimice-“Bílá lhota za školkou”, Držovice-“Hrubý Háj”, Dub nad Moravou), or in places where the chipped stone comes from multi-phase settlements with mixed features (Mohelnice).

In western Slovakia, Krakow Jurassic silicites appear in larger quantities (Borovce; Kaczanowska 1985, 26). In south-eastern Poland they are complemented by Volhynian flint, Świeciechów silicites and obsidian (Rzeszów-Piastów; Kaczanowska & Lech 1977, 9). They rarely appear in the Chełmno-land and Kujavia.

Isolated artefacts made of Krakow Jurassic silicites occur as far south as Lower Austria (Asparn-Schletz), Transdanubia (Budapest-Aranyhegyi út), south-eastern Slovakia and the Tisza valley (Balsa-Fecskepart, Tiszaföldvár-Téglagyár; Biró 1998, 38, 41, 46, 110, 120, 145–146).

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic and during the Late Neolithic, the distribution of Krakow Jurassic silicites changed (maps 9 & 28), as they lost their supra-regional importance. The areas previously supplied *en masse* with this raw material suddenly lost contact with the source area and mainly began to make use of local erratic silicites complemented by other raw material types (see below chapter 7.2.6.). The erratic silicites perhaps came into favour because of the ease of access, which did not require the organisation of larger groups. Although Krakow Jurassic silicites do appear in the Stroke-Ornamented Ware and Lengyel

cultures, this is only in the form of individual artefacts.

In Lower Silesia, east Bohemia and Moravia, where the Stroke-Ornamented Ware culture developed, Krakow Jurassic silicites were replaced by erratic silicites (Mateiciucová 2001b). A somewhat larger proportion of Krakow Jurassic silicites occurs in western Slovakia, where the Želiezovce group continued into the Lengyel culture (Pečeňady, Budmerice, Svodín; Kaczanowska 1985, 81; Kaczanowska & Kozłowski 1991, 30). In Moravia, Krakow Jurassic silicites were in use at Olomouc-Slavonín in a Stroke-Ornamented Ware context (Kazdová, Peška & Mateiciucová 1999, 139), at Těšetice-Kyjovice in both Stroke-Ornamented Ware and early Moravian Painted Ware contexts, and at Pavlov in the early Moravian Painted Ware context (Přichystal 1984, 207; Kaczanowska 1985, 81; Oliva, Neruda & Přichystal 1999, 269).

To the west, the furthest extent of the distribution of Krakow Jurassic silicites reached Chrástany near Rakovník (430–440 km), where they have been identified in a Stroke-Ornamented Ware pit (Lech 1993).

These silicites also appear in the early Moravian/Austrian Painted Ware culture in Lower Austria, at Schletz (Mateiciucová & Trnka 2005, 164). In Hungary they are known from southern Transdanubia (Villánykövesd) and the Alföld plain (the cemetery at Aszód), where they are some 500 km from the primary source (Kaczanowska 1985, 81; Biró 1998, 50–51, 62, 274).

Summary: the distribution of Krakow Jurassic silicite

- 1) In the Mesolithic, Krakow Jurassic silicites penetrated in limited quantities into south Moravia and south-western Slovakia.
- 2) To date, Krakow Jurassic silicites have been identified in neither the Starčevo culture nor the Körös culture.
- 3) In the early phase of the LBK, Krakow Jurassic silicites were the main raw material supplying settlements in the Chełmno-land and Kujavia regions (at the northern edge of the early LBK distribution), which are some 360 km from the primary source. The extent and volume of the distribution mark out the main direction of Neolithisation in the north-eastern part of central Europe; the major axis of communication at this time was along the Vistula.
- 4) Even in the early phase of the LBK, these silicites also predominated in north Moravia. In east Bohemia and Lower Austria, by contrast, they were either entirely absent or of only secondary importance (Přichystal 1985; Lech 1985; 1989a). They are also absent from the earliest phase of the Eastern LBK (AVK).
- 5) At the cemeteries of Kleinhadersdorf and Vedrovice “Široká u lesa”, the majority of chipped stone

artefacts were made from Krakow Jurassic silicites even though other sources of raw materials were accessible nearby. At these sites, they formed part of the inventories of male graves in particular.

6) In phase II of the LBK, the distribution of Krakow Jurassic silicites increased in intensity. At this time, they clearly predominated in settlements within a radius of up to 330 km and were the most important raw material for the production of chipped tools in south-east Poland, the Sandomierz Basin, north Moravia, Lower Silesia and east Bohemia. Beyond this boundary, they appear only occasionally. As stray artefacts, they occur as far south as Banat in Romania (480–490 km), in the *milieu* of the Vinča culture, and north-westwards they reached western Pomerania (750 km). To the north, on the Lower Vistula – where they had previously predominated – they now appear only rarely.

7) In the late phase of the LBK, the developments of the middle phase continued. Distant areas continued to be supplied with Krakow Jurassic silicites as their main raw material, but this was ever more often complemented by raw materials from other sources. Krakow Jurassic silicites also appear in settlements of the Bükk culture.

8) At the end of the Middle Neolithic, the distribution system that had functioned during the time of the LBK collapsed. Those areas in which Krakow Jurassic silicites had been the primary raw material for virtually the whole of the LBK now oriented themselves towards closer, probably more easily accessible, raw materials. Krakow Jurassic silicites now predominated only in settlements in the immediate vicinity of their sources.

9) In the Stroke-Ornamented Ware and Lengyel cultures, Krakow Jurassic silicites were distributed over great distances, but only in limited quantities.

7.2.6. *Erratic silicites*

The appearance of erratic silicites is not dependent on a single delimited region, but rather represents a source available over a wide area. In the eastern part of central Europe, it was possible to obtain them by simple collection from glaciogenic and glaciofluvial sediments, which concentrated in north Moravia, Silesia and north Bohemia (the Varnsdorf outcropping). For Moravia and western Slovakia, the closest sources lay north of Hranice and north of Nový Jičín (Libhošťská Hůrka – Libhošť hill; Přichystal 1985, 482; 1999, 26–27).

The Mesolithic

During the Mesolithic, erratic silicites were a favourite raw material in north Moravia (**maps 5 & 36**).

Numerous Mesolithic settlements have been found directly on the moraine in the area of Příbor (Diviš 1994). At south Moravian Mesolithic sites, erratic silicites appear regularly, but in small quantities (Smolín, Přibice, Dolní Věstonice and Mikulčice; Hudec 1996; Škrdla, Mateiciucová & Přichystal 1997, 55; Mateiciucová 2001a). These silicites have also been recognised in south-western Slovakia at Sereď and Tomášikovo; the latter shows their transport over a distance of some 170–180 km (Hudec 1996).

The Starčevo and Körös cultures

To date, erratic silicites have not been identified in either the Starčevo or the Körös culture.

The early phase of the LBK

At the beginning of the LBK, erratic silicites appear fairly commonly, perhaps because of their easy accessibility (**maps 6 & 37**). On the other hand, in some areas there was a preference for Krakow Jurassic silicites despite an abundant local occurrence of erratic silicites.

In Moravia, erratic silicites were used more often in the early LBK than in later periods, but they remained of only complementary significance. At Kladníky, just a few kilometres from the moraine, they make up around 22 % of the assemblage, while the majority of the raw materials were transported from Little Poland. At early LBK settlements further south, erratic silicites appear only as individual artefacts. The most southerly occurrence known to date comes from Rosenberg I in Waldviertel (about 200 km from the closest potential source).

In Poland, erratic silicites are a local raw material in most of the settlements where they occur. To the north, along the lower course of the Vistula, some settlements had a preference for Krakow Jurassic silicites, which here were imported over a distance of 400 km (Boguszewo 41, Boguszewo 43a, Nowy Dwór, Grabie 4) (Małecka-Kukawka 1992, 61–65; Czerniak 1994, Ryc. 43).

In Lower Silesia, the chipped stone artefacts at the settlements at Stary Zamek and Gniechowice are almost exclusively fashioned out of local erratic silicites (Lech 1985, 75). In later phases of the LBK, there was a preference for Krakow Jurassic silicites in Lower Silesia. In northern Germany, at Eilsleben, Eitzum and Klein Denkte, which lie at the edge of the glacial moraine, there is also a clear predominance of erratic silicites (Kaczanowska 1990, 29; Gronenborn 1997, 56–57). They also appear occasionally at the western edge of the early LBK distribution, where their closest source is some 150–180 km to the north in the Ruhr valley (Zimmermann 1995, Abb. 2). A single, contentious example is also known from the Danube at

Mintraching, some 250 km from the closest possible source (Gronenborn 1997, 26).

The end of phase I and the middle phase of the LBK

At the end of phase I, too, occasional artefacts made from erratic silicites travelled as far as Waldviertel (Mold). They also appeared at the cemeteries at Kleinhadersdorf and Vedrovice “Široká u lesa”, albeit rarely (Mateiciucová 1998; 2002a).

In the middle phase, the settlements using a greater proportion of erratic silicites concentrated along the middle Morava at the mouth of the Moravian Gate (**maps 7 & 38**), some 40–50 km from any potential source. Further south, these silicites appear only sporadically in chipped stone assemblages.

In east Bohemia, where erratic silicites had predominated during the early phase of the LBK, they were now replaced by Krakow Jurassic silicites (Přichystal 1985; Lech 1989a, 112; Pavlů 1998a, 65). Similarly, they were replaced by imported Krakow Jurassic silicites in Lower Austria (Kaczanowska & Lech 1977, 9; Lech 1989a, 117; Milisauskas 1986, 165).

Along the Lower Vistula, in Kujavia and Chełmno-land, settlements can be divided into two groups according to their preferred raw materials. One group predominantly used local erratic silicites (Stolno 2, Podgaj ceramics), while the other was more oriented towards imported raw materials, above all chocolate silicites. Krakow Jurassic silicites almost completely disappeared from the region (Domańska 1987, 351; Małecka-Kukawka 1992, 37, 66–67; Czerniak 1994, 36–66).

Occasionally, but regularly, erratic silicites also appear on the upper Vistula and in south-eastern Poland, along the rivers San and Wisłok (Kaczanowska & Lech 1977, 9; Milisauskas 1986, 165; Caspar, Kaczanowska & Kozłowski 1989, 159, 172).

Furthermore, erratic silicites and Pomeranian Baltic silicites predominated as local raw materials at Żelecin and Żukow in Pomerania (Caspar, Kaczanowska & Kozłowski 1989, 168–169).

In Lower Silesia, there were no major changes in comparison with the early phase of the LBK, and at Eilsleben there was a continued preference for local erratic silicites (Kaczanowska 1990, 29).

The late phase of the LBK

On the basis of the incomplete information available, it seems that in the late phase of the LBK settlements continued to obtain the same raw materials as previously (**maps 8 & 39**). In Lower Austria, erratic silicites appear at the Asparn-Schletz settlement. In east Bohemia, Krakow Jurassic silicites continue to predominate, while erratic silicites play only a complementary role (Lech 1989a, 112; Pavlů 1998a, 65). The situation

is similar in Lower Silesia, where there is a continuing preference for Krakow Jurassic silicites at the expense of local erratic silicites (Lech 1997, 250). In the Kujavia region of Poland, it is generally erratic silicites that predominate in the middle phase. In the late phase at Przybramowo 3, however, they make up just 18% of the assemblage (Domańska 1987, 351). In south-eastern Poland, they continue to be distributed occasionally (Rzeszów-Piastów; Kaczanowska & Lech 1977, 9).

The end of the Middle Neolithic and the Late Neolithic

In the Middle Neolithic, striking changes occurred in the use of erratic silicites in the Stroke-Ornamented Ware culture (**maps 9 & 40**). At this time, they came to predominate in those areas where Krakow Jurassic silicites had dominated during the LBK. These changes in raw material supply are probably closely related to the transformations that took place during the demise of the LBK and which were expressed in a different cultural development. It was at this time that the already mature Stroke-Ornamented Ware culture permeated from Bohemia into Moravia. In contrast, Little Poland – from where Krakow Jurassic silicites had flowed into what is now the Czech Republic – was more under the influence of the Lengyel cultural complex. At the end of the Middle Neolithic, population mobility apparently increased and – as the archaeological finds show – there was also a population decline expressed in the shrinking of settlements and the depopulation of certain regions (Kulczycka-Leciejewiczowa 1993, 55–62, footnote 38). These different dominant cultural impulses in Little Poland and elsewhere interrupted the mutual links between regions, which ultimately led to the interruption of intensive contacts. Nevertheless, communication with the source area of Krakow Jurassic silicites, which had been so intense and regular in the LBK period, was not completely disrupted, but reduced to occasional contacts.

The high volume of Krakow Jurassic silicites distributed during the LBK was very probably obtained through mining. The mining of raw materials in turn requires a certain degree of work organisation. During the LBK, the acquisition of raw material (Krakow Jurassic silicites) might have taken the form of an annual gathering, as attested by numerous ethnographic examples. When the movement of Krakow Jurassic silicites ceased, the settlements began to use local or other more easily accessible raw materials. Their acquisition did not require the creation of organised groups, but could have been undertaken by individuals (see a similar situation with Krumlovský Les chert in south Moravia). Erratic silicites were part of these more easily accessible raw materials.

At the end of the Middle Neolithic, the erratic silicites became the primary raw material used in central and north-eastern Moravia, in east Bohemia, in north Bohemia and in Lower Silesia (Kulczycka-Leciejewiczowa 1993, 60–61; Kazdová, Peška & Mateiciucová 1999, 136–138). At the same time, they also came to be used far more intensively in central and north-west Bohemia.

On the Lower Vistula, in Kujavia and Chełmno-land, the previous influx of chocolate silicites was mostly replaced by the use of local erratic silicites.

By contrast, in the early Moravian Painted Ware cultural *milieu* of south Moravia, erratic silicites appeared only very sporadically.

Summary: the distribution of erratic silicites

1) Mesolithic sites close to the glacial moraine used erratic silicites as their primary raw material. At more distant sites these silicites appear regularly, but in limited quantities.

2) In the early phase of the LBK, erratic silicites attained supra-regional importance in some areas. They predominate in east Bohemia at Bylany I. In most regions, however, they are only of local or regional significance.

Sites in the vicinity of the sources can be divided into two groups according to the volume of raw material with which they were supplied:

- a) *settlements at which erratic silicites predominated* – these dominated in Lower Silesia, east Bohemia⁶⁹ (Bylany I) and in Lower Saxony.
- b) *settlements at which Krakow Jurassic silicites predominate* – these dominate in central and north-eastern Moravia, Kujavia and in the Chełmno-land.

3) In the middle phase of the LBK, erratic silicites are of local or at most regional significance. In many settlements in Lower Silesia and east Bohemia, they were replaced by imported raw materials. By contrast, in Kujavia and Chełmno-land erratic silicites and chocolate silicites replaced the previously preferred Krakow Jurassic silicites.

4) In the late phase of the LBK, the situation in Moravia, east Bohemia and Lower Silesia underwent no conspicuous changes. In Kujavia, chocolate silicites came to be preferred over erratic silicites.

5) Visible changes occurred in the Middle and Late Neolithic, when erratic silicites achieved supra-regional importance. Areas that had previously preferred Krakow Jurassic silicites began to orient themselves towards the more easily accessible erratic silicites (central and north-eastern Moravia, east Bohe-

mia, Lower Silesia). Erratic silicites also predominate in Kujavia and Chełmno-land, while the previously favoured chocolate silicites now occur only occasionally.

6) Erratic silicites appear only very sporadically in south Moravia and the other regions to which the Lengyel complex spread in the Late Neolithic, as their source areas were settled by Stroke-Ornamented Ware communities at this time.

7.2.7. Siliceous weathering products of serpentinites

In Moravia and Lower Austria, two primary sources of siliceous weathering products of serpentinites are known. One lies in south-western Moravia close to Jevišovice, while the other is in Waldviertel near Japons. In Waldviertel, it is also possible to collect siliceous weathering products of serpentinites from riverine sediments (on the Kamp). The geological situation in these areas indicates that siliceous weathering products of serpentinites might also have formed elsewhere, and it is therefore necessary to take account of other potential sources in addition to the outcrop near Japons. Material from both sources was used only locally throughout prehistory and was of more or less secondary importance, except during the Mesolithic and the Moravian Painted Ware period (Jevišovice, Bojanovice, Jiřice, Černín; Kovárník 1994, 168).

The Mesolithic

Siliceous weathering products of serpentinites of the Japons type were an important raw material for the Mesolithic sites in the immediate area (Horn-Mühlfeld, Burgschleinitz). Nevertheless, at some of these sites they were merely a supplement to Krumlovský Les cherts (Horn-Mühlfeld, Kamegg). So far, they have not been recognised at Mesolithic sites further from their primary sources (**maps 5 & 41**).

Siliceous weathering products of serpentinites also occur in isolation at Mikulčice in south-east Moravia; these examples are, however, highly likely to have been of south Moravian origin (Škrdla, Mateiciucová & Přichystal 1997, 55).

The Starčevo and Körös cultures

To date, siliceous weathering products of serpentinites have not been identified in either the Starčevo or the Körös cultures.

The early phase of the LBK

Areas close to the source of the Japons variety of siliceous weathering products of serpentinites were also settled in the early phase of the LBK. In contrast to the situation in the Mesolithic, however, the source

⁶⁹ Although erratic silicites are not a local raw material in east Bohemia, its sources can be classified as closer than those of Krakow Jurassic silicites or others.

remained almost unnoticed and priority was instead given to Bakony radiolarites (Rosenburg I, Strögen).

The distribution of siliceous weathering products of serpentinites in Moravia during this period remains obscure (**maps 6 & 42**).

The end of phase I and the middle phase of the LBK

At the end of phase I of the LBK, siliceous weathering products of serpentinites of the Japons variety came to be used somewhat more intensively (Mold – around 20% of the assemblage; **maps 7 & 43**). The Transdanubian radiolarites that had dominated the region in the previous phase were mostly replaced by Krumlovský Les cherts, the primary sources of which lay at far greater distances than that of the siliceous weathering products of serpentinites.

Siliceous weathering products of serpentinites from the Jevišovice area only sporadically appear in assemblages dating to the end of LBK phase I and phase II. At Těšetice, which lies some 15–20 km from the source area, they form a mere 6% of the total chipped stone assemblage; here, too, the more distant Krumlovský Les cherts were preferred. Some very few artefacts made of siliceous weathering products of serpentinites have been recovered from the settlement at Vedrovice “Široká u lesa” (Mateiciucová 1992).

The late phase of the LBK

To date, no settlements dating to the late phase of the LBK have been excavated in the regions of the source areas. As this was a raw material of more or less only local significance, it is so far also absent from more distant settlements of the time.

The end of the Middle Neolithic and the Late Neolithic

The use of siliceous weathering products of serpentinites has not yet been demonstrated in the Stroke-Ornamented Ware culture (Oliva 1996, 106; Kazdová, Peška & Mateiciucová 1999).

The situation changed in the Moravian Painted Ware culture of the Late Neolithic. While siliceous weathering products of serpentinites remained of only local importance, they were used in greater quantities. Evidence for this comes above all from the concentration of producer settlements close to the source (at Jevišovice, Bojanovice, Jiřice and Černín; Přichystal 1984, 209; Kovárník 1994, 168).

In Lower Austria, the distribution of siliceous weathering products of serpentinites in this period has not yet received attention (**maps 9 & 44**).

Summary: the distribution of siliceous weathering products of serpentinites:

1) In the Mesolithic, siliceous weathering products of serpentinites of the Japons type were used at sites

in the immediate vicinity of the source. At several of these, they are merely a complement to Krumlovský Les cherts. In Moravia, siliceous weathering products of serpentinites only rarely appear in Mesolithic assemblages, and where they do are probably of south Moravian origin.

2) At the beginning of the LBK, siliceous weathering products of serpentinites of the Japons type were used in settlements not far from the source, but only as a complementary raw material. In Moravia, the distribution of siliceous weathering products of serpentinites in this period has yet to be demonstrated.

3) The use of siliceous weathering products of serpentinites of the Japons type did not greatly change at the end of phase I of the LBK.

4) The distribution of siliceous weathering products of serpentinites at the end of the LBK has not yet been demonstrated.

5) So far, no great attention has paid to the distribution of siliceous weathering products of serpentinites in the Stroke-Ornamented Ware culture in either Moravia or Lower Austria. In the Moravian Painted Ware culture, the intensive processing of siliceous weathering products of serpentinites began in south-western Moravia, but the material was never more than locally significant.

7.2.8. Spotted Świeciechów silicite

The Mesolithic

To date, Świeciechów silicites have not been identified from any Mesolithic sites in Moravia or Lower Austria (**map 5**).

The Starčevo and Körös cultures

For now, Świeciechów silicites are unknown in both the Starčevo culture and the Körös culture.

The early phase of the LBK

It was only at the beginning of the LBK that Świeciechów silicites began to be distributed over notable distances (**maps 6 & 58**). Assemblages contain examples with partially smoothed original surfaces (Kazimierza Mała), which indicates that they were selected from gravels. At the same time, their limited occurrence implies that they were probably found by chance, rather than some settlements being oriented specifically towards their acquisition from primary sources.

Towards the south-west, these silicites were distributed along the same routes as Krakow Jurassic silicites, but unlike the latter in only small quantities. In all settlements in which Świeciechów silicites have been found, Krakow Jurassic silicites also appear.

They spread upstream along the Vistula (Samborzec, Kazimierza Mała 1, Kraków-Mogiła 62), through the Moravian Gate to the upper Morava valley (Mohelnice) and apparently from there westwards to the Labe (Elbe). The furthest site at which they occur is Bylany I near Kutná Hora⁷⁰, some 480 km from their primary source (J. K. Kozłowski 1971a, 139; Kaczanowska 1987, 175; Lech 1989a, 112; Gronenborn 1997, 110). They have not yet been recognised in settlements along the Lower Vistula (Małecka-Kukawka 1992, 37).

The end of phase I and the middle phase of the LBK

In the middle phase of the LBK, Świeciechów silicites were still used only peripherally (**maps 7 & 59**). Even at this time they did not penetrate northwards to the Lower Vistula, but rather travelled once again upstream to the south-west (Trzebisławice). In contrast to the early phase of the LBK, their distribution stops south of the Krakow-Czestochowa highlands (Olszanica⁷¹) and does not continue into Moravia and Bohemia. Świeciechów silicites also begin to appear again in south-eastern Poland (Rzeszów-Staromieście, Kraczkowa, Kormanice), where in comparison to other areas they make up a greater proportion of the assemblages.

The late phase of the LBK

There is little evidence for the distribution of Świeciechów silicites in the late phase of the LBK (**maps 8 & 60**). At the settlement at Rzeszów-Piastów, in the catchment of the San, they make up 21 % of the assemblage and are the second most frequent raw material (Kaczanowska & Lech 1977, 9). They probably also still spread towards the south-west and their presence cannot be ruled out in Olszanica at this time (see note 70). Perhaps they also occur at Mohelnice in north Moravia, where they had already been present in the earliest phase. Surprisingly, a blade made from Świeciechów silicite was discovered at Asparn-Schletz in Lower Austria, at a distance of some 470 km from the source.

The end of the Middle Neolithic and the Late Neolithic

The distribution of Świeciechów silicites in this period has not been systematically studied for the purposes

of this paper. Thus far, Świeciechów silicites have not been recognised in either Moravia or Lower Austria, in either the Stroke-Ornamented Ware or Lengyel cultures.

It is likely that at the end of the Middle Neolithic and the beginning of the Late Neolithic, the situation known from the LBK persisted. Świeciechów silicites did not spread further north into the Chełmno-land region (Małecka-Kukawka 1992, 43). They do, however, appear at very distant sites to the west and south of the primary source. They have been identified in the Stroke-Ornamented Ware cultural *milieu* at Lobeč, north-east of Mělník in central Bohemia (Vencel 1986a, 497), which would also explain their presence in Moravia (**maps 9 & 60**). They also appeared in contexts of the early phase of the Lengyel culture at Pečeňady in south-western Slovakia (Kaczanowska 1985, 81).

Summary: the distribution of Spotted Świeciechów silicite

Throughout the duration of the LBK, Świeciechów silicites were distributed in only limited quantities into areas not far from their sources.

During the LBK period, they do not appear in northern Poland or Lower Silesia. It is characteristic of this raw material to penetrate into relatively distant regions (east Bohemia, Lower Austria), especially at the beginning and at the end of the LBK. They retained a similar distribution pattern at the end of the Middle Neolithic and in the Late Neolithic, when they have even been found in central Bohemia and south-western Slovakia. Their presence at great distances seems to be linked to lower settlement densities and greater mobility of the communities in these periods of upheaval. It was indeed this decrease of population that made at least occasional contacts necessary, above all for social reasons. The limited quantities of imported raw materials may actually be evidence for this.

7.2.9. Chocolate silicite

The Mesolithic

Chocolate silicites were closely linked to the Late Mesolithic Janisławice culture (**maps 5 & 53**), which is also credited with the extraction of these raw materials (Tomaszów; Schild, Królik & Marczak 1985; Schild 1995a).

In the Mesolithic, chocolate silicites predominated at sites within a radius of 50 km from their primary source (Cyrek 1981, 63–67; Schild 1995a, 465). They also spread in small quantities over much greater distances of up to almost 450 km. In Moravia they appeared at the Mesolithic sites of Smolín, Přibice and Dolní Věstonice (Hudec 1996; Mateiciucová 2001a);

⁷⁰ Recently, I was able to identify a single blade made of Świeciechów silicite in the chipped stone assemblage from Brunn IV (some 500km from the source). The site is later than Brunn IIa and Brunn IIb, but older than Brunn I (Stadler 2005, 270).

⁷¹ The settlement at Olszanica dates to both the middle and the Żeliezowce phase. The chipped stone industry from both phases was analysed as a single unit (Caspar, Kaczanowska & Kozłowski 1989, 159; Milisauskas 1986, 165). For this reason, it is impossible to rule out the possibility that artefacts made from Świeciechów silicites might come from the late Żeliezowce phase.

they are also known from the site at Hořín III in Bohemia (Přichystal 2000) and have been identified at Mostová in south-western Slovakia (Hudec 1996). In Lower Austria chocolate silicites have not yet been found in Mesolithic contexts. Only a single, contentious example has been found at the Late Mesolithic site of Jászberény III in northern Hungary.

The Starčevo and Körös cultures

Until now, chocolate silicites have not been recognised in the Starčevo or Körös cultures (Starnini 1994; Starnini & Szakmány 1998; Mateiciucová 2007).

The early phase of the LBK

In the early phase of the LBK, chocolate silicites are found only occasionally (**maps 6 & 54**). Along the Lower Vistula, in the Kujavia and Chełmno-land regions, they complemented the supply of Krakow Jurassic silicites, which predominated in most settlements (Boguszewo 41, Linowo 6, Nowy Dwór, Grabie 4) (Małecka-Kukawka 1992, 18, 37; Czerniak 1994, Ryc. 43). On the other hand, chocolate silicites also spread to the south-west along the Vistula. Here, too, their distribution was only occasional (Kazimierza Mała 1, Kraków-Mogiła 62; Kaczanowska & Lech 1977, 9).

They have not yet been securely identified in the early phase of the LBK in Moravia, Bohemia, Lower Austria or Transdanubia, and are likewise absent from the earliest phase of the Alföld LBK (Biró 1987; J. K. Kozłowski 1989b; Gronenborn 1997; Kaczanowska & Kozłowski 1997). The only exception is a disputed artefact from Neckenmarkt in Burgenland (Gronenborn 1997, 20), which would have travelled 525–535 km from the primary source. Chocolate silicites do also appear at Mohelnice, but their precise classification will only be possible after the general evaluation of the site.

The end of phase I and the middle phase of the LBK

The situation changed at the end of phase I and during the middle phase of the LBK (**maps 7 & 55**), when chocolate silicites began to be distributed *en masse* to the north into Kujavia and Chełmno-land, where they displaced Krakow Jurassic silicites (Krzywosadz, Radziejow Kujawski 5, Straszewo 47, Strzelce 2, Łojewo 35, Miechowice 7, Kornatowo 14; Kaczanowska & Lech 1977, 9; Domańska 1987, 351; Małecka-Kukawka 1992, 37; Czerniak 1994, 36–66, 116). Local raw material resources were used in only a few settlements at this time, which has led to considerations about the survival of Mesolithic communities (Czerniak 1994, 57).

With the exception of the Lower Vistula, chocolate silicites only spread into other areas in isolated

instances; nevertheless, they were capable of reaching very distant areas. Their distribution is tied to the major watercourses.

To the north, they have been found along the lower Oder in western Pomerania (Żelecin and Żukow; Caspar, Kaczanowska & Kozłowski 1989, 168–169). They also appear at a range of sites in south-eastern Poland, areas much closer to the source than Kujavia and Chełmno-land. However, they still play only a complementary role here (Rzeszów-Staromieście, Kraczkowa; Milisauskas 1986, 165; Caspar, Kaczanowska & Kozłowski 1989, 172).

They reached Lower Silesia by travelling upstream along the Vistula (Trzebisławice, Olszanica) and then along the Oder valley (Skoroszewice, Niemcza; Kaczanowska & Lech 1977, 9; Milisauskas 1986, 165; Lech 1989a, 117). They are also known from east Bohemia at Bylany II (Lech 1989a, 112) and from south-western Slovakia at the settlement at Velký Grob (Kaczanowska 1985, 26–73).

The late phase of the LBK

Developments begun in the middle phase continued during the late phase of the LBK (**maps 8 & 56**). The number of known settlements is substantially lower and probably at least partly reflects a real decline in population density.

In the Kujavia region, chocolate silicites were still preferentially used (Brześć Kujawski 4; Domańska 1987, 351; Czerniak 1994, 56–57, Ryc. 43). It is likely that a similar scenario was played out in the Chełmno-land, where some mid-LBK sites were also settled in the late phase (Wieldzadz 31, Lisewo 31; Małecka-Kukawka 1992, 18, 37). In other areas, as in the preceding period, chocolate silicites appear only in limited quantities. They were also imported into the Bükk cultural *milieu* (Malé Raškovce, Borsod, Balsa-Fecskepart; Kaczanowska 1985, 47, 57; Biró 1998, 38, 43, 49, 110, 161), which they may have reached from south-eastern Poland (Rzeszów-Piastów; Kaczanowska & Lech 1977, 9). They have not been found at Strachów in Lower Silesia (Lech 1997, 250), but do again appear in east Bohemia (Bylany III; Lech 1989a, 112). It may be assumed that some of the chocolate silicite artefacts found at Mohelnice in north Moravia will also be found to date to this period.

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle and in the Late Neolithic, changes in the distribution of chocolate silicites occurred (**maps 9 & 57**). At this time, they cease to supply the lower course of the Vistula, where there is a complete predominance of local raw materials. Chocolate silicites did not, however, completely lose their supra-regional importance. In contrast to the

earlier period, their distribution becomes oriented southwards, to the *milieu* of the Lengyel culture complex. At several Lengyel culture sites in Slovakia, they were employed to make over a third of the chipped stone artefacts (Pečeňady, Ižkovce; Kaczanowska 1985, 81; Biró 1998, 63, 281).

In the early Moravian/Austrian Painted Ware culture, chocolate silicites appear regularly in the chipped stone assemblages of south and central Moravia (Těšetice-Kyjovice, Jezeřany-Maršovice, Horákov), for the first time since the Mesolithic (Mateiciucová 2001b, 219). They may also be expected to appear in Lower Austria, where no particular attention has yet been paid to their distribution. A single example has been identified in the assemblage from Eggendorf am Walde in Waldviertel, but they have not been found at Kamegg or Schletz (Mateiciucová & Trnka 2004; 2005).

In the Late Neolithic, chocolate silicites spread as far as Transdanubia (Zengővárkony, Villánykövesd; Biró 1998, 62–63, 274, 278–279).

Setting aside the occurrence of chocolate silicites at Węgiec 12 in the Kujavia region, where stroke-ornamented elements dominate the ceramics (Domańska 1987, 351; Czerniak 1994, 60–66, Ryc. 43), chocolate silicites have yet to be identified in the Stroke-Ornamented Ware cultural *milieu*.

Summary: the distribution of chocolate silicite

- 1) During the Mesolithic, chocolate silicites, closely associated with the Late Mesolithic Janisławice culture, played an important regional role. They were also found in Moravia and south-western Slovakia at this time, albeit rarely.
- 2) In the early phase of the LBK, chocolate silicites spread along the Vistula in particular. Most appear as rather isolated pieces. To the north, in the Kujavia and Chełmno-land regions, they complemented supplies of Krakow Jurassic silicites. To the south-west, they certainly travelled as far as the Krakow region.
- 3) In the middle phase of the LBK, the distribution of occasional artefacts significantly extended its scope, primarily to the west and south-west (Pomerania, east Bohemia, south-west Slovakia). In the Kujavia and Chełmno-land regions, they replaced both local erratic silicites and imported Krakow Jurassic silicites.
- 4) In the late phase of the LBK, the distribution of chocolate silicites was similar to that in the middle phase of the LBK. Occasional imports also appear in the Bükk culture.
- 5) In the Late Neolithic, chocolate silicites penetrate far to the south. They regularly appear in small numbers in south Moravia, in the Moravian Painted Ware cultural *milieu*.
- 6) Chocolate silicites have thus far not been identified from either the Mesolithic or the Neolithic in Low-

er Austria, except at the settlement at Eggendorf am Walde.

7.2.10. Carpathian obsidian and Banat silicite

The Mesolithic

Carpathian obsidians (**maps 5 & 45**), particularly the transparent variety from the Slovakian part of the Zemplén mountains, were used by foraging groups exploiting the immediate area (Barca I; Bárta 1965, 162). In the Late Mesolithic, areas of eastern Slovakia (Ružín-Medvedia jaskyňa, literally: Bear cave) were penetrated by hunters using obsidian and limnosilicite blades clearly made by pressure technique. The pressure technique and the overall appearance of the blades were somewhat foreign elements in the Mesolithic of Slovakia and Hungary – the closest known analogies come from the Janisławice culture. Again, as in the Janisławice culture, these blades are linked to influences from the northern Black Sea region, and specifically to the already Early Neolithic Kukrek culture (Domańska 1990a; 1990b; Bárta 1989; 1990).

Even during the Mesolithic, the existence of long-distance contacts is illustrated by the appearance of Carpathian obsidians, extending far beyond the limits of group territories. As with other easily recognisable raw material types, tracing their distribution reveals how apparently very distant, and perhaps in some periods isolated, groups of Mesolithic foragers were linked to each other. In this respect, obsidian is above all important for the creation of a model of the beginnings of the Neolithic in the south-eastern part of central Europe, as it was distributed in both Mesolithic and Early Balkan and central European Neolithic cultures. Moreover, unlike other types of raw material, it can generally be reliably differentiated from obsidians of other provenience with the aid of neutron activation analysis.

At greater distances from their sources, obsidians spread as isolated artefacts. They appear at the Mesolithic sites of Jászberény I, II and III and at Jásztelek I, where there was a preference for limnosilicites from the Mátra mountains (Kertész *et al.* 1994, 24, 29). The presence of Carpathian obsidians is known from relatively far to the south, in the Iron Gates region, some 405–440 km from their primary source (Lepenski Vir I, Padina A1; Radovanović 1981; Kozłowski & Kozłowski 1984, 261; Gronenborn 1997, 106). In addition to the distribution of isolated artefacts, there are exceptional sites to which even large quantities of raw material have been imported over great distances (Ciumești II; Kertész 1994a, 34). This is reminiscent of the later Körös culture, when even distant settlements were supplied predominantly

by Carpathian obsidian. The main axes of communication were the Tisza and the lower Danube.

Obsidians also penetrated to the south-west and west, into Transdanubia (Kaposhomok), south-western Slovakia (Mostová) and south Moravia (Smolín and Příbice; Kertész 1993, 89; Hudec 1996; Škrdla, Mateiciucová & Přichystal 1997, 55; Mateiciucová 2001a). Their distribution in the Mesolithic is evidence for lively contacts linking the Balkans to central Europe.

The Körös and Starčevo-Criş cultures

In addition to the distribution of Carpathian obsidians, attention is here also given to the distribution of Banat silicites. They were a favourite raw material at this time, and the tracing of their distribution might shed further light on the origins and beginnings of the Neolithic in the Balkans and central Europe.

Carpathian obsidians were used intensively in the Körös and Starčevo-Criş cultures, despite the fact that their sources lay outside the area settled by these Early Neolithic Balkan cultures (maps 6 & 46). The transparent variety – Carpathian obsidian 1 – was particularly sought after. Its source lies on the Slovak side of the Zemplén mountains. The non-transparent and dark grey variety – Carpathian obsidian 2 – from the Tokaj mountains and the Mád mountains in north-eastern Hungary appears only rarely (Starnini 1994; Biró 1998, 33; Mateiciucová 2007). It may be presumed that early farmers knew the location of the source through Mesolithic foragers, rather than through their own prospection of unknown regions. Obsidian was apparently an important article of exchange between the Mesolithic and early agricultural communities.

Unfortunately, we lack any more detailed information regarding the Mesolithic communities living close to the primary sources of obsidian; there is also a lack of radiocarbon dates. Radiocarbon dates available from the Mesolithic site at Jászberény I (layer C) fall into the later Boreal and the onset of the Atlantic (Kertész 2002, 29), and it may be assumed that the age of the typologically later surface sites around Jászberény and Jásztelek is not much lower than some of the dates obtained from sites of the Starčevo and Körös cultures. It is thus probable that the area around the primary obsidian sources was settled by Mesolithic communities at the time early farming societies were developing in the Balkans.

In the Körös culture, obsidian was used to produce long, regular blades, but also a small chipped industry. The latter appears in the form of cores and preparation flakes, alongside blades and tools. Small blades usually show signs of being worked by punch technique, while the long regular blades were probably made by pressure technique.

Banat silicites are another characteristic raw material of the Starčevo and Körös cultures, and probably occur on the pre-Balkan Plateau (maps 6 & 51). Unlike obsidian, they appear almost everywhere in the form of completed blanks or finished tools. Blades and blade tools made from Banat silicite are in general remarkably long, broad and regular. It is assumed that they were made by pressure flaking. This means that within the framework of the Körös and Starčevo-Criş cultures, two different technologies and two different patterns of raw material supply existed alongside one another. It is this very fact that may attest to contacts between Mesolithic foragers and Early Neolithic farmers, perhaps completed by the eventual mixing of both populations. For this reason, it is impossible to repudiate the hypothesis of the partially local origin of the Körös culture.

Virtually all of the settlements preferentially using Carpathian obsidian lie at a distance of 100–300 km south of the primary source. This is the area of the Körös culture. To the east, the Körös culture borders the Criş culture. With the exception of Méhtelek, which together with the settlement at Tiszacsege-Homokbánya is sometimes dated to the Szatmár phase of the Alföld LBK, the assemblages recovered are small and sometimes very modest, comprising just a few artefacts. More numerous assemblages come from, for example, Ecsefalva 23, Dévaványa-Réthely-Dülö, Endrőd 23 and Furta-Csátó (Bacsikay & Siman 1987, 121–122; Starnini & Szakmány 1998, Tab. 3, Tab 4; Mateiciucová 2007). The majority of Körös culture settlements preferred obsidian, but at some sites limnosilicites predominated (Ecsefalva 23; Mateiciucová 2007).

From the maps it is clear that the Tisza and its left bank tributaries were the main axis of communication. Downstream along the Tisza obsidian penetrated far to the south, to the Danube, and into the Starčevo cultural *milieu*. The most distant occurrences known are in northern Serbia, Vojvodina and in Bosnia-Herzegovina (Starčevo, Gologút, Obre, Vinča, Vinkovci, Gornja Tuzla), in the Iron Gates region (Gura Baicului, Ostrovul Banului, Schela Cladovei, Lepenski Vir III) and along the river Olt, a left-bank tributary of the Danube in southern Romania (Balş, Velea Raii Vilcea; Willms 1982, 67, 68, 109; Kozłowski & Kozłowski 1984, 275; Kaczanowska & Kozłowski 1984–85, 27; Gronenborn 1997, 106). In settlements of the Starčevo culture, however, it now appears only sporadically, while Banat silicites play the major role (Lepenski Vir III; Kozłowski & Kozłowski 1984, 271). Banat silicites are also the primary raw material in southern parts of the Körös culture distribution (Endrőd 39, Endrőd 35; Starnini & Szakmány 1998,

Tab. 2, Tab. 4). To the north, the furthest known example of Banat silicite was found at the settlement of Méhtelek-Nádas in north-eastern Hungary (Starnini 1994).

The early phase of the LBK

For the Eastern LBK (Alföld LBK), obsidians were the most important raw materials used in the production of chipped tools (**maps 6 & 46**). Preference was given to variety 1 from the Slovak side of the Zemplén mountains. At this time, obsidian was of regional importance and supplied settlements within a radius of around 60 km from the primary source (Slavkovce, Zemplínské Kopčany, Zbudza, Zalužice; J. K. Kozłowski 1989b, 390; Kaczanowska & Kozłowski 1997, 177–210).

On settlements further west, on the other side of the Slánské vrchy upland (the northern extension of the Zemplén mountains), obsidian is not present in such quantities, accounting for only around a third of the raw material used (Čečevojce, Košice-Barca III; Kaczanowska 1985, 47; J. K. Kozłowski 1989b, 390)⁷². Even in the early phase obsidians were occasionally distributed into the territory of the western branch of the LBK; they appear in Little Poland on the upper Vistula (Kraków-Mogiła 62, Kazimierza Mała 1; Kaczanowska & Lech 1977, 9). Here, communication may have been along some of the tributaries of the Danube or along the river San, especially visible for later phases. While the finds and dating have not yet been verified, it is possible that in this period obsidians were also distributed in north Moravia, where they appear in assemblages dominated by Krakow Jurassic silicites (Mohelnice, Šišma)⁷³.

Obsidians also spread south-westwards into Transdanubia, where they have been found on the settlements at Szentlőrinc-Téglagyár and Budapest-Aranyhegyi út (Biró 1987, 145; Biró 1998, 46)⁷⁴. They are not known from Lower Austria, Burgenland or south Moravia during this phase.

The end of phase I and the middle phase of the LBK

In the middle phase of the LBK, too, the distribution of obsidian was regional in character (**maps 7 & 47**). It supplied settlements in the east Slovak lowlands in particular (Slavkovce, Zalužice, Michalovce-Hrá-

dok, Zemplínské Kopčany), but also settlements in the Košice Basin and the Šariš valley (Bohdanovce, Prešov-Šarišské Lúky; Kaczanowska 1985, 47–73, Karte 3; J. K. Kozłowski 1989b, 390; Kaczanowska & Kozłowski 1997, 184–192; Biró 1998, 49). Carpathian obsidian – although the literature does not make clear which variety – also predominates in the settlements of the Tisza valley in the north of the Alföld plain (Tiszabercel-Kerítő part, Nyirpazony; Kaczanowska 1985, 47–73, Karte 3).

Obsidians spread into the area of the western branch of the LBK primarily via the northern route. They appear in settlements along the San and Vistula (Rzeszów-Staromieście, Kraczkowa, Kormanice, Trzebisławice, Kraków-Mogiła, Olszanica; Kaczanowska & Lech 1977, 9; Milisauskas 1986, 165; Caspar, Kaczanowska & Kozłowski 1989, 159, 172), albeit in limited numbers. From here, they penetrated further west along with Krakow Jurassic silicites. They appear at Skoroszewice in Lower Silesia (Lech 1989a, 117) and along the river Morava in northern Moravia, which they probably reached via the Moravian Gate (Količín-“Na újezdě”, Mezice-“Za kovárnou”; Janšák, 1935, 33). Several obsidian artefacts have also been identified at Hurbanovo in south-western Slovakia (Kaczanowska 1985, 26). Like raw materials in other periods, it seems that the majority of the material was distributed in the form of prepared cores, as attested by the finds from Olszanica (Milisauskas 1986, 145). The distribution of complete blade blanks cannot, however, be ruled out.

During the period in which the LBK formed, obsidians also spread southward into the *milieu* of the Vinča culture (Satchinez, Parța, Fratelia, Vinča, Divostin), which developed in areas previously occupied by the Early Neolithic Körös and Starčevo cultures (Gronenborn 1997, 106; Biró 1998, 49, 65).

There is only piecemeal information regarding Banat silicites in this period (**map 7, site 150**), but it would seem that there was a decline in their use. A certain proportion of Banat silicites appears in assemblages of the Vinča A culture (Parta, Satchinez; Biró 1998, 49).

The late phase of the LBK

At the end of the LBK, the Tiszadob group, from which the Bükk culture subsequently evolved, developed in eastern Slovakia and north-eastern Hungary (Kalicz & Makkay 1977, 43–49). At this time, obsidian was a raw material of supra-regional importance (**maps 8 & 48**); it was during the time of the Bükk culture that obsidian distribution was to reach its greatest extent. In addition to being present within the range of the Tiszadob group and the Bükk

⁷² Some settlements, e.g. Barca III, are dated towards the end of phase I of the LBK and are thus not fully comparable to the settlements dated to the proto-Linear phase of the Eastern LBK (Šiška 1989, 116–122).

⁷³ At Mohelnice, the obsidian finds are more probably linked to the import of Bükk ceramics.

⁷⁴ The presence of obsidian in the earliest phase of the LBK at Budapest-Aranyhegyi út. is uncertain, as settlements of the Želiezovce group and the Lengyel culture have also been identified. Both are periods when obsidian was distributed into this region on a far greater scale.

culture itself, obsidians were exported in varying quantities to the other regional groups into which the eastern branch of the LBK (Alföld LBK) had split. They were one of the main raw materials used for tool production in settlements of the Szakálhát group (Mezőberény-Epres, Mezőberény-Laposi kert II, Tiszaföldvár-Téglagyár) and of the Esztár group (Gerla-Kasmán) in the Alföld plain (Biró 1987, 159, 161; Biró 1998, 25, 26, 39–41, 120).

In addition to supplying the former area of the Eastern LBK, the Bükk culture also supplied its western neighbour, the Želiezovce group. Particularly in the more easterly settlements of this group (Szécsény-Ultetés; Biró 1987, 154; Biró 1998, 28, 45, 138–139), obsidian was preferentially used. It was probably these sites which mediated its further distribution within the group's area.

Isolated imports of obsidians also travelled as far as south Moravia (Buchlovice), Lower Austria (Asparn-Schletz) and perhaps even Little Poland (Kraków-Mogiła, Olszanica⁷⁵; Janšák 1935, 33; Caspar, Kaczanowska & Kozłowski 1989, 159). Their furthest known occurrence to the west is in the area of the Šárka group, at Strachów in Lower Silesia, a distance of some 410–430 km from the source⁷⁶.

In addition to the spread of obsidians westwards, isolated artefacts may also have headed southwards into the Vinča culture (Parta, Vinča, Divostin; Gronenborn 1997, 106; Biró 1998, 49, 65). The distribution of obsidian within the range of the Vinča culture was apparently mediated by the Hát group, with which it maintained relations (Kalicz & Makkay 1977, 115).

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic and during the Late Neolithic, the Tisza culture appeared in eastern Slovakia and the Alföld plain (**maps 9 & 49**). To the west, the Lengyel culture built on the foundations of the Želiezovce group; in Hungary it was preceded by the Sopot-Bicske culture and in south-western Slovakia by the Lužianky group.

Certain changes took place during this period. The volume and extent of obsidian distribution dropped compared to the Bükk culture. With a few exceptions (Koláry I; Kaczanowska 1985, 81, Karte 4), obsidians were no longer a primary raw material supplied to more distant settlements. In the settlements closer to obsidian sources, too, a greater role begins to be played by other raw materials – especially the local

cherts and the Volhynian silicites imported from the east (Čičarovce, Velké Raškovce; Kaczanowska 1985, 125–126, Karte 4; Biró 1998, 63).

Obsidians were still travelling considerable distances, but in proportions that were negligible in comparison to those of other raw materials. From south-eastern Slovakia, they spread westwards in particular, into the *milieu* of the Lengyel culture. In the early phase, obsidians are a characteristic element in chipped stone assemblages from across the entire Lengyel culture area. They appear regularly not only in south-western Slovakia and Transdanubia, but also in the assemblages of the Moravian/Austrian Painted Ware culture in Moravia and Lower Austria (Eggendorf am Walde; Wentzleinsdorf, Falkenstein-Schanzboden, Schletz, Kamegg; Neugebauer-Maresch 1981, 17, 18; Kaczanowska 1985, 139; Lenneis, Neugebauer-Maresch & Ruttkay 1995, 76; Mateiciucová & Trnka 2004, 90; 2005, 164). In most settlements, they appear in the form of miniature blades and small cores (Oliva 1990; Mateiciucová 2001b, 219–220). From the *milieu* of the earliest Lengyel, obsidians also reached the Stroke-Ornamented Ware culture (Olomouc-Slavonín, Nová Ves u Oslavan, Předměřice nad Labem, Smiřice; Janšák, 1935, 32; Kazdová, Peška & Mateiciucová 1999, 138–142).

Obsidians also appear to the south, in Serbia and Croatia, within the area of the Vinča culture (Gomolava-Hrtkovci, Parta, Vinča; Kaczanowska & Kozłowski 1986, Table 1; Biró 1998, 49, 65).

Banat silicites were used in the Late Neolithic Vinča culture, especially locally (Hodoni; Biró 1998, 64). During the remainder of the Neolithic, they never again achieved the significance they had in its early phase (**map 52**). Nevertheless, they did spread, particularly in this period, over considerable distances and into the *milieux* of other cultures: they appear in the Tisza culture (Öcsöd-Kováshalom, Battonya-Parásztanya, Szegvár-Tűzköves, Hódmezővásárhely-Gorzsa) and have also been identified in a Lengyel settlement in Transdanubia (Csabdi-Télizöldes; Biró 1998, 38, 52–55, 59–60, 196–198, 254–255).

Summary: the distribution of Carpathian obsidian and Banat silicite

- 1) Both in the Mesolithic and the Neolithic, the distribution of Carpathian obsidians from the Slovak side of the Zemplén mountains, known as variety 1, predominates.
- 2) In the Mesolithic, obsidians were of regional importance. They travelled to distant areas to the west and south-west (south Moravia, south-west Slovakia, southern Transdanubia) in limited quantities.
- 3) During the Early Balkan Neolithic, the distribution of obsidian attained supra-regional significance.

⁷⁵ The appearance of obsidians at Olszanica has not, sadly, been precisely dated to a specific chronological phase. Because there is also evidence from the Želiezovce phase at the settlement, a wave of obsidian imports in this period cannot be discounted.

⁷⁶ I am grateful to J. Lech (IAE PAN Warsaw) for the opportunity to study the chipped stone material from Strachów.

They travelled primarily southwards and were favoured in the Körös culture *milieu*. They are replaced by Banat silicites in the south of the Körös area and in settlements of the Starčevo culture. Obsidians were distributed in the form of prepared cores and perhaps as blade blanks. The artefacts made from these are generally small. By contrast, Banat silicites were mostly distributed in the form of long, broad blades or blade tools. Obsidians penetrated deep into the south as occasional artefacts, reaching the valley of the Olt (Baş). Banat silicites reached the northern frontier of the Early Balkan Neolithic cultures (Méhtelek-Nádas).

4) At the beginning of the LBK, obsidians retained their regional importance for the Alföld plain. As individual artefacts they spread into Little Poland and perhaps into north Moravia, as well as into eastern Transdanubia.

5) Equally, obsidians retained their regional character in the middle phase of the LBK. At this time, they supplied the majority of settlements within the range of the Eastern LBK. In contrast to the earlier phase, they also penetrated into Lower Silesia. Banat silicites were a local raw material.

6) At the end of the LBK, the distribution of obsidians flourished in the Bükk culture. In addition to supplying its own region, this culture also supplied settlements of the related Hát group mainly on the Alföld plain. Together with ceramic imports, occasional obsidian artefacts also spread into the *milieux* of the Želiezovce and Šárka groups.

7) In the Late Neolithic, obsidians began to be replaced by other, generally local raw materials and by Volhynian silicites. Occasionally, they still travelled considerable distances and into the *milieux* of other cultures. They are characteristic of the earliest phase of the Lengyel culture and also reached the Stroke-Ornamented Ware culture. To the south, they appear in the Vinča culture. At this time, Banat silicites spread north into the *milieux* of the Tisza and Lengyel cultures.

7.2.11. Bavarian Abensberg-Arnhofen striped tabular chert

The distribution of Bavarian striped tabular cherts of Abensberg-Arnhofen type has been considered only peripherally, in order to complement the picture of distribution in the Mesolithic and Neolithic.

The Mesolithic

In this period, there is evidence for Bavarian striped tabular cherts both from Bohemia (Hůrka 4 near Český Krumlov; Vencl 1990, 238) and south Mora-

via (Dolní Věstonice “Písky”⁷⁷; **maps 5 & 64**). This raw material has not been found at Smolín, Přebice or Mikulčice (Hudec 1996; Škrdla, Mateiciucová & Přichystal 1997, 55; Mateiciucová 2001a), nor is it known from any of the Lower Austrian sites in Waldviertel (Kamegg, Burgschleinitz, Limberg-Mühlberg) or from Wien-Bisamberg.

The Starčevo and Körös cultures

The presence of Bavarian striped tabular cherts in the area of the Balkan Early Neolithic cultures has not yet been demonstrated and seems unlikely.

The early phase of the LBK

In this period, Bavarian cherts spread along the Danube (Mintraching, Strögen, Schwanfeld) and the Main to the west, where they reached the westernmost frontier of the early LBK (Ostheim-Mühlweide, Bruchenbrücken; **maps 6 & 65**). Because Middle Neolithic (according to the western European chronology) material also appears here, the presence of these Bavarian cherts in the earliest Neolithic is doubted by some scholars (Gronenborn 1997, 24, 114). On the other hand, the appearance of Bavarian striped cherts corresponds well to the western and north-western spread of Szentgál radiolarites (Mintraching, Strögen, Schwanfeld, Ostheim-Mühlweide; Gronenborn 1997, 108–110; Kazdová, Peška & Mateiciucová 1999, 141).

The middle and late phases of the LBK

In the middle phase, Bavarian striped cherts were used particularly in settlements in the source area itself (for example Hienheim; **maps 7, 8 & 66**).⁷⁸

In the late phase of the LBK, it is assumed that the tabular chert was obtained through mining (de Grooth 1994, 398). Bavarian chert of the Abensberg-Arnhofen type was distributed in Germany, in particular into regions south of the Main; only occasionally did it also travel northwards. The most northerly occurrence known is south of Kassel at Arnsbach, some 280 km away (Zimmermann 1995, 40–41).

In the middle and late phases of the LBK, this material also appears in Bohemia (Křimice and Nynice near Plzeň, Velká Černoc and Malá Černoc near Žatec, Bylany, Smiřice; Vencl 1960, 61; Přichystal 1985, 483; Lech 1989a, 112; Popelka 1991a, Table 20; Pavlů 1992, 363–364).

In Moravia, chert of Bavarian provenience has not yet been identified in this period.

⁷⁷ A core of this material is deposited in the collections of the Anthropos Institute of the Moravian Museum in Brno.

⁷⁸ In the earlier phase of occupation (middle LBK), the settlement at Hienheim displayed a preference for Abensberg-Arnhofen cherts obtained in the form of ‘loafs’ and nodules. The tabular forms were particularly used during later phases of the central European Neolithic (Davis 1975, 64–65; de Grooth 1994, Tab. 5).

The end of the Middle Neolithic and the Late Neolithic

The importance of Bavarian striped tabular cherts culminated at the end of the Middle and during the Late Neolithic (the period known as the Middle Neolithic in the western European chronology), when the Stroke-Ornamented Ware culture developed in Bohemia and eastern parts of Germany and spread into other parts of central Europe (Davis 1975, 64–89, Engelhardt & Binsteiner 1988, 23–25, Binsteiner 1992, 355–356, Zimmermann 1995, 17, 20). It was at this time that the mining of Bavarian Abensberg-Arnshofen tabular chert began on a large scale (de Grooth 1994, 398).

In this period, Bavarian striped tabular cherts appear in the Czech Republic, but with some exceptions (the hoard at Roztoky u Prahy) in only negligible quantities (**maps 9 & 67**). Their distribution to the east and north-east never reached volumes comparable to sites of the Stroke-Ornamented Ware (Stichbandkeramik), Rössen and Großgartach cultures in Germany (Zimmermann 1995, 17, 20, 21, de Grooth 1994, 391–395).

In Bohemia, this material has been found in the Plzeň region (Křimice and Nynice), in central Bohemia (Chrástany, Praha-Řeporyje, Praha-Stodůlky, Praha-Řež, Praha-Černý Vůl, Roztoky u Prahy, Slaný) and in east Bohemia (Předměřice, Plotičtš nad Labem, Smiřice, Nový Bydžov, Skřivany, Bylany, Miskovice). In north-west and north Bohemia, it has so far been recorded in only a few cases (Malá Černoc, Malé Březno, Hrobčice, Žalany; Vencl 1960, 46; 1969a, 750; 1971, 78; Davis, 1975, 87; Přichystal 1985, 483; Lech 1987, 243–245; 1989a, 112; 1993, 458–459; Popelka 1991b, 10–13; 1999, 59–63; Pavlů, Rulf & Zápotocká 1995; Zápotocká, Motýl & Vencl 1997, 594). It also travelled as far as Lower Silesia (Gniechowice; Kulczycka-Leciejewiczowa 1993, 60).

In Moravia, Bavarian striped cherts are known from the Stroke-Ornamented Ware settlements at Určice-“Záhumení”, Olomouc-Slavonín, Náměšť na Hané-“Valník”, Křižanovice near Vyškov and Těšetice-Kyjovice (ten pieces in total, of which one from grave H 5; Oliva 1996, 106; Čižmář & Šmíd 1997, 141; Kazdová, Peška & Mateiciucová 1999, 140–142, fig. 36; Čižmář & Oliva 2001). They are absent from the Stroke-Ornamented Ware settlement at Kuřim (Kazdová 1994, 30; Oliva 1996, 106).

In Moravia, this material also appears at sites dated to the Moravian Painted Ware culture (e.g. at Boskovštejn, Těšetice-Kyjovice, Mašovice in the Znojmo region and Vyškov-Dědice; Vencl 1960, 46, 61; Přichystal 1984, 207; Lech 1987, 244, 245). In Lower Austria, it has been found in the double grave of a man and a woman at the proto-Lengyel site of Friebritz and at Kamegg (Neugebauer-Maresch 1983;

1986, 203; Mateiciucová & Trnka 2004, 90). The easternmost sites at which Bavarian striped tabular cherts have been identified are a settlement of the early phase of the Lengyel culture at Budmerice in south-western Slovakia (Kaczanowska 1985, Karte 4) and the settlement of Kismórágy-Tűzkődomb in southern Transdanubia – some 590 km from the primary source (Biró 1998, 60–61, 262).

When plotting sites with Bavarian cherts on a map of Bohemia and Moravia, two major distribution areas can be made out, highlighting the two major communication arteries between Bavaria and what is now the Czech Republic. The directions of each route, as J. Lech (1987, Fig. 28) has noted, were determined by the main river courses. The first of these routes led from the middle Danube to the Prague Basin, then north via the valley of the Labe (Elbe) (Hrobčice, Malé Březno), and from there to the catchment of the Ohře or Eger (Malá Černoc; Vencl 1960, 61; Lech 1987, Fig. 28.2.; Popelka 1987, 15; 1995, 100) or upstream to east Bohemia. The second led along the Danube to Lower Austria and continued via the Morava and Dyje (Thaya) to Moravia.

Summary: the distribution of Bavarian Abensberg-Arnshofen striped tabular chert

- 1) In the Mesolithic, Bavarian striped cherts occasionally travelled as far as south Moravia.
- 2) In the early phase of the LBK, the distribution of Bavarian striped cherts has been identified both to the west and to the east of their primary source area. The main axes of distribution were the Danube, the Main and the Labe (Elbe).
- 3) In the middle and late phases of the LBK, these cherts were used particularly at the local level. Abensberg-Arnshofen chert probably began to be mined towards the end of the LBK. It was at this time that Bavarian cherts began to appear more often in Bohemia.
- 4) At the end of the Middle Neolithic and during the Late Neolithic, the distribution of Bavarian striped tabular cherts reached its greatest volume and extent. Intensive mining of the material has also been demonstrated. Bavarian striped cherts spread within the framework of the Stroke-Ornamented Ware culture in particular, although occasional imports into Lengyel *milieux* (Moravia, Lower Austria, south-western Slovakia and Transdanubia) are known.

7.2.12. Skršín, Tušimice and Bečov quartzites (North-west Bohemian quartzites)

The distribution of these north-west Bohemian quartzites is here considered primarily from the point of view of their relationship to Moravia.

The Mesolithic

In the Mesolithic, there was a preference for the use of quartzites from Skršín (Sopotnice) and Bečov (Sopotnice, Praha-Ďáblice; Vencl 1990, 238–239; Lech & Mateiciucová; 1995b, 277–278; Novák 2003, Tab. VI. 1; **maps 5 & 61**). Although these materials primarily supplied sites in the immediate area, they were also distributed to more distant areas to the west (Leupoldsdorf in Upper Franconia; Schönweiß 1991, 25). Occasionally, they also penetrated to the south-east. They have been identified in the Prague Basin (Hořín III) and reached as far as south Moravia (Dolní Věstonice-“Písky”). By contrast, Tušimice quartzite was used only sporadically in the Mesolithic, and then mainly in north-west and north Bohemia, although it has also been found at Hořín III (Vencl 1990, 238–239; Lech & Mateiciucová 1995a, 275; Přichystal 2000; Novák 2003, Tab. VI. 1.).

The Starčevo and Körös cultures

North-west Bohemian quartzites have so far not been identified in the Balkan Early Neolithic cultures, and their distribution here is not considered likely.

The early phase of the LBK

The distribution of north-west Bohemian quartzites in this period has not yet been demonstrated (Přichystal 1985; Vencl 1986a; Lech 1989a; Popelka 1999), although it may be assumed that it was used at least at the local level.

The end of phase I and the middle phase of the LBK

In the middle phase of the LBK, there was a preference for the use of Skršín quartzite (**maps 7 & 62**), which predominated in settlements located close to the primary sources (Žichov, Malé Březno, Březno u Loun, Hrobčice; Vencl 1986a, 487–488, 496–497; Popelka 1999, 50–57). It was only occasionally distributed to more distant areas. The greatest distance at which it is known is east Bohemia (Bylany II, Močovice; Lech 1989a, 112; Pavlů 1998a, 65).

Tušimice quartzite was also worked, and perhaps mined, in this period (Lech & Mateiciucová 1995a, 274–275). Its distribution ran south towards the Plzeň (Pilsen) region, where it was the main raw material at the Nynice settlement (Pavlů 1992, 363–364). Occasionally it penetrated into the same areas as Skršín quartzite.

Bečov quartzite, by contrast, occurs only rarely and its distribution is limited to the immediate area of the source (Žichov; Vencl 1986a, 487–488; Lech & Mateiciucová; 1995b, 278).

The late phase of the LBK

From the current state of knowledge, it seems that at

the end of the LBK there was a decline in the processing of Skršín quartzite and that this tendency continued into the Late Neolithic (**maps 8 & 62**). Bečov quartzite, too, appears only occasionally at this time. However, at least in sites in the immediate vicinity, Tušimice quartzite was more in favour (Chotěbudice; Popelka 1999, 38–39). In this period, north-west Bohemian quartzites spread into east Bohemia and perhaps also into Moravia. An artefact made of Bečov quartzite has been found in south-west Moravia at Nová Ves u Oslavan (information from J. Lech). Unfortunately, its cultural classification is unclear, as the site was occupied not just in the LBK period (mostly in the late phase – Šárka ceramics also appear here), but also during the Stroke-Ornamented Ware and Moravian Painted Ware periods.

The end of the Middle Neolithic and the Late Neolithic

At the end of the Middle Neolithic and during the Late Neolithic, Tušimice quartzite was also favoured and in particular supplied sites lying to the south of the source area (Nynice; Pavlů 1992, 363–364; **maps 9 & 63**). Several sherds discovered in extraction pits are associated with the Stroke-Ornamented Ware culture (Neustupný 1963, 3; Lech & Mateiciucová 1995a, 275).

Skršín quartzite was only of secondary importance at this time. In the area close to the source, where it previously predominated, it was replaced by erratic silicites, the sources of which are much further away (Chabařovice, Žalany; Vencl 1969a, 749–753; Popelka 1999, 33). A similar development, whereby erratic silicites came to predominate over previously favoured raw materials, was experienced across the whole of north and east Bohemia, Lower Silesia and north Moravia (see chapter 7.2.6.).

On the other hand, it was also during this period that Skršín quartzite spread with stroke-ornamented ceramics in Moravia (Náměšť na Hané-“Valník”). In Moravia, Tušimice quartzite also appeared (Určice-Sedliska). Sometimes, both quartzites occur together (Těšetice-Kyjovice, Olomouc-Slavonín; Kazdová, Peška & Mateiciucová 1999, 138–13; Oliva, Neruda & Přichystal 1999, 269). The distribution of Bečov quartzite was limited to the immediate area around the source (Malá Černoc).

Summary: the distribution of Skršín, Tušimice and Bečov quartzites

- 1) In the Mesolithic, Skršín and Bečov quartzites were used more often.
- 2) Bečov quartzite was a favourite raw material in the Palaeolithic and Mesolithic, while in the Neolithic it occurs rather sporadically (Lech & Mateiciucová 1995b, 277–278). Various explanations suggest

themselves – the natural surface sources, having been used in the Palaeolithic and Mesolithic, were probably exhausted in later periods, knowledge of the more abundant sources may have been forgotten in the Neolithic, or such sources may have been deliberately ignored.

3) There is a lack of information regarding the use of these quartzites in the early phase of the LBK.

4) In the middle phase of the LBK, Skršín quartzite was used intensively at the local level. Tušimice quartzite is attested south of the source area.

5) In the late phase of the LBK, there was a decline in the processing of Skršín quartzite. Tušimice quartzite continued to supply the region to the south.

6) In the Late Neolithic, the distribution of north-west Bohemian quartzites as far as Moravia is associated with the Stroke-Ornamented Ware culture. So far, they have not been identified from within the Moravian Painted Ware cultural *milieu*.

7) In the Stroke-Ornamented Ware culture, Skršín quartzite was displaced by erratic silicites coming from far more distant sources. The volume and extent of Tušimice quartzite distribution did not change. Tušimice and Skršín quartzites also occur sporadically in central and south Moravia.

7.3. Spongolite – a raw material used in the Mesolithic, but not in the LBK

Essentially, spongolites make up a certain proportion of all south Moravian chipped stone assemblages (Smolín, Přibice, Šakvice, Dolní Věstonice, Mikulčice; Hudec 1996; Škrdla, Mateiciucová & Přichystal 1997; Mateiciucová 2001a). Paradoxically, the greatest proportions of spongolites appear at the Mesolithic stations furthest from the primary sources (Dolní Věstonice, Mikulčice). This can be explained by the fact that the majority of spongolites were at this time obtained from secondary sources, such as fluvial sediments. According to A. Přichystal, spongolites appear in the river gravels of the Svitava and Svatka (Přichystal 1994, 45); in this case, the spongolites from the Dolní Věstonice and Mikulčice assemblages would be local raw materials. This is also attested by the frequently smooth natural surfaces of the artefacts.

In the LBK, spongolites hardly appear at all. The only exceptions are a few artefacts from settlements in the vicinity of the primary and secondary sources (Bořítov “Býkovky”, Bořítov “Písky”, Kuřim; Čížmář 1995).

For what reasons were they ignored for virtually the whole of the Neolithic?

It seems likely that the main causes lay in the different demands on quality, the different means of ac-

quiring raw materials, and a way of managing raw materials that differed from that of the Mesolithic.

In the Mesolithic, primarily in the Early Mesolithic, microlithic industries were produced, which did not need stone raw materials of particularly good quality. The majority of the necessary raw materials were obtained individually through free collection from fluvial and glacial gravels, or from easily accessible outcrops. The same model persisted in part at the beginning of the LBK culture.⁷⁹

It may also be presumed that due to thick forest growth the primary outcrops of spongolites may have been unknown to the Mesolithic communities, who instead selected spongolites from gravels. Thus, primary outcrops might have remained neglected for a long time.

7.4. Characteristics of the stone raw material distribution in the Mesolithic and Neolithic – a palaeohistorical framework

This chapter presents the general characteristics of the distribution mechanisms of raw materials in the Mesolithic and Neolithic of central Europe. Tables on the basis of cultural anthropological studies (see chapters 7.1.2. & 7.1.3.) then summarise the most important information regarding the utilization of raw materials in the Mesolithic and Neolithic in Moravia and Lower Austria, in order to construct a palaeohistorical framework.

7.4.1. The Mesolithic

At Mesolithic stations, raw materials of a local and regional origin were used preferentially (**maps 5 & 10**). It would seem that in their selection, the greatest significance was attached to their physical accessibility. The quality of the raw material played a secondary role, particularly in the Early Mesolithic. A diverse raw material spectrum is characteristic of Mesolithic assemblages. The manufacturers of chipped stone artefacts did not orient themselves to just one particular type of raw material, or to a particular variety, as is typical above all of the middle phase of the LBK; rather, collections contain a whole range of raw material types and varieties, often of no great quality. The cause of this variability was primarily the means by which raw materials were acquired, which is substantially different

⁷⁹ The extraction of raw material is already known in the Late Mesolithic, specifically chocolate silicites (Schild, Królik & Marczak 1985; Schild 1995a), but in this case is closely linked to high demands for quality, as the bearers of the Janisławice culture made blades by the pressure technique (Domańska 1991a).

to that of the Neolithic. Raw materials, which often bear the remains of a smooth surface, were obtained from fluvial and glacial gravels or other surface sources. This method of securing raw materials did not require any more complex form of organisation, and raw materials could be obtained more or less on an individual basis. The diversity of types also indicates greater mobility. In order to secure sustenance, Mesolithic hunters and gathers moved over spaces of around 60–80 km² (Bakels 1978, 5–9). The size of territories was dependent on the configuration of the terrain and the distribution of subsistence resources crucial for survival. The presumed territorial extents of the Mesolithic also cover the distances from which the majority of raw materials in this period come.

Demands on the quality of raw materials changed in the Late and particularly the Terminal Mesolithic, in connection with a new technology for the production of blanks that concentrated on the making of regular blades (Taute 1973/74, 76, 92–94; Kind 1992, 344; Tillmann 1993, 170–73; Gronenborn 1997, 124–30). This led to more careful selection and to a gradual orientation towards just one, high quality, raw material type (e.g. chocolate silicite in the Janisławice culture). In Moravia and Lower Austria, where evidence for the Terminal Mesolithic⁸⁰ is so far lacking, these changes are not particularly recognisable.

At the end of the Early and during the Late Mesolithic, raw materials imported over great distances begin to appear alongside raw materials of local and regional origin (Kind 1992, 344; Vencl 1993; Gronenborn 1999, 130; Mateiciucová 2001a). The quantity in which they appear is, from an economic point of view, negligible. Unlike the situation in the LBK, they appear immediately from several different geographic areas, and at relatively large distances from their sources. Their presence can be explained mainly with social needs (a developed social network), probably linked to marriage alliances. Great distances are, amongst other things, evidence for a low population density. The presence of raw materials of south-eastern origin in the south Moravian Mesolithic assemblages reveals ties to areas that functioned as centres of secondary Neolithisation (Transdanubian radiolarites and obsidians). The extensive distribution network linking central Europe to areas in the Balkans is important evidence for the developed social network that existed here long before the beginning of the Neolithic, and which formed the ideal incubator for its development, as it is through this medium that hunters and gatherers obtained the

knowledge of the existence of another world with other subsistence opportunities.

<i>Basic characteristics of Mesolithic society</i>
Hunting and gathering, low population density, mobility, settlement of broad areas territory does not take the form of owned land, raw material sources freely accessible, no cemeteries known, operation in small groups seasonal gatherings (generally a single annual gathering of many groups) individuals often change their residence in the Late Mesolithic possibly a semi-sedentary way of life and the gathering of supplies, an egalitarian society based on kinship ties.
<i>Social and/or religious character of distribution</i>
Wide range of raw materials used; in addition to local raw materials a high proportion of regional raw materials = mobility within a territory Raw materials often come from gravels = low demands on raw material quality = individual acquisition of raw materials (free collection) The presence of isolated imports from great distances = low population density, periodic celebrations and ceremonies, higher proportion of exogamy, maintenance of kinship and other social ties
<i>Economic character of distribution</i>
At the end of the Mesolithic, higher demands on raw material quality

7.4.2. The Early Neolithic

Several traits typical for Mesolithic distribution persisted even into the Early Neolithic (**maps 6 & 11**), when the spectrum of raw materials used is also relatively diverse. The proportion of regional raw materials is still relatively high in some areas. Gradually, however, raw materials of regional origin are replaced by either local or imported raw materials, which probably relates to

- a more sedentary way of life,
- shrinking territory sizes (Bakels 1978, 5–9; de Grooth 1994, 363).
- the acquisition of products and raw materials through an exchange network
- greater demands on the quality and size of stone raw materials.

In this period, too, the broad range of raw materials is evidence for their acquisition by individuals. A certain proportion of regional raw material points to the specific mobility of the communities, as related for example to complementary subsistence strategies dur-

80 The Terminal Mesolithic is known for example from sites in southern Germany (Henauhof Nord II, Henauhof Nordwest III, Rottenburg-Siebenlinden 3, Jägerhaus-Höhle 6; Kind 1992, 1997b).

ing which more distant regions, such as foothills, were visited as well (hunting, herding or transhumance).

One of the characteristic features of the Early Neolithic is the huge range over which certain raw materials are distributed, something never again repeated on such a scale in later periods. Some types of raw material even come to predominate in areas that have their own, high quality, local sources. It seems likely that in some regions at least the preponderance of imported raw materials is evidence for the movement of Neolithic or Neolithised communities into regions where local sources were not yet known. That is to say, for a certain period particular stocks of raw material were used, which could also have been periodically replenished. Only with gradual adaptation did local sources start to be used as well, or were connections forged to other raw material centres (Zimmermann 1995, 7–17; Mateiciucová 2001a; 2001b). Transdanubian radiolarites and Krakow Jurassic sili-cites in particular fall into this category.

The preponderance of imported raw materials in regions with their own, albeit less high quality, sources indicates the existence of a distribution network that also fulfilled certain economic needs. In addition to these predominant raw materials, diverse but sporadic raw material imports are characteristic, bearing evidence of ties of a mainly social character.

<i>Basic characteristics of Early Neolithic society</i>
Extensive land management predominates, settlement of large areas, low population density, small settlements or individual homesteads No large cemeteries known, territory not yet understood as being within the ownership of a particular community In addition to sedentism also a partially mobile way of life (hunting, raw materials of regional origin Raw materials obtained by free collection), group movement (predominance of raw materials of south-eastern and southern origin from great distances, their place taken by local raw materials later) Only in some areas a tendency to more intensive farming (settlements with only a few or just one farmstead = intensive farming not required), hunting (arrowheads in graves and on settlements), egalitarian society based on kinship ties
<i>Social and/or religious character of distribution</i>
a) in some areas a preponderance of imported raw materials, despite the availability of local and regional raw materials. Local raw materials predominated from the end of LBK phase I = population movement and adaptation?

b) in some areas local raw materials were used from the outset. In later phases there might be a reorientation towards imported raw materials.

Gradual orientation towards a single type of raw material – local or imported (raw material obtained directly or through an exchange network) = shrinking of territories, a more sedentary way of life

A certain proportion of raw materials from gravels = lower demands on raw material quality
= individual acquisition of raw materials (free collection)

A certain proportion of regional raw materials = maintenance of a certain degree of mobility

Presence of isolated imports from great distances = relatively low population density, settlements are built primarily along rivers that make communication over long distances easier, settlements or settlement microregions are more distant from one another, seasonal meetings (e.g. annual celebrations and ceremonies), higher proportion of exogamy, maintenance of kinship and other social ties.

Economic character of distribution

A bond forms to one type of raw material, demand for high quality raw material rises = crystallisation of an organised distribution network

7.4.3. The end of LBK phase I and the middle phase of the LBK

At the end of LBK phase I, the distribution of Transdanubian radiolarites to distant regions, or to regions with their own local or easily accessible raw materials, came to an end.

In the middle phase of the LBK, there was a heavier orientation towards a single type of raw material (**maps 7 & 12**). Complementary raw material types gradually disappear, as do those raw materials obtained from gravels. At several sites, it is possible to identify a certain degree of specialisation towards the production of blades (Kuřim, Nové Bránice; Mateiciucová 1997b, 252). Blades are larger and broader, which means that in addition to improved technology an important role was also played by the selection of high quality raw materials of appropriate size (Zimmermann 1995, 49). In this period it is probably already reasonable to assume that raw materials were being obtained through mining. This kind of activity required a greater concentration of the workforce (de Grooth 1994, 357, 398–404). It might also be expressed in the greater extent of the distribution of raw material, which of course was dependent both on the abundance of the source and on a whole range of other factors.

It is indeed the communal acquisition of stone raw materials that might have played a strong integrative role, confirming and strengthening solidarity with a greater whole (the clan, the tribe), with an importance that was thus far greater than that of the raw material itself. Such meetings, practised in various forms by the majority of modern indigenous peoples (Mauss 1990; Vivaldo 1988, 102), and which led amongst other things to the acquisition of stone raw materials, might have taken the form of celebrations and ceremonies linked to marriages, initiations, the public sealing of contracts, competitions, the exchange of foodstuffs and other raw materials and products, and last but not least the exchange of information. Given its function as an integrating agent, stone raw material also became an economic necessity, and other, closer sources were neglected. Perhaps the preference for Krakow Jurassic silicites can be understood as a fashion with a strong social and even religious sub-text (i.e. motivated by social, political and religious needs)⁸¹.

It seems that in the middle phase of the LBK, those settlements supplied with a particular type of raw material came to rely on its regular and sufficient movement, so that other raw materials were no longer required. This all indicates the creation of a to a certain degree stable, organised exchange and communication network. The orientation towards a particular type of raw material also regulated other kinds of contacts. The decreased diversity of imports might also have been influenced by greater population density, as the required degree of exogamy could be attained within a smaller area than was the case in periods and in regions with a lower population density (the Mesolithic and Early Neolithic), when partners were far more often sought outside settlements or settlement zones.

Basic characteristics of society in the middle phase of the LBK

Intensive land management predominates, cemeteries appear that are linked to territorial ownership, mainly sedentary way of life, higher population density
Settlement on less fertile soils as well, orientation towards livestock rearing and agriculture, settlement cells appear
Partial specialisation in particular activities (manufacture of standardised blades, raw material extraction)

Social and/or religious character of distribution

Orientation towards local or imported raw materials = sedentary way of life, development of exchange

Isolated imports appear less often, and are less diverse = greater density and concentration of population, lower degree of exogamy

Mass movement of imported raw materials even into areas with closer raw material sources = raw material acquisition fulfils an integrating role = economic need is to a certain extent determined by the orientation of social needs, membership in particular communities

Economic character of distribution

Mass movement of imported raw materials even into areas with closer raw material sources = orientation towards raw materials obtained by mining rich sources

Orientation towards one kind of raw material = greater demands on technical quality, raw material extraction, the appearance of a stable and organised distribution network

7.4.4. The Middle and Late Neolithic

At the end of the LBK, population density in some regions declined (Lüning 1982, 23). The development of the LBK into the Želiezovce group in south-west Slovakia and south-east Moravia, and into the Šárka group in central Bohemia, gradually led to the division of the territory of Moravia and Lower Austria into western and eastern regions, under the predominant influence of one of these cultural groups. This led to the loosening of earlier ties and the collapse of the earlier distribution network. A similar scenario was played out in other regions as well (Zimmermann 1995, 16). During this period, Moravia and Lower Austria became peripheral areas, but also a contact zone in which eastern and western influences met (**map 8**).

This trend continues to the end of the Middle Neolithic and into the Late Neolithic (in the Czech chronology). At the end of the Middle Neolithic, the decline in population apparently culminated in population movements, and the partial depopulation of some areas cannot be ruled out. The climate changed to become cooler and damper, and groundwater levels rose. It was probably for these reasons that new areas suitable for settlement began to be sought. Terrain with sandy and clayey substrates, at a greater distance from water and in higher locations, is also settled far more often. In this context, A. Kulczycka-Leciejewiczowa speaks of a crisis in settlement (1993, 55–62, 215). In the Stroke-Ornamented Ware culture raw materials of local or regional character were used (**maps 9 & 13**). As in the preceding period, the majority of settlements concentrated on one

81 To what extent the distribution range of Krakow Jurassic silicites was influenced by nearby salt beds is hard to assess.

type of raw material, but this orientation is not as exclusive as it was in the middle phase of the LBK. In addition to the dominant raw material, other types of regional and local raw material also appear more often. The decreasing population density also led to dangerous cracks appearing in the exchange network, and the workforce required for the organised extraction of raw materials disappeared. Raw materials are repeatedly taken from fluvial, glacial or tertiary (KL II) gravels⁸², and their acquisition becomes a more individual affair, without the need for a greater degree of organisation. This development particularly affected the cultural periphery. By contrast, in central areas cultural development also includes the initiation or further intensification of raw material extraction (Tušimice type quartzite, Bavarian Abensberg-Arnhofen striped tabular chert). The raw material usage model particularly in peripheral areas is more reminiscent of the situation in the Mesolithic and Early Neolithic. It is possible that the orientation to local and regional raw materials is the reflection of a partial change in the means of subsistence, caused by climatic and social changes. It is also impossible to rule out a higher degree of mobility, linked for example to a greater role of hunting in subsistence (trapeze finds) or to herding (or transhumance), as suggested by traces of settlements with Stroke-Ornamented Ware found at higher, agriculturally less attractive, altitudes (Svoboda, Čílek & Jarošová 1998, 363; Svoboda 2003b, 96).

It is characteristic of the Late Neolithic that imported raw materials – in both the Stroke-Ornamented Ware and early Austrian/Moravian Painted Ware cultures – appear only in small quantities, but that they come from all points of the compass, which indicates a lively network of mainly socially oriented contacts from which a distribution network gradually crystallised.

Basic characteristics of society in the Middle and Late Neolithic

In several areas, a decline in population, resettlement predominantly of fertile chernozems, onset of the development of new cultural centres, conflicts
Later, the less agriculturally suitable terrains are also settled = partial change of subsistence to more hunting or herding (or transhumance)

Social and/or religious character of distribution

Higher proportion of regional raw materials and raw materials from gravels = population decline in peripheral areas, greater mobility (renewed importance of hunting)?, individual acquisition of raw materials (free collection)

More frequent appearance of isolated imports from great distances = population decline, greater proportion of exogamy

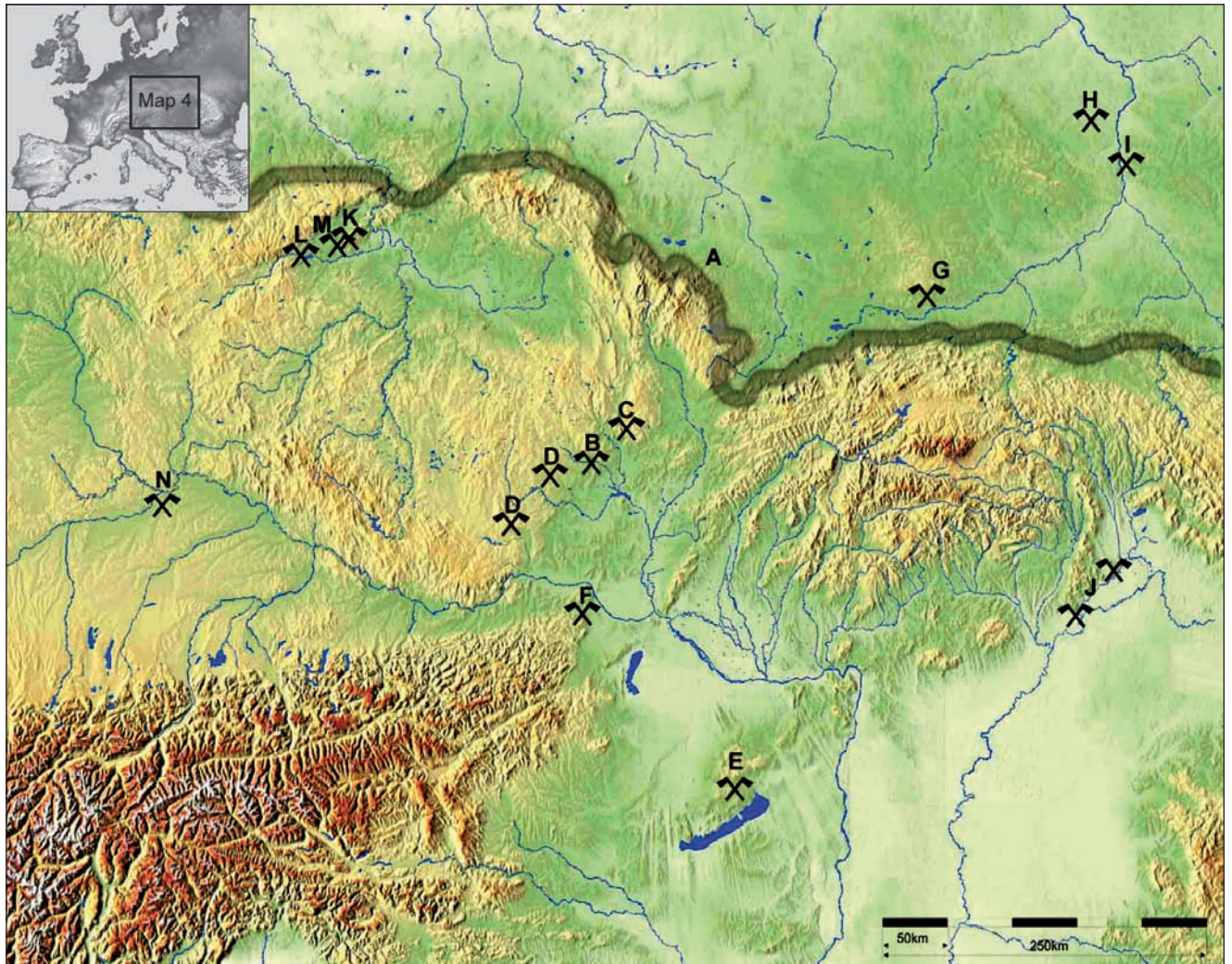
Preponderance of regional raw materials even in areas where local raw materials were previously employed preferentially = movements of communities of the Stroke-Ornamented Ware culture to the north, under pressure from the early Moravian Painted Ware culture, exhaustion of outcrops of local raw materials?

Regular presence of raw materials of western origin in the Stroke-Ornamented Ware culture, and of raw materials of south-eastern origin in the early Austrian/Moravian Painted Ware culture = the division of Moravia and Lower Austria into two cultural regions
Mass movement of imported raw materials replaced by sources closer at hand = differential cultural development in previously connected areas, the depopulation of several regions.

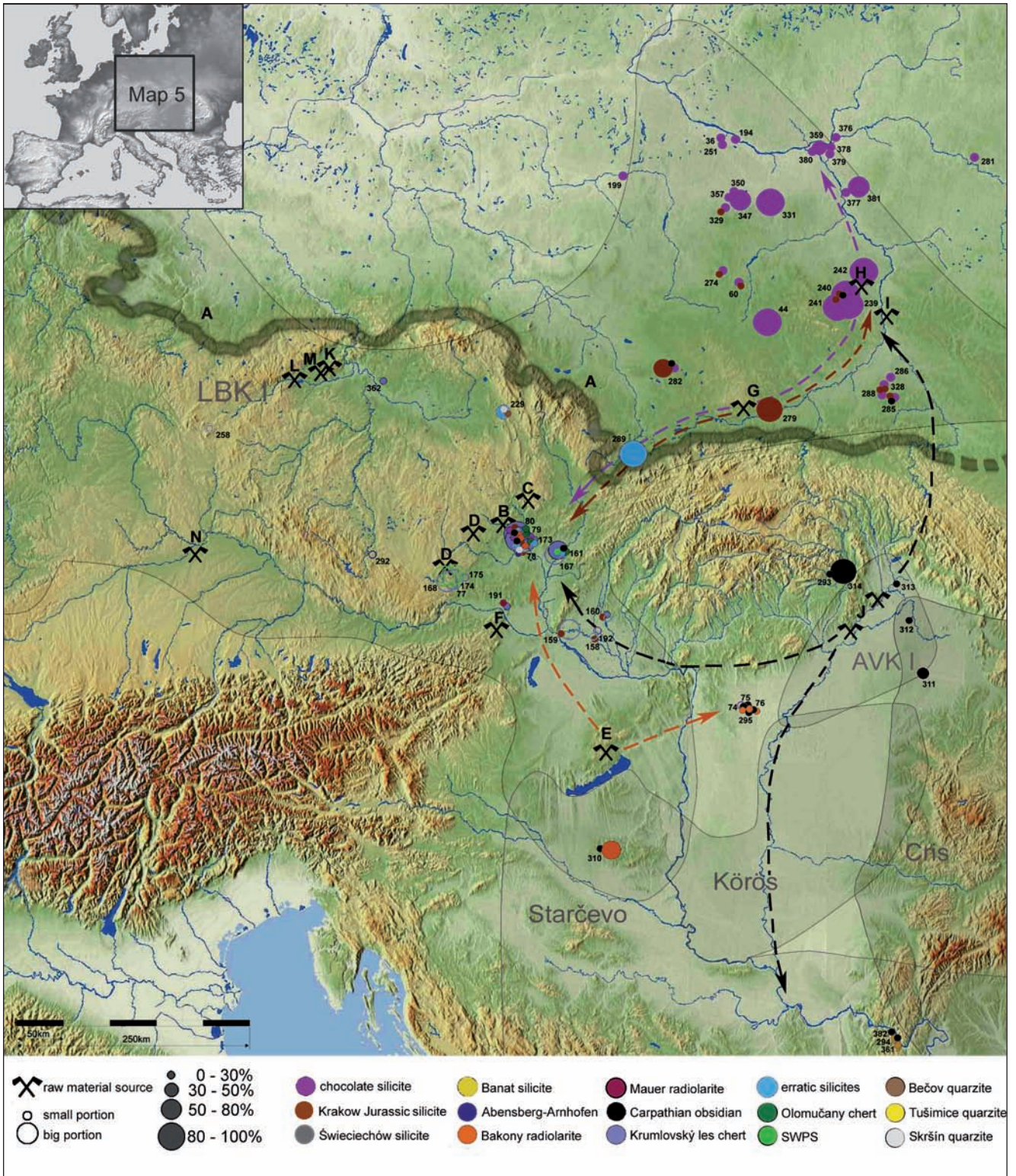
Economic character of distribution

More frequent use of raw materials of lower quality = collapse of the earlier distribution network, the region comes to be on the periphery of the newly emerging cultural centres.

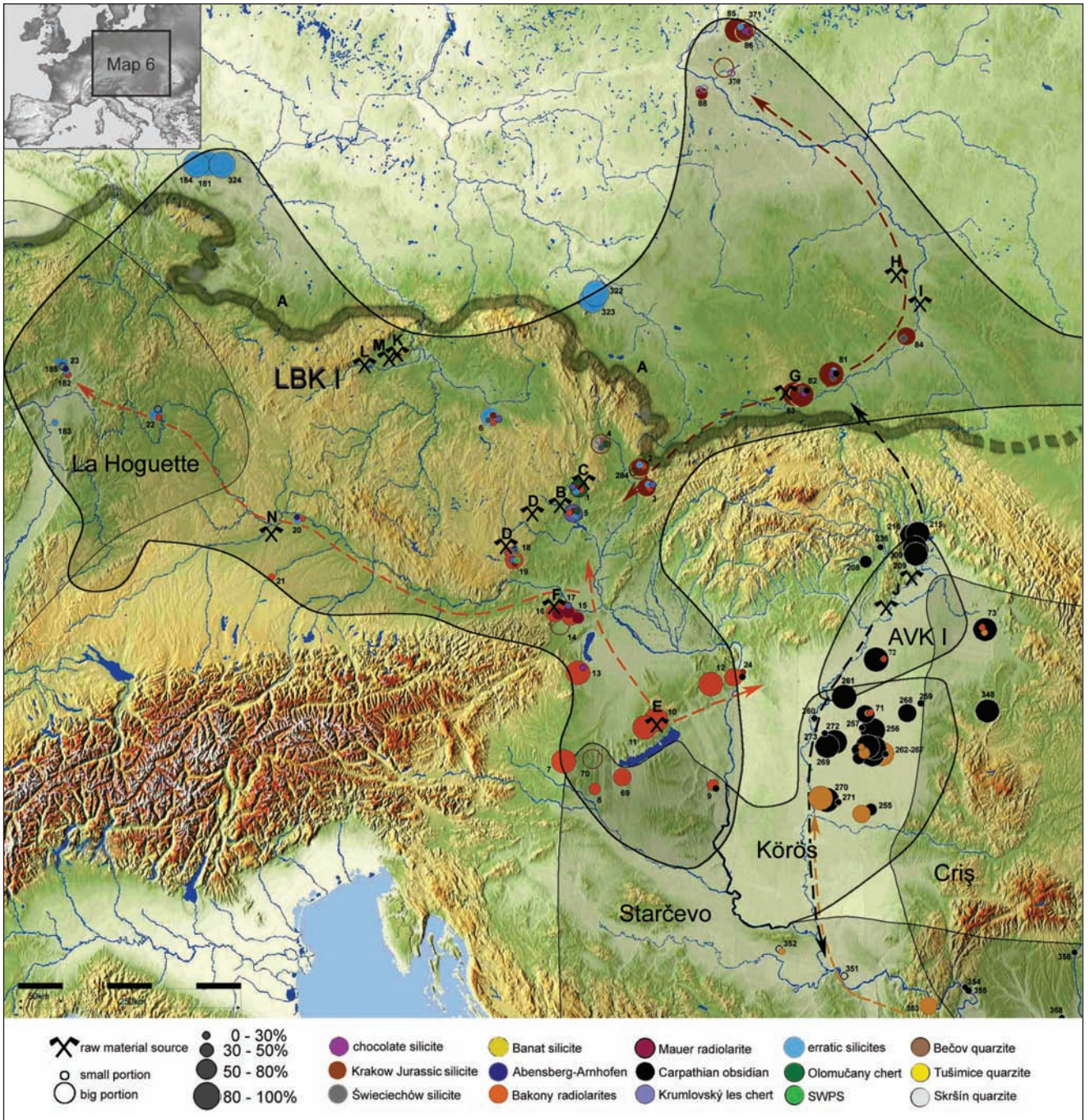
82 Another influence on the partial use of raw materials from gravels may have been the breaking of kinship ties with those areas in which high quality raw materials occurred. Among the Duna of New Guinea, for example, free access to raw materials is available not only to the population of a territory, but also to the former residents of the territory (free movement between clans). Only those who have no kin in the area are forbidden to collect raw materials from the river gravels (de Grooth 1994, 374).



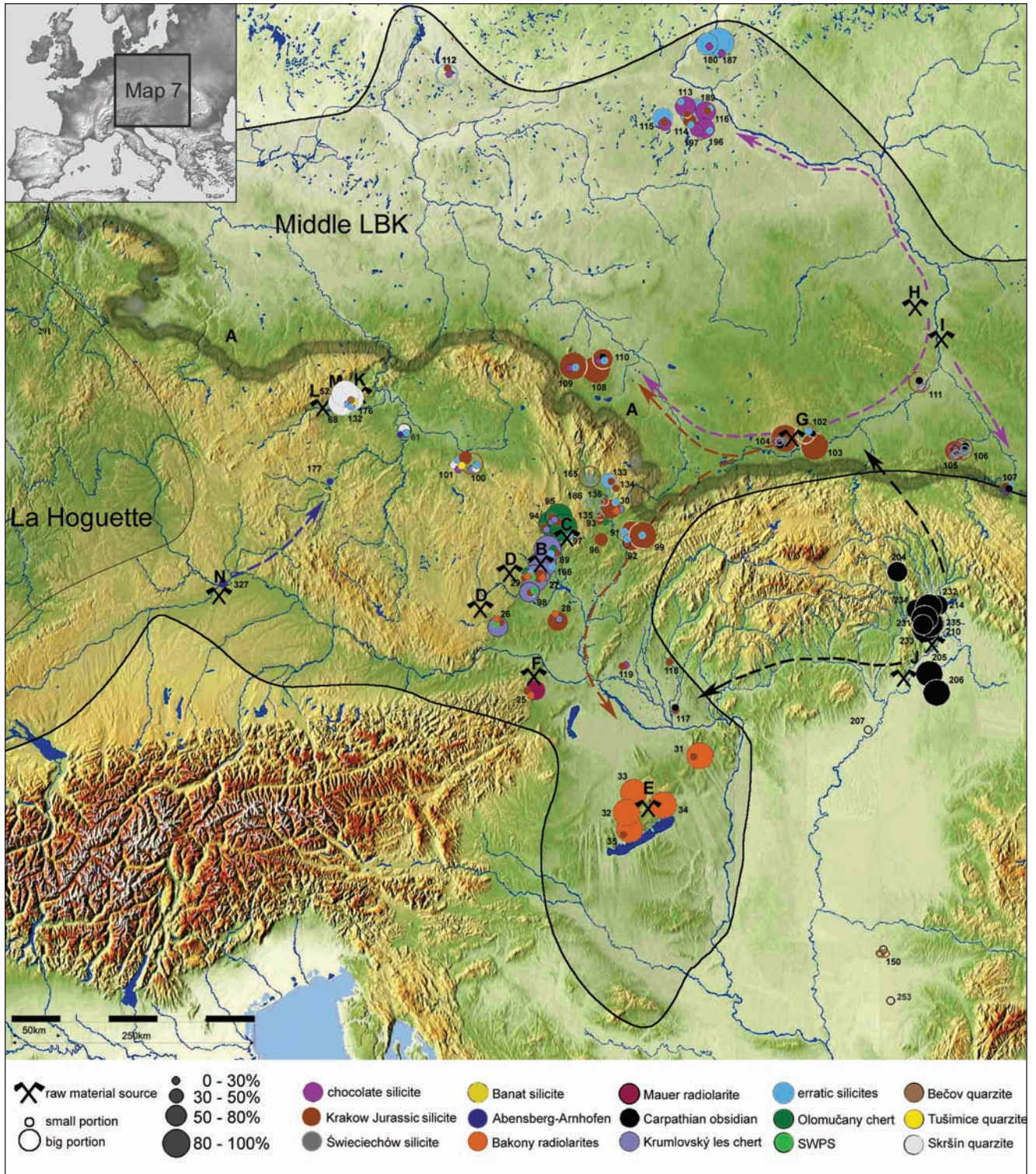
Map 4. Raw material sources. A – Erratic silicites, B – Krumlovský les chert, C – Olomučany chert, D – siliceous weathering products of serpentinites; E – Szentgál, Hárskút and Úrkút-Eplény radiolarites, F – Mauer radiolarite, G – Krakow Jurassic silicite, H – chocolate silicite, I – Spotted Świeciechów silicite, J – Carpathian obsidian, K – Skršín quartzite, L – Tušimice quartzite, M – Bečov quartzite, N – Abensberg-Arnhofen striped tabular chert.



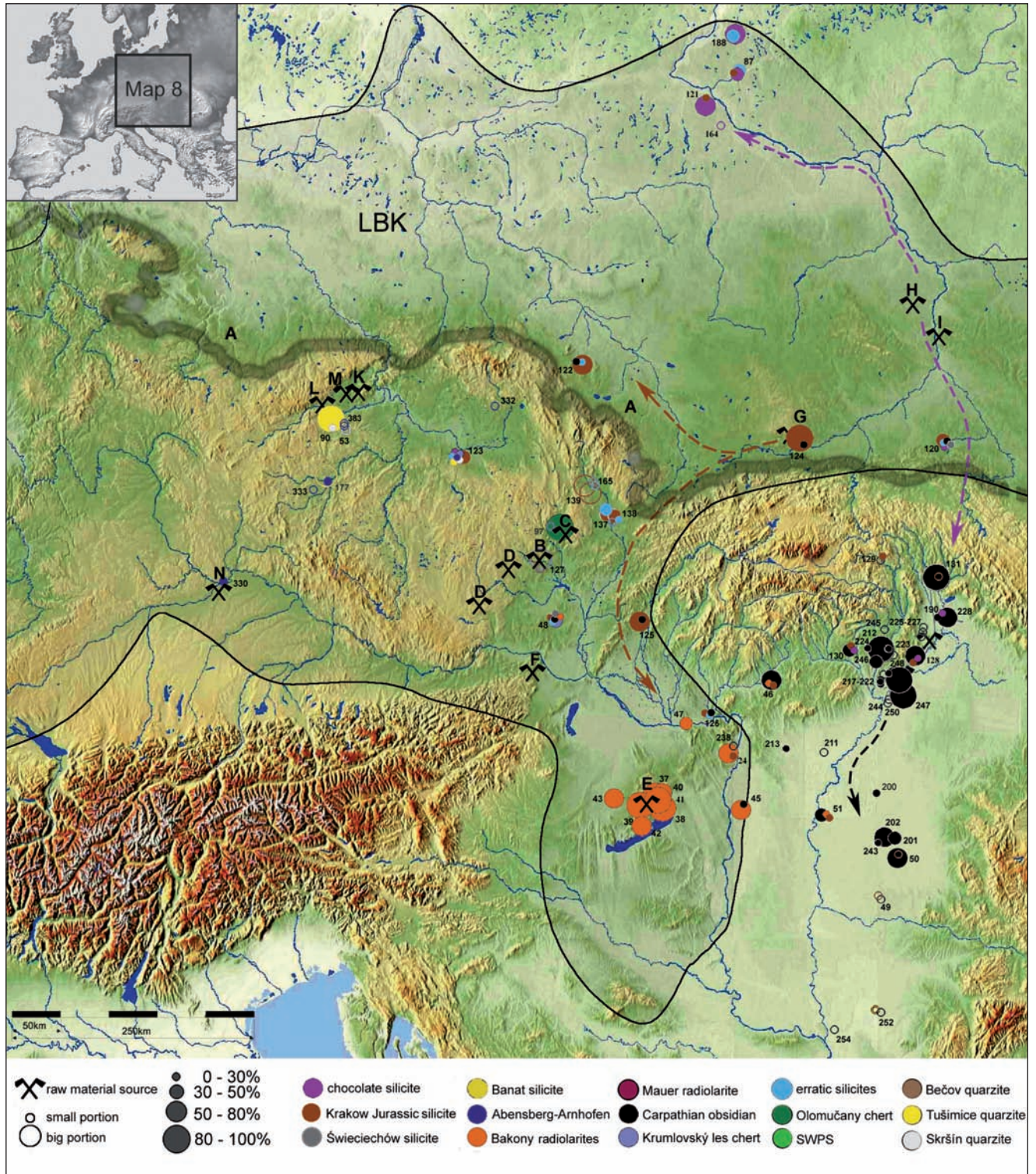
Map 5. Raw material distribution during the Mesolithic in central Europe. A list of sites is provided in table 323.



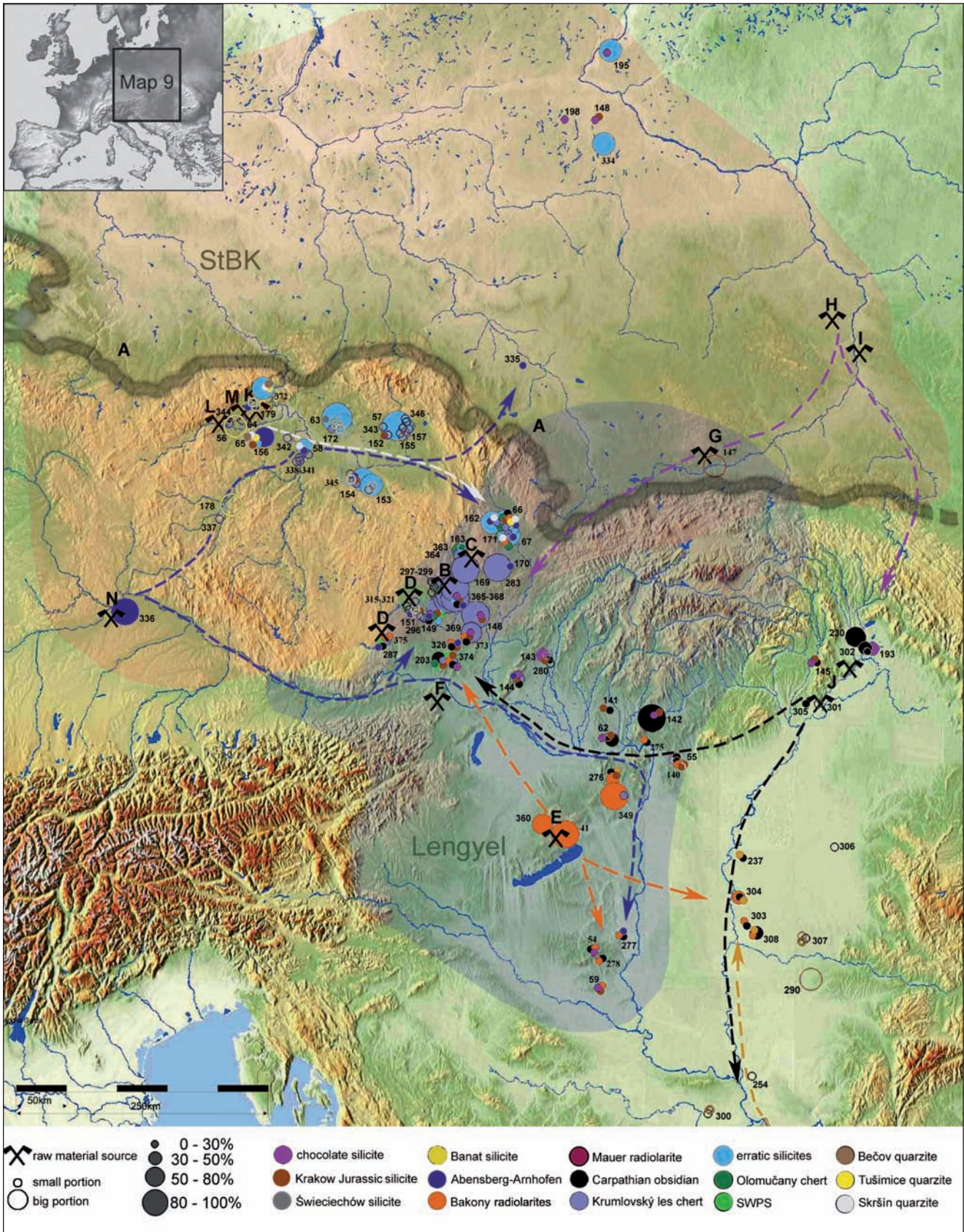
Map 6. Raw material distribution during the Early Neolithic in south-eastern central Europe. A list of sites is provided in table 323.



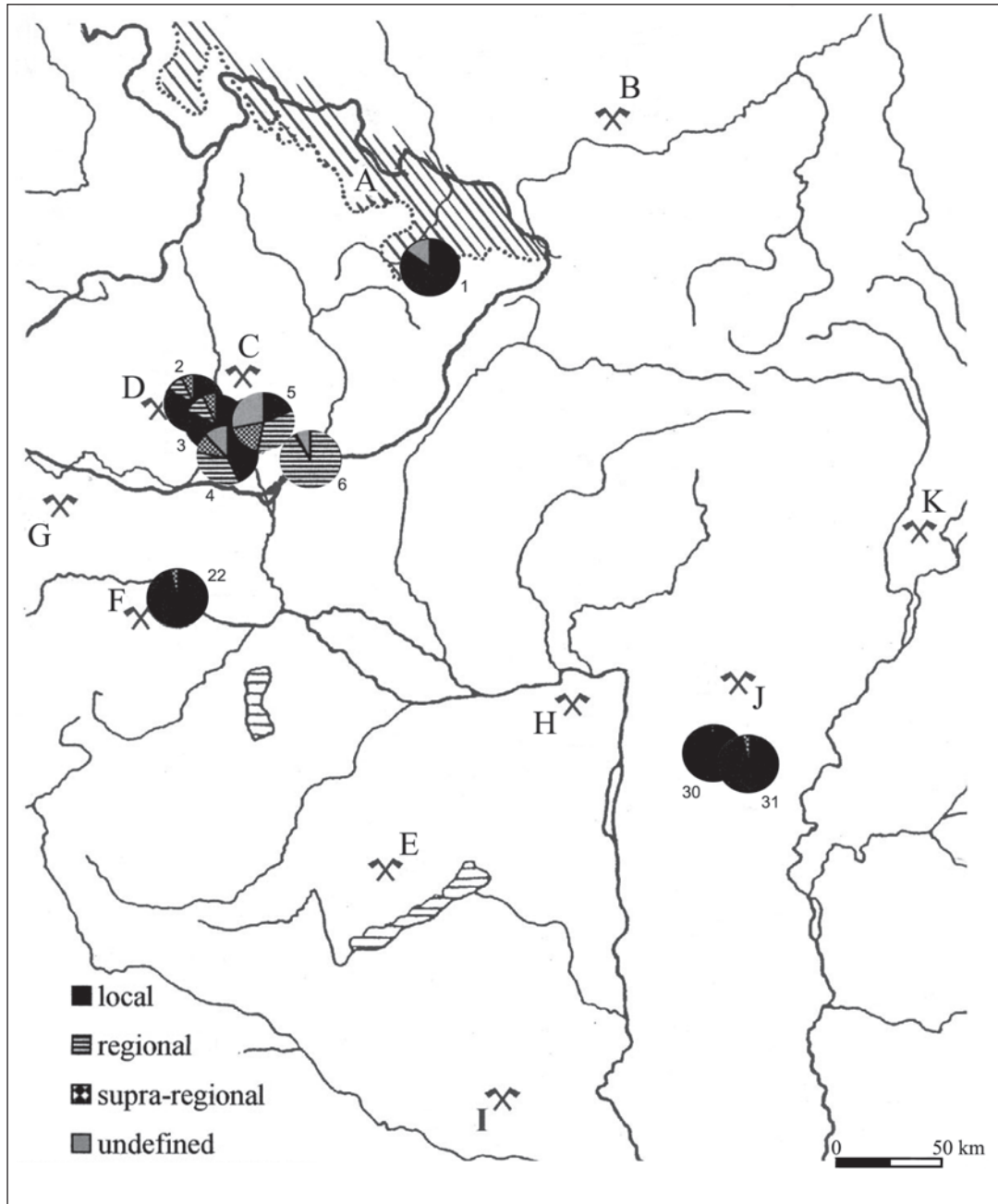
Map 7. Raw material distribution during the end of LBK phase I and the middle phase of the LBK. A list of sites is provided in table 323.



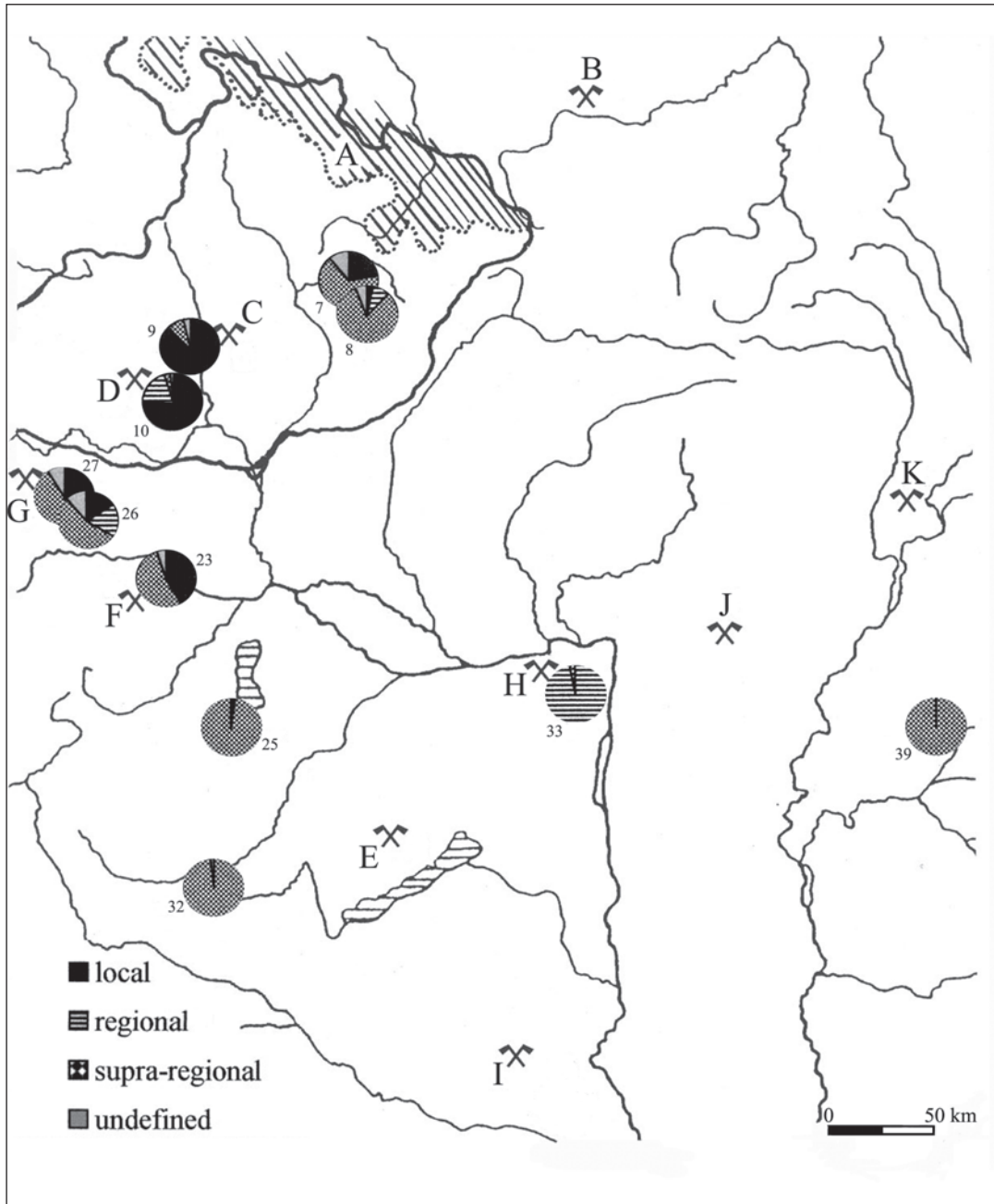
Map 8. Raw material distribution during the late LBK and late AVK. A list of sites is provided in table 323.



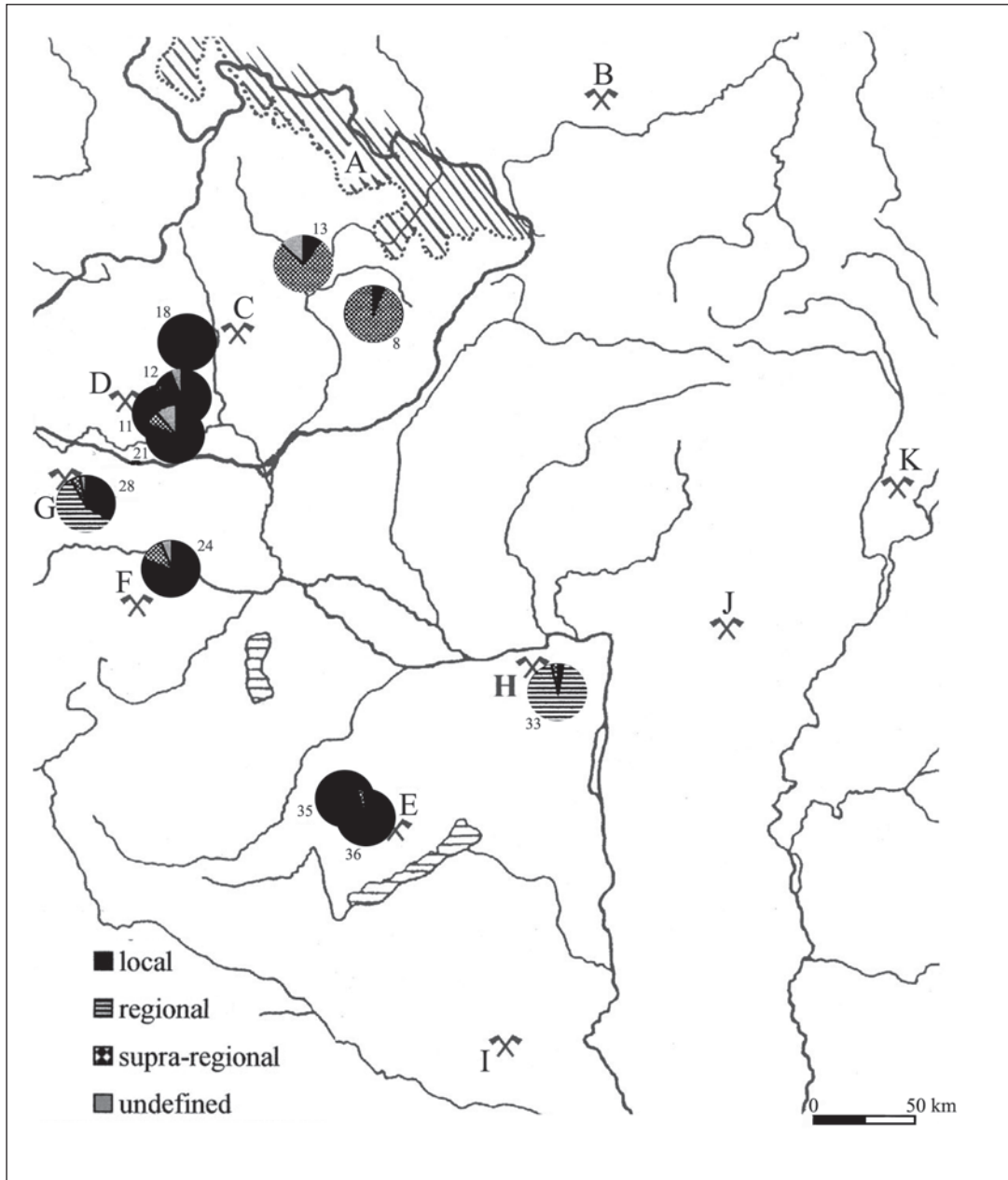
Map. 9. Raw material distribution during the Middle and Late Neolithic in central Europe. A list of sites is provided in table 323.



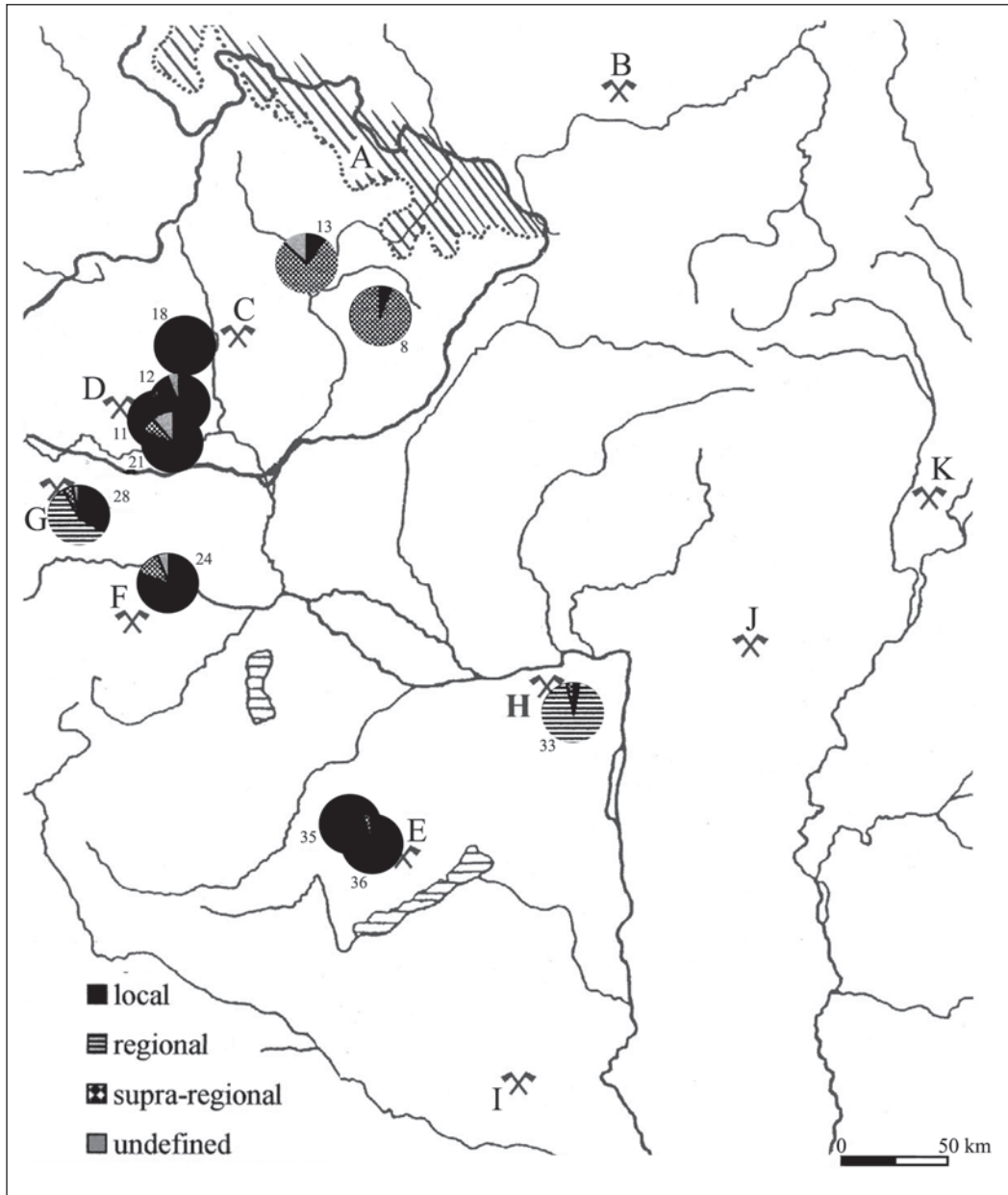
Map 10. Raw material use during the Mesolithic in south-eastern central Europe. Key: see table 324.



Map 11. Raw material use during the Early Neolithic in south-eastern central Europe. Key: see table 324.



Map 12. Raw material use during the end of LBK phase I and the middle phase of the LBK in south-eastern central Europe. Key: see table 324.



Map 13. Raw material use during the Middle Neolithic and Late Neolithic in south-eastern central Europe. Key: see table 324.