ŽIVOT NA NEOLITICKÉM SÍDLIŠTI

LIFE ON A NEOLITHIC SITE

IVAN PAVLŮ

Praha 2009

Dedicated to the memory of
Prof. PhDr. Bohumil Soudský
from whom I received this task

and

PhDr. Jan Rulf,
whom fate did not allow to continue it.

Ivan Pavlů

Life on a Neolithic Site

Bylany - Situational Analysis of Artefacts

Život na sídlišti kultury s lineární keramikou
v Bylanech u Kutné Hory
Situační analýza artefaktů

Praha 2000

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Abbreviations

Lnk = Linear Pottery Culture (comp. LBK in German texts or LPC)
StK = Stroke Ornamented Pottery Culture (comp. SBK in German texts)

Retrospective Introduction

This publication is the continuation of a series of papers and publications that have been developed over the recent years on the basis of fieldwork and excavations carried out at the Neolithic site of Bylany. This publication deals with the systematic analysis of several of the principal artefact types most common on Neolithic sites. These consist of chipped and polished industry, querns, form and ceramic decoration, houses, and the settlement area as a whole. The interpretation of analytical results contributes to a synthetic view of a Linear Pottery Culture (LnK) site in Bohemia, part of the mosaic comprising several thousand such sites in temperate Europe. This interpretation must be understood as one of the possible results of the study of the Neolithic that has progressed over the course of the last thirty years through focused study by several universities and dozens of scientists in Europe and abroad. This interpretation of the Bylany site is based on a situational analysis of artefacts found in refuse. It remains open in the sense that new data will be provided, as well as in the sense that other kinds of evidence may be included, stemming particularly from environmental factors.

The history of the excavations has been described by M. Zápotocká (BYA1: 10 - 19, BYSE: 21 - 33 - for an explanation of the abbreviations used, please see the footnote at the end of this chapter), who also wrote a thorough review of the surveys conducted from the 1960's to the 1980's (BYV1: 125 - 146). After the main recovery work undertaken between 1955 - 1964 and 1966 - 1967 in area BY1, small scale excavations were carried out in 1977 - 1980 at the Miskovice 2 (MI2) area within the project framework of a Stroke Ornamented Pottery Culture (StK) cemetery. These contributed new facts to what was already known about this small, isolated Linear Pottery Culture settlement area (Pavlů 1998a). The 1990's saw the last large-scale excavations carried out between 1990 - 1993 with the Roundel project in the area BY4 (BYRO), as well as a small, hitherto unpublished project in area BY2 in 1991. The test excavations carried out in the wider region of the Bylanka and Vrchlice streams in the 1970's and 1980's have not yet been published in full (Pavlů 1982: 194), and other activities on the site continue to the present day (Šumberová 1998).

Finds and materials processing have been undertaken continuously since the time of the first excavations in 1956. At the end of 1950's, the first simple quantitative analysis was published (Soudský 1960), in which the author set out the basis of the Bylany site chronology. Very shortly afterwards a more popularly oriented book was published (Soudský 1966) containing the author's general thoughts about the Bylany project, the Neolithic site and how it must have looked. His concept of the periodic use of the settlement area being interrupted by regular breaks when settlements were founded elsewhere in the vicinity was based on the theory of cyclic agriculture, the economic system of which was ascribed to the Neolithic population in Central Europe.

Similar excavations began to be organised elsewhere in Europe, particularly in the Netherlands (Limburg) and later in Germany (Rhineland). The original Bylany interpretation concept was not accepted as a conclusive description, even though it was popular at the time because of its simplicity and openness. The excavators, having gained experience from the Bylany case, tried to develop their own interpretations. These consisted either of the demonstration of overall movements of sites, creating different centres in the landscape and models differing on a regional basis (Modderman 1988: 101), or of the construction of a completely new idea of the Neolithic site as a complex of individual yards developing independently (Boelicke - Brandt - Lüning - Zimmermann 1988: 890-931).

The excavations in section A at Bylany, having begun in 1955, were interrupted in 1964 in connection with the changing conception of the scientific programme of the Institute of Archaeology. It remains the largest opened area on a Neolithic site in Bohemia, but was only a part of the originally projected excavation of the whole area at Bylany 1 (BY1). In the same area, section B was partly excavated under rescue conditions, because in 1956 the field was designated a building area for the local co-operative. The excavations in area BY1 were completed with the 1966 - 1967 season at section F, where the project relating to the earliest site was combined with the need to represent Bohemian archaeology at the first international archaeological congress held in Eastern Europe after 1945.

As the quantity of material grew, the main problem with their final publication appeared to be the technical processing of the work which had been undertaken at the site since 1958. Regardless of the continuous evaluation of new materials after every field season, which focused on the chronology of the site, final publication was delayed until after fieldwork was completed.

The initial programme of those final processing stages started at the beginning of 1967, and the initial phase consisted of data creation based on the detailed description of the items discovered. The automatic processing of this data contained mainly their summarisation according to particular artefact types and their comparative analysis. The results of such analyses would further support the preliminary picture of the Neolithic site in Bohemia. Several volumes of data and analyses including the application of scientific expertise were compiled for publication, the intent being to follow them with a final publication summarising all of the earlier works. Only the first part of analysis was completed, comprising a publication of finds coming from the central part of section A. This remained in the manuscript provided to the printing house, but after the political affairs that marked the end of the 1960's the printing of the publication was no longer possible.

In the first half of the 1970's, these affairs were projected into the next changes in the composition of the Institute's scientific programme. Subsequently, a new variant for processing the Bylany materials was also projected. Publications were required to focus primarily on the resources provided by the finds, the processing of which was then in progress. Thematic papers were meant to follow, and finally a summary publication. In the years 1983 - 1987, three volumes of catalogues were published by the Institute (BYA1, BYA2 a BYBF). They comprise the complete drawings of features and of all the diagnostic finds of ceramics, chipped industry and polished industry. The data on features and finds were summarised into tabular lists and on finds by their basic statistical characteristics, thereby enabling a basic critique of the finds complexes. The linear and stroke-ornamented pottery finds were processed separately. Besides the author, catalogues were compiled by M. Zápotocká, who mainly described the features and the late Neolithic finds, and later also by Ondřej Soudský in his role as project statistician. The first papers on the structure of Linear Pottery Culture finds (Rulf 1986, 1993, 1997a) were published based on the data in the catalogues. The catalogues contributed mainly the formulation of higher finds assemblages, labelled housing complexes, to the study of the Bylany LnK site. The general list of finds complexes (BYBF: 122 - 144), which need not be revised except for a few items (cf. Appendix 3), is used here for the definition of housing assemblages and phase assemblages.

After more detailed data information had been compiled, the Bylany chronology could be more accurately assessed. In the first analysis (Soudský 1960), only six main categories of linear decoration techniques were used. Later, a higher number of categories with an extended content were used, containing a higher level of information. The description of details was compressed in the first manuscript into chronological elements, labelled with letters of the Greek alphabet. The new system with its chronologically evaluated division of descriptive items was re-examined twice for notenkopf attributes (BYTH: 320 - 321). The first variant was used for a chronology, entitled CHRON82 (BYTH: 318) and the second one for a slightly more detailed chronology, entitled CHRON86 (BYTH: 407). The chronology in 1982 was in fact an extension of the analysis compiled in the first manuscript (BYA1) for all of the houses in area BY1.

The compilation of data based on the artefacts found at Bylany lasted almost two decades, during which time the field documentation was processed and descriptions of more than one hundred thousand individual artefacts were carried out. In the catalogues (BYA1, BYA2, BYBF), most of the finds are described and figured. The figures comprise all the decorated sherds, diagnostic sections of said sherds, chipped (SI) and polished industry (BI). For this reason, it has not been felt necessary to repeat the figures showing this material here. The majority of the information used in the analysis presented come from this data assemblage, as published in the catalogues. Further data were used that were prepared by other scientists during the processing of individual parts of the Bylany material, which were published as special studies following the processing of the programme (chipped industry: R. Tringham 1972, M. Popelka 1991, polished industry: T. Velímský 1969, J. Rulf 1991). The information content of the Bylany assemblage is far from exhausted by these analyses, and can serve as an archive of records for further investigative attempts. The first experiments were carried out in a study on the technology of ceramics (Franklin 1998), and an analysis of settlement refuse (Last 1998).

At the end of 1970's and beginning of the 1980's, when material processing was completed, the socio-economic interpretation of the site progressed only slightly under the influence of the (as yet unfinished) analyses of attributes other than the chronological. Two conferences were of great importance during this period. The first one was held in 1981 at Nové Vozokany (Pavúk 1982), and the Bylany area was dealt with briefly in the context of other sites within the micro-region of the Bylanka and Vrchlice (Pavlů 1982). Amongst other things, the idea of Neolithic Yards was explicitly presented here (Boelicke 1982). Additionally and implicitly, former idea about the cyclic development of Neolithic village were rejected, as was those that had previously been formulated for Bylany itself by B. Soudský.

The second conference was held in 1987, after processing of the Bylany materials at Liblice had been completed (Rulf 1989). Contributions on the analytical methods relevant to the different artefact types were prepared for this conference (BYSE), and theses on the site's chronology were published prior to it (BYTH). The Bylany chronology of the LnK site was based on a multi-dimensional analysis of the linear pottery decoration elements. The main changes were the formulation of an additional sub-period, IId, which it had not been possible to postulate earlier on the basis of field evidence. The positions of several houses changed against those listed in CHRON82. The resulting sequence of 25 settlement phases is used here. After the LnK site chronology, a chronology of the late Neolithic settlement followed (Zápotocká 1986), including the formulation of settlement areas (Zápotocká 1989c). The problem of intrusions was subsequently discussed at least in relation to the clearly separate nature of the LnK and StK sherds (Zápotocká 1986: 369). This was generalised later (Rulf 1997a).

There are two essential concepts at work in the Bylany site chronology. The first is the house complex, considered at the empirical level to be an assemblage of finds characterised by the inventory of a house. At the interpretative level, it is represented with the household as a principal socio-economic unit for the whole prehistoric period beyond the Neolithic. Its components are not always completely archaeologically evidenced, as economic, production and other areas did not necessarily comprise a unit with a house - at a very densely built-up site these disappear in a maze of asynchronic features. The concept of a yard is therefore slightly simplified in this context, both at the empirical and interpretative levels.

The next concept deals with the settlement phase. This is considered to be the shortest period analysed by linear ornament, representing approximately one generation of ceramic makers. It comprises at present a group of synchronic houses covering one generation. It can also be considered as a schematic temporal division enabling the vertical subdivision of settlement areas. It is more important during analysis; during interpretation its schematisation is emphasised and need not correspond with the overall lifetime of the houses.

It is highly probable that any future revision of the site's chronology will bring only minor changes in the mutual positions of household complexes. A considerable part of the finds was deliberately excluded from the analysis, which dealt separately with isolated pits and large loam pits. Their chronological position depends in a different way on the mechanism of formative processes changing the structure of the handling of refuse. It would be more accurate to label the chronological system used for Bylany from 1986 (CHRON86) as a ceramic chronology of select household complexes. The legitimacy of using this system of chronology was proved here by the results presented, providing a sufficiently consistent and mutually interconnected picture not only of ceramic decoration, but also of other artefact types and their attributes. The chronology, together with the variability of querns before the interruption or renewal of houses, led to an interpretation of rotating continuous habitation of the area with only short breaks, and the movement of houses or their construction spaces (Pavlů 1989, Rulf 1991, 1993). This model is more complicated than that previously accepted, and is based on individual changes within one settlement area. It replaces the earlier, more schematised model of the regular alternation of settlement phases with settlement hiatuses.

The 1980's brought a fundamental change in the consideration of settlement refuse. Finds complexes, previously considered the static sum of broken pieces of the ceramics characterising each period, are now considered participants in complex cultural and natural formative processes. These processes led, from the moment the artefacts were discarded by a living culture, to the deformation not only of individual pieces but also of their original cultural contexts. The study of refuse formation processes requires the complete analysis of different attributes than have been used for the current description of the Bylany finds. Archaeological re-examinations are only just beginning, and the consequences for revision of the chronology at Bylany cannot be assessed.

The possibility of constructing different models of refuse constitution has been proven for Bylany; under suitable conditions, the models could even be followed up within asynchronic complexes (Last 1998). The results of the analyses presented artefact patternings that need to be considered as the structure of the refuse interpreted in terms of a living culture. There is an unknown block of post-depositional processes that remains between both of these structures (Schiffer 1987, Vencl 1995, Rulf 1997a). The study of this connecting link is a task for the future-evidently, it can be supported by the same records as the present one.

The excavations and materials processing at Bylany represent, in fact, the efforts of two generations of scientists to solve the problems of settlement archaeology. Regardless of the marked departure of Czech archaeology from developments elsewhere in the world of archaeological theory in the 1970's and the 1980's, the Bylany excavations followed these principal trends, albeit not always according to a programme. As the 1950's project was entirely limited to cultural and historical theory, some of the methods preceded the period of functional/processual archaeology. A positivistic approach to data creation and analysis was typical of the first processing programme, undertaken in the late 1960's. The fixed descriptive system proposed for future automatic procedures enabled vast increases in the data contained here. The type of sampling used at smaller sites in the region during the 1970's and 1980's is comparable with programmes in processual field archaeology. At Bylany, this was due more to limited financial resources than to the programme itself.

The Bylany excavations did not sufficiently meet the other conditions inherent in this theory, namely the integration of ecological and archaeological data. During the excavations, the collection of artefacts was preferred and ecodata were of secondary importance. Something of a balance was given to this situation in later publications by J. Rulf (1983, 1994), but the intensity of environmental studies did not reach that of other European excavations (Bakels 1978). The Bylany ecodata are processed only on the more general level of the characteristics of the Neolithic environment, without more detailed integration into site development (Peške - Rulf - Slavíková 1998). Nor was this latter taken into account in preparing this work, and a final evaluation of the data will be a subject for future studies. The other materials from BY4, collected rather more systematically, can be added to the ecodata from BY1 (BYRO).

The most recent cognitive/processual period of contemporary archaeological theory has not yet been sufficiently reflected. The majority of contemporary theoretical experiments precede practical field studies. The author has substituted his experience with ceramic classification for the concepts from this field, since the design and style distinguishing the ceramics themselves are transferred to other artefacts. The distinguishing of three levels of knowledge has been common practise in archaeology for a long time (cf. Thompson 1958: 6 - 8). The author argues here that for the analysis of site artefacts, it is worthwhile to combine these three facets of the artefacts with analogous problems presented by situational analysis. One philosopher (Popper 1995) was formerly called the last positivist, but his ideas have been included in the body of theoretical ideas of contemporary cognitive archaeology (Whitley 1993). Their practical availability has to be demonstrated here.

Situational analysis provides broad theoretical possibilities for organising attributes into an arranged frame of questions and problems (Pavlů 1997: 97). It starts by distinguishing three worlds of knowledge: physical existence, subjective experiences, and theoretical knowledge processes (Popper 1993: 75). Within these three category stages, a complex series of questions can be organised, as well as different facets of artefacts. A matrix of nine areas of situational analysis is defined in this way. It is, under specific conditions, usable for any kind of artefact. The best example is the analysis of ceramic decoration, where besides the physical body of decoration design and style can be recognised and isolated (Whitley 1993: 61). Because of the unified processing of different artefacts, the author also analysed chipped and polished industry, although he did not deal with them in detail prior to this. Details of the situational analyses carried out for different artefacts are discussed in the introductions to each chapter.

Every human product can be considered an artefact in this way, including both portable and immovable finds. The analyses are relevant to houses as well as to the whole site, considered in the same way as the linear pottery. It is then possible to analyse in retrospect any landscape of the Bylany region as a specific artefact. In the analysis of artefacts, the principles of archaeology are currently not limited to typological classification, but remain an indispensable basis for any kind of theoretical view. Differing concepts of archaeology do not differ in relation to artefacts, considered here in the broader sense of any human creation, but only in the scale and angle of the view taken. Landscape archaeology is in this sense a concept of artefacts on the largest scale possible.

This situational analysis is thus analogous to the illuminating of problems with a bright light consisting of three basic colours. Individual views are similarly complementary and together result in a complete and valuable picture. This can be defined within a much broader matrix of questions than has been employed here. On the other hand, it also enables an alteration in the scale of the analysis: theoretically, it would be possible to construct another matrix with a higher degree of problems, over and above those of every field in the initial matrix.

While the physical principles of artefacts can be characterised by individual finds, the answers to other questions usually require an analysis of the structure of artefacts within particular contexts. In this case, there are complexes of finds from households in synchronic as well as in asynchronic contexts, within settlement phases and among them. The individual artefact types were processed using roughly similar procedures, starting with shape and size characterisation, continuing with design attributes and ending up with the symbolic attributes of style. When at all possible, attributes were quantified within the contexts used. Simple statistical methods were employed for such quantification, e.g. frequency distributions, correlations between attributes, and analysis of frequency tables. The internal structure of these tables can at best be described by correspondence analysis as one of the most suitable multi-dimensional statistical methods. The majority of interpretations are based on the results of such analyses.

Within the framework of a situational analysis, it is necessary to distinguish the different kinds of classifications within particular fields of problems, which can be labelled formal, functional, and stylistic. The analytical practice in archaeology usually defines only one kind of classification, which must answer different questions. A hierarchy of attributes and the construction of different types of classification are preferred here; thus, the data can be processed from many angles and their particular structures are easier to understand when separated into their relevant parts. Artefacts are therefore studied, as noted above, under spectra of individual colours, the synthesis of which gives the final picture. The only disadvantage comes in the possibility of the insufficient and unequal classification of artefacts - this is caused by their fragmentary nature and by the higher number of attributes of these modes.

Alongside the opportunities for the automatic processing of data from refuse, a number of forms of secondary data arose which could not all be considered here - their patterning within synchronic households and asynchronic phases is not uniquely interpretable. Readers may, of course, accept or reject the author's interpretations, or may try to develop their own; in particular, the results of correspondence analysis have not been exhausted, as they offered a higher number of factors. This work must represent a concise analysis of those Bylany artefacts that are fundamental to an understanding of the history of the site; at the same time, it offers structured data for all students of settlement area.

At Bylany, June 30th, 1999. Ivan Pavlů

List of abbreviations from basic publications on Bylany:

BYLANY, Osada zemědělců z mladší doby kamenné (Soudský 1966).
BYAI, Bylany, analýza, díl I (Soudský and other 1970, MS).
BYA1, Katalog sekce A, část 1 (Pavlů - Zápotocká 1983).
BYA2, Katalog sekce A, část 2 (Pavlů - Zápotocká - O. Soudský 1985).
BYBF, Katalog sekce B a F (Pavlů - Zápotocká - O. Soudský 1987).
BYRO, Bylany - Rondel (Pavlů - Rulf - Zápotocká 1995).
BYSE, Bylany - Seminar 1987 (Rulf, ed. 1989).
BYST, Bylany - Stones (Pavlů - Rulf, ed. 1991).
BYTH, Bylany - Theses (Pavlů - Rulf - Zápotocká 1986).
BYV1, Bylany - Varia 1 (Pavlů, ed. 1998).

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"Vermutlich war die Schäftung eines Feuersteigerätes wertvoller als ihr Silexeinsatz."
(Zimmermann 1995: 107)

1. Chipped industry

1.0. Introduction

1.0.1. Neolithic chipped industry (SI)

From the 1960's onwards, the intensive study of the Neolithic chipped industry developed in several directions. The first of these inclined towards morphological typology, due to which chronological positions were fixed for both the earlier and later complexes (Vencl 1971). More detailed chronological tendencies within Linear Pottery Culture sites were barely recognisable, thanks to the insufficiently specific character of the chipped industry (Vencl 1960: 60). Relations to the industry of the Starčevo and Vinča cultures were also studied, and the chipped industry was genetically linked to them (Kaczanowska 1989). The second broad field of study, carried out with other scientists, is the study of the composition of raw materials and the related topics of raw material procurement and distribution (Weisberger - Slotta - Weiner 1980). In addition to these two fields is a third, the functional analysis of the chipped industry based on the use/wear traces of implements. This was applied only on a limited scale within the LnK.

The most comprehensive study of a chipped industry was realised in conjunction with large-scale rescue excavations at Aldenhovener Platte in the Lower Rhineland (Zimmermann 1988). First of all, a systematic descriptive system was elaborated, consisting not only of principal morphological characteristics but also of details of flaking techniques. Great attention was paid to the classification of raw materials; individual forms were then analysed with respect to their morphology and metrology, as for example with the scrapers and sickle blades (Zimmermann 1988, 683, 686), or arrow heads common in the Rhineland (Zimmermann 1977). A system of raw materials exchange was developed which had profound consequences for the theory of central and satellite sites (Zimmermann 1995, Lüning 1997).

1.0.2. The Neolithic chipped industry from Bylany

From the 1960's onwards, the Bylany chipped industry assemblage was the subject of detailed analysis (Tringham 1972, 1973). Morphological typology was combined in this paper with observation of wear under low magnification. The most important part of this was the resulting statement that most of the artefacts, including those classifiable as waste or chips, were more or less worn at their sharper edges. The first theses on the potential quality of the materials used were also pronounced. As the assemblage was not available as a whole, this data remains a core body of data. Only in the 1980's was the whole assemblage reclassified according to newly defined morphological attributes (Popelka 1991, 1999). As a result, the stylistic classification of retouched artefacts was defined and the main chronological cultural groups were morphologically specified. Data was revised at this point, and mostly processed according to new, more detailed criteria.

The whole Bylany assemblage was classified as being very well informed in regard to petrological definition and the provenience of raw materials (Přichystal 1985). This data was used for an evaluation of the quality of the processed materials, and of the characteristics of the Bylany chipped industry's economics. On the basis of the detailed classification of raw materials, new statements about their main chronological trends and geographical distribution were published (Lech 1989). A further period of wear analysis and evaluation is currently in progress, along with other experiments (Popelka 1997).

1.0.3. Situational analysis of the chipped industry

As they are the principal physical characteristics of the chipped industry, size and length to width

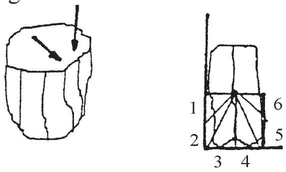
	TECHNICAL ELEMENTS	ATTRIBUTES AND THEIR CLASSIFICATION

STYLE OF CHIPPED INDUSTRY

Technical elements:

type and direction of cutting

right left



strenght of cut (bulb)

placing of deliberate retouch

Attributes and their classification:

symmetry and composition

prototypes

stylistic classification

direction and strength of cut	type	modification: retouched	modification: unretouched
left	weak	S1	S2
	strong	S3	S4
right	weak	S5	S6
	strong	S7	S8

DESIGN OF CHIPPED INDUSTRY

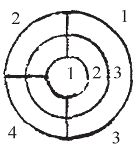
Technical elements:

distance and direction of resources

1 (to 10 km)

2 (to 100 km)

3 (more km)



1 (NE)

2 (NW)

3 (SE)

4 (SW)

working retouch

gloss scars and other

macrowears microwears

edge angle

tg α = height : 1/2width

height of artefact

Attributes and their classification:

score of availability

score / distance	direction 1	2	3	4
1		1		
2	2	4	6	8
3	3	6	9	12

functional classification

edge angle	type	height < 4 mm	> 4 mm
10° <= 30°	knives for soft and hard materials	F1	F2
30° <= 40°	scrapers for soft materials	F3	F4
> 40°	shavers for hard material	F5	F6

PRINCIPLE FORMS OF CHIPPED INDUSTRY

Technical elements:

raw materials

A (mined hornstones)

B (mined quartz)

C (collected hornstones)

weight (g)

forms

0 (cores)

1 (blades)

2 (flakes)

3 (waste chips)

form: index width/length

size

Attributes and their classification:

score of processing

score (form)	quality of raw materials 1(A)	2(C)	3(B)
1	1	2	3
2	2	4	6
3	3	6	9

formal classification

type / size	blades L<40 mm	blades >40 mm	flakes <30 mm	flakes >30 mm
W/L<0.70	L1	L2		
W/L>0.70	L3	L4		
W/L<0.90			L5	L6
W/L>0.90			L7	L8

Fig. 1.0.3.a. Scheme showing the situational analysis of the chipped industry. - Schéma situační analýzy štípané industrie.

proportion were applied here. The main characteristics of quality in the raw materials are a part of these characteristics. A simple, formal classification of the industry is used. A value of processing quality is also applied, this being defined by the paradigmatic classes of the principal forms and the quality of the raw materials. For more details on paradigmatic classification, see D. Read (1982:65).

The height and edge angle of the artefacts are the main measurable functional attributes. The classes in the Bylany industry's functional classification are defined within different categories of these attributes. The economy of chipped industry production was evaluated according to the distance from which, and direction from whence, raw materials came. However, as the Bylany site is a user-site and not a producer-site, the coefficient of availability bears witness to the deliberate choices of the inhabitants, who in this way influenced the overall content of the industry and also its quality. These inhabitants also influenced the overall composition of the chipped industry, and its qualitative variability, by their response to the changing conditions offered by resources coming from different directions.

Stylistic attributes, which give an informative and symbolic content to the industry, were defined as the type of blade, and directions that the blades were spread from the core. Within both synchronic and asynchronic contexts, stylistic classifications of the blades were conducted. Based on the presence or absence of deliberate retouch, which is not generally common in the Bylany industry, prototypes of all forms were defined (Pavlů 1999) and their chronological and contextual relations traced.

1.1. Formal classification of SI: cores, flakes, blades

1.1.1. Principal characteristics of blade forms (length and width)

The principal characteristic of any artefact form comprise the mutual ratio of its three main dimensions. In the case of height, which is related to the edge angle of implements, its significance is greater for functional than for formal characterisation. The ratio of length to width sufficiently describes the limits within which the different forms of implements were produced. The widths of the blades vary from 4-30 mm with an average width of 14.3 mm (s = 4.1, N = 394, where s is the standard deviation of statistical distribution and N is the size of this distribution). Frequency distribution of blade width shows virtually no modality, with some depression around the average value. The lengths of the blades vary from 12-78 mm, with an average value of 29.5 mm (s = 11.8, N = 394). Frequency distribution is sufficiently unequal if the classes are stated with limits of 2.5 mm. If the range of classes is higher, up to 5.0 mm, the frequency distribution shows two modes of smaller and greater blades divided along the value of 40 mm. The frequencies decrease after this value.

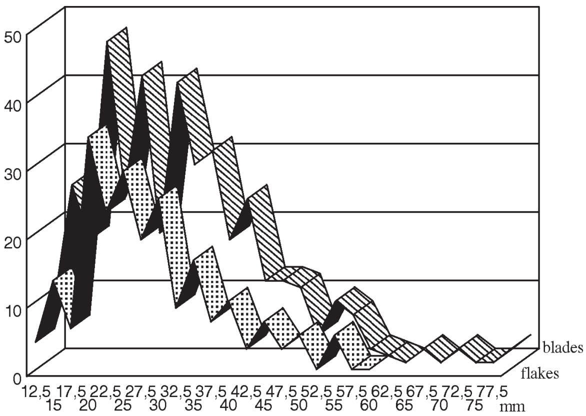


Fig. 1.1.1.a. Frequency division of blade and flake lengths. - Rozdělení četností délky čepelí a úštěpů.

The correlation of blade length and width gives a lower value (R = 0.394, N = 394, where R is correlation coefficient), which may indicate that blade length is not uniquely dependent on the size of the percussion platform. Indeed, it proves that blade length is prescribed by the preparation and size of the core.

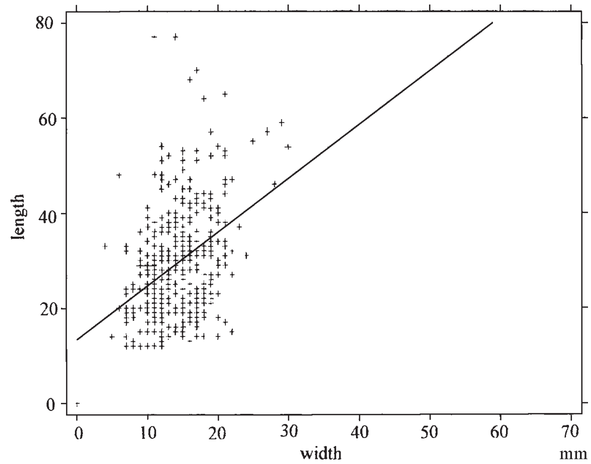


Fig. 1.1.1.b. Correlation of blade length and width. - Korelace délky a šířky čepelí.

1.1.2. Principal characteristics of flake forms (length, width)

The width of flakes ranges from 2-50 mm with an average of 20.5 mm (s = 8.3, N = 243). The frequency distribution is clearly bimodal, with narrower and broader flakes distinguishable at a limit of 20.0 mm. The distribution is not particularly unified in extreme values, due to sufficient inconsistency in this basic form. The length of flakes ranges from 10-60 mm, with an average value of 27.5 mm (s = 10.9, N = 243). The frequency distribution is similarly uneven to that of blades when the classes are limited by 2.5 mm, and relatively even if the limits are 5.0 mm. If there is any division by length into larger and smaller flakes, then it falls at an average value of about 30 mm.

The correlation of flake length and width has a value of R = 0.620 (N = 243) which is much higher than in the case of the blades. The striking of flakes was evidently less bound up with the length of the core, and their size expressed by their length depended much more on the percussion plane than in the case of blades. Such a correlation makes it easier to further extend length as a characteristic of size regardless of width, showing a bimodal statistical frequency distribution. With regard to the correlation of both characteristics, variability in width is adequately reflected by variability in length.

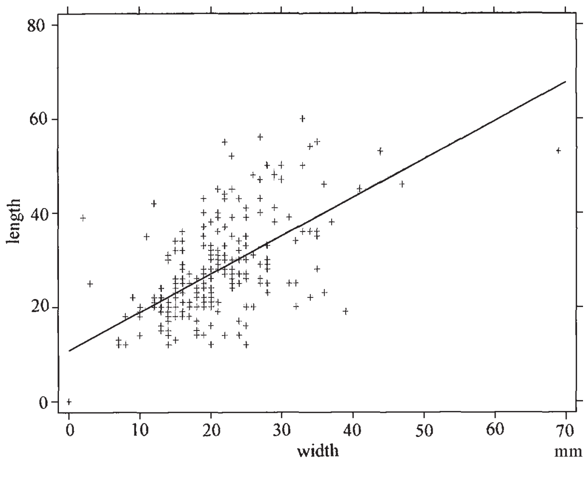


Fig. 1.1.2.a. Correlation of flake length and width. - Korelace délky a šířky úštěpů

1.1.3. Primary characteristics of blade and flake sizes (weight, length)

The weight of blades is characterised by an unimodal frequency distribution with an average value of 2.5 g (s = 2.2, N = 394). It can be considered a reliable measure of artefact size as it corresponds to volume, which includes all three dimensions. It requires the practical but sufficiently accurate weighing of artefacts, together with measurement of the substantial weight of the raw materials, which was not accessible during data procurement. Because of the high correlation of blade weight to length (R = 0.683), both measurements are interchangeable as characteristic of size.

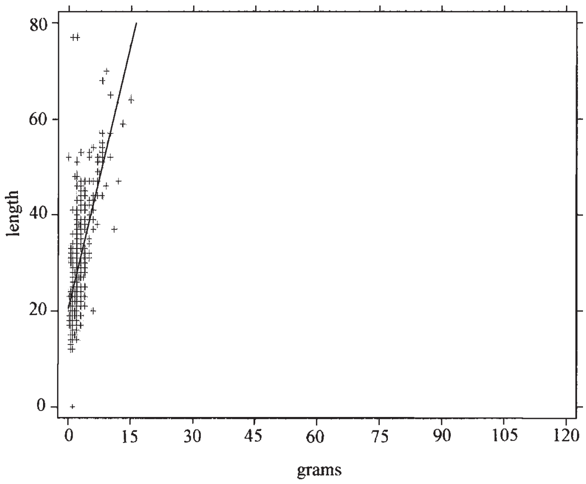


Fig. 1.1.3.a. Correlation of blade length and weight. - Korelace délky a hmotnosti čepelí.

The weight of flakes is also characterised by a unimodal frequency distribution, with an average value of 5.2 g (s = 6.2, N = 243). This is the same in the case of flakes, as length correlates sufficiently with length (R = 0.719) and data on weight can be replaced with those on length.

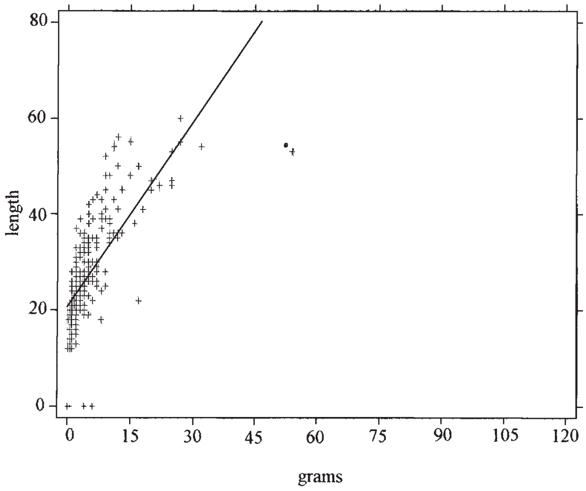


Fig. 1.1.3.b. Correlation of flake length and weight. - Korelace délky a hmotnosti úštěpů.

1.1.4. Primary characteristics of chip and core sizes (weight, length)

The weight of the chips has a unimodal frequency distribution with an average of 2.9 g (s = 4.2, N = 179). Length and weight correlate slightly less than in the case of flakes (R = 0.159). The chips mainly represent refuse from the production of other artefacts, and from the point of view of size comprise a fairly inconsistent class of forms.

The weight of cores has a greater range, and due to their limited number (N = 31) the frequency distribution is highly inconsistent. The average value is 30.8 g (s = 27.3), but smaller cores are separated by up to 60 g from larger ones. Among smaller cores, the forms with secondary polishing can often be shown to be from the preparation of the grinding surface of quernstones (Zimmermann 1988:706), or from their use as flints (Seeberger 1977). Within the group of larger cores, only one used core appeared to have been used as a handstone. The correlation of core length and weight, regardless of the inconsistencies noted, remains sufficiently high (R = 0.677).

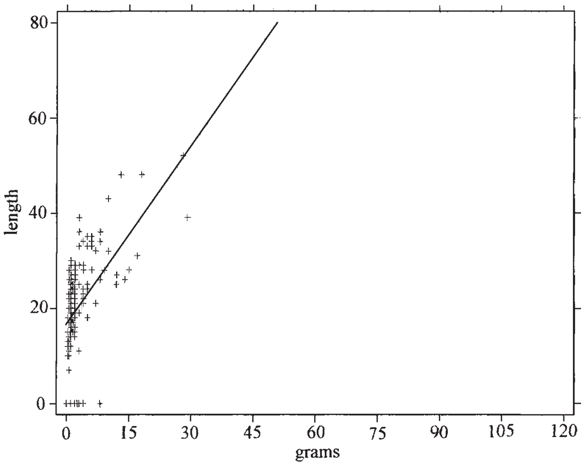


Fig. 1.1.4.a. Correlation of chip length and weight - Korelace délky a hmotnosti odštěpků.

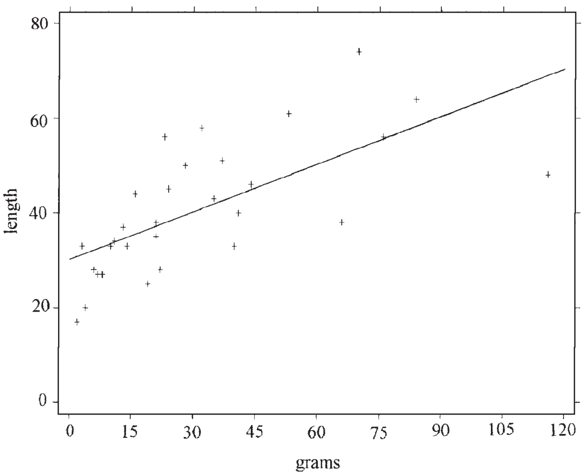


Fig. 1.1.4.b. Correlation of core length and weight. - Korelace délky a hmotnosti jader.

1.1.5. Formal classification of blades

The formal classification of blades is defined as a matrix of the paradigmatic classes of form and size. The forms themselves are characterised by a width-length index and can be divided into narrower and more extended types; this follows from the bimodal distribution of blades, which is divided by a value limit 0.7. The majority of the members falling into the narrower class corresponds to the intuitive definition of blades.

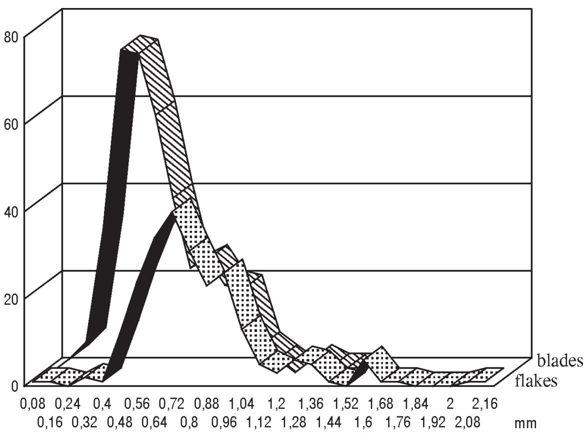


Fig. 1.1.5.a. Frequency distribution of the blade width/length index. - Rozdělení četností šířko-délkového indexu čepelí.

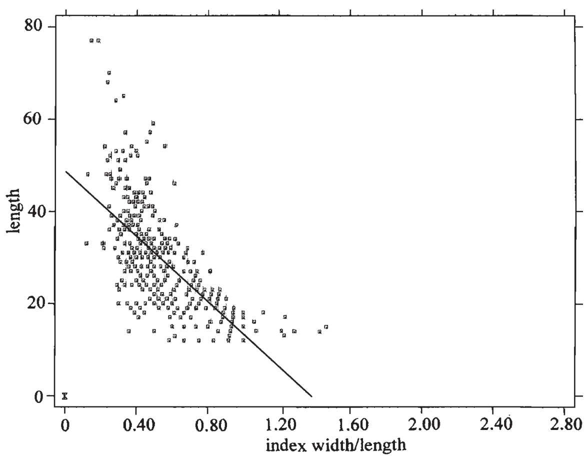


Fig. 1.1.5.b. Correlation of the width/length index and blade length. - Korelace šířko-délkového indexu a délky čepelí.

Blades were divided into two groups by length (Chap. 1.1.1.), those shorter and longer than 40 mm. By compiling both criteria, blade classification is constructed of four formal types: (1) narrower and shorter, (2) narrow and longer (3) wider and shorter, and (4) wider and longer (Fig. 1.0.3.a.). Type 4 does not appear among the Bylany finds, as it is excluded by the definition of that form. Type 3 also contains broken blade pieces, or deliberately shortened blades, the width of which exceeded their length and the index of which was therefore greater than 1.0. The characteristics of form represented by the ratio of length and width and blade size correlate very negatively (R =-0.659). Size is represented by length rather than weight.

1.1.6. Formal classification of flakes

The statistical frequency distribution of the width/length index is also bimodal for the Bylany flakes (Fig. 1.1.5.a), but the limit between narrower and wider flakes has a value of 0.9. The narrower flakes defined in this way prevail in the Bylany assemblage, but, given the definitions of form, more extended flakes tend to dominate. This is most probably an expression of attempts to produce and use the forms tending formally more towards the blades.

On the basis of size and form, four paradigmatic classes of formal classification were formulated: (5) narrower and shorter, (6) narrower and longer, (7) wider and shorter, and (8) wide and longer (Fig. 1.0.a-A). The length and width/length index of flakes correlate similarly to those of blades (Fig. 1.1.6.a), but less negatively (R = -0.418). The Bylany assemblage also contains, albeit infrequently, class 8, which comprises extended and long forms. Intuitively, these would be classified as large flakes.

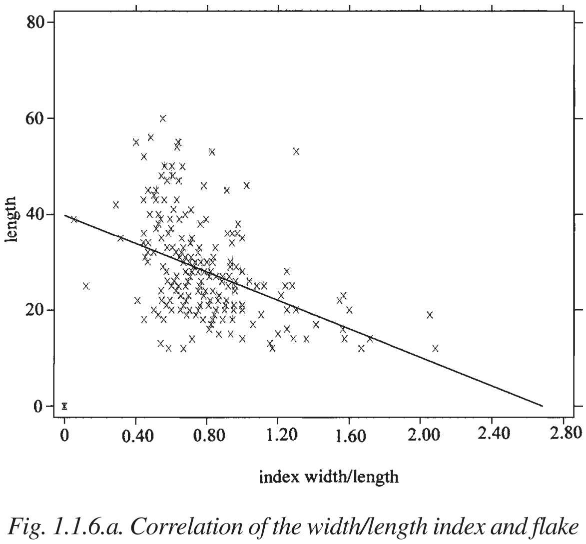


Fig. 1.1.6.a. Correlation of the width/length index and flake length. - Korelace šířko-délkového indexu a délky úštěpů.

1.1.7. The chronological variability of formal classes

The relative occurrences of the formal classes of blades and flakes vary irregularly in the settlement phases. From the total numbers available, the small narrow blades stand out (L1), reaching an average value of 38 % and also prevalent in most phases. Large extended flakes are relatively rare, attaining a value of only 2 %, and are entirely absent in many phases. The other formal types together total about 10 %, but in some particular phases their values vary much more.

If only those phases are considered where the number of artefacts found exceeds 10 pieces, then 14 phases remain to be characterised. The variability of formal types can be confronted with the interpreted fluctuations in the Bylany settlement. The ratio of small narrow blades increases in some phases of restoration or movement (8, 13), which corresponds with the variability of large narrow blades. Small wide blades appear to have relatively stable values, and their chronological variability is therefore relatively unimportant. The corresponding formal types of flakes have very similar trends to those of blades.

From the chronological point of view, the characteristics of size and shape behave similarly regardless of basic forms. This bears witness to similar user trends in particular chronological periods. It corresponds to the fact that the differences between the contents of particular phases are not significant (chq = 181.073, d.f. = 150, p = 0.0426, where chq is Pearson's chi quadrat coefficient with d.f. degrees of freedom and p is a probability. This coefficient can be an index for the evaluation of the homogeneity of any contingency table, cf. Ihm 1978: 209).

It is necessary to suppose that most of the artefacts were not produced at the site. The chronological variability may be influenced by fluctuating conditions in the forming of secondary refuse on the site. Nor can the situation be excluded whereby over a longer period of inhabiting one area refuse accumulated until the end of that period. Before the area was finally abandoned, it is possible that most of the items might have been removed. The data used is consistent in the sense of the similar formative processes establishing refuse around the houses. The artefact complexes coming from remote pits are not considered in the analysis. →Tab. 1.1.7.A.

1.2. The economics of raw materials use and the production of chipped artefacts. Relationships to the environment: the adaptability of raw materials and basic forms

1.2.1. Adaptation of production and the use of basic forms

From the point of view of the use of more friable materials, Bylany is a typical consumer site, on which great differentiation in the materials used is the norm (Vencl 1986). The spectrum of raw materials includes more than twenty different minerals (Přichystal 1985) coming from different directions and distances. They usually reached the site in the form of ready-made artefacts or their component parts; judging from the metrics, it is possible that some of them were further prepared, mainly for secondary use. Cores as initial artefact forms made up only 4 %; the majority of them were used secondarily as handstones (Zimmermann 1988, 706) or for striking fires (Seerberger 1977). This bears witness first to the exceptional nature of the chipped industry production at the Bylany site. On the other hand, it also proves the adaptability of the population to the shortage of suitable raw materials in the vicinity. Waste, or rather small irregular chips, appear only in smaller quantities (18 %); these prove that there was limited production at the site, but more likely bear witness to the more economic use of raw materials. Some have been greatly worn down, because most of the sharp edges have been used (Tringham 1972: 146).

In the Bylany assemblages, the proportion of shorter blades (46 %) exceeds that of other flakes (31 %). This reflects the specialisation of Neolithic industry in field tools (sickles) or implements for domestic use (food processing). Coarser tasks, such as the working of skins, wood or bone, for which flakes would have been required, were not practised to any greater extent, judging from the waste preserved. It is of course possible that the useful life of coarser tools was longer, and that their relative representation is lower, even if the same ratio of various tasks is assumed. Scrapers are not included among the basic forms as they may appear on either blades or flakes. Blades themselves are understood as intermediate flake forms. Both basic forms are easily classifiable into separate, distinct classes. The proportion of basic forms also depends to a great extent on the quality of raw materials. Of the silicites, hornstone and flint can be described as cleaving better than quartzite, while mined raw materials are of better quality than gathered ones (Tringham 1972: 143). The following groups of raw materials were therefore distinguished on the basis of their means of procurement and source (after Přichystal 1985):

A-mined hornstone, including Bavarian bedded hornstone (code 06, see the cited work), Kraków-Częstochowa Jura silicate ("Kraków flint", 09), chocolate silicate ("świętokrzyzski"/"Holy Cross" type, 10), hornstones of the Krumlovský les I & II types (11, 12), hornstone X (13), radiolarite (17), hornstone 21 (21) and speckled silicate ("świenciechów" type, 22).

B-mined quartzite, including West Bohemian quartzites of the "Skršín" (02) and "Tušimice" (03) types, a very fine quartzites known as limnoquartzite (04), "Bečov" quartzite (14), Boskovštejn-type disintegrated siliceous serpentine (19), quartzite of uncertain provenience or from sarsen stone (20), and silicates to limnoquartzites (22).

C-gathered hornstones, including various siliceous glaciogenic "moraine" and "Baltic" sediments (01).

D-other materials, including porcellanite (05), chert (07), opal (15), chalcedony (16) and rock crystal (18).

The overall occurrence of these groups is in the order of: Group A-43%; Group C-32%; Group B-21%; and Group D-4%. Glaciogenic silicates ("Baltic flints") are more common because their structures were affected by long-term glacial transport and disintegration. They are nevertheless preserved with good fissility in comparison with the various types of quartzite, and were preferred over the more easily accessible and otherwise abundant West Bohemian quartzite. This result does not match the (therefore theoretical) assumption that mined raw materials are of better quality than those gathered. The fourth group of "other" materials contains worked artefacts only exceptionally.

The appearance of the basic classes by raw material group shows statistically significant differences. The given proportions of basic raw material may be regarded as adaptations to the state of natural resources of readily cleavable raw materials in Bohemia. Constantly renewed contacts clearly did not require the inhabitants of Bylany to substitute imported raw materials entirely for lesser quality local varieties (Group D), which were prepared only for the "hard times".

1.2.2. Raw materials and their processing

The relative proportions of the individual classes of raw materials changed during the settlement phases. In the earliest phases (1-9), class C is prevalent, comprising collected hornstones-mainly silicates of glacial sediments (SGS)-that in their time represented the only available raw materials of a sufficiently high quality. Classes A and B played a more complementary role in the earliest periods, as materials that were either exclusive (A) or substitutive (B). The differences relating to raw materials between the phases are statistically significant (chq = 276.656, d.f. 75, p = 0.0000).

During the middle and late LnK, first-class materials of the highest quality are conspicuously dominant. These comprise silicates of Kraków-Częstochowa Jura (SKJ). Phase 13 is an exception, in which the proportion of the third class (C) increased again. During phases 17 and 21 the occurrences of raw material classes are more or less even. Later, during the final phases, class B dominates, representing lower quality materials and showing the interruption of long-distance contacts to the north-east. The chronological sequence of raw materials for the Bylany site is simply C-A-B. ➔Tab. 1.2.2.A.

1.2.3. The volume of chipped industry in houses with simple and double mid-sections

It is supposed that particular chipped implements were used for specific actions and only some of them were possessed by individuals. It follows that their number will not correspond directly to the number of the inhabitants in a given house. The distortion of the number of implements saved within the refuse against the original number increases due to the sufficient durability of the materials used. Therefore the implements used were inherited if they were not damaged.

The average total number of chipped artefacts per house is 2.5 pieces/house. This number is much lower in those houses with a simple mid-section (2.2), when compared to houses with a double mid-section (3.2), but the relationship of the two values in not linear. It can be inferred from this that not every member of a given household possessed a complete set of implements; it is more likely that these sets were held in common by all the members of the household. In those houses with a higher number of people, corresponding to the interpretation of the doubled mid-section, there was thus only a limited number of the implements necessary for the larger range of tasks available at any give moment. The implements were multifunctional, and not all activities were carried out concurrently.

Among the basic forms, the average number of differences between blades and flakes per house are even lower than for all taken together. These differences are less among flakes than among blades. There are no significant statistical differences (chq = 18.475, d.f. 12, p = 0.1020). In houses with a double mid-section, there are about 35% more blades, but only 25% more flakes, than in houses with a simple mid-section. The basic forms of chipped industry can only be interpreted to a limited degree as being indicative of the number of inhabitants. ➔Tabs. 1.2.3.A, 1.2.3.B.

1.2.4. Basic forms during phases 8-11

The number of examples of datable basic forms in particular settlement phases varies from 2 (phase 3) to 60 (phase 19). For the characterisation of a continuous stretch of time covering several phases, the period of phases 8-11 was selected. Each of these phases contains over 30 pieces of chipped industry, with the exception of phase 9, from which only 9 pieces were recovered. The mutual relationships existing between the phases were analysed using correspondence analysis in the space of the basic forms. The first axis of the resulting plot (77.5% of the variability) corresponds to the production sequence of basic forms in the decreasing sequence: cores-flakes-blades-chips. The second axis (17.9% of the variability) can be interpreted as the dichotomy of implements (flakes and blades) and production refuse (chips and the remains of cores).

Within such an interpreted space of basic forms, the group represented by phases 10 and 11 is remarkable; in these phases, finished blades and flakes are prevalent. Phase 8 is characterised by waste material and chips, and phase 9 by the remains of cores; both of these phases represent complementary local production during the period when the settlement shifted from section F, with the earliest phases, to section B about 200-300 m westward, with the middle LnK period phases. This complementary production can be explained by increased demand for implements during these movements, or by the need to complete sets of implements.

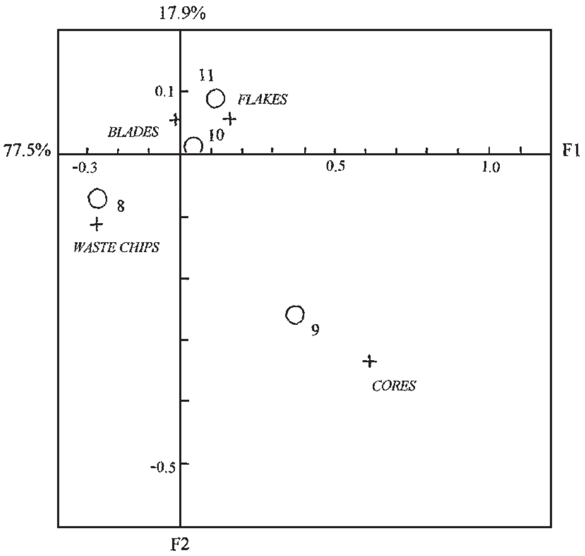


Fig. 1.2.4.a. Basic forms in phases 8-11. - Základní formy v prostoru fází 8-11.

1.2.5. Basic forms in households of phases 8-11

Similar analyses were carried out in these phases for all of the households. The results of the correspondence analysis are expressed in three axes, the second (24.5 % of the variability) and the third (18.7 % of the variability of which are interpretable in a manner analogous to that of the first and second in the preceding case. This interpretation is not at all chronological, but is the result of the variability originating during the production of chipped implements. The first axis in the households (56.6 % of the variability) follows the formal characteristics more closely. The blades and the core remains of cores are in opposition to the flakes and chips.

In the space of the first and second axes, individual houses fit into four quadrants according to the prevalent forms and their production. The first group consists of households with core remains (H306, 604, 680, 620), and the second a group of households with blades (H224, 525, 741, 9001, 9002). The next two groups of households are characterised by flakes (H312, 9004) and chips (H302, 405, 569, 3199).

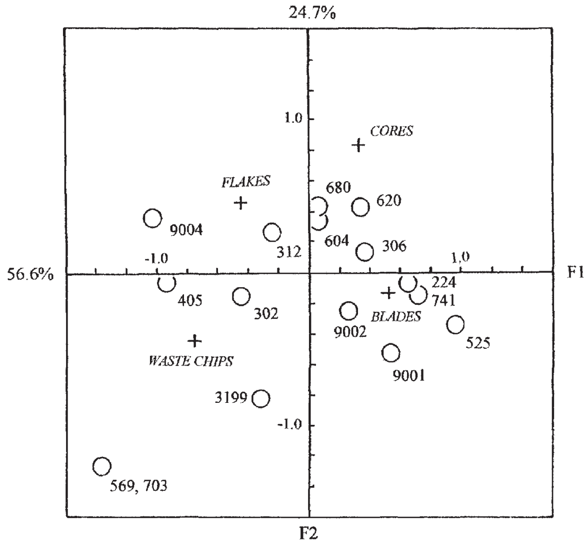


Fig. 1.2.5. Basic forms of chipped industry in complexes of phases 8-11. - Základní formy ŠI v prostoru komplexů ve fázích 8-11.

1.3. The informative content of the functional categories of the chipped industry

1.3.1. Genotypes in settlement phases 8-11

The basic forms of chipped industry maintain their manufactured characteristics within phases and households. In these spaces, the formal types follow the prescribed chronological sequence more closely. The first axis (59.2 % of the variability) emphasises the "broadness" of artefacts, and the second (29.2 % of the variability) more their "narrowness". The resultant trends in the spaces of both of these axes lead to a range beginning with large narrow blades (L3) and running down to large narrow flakes (L7). The studied sample of the whole periodic sequence permits the argument that over time the formal chipped industry classes play the evolutionary role of genotypes in biological systems. This means that they are principal formal bearers of some production tradition, which is continuously maintained over a fixed period regardless of changes in the generations of producers (Hill 1985: 382). This has not been disproved at Bylany, where generations of users substituted for those of producers.

The producers, however remote, were, along with the makers of complementary artefacts at the site, subordinate to the same cultural tradition of chipped industry. In this sense, the segments of Bylany phases with consistent genotypic implement forms may represent sub-cultural production circles. The tradition of production, on the other hand, influenced demand in itself. Smaller blades of narrower and more extended form, in particular, strengthened this tradition.

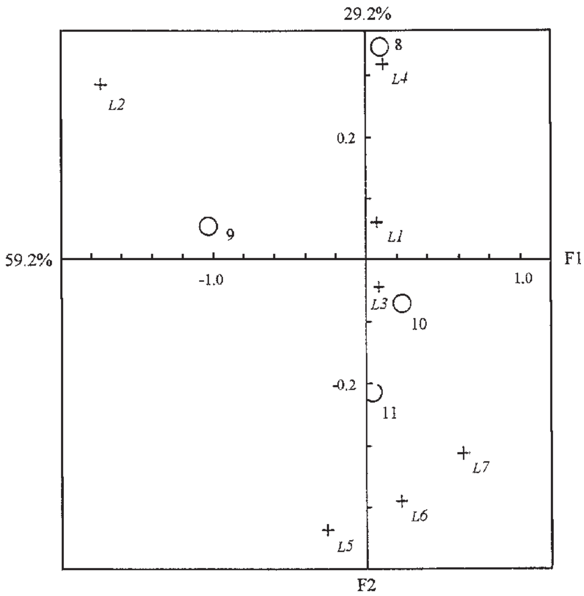


Fig. 1.3.1.a. Formal chipped industry genotypes in phases 8-11. - Formální genotypy ŠI v prostoru fází 8-11.

1.3.2. Phenotypes in households

The same formal type behaves slightly differently in individual households. The second axis (27.4 % of the variability) mirrors the "extension" of forms, which is similar to the first axis within the space of the phases, but in the reverse order. The first axis (40.7 % of the variability) brings small blades more into opposition, regardless of their width, and this is also true of the large flakes. The order is comparable to the order on the third axis in the space of the phases. By contrast, the third axis of household space (15.8 % of the variability) separates the extended blades and narrow flakes from narrow blades and extended flakes.

Variability of form within the chipped industry comes in later oppositions. The ordering of households within the second and third axes overcomes their positions in phases; the position of the large narrow blades from house 604 is exceptional in this regard. The cross section of the "extent" and "narrowness" of blades and flakes within synchronic households can be described as a phenotypic variability in the chipped industry. It results from individual adaptation to the changing conditions of the Bylany site and its surrounding environment. The conceptual analogy from the sphere of biological evolution reflects a specific feature of cultural similarities that has no genetic base (Rindos 1989: 6).

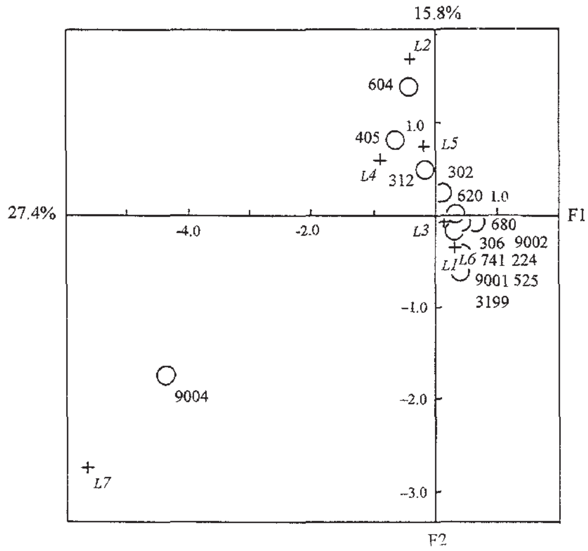


Fig. 1.3.2.a. Formal phenotypes within the space of the complexes in phases 8-11. - Formální fenotypy v prostoru komplexů z fází 8-11.

1.3.3. The quality of the chipped industry in individual houses

The quality of the raw materials was evaluated on the basis of their overall distribution (scores of materials: class A = score 1, C = 2, B = 3, where the most common mined silicates A are marked with the highest score, and the least numerous mined quartzites B with the lowest score). The resultant, increasing quality points do not correspond to the current supposition that mined materials were better than collected ones (cf. section 1.2.1 above).

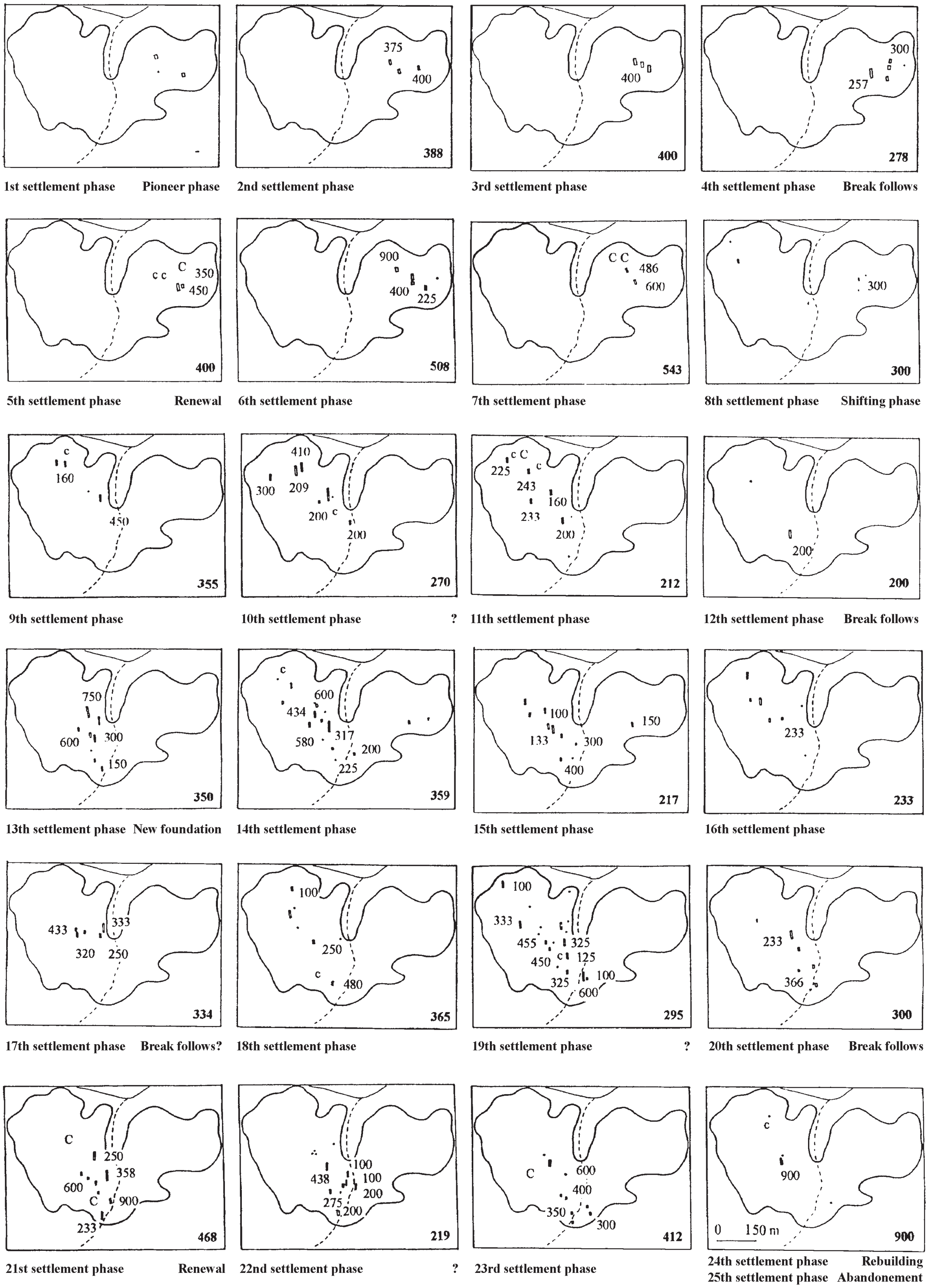


Fig. 1.3.3.a. Division of the quality scores of the chipped industry in households in individual phases and finds of cores (C- core, c- core handstone). - Rozložení skóre kvality ŠI v domech jednotlivých fází a nálezy jader (C- jádro, c- jádrový otloukač).

The strikability of silicates from glacial sediments remained higher even after oxidisation on the earth's surface than that of any other quartz stones. Despite their easier accessibility, later quartzites were considered more as complementary materials by Neolithic peoples. Others stones such as crystal, quartz, and chalcedony are preserved at Bylany only in the form of raw pieces of stone, and not as implements.

The quality of manufacture was evaluated in accordance with the difficulty of basic forms of percussion (scores: blades = 1, flakes = 2, chips = 3, cores = 0, not applicable). By multiplication of the scores of material quality and difficulty, the matrix of chipped industry quality is discovered (Fig. 1.0.3.a), which ranges from 1 to 9. With the help of this matrix, the relative frequencies of basic forms in households were classified (Fig. 1.0.3.a).

For each household, the coefficient of quality was calculated by multiplying the matrices of both forms and scores. The values of the score obtained range from 100 for the highest quality, when 100 % of the industry consists of blades made of mined hornstone, to 900 for the poorest quality, where 100 % of silexes consist of chips from quartz stones. From these values, the indicator of the quality of the chipped industry within each household, the average values for phases were calculated. As a result, the sequence of average quality scores characterises the sequence of the phases. There are no artefacts classifiable for phases 1 and 24; in the majority of the other phases, the score reaches less than 450, which indicates the relatively high quality of the chipped industry. This is not the case in phases 6, 7 and 25. The scores vary in the non-random intervals between the phases, which correspond to the desertion and revitalisation of settlement areas as previously formulated on the basis of the ceramic chronology. The development starting in phase 8 is typical in the phases intervals, after which the transfer of the area from section F to sections B and A occurred. After phase 12, the areas was again abandoned for a short period of time. An analogous periodic development appeared in phases 1 & 4, in phases 18 & 20, and between phases 21 and 22.

A slightly different model of quality variation is evidenced for the period of phases 13-17. Quality increased until phase 15, and subsequently decreased again; there is no interruption between phases 15 and 16 in the ceramic chronology. This is similar to the first period of phases 1-8, with decreasing quality in phases 5 and 6, but with a corresponding interruption in ceramics. The final decrease in quality at the end of the LnK settlement in area BY1 is connected with the latter's abandonment. The periods of quality development correspond with the situation concerning cores. These accumulate in the initial phases of each period, while secondary reused cores appear as handstones in the final phases of each period. The variability of quality may be influenced by a general increase in chipped industry refuse during uninterrupted settlement in one portion of the landscape. In this case, it would be more likely that the accumulation of chips resulted from secondary waste from tool wear. It must be stressed that the interpreted picture is based only on the data collected from the houses-finds from other pits were not included.

1.4. The classification of the primary functional categories of chipped industry within the subsistence system, and division of labour

1.4.1. Design of the working edge (edge angle)

The edge angle is considered to be one of the determining correlates (Tringham 1973: 17) of any function of the tool. This angle differs in different prehistoric cultures; it consists of the measurable sharpness of the working edges, which may additionally be prepared with deliberate retouching. In the majority of cases, the edges were created naturally during the action of striking (Wilmsen 1968: 156). The size of the angle as a measure of the sharpness is influenced by the different kinds of materials used. Direct measurements at Bylany were taken for only a limited number of artefacts, and do not completely cover the data used here (Tringham 1973, graph 25).

A relatively unified frequency distribution, which need not represent one assemblage, resulted from the sample measured in the 1960's. In accordance with the knowledge then available, three categories (Tringham 1973: 14) of artefacts were defined: A-knives for hard and soft material (10-30°), B-scrapers for soft material (30-40°), C-scrapers for hard material (more than 40°). This classification is to be considered as a simplification of the functional interpretation of the metrics, but can also serve as a first approach to interpretation of the data.

Direct measurements of the edge angle were originally carried out on about one third of the total number of artefacts. At that point, it was replaced by the tangents of the angle calculated as a ratio of the height and half the width of any given

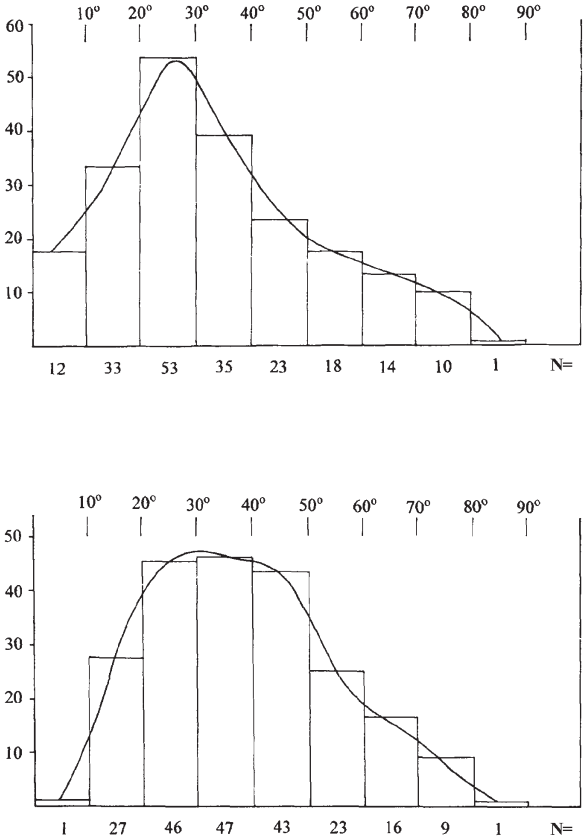


Fig. 1.4.1.a. The range of sharp edges (according to Tringham 1973: graph 25). - Rozložení četností úhlu ostří.

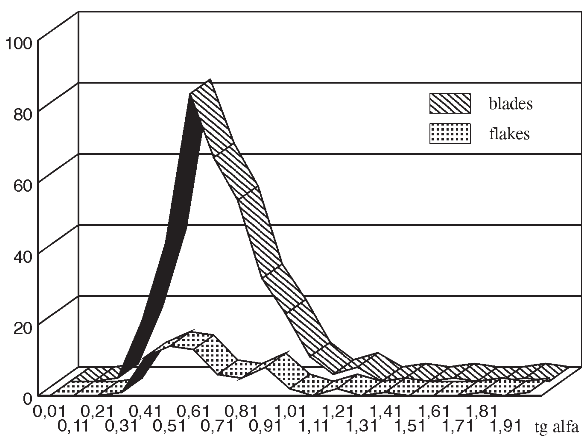


Fig. 1.4.1.b. The range of sharp edges for blades and flakes. - Rozložení četností tgα pro čepele a úštěpy.

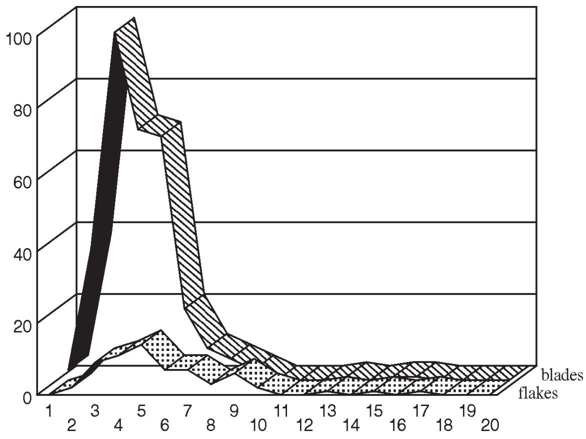


Fig. 1.4.1.c. The range of sharp edge heights for blades and flakes. - Rozložení četností výšky pro čepele a úštěpy.

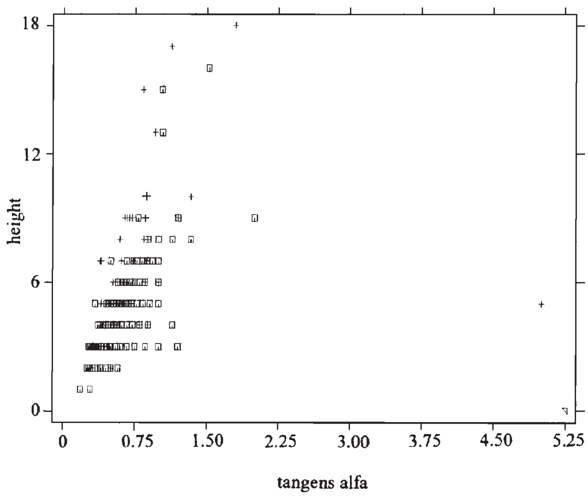


Fig. 1.4.1.d. Correlation of heights and angles. - Korelace výšky.

artefact. In absolute terms, this approximation yields slightly higher values than the original angle. It is supposed that relationships between the artefacts remain despite the substituted calculation. The tangent of an angle varies between 0.21 and 1.96, with an average value of 0.578 (s = 0.203, N = 316) for blades and 0.697 (s = 0.603, N = 65) for flakes. The frequency distribution of these values is irregular, with limits of 30° and 40°.

The massivity of the artefacts, which also correlates to their function, is measurable according to their height. The height of the blades ranges from 1-16 mm with an average of 4.1 mm (s = 1.8, N = 316). The frequency distribution is unimodal. The height of flakes ranges from 2-18 mm with an average of 6.1 mm (s = 3.2, N = 65). The frequency distribution is irregular. The limit of 4 mm correlates with a decrease in general distribution.

1.4.2. Wear (gloss)

The different wear traces on a given artefact's surface are important attributes for functional classification. They comprise different types of incision, striation and grinding, evidenced under different magnifications, usually on the working edges of the artefacts (Popelka 1999). A previous study concerned only a part of the finds, and summary results have been published; it can be supposed that the main directions of the functions found on this approximate third of the assemblage will be similar for the whole-of the tools, 41 % were for soft materials (meat, hide), 34 % for hard materials and 17 % for organic materials, e.g. sickle blades (Tringham 1972: 147). The rare awls found increased only by a very small amount later (cf. Tab. 1.8.3.A.). The only new forms are arrow heads (see below). ➔Tabs. 1.4.2.A, 1.4.2.B, 1.4.2.C.

Sickle gloss can be considered as the most remarkable macroscopic wear feature on the working edge. There are no significant statistical differences between any of the 864 artefacts studied for the presence or absence of gloss as compared to other functional features, such as edge angle or artefact massiveness. The test value between artefacts with gloss to the three classes of edge angle is chq = 0,103, d.f. = 1, p = 0.9498. The test value between artefacts with gloss and the two classes of artefact height was slightly greater a little higher (chq = 0.206, d.f. = 1, p = 0.6498). Based on this result, the presence of gloss can only be considered as a complementary functional criterion in comparison to edge angle or artefact height.

By contrast, a significant statistical difference appears between the gloss and the basic forms. The artefacts with gloss comprise about 15 % flakes and 85 % blades (chq = 27.486, d.f. = 1, p = 0.0). The gloss is significantly related to the blades, but also appears on some of the flakes. This evidence corresponds to the character of the users at Bylany, where every form was used according to need and did not correspond solely to function.

1.4.3. Functional classification

The functional classification of the chipped industry comprises the paradigmatic classes of edge angle and artefact height. The limits of the angle tangents are 10-30°, 30-40°, and > 40°. The height comprises two classes with a limit of 4 mm. The six resulting classes (Fig. 1.0.3.a-C) are interpreted as knives, scrapers and planes, all with lower and higher variants. The classification of the 409 artefacts shows statistically significant differences between the classes (chq = 104.742, d.f. = 2, p = 0.0). In absolute frequencies, the lower knives and higher scrapers prevail, corresponding to the natural, morphologically basic forms. The proportion of higher knives and lower scrapers is about 10 %. Both lower and higher planes are fairly infrequent (2 %, 9 %). ➔Tab. 1.4.3.A.

1.4.4. Chronological variability of functional classes

The lower knives and higher scrapers are also the most frequent functional types during settlement phases. The variability of their values seems to be random. The number of classified artefacts decreases in the phases (4, 7, 12, 18 and 20) before the interpreted changes. These numbers apparently increase during most of the subsequent phases (5, 8, 13, 18 and 21) after the renewal of the settlement area. The planes are found relatively frequently in the same phases. If these implements were used for working hard materials such as woods or bone, this would correspond to those times when the sets of implements made of those materials were also renewed.

It can be assumed that there was also a greater demand for other implements made from organic materials during such phases of renewal. The chronological variability of the functional classes corresponds more to the periods which are independently interpreted through the ceramic chronology, than to the long-term trends of the settlement area's development. The design elements in the chipped industry correspond more, therefore, to functional changes, and cannot be used as chronological criteria, at least during the development of the LnK period. ➔Tab. 1.4.4.A.

1.5. Identification of activities within households, and the stability and variability of economic activities

1.5.1. The economy of raw material procurement

Thanks to the reliable classification of the origin of most of the artefacts (Přichystal 1985), raw material sources can be divided into groups by the distance and direction from the Bylany site. The quantitative differences between these groups are statistically significant (chq = 36.680, d.f. = 21, p = 0.0183).

Although a small number of raw materials were sourced locally, i.e. from within 10 km distance, the main raw materials employed came from sources located within a band 100-150 km distant, and another group from over 150 km. The resources in the first circle could be reached within one day, and consist of quartz (code 07), rock crystal (18), opal (15) and chert (16). The resources from the second band could be reached by a short expedition of approximately one week's duration, or by one exchange. From the north-east these are: porcellanite (5), hornstone X (13), hornstone 21 (21) and silicates to limnoquartzites (23). From the north-west come several West Bohemian types of quartzite, including Skršín quartzite (2), Tušimice quartzite (3), and Bečov quartzite (14), as well as limnoquartzites (4) and sarsen stone (20). From the south-west no resources are evidenced, while from the south-east came Moravian quartzite of the Krumlovský les I (11) and II (12) types, as well as Boskovštejn-type disintegrated siliceous serpentine (19).

The raw materials from the outermost band were obtainable either by making longer expeditions of several weeks' duration, or through multiple exchanges. These include silicates from the Kraków-Częstochowa region (SKJ: 9,10,22) to the north-east, and silicates of glaciogenic sediments from the north-west (SGS:1), i.e. "Baltic" or "moraine" flints. The SGS groups comprise heterogeneous resources from glacial sediments the detailed origins of which cannot be specified. They were included amongst the raw materials of the third group from the north-west on the assumption that they were transported through the Elbe (Labe) region from Central Germany. Some of these could have come from the north-east, if the supposition of an origin in Lower Silesia or, later, along the upper Elbe could be proven. Because petrological methods do not permit of such differentiation, the whole group was left undivided.

Radiolarites (17) from the outermost band come from the south-east, and associated with the earliest settlements, while from the south-west are rare Bavarian hornstones (6). The latter initially appear in the later LnK, and again later during the StK. By contrast, in the Pilsen region, Bavarian hornstone is known as a standard material from the middle LnK period onwards.

Raw materials from the south are in a minority among all of the basic forms of chipped industry. The picture of the materials used in cores, however, is noteworthy: material from the second band occurs only sporadically (3.4 %). Cores from the south are absent, while the majority come from the north-west (SGS: 43.8 %), i.e. from Germany, or from the north-east (34.3 %), mainly from SKJ. It can be inferred from this that the materials from the nearer resources were imported in the form of ready-made implements, by way of simple exchange. Materials from the more distant resources

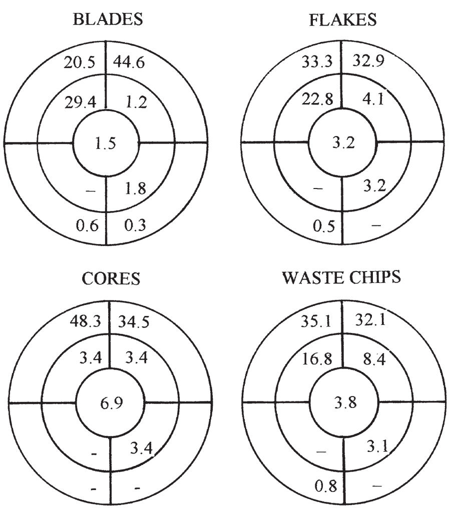


Fig. 1.5.1.a. Relative representation of basic forms according to the direction and distance of raw material resources. - Relativní zastoupení základních forem podle směru a vzdálenosti zdrojů surovin.

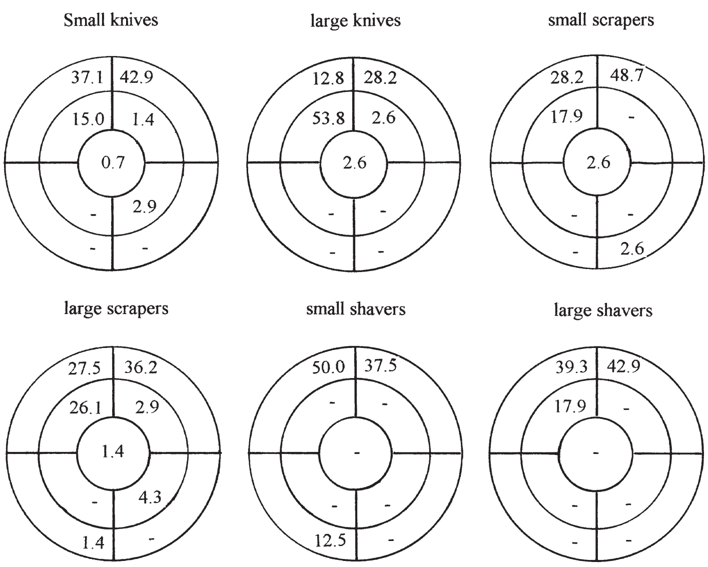


Fig. 1.5.1.b. The relative representation of functional types based on distance and direction from the site. - Relativní zastoupení funkčních typů podle směru a vzdálenosti zdrojů surovin.

arrived indirectly, in various steps and in a form also usable for occasional on-site production. In the case of SGS, the Bylany site might also have played a mediating role for the materials coming from the south (Lech 1989, fig. 1). →Tab. 1.5.1.A.

The artefacts of the functional classes were produced in a similar ratio from all of the materials. The functional types differ according to the prevalent materials; the majority are made from materials from the north-east: small knives, small and large scrapers and large planes. An exception to this is represented by the large knives that are mostly made of North-West Bohemian quartzite, i.e. from materials originating in the second band and coming from the north-west (QNWB). The materials from the third band to the north-west dominate in the group represented by small planes. The differences between the functional classes and material groups are not of great statistical significance (chq = 27.906, d.f. = 14, p = 0.0146). →Tab. 1.5.1.B.

1.5.2. Identification of activities in households

The sign value of the functional groups must be an index of the primary division of the activities that occupied the people of different genders and ages from different households. Therefore, the artefacts with gloss indicating the use of "sickle" edges were separated from the main functional classes. Sickles are considered to be an indicator of the role of the female part of the population (Löhr - Zimmermann - Hahn 1977: 261). The awls and arrow heads were included in the functional classification as morphologically clear artefacts. The relationships of such classifications to houses with simple and double mid-sections show no significant statistical differences (chq = 11.388, d.f. = 16, p = 0.7849).

The ratio of functional types to each house with a simple or double mid-section yields only slightly higher values for the latter. Within the houses, in the cases where there are less than 10 finds there are no differences (arrowheads or awls), or such differences are insignificant (f5, small planes). A slightly higher value was found for small knives, while for other types the ratio increases to 40 % : 60 %, and more in the cases of houses with a double mid-section. A value of double the average was calculated for large planes.

The ratio of functional types is comparable to the ratio of primary types. If double the number of inhabitants is assumed for those houses with a double mid-section, then the number of activities did not necessarily double accordingly. The small knives served for preparing vegetables "in the kitchen", and did not need to be multiplied even if there was a higher number of "lodgers". By contrast, the number of large planes for processing hard materials, which were used by men, denotes the relatively higher number of such users in those houses. For other types that are not functionally specified, the quantitative relationship to user gender is not linear according to the results.

1.5.3. Implement function, gender and the age of household members

The correspondence analysis of functional types within the space of the settlement phases respects different points of view, as they are evidently plotted according to user gender and function. The first axis (24 % of the variability) very clearly separates one arrowhead and awls in one section and the artefacts with gloss in the other. The second and the third axes also differentiate between functions, but only those connected to user gender. Within the space of the first and the third factors, the majority of the phases form one central group, excepting phases 16 and 25, extremes showing only "male activities", and phases 24 and 26, extremes dominated by "female activities". →Tab. 1.5.3.A.

The same data analysed by correspondence analysis, but within the space of the households, provides different results. The second axis (18.2 %

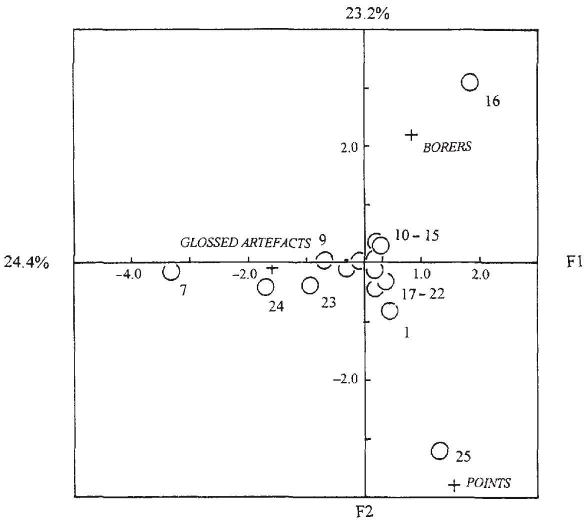


Fig. 1.5.3.a. Functional types within the space of the settlement phases. - Funkční typy v prostoru fází.

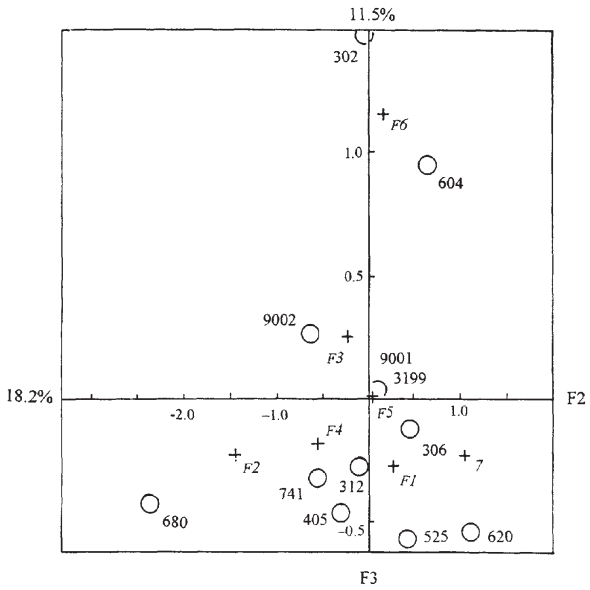


Fig. 1.5.3.b. Functional types within the space of complexes of the phases 8-11. - Funkční typy v prostoru komplexů domů z fází 8-11.

of the variability) corresponds to the interpretation of the first axis mentioned above. House 3199 differs along the first axis (51.3 % of the variability) due to the discovery of a small shaver; it differs from other households containing other implements, but this does not greatly aid in the interpretation. It is more likely that the situation is disturbed by the less reliable nature of house 3199. The small planes concentrate in the centre of the type variability on the second and the third axes. The second axis contains the function related to the gender of the inhabitants, which is marked as the contrast between large knives and glossed artefacts, while points and awls are lacking.

The interpretation of the third axis (11.5 %) had to be based on the social role of the "large planes", which distinguish houses 302 and 604. Only fragments of both houses are preserved, and the size of their mid-sections is unknown, which would prescribe the appearance of these artefacts as in other cases (cf. 1.5.2.). If the first axis was interpreted as the age factor, then the large planes would belong to older men and large knives more probably to younger men as a more active element among implements, if not weapons. The rest of the functional types in the centre of the space could be connected to middle-aged inhabitants. The majority of households belong to this middle group. Older men were thus more likely to have lived in houses 302 and 604, and younger men in house 680.

1.6. The information content of the chipped industry from the point of view of technique continuity and discontinuity, and the securing of subsistence between and during the phases

1.6.1. Functional classes within the space of the phases

The relative appearance of functional classes was traced during all of the phases. The extreme types, such as points and awls were, however, excluded as indices of male activities, as were the glossed artefacts representing female activities in the preceding analysis. Phase 7 is not represented because it contains only chips, the function of which could not be classified. Finds from phase 1, which was empty in section 1.3.3., are included because of the items coming from isolated pit 2123. Along the first (32.5 % of the variability) and the second (27.8 % of the variability) axes of the correspondence analysis, the data from an initial matrix (phases 1-25 x functional types F1-F6) are ordered roughly into three groups. The first phase is situated outside these groups because it does not yet contain any supposed continuity of activity. The majority of the other phases concentrate in the centre of the space. Regardless of the possible interpretation of both axes, which must be within the socio-economic role

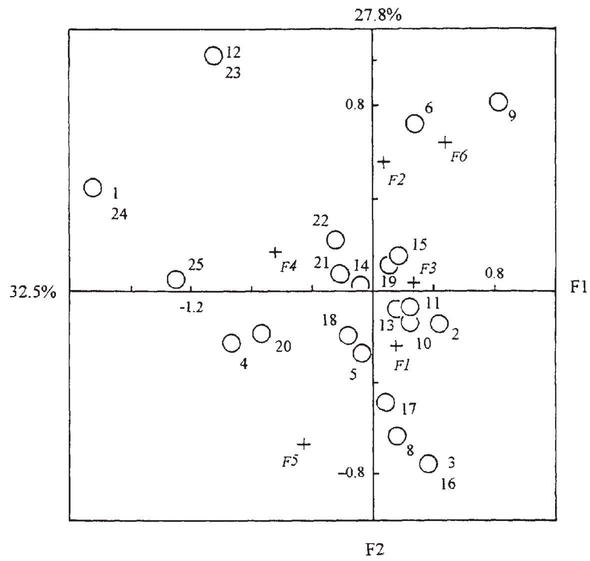


Fig. 1.6.1.a. Functional classes within the space of the settlement phases. - Funkční třídy v prostoru fází.

of the chipped industry, the ordering corresponds to the supposed continuity of economic activities at the site. (Cf. section 1.5.3.a above, where the second axis was interpreted as "gender" and the first was not interpreted at all.)

The interpretation of the next two groups of phases is based on the role of artefacts with a higher edge angle. These were classified as large or high planes as opposed to smaller or lower ones. The former are connected with the phases 3 and 8, the latter with phases 6, 9, 12 and 17. In these phases, standard activities were connected with subsistence procurement, and there was a higher degree of activity conducted requiring the processing of hard materials. They represent a period of increased demand for wooden and bone artefacts. The functional classification itself does not enable any further interpretation of causal relationships.

1.6.2. Functional classes within the space of households

The detailed behaviour of functional types was studied separately in periods covering several phases in the middle and late periods. The first group is plotted in the space of the first and the second axes (44.5 % and 21.7 % of the variability, respectively). The primary core of functional types consists of small knives, small scrapers and glossed artefacts. The houses belonging to these core types are numbers 604, 306, 741, 9001 and 9002. This primary functional set can be interpreted as containing the principal implements used for food processing by women. The houses included in the group of the principal set comprise a core within each phase from the point of view of subsistence. A little more loosely attached to this group are houses 3199, 680, 525 and 620.

Around the principal functional set are dispersed houses 302, 405 and 224, characterised by large scrapers and large planes. They are interpreted as houses where not only basic food was processed, but other materials also. House 312 is unique in terms of the number of large knives; these were ascribed to younger men, the number of which can be therefore considered as being higher in this household.

The ordering of the houses in several phases of the later period is interpreted in the same way. The primary functional core within the space of the first and the second axes (27.0 % and 19.7 % of the variability, respectively) is made up of small knives, glossed artefacts and now also large scrapers (instead of small ones as before). The group for basic food processing comprises houses 1161, 79, 682, 912, 1111, 1226 and 65. House 679, with small planes, is separated from those on the first axis, and houses 619 and 933 with small scrapers are included on the second axis.

A greater number of houses with large planes is distinguishable along the second axis: houses 162, 959, 361, 1240 and 1246 from phase 19 and houses 903, 910 and 1144 from phase 22. A none-too-apparent group of houses with awls and large knives comprises houses 96, 702 and 434 from

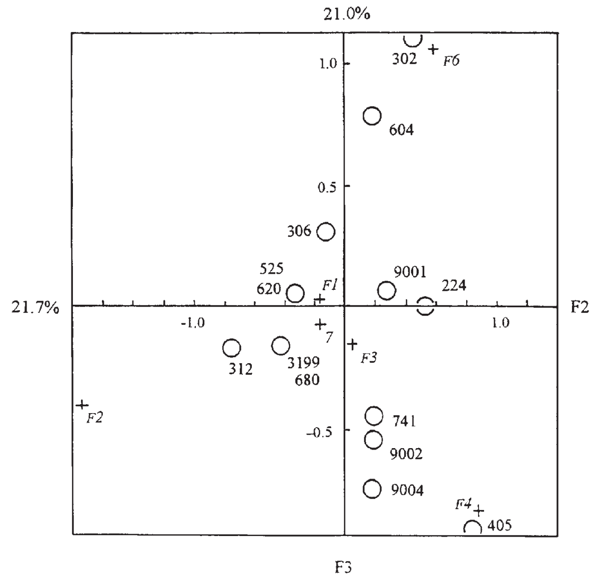


Fig. 1.6.2.a. Functional classes in households in phases 8-11. - Funkční třídy v prostoru komplexů domů z fází 8-11.

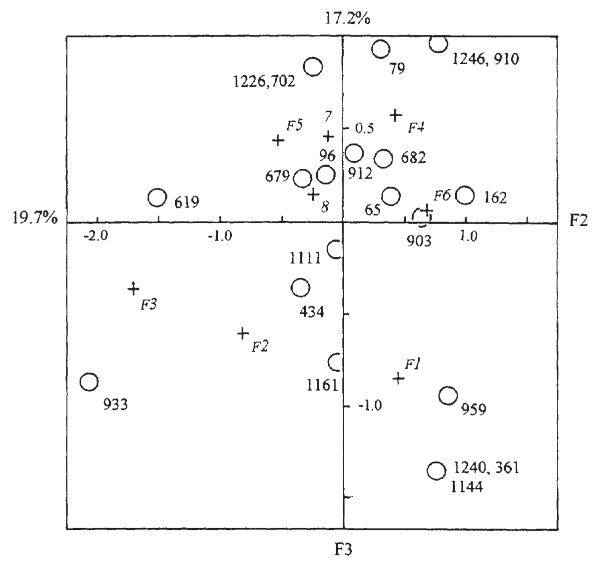


Fig. 1.6.2.b. Functional classes in households in phases 19-22. - Funkční třídy v prostoru fází 19-22.

phase 19. The houses in the former groups were probably inhabited rather by older men, and the houses of the latter group by younger men.

In conclusion, the functional types of the chipped industry represent basic subsistence activities and food processing in the phases of the middle period. In the phases of the later period, a greater diversity of activities from the point of view of the chipped industry is apparent. This means that the processing of other materials, not connected directly with subsistence, was developed. The number of male activities also increased.

1.7. The style of chipped industry technology in the context of ideas and imagination

1.7.1. Direction and strength of percussion

The most important stylistic characteristics of the chipped industry are the direction and strength of percussion. Both are related not only to individual techniques, but primarily to the culturally conditioned style of percussion. At Bylany, this is important only exceptionally, as producers came from amongst the site's inhabitants. On the other hand, the common character of the chipped industry at the site makes it possible to speak of a unified style of production. In some ways, products found at a user site represent a sample of this common style; local habits are expressed only exceptionally, as when an individual appeared who adopted such an ability. Chipped industry can be considered as the first specialised handicraft, being one of the oldest discovered. At Bylany, it appears in most cases as a secondary, occasional and complementary arrangement of implements.

The direction of percussion is measurable by the position of a point of percussion within the smallest square made by the width of artefact (Zimmermann 1988: 582); the bulb and the wear caused by striking are usually oriented along the direction of percussion. At Bylany, this attribute was studied primarily on blades, as it was difficult to orient the flakes on the long axis; it follows that stylistic analyses were only conducted on blades. The direction of percussion indicates striking leftwards or rightwards, but does not directly indicate left-handedness, as suggested in a paper by A. Close (1978: 227). It is difficult to decide whether the blades were struck on the nearer or further side of the core from the producer's point of view. The Bylany assemblage contains both cases in a roughly equal ratio. There are up to four possible positions applied by the same hand, supposing either "forehand" or "backhand" striking.

The strength of percussion and the kind of percussion tool can be identified by the presence or absence of a bulb, as well by such other details as the distortion of the percussion edge or the shape of the Wallner lines. A broken bulb does not necessarily prove that it a hard percussion tool was used, nor does it need to be an indication of stronger striking (Zimmermann 1988: 656). Not all of the details were studied in the Bylany assemblage, as some require greater magnifications than were available and more detailed study. To simplify this, the presence of a bulb or its remains were classified as indicating strong percussion, and their absence as indicating light percussion.

The direction of percussion was identified on 46 % of blades but only on 2 % of flakes. Leftwards strike on blades comprises 24.1 %, but only slightly exceeds rightwards strike (21.6 %). A bulb was identified on 49 % of blades, and on 580 flakes. On 21.1 % of blades the bulb was preserved -bulb remnants were identified on only 28 pieces (0.8 %), while on the rest the bulbs were intact. Of the flakes, 26.7 % had a bulb preserved, and 30.9 % had bulb remnants preserved.

1.7.2. The style of retouch

The deliberate retouch is considered to be the main stylistic feature of chipped industry (Tringham 1972: 143, Close 1978: 228). The industry in Bylany does not contain the variability of retouch classified at other sites e.g. in the Rhineland (Zimmermann 1988: 695). Therefore, only the basic modes of modified and unmodified implements are considered. The working retouch, irregular damage of the edge, was counted among the unmodified variants. About one-third of artefacts were modified by deliberate retouching, while two-thirds were not. The retouch of awls or points is exceptional. Another relationship appeared within basic forms-more than one-third of blades were modified, while less than one-fifth of flakes were. The differences are statistically significant (chq = 29.411, d.f. = 3, p = 0.0). →Tab. 1.7.2.A.

1.7.3. Stylistic classification of blades

The attributes used for stylistic classification are relatively detailed, and for this reason the total number of artefacts classified according to their attributes is lower-of all the blades found, only 46 % (183) were classified. The relative proportion of artefacts modified by deliberate retouch differs in the groups of leftwards and rightwards striking; within these groups, those with stronger percussion are only slightly more numerous than those with light percussion. The style of striking is almost equal, with leftwards prevailing slightly over rightwards. Some 20 % of leftwards struck artefacts, but only 10 % of rightwards struck artefacts, had been modified.

Although a leftward strike does not indicate a left-hander, these artefacts were more often deliberately retouched. A leftward strike could also be made with the right hand, by the "forehand" directly when striking the core nearer the body, or indirectly when striking further away from the body. If leftward striking demanded more additional retouch, it would mean that the style was less routine and its results less assured than was the case for rightward striking. If it was carried out with the left hand, it would not indicate a less skilful strike than that of a right-hander. ➔Tab. 1.7.3.A.

1.7.4. The chronological variability of the stylistic classification

From the chronological point of view, the lack of classifiable finds is more apparent than was the case in the primary classification. J. Lech (1989, fig. 2) dealt with the basic trends of retouched artefacts and showed the variability of the category even at the level of the coarse chronological periods of the LnK. In those phases where the number of finds is relatively low, unclassifiable pieces dominate. The artefacts made by a mild leftward strike without additional retouching are the most common (31.9 %). The artefacts made by strong, rightward striking, again without retouching, are the second most numerous class (22.9 %). The chronological variability of the stylistic types is quite irregular over the phases, and no more evident chronological trends appear even if phases with a low artefact count are excluded. The majority of stylistic types appear in some quantity in all of the phases. Unretouched artefacts made by strong leftward striking are entirely absent. Retouched artefacts made by mild rightward striking appear in smaller numbers in the late phases. ➔Tab. 1.7.4.A.

1.8. The symbolic value of the chipped industry and kinship or labour groups in different stylistic presentations

1.8.1. Blade and flake prototypes

Those artefact are defined as prototypes which are sufficiently stable within their principal formal attributes of size and shape, represented by their length and width. Any combination of those elements regularly repeating marks the conscious creation of an artefact with culturally programmed stylistics. The frequencies of blades in the spaces of length and width cover a relatively broad range of values, concentrating in a width range of 11-18 mm and a length range of 14-42 mm. The frequency distribution of individual items measured by combinations decreases sharply at the rate of 3 pieces per combination.

Because the production of blades could be influenced by many random factors, from the uneven habitual mobility of producers to specific user ideas concerning the most appropriate forms, the frequency of 2 was delayed as a random one. Starting from value 3 of the same length-width combination, the form is designed as a prototype. The form, sufficiently frequent apart from the core of the highest concentration, relates to the local morphological variability. In the Bylany assemblage there are no clearly separated core frequencies enabling a more detailed classification of prototypes. ➔Tab. 1.8.1.A.

Flake prototypes are defined in a similar way. The spread of their frequency within the space of length and width is greater than that of blades, matching their less standardised forms. The highest frequency core is also not as homogeneous as is the case for blades, but similarly does not allow any detailed classification of the prototypes to be made. The only separated group is the class of small flakes with a width of 45 mm and length of 10 mm. This group would be better classified as chips, rather than flakes, because it represents the continuation of the size into the values supposedly belonging to waste, including microdebitage. ➔Tab. 1.8.1.B.

1.8.2. Chipped industry prototypes in phases and households

The blade and flake prototypes were summarised into a group and their common ratio in households and phases was analysed. The resultant ordering and variability between the phases, i.e. between synchronic households, can be interpreted as a measure of the standardisation of the chipped industry caused by the degree of social and information exchange attained. This exchange of information was oriented vertically among asynchronic complexes of phases and horizontally among the synchronic family units of individual households.

The proportion of prototypes varies irregularly in the phases of the earliest period, indicating a lower degree of standardisation. The exchange of information among the later generations was not particularly systematic. Only in some of the phases is the proportion of prototypes near the total average of 44.0 %. During the middle period phases, this number fluctuates at around 50.0 %, exceeding the total average. Phases 9 (33.3 %) and 16 (71.4 %) phases are exceptional; in the former the prototypes are regularly dispersed across all of the households of the phase, while in the latter they are concentrated in house 739 and some of the pits.

During the later period phases, the number of prototypes decreases. In phase 20 they again concentrate, in house 682; in the preceding phase (phase 19), they had constituted 20-100 % of the chipped industry content of all the houses. The variability of the prototype proportion can be explained by way of the different times at which the implements were used. The irregular renewal of the sets of implements probably caused a distortion of regular forms; the may be other interpretations. The forms of irregular information exchange pertaining to the chipped industry have hardly been touched on, and it cannot be ruled out that the higher ratio of prototypes represented some kind of prestige status.

1.8.3. Awls and arrowheads

The awls and arrowheads can be described formally as being particularly outstanding implements. In the Bylany assemblage, only eight artefacts show a typical awl retouch-these come from phases 5, 16, 19 and 21. They are not morphologically consistent, an appear more as a non-standardised group of pointed implements. Typical awls come from features 430 (BYA1: 191) and 852 (BYA2: 254), and have retouched, narrow points. The retouch is made from the same side of the point, not from the opposite side as was in the case in "right" awls. The pointed blades from features 914 (BYA2: 296) and 1260 (BYA2: 377) might also have been used as arrowheads. Atypical forms come from features 231 (BYA1: 149), 735 (BYA2: 163) and 2250 (BYBF: 306). A retouched stick comes from feature 231, an irregular pointed flake was found in feature 735 and a blade with a retouched scraper, distal end and retouched sides sloping down to the base was found in feature 2250. ➔Tab. 1.8.3.A.

Typical arrowheads are well represented by the broad pointed artefact from feature 269 (BYA1: 168) and the trapezoid blade from feature 699c (BYA2: 141). The artefacts from pits 614 and 1260 can be associated with these, even though they were formerly classified as awls. This would mean that in the phases 14, 19, 21 and 25, the use of weapons of this type has been proven. Because it is not possible to estimate the ratio of weapons generally kept from settlement refuse, it is also impossible to interpret the finds as representing either a greater demand for hunting game or a need to defend the site. The latter may be the case for an arrowhead coming from the final phase. The trapezoid from pit 699 may have cultural implications in contact with "Mesolithic" groups. The point and awls from houses 912 and 1260 relate to the exceptional character of these buildings, which maintained some sort of leading position amongst the other households.

1.9. The formation and preservation of cultural tradition in the chipped industry

1.9.1. Stylistic classes of blades in the space of phases

The stylistic types of blades were split in the space of the phases into two groups. The artefacts modified with a deliberate retouch and struck from the right, regardless of the strength of percussion, belong to the first group (A) . The second group (B) consists of analogous blades struck from the left,

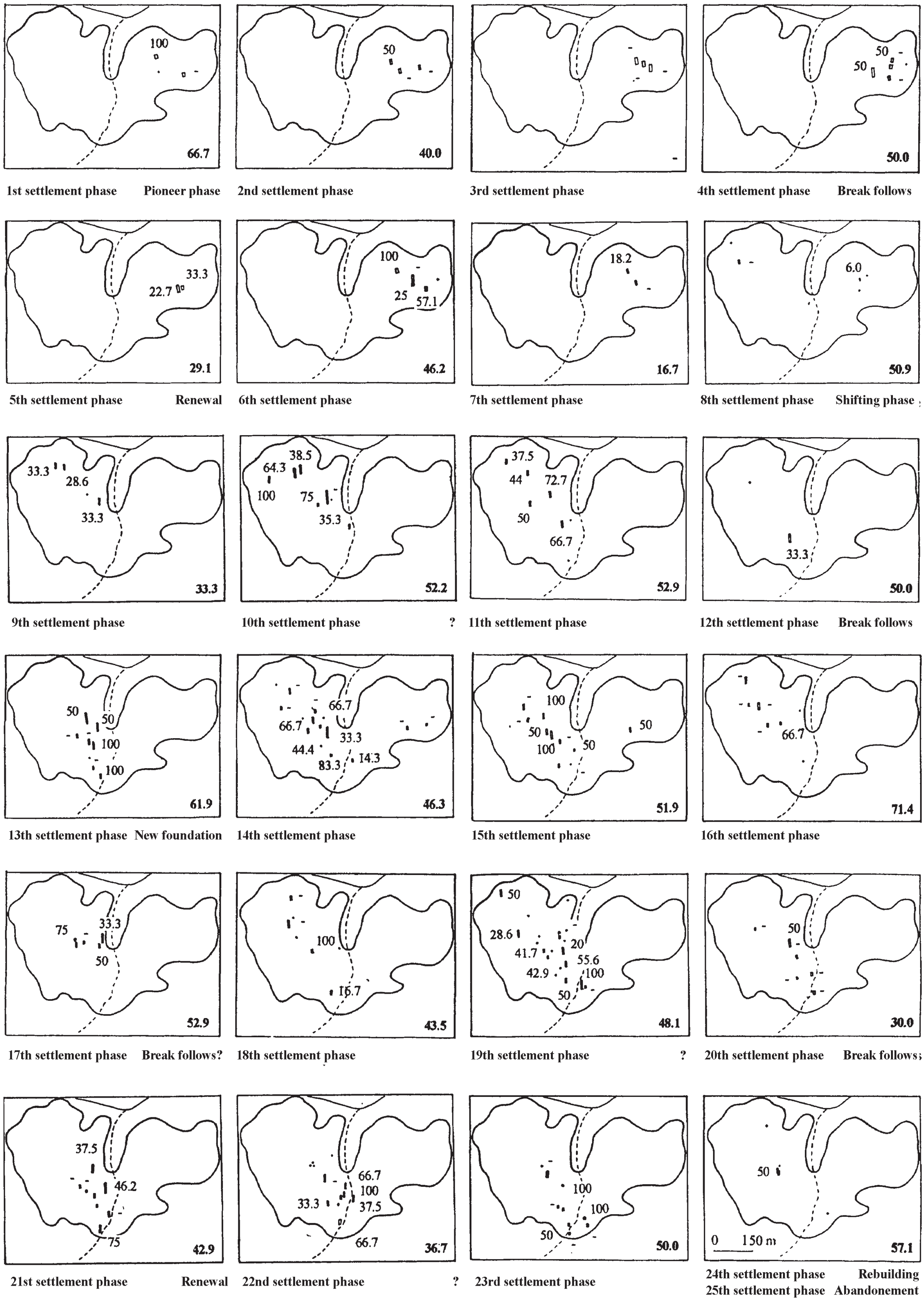


Fig. 1.8.2.a. Relative proportions of chipped industry prototypes in individual households and phases. - Relativní podíl prototypů ŠI v jednotlivých domech a fázích.

and these belong along the first axis (26.2 % of the variability). Both groups are separated as opposite parts of axes two and three (21.4 % and 19.2 % of the variability, respectively). Because the first factor must be mainly chronological, it can be supposed that the second and the third are more stylistic in the narrow sense.

The phases are apparently divided by their membership in both groups along the second and the third axes. The following phases belong to Group A (the number of classified artefacts is given in brackets): nos. 2(4), 5(13), 13(4), 14(7), 8(14), 10(9), 11(13), 19(24), 21(8), 22(7), 24(1) and 25(1). The following phases belong to Group B: nos. 4(6), 9(2), 12(1), 15(11), 17(1), 18(5), 20(2) and 23(1). The remaining phases, nos. 1, 3, 6, and 7, remain unclassified. With the exception of phase 15, Group B contains only phases with a small number of classifiable artefacts. By contrast, with the exception of phases 24 and 25, all of the phases with a higher number of artefacts fall within Group A.

The appearance of stylistic features classed in phases is therefore negatively influenced by the number of preserved and classified artefacts. The differences between left and right striking could, apart from that, have marked productivity in both techniques. The rightwards struck were more productive, which would have proven more often that they were right-handers. The left-sided style tends to be preserved more in the refuse of artefacts made using greater strength. Those artefacts which were much larger were produced in this way, and became a better medium of the information carried by the chipped industry.

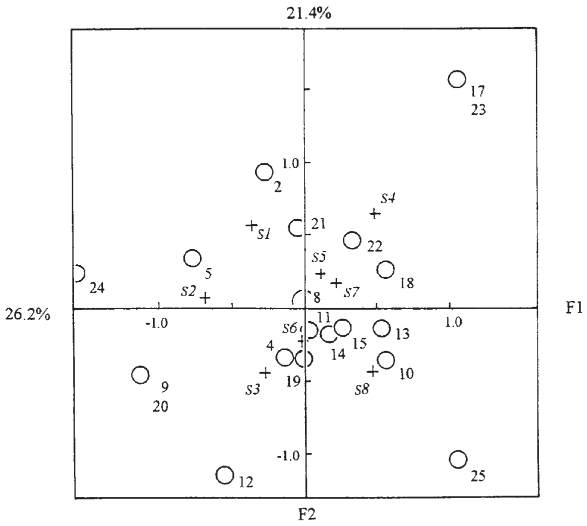


Fig. 1.9.1.a. Division of stylistic types in phases. - Stylistické typy ve fázích.

1.9.2. Stylistic classes of blades in the spaces of households

The problem caused by the lower number of classified artefacts is even more pronounced among the households of individual phases. Phase 19 was selected for further study, therefore, because it contains the highest number of classifiable artefacts (N = 24)-there are up to four pieces per house (but none at all in houses 162 and 1246). As in the case of the phases, two groups of stylistic types can be separated out. Only houses 96 and 434 belong to Group B, but these contain the richest assemblages, which contrasts with the preceding situation. The leftwards struck and modified artefacts occupied a privileged position, as far as can be judged by the fact that house 96 was surrounded by an enclosure. The meaning of these attributes has thus far not been explained.

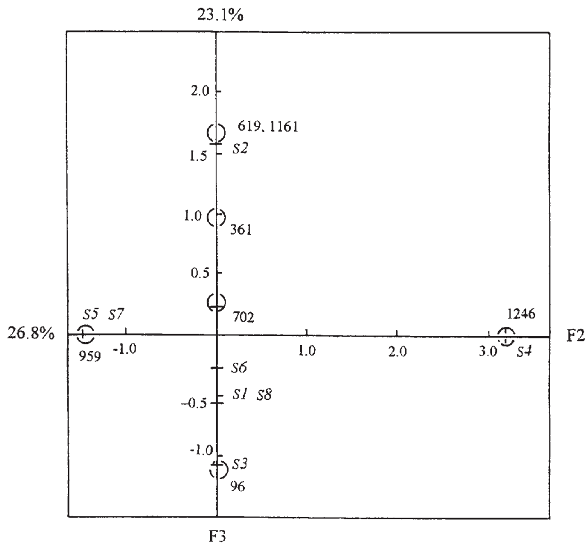


Fig. 1.9.2.a. Stylistic types within the house complexes of settlement phase 19. - Stylistické typy v prostoru komplexů z 19. fáze.

1.9.3. Information and communication from the point of view of the chipped industry

The communicative role of the chipped industry is expressed by its utility value as well as by the economics of raw materials processing. The Neolithic inhabitants were not limited to using materials available in the immediate vicinity of the site; thanks to a whole network of interregional relations, they had a sufficient range of choice for semi-finished products, finished products and complementary raw materials, which provided a reserve for local production. This is the main difference in communication when compared to the preceding Palaeolithic; there is also the question of comparison with the Mesolithic, when the system of seasonal and long-distance contacts was probably established, to be extended during the Neolithic (Zimmermann 1995: 63).

The dominance of SGS materials during the earliest phases at Bylany is also typical for other sites of the same period, and proves that there were contacts to the north. Mesolithic communications are, from this point of view, the result of earlier Palaeolithic forms. On the other hand, more "exotic" materials, such as the radiolarite found at Bylany (Přichystal 1985), correspond to south-eastern patterns of cultural contexts, which however need not prove the direct origins of the Bylany Neolithic - it seems to be more an example of a communicative residuum, the original picture of which is not yet clear. The informational lode of stylistic attributes was previously disputed, as artefacts were hafted and the attributes thus invisible. For this reason, intra-site communications were ruled out, but not necessarily communications between them and the tool producers - it would need to be assumed that tools were imported before being hafted.

The Neolithic chipped industry style, as represented by the Bylany assemblage, is a part of the cultural unit that covered at least the Central and East Bohemian regions. Within those regions, roughly similar conditions to the main material groups (SGS, SKJ a QNWB) existed. The utility of the sharp edges was undoubtedly a primary concern, and more important than the form itself. The predominance of blades over flakes at Bylany thus bears witness to the greater ability of these forms to retain a sharp edge in the majority of artefacts. The importance of right-sided and most probably also right-handed striking was not solely a preserve of the inhabitants of Bylany, but a characteristic of the more remote producers -these were the main transmitters of the cultural tradition represented by the chipped industry. In this sense the people living in the houses in Bylany were not the immediate bearers of Neolithic chipped industry communication: they were more receivers of communication through implements such as knives, sickles, scrapers, planes, and arrowheads, which they occasionally improved with their own supplementary forms of shafts, handles or arrows.

Phase / length	L1	L2	L3	L5	L6	L7	L8	N=
1	0.0	0.0	33.3	33.3	0.0	33.3	0.0	3
2	20.0	10.0	20.0	10.0	10.0	10.0	20.0	10
3	0.0	0.0	0.0	50.0	0.0	50.0	0.0	2
4	50.0	8.3	0.0	0.0	16.7	16.7	8.3	12
5	41.2	5.9	5.9	20.6	8.8	14.7	2.9	34
6	0.0	0.0	22.2	55.6	11.1	11.1	0.0	9
7	0.0	0.0	0.0	25.0	50.0	25.0	0.0	4
8	52.6	2.6	18.4	21.1	2.6	2.6	0.0	38
9	33.3	22.2	11.1	11.1	22.2	0.0	0.0	9
10	45.5	0.0	18.2	15.2	12.1	6.1	3.0	33
11	44.4	1.9	20.4	9.3	16.7	7.4	0.0	54
12	20.0	0.0	20.0	0.0	40.0	20.0	0.0	5
13	41.2	5.9	17.6	23.5	5.9	5.9	0.0	17
14	26.2	7.1	19.0	16.7	16.7	11.9	2.4	42
15	54.2	25.0	0.0	8.3	8.3	4.2	0.0	24
16	0.0	0.0	40.0	60.0	0.0	0.0	0.0	5
17	36.4	18.2	18.2	0.0	18.2	9.1	0.0	11
18	57.1	7.1	14.3	14.3	7.1	0.0	0.0	14
19	33.3	15.0	16.7	13.3	11.7	10.0	0.0	60
20	37.5	12.5	12.5	12.5	25.0	0.0	0.0	8
21	37.9	6.9	13.8	10.3	20.7	10.3	0.0	29
22	50.0	9.1	9.1	9.1	13.6	9.1	0.0	22
23	14.3	14.3	0.0	14.3	28.6	14.3	14.3	7
24	0.0	50.0	0.0	0.0	50.0	0.0	0.0	2
25	50.0	25.0	0.0	25.0	0.0	0.0	0.0	4
0	37.0	17.3	10.4	15.0	9.8	8.1	2.3	173
%	38.0	10.8	13.5	15.1	12.4	8.6	1.7	100.0%
N =	240	68	85	95	78	54	11	631

Tab. 1.1.7.A. The relative occurrence of formal classes of blades and flakes (code L comp. Fig. 1.0.3.a) in the settlement phases. - Relativní výskyt formálních tříd podle délky čepelí a úštěpů (kód L srov. obr. 1.0.3.a) v sídlištních fázích.

Materials	SILICIT	QUARTZIT	FLINT	OTHER	N=
Forms	A	B	C	D	
CORES	11	1	14	3	29
FLAKES	85	53	73	8	219
BLADES	156	69	96	6	327
WASTE CHIPS	49	25	46	11	131
N=	301	148	229	28	706
CORES	37.9	3.4	48.3	10.3	100.0
FLAKES	38.8	24.2	33.3	3.7	100.0
BLADES	47.7	21.1	29.4	1.8	100.0
WASTE CHIPS	37.4	19.1	35.1	8.4	100.0
%	42.6	21.0	32.4	4.0	100.0
CORES	3.7	0.7	6.1	10.7	4.1
FLAKES	28.2	35.8	31.9	28.6	31.0
BLADES	51.8	46.6	41.9	21.4	46.3
WASTE CHIPS	16.3	16.9	20.1	39.3	18.6
%	100.0	100.0	100.0	100.0	100.0
CORES	1.6	0.1	2.0	0.4	4.1
FLAKES	12.0	7.5	10.3	1.1	31.0
BLADES	22.1	9.8	13.6	0.8	46.3
WASTE CHIPS	6.9	3.5	6.5	1.6	18.6
%	42.6	21.0	32.4	4.0	100.0

Tab. 1.2.1.A. Basic forms of chipped industry and raw materials by quality of processing. - Základní formy ŠI a suroviny podle kvality zpracovatelnosti.

Phases / materials	SILICIT	QUARTZIT	FLINT	OTHER	N=
	A	B	C	D	
1	0.0	0.0	100.0	0.0	2
2	0.0	7.1	92.9	0.0	14
3	0.0	0.0	100.0	0.0	2
4	8.3	0.0	83.3	8.3	12
5	16.3	10.2	73.5	0.0	49
6	11.1	11.1	66.7	11.1	9
7	0.0	0.0	100.0	0.0	12
8	29.3	4.9	65.9	0.0	41
9	30.8	23.1	38.5	7.7	13
10	55.3	13.2	31.6	0.0	38
11	80.6	6.5	12.9	0.0	62
12	40.0	40.0	20.0	0.0	5
13	35.3	17.6	47.1	0.0	17
14	63.4	24.4	12.2	0.0	41
15	44.0	32.0	24.0	0.0	25
16	100.0	0.0	0.0	0.0	6
17	33.3	40.0	26.7	0.0	15
18	40.0	33.3	13.3	13.3	15
19	46.8	32.3	14.5	6.5	62
20	55.6	33.3	11.1	0.0	9
21	33.3	33.3	30.0	3.3	30
22	52.2	26.1	17.4	4.3	23
23	33.3	55.6	11.1	0.0	9
24	0.0	66.7	0.0	33.3	3
25	0.0	50.0	25.0	25.0	4
0	44.2	24.2	23.7	7.9	190
%	42.7	21.0	32.3	4.0	100.0%
N =	302	149	229	28	708

Tab. 1.2.2.A. Categorisation of raw materials by quality in the individual phases. - Zpracování surovin podle kvality v jednotlivých fázích.

Mid-section of houses	L1	L2	L3	L5	L6	L7	L8
unclassified CEN0	26	5	11	12	15	2	5
simple CEN1	69	11	24	28	21	21	2
double CEN2	31	7	12	12	13	6	0
N =	126	23	47	52	49	29	7

Tab. 1.2.3.A. The number of formal classes (code L comp. Fig. 1.0.3.a) in houses with a separate mid-section. - Počty formálních tříd podle délky (kód L srov. obr. 1.0.3.a) v domech s rozdílnou střední částí.

Mid-section of houses	N =	SI	Per house	Blades	Per house	Flakes	Per house
unclassified CEN0	30	76	2.5	42	1.4	34	1.1
simple CEN1	80	176	2.2	104	1.3	72	0.9
double CEN2	25	81	3.2	50	2.0	31	1.2
N =	135	333	2.5	196	1.4	137	1.0

Tab. 1.2.3.B. The relative proportions of basic forms in houses with mid - sections of different sizes. - Relativní podíl základních forem v domech s různě velkou střední částí.

Forms	Gloss		N =
	PRESENT	ABSENT	
FLAKES BLADES N=	13 74 87	140 164 304	153 238 391
FLAKES BLADES %	8.5 31.1 22.3	91.5 68.9 77.7	100.0 100.0 100.0
FLAKES BLADES %	14.s9 85.1 100.0	46.1 53.9 100.0	39.1 60.9 100.0
FLAKES BLADES %	3.3 18.9 22.3	35.8 41.9 77.7	39.1 60.9 100.0

Tab. 1.4.2.A. Gloss according to form. - Oleštění podle forem.

Height	Gloss		N =
	PRESENT	ABSENT	
LOWER HIGHER N =	38 32 70	100 74 174	138 106 244
LOWER HIGHER %	27.5 30.2 28.7	72.5 69.8 71.3	100.0 100.0 100.0
LOWER HIGHER %	54.3 45.7 100.0	57.5 42.5 100.0	56.6 43.4 100.0
LOWER HIGHER %	15.6 13.1 28.7	41.0 30.3 71.3	56.6 43.4 100.0

Tab. 1.4.2.B. Gloss according to height. - Oleštění podle výšky.

Tangal	Gloss		N =
	PRESENT	ABSENT	
KNIVES H. SCRAPERS SHAVER H. N =	41 21 8 70	98 55 21 174	139 76 29 244
KNIVES H. SCRAPERS SHAVER H. %	29.5 27.6 27.6 28.7	70.5 72.4 72.4 71.3	100.0 100.0 100.0 100.0
KNIVES H. SCRAPERS SHAVER H. %	58.6 30.0 11.4 100.0	56.3 31.6 12.1 100.0	57.0 31.1 11.9 100.0
KNIVES H. SCRAPERS SHAVER H. %	16.8 8.6 3.3 28.7	40.2 22.5 8.6 71.3	57.0 31.1 11.9 100.0

Tab. 1.4.2.C. Gloss according to the sharp edge (Tangal = tangens alfa). - Oleštění podle úhlu ostří.

Edge angle height	<=4 mm	>4 mm	N=
10^{o}- 30^{o}	183	42	225
30^{o}- 40^{o}	49	88	137
$>40^{o}$	10	37	47
N =	242	167	409
10^{o}- 30^{o}	81.3	18.7	100.0
30^{o}- 40^{o}	35.8	64.2	100.0
$>40^{o}$	21.3	78.7	100.0
%	59.2	40.8	100.0

Tab. 1.4.3.A. Functional classification of the chipped industry. - Funkční klasifikace štípané industrie.

Phase / edge angle	Height <=4 mm					Height >4mm			
	0-30°	30°-40°	>40°	%	N=	10°-30°	30°-40°	>40°	N=
1	0.0	0.0	0.0	0.0	0	0.0	100.0	0.0	1
2	75.0	25.0	0.0	100.0	4	100.0	0.0	0.0	1
3	100.0	0.0	0.0	100.0	2	0.0	0.0	0.0	0
4	50.0	25.0	25.0	100.0	4	0.0	100.0	0.0	4
5	69.6	21.7	8.7	100.0	23	27.3	63.6	9.1	11
6	100.0	0.0	0.0	100.0	4	20.0	20.0	60.0	5
7	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0
8	83.3	8.3	8.3	100.0	24	0.0	66.7	33.3	3
9	66.7	33.3	0.0	100.0	3	25.0	0.0	75.0	4
10	78.6	21.4	0.0	100.0	14	40.0	40.0	20.0	5
11	68.2	31.8	0.0	100.0	22	33.3	41.7	25.0	12
12	0.0	0.0	0.0	0.0	0	50.0	50.0	0.0	2
13	62.5	37.5	0.0	100.0	8	25.0	50.0	25.0	4
14	69.2	23.1	7.7	100.0	13	18.2	54.5	27.3	11
15	63.6	36.4	0.0	100.0	11	66.7	33.3	0.0	6
16	100.0	0.0	0.0	100.0	1	0.0	0.0	0.0	0
17	100.0	0.0	0.0	100.0	2	25.0	50.0	25.0	4
18	87.5	12.5	0.0	100.0	8	20.0	80.0	0.0	5
19	78.6	21.4	0.0	100.0	28	16.7	50.0	33.3	18
20	100.0	0.0	0.0	100.0	3	0.0	100.0	0.0	3
21	50.0	25.0	25.0	100.0	8	25.0	37.5	37.5	8
22	87.5	12.5	0.0	100.0	8	30.0	60.0	10.0	10
23	0.0	0.0	0.0	0.0	0	50.0	50.0	0.0	2
24	100.0	0.0	0.0	100.0	1	0.0	100.0	0.0	1
25	100.0	0.0	0.0	100.0	1	0.0	100.0	0.0	2
0	78.0	18.0	4.0	100.0	50	24.4	53.3	22.2	45
%	75.6	20.2	4.1	100.0		25.1	52.7	22.2	
N =	183	49	10		242	42	88	37	167

Tab. 1.4.4.A. Chipped industry functional classes in the individual phases. - Funkční třídy štípané industrie ve fázích.

Raw material direction/form	BLADES	WASTE CHIPS	FLAKES	N=
NE1	146	72	42	260
NE2	4	9	11	24
NW1	1	0	0	1
NW2	6	7	4	17
SE1	2	1	1	4
SW1	96	73	46	215
SW2	67	50	22	139
LOC	5	7	5	17
N=	327	219	131	677
NE1	56.2	27.7	16.2	100.0
NE2	16.7	37.5	45.8	100.0
NW1	100.0	0.0	0.0	100.0
NW2	35.3	41.2	23.5	100.0
SE1	50.0	25.0	25.0	100.0
SW1	44.7	34.0	21.4	100.0
SW2	48.2	36.0	15.8	100.0
LOC	29.4	41.2	29.4	100.0
%	48.3	32.3	19.4	100.0

Raw material direction/form	BLADES	WASTE CHIPS	FLAKES	%
NE1	44.6	32.9	32.1	38.4
NE2	1.2	4.1	8.4	3.5
NW1	0.3	0.0	0.0	0.1
NW2	1.8	3.2	3.1	2.5
SE1	0.6	0.5	0.8	0.6
SW1	29.4	33.3	35.1	31.8
SW2	20.5	22.8	16.8	20.5
LOC	1.5	3.2	3.8	2.5
%	100.0	100.0	100.0	100.0
NE1	21.6	10.6	6.2	38.4
NE2	0.6	1.3	1.6	3.5
NW1	0.1	0.0	0.0	0.1
NW2	0.9	1.0	0.6	2.5
SE1	0.3	0.1	0.1	0.6
SW1	14.2	10.8	6.8	31.8
SW2	9.9	7.4	3.2	20.5
LOC	0.7	1.0	0.7	2.5
%	48.3	32.3	19.4	100.0

Tab. 1.5.1.A. Basic forms on the basis of raw material accessibility. - Základní formy podle dostupnosti surovin.

Raw material directions / classes	Small knives F1	Large knives F2	Small srapers F3	Large scrapers F4	Small shavers F5	Large shavers F6	N =
NE1	60	11	19	25	3	12	130
NE2	2	1	0	2	0	0	5
NW1	0	0	1	0	0	0	1
NW2	4	0	0	3	0	0	7
SE1	0	0	0	1	1	0	2
SW1	52	5	11	19	4	11	102
SW2	21	21	7	18	0	5	72
LOC	1	1	1	1	0	0	4
N=	140	39	39	69	8	28	323
NE1	46.2	8.5	14.6	19.2	2.3	9.2	100.0
NE2	40.0	20.0	0.0	40.0	0.0	0.0	100.0
NW1	0.0	0.0	100.0	0.0	0.0	0.0	100.0
NW2	57.1	0.0	0.0	42.9	0.0	0.0	100.0
SE1	0.0	0.0	0.0	50.0	50.0	0.0	100.0
SW1	51.0	4.9	10.8	18.6	3.9	10.8	100.0
SW2	29.2	29.2	9.7	25.0	0.0	6.9	100.0
LOC	25.0	25.0	25.0	25.0	0.0	0.0	100.0
%	43.3	12.1	12.1	21.4	2.5	8.7	100.0
NE1	42.9	28.2	48.7	36.2	37.5	42.9	40.2
NE2	1.4	2.6	0.0	2.9	0.0	0.0	1.5
NW1	0.0	0.0	2.6	0.0	0.0	0.0	0.3
NW2	2.9	0.0	0.0	4.3	0.0	0.0	2.2
SE1	0.0	0.0	0.0	1.4	12.5	0.0	0.6
SW1	37.1	12.8	28.2	27.5	50.0	39.3	31.6
SW2	15.0	53.8	17.9	26.1	0.0	17.9	22.3
LOC	0.7	2.6	2.6	1.4	0.0	0.0	1.2
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NE1	18.6	3.4	5.9	7.7	0.9	3.7	40.2
NE2	0.6	0.3	0.0	0.6	0.0	0.0	1.5
NW1	0.0	0.0	0.3	0.0	0.0	0.0	0.3
NW2	1.2	0.0	0.0	0.9	0.0	0.0	2.2
SE1	0.0	0.0	0.0	0.3	0.3	0.0	0.6
SW1	16.1	1.5	3.4	5.9	1.2	3.4	31.6
SW2	6.5	6.5	2.2	5.6	0.0	1.5	22.3
LOC	0.3	0.3	0.3	0.3	0.0	0.0	1.2
%	43.3	12.1	12.1	21.4	2.5	8.7	100.0

Tab. 1.5.1.B. Functional classes (code F comp. Fig. 1.0.3.a) and availability of raw materials. - Funkční třídy (kód F srov. obr. 1.0.3.a) a dostupnost surovin.

House mid-section	F1	F 2	F 3	F 4	F5	F6	7	8	9	N=	No. of houses
unclassified CEN0	0.53	0.10	0.23	0.13	-	0.07	-	-	0.27	40	30
simple CEN1	0.56	0.10	0.11	0.26	0.02	0.10	0.01	0.05	0.28	120	80
double CEN2	0.60	0.16	0.16	0.36	0.08	0.24	-	0.04	0.44	52	25
N=	76	15	20	34	4	16	1	5	41	212	135

Tab. 1.5.3.A. The relative number of individual functional types (F1 - F6 without gloss, 7 = spike, 8 = drill, 9 = artefacts as F1 - F6 with gloss) per household with different mid-sections (CEN0 - unclassified, CEN1 - simple, CEN2 - double mid-section). - Relativní počet jednotlivých funkčních typů (F1 - F6 bez oleštění, 7 = hrot, 8 = vrtáky, 9 = artefakty jako F1 - F6 s oleštěním) připadající na jeden dům s různou střední částí (CEN0 - neklasifikováno, CEN1 - jednoduchá, CEN2 - zdvojená).

Bulb	Percussion			N=
	LEFT	RIGHT	N/A	
WHOLE	50	31	67	148
SCAR	52	55	80	187
N/A	0	0	529	529
N=	102	86	676	864
WHOLE	33.8	20.9	45.3	100.0
SCAR	27.8	29.4	42.8	100.0
N/A	0.0	0.0	100.0	100.0
%	11.8	10.0	78.2	100.0

Bulb	Percussion			N=
	LEFT	RIGHT	N/A	
WHOLE	49.0	36.0	9.9	17.1
SCAR	51.0	64.0	11.8	21.6
N/A	0.0	0.0	78.3	61.2
%	100.0	100.0	100.0	100.0
WHOLE	5.8	3.6	7.8	17.1
SCAR	6.0	6.4	9.3	21.6
N/A	0.0	0.0	61.2	61.2
%	11.8	10.0	78.2	100.0

Tab. 1.7.1.A. Direction and strength of percussion. - Směr a síla úderu.

Form/type	MODIF.	BORER	POINT	UNMODIF.	N=
BLADES	142	6	2	241	391
FLAKES	42	2	0	199	243
N=	184	8	2	440	634
BLADES	36.3	1.5	0.5	61.6	100.0
FLAKES	17.3	0.8	0.0	81.9	100.0
%	29.0	1.3	0.3	69.4	100.0
BLADES	77.2	75.0	100.0	54.8	61.7
FLAKES	22.8	25.0	0.0	45.2	38.3
%	100.0	100.0	100.0	100.0	100.0
BLADES	22.4	0.9	0.3	38.0	61.7
FLAKES	6.6	0.3	0.0	31.4	38.3
%	29.0	1.3	0.3	69.4	100.0

Tab. 1.7.2.A. Deliberate retouch of blades and flakes. - Záměrná retuš čepelí a úštěpů.

Percussion direction and strength		Bulb modification by retouch		N=/%
		MODIF.	UNMODIF.	
LEFT	SLIGHT	20	28	48
	STRONG	22	28	50
	N=	42	56	98
RIGHT	SLIGHT	7	24	31
	STRONG	11	43	54
	N=	18	67	85
LEFT	SLIGHT	41.7	58.3	100.0
	STRONG	44.0	56.0	100.0
	%	42.9	57.1	100.0
RIGHT	SLIGHT	22.6	77.4	100.0
	STRONG	20.4	79.6	100.0
	%	21.2	78.8	100.0

Tab. 1.7.3.A. Stylistic classification of blades. - Stylistická klasifikace čepelí.

Phases/classes	S1	S2	S3	S4	S5	S6	S7	S8	N/A	%	N=
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	3
2	6.7	13.3	0.0	0.0	6.7	0.0	0.0	0.0	73.3	100.0	15
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	2
4	0.0	14.3	14.3	0.0	0.0	7.1	0.0	7.1	57.1	100.0	14
5	3.6	12.7	1.8	0.0	0.0	3.6	1.8	0.0	76.4	100.0	55
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	13
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	12
8	3.5	7.0	3.5	0.0	0.0	3.5	1.8	5.3	75.4	100.0	57
9	0.0	6.7	6.7	0.0	0.0	0.0	0.0	0.0	86.7	100.0	15
10	0.0	2.2	2.2	0.0	2.2	2.2	2.2	8.7	80.4	100.0	46
11	0.0	7.4	1.5	0.0	0.0	4.4	1.5	4.4	80.9	100.0	68
12	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	83.3	100.0	6
13	0.0	4.8	0.0	0.0	0.0	9.5	0.0	4.8	81.0	100.0	21
14	1.9	1.9	0.0	0.0	0.0	1.9	1.9	5.6	87.0	100.0	54
15	0.0	18.5	7.4	0.0	0.0	0.0	0.0	14.8	59.3	100.0	27
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7
17	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	94.1	100.0	17
18	0.0	8.7	4.3	0.0	0.0	0.0	4.3	4.3	78.3	100.0	23
19	1.3	6.5	5.2	0.0	2.6	5.2	1.3	9.1	68.8	100.0	77
20	0.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	80.0	100.0	10
21	2.4	7.1	2.4	0.0	2.4	2.4	2.4	0.0	81.0	100.0	42
22	3.3	10.0	0.0	0.0	0.0	0.0	3.3	6.7	76.7	100.0	30
23	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	100.0	10
24	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	100.0	4
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	85.7	100.0	7
0	4.8	6.1	1.7	0.0	0.9	3.1	1.3	5.7	76.4	100.0	229
%	2.3	6.9	2.5	0.0	0.8	2.8	1.4	5.0	78.2	100.0	
N=	20	60	22	0	7	24	12	43	676		864

Tab. 1.7.4.A. The chronological variability of stylistic classes (code S comp. Fig. 1.0.3.a) in settlement phases. - Chronologická variabilita stylistických tříd (kód S srov. obr. 1.0.3.a) v sídlištních fázích.

Lenght / width in mm	4	6	8	10	12	14	16	18	20	22	24	26	28	30	N=
10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	0	0	2	**3**	**4**	0	0	0	0	0	0	0	0	0	9
14	0	1	2	0	2	**3**	2	2	1	0	0	0	0	0	13
16	0	0	0	2	**4**	**9**	**3**	1	0	1	0	0	0	0	20
18	0	0	**3**	1	**9**	0	**3**	**3**	1	1	0	0	0	0	21
20	0	1	**7**	**7**	**5**	**6**	**8**	**3**	0	0	0	0	0	0	37
22	0	0	0	2	**4**	**6**	**5**	**6**	2	0	0	0	0	0	25
24	0	0	**3**	**9**	**6**	2	**3**	**4**	2	0	0	0	0	0	29
26	0	0	1	**4**	**3**	**4**	**3**	1	2	0	0	0	0	0	18
28	0	0	0	**3**	**4**	**4**	**8**	**5**	2	1	0	0	0	0	27
30	0	0	0	**4**	**5**	**10**	**3**	2	**3**	1	0	0	0	0	28
32	0	0	1	2	**5**	**4**	**7**	**5**	2	2	1	0	0	0	29
34	1	0	1	2	**3**	2	**6**	2	**5**	2	0	0	0	0	24
36	0	0	0	1	**4**	**4**	**4**	1	2	0	0	0	0	0	16
38	0	0	0	1	**4**	**8**	**3**	0	1	1	1	0	0	0	19
40	0	0	0	2	2	**3**	**3**	1	**3**	0	0	0	0	0	14
42	0	0	0	1	0	0	**4**	**4**	**3**	0	0	0	0	0	12
44	0	0	0	0	0	1	1	**3**	2	2	0	0	0	0	9
46	0	0	0	0	1	1	2	0	0	1	0	0	1	0	6
48	0	1	0	0	**3**	1	2	0	0	**4**	0	0	0	0	11
52	0	0	0	0	1	1	1	1	**3**	2	0	0	0	0	9
54	0	0	0	0	1	0	1	1	1	1	0	0	0	1	6
56	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
58	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2
60	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
>60	0	0	0	0	1	1	1	2	0	1	0	0	0	0	6
N=	2	3	20	44	71	70	74	47	36	20	2	1	2	2	394

Tab. 1.8.1.A. Blade prototypes (bold). - Prototypy čepelí (tučně).

Lenght / width in mm	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	>	N=
10	**5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
12	0	0	2	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5
14	0	0	1	2	0	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	11
16	0	0	0	0	0	**3**	0	1	1	0	0	1	0	0	0	0	0	0	0	0	6
18	0	0	1	2	0	**4**	2	2	0	0	1	0	0	0	0	0	0	0	0	0	12
20	0	0	0	**3**	2	**8**	**5**	2	2	1	0	2	0	0	1	0	0	0	1	0	27
22	0	0	0	1	**3**	**4**	**5**	2	**6**	1	0	0	0	0	0	2	0	0	0	0	24
24	0	0	0	0	0	1	**3**	**3**	**6**	0	1	0	1	0	0	0	1	0	0	0	16
26	1	0	0	0	0	0	**6**	2	**3**	0	**4**	2	**4**	0	2	0	0	0	0	0	24
28	0	0	0	0	0	0	1	**3**	**4**	**3**	**4**	**3**	1	0	0	0	1	0	0	0	20
30	0	0	0	0	0	1	1	0	2	**5**	2	1	**4**	0	0	0	0	0	0	0	16
32	0	0	0	0	0	1	2	0	2	**3**	1	1	0	0	0	0	0	0	0	0	10
34	0	0	0	0	0	0	2	0	2	1	1	2	1	0	1	0	0	0	0	0	10
36	0	0	0	0	1	0	1	0	1	2	2	2	0	0	0	2	2	0	0	0	13
38	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	0	1	0	0	5
40	1	0	0	0	0	0	0	0	1	2	1	1	1	0	1	0	0	0	0	0	8
42	0	0	0	0	1	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	4
44	0	0	0	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	5
46	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	2	5
48	0	0	0	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0	5
50	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	3
52	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4
56	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	3
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
>60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N=	7	0	4	8	7	25	29	17	35	24	21	19	16	6	5	8	6	1	1	4	243

Tab. 1.8.1.B. Flake prototypes (bold). - Prototypy úštěpů (tučně).

Feature	Phase	House No.	Inv. No.
231	-	-	17886
2250	5	2278	81337
735	16	739	60732
852	16	-	65944
94	19	96	05673
430	19	434	18213
1260	19	-	72639
914	21	912	47163
699c	14	-	43683
269	25	277	14373

Tab. 1.8.3.A. List of drills and spikes. - Seznam vrtáků a šipek.

"Bylo by - soudím - téměř bez užitku, sledovati dějiny omylů, které se vážou kolem výkladu užití BN". (Vencl 1960: 11)

2. Polished industry

2.0. Introduction

2.0.1. Study of the polished industry (BI)

The polished industry is less frequently studied by researchers than the chipped industry. The variability of the polished industry is considered to be the lesser of the two forms within a space-time structure. The greater differences used to be deemed characteristic of periods of cultural change or higher units. At the beginning of the 1960's, the principal trends of those artefacts within the Linear Pottery Culture were identified (Vencl 1960). A metric typology based mostly on the length-height index was developed in the Rhineland and unified for all types (Modderman 1970, Bakels 1987, Farruggia 1989). J.Rulf proved the qualitative differences between shoe-last adzes, flat shoe-last axes (1991, 315) and axes with vertical edges. The variability of functional classes is not particularly great in the polished industry in comparison with that of the chipped industry. Judging from the macroscopic wear, it is possible to speak of only two groups of adzes and axes, which differed in the kind of shaft employed. On the other hand, the problem of raw material provenience has not been satisfactorily resolved, and it is neither certain of what the industry was made, nor even, in some cases, when the identification was carried out. Current examples from different parts of the world provide the industry with another symbolic yardstick (Oliva 1985), even if their possible application to the Neolithic polished industry is doubtful (Podborský 1993, 91).

2.0.2. The study of the polished industry from Bylany

The polished industry assemblage was, at the end of the 1960's, used as a record in the thesis (Velímský 1969), which processed all of the finds then available. The author of this thesis dealt in detail with the petrography of the raw materials and the means of their procurement. The metric typology was carried out at the beginning of the 1990's (Rulf 1991), and the implement variants were defined accordingly using frequencies of the main measures. The metric data from this publication can be applied here to another, more detailed analysis. It was possible to continue with the results that J. Rulf published, and they were able to be extended according to the situational analysis schemata.

2.0.3. Introduction to the situational analysis of the polished artefacts

The formal classification of the polished artefacts is based on the length and weight of shoe-last adzes and axes. The quality of the products was considered according to the orientation of foliation layers and their relation to the axes of the implements. The majority of the industry at Bylany BI is made of actinolite (amphibolitic schists), and further differentiation in the quality of the material is thus rendered useless.

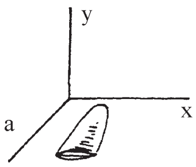
The functional classification is based on a combination of classes according to the edge angle and use/wear traces. For practical purposes, the shoe-last celts are described as adzes, because in classifiable cases the two correlate closely, with very similar wear. This allows the classification of a higher number of artefacts than would be possible on the basis of use/wear traces alone. The stylistic classification was carried out separately for axes, where different forms of the cross-section could be recognised, and for shoe-last adzes. The Linear Pottery Culture adzes (KK) are mostly plano-convex, and this group was therefore further subdivided by maximum width and the width-height index. The forms occurring most often were described as prototypes of the polished industry and were traced in settlement contexts.

	TECHNICAL ELEMENTS	ATTRIBUTES AND THEIR CLASSIFICATION

STYLE OF POLISHED INDUSTRY

Technical elements

bored nonworking forms



xa groundplan

angle of side convergence OMEGA

xy front view

index = hight x 100/width

axes	adzes	code
A	A	1
		2
		3
B	B	4
C	C	5
	D	6
D	E	7
		8
E		9

Attributes and their classification

symmetry and composition

in groundplan side view front view

Prototypes

(Rulf 1991:319) stylistic classification of planoconvex adzes

ADZES A	i<=85	85<i<=110	110<i<=150	i>150
narrow W<=20 mm	111 (A1a)	121 (A2a)	131 (A3a)	141 (A4a)
wide W>20 mm	112 (A1b)	122 (A2b)	132 (A3b)	142 (A4b)

(Rulf 1991:321) stylistic classification of axes

AXES A-E		OMEGA	section in frontplan
1	narrow W<=50 mm broad W>50 mm	0 - 3°	A1 B1 C1 D1 E1
2	narrow W<=50 mm broad W>50 mm	4 - 14°	A2 B2 C2 D2 E2
3	narrow W<=50 mm broad W>50 mm	> 15°	A3 B3 C3 D3 E3

DESIGN

Technical elements

ay side view

edge angle gama

wears

paralel oblique

resources of raw materials

Attributes and their classification

functional classification

		ADZES	AXES
sharp	GAMA <= 68°	F1	F3
blunt	GAMA > 68°	F2	F4

PRINCIPLE FORMS OF POLISHED INDUSTRY

Technical elements

foliage of surfaces s

ADZES (2)	AXES (1)	code
2	1	1
3	2	2
1	3	3
scores of quality	?	4

form

1 whole artefacts
2 classifiable parts
3 semiproducts
4 unspecified forms

Index width/length

size

W = width in mm
L = length in mm
Weight (G) in g

Attributes and their classification

kinds of raw materials

A actinolith-amphibolitic schist
B amphibolitic schist
C amphibolith
D epidotic amphibolith
E eclogith
Fa graphitic plynith
Fb biotic/seritic plynith
G graphitic schist
H pelitic schist

quality of processing

	score	ADZES	AXES
foliage		4	1
		6	2
		2	3
		3	

formal classification

	size / weight	small G<=60g	large G>60g
adzes1	L<=50 & W<=20 50<L<=100 & W<=25	L1	L5
adzes2	L>50 & W>20 50<=L<=100 & W>25	L2	L6
adzes3	100<L & 20<W 110<L & 25<W	L3	L7
axes		L4	L8

Fig. 2.0.3.a. Scheme showing the situation analysis of the polished industry. - Schéma situační analýzy broušené neolitické industrie.

2.1. Primary functional classifications: adzes and axes

2.1.1. Primary characteristics of shape (length and width)

The classification of the polished industry into two primary classes of shoe-last adzes and flat shoe-last axes is proven both qualitatively and quantitatively. Within the Bylany assemblage, all of the whole forms can be divided into one of these two classes, as is the case for most of the broken pieces. Quantitatively, they differ according to the basic criteria of the form, i.e. length and width at the level of the **ax** (Fig. 2.0.3.a). These mutual values overlap only slightly, and therefore the separate existence of both classes is acceptable without more detailed analysis (Rulf 1991: 315); this has also been proven at other sites (Modderman 1970, Bakels 1978, Farruggia 1977). The other morphologically distinct forms, mainly axes with a vertical edge, occur in smaller numbers and were thus not included in the analysis. Drilling implements of various forms, with non-practical uses in the LnK, have been included in the section on polished industry stylistic classes.

The length and the width of the adzes correlates very slightly R = 0.144 (N = 135) in the assemblages of artefacts as a whole, or of classifiable fragments. According to their plotted values, it is possible to suppose that they consist of at least three metrically different classes. The first consists of short, narrow artefacts, the second short but slightly longer ones, and the third class the longest forms, regardless of their width. The classes were labelled AD1, AD2 and AD3.

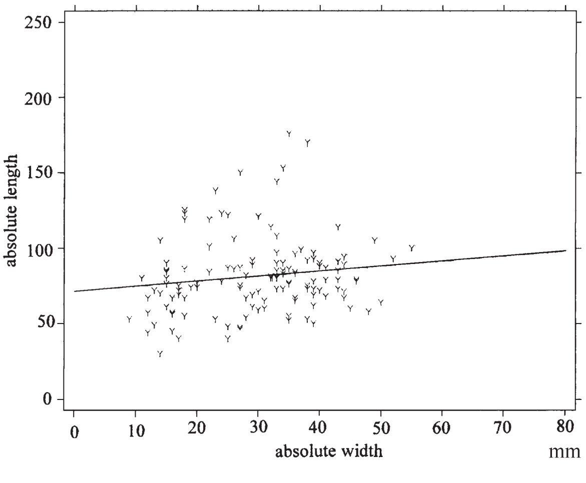


Fig. 2.1.1.a. Correlation of the length and width of adzes along the level ax. - Korelace délky a šířky kopytovitých klínů v rovině ax.

The length and the width of the axes correlate more closely than those of the adzes, R = 0.421 (N = 262); plotting their values shows no potential for distinguishing separate classes. One long artefact (from phase 10, feature no 328, BYBF: 112) is outside this range, and must be treated as a separate morphological type.

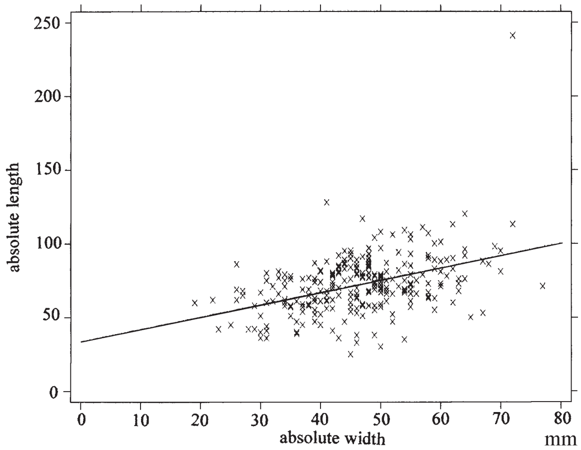


Fig. 2.1.1.b. Correlation of the length and width of flat shoe-last axes. - Korelace délky a šířky plochých kopytovitých sekerek.

2.1.2. Primary characteristics of size (weight)

Unlike the case of the chipped industry, the size of the polished industry can be well characterised by weight. Analysis using this measure is limited to whole pieces, reducing the number of classifiable artefacts. The weights of the shoe-last adzes,

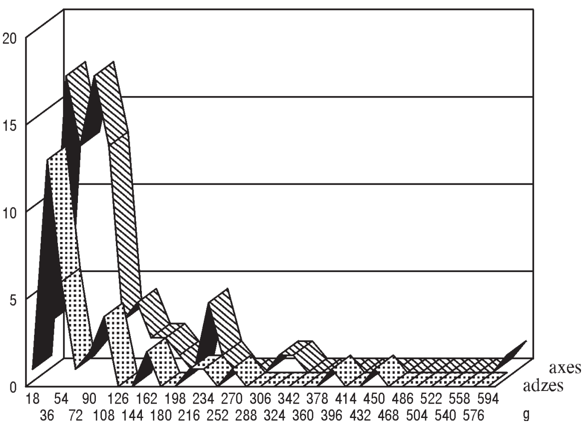


Fig. 2.1.2.a. Total mass of the complete adzes and axes. - Hmotnost celých kopytovitých klínů a sekerek.

of which 35 were measured, varied below a maximum of 450 g. In consequence of their small number, their frequency distribution is irregular with an average of 87.5 g (s = 102.7). Regardless of the irregularity of the distribution, the limits can be marked at an average value of 60 g and groups of smaller and larger adzes can thus be defined.

The number of classifiable axes is higher (N = 84), and their frequency distribution is more regular. They have an average weight of 78.8 g (s = 77.9). Their distribution is apparently bimodal, and smaller and larger axes can be separated. The border between these is roughly equal to the limit for adzes, at a value of 60 g.

2.1.3. Formal classification

The formal classifications of adzes and axes can be formulated together as paradigmatic classes within the spaces of shape and size classes, i.e. the weight classes AD1, AD2, AD3, AXE x small, large). As a result, six formal classes of adzes and two formal classes of axes occur, which represent the majority of the Bylany polished industry. The number of classifiable forms totals 119, with 70 % of these axes. This number represents only 15 % of all of the adzes and 24 % of all of the axes, and these relationships need not, therefore, be taken as being particularly representative.

The relative numbers within the classes of adzes decreases in larger forms, this corresponding to a greater demand for the smaller forms. The frequency of small and large axes seems to be equal, small ones being only slightly more prevalent. The statistical differences within the table are significant (chq = 24.796, d.f. = 3, p = 0.0000). ➔Tab. 2.1.3.A.

2.1.4. The chronological variability of formal classes

The numbers of items in the formal and weight classes vary within the phases more in relation to the preservation of the implements (only whole ones are classifiable) than as a consequence of their chronological variability. The highest numbers appear in phases 14, 15 and 21. Classifiable adzes are absent in the earliest phases. There are no special trends or concentrations in the phases other then changes related to development. The larger adzes occur in phases 15, 18, 19, 22, and 23; otherwise, larger axes occur in more phases. The appearance of the latter concentrates regularly at the beginning of phase groups at a new site, and they are usually absent in the phases immediately preceding change -this can be seen in phases 4, 8, 12, 17, 20, and 25. This would correspond to greater construction activity after changes of settlement area and during the several phases immediately following such a change. ➔Tabs. 2.1.4.A, 2.1.4.B.

2.2. The economics of raw material procurement and the production of polished artefacts. Relationships with the environment: the adaptability of implements

2.2.1. The adaptability of production and usage (basic forms)

Polished implements and their broken pieces represent 80 % of all green schist finds, both by number of pieces and total weight. This marks the character of the users of the area at Bylany 1, where evidence of the individual stages of raw materials processing is lacking. Semi-finished products are absent in the majority of phases, and do not exceed 5 % of the total number of finds. In phases 13, 19 and 21 less than 10 % of the products found were semi-finished. Only in phases 4-6 and 15-16 did semi-finished products constitute more than 10 % of the items found. Both periods are connected with the stabilisation of the settlement, which is also apparent in other artefacts types. These were probably periods when additional local production could be realised, but only as an exceptional phenomenon. The appearance of basic forms of the polished industry does not correlate with phases that are interpreted as representing changes in the area's development. ➔Tabs. 2.2.1.A, 2.2.1.B, 2.2.1.C.

2.2.2. Raw materials and their processing

The most detailed petrographic analysis carried out to date on the raw materials of the polished industry was that undertaken by T. Velímský in his thesis (1969: 57-81). The description of the raw materials is based on the microscopic analysis of about 7 % of the artefacts studied there. These comprise a whole range of the metamorphic minerals, including sedimentary pelitic schists. Uniquely, varieties of actinolitic, actinolitic/amphibolitic and amphibolo-actinolitic schists dominate. Their origin has not been ascertained. They are significantly more frequent than the amphiboles and eclogites of Kutná Hora crystal tuff available within a radius of 10 km of the site, and which were used for some of the quernstones. The main raw material, commonly described as "green schist", has not yet been proven to be of local origin. It displays suitable mechanical properties (toughness, grinding ability, specific weight) and fine granulation with easy separation possible along the strata of the material. Implements were produced from other materials only exceptionally.

Artefacts from areas BY B and F were not included in the list of products made from other materials as they were not available for study at that time. The range of particular types of raw materials did not change. The only type of artefact that was of a visibly different material is a irregular hammer-axe from feature 2157 (278188, BYBF: 273); this is made of light green schist with inclusions of black minerals. More detailed petrographic analysis is not yet available. →Tab. 2.2.2.A.

The relative frequency of particular materials in the settlement phases does not differ greatly overall. Amorphous pieces of amphibolite also occurred in the assemblage, mainly from phases 2, 21 and 25. This bears witness to the possible accumulation of raw materials at some critical moments in development, these materials never being used. Phase 2 has indications of contacts -as yet insufficiently elaborated- for the procurement of optimal materials. Phase 21 contains indications of the apparent renewal of the area, and the last phase of perhaps a broader change, which resulted in the abandonment of area BY1. This is similar to the explanation of the higher occurrence of graphite schist in phase 8, which has indications of substantial movement in the settlement area at the end of the earliest period. These raw materials are accessible in the vicinity of Bylany at Železné hory. →Tabs. 2.2.2.B, 2.2.2.C.

2.2.3. Number of artefacts in houses with simple and double mid-sections

The polished implements are usually associated with the work of the male population, and their numbers may in some way relate to the total proportion of men in the population, or to the relevant changes in the population. This is the core element of what has been inferred about the consumption of raw materials. T. Velímský makes his suppositions based on the ethnographic model of an average number of 3-5 implements used per man (Velímský 1969: 75). J. Rulf regards this number as typical per man per year and arrives at an average of 6 artefacts per house (Rulf 1991: 326), with an overall range of 0.7-12.6 pieces per house through the phases. From these numbers and different variants of refuse quantities he also estimates the relative length of a phase. From the refuse of the polished artefacts he estimated an optimal survival rate of 1-3 % of the original number of artefacts, and calculated optimal span for each phase as falling somewhere in the range of 15-30 years (Rulf 1991: 327).

If the numbers of basic polished industry forms found amongst the refuse at the houses with simple and double mid-sections are compared, the result is a proportion of 3.3 pieces per house with a simple mid-section, and 7.7 pieces per house with a double mid-section. If the polished artefacts are emblematic of the number of men in each house, it means that a smaller number of men lived and worked in those houses with a smaller mid-section than in the larger houses. These numbers may of course be distorted by the degree of preservation of original relationships in the refuse. The composition of the refuse may be influenced by many factors, particularly the transportation of usable artefacts to another house built later. In these relationships, about 50 % of the artefacts were classified. The differences in the table are statistically significant (chq = 14.511, d.f. = 6, p = 0.0244). →Tab. 2.2.3.A.

The formal types yield similar proportions, with both small and large implements occurring at an average rate of 0.6 and 0.3 pieces respectively per house with a simple mid-section, and 1.4 and 0.7 pieces respectively per house with a double mid-section. This clearly indicates a higher number of men working in houses with double mid-sections, working on the two separate tasks that the small and large pieces may represent. The differences in the table, however are not of statistical significance (chq = 0.173, d.f. = 2, p = 0.9173). →Tab. 2.2.3.B.

2.3. The informative content of polished industry functional categories. The organisation of production and use: individual variability

2.3.1. Genotypes in the space of settlement phases

In view of the variability of the numbers of classifiable formal types within the phases, only those sections of the phases were selected for further analysis which contained greater numbers of implements-phases 13-15 and phases 21-23. The resulting plots of correspondence analysis within the space of these phases gives an ordering that corresponds to the differences between large and small implements. The interpretation of the resulting dimensions is difficult. The chronological sequence of phases 13-15 is preserved only on the second axis, and that of phases 21-23 on the first axis, neither of which is uniquely chronological. This factor emphasises more the individual forms. Along the first axis (52.6 % of the variability), the large adzes of the second class are separated from the others. Along the second axis (28.9 % of the variability), there is a remarkable contrast between the large adzes of the second and third classes. Along the third axis (10.3 % of the variability), the small adzes of the first class are separated from the other implements. Particular factors therefore correspond more to the formal attributes of the implements than to their chronological sequence. It can be inferred from this that the formal classification represents primary genotypes of implements not changing over partial chronological sequences.

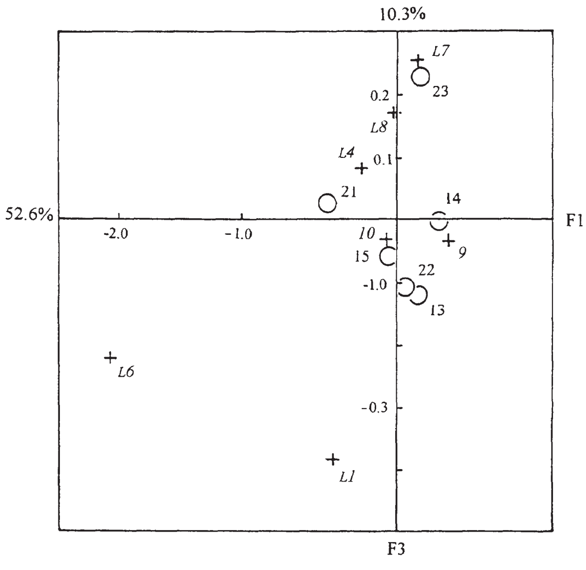


Fig. 2.3.1.a. Correspondence analysis of polished industry formal classes in selected phases (nos. 13 - 15 and 21 - 23). - Korespondenční analýza formálních tříd BI v prostoru vybraných fází.

2.3.2. Phenotypes in the space of households

The formal differences amongst the classifiable implements were studied in phase 21, which contained the greatest number of artefacts. The plot of synchronic houses within the space of formal types shows a core of houses-nos. 912, 16, 81, and 965- as particularly associated with large adzes. House 679, characterised by small axes, is separated from these, as is house 1111, characterised by large axes. The first axis (73.0 % of the variability) represents the differences between adze and axe forms, while the second and the third (15.1 % and 11.2 % of the variability respectively) are more representative of the size of the artefacts. Axe size can therefore be considered as a phenomenon of phenotypic variability (cf. section 1.3.2) in the forms of the polished industry. This would correspond to an uneven adaptation to the immediate demand for the implements within particular households.

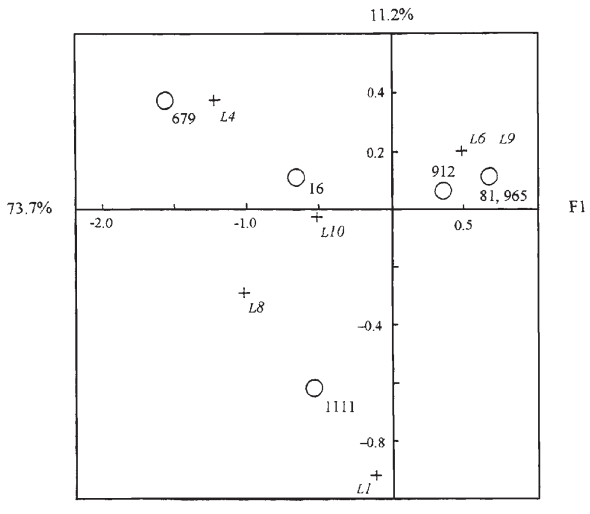


Fig. 2.3.2.a. Correspondence analysis of formal classes of the polished industry in synchronic house complexes in phase 21. - Korespondenční analýza formálních tříd BI v prostoru synchronních domů v rámci 21. fáze.

2.3.3. The quality of the industry in particular houses

Because the polished industry at Bylany consists mainly of one type of material, its quality is measurable only through the more detailed characteristics of this material. T. Velímský demonstrated that the mechanical properties of the minerals depend on the direction in which they are measured. The mechanical properties of the implements, such as are their toughness, grinding ability, resistance to pressure from different directions and so forth, directly depend on the mutual orientation of the material and implement axes. For the schists orientation axis b, which gives the prevailing direction of formal mineral prolongation, and the perpendicular axis a are the most important. The level s defined with these two axes represents mineral foliation, as constituted during the original sedimentation. The majority of the Bylany implements respect this foliation (Velímský 1969: 71), which testifies on the one hand to the deliberate processing of materials, and on the other to the differentiation in the quality of implements in relation to their users.

The quality of both shoe-last adzes and flat shoe-last axes is measurable by the orientation of their axes to the orientation of the actinolitic/amphibolitic schists and s-levels. The quality of orientation of the adzes are labelled with a "1" if the material levels s are parallel to plane ay of the implement, with a "2" if the levels are parallel to plane ax, and with a "3" if the levels s are normally positioned with relation to the implement planes. The axes of the best quality ("1") have their plane ax parallel to the s-levels, while in those of a lower quality ("2") the orientation of the s-levels is not respected. The axes are labelled with a "3" if their plane az is parallel to the s-levels of the material. The axes labelled "1" are considered to be a more specialised and progressive form, the adzes labelled "2" a more conservative form. The adzes are implements resembling older and more universal forms of longitudinal pebbles with a sharpened side edge, as found, for example, in the Starčevo culture. The adzes of the earlier LnK period should be evaluated separately, as they express the same orientation as the axes.

The quality score of polished industry manufacture has yet to be defined in a unified manner, regardless of what the chronology of the implements as a product of form and orientation quality would indicate. The score value for each house is calculated as the product of the quality points and relative frequencies of particular implements. It ranges from 100 for the complexes with the highest quality tools to 600 for complexes with the lowest quality of industry. The artefacts for which foliation has not been identified have been labelled "3"; the average quality of the complexes is marked by a value of 300. The phase score is the average of all of the house scores pertinent to that particular phase.

The differences in scores within a phase vary from 87 points in phase 21 to 267 points in phase 11; they are negatively influenced by lower numbers of preserved, classifiable artefacts. The average score for individual phases varies with the previously interpreted changes in the area's development. It decreases in phases of renewal, i.e. in those phases with a higher demand for polished implements, where quality also increases. The quality of the implements in the earliest phases is artificially lower because of the occurrence of adzes with an axe-like orientation; the criteria of quality for this industry are also different. In this sense, the habits of polished stone industry production also differ in this period. During the occupation of the BY1 settlement area, the quality of the industry either decreased or stagnated. Periods of development in the area, originally defined by the volume of industry, have also been proven by quality variability.

2.4. Classification of primary functional categories in the subsistence system, and division of labour. Polished industry taphonomy

2.4.1. The design of the working edge (gamma angle)

The main functional characteristics of polished implements are represented by the edge angle, which influences their utility value to a substantial degree. The frequency distribution of this angle is remarkably irregular if all of the measurable pieces are included (51 shoe-last adzes, 154 flat shoe-last axes and 1 axe with a vertical edge). The irregularity of the frequency distribution may mark more modalities, or a different degree of edge wear and secondary sharpening. The average for distri-

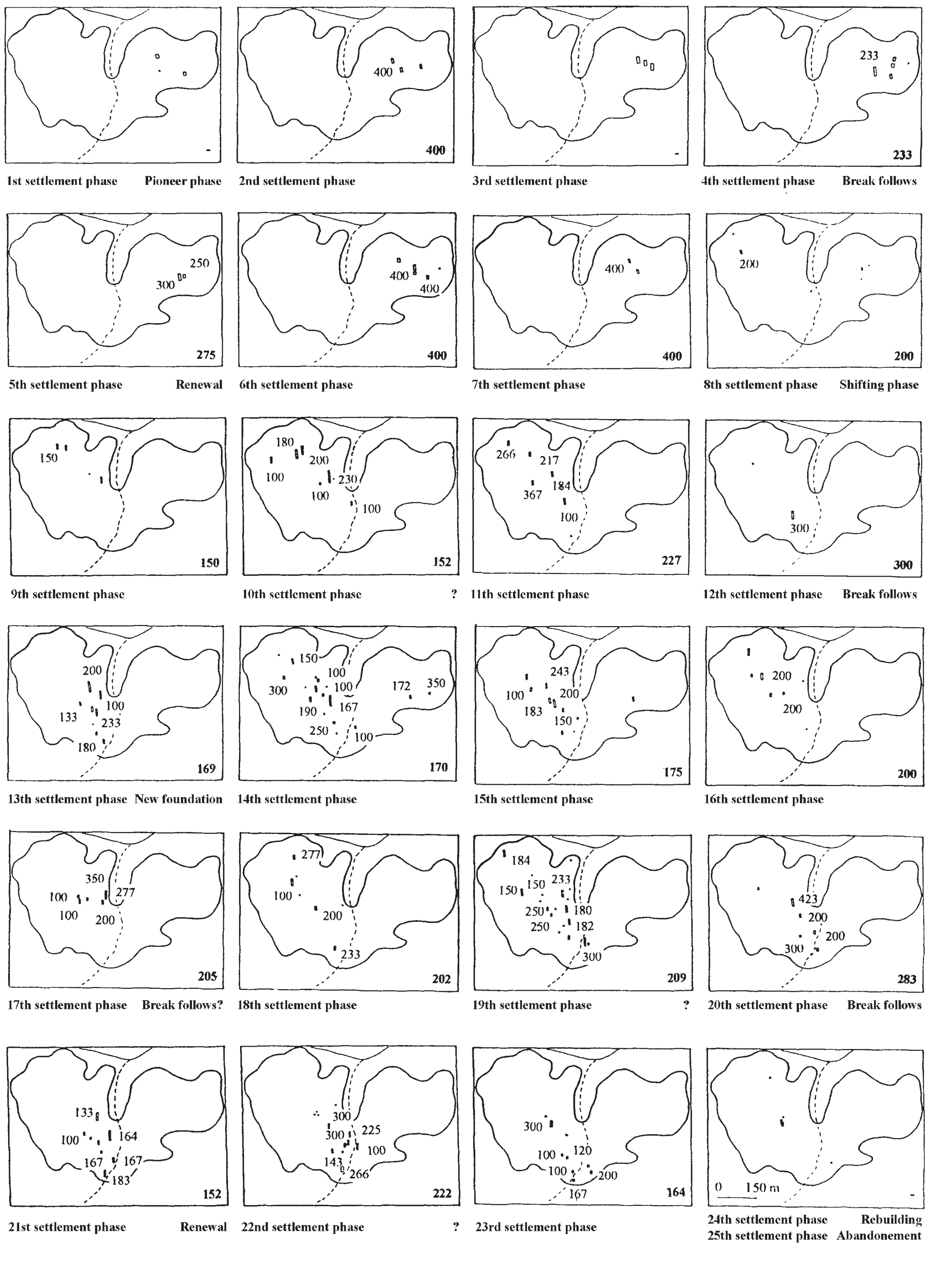


Fig. 2.3.3.a. Quality scores for polished industry in individual settlement phases. - Skóre kvality BI v jednotlivých fázích.

bution is the same for both forms, and comes to about 68°. This value is used to distinguish sharp from blunt forms; these forms are also to be considered as the basic classes of implement edge design for adzes and axes.

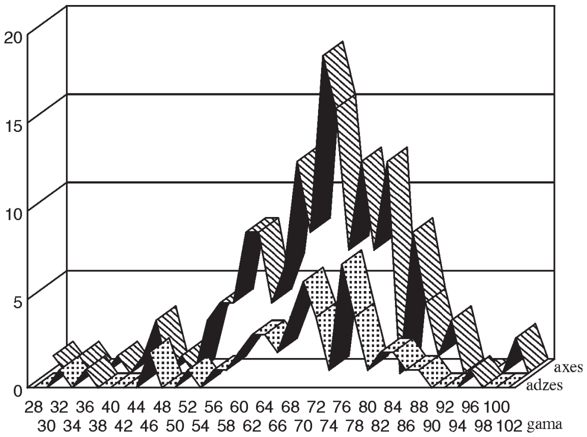


Fig. 2.4.1.a. Division of sharp edges. - Rozdělení četností úhlu ostří.

2.4.2. Wear (adzes and axes)

The next characteristic directly correlating to function is wear that has left thin incisions on the lower or upper parts of the edges of some artefacts. Because both are of practically equal value, only traces on the upper side were compared with the classification of artefacts for adzes and axes. Wear can be divided into two classes. The lines perpendicular to the edge represent adzes and the lines diagonal to the edge represent axes, as stated in general terms some time ago (Vencl 1960: 17, Velímský 1969: 133, Rulf 1991: 325). The differences in the contingency table are statistically significant (chq = 69.283, d.f = 1, p = 0.0000). Only 9 % of finds were classified according to this criterion. ➔Tab. 2.4.2.A.

The comparison of wear with the size of classes, by contrast, yields statistically insignificant differences (chq = 1.666, d.f = 1, p = 0.1968). This corresponds to the expected functional differences between adzes and axes, as well as to the absence of functional differences between large and small implements. It can be stated that the formal classification only partially overlaps the functional one, which was carried out according to edge angles and wear. ➔Tab. 2.4.2.B.

2.4.3. Functional classification

Because the number of artefacts directly classifiable by wear is limited to 5-10 % of the implements, functional classifications were defined as paradigmatic classes in the matrix of angles (sharp and blunt) and forms (adzes and axes) which correspond to wear. The differences in the table are not statistically significant (chq = 0.077, d.f. = 1, p = 0.7821). Axes are prevalent in about two-thirds of cases, both for blunt and sharp implements. A similar ratio for blunt implements applies to both axes and adzes. In total, the lowest proportion is made up of sharp adzes and the highest number of blunt axes. This picture corresponds to experimental results regarding the use of polished industry, primarily in cutting down trees-a blunt edge was more effective for this type of work (Velímský 1969: 37, note. 7). ➔Tab. 2.4.3.A.

2.4.4. The chronological variability of functional classes

The number of chronologically and functionally classifiable artefacts is relatively low (72 pieces). In the total number, there are no significant differences between individual functional types. The number of blunt axes is twice that than of blunt adzes. In particular phases, numbers are more variable because totals are lower. There are no classifiable artefacts in the earliest phases. The majority of implements occur in phase 21, where blunt axes dominate and blunt adzes are completely absent. In phase 19, which still comprises less than 10 pieces, the highest number is for sharp adzes, ahead of blunt axes. This bears witness to the functional classes following a different quantity of work in the phases. While in phase 21 the cutting down of trees was prevalent in a time of renewal, in phase 19 a higher number of implements were required for the finer working of wood, for example in the production of wooden implements or pots. The overall numbers may of course be distorted by the lower number of classifiable artefacts. ➔Tab. 2.4.4.A.

2.5. The identification of household activities from polished artefacts. The stability and variability of economic activities

2.5.1. Ratio of adzes and axes within phases

The overall number of adzes and axes, expressed by the ratio 35 : 65 %, changes in individual phases; at the same time, however, many artefacts cannot be classified as functional types. In the majority of cases, more axes have been preserved. The ratio is not equal very often, with the exception of the phase 23 where more adzes occur. The supposition is that both tool types have roughly the same probability of being preserved. For comparison, a ratio of basic forms of adzes and axes has been added, which corresponds well with the functional classification. Given the higher likelihood of the classification of forms, the relationships of formal types are evidently more representative. The prevalence of adzes is striking in phase 20, exists in phase 16, but is not repeated in phase 23. Phase 20 is not exceptional in other parameters, and is interpreted as representing the final days of one settlement period in the BY1 area. Finds from amongst refuse come only from phase 17, but the proportion of adzes is different. It is possible that phase 20 demonstrates a higher demand for wood processing and the production of wooden items in the time before the area was abandoned. On the other hand, the irregular dumping of refuse cannot be ruled out at this point, since, for example, it is possible axes which were still usable were transported to a new settlement area, causing a seeming increase in the number of adzes. ➔Tabs. 2.5.1.A, 2.5.1.B, 2.5.1.C.

2.5.2. Identification of activities in households

The situation within houses resembles that within phases. The axes were better identified, and can be used to estimate the number of men in the household (see Rulf 1991: 326). In the houses of phase 19, when classification was possible according to these criteria, sharp adzes prevail, just as they do in the isolated pits of this phase. The axes are in smaller proportion, and they are therefore likely to have h ad a different function. The ratio of unclassified artefacts is high, at 80-100 % per household. For example, in house 96 there are 14, and in house 912 there are 21, unclassifiable polished artefacts. Regardless of this, it can be supposed that types which were also prevalent in the original assemblages are preserved in the refuse. From the different proportions of functional types found in houses 96 and 912, it follows that the proportion of polished industry functions was different in the houses with a similar central role within the settlement. In the former case, the significance of further wood processing after the house was constructed was higher, while in the latter the polished industry was mainly used during the actual construction. ➔Tab. 2.5.2.A.

2.5.3. Number of implements and number of inhabitants

The indicative value of the polished stone industry is described as an index of the male population. The axes are concentrated in the furnishings of male graves (Zápotocká 1998a: 33), and are interpreted as tools used for the clearance of trees and procurement of wood, later used for the construction of houses, all of which were typical male activities in that era. The implements were of course multi-functional, with many secondary uses, not the least of which was as weapons. During most of these activities, they remained in the hands of the male population. According to the estimation of quantitative parameters, it is supposed that one man would have used 3-5 pieces per year (Velímský 1969: 75), but that no more than 3-6 % of the total number of implements used is preserved in the refuse (Rulf 1991: 327). On the basis of the average number of implements preserved in each household, a method of estimating the average length of a phase was created, and the optimal value calculated to be 15-30 years (Rulf 1991: 330).

The method used works with several unknown parameters, but its results are acceptable as a possible range of values from which an optimal combination can be inferred, meeting the requirements of the situation under consideration. It can be made more precise through the involvement of more parameters, or through the functional specification of the implements. All artefacts comprise functionally different forms, the numbers of which were not dispersed equally amongst the users; therefore, the estimate of 3-5 pieces per man per year is only rough. The distinguishing of a functionally more comprehensive group of axes enables simplification of the supposition of an average of 1 axe per man per year. The axes were evaluated in groups based on basic forms, and not on wear. As noted above, their numbers were studied in the context of houses with simple or double mid-sections.

The frequency distribution of all of the preserved implements in houses with a simple mid-section varies irregularly from 0 to the local maximum of 6 pieces per house. This irregularity may be influenced by other forms, as the individual distributions of adzes and axes run a regularly decreasing course. The frequency distribution within houses with a double mid-section is entirely uneven. The regular distribution of axes in those houses with a simple mid-section has a local maximum of 3 pieces, while in houses with a double mid-section, the value is 2 pieces.

A similarly-processed table of estimations (Rulf 1991: Tab. 53), including new parameters, was completed assuming the preservation of 2 % of all artefacts and a phase duration of 20 years. Optimal estimates seem to be 15-30 years for the duration of a phase and a 2-3 % rate of implement preservation in refuse. It is possible to agree with the argument that there was a higher preservation of polished industry than of ceramics-Rulf (1991: 330) supposes 1 % of ceramics and 3-6 % of implements were preserved-even if the lower parameters give better estimations. After taking all of these suppositions into account, estimates of 1.4-4.3 men per house with a simple mid-section were arrived at. →Tab. 2.5.3.A.

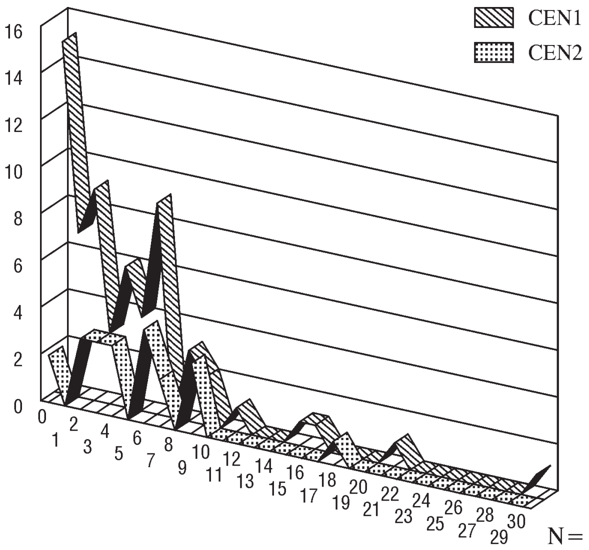


Fig. 2.5.3.a. Frequency distribution of polished industry per house. - Rozdělení četností BI v domech.

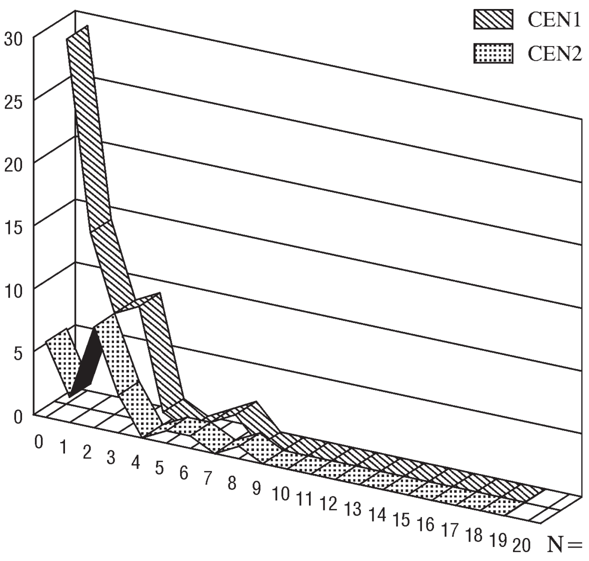


Fig. 2.5.3.b. Frequency distribution of axes per house. - Rozdělení četností sekerek v domech.

2.6. Informative content regarding continuity and discontinuity in polished artefacts

2.6.1. Functional classes within the space of phases

The main functional types of polished industry - axes and adzes-form, together with other unspecified implements, three apparently different groups in the space of phases 13-23. The core of the spatial division is occupied by other implement forms, including a section with unclassified basic forms. The adzes are separated from axes in the first factor (75.6 % of the variability), while the axes are separated from adzes in the second factor (24.4 % of the variability). The majority of the phases are focused on a centre, and in this way the functional continuity of forms during the long-term development of the classic pe-

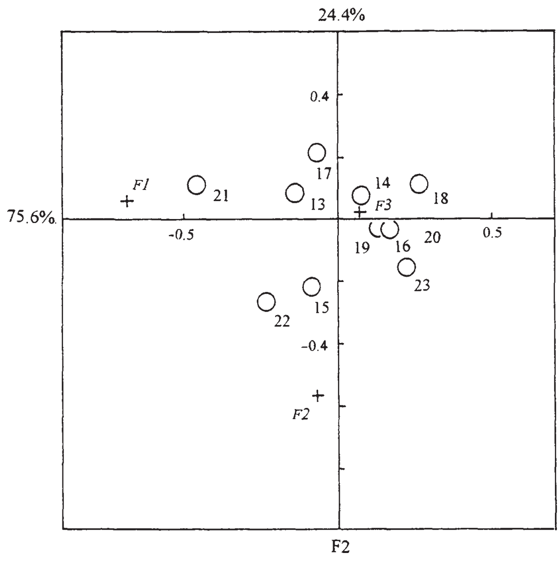


Fig. 2.6.1.a. Functional classes within the space of phases 13-23. - Funkční třídy v prostoru fází 13-23.

riod of the Linear Pottery Culture was proven. With regard to socio-economic function, there are no differences in this period in the structure of polished industry; structural differences appear only during the earliest period, when the function of axes and adzes was not yet morphologically explicit.

In the plotted structure, the position of phase 21 is irregular, probably because it represents a period for axes following the construction activities in area BY1. Phases 22 and 15 maintain a position towards the adzes that may represent the stability of activities during a stable period in the area. The possible use of axes as weapons has not been ruled out; this theoretical case would probably not change the structure of the refuse greatly.

2.6.2. Functional classes within the space of houses

The specific variability of functional forms in the space of households was studied in a sample group of houses from phase 21, which contained the greatest number of artefacts. In this space, the functional dichotomy of adzes (in the second factor of 13.9 % of the variability) and axes (in the first factor of 86.1 % of the variability) also appears. Among the houses, which form a more-or-less functionally undifferentiated group, only house 965 is separated by its higher number of axes. This may be a house built after the other houses during the phase, or rebuilt during it. Its architectural remains are very poor.

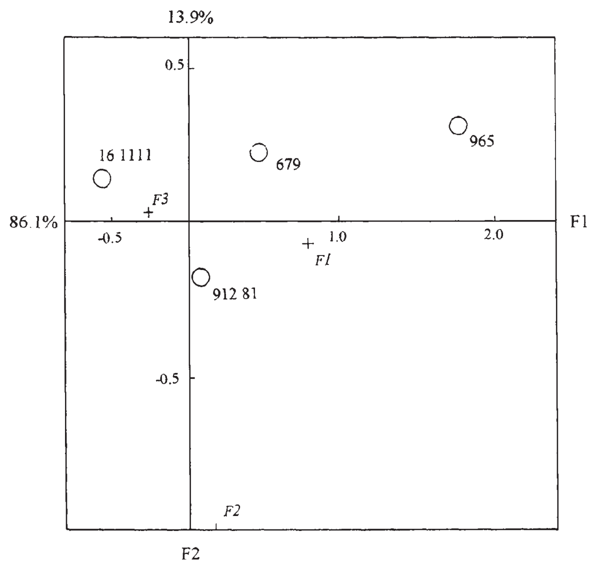


Fig. 2.6.2.a. Functional classes within the space of complexes in phase 21. - Funkční třídy v prostoru komplexů z fáze 21.

2.7. The context of ideas and imagination. The style of polished stone industry technology

2.7.1. Symmetry of plan (omega angle)

Projections of implements into the three principal spatial dimensions can be considered as the main stylistic attributes of the polished industry. The orientation of the implements traditionally rests on the view of an artefact taken (Salaš 1984), regardless of its original hafting, while working orientations were different. In the projection into the plane xa, the following classes of artefact side and symmetry could be distinguished: (parallel-straight, parallel-convex, parallel-offset, convergent-straight, convergent-convex, convergent-offset, unclassified).

Of these shapes, 30 % were classified by basic form. Even then the classification of formal classes would have been better if only classes of basic forms had been used, as these enable the description of individual artefacts. The straight and convex symmetrical units both dominate. The offset forms with asymmetric sides are in fact more exceptional for the convex forms. The axes have more convergent sides than parallel, like those demonstrated by adzes, this pattern being repeated in the offset forms. Their naturally narrowed nape, in opposition to the broader edge, enables better hafting onto a narrower shaft. The limited width of antlers may have been a decisive factor, as wooden shafts were more adaptable. Theoretically, the axes with parallel sides would more commonly have been shafted onto wooden handles. For adzes with a relatively narrow edge this point was not so important. The differences in the stylistic arrangement of the sides of the polished artefacts are statistically significant (chq = 506.953, d.f = 18, p = 0.0). →Tab. 2.7.1.A.

2.7.2. Symmetry of elevation

For projection onto the plane ay, the following forms of the lines of the base and spine of an implement and their symmetry are distinguished: shoe-last, sharpened-asymmetric, sharpened symmetric, rectangular, unclassified. This is a simplified scheme, which has been proposed previously (Salaš 1984). Within the group of basic forms, about 20 % of the finds are classifiable according to these attributes. Their ratio of 1:2 is similar to the ratio between the total number of axes and adzes. The sharpened asymmetric composition is an exception, as these are classified along with axes, because the adzes are mostly described as shoe-last forms. The differences in the elevations are statistically significant (chq = 231.314, d. f. = 12, p = 0.0).

In the elevation, a tendency for transition towards symmetrical forms first appeared among the axes. The asymmetrical elevation was derived from other models, such as cross sections of antlers or the natural forms of oval pebbles. The functionality of this asymmetry has not yet been proven. It was transferred to axes with a conservative style of manufacture regardless of practical usage, and may be an additional stylistic attribute of form which is principally without function. →Tab. 2.7.2.A.

2.7.3. Symmetry in section

In the symmetry of the front side, or the front view of the implement projected into the plane **xy**, the stylistic and functional attributes of the forming of the artefacts are connected. This section undoubtedly influenced the efficiency of the blow delivered by the implements. The broader plano-convex section bears witness to the original adze style of blow. From this point of view, axes shafted in the same way as modern ones are the result of stylistic innovations in polished implements.

With the projection of an implement into the **xy** plane, the following lines of its base and spine and symmetrical formation can be recognised: high plano-convex, low plano-convex low, oval, lenticular, bi-convex, trapezoid, triangular, unclassified. The classification of this section is not entirely equal for adzes and axes. The lenticular section does not occur in adzes, while trapezoidal and triangular sections are lacking for axes. This is a consequence of the general forms themselves.

Almost 40 % of the implements were classified in this way. The differences among the sectional variations are statistically significant (chq = 965.386, d.f. = 21, p = 0.0000). The ratio of particular variants reflects more the principal difference of both basic forms than any more detailed classification. The transition to symmetry in section naturally appears more in the case of axes than of adzes. The oval section of the adzes is, by contrast, a hangover from earlier and simpler stone tools. →Tab. 2.7.3.A.

2.7.4. Stylistic classification of adzes

The stylistic classification must begin with the stylistic attributes described above, a combination of the paradigmatic classes of which must be established, this consisting of the symmetric attributes of the plan, elevation and frontal sections of the implements. All of the permutations together constitute a stylistic typology that would be too divided, limiting the possibility of classification to only those artefacts preserved in their entirety. Therefore, a simpler classification process developed earlier was used (Rulf 1991: Fig. 22); this is based partly on the metrics, and partly on the frontal section. The resulting paradigmatic classes are more detailed only for adzes with a plano-convex section. The classification can be labelled as "functional/stylistic", as it encompasses both functional (height-width index, width) and stylistic (section) attributes.

Almost 40 % of the total number of finds was classified in this way. The stylistic typology of the plano-convex adzes is based on a height-width index that is divided into four classes with divisions at 85, 110 and 150 mm, and on two classes of width (<20 mm and >20 mm) (Rulf 1991: 318-319). Adzes with different sections (e.g. oval, quadrangular, trapezoid or triangular) are rare, and therefore their metric subclasses were not studied. The broad adzes of types 112, 122, and 132 (= A1b, A2b, A3b) prevail over the narrower adzes. →Tab. 2.7.4.A.

2.7.5. Stylistic classification of axes

The stylistic typology of the axes is based on their sections (plano-convex, oval, lenticular, rectangular or trapezoid), the angle of side convergence (the omega angle, divided into three classes with the values of 3-14°), and maximum width (with two classes divided at the 47 mm value). This classification, too, has been previously elaborated (Rulf 1991: Fig. 26), and is used here as a substitute for a more detailed classification using attributes of the three projections. Axes of subtypes 121 and 122 are prevalent, i.e. axes with a plano-convex section and convergent sides, divided into narrow and broad examples. These represent over 40 % of all of the classifiable artefacts, and comprise the principal stylistic type of Linear Pottery Culture axes. The differences within the stylistic classification of the adzes, axes and individual subtypes are statistically significant (chq = 122.621, d. f. = 52, p = 0.0000).

2.7.6. The chronological variability of stylistic classification

The principal chronological trends of adze development were first detailed some time ago (Vencl 1960: 22); this was subsequently proven at the level of the higher cultural periods of the LnK (Rulf 1991: 320). The quantitative evaluation of their detailed chronology is limited by the small number (N = 64) of artefacts datable to individual phases. The qualitative trends are proven. The relative height of the adzes increases during the development of the site. Type A3b appears from phase 10 onwards, and type A4b from only phase 19. The standard type A1b appears throughout the entire development period, but is absent in the later phases. The overall stylistic trend lasts throughout the development from the lower forms to higher and narrower ones. From this it follows that adze form changed in relation to the increasing efficiency of woodworking implements.

The development of axes has also been expertly outlined previously (Vencl 1960: 29) and repeated at the level of periods (Rulf 1991: 322). It has been stated that the chronological value of their typology is low. At the level of settlement phases, it was possible to classify a greater number of artefacts (N = 165). The standard types which survived through the whole developmental period begin with A2a, which appears first in phase 10, and end with type A2b. Type A3, with strongly convergent sides, appears from phase 10 onwards but is not found in all of the subsequent phases; it is more likely to have had a different function than just a different style, and perhaps this type enabled the use of a different kind of shaft. Other types of axes occur scattered across the individual phases without any apparent chronological system. The trapezoidal axes, a similar later form of which appears in phase 13, may be unfinished artefacts. →Tabs. 2.7.6.A, 2.7.6.B.

2.8. Kinship or work groups in the different stylistic displays of polished artefacts

2.8.1. Adze and axe prototypes in the space of households

Artefacts are titled prototypes if they appear more than three times in the matrix of the absolute length and width categories. Amongst the adzes, the cores of formal types AD1 and AD2 belong among prototypes, but not type AD3 as this never appeared more than twice in each category. Amongst the axes, prototypes consist of a core of forms broader than 36 mm, while others are narrower. These prototypes were studied in relation to the other implements from the houses.

Prototypes occur from phase 4 onwards, although they are more common from phase 10 onwards. The relative proportion of prototypes varies within a greater range in each phase. Their appearance comprises circles of houses surrounding the house with the highest number of artefacts. This situation repeats itself in several phases where more houses have been preserved. The houses containing more standardised industry are otherwise exceptional, even though they are not the largest buildings in the phase; this situation might arise, for example, from some sort of differentiation between men by stylistic implement sets, or alternately by weapons.

2.8.2. Bored non-practical artefacts

All of the bored artefacts datable to the LnK can be defined as non-practical, indicating the higher social status of their owners. A typical double shouldered hammer-axe appears in feature 1180, belonging to household 1192. Disc-heads occur in features 40 and 93. All of the others are broken pieces of unidentified forms, but mostly coming from larger quadrangular hammer-axes. The artefact from pit 731 has incomplete boring.

The appearance of bored hammer-axes is hypothetical in relation to the limited number of phases in development cycles in the area. The artefact from phase 1 is striking because of its material; it was recovered from house 2200, and proves the occurrence of the forms from this earliest phase onwards. Further finds come from renewal phases 5

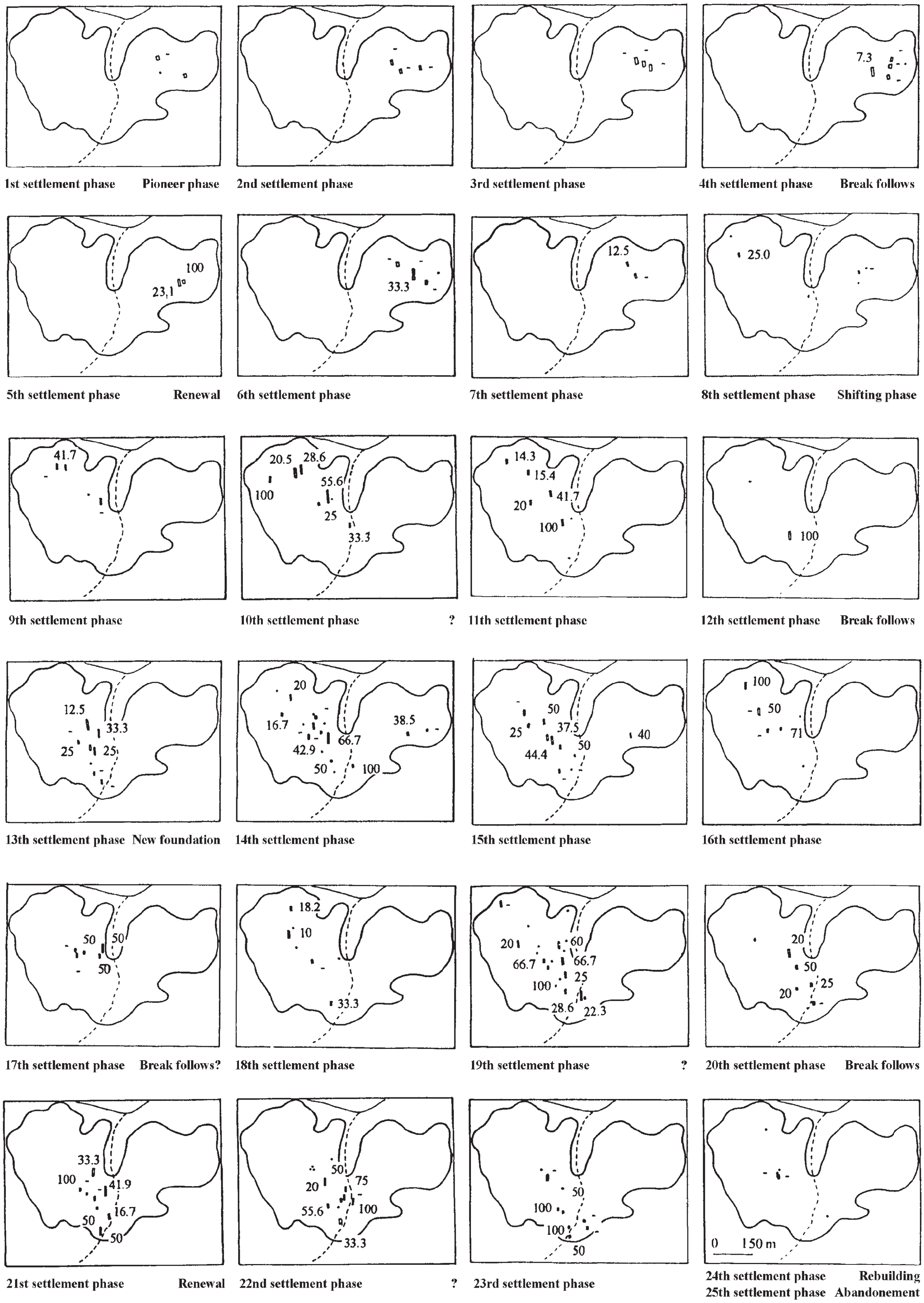


Fig. 2.8.1.a. Proportion of prototypes in houses from the settlement phases, and the appearance of bored tools in the house complexes. - Podíl prototypů v domech sídelních fází a výskyt vrtaných nástrojů v komplexech domů.

and 21, and shifting phase 8. Two pieces were found in phase 23, at the end of the last phase cycle, preceding the last two phases of rather limited occupation. Some of the finds are not datable, mainly those from isolated pits.

If the symbolic function of these finds is accepted as being perhaps a sign of lineage, then it could mark a kind of lineage interruption, or even extinction, in the limited phases. The deliberate breaking of a hammer-axe may match this interpretation. Phase 23 would precede the final phases in area BY1 as a result of the extinction of more than one lineage. This is one of the possible interpretations of the hammer-axes found in the settlement refuse. Such forms are particularly likely to have been inherited and transferred to a new area, and were thus not meant to be found among refuse. Therefore, if they are found there, then this represents an exceptional event. →Tab. 2.8.3.A.

2.9. The formation and preservation of the cultural tradition of polished artefacts

2.9.1. Stylistic adze classes in the spaces of phases and households

Correspondence analysis of the stylistic classes of adzes in the space of phases yields a three dimensional plot of these forms which can be interpreted as a stylistic/functional classification. The first axis (26.3 % of the variability), marks the primary developmental trend of the section of the implement, starting with the lower and broader adzes and moving towards narrow, high ones. The second axis (21.3% of the variability) represents the basic group of adzes, most probably of universal utility. The high adzes comprise a separate group of tools, used predominantly as axes. The type represented by the medium and narrow adze (A2a) is completely separate from the others, as it was used for a limited range of activities. The third axis (13.9 % of the variability) displays the differences between the styles of the narrow and broad forms. As the first factor mainly represents the chronological sequence of the phases, the functional/stylistic classes were defined according to the ordering of the item within the space of the second and third factors. The majority of the phases concentrate around group 12, comprising broad adzes of universal utility.

If the artefacts from houses were to be evaluated in the same manner, the general characteris-

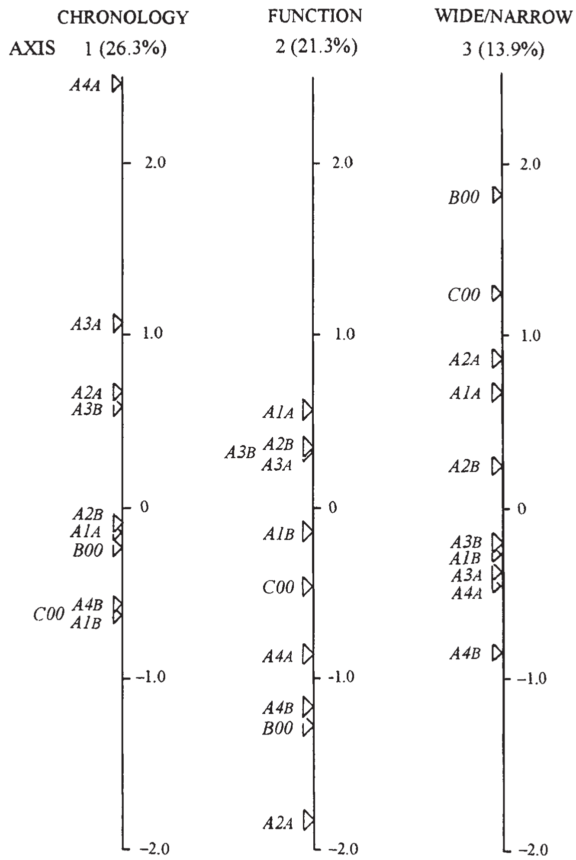


Fig. 2.9.1.a. Interpretation of factors 1-3 (adzes in the space of a phase). - Interpretace faktorů 1-3 (klíny v prostoru fází).

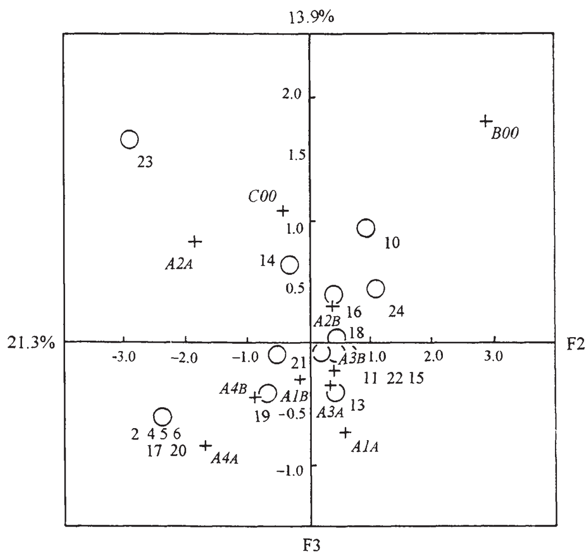


Fig. 2.9.1.b. Adzes in the space of the 2nd and 3rd factors in the space of the phases. - Klíny v prostoru 2. a 3. faktoru v prostoru fází.

tics of the household's activities would be traceable. There is a shortage of classified artefacts, however, and any broader study of the functional/stylistic classes in the houses, as was possible in the case of phase 19, is thus difficult to undertake. →Tab. 2.9.1.A.

2.9.2. Stylistic classes of axes in the spaces of phases and houses

The interpretation of the results of correspondence analysis of the axes is similar to that of adzes. The first axis displays a mainly chronological/stylistic distribution, but the variability of the axes within this factor is low. On the second axis (18.8 % of the variability), the axes with straight edges in plan, and others with a lenticular section, are in opposition to this. The majority of the artefacts with a plano-convex section and convergent edges belong to the main core of functionally unspecified forms. On the third axis (17.9 % of the variability), the forms with plano-convex and oval sections are separate from the forms with faceted sections, although the plano-convex axes with convergent edges are an exception. Within the space of the second and third factors, the majority of phases concentrate around the central group, with the exception of the phases 13 & 18 and 10 & 23 phases, which display a greater proportion of faceted edges.

The majority of houses in phase 19 belong to the main group of functional/stylistic axe forms. In this case, there is no diversity among the specific products such as occurred with adzes. It follows that the style of the axes and their usage were much more focused on one circle of activities than was the case with adzes. The axes therefore have a lower informative potential, and their forms have remained unchanged until the present. Adzes remained exclusively representative of Neolithic society and its manifold activities. →Tab. 2.9.2.A.

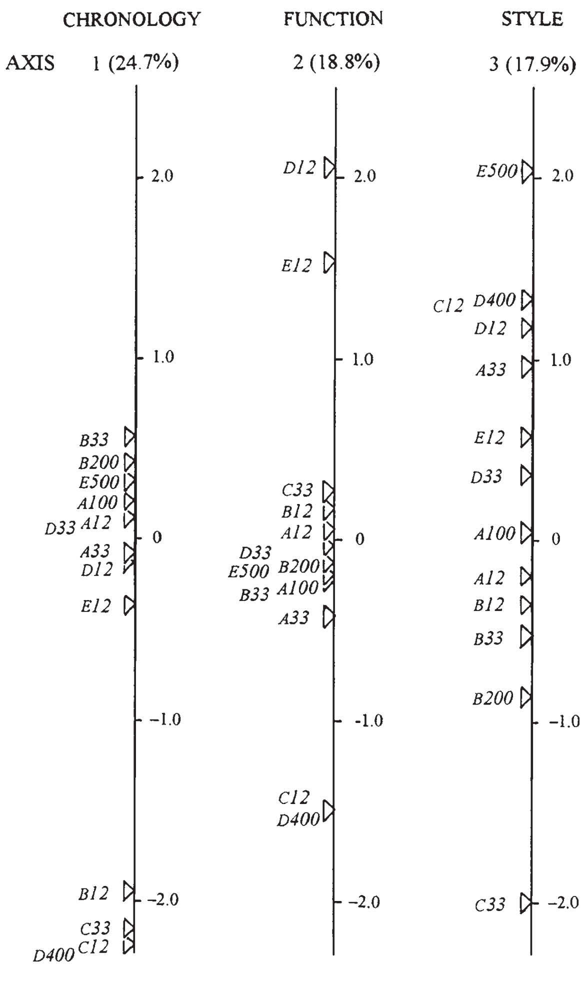


Fig. 2.9.2.a. Interpretation of factors 1-3 (axes in the space of the phases). - Interpretace faktorů 1-3 (sekerky v prostoru fází).

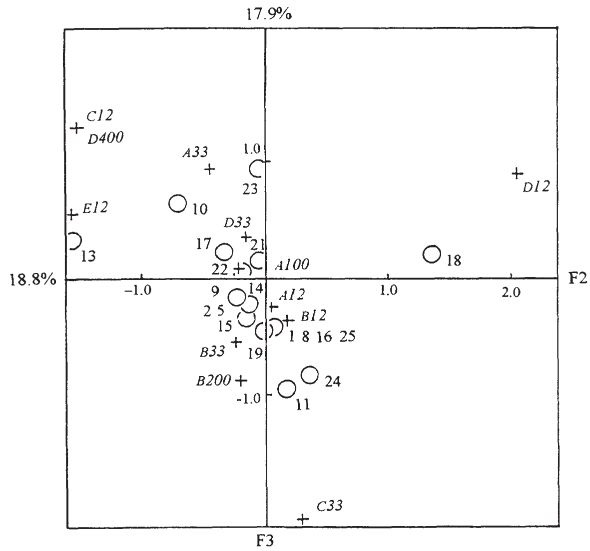


Fig. 2.9.2.b. Axes in the space of the 2nd and 3rd factors, in the space of the phases. - Sekerky v prostoru 2. a 3. faktoru v prostoru fází.

2.9.3. Information and communication as seen through the polished industry

The polished stone implements are considered to be typical artefacts symbolising the presence of men, their work, and their power and prestige within their society. Items from burial contexts also show this (Dohrn-Ihmig 1983: 100, Nieszery 1995, Zápotocká 1998a: 33), as they appear in male graves. The non-practical forms are considered symbols of social prestige (Vencl 1960: 36). The anthropological traces of adzes as weapons prove the known fact that every tool can be used as a weapon (Windl 1995, Teschler-Nicola 1995). These contexts lead to a conclusive statement about the huge informative and communicative potential of the polished industry. Only the symbolic role of polished industry in exchange, as known from recent examples, remains to be proven for the Neolithic (Velímský 1969: 111, Oliva 1985, Zimmermann 1995: 106).

Size / form	AD1	AD2	AD3	AXE	%	N =
SMALL	28.8	3.0	1.5	66.7	100.0	66
LARGE	0.0	9.4	15.1	75.5	100.0	53
%	16.0	5.9	7.6	70.6	100.0	119
SMALL	100.0	28.6	11.1	52.4	55.5	
LARGE	0.0	71.4	88.9	47.6	44.5	
%	100.0	100.0	100.0	100.0	100.0	
SMALL	16.0	1.7	0.8	37.0	55.5	
LARGE	0.0	4.2	6.7	33.6	44.5	
%	16.0	5.9	7.6	70.6	100.0	
N =	19	7	9	84	119	

Tab. 2.1.3.A. Formal classification of ADzes and AXEs. - Formální klasifikace KK a PKS.

Phase / type in g	SMALL	LARGE	N=	SMALL	LARGE	%
1	4	0	4	100.0	0.0	100.0
2	9	5	14	64.3	35.7	100.0
3	1	0	1	100.0	0.0	100.0
4	11	3	14	78.6	21.4	100.0
5	5	3	8	62.5	37.5	100.0
6	0	1	1	0.0	100.0	100.0
7	2	0	2	100.0	0.0	100.0
8	2	0	2	100.0	0.0	100.0
9	2	1	3	66.7	33.3	100.0
10	16	2	18	88.9	11.1	100.0
11	5	5	10	50.0	50.0	100.0
12	0	0	0	0.0	0.0	0.0
13	5	4	9	55.6	44.4	100.0
14	9	7	16	56.2	43.7	100.0
15	10	6	16	62.5	37.5	100.0
16	7	1	8	87.5	12.5	100.0
17	1	0	1	100.0	0.0	100.0
18	11	1	12	91.7	8.3	100.0
19	6	5	11	54.5	45.5	100.0
20	3	0	3	100.0	0.0	100.0
21	10	9	19	52.6	47.4	100.0
22	7	3	10	70.0	30.0	100.0
23	7	6	13	53.8	46.2	100.0
24	0	0	0	0.0	0.0	0.0
25	0	1	1	0.0	100.0	100.0
0	78	30	108	72.2	27.8	100.0
N=	211	93	304	69.4	30.6	100.0

Tab. 2.1.4.A. Polished industry weight classes by phase. - Třídy hmotnosti BI ve fázích.

Phase / SMALL	AD1	AD2	AD3	AXE	%	N
1	0.0	0.0	0.0	0.0	0.0	0
2	0.0	0.0	0.0	0.0	0.0	0
3	0.0	0.0	0.0	0.0	0.0	0
4	0.0	0.0	0.0	100.0	100.0	1
5	0.0	0.0	0.0	100.0	100.0	1
6	0.0	0.0	0.0	0.0	0.0	0
7	0.0	0.0	0.0	0.0	0.0	0
8	0.0	0.0	0.0	0.0	0.0	0
9	0.0	0.0	0.0	0.0	0.0	0
10	33.3	0.0	0.0	66.7	100.0	3
11	0.0	0.0	0.0	100.0	100.0	2
12	0.0	0.0	0.0	0.0	0.0	0
13	50.0	0.0	0.0	50.0	100.0	2
14	20.0	0.0	0.0	80.0	100.0	5
15	33.3	0.0	0.0	66.7	100.0	6
16	50.0	0.0	0.0	50.0	100.0	2
17	0.0	0.0	0.0	100.0	100.0	1
18	0.0	0.0	100.0	0.0	100.0	1
19	33.3	0.0	0.0	66.7	100.0	3
20	0.0	0.0	0.0	0.0	0.0	0
21	28.6	0.0	0.0	71.4	100.0	7
22	25.0	0.0	0.0	75.0	100.0	4
23	0.0	0.0	0.0	100.0	100.0	3
24	0.0	0.0	0.0	0.0	0.0	0
25	0.0	0.0	0.0	0.0	0.0	0
0	36.0	8.0	0.0	56.0	100.0	25
%	28.8	3.0	1.5	66.7	100.0	
N=	19	2	1	44		66

Tab. 2.1.4.B. Polished industry shape classes small (comp. Fig. 2.0.3.a) by phase. - Velikostní třídy (srov. obr. 2.0.3.a) tvarů BI.

Phase / LARGE						
1	0.0	0.0	0.0	0.0	0.0	0
2	0.0	0.0	0.0	0.0	0.0	0
3	0.0	0.0	0.0	0.0	0.0	0
4	0.0	0.0	0.0	0.0	0.0	0
5	0.0	0.0	0.0	100.0	100.0	1
6	0.0	0.0	0.0	0.0	0.0	0
7	0.0	0.0	0.0	0.0	0.0	0
8	0.0	0.0	0.0	0.0	0.0	0
9	0.0	0.0	0.0	100.0	100.0	1
10	0.0	0.0	0.0	100.0	100.0	1
11	0.0	25.0	0.0	75.0	100.0	4
12	0.0	0.0	0.0	0.0	0.0	0
13	0.0	0.0	0.0	100.0	100.0	3
14	0.0	0.0	0.0	100.0	100.0	7
15	0.0	0.0	25.0	75.0	100.0	4
16	0.0	0.0	0.0	0.0	0.0	0
17	0.0	0.0	0.0	0.0	0.0	0
18	0.0	0.0	0.0	100.0	100.0	1
19	0.0	0.0	50.0	50.0	100.0	2
20	0.0	0.0	0.0	0.0	0.0	0
21	0.0	16.7	0.0	83.3	100.0	6
22	0.0	0.0	50.0	50.0	100.0	2
23	0.0	0.0	20.0	80.0	100.0	5
24	0.0	0.0	0.0	0.0	0.0	0
25	0.0	0.0	0.0	0.0	0.0	0
0	0.0	18.8	25.0	56.2	100.0	16
%	0.0	9.4	15.1	75.5	100.0	
N	0	5	8	40		53

Tab. 2.1.4.C. Polished industry shape classes large (comp. Fig. 2.0.3.a) by phase. - Velikostní třídy (srov. obr. 2.0.3.a) tvarů BI.

Phase	Type of artefact in g					
	PIECES	BROKEN	SEMIPRODUCTS	UNSPECIFIED	g	N=
1	210	30	0	0	240	7
2	200	3	0	1111	1314	16
3	0	1	0	1	2	2
4	225	940	240	251	1656	44
5	1060	208	700	81	2049	23
6	220	149	180	0	549	12
7	65	53	0	25	143	8
8	365	27	0	10	402	8
9	485	86	0	33	604	13
10	2804	325	0	222	3351	64
11	2326	255	0	705	3286	43
12	200	0	0	0	200	2
13	2288	142	70	0	2500	34
14	4192	461	0	53	4706	77
15	1929	422	295	80	2726	42
16	485	95	180	30	790	20
17	1166	13	0	0	1179	16
18	1559	187	0	28	1774	47
19	5258	591	220	120	6189	103
20	673	145	0	10	828	21
21	2596	325	225	1890	5036	63
22	1774	46	0	507	2327	38
23	2531	34	0	53	2618	39
24	260	40	0	0	300	6
25	448	21	0	1110	1579	8
0	17977	2202	1305	4046	25530	428
g	51296	6801	3415	10366	71878	
N=	601	426	17	140		1184

Tab. 2.2.1.A. Absolute number of occurrences of basic forms by phase (mass and pieces). - Absolutní počty výskytu základních forem ve fázích (hmotnost a kusy).

Phase	% type of artefact					
	PIECES	BROKEN	SEMIPRODUCTS	UNSPECIFIED	%	N=
1	28.6	71.4	0.0	0.0	100.0	7
2	6.2	6.2	0.0	87.5	100.0	16
3	0.0	50.0	0.0	50.0	100.0	2
4	9.1	61.4	4.5	25.0	100.0	44
5	26.1	47.8	8.7	17.4	100.0	23
6	16.7	75.0	8.3	0.0	100.0	12
7	12.5	62.5	0.0	25.0	100.0	8
8	37.5	37.5	0.0	25.0	100.0	8
9	53.8	30.8	0.0	15.4	100.0	13
10	42.2	37.5	0.0	20.3	100.0	64
11	53.5	39.5	0.0	7.0	100.0	43
12	100.0	0.0	0.0	0.0	100.0	2
13	67.6	23.5	2.9	5.9	100.0	34
14	66.2	28.6	0.0	5.2	100.0	77
15	69.0	23.8	4.8	2.4	100.0	42
16	30.0	40.0	5.0	25.0	100.0	20
17	75.0	25.0	0.0	0.0	100.0	16
18	42.6	40.4	0.0	17.0	100.0	47
19	62.1	35.0	1.9	1.0	100.0	103
20	57.1	38.1	0.0	4.8	100.0	21
21	58.7	31.7	1.6	7.9	100.0	63
22	68.4	23.7	0.0	7.9	100.0	38
23	71.8	17.9	0.0	10.3	100.0	39
24	50.0	50.0	0.0	0.0	100.0	6
25	62.5	25.0	0.0	12.5	100.0	8
0	48.4	38.1	1.2	12.4	100.0	428
%	50.8	36.0	1.4	11.8	100.0	
N=	601	426	17	140		1184

Tab. 2.2.1.B. Relative number of occurrences of basic forms by phase (pieces). - Relativní počty výskytu základních forem ve fázích (kusy).

Phase	% type of artefacts				g
	PIECES	BROKEN	SEMIPRODUCTS	UNSPECIFIED	
1	87.5	12.5	0.0	0.0	240
2	15.2	0.2	0.0	84.6	1314
3	0.0	50.0	0.0	50.0	2
4	13.6	56.8	14.5	15.2	1656
5	51.7	10.2	34.2	4.0	2049
6	40.1	27.1	32.8	0.0	549
7	45.5	37.1	0.0	17.5	143
8	90.8	6.7	0.0	2.5	402
9	80.3	14.2	0.0	5.5	604
10	83.7	9.7	0.0	6.6	3351
11	70.8	7.8	0.0	21.5	3286
12	100.0	0.0	0.0	0.0	200
13	91.5	5.7	2.8	0.0	2500
14	89.1	9.8	0.0	1.1	4706
15	70.8	15.5	10.8	2.9	2726
16	61.4	12.0	22.8	3.8	790
17	98.9	1.1	0.0	0.0	1179
18	87.9	10.5	0.0	1.6	1774
19	85.0	9.5	3.6	1.9	6189
20	81.3	17.5	0.0	1.2	828
21	51.5	6.5	4.5	37.5	5036
22	76.2	2.0	0.0	21.8	2327
23	96.7	1.3	0.0	2.0	2618
24	86.7	13.3	0.0	0.0	300
25	28.4	1.3	0.0	70.3	1579
0	70.4	8.6	5.1	15.8	25530
%	71.4	9.5	4.8	14.4	100.0
N=	51296	6801	3415	10366	71878

Tab. 2.2.1.C. Relative number of occurrences of basic forms by phase (mass). - Relativní počty výskytu základních forem ve fázích (hmotnost).

Petrographic identification	N =	%
A aktinolithic and aktinolith-amfibolith schist	946	97.7%
B amfibole schist	1	0.1
C Amfibole	8	0.8
D Epidotic amfibole	1	0.1
E Eklogit	1	0.1
Fa Grafitic phylit	2	0.2
Fb Biotit-sericitic phylit	2	0.2
G Grafitic schist	1	0.1
H Pelitic schist	7	0.7
Total	969	100.0

Tab. 2.2.2.A. Relative proportions of polished industry raw materials (969 ks, according to Velímský 1969: 59). - Relativní podíl surovin broušené industrie (969 ks, podle Velímský 1969: 59).

Phase / code	A	B	C	D	E	F	Fb	G	H	OTHER	%	g
1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	240
2	71.8	0.0	28.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1314
3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2
4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1656
5	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2049
6	99.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	549
7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	143
8	55.2	0.0	0.0	0.0	0.0	44.8	0.0	0.0	0.0	0.0	100.0	402
9	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	604
10	97.6	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	3351
11	96.3	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	3286
12	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	200
13	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2500
14	97.2	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.4	0.5	100.0	4706
15	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2726
16	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	789
17	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1179
18	99.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	100.0	1774
19	99.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	6189
20	98.2	0.0	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	100.0	828
21	58.1	0.0	36.7	0.0	0.0	0.0	0.0	0.0	0.0	5.2	100.0	5036
22	99.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	100.0	2327
23	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2618
24	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	300
25	29.7	0.0	70.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1579
0	89.5	0.5	7.4	0.0	0.0	0.1	0.8	0.1	0.5	1.2	100.0	25432
%	90.5	0.3	7.6	0.0	0.0	0.3	0.3	0.0	0.2	0.8	100.0	
g	64961	198	5442	0	5	205	198	34	147	589		71779

Tab. 2.2.2.B. The relative occurrence of polished industry raw materials (code in Tab. 2.2.2.A) by phase. - Relativní výskyt surovin (kód je uveden v tab. 2.2.2.A) BI ve fázích.

B-amfibole schist	Fa grafitic phylit
adze 44:201308	hammer axe 945: 250870
C-amfibole	Fb biotit-sericitic phylit
adze 906:247911	bored 542:233241
axe 378:226156	G-grafitic schist
hammer axe 1215:258955	axe 99:206123
raw material 542: 233 240	H-pelitic schist
D-epidotic amfibole	
adze 869:260246	
E-eklogit	

Tab. 2.2.2.C. List of tools from the southern highlands (according to Velímský 1969: 79-80). - Seznam nástrojů z jiných hornin (podle Velímský 1969: 79-80).

House mid-section	Type of artefact				N=
	PIECES	BROKEN	SEMIPRODUCTS	UNSPECIFIED	
unclassified CEN0	54	39	0	25	118
simple CEN1	147	114	6	37	304
double CEN2	104	56	4	17	181
N=	305	209	10	79	603
unclassified CEN0	45.8	33.1	0.0	21.2	100.0
simple CEN1	48.4	37.5	2.0	12.2	100.0
double CEN2	57.5	30.9	2.2	9.4	100.0
%	50.6	34.7	1.7	13.1	100.0
unclassified CEN0	17.7	18.7	0.0	31.6	19.6
simple CEN1	48.2	54.5	60.0	46.8	50.4
double CEN2	34.1	26.8	40.0	21.5	30.0
%	100.0	100.0	100.0	100.0	100.0
unclassified CEN0	9.0	6.5	0.0	4.1	19.6
simple CEN1	24.4	18.9	1.0	6.1	50.4
double CEN2	17.2	9.3	0.7	2.8	30.0
%	50.6	34.7	1.7	13.1	100.0

Tab. 2.2.3.A. Number of basic of polished industry forms in houses with simple (CEN1) and double (CEN2) mid-section. - Počty základních forem BI v domech s jednoduchou (CEN1) a zdvojenou (CEN2) střední částí.

House mid-section	Type of artefact		N=
	SMALL	LARGE	
unclassified CEN0 (32)	30	12	42
simple CEN1 (63)	490.8	230.3	72
double CEN2 (22)	361.7	170.7	53
N=	115	52	167
unclassified CEN0	71.4	28.6	100.0
simple CEN1	68.1	31.9	100.0
double CEN2	67.9	32.1	100.0
%	68.9	31.1	100.0
unclassified CEN0	26.1	23.1	25.1
simple CEN1	42.6	44.2	43.1
double CEN2	31.3	32.7	31.7
%	100.0	00.0	100.0
unclassified CEN0	18.0	7.2	25.1
simple CEN1	29.3	13.8	43.1
ouble CEN2	21.6	10.2	31.7
%	68.9	31.1	100.0

Tab. 2.2.3.B. Weight classes in houses with simple (CEN1) and double (CEN2) mid-section. - Počty hmotnostních tříd v domech s jednoduchou (CEN1) a zdvojenou (CEN2) střední částí.

Type (based on form) / type (based on wear)			
	AXES	ADZES	N=
ADZES	3	30	33
AXES	73	8	81
N=	76	38	114
ADZES	9.1	90.9	100.0
AXES	90.1	9.9	100.0
%	66.7	33.3	100.0
ADZES	3.9	78.9	28.9
AXES	96.1	21.1	71.1
%	100.0	100.0	100.0
ADZES	2.6	26.3	28.9
AXES	64.0	7.0	71.1
%	66.7	33.3	100.0

Tab. 2.4.2.A. Correlation of formal types and use/wear on the lower sharp edge. - Korelace formálních typů a pracovních stop na spodní hraně ostří.

Type of size / Type of wear			
	AXES	ADZES	N=
SMALL	16	18	34
LARGE	16	9	25
N=	32	27	59
SMALL	47.1	52.9	100.0
LARGE	64.0	36.0	100.0
%	54.2	45.8	100.0
SMALL	50.0	66.7	57.6
LARGE	50.0	33.3	42.4
%	100.0	100.0	100.0
SMALL	27.1	30.5	57.6
LARGE	27.1	15.3	42.4
%	54.2	45.8	100.0

Tab. 2.4.2.B. Correlation of mass types and use/wear traces on the lower sharp edge. - Korelace hmotnostních typů a pracovních stop na spodní hraněostří.

Gama angle	Type of wear		
	AXES	ADZES	N=
SHARP	22	11	33
BLUNT	46	26	72
N=	68	37	105
SHARP	66.7	33.3	100.0
BLUNT	63.9	36.1	100.0
%	64.8	35.2	100.0
SHARP	32.4	29.7	31.4
BLUNT	67.6	70.3	68.6
%	100.0	100.0	100.0
SHARP	21.0	10.5	31.4
BLUNT	43.8	24.8	68.6
%	64.8	35.2	100.0

Tab 2.4.3.A. Correlation of sharp edge and use/wear traces (lower sharp edge). - Korelace desénu ostří a pracovních stop (spodní hrana ostří).

Phase / classes	F1 SHARP ADZE	F2 BLUNT ADZE	F3 SHARP AXE	F4 BLUNT AXE	%	N=
1	0.0	0.0	0.0	0.0	0.0	0
2	0.0	0.0	0.0	0.0	0.0	0
3	0.0	0.0	0.0	0.0	0.0	0
4	0.0	0.0	0.0	0.0	0.0	0
5	0.0	0.0	0.0	0.0	0.0	0
6	0.0	0.0	0.0	0.0	0.0	0
7	0.0	0.0	0.0	0.0	0.0	0
8	0.0	0.0	0.0	0.0	0.0	0
9	0.0	0.0	100.0	0.0	100.0	1
10	0.0	0.0	0.0	0.0	0.0	0
11	0.0	25.0	25.0	50.0	100.0	4
12	0.0	0.0	0.0	0.0	0.0	0
3	0.0	16.7	66.7	16.7	100.0	6
14	0.0	28.6	28.6	42.9	100.0	7
15	25.0	25.0	0.0	50.0	100.0	8
16	50.0	0.0	0.0	50.0	100.0	2
17	0.0	0.0	100.0	0.0	100.0	1
18	50.0	0.0	0.0	50.0	100.0	2
19	40.0	10.0	20.0	30.0	100.0	10
20	0.0	0.0	50.0	50.0	100.0	2
21	14.3	0.0	21.4	64.3	100.0	14
22	22.2	22.2	33.3	22.2	100.0	9
23	16.7	50.0	33.3	0.0	100.0	6
24	0.0	0.0	0.0	0.0	0.0	0
25	0.0	0.0	0.0	0.0	0.0	0
%	18.1	16.7	27.8	37.5	100.0	72
N=	13	12	20	27	72	

Tab. 2.4.4.A. Functional classes based on form (code F comp. Fig. 2.0.3.a) within the settlement phases. - Funkční třídy na základě forem (kód F srov. obr. 2.0.3.a) v sídelních fázích.

Phase / forms	AXES	ADZES	OTHER	%	N=
1	0.0	0.0	100.0	100.0	7
2	0.0	0.0	100.0	100.0	16
3	0.0	0.0	100.0	100.0	2
4	0.0	0.0	100.0	100.0	44
5	0.0	0.0	100.0	100.0	23
6	0.0	0.0	100.0	100.0	12
7	0.0	0.0	100.0	100.0	8
8	12.5	0.0	87.5	100.0	8
9	7.7	0.0	92.3	100.0	13
10	0.0	0.0	0.0	0.0	0
11	7.0	2.3	90.7	100.0	43
12	0.0	0.0	100.0	100.0	2
13	14.3	2.9	82.9	100.0	35
4	7.8	2.6	89.6	100.0	77
15	11.6	9.3	79.1	100.0	43
16	5.0	5.0	90.0	100.0	20
17	12.5	0.0	87.5	100.0	16
8	2.0	2.0	95.9	100.0	49
19	5.8	4.8	89.4	100.0	104
20	4.8	4.8	90.5	100.0	21
21	23.8	3.2	73.0	100.0	63
22	15.8	10.5	73.7	100.0	38
23	2.6	7.7	89.7	100.0	39
24	0.0	0.0	100.0	100.0	6
25	0.0	0.0	100.0	100.0	8
%=	7.7	3.6	88.7	100.0	
N=	54	25	618		697

Tab. 2.5.1.A. Ratio of adzes to axes (based on wear). - Poměr tesel ku sekerkám (podle pracovních stop) ve fázích.

Houses / forms	AXES	ADZES	OTHER	%	N =
2277	0.0	0.0	100.0	100.0	4
2200	0.0	0.0	100.0	100.0	1
2123	0.0	0.0	100.0	100.0	2
2199	0.0	0.0	100.0	100.0	12
2209	0.0	0.0	100.0	100.0	3
2223	0.0	0.0	100.0	100.0	1
2225	0.0	0.0	100.0	100.0	2
2244	0.0	0.0	0.0	0.0	0
2227	0.0	0.0	0.0	0.0	0
2197	0.0	0.0	100.0	100.0	41
2290	0.0	0.0	100.0	100.0	1
2224	0.0	0.0	0.0	0.0	0
2295	0.0	0.0	0.0	0.0	0
2102	0.0	0.0	100.0	100.0	2
2198	0.0	0.0	100.0	100.0	13
2278	0.0	0.0	100.0	100.0	10
2226	0.0	0.0	100.0	100.0	3
2294	0.0	0.0	100.0	100.0	8
2202	0.0	0.0	0.0	0.0	0
2299	0.0	0.0	100.0	100.0	1
2103	0.0	0.0	0.0	0.0	0
2201	0.0	0.0	100.0	100.0	8
2210	0.0	0.0	0.0	0.0	0
3199	0.0	0.0	0.0	0.0	0
569	25.0	0.0	75.0	100.0	4
2151	0.0	0.0	0.0	0.0	0
945	0.0	0.0	100.0	100.0	1
665	0.0	0.0	0.0	0.0	0
2206	0.0	0.0	100.0	100.0	2
680	0.0	0.0	0.0	0.0	0

Houses / forms	AXES	ADZES	OTHER	%	N =
302	0.0	0.0	0.0	0.0	0
604	8.3	0.0	91.7	100.0	12
39	0.0	0.0	100.0	100.0	1
703	0.0	0.0	100.0	100.0	9
741	0.0	0.0	100.0	100.0	4
9004	0.0	0.0	100.0	100.0	3
306	5.1	2.6	92.3	100.0	39
405	0.0	0.0	100.0	100.0	7
525	0.0	0.0	100.0	100.0	1
780	0.0	0.0	0.0	0.0	0
224	0.0	0.0	100.0	100.0	5
9001	0.0	0.0	100.0	100.0	12
9002	100.0	0.0	0.0	100.0	3
312	0.0	7.7	92.3	100.0	13
620	0.0	0.0	100.0	100.0	7
918	0.0	0.0	100.0	100.0	1
989	0.0	0.0	100.0	100.0	2
88	0.0	0.0	100.0	100.0	2
554	0.0	0.0	0.0	0.0	0
19	0.0	0.0	100.0	100.0	6
41	25.0	0.0	75.0	100.0	8
132	25.0	0.0	75.0	100.0	4
211	25.0	0.0	75.0	100.0	4
678	0.0	0.0	100.0	100.0	6
999	0.0	0.0	0.0	0.0	0
427	0.0	0.0	0.0	0.0	0
7	14.3	14.3	71.4	100.0	7
85	16.7	0.0	83.3	100.0	6
165	66.7	0.0	33.3	100.0	3
426	9.5	9.5	81.0	100.0	21
558	0.0	0.0	0.0	0.0	0
567	0.0	0.0	100.0	100.0	1
681	0.0	0.0	100.0	100.0	2
2196	0.0	0.0	100.0	100.0	13
2292	0.0	0.0	100.0	100.0	2
1195	0.0	0.0	100.0	100.0	1
313	20.0	0.0	80.0	100.0	5
362	0.0	0.0	100.0	100.0	6
124	0.0	0.0	100.0	100.0	1
837	0.0	0.0	100.0	100.0	4
30	0.0	0.0	100.0	100.0	1
215	0.0	0.0	0.0	0.0	0
664	0.0	0.0	100.0	100.0	5
699	0.0	0.0	100.0	100.0	6
149	0.0	0.0	100.0	100.0	2
174	22.2	22.2	55.6	100.0	9
225	25.0	0.0	75.0	100.0	4
433	0.0	12.5	87.5	100.0	8
581	16.7	0.0	83.3	100.0	6
926	0.0	0.0	0.0	0.0	0
368	0.0	0.0	100.0	100.0	1
2192	0.0	0.0	100.0	100.0	5
1116	0.0	0.0	0.0	0.0	0
334	0.0	20.0	80.0	100.0	5
143	0.0	0.0	100.0	100.0	1
1	40.0	0.0	60.0	100.0	5
245	0.0	0.0	0.0	0.0	0
571	0.0	0.0	100.0	100.0	4
739	0.0	7.1	92.9	100.0	14
78	100.0	0.0	0.0	100.0	1
852	0.0	0.0	0.0	0.0	0
372	0.0	0.0	0.0	0.0	0

Houses / forms	AXES	ADZES	OTHER	%	N =
621	0.0	0.0	100.0	100.0	1
272	50.0	0.0	50.0	100.0	2
580	50.0	0.0	50.0	100.0	2
677	0.0	0.0	100.0	100.0	8
740	0.0	0.0	100.0	100.0	2
877	0.0	0.0	100.0	100.0	2
263	0.0	0.0	100.0	100.0	4
982	33.3	0.0	66.7	100.0	3
610	0.0	4.5	95.5	100.0	22
369	0.0	0.0	100.0	100.0	1
232	0.0	0.0	100.0	100.0	5
409	0.0	0.0	100.0	100.0	13
881	0.0	0.0	100.0	100.0	1
96	0.0	12.5	87.5	100.0	16
162	16.7	0.0	83.3	100.0	6
434	16.7	0.0	83.3	100.0	6
959	50.0	0.0	50.0	100.0	2
1161	0.0	0.0	100.0	100.0	7
1246	0.0	16.7	83.3	100.0	6
1240	0.0	0.0	0.0	0.0	0
619	0.0	0.0	100.0	100.0	6
361	0.0	0.0	100.0	100.0	5
702	0.0	0.0	100.0	100.0	5
385	0.0	0.0	100.0	100.0	8
715	8.3	0.0	91.7	100.0	12
198	0.0	0.0	100.0	100.0	3
1300	0.0	0.0	100.0	100.0	4
545	0.0	0.0	0.0	0.0	0
822	0.0	0.0	100.0	100.0	7
869	0.0	0.0	0.0	0.0	0
155	20.0	20.0	60.0	100.0	5
1260	0.0	0.0	100.0	100.0	8
468	20.0	20.0	60.0	100.0	5
79	0.0	0.0	100.0	100.0	5
147	0.0	0.0	100.0	100.0	4
682	0.0	0.0	100.0	100.0	5
9003	25.0	25.0	50.0	100.0	4
366	0.0	0.0	100.0	100.0	3
1227	0.0	0.0	0.0	0.0	0
16	0.0	0.0	100.0	100.0	6
190	0.0	0.0	0.0	0.0	0
679	44.4	0.0	55.6	100.0	9
912	25.8	6.5	67.7	100.0	31
1111	0.0	0.0	100.0	100.0	12
81	50.0	0.0	50.0	100.0	4
133	0.0	0.0	0.0	0.0	0
965	100.0	0.0	0.0	100.0	1
65	11.1	22.2	66.7	100.0	9
166	0.0	0.0	100.0	100.0	2
903	0.0	0.0	0.0	0.0	0
933	50.0	25.0	25.0	100.0	4
1144	0.0	0.0	100.0	100.0	1
1226	0.0	0.0	100.0	100.0	6
910	0.0	0.0	100.0	100.0	5
874	0.0	0.0	0.0	0.0	0
574	0.0	0.0	0.0	0.0	0
298	50.0	16.7	33.3	100.0	6
292	0.0	0.0	0.0	0.0	0
1128	0.0	0.0	100.0	100.0	4
80	50.0	50.0	0.0	100.0	2
1100	0.0	0.0	100.0	100.0	2
1192	0.0	0.0	100.0	100.0	4

Houses / forms	AXES	ADZES	OTHER	%	N =
1129	0.0	0.0	100.0	100.0	6
1236	0.0	0.0	0.0	0.0	0
1289	0.0	0.0	100.0	100.0	2
688	0.0	0.0	100.0	100.0	3
137	0.0	33.3	66.7	100.0	3
2932	0.0	7.7	92.3	100.0	13
278	0.0	0.0	0.0	0.0	0
607	0.0	0.0	100.0	100.0	4
2931	0.0	0.0	100.0	100.0	2
277	0.0	0.0	100.0	100.0	1
1258	0.0	0.0	100.0	100.0	6
%	7.5	3.4	89.1	100.0	
N=	57	26	680		763

Tab. 2.5.1.B. Ratio of adzes to axes (based on wear) in the complexes. - Poměr tesel ku sekerkám (podle pracovních stop) v komplexech.

Phase	ADZES : AXES (in houses and pits)		ADZES : AXES (only in houses)
9	0:1	(12N/A)	1:5
11	1:3	(N=39)	10:11
13	1:5	(29)	4:12
14	2:5	(70)	16:24
15	4:4	(35)	9:13
16	1:1	(18)	3:2
17	0:1	(15)	4:8
18	1:1	(47)	6:6
19	5:5	(94)	16:22
20	0:2	(19)	8:3
21	2:12	(49)	7:29
22	4:5	(29)	6:12
23	4:2	(33)	4:11

Tab. 2.5.1.C. Ratio of adzes to axes (based on wear) and basic forms by phase. - Poměr tesel ku sekerkám (podle pracovních stop) a základních tvarů ve fázích.

House	Type				%	N=
Phase 19	F1 SHARP ADZE	F2 BLUNT ADZE	F3 SHARP AXE	F4 BLUNT AXE		
96	50.0	50.0	0.0	0.0	100.0	2
162						0
434	50.0	0.0	0.0	50.0	100.0	2
959	0.0	0.0	100.0	0.0	100.0	1
1161						0
1246						0
1240						0
619						0
361						0
702						0
385						0
715	0.0	0.0	100.0	0.0	100.0	1
198						0
1300						0
545						0
822						0
869						0
155	50.0	0.0	0.0	50.0	100.0	2
1260						0
468	50.0	0.0	0.0	50.0	100.0	2
	40.0	10.0	20.0	30.0		10

House	Type				%	N=
	F1 SHARP ADZE	F2 BLUNT ADZE	F3 SHARP AXE	F4 BLUNT AXE		
16						0
190						0
679	0.0	0.0	50.0	50.0	100.0	2
912	20.0	0.0	20.0	60.0	100.0	10
1111						0
81	0.0	0.0	0.0	100.0	100.0	1
133						0
965	0.0	0.0	0.0	100.0	100.0	1
%	14.3	0.0	21.4	64.3	100.0	14
N=	6	1	5	12		24

Tab. 2.5.2.A. Proportion of functional types based on forms (code F comp. Fig. 2.0.3.a) in complexes of phases 19 and 21. - Podíl funkčních typů založených na tvarech (kód F srov. obr. 2.0.3.a) v komplexech fáze 19 a 21.

Average 1.28 of found axes per house represents:	Estimated No. of men	Estimated No. of axes after			
estimated percentage of preservation	100%=	7 yrs.	15 yrs.	20 yrs.	30 yrs.
1%	128	18.3	8.5	6.4	4.3
2%	64	9.1	4.3	3.2	2.1
3%	43	6.1	2.9	2.2	1.4
6%	21	3.0	1.4	1.0	0.7
10%	13	1.8	0.9	0.6	0.4

Tab. 2.5.3.A. Estimate of the number of men per house with a simple mid-section, based on the estimated percentage of preserved axes. - Odhad počtu mužů v domech s jednoduchou střední částí podle odhadu procenta dochovaného počtu sekerek.

Edge	ADZES	AXES	OTHER	FRG	N=
PAST	40	27	3	2	72
PACO	26	4	3	0	33
PAAS	0	4	1	0	5
COST	18	118	3	0	139
COCO	7	50	1	0	58
COAS	0	5	0	0	5
N/A	140	135	33	424	732
N =	231	343	44	426	1044
PAST	55.6	37.5	4.2	2.8	100.0
PACO	78.8	12.1	9.1	0.0	100.0
PAAS	0.0	80.0	20.0	0.0	100.0
COST	12.9	84.9	2.2	0.0	100.0
COCO	12.1	86.2	1.7	0.0	100.0
COAS	0.0	100.0	0.0	0.0	100.0
N/A	19.1	18.4	4.5	57.9	100.0
%	22.1	32.9	4.2	40.8	100.0
PAST	17.3	7.9	6.8	0.5	6.9
PACO	11.3	1.2	6.8	0.0	3.2
PAAS	0.0	1.2	2.3	0.0	0.5
COST	7.8	34.4	6.8	0.0	13.3
COCO	3.0	14.6	2.3	0.0	5.6
COAS	0.0	1.5	0.0	0.0	0.5
N/A	60.6	39.4	75.0	99.5	70.1
%	100.0	100.0	100.0	100.0	100.0
PAST	3.8	2.6	0.3	0.2	6.9
PACO	2.5	0.4	0.3	0.0	3.2

Edge	ADZES	AXES	OTHER	FRG	N=
PAAS	0.0	0.4	0.1	0.0	0.5
COST	1.7	11.3	0.3	0.0	13.3
COCO	0.7	4.8	0.1	0.0	5.6
COAS	0.0	0.5	0.0	0.0	0.5
N/A	13.4	12.9	3.2	40.6	70.1
%	22.1	32.9	4.2	40.8	100.0

Tab. 2.7.1.A. Shapes of the edges in plan (data Rulf 1991). (PAralel STraight, PA COnvex, PA ASymmetric, COnvergent STraight, CO COnvex, CO ASymmetric). - Tvar hran v půdorysu (data Rulf 1991).

Edge	ADZES	AXES	OTHER	FRG	N=/%
SHOE	58	111	6	1	176
SHAS	0	22	0	0	22
SHSY	2	6	2	0	10
REGT	1	3	0	0	4
N/A	170	201	36	425	832
N=	231	343	44	426	1044
SHOE	33.0	63.1	3.4	0.6	100.0
SHAS	0.0	100.0	0.0	0.0	100.0
SHSY	20.0	60.0	20.0	0.0	100.0
REGT	25.0	75.0	0.0	0.0	100.0
N/A	20.4	24.2	4.3	51.1	100.0
%	22.1	32.9	4.2	40.8	100.0
SHOE	25.1	32.4	13.6	0.2	16.9
SHAS	0.0	6.4	0.0	0.0	2.1
SHSY	0.9	1.7	4.5	0.0	1.0
REGT	0.4	0.9	0.0	0.0	0.4
N/A	73.6	58.6	81.8	99.8	79.7
%	100.0	100.0	100.0	100.0	100.0
SHOE	5.6	10.6	0.6	0.1	16.9
SHAS	0.0	2.1	0.0	0.0	2.1
SHSY	0.2	0.6	0.2	0.0	1.0
REGT	0.1	0.3	0.0	0.0	0.4
N/A	16.3	19.3	3.4	40.7	79.7
%	22.1	32.9	4.2	40.8	100.0

Tab. 2.7.2.A. Shapes of the edges in elevation (data Rulf 1991). (SHOElast, SHaped ASymmetric, SHaped SYmmetric, REGTangular). - Tvar hran v bokorysu (data Rulf 1991).

Section	ADZES	AXES	OTHER	FRG	N=/%
PLTA	130	10	6	1	147
PLSH	14	199	3	0	216
OVAL	1	13	0	1	15
LENT	0	4	0	0	4
BICO	3	14	2	0	19
TRAP	1	0	0	0	1
TRIA	1	0	0	0	1
N/A	81	103	33	424	641
N=	231	343	44	426	1044
PLTA	88.4	6.8	4.1	0.7	100.0
PLSH	6.5	92.1	1.4	0.0	100.0
OVAL	6.7	86.7	0.0	6.7	100.0
LENT	0.0	100.0	0.0	0.0	100.0
BICO	15.8	73.7	10.5	0.0	100.0
TRAP	100.0	0.0	0.0	0.0	100.0
TRIA	100.0	0.0	0.0	0.0	100.0
N/A	12.6	16.1	5.1	66.1	100.0
%	22.1	32.9	4.2	40.8	100.0

Section	ADZES	AXES	OTHER	FRG	N=/%
PLTA	56.3	2.9	13.6	0.2	14.1
PLSH	6.1	58.0	6.8	0.0	20.7
OVAL	0.4	3.8	0.0	0.2	1.4
LENT	0.0	1.2	0.0	0.0	0.4
BICO	1.3	4.1	4.5	0.0	1.8
TRAP	0.4	0.0	0.0	0.0	0.1
TRIA	0.4	0.0	0.0	0.0	0.1
N/A	35.1	30.0	75.0	99.5	61.4
%	100.0	100.0	100.0	100.0	100.0
PLTA	12.5	1.0	0.6	0.1	14.1
PLSH	1.3	19.1	0.3	0.0	20.7
OVAL	0.1	1.2	0.0	0.1	1.4
LENT	0.0	0.4	0.0	0.0	0.4
BICO	0.3	1.3	0.2	0.0	1.8
TRAP	0.1	0.0	0.0	0.0	0.1
TRIA	0.1	0.0	0.0	0.0	0.1
N/A	7.8	9.9	3.2	40.6	61.4
%	22.1	32.9	4.2	40.8	100.0

Tab. 2.7.3.A. Shape of the sections in outline (data Rulf 1991). (PLancon TAll, PLanconvex SHort, OVAL, LENTil, BICOnvex , TRAPezoid, TRIAngl). - Tvar řezů v nárysu (data Rulf 1991).

Stylistical subtype	ADZE	%	AXES	%	N=
100	0	0.0	52	21.8	53
111	9	8.3	9	3.8	18
112	36	33.3	18	7.6	54
121	8	7.4	50	21.0	58
122	19	17.6	53	22.3	72
131	10	9.3	20	8.4	30
132	12	11.1	4	1.7	16
141	4	3.7	0	0.0	4
142	4	3.7	0	0.0	4
200	1	0.9	3	1.3	4
211	0	0.0	1	0.4	1
212	0	0.0	1	0.4	1
221	0	0.0	2	0.8	2
222	0	0.0	5	2.1	5
231	0	0.0	1	0.4	1
300	2	1.9	0	0.0	2
321	0	0.0	2	0.8	2
322	0	0.0	1	0.4	1
331	0	0.0	1	0.4	1
400	2	1.9	1	0.4	3
411	0	0.0	2	0.8	2
421	0	0.0	2	0.8	2
422	0	0.0	2	0.8	2
431	0	0.0	3	1.3	3
432	0	0.0	1	0.4	1
500	1	0.9	2	0.8	3
521	0	0.0	2	0.8	2
N=	108	100.0	238	100.0	347

Tab. 2.7.4.A. Stylistic subclasses (comp. Fig. 2.0.3.a) of adzes and axes (data Rulf 1991). - Stylistické podtypy (srov. obr. 2.0.3.a) klínů a seker (data Rulf 1991).

Type / phase	2	4	5	6	10	11	13	14	15	16	17	18	19	20	21	22	23	24	?
111	0	0	0	0	1	0	0	1	1	1	0	1	0	0	0	0	0	0	5
112	1	1	2	1	1	1	1	3	1	1	1	2	4	1	0	1	0	0	22
121	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	4
122	0	0	0	0	1	1	1	2	1	0	0	2	1	0	0	2	0	1	12
131	0	0	0	0	0	0	1	0	3	0	0	1	0	0	2	1	0	0	8
132	0	0	0	0	1	0	2	0	2	0	0	1	1	0	1	0	0	0	8
141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
142	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
200	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
300	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
N=	1	1	2	1	5	2	5	8	8	2	1	7	9	1	5	4	1	1	64

Tab. 2.7.6.A. Stylistic types (comp. Fig. 2.0.3.a) of shoe - last adzes and settlement phases. - Stylistické typy (srov. obr. 2.0.3.a) kopytovitých klínů a sídelní fáze.

Type / phase	2	4	5	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	N=
100	0	1	1	0	3	2	1	1	4	6	0	3	1	2	1	5	4	3	0	0	38
111	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	3	0	0	0	0	7
112	0	0	0	0	1	0	0	0	3	1	0	0	0	3	2	1	1	1	0	0	13
121	1	1	1	0	0	1	2	2	6	2	2	1	2	6	0	4	4	1	0	0	36
122	0	0	0	1	0	2	2	1	5	3	1	1	2	4	0	5	3	3	0	1	34
131	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	3	2	4	0	0	12
132	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3
200	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
211	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
221	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2
222	0	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0	4
231	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
321	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
331	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
400	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
411	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2
421	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
422	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
431	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
521	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2
N=	1	2	2	1	5	11	8	8	20	14	3	6	8	18	3	26	14	15	1	1	167

Tab. 2.7.6.B. Stylistical types (comp. Fig. 2.0.3.a) of adxes and settlement phases. - Stylistické typy (srov. obr. 2.0.3.a) sekerek a sídelní fáze.

Feature No.	Inv. No.	House	Phase	Reference
40	201221			BYA1:32
93	205291	96	19	BYA1:60
181a	254389			BYA1:125
542	233241			BYA2:-
693d	249309	912	21	BYA2:137
731a	259896	688	23	BYA2:161
761b	261455			BYA2:171
899a	246344			BYA2:279
945	250870	945	8	BYA2:-
1180a	270957	1192	23	BYA2:357
1215a	258955			BYA2:-
2126	277065	2200	1	BYBF:264
2233	280952			BYBF:302
2249a	281215	2198	5	BYBF:304

Tab. 2.8.3.A. List of LnK bored tools. - Seznam vrtaných nástrojů LnK.

House / type	A100	A12	A33	B200	B12	B33	C300	C12	C33	D400	D12	D33	E500	E12	X000	N=
96	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	4
162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
959	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
1161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
1246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
1240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
619	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
702	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
385	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	4
715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
198	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1300	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
1260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
N=	0	6	1	0	0	0	0	0	0	0	0	0	0	0	20	27

Tab. 2.9.1.A. Stylistic classes (comp. Fig. 2.0.3.a) of adzes in the complexes of phase 19. - Stylistické třídy (srov. obr. 2.0.3.a) klínů v komplexech fáze 19.

House / type	A100	A12	A33	B200	B12	X000	N=
96	0	1	0	1	0	5	7
162	1	0	0	0	0	2	3
434	0	2	0	0	0	0	2
959	0	1	0	0	0	0	1
1161	0	0	0	0	0	0	0
1246	0	0	0	0	0	1	1
1240	0	0	0	0	0	0	0
619	0	2	0	0	0	3	5
361	0	2	0	0	0	0	2
702	0	1	0	0	0	0	1
385	0	0	0	0	0	0	0
715	1	1	0	0	0	0	2
198	0	0	0	0	0	0	0
1300	0	1	0	0	0	0	1
545	0	0	0	0	0	0	0
822	0	0	0	0	0	1	1
869	0	0	0	0	0	0	0
155	0	1	0	0	0	2	3
1260	0	1	0	0	0	1	2
468	0	1	0	0	1	0	2
N=	2	14	0	1	1	15	33

Tab. 2.9.2.A. Stylistic classes (comp. Fig. 2.0.3.a) of axes in the complexes of phase 19. - Stylistické třídy (srov. obr. 2.0.3a) sekerek v komplexech fáze 19.

"Mano/metate designs vary by village." (Jenny L. Adams 1994: 87)

3. Double querns

3.0. Introduction

3.0.1. Neolithic querns

Bipartite querns are among the characteristic archaeological finds in this country, for a period stretching from the Neolithic until the La Tène. They served for the grinding of grains in the classic sense, i.e. for making flour out of cereals. It is necessary to distinguish these types from other kinds of grinding implements, such as were used for materials such as red haematite, ceramic temper etc. In parts of the Near East and the Balkans, querns appear with stone mortars, where the grains were husked after being threshed. Such stone mortars do not appear in the Neolithic cultures of Central Europe or the Carpathian basin. Experiments in the Linear Pottery Culture region have demonstrated that they are fully replaceable by wooden mortars (Maurers-Balke - Lüning 1992).

In the Czech terminology this tool is known as a double attrition mill (in Czech: dvoudílný třecí mlýn). Different mills, characterised by a unidirectional rotating motion, have recently been distinguished from grindstones employing a two-way movement along one axis (Wright 1992, 1993: 95). Paired stones are commonly known as "grinding slabs" in English, and their separate parts as the "lower stone" and the "upper stone". In American literature, the common terminology has developed from local languages influenced by Spanish: "metate" for the lower and "mano" for the upper stones. German terminology emphasises functional characteristics through "Unterlieger" and "Läufer", while the French use metaphorical terms such as "pierre dormant" (meul) and "mollete".

Querns appear in the Near East during Epipalaeolithic development, as a phenomenon complementary to grain processing (Solecki 1969), long before cereals were ever domesticated. Their forms developed gradually during the later Natufian, when the first local differences in the inventory of stone tools used for processing grains appeared (Wright 1993: 95). During the subsequent development of the PPNA, querns correspond to the branching of cultural development in relation to the increasing proportion of domesticated cereals (Wright 1993: 96). Their appearance stabilised during the following PPNB. They became a specific type among the range of tools that were reached their zenith at this time (Davis 1982). They played a critical role in the process of food preparation that began in the Neolithic cultures of the Near East (Hersh 1981). They were kept in a place reserved for them in the household. Later, both written and archaeological records indicate that they were kept in a separate room. They formed a valuable part of the domestic inventories that later appeared as inheritances or in deeds of gift in the written records of the 3rd to 1st millennium BC (Reiter 1996: 264).

Within the Neolithic cultures of Central Europe, querns are considered to a commonplace element among archaeological finds, but are usually included under the heading of "other stone industry", from which only chipped and polished tools are separated out into their own categories. Due to their functional significance and informative value, querns deserve more concentrated attention (Zimmermann 1988: 725)

3.0.2. Neolithic querns from Bylany

The Bylany finds have been processed on the level of simple morphology, in relation to the raw materials and quantitative chronology of the basic forms. The typological morphology was studied separately for querns proper and for other grinders and hand-stones. Because of the great heterogeneity of the artefacts included in the latter group, they are not analysed here. The querns were divided into lower and upper stones, which are easily distinguished at a macroscopic level even when broken. Considering the contexts of the finds, this division is fundamental.

The lower stones are divided into two groups; the first consists of unprepared or only crudely prepared forms, while the second consists of forms with clearly prepared sides. The upper stones also make up two groups - the first one consists of stones with a well polished centre, and the second of stones with a loaf-like, prepared form. In general, the less commonly-occurring platforms for grinding haematite and unspecific mortar forms were included in this typology, including stray finds, as were inexpressive forms with polished depressions. The latter belong more to the functionally specific grinders than to the actual mortars used for husking (Pavlů 1991: 340).

The significant differences between the lower and upper stones appear mainly in the raw materials used. While the lower stones were in the main made of local raw materials, some (about a quarter) of the upper stones were made of imported sandstone of two kinds. This bears witness to the attention that was paid to the production of these implements. This material diversity is especially important for the loaf-like upper stones. A detailed division of the finds in the refuse was carried out for the Miskovice 2 site, where there appear to be two upper stones for every lower stone (Pavlů 1998b: Fig. 12). A similar proportion has not been demonstrated at Bylany because the stone refuse is more dispersed there. The chronological appearance of double querns varies markedly within phases. These changes gave rise to the interim interpretation of the dynamics of area BY1 (Pavlů 1989: 285).

3.0.3. Situational analysis of Neolithic querns

The formal classification of querns is based on the metrics of the basic forms of upper and lower stones. The criterion of division used was the border given by the different width frequencies for the two separate forms separately. The quality of the stones is evaluated according to the raw materials used, whether originating in the immediate vicinity or from more distant sources. The resulting scores were calculated for individual houses, and also as an average for each settlement phase. The classification of the basic forms is formulated in simple categories, enabling the greatest number of finds to be classified. Nevertheless, the level of classifiability among fragmentary waste is low, and accounts for no more than two thirds of the finds.

The functional classification was formulated using analysis of the width-height index as the main functional criterion. For the lower stones, this is complemented by a width limit of 200 mm. The design of the tools was traced in phases of preserved use/wear, which could be characterised by the proportion of minimum and maximum height measured in the longitudinal section. Cross-sections, which might be important in the upper stones, have not been analysed for this purpose. The design is complemented by characteristic raw material procurement efficiency, according to a rough subdivision of the quality of local and non-local raw materials.

The stylistic classification is formulated according to the relation of the length of the upper stones to the width of the lower stones. Besides this, the form of the plane of both parts is considered, both in the long and cross-sections. The resulting classification draws together simplified forms and the descriptive classification of querns used at Bylany heretofore. The stylistic types are complemented by an analysis of prototypes, which were defined according to the frequency of appearance in the categories of height and width, in a way analogous to that used for other artefact types. On the basis of ordered attributes, the situational analysis of querns enables various degrees of classification to be distinguished, which can then be traced in the context of forms, phases and house complexes. The refuse characterised in this way also allows hypotheses to be developed for various aspects of the behaviour of the original culture.

3.1. Basic functional classification: upper and lower stones, refuse

3.1.1. Metrics of double querns

Neolithic double querns must first be divided into lower and upper stones, and the basic attributes of each assessed separately. The lower, stationary, stones are in principle larger, while the upper stones, moving stones do not exceed a certain size and weight. Although sometimes symmetrical the two are not confusable, and are marked in particular by characteristically-oriented use/wear traces. These allow the reasonably secure classification even of smaller fragments, and the majority of the finds can thus be classed into these two basic forms.

	TECHNICAL ELEMENTS	ATTRIBUTES AND THEIR CLASSIFICATION

STYLE OF GRINDSTONES

Technical elements

principal stylistical forms

length of upper : width of lower

< = >

(Zimmermann 1988: 725)

Attributes and their classification

prototypes

stylistic classification

upper	(descriptive code)	(510)	(520)	(610)	(710)
	stylistic types	SU1	SU2	SU3	SU4

lower	(descriptive code)	(110)	(210)	(350)
	stylistic types	SL5	SL6	SL7

DESIGN OF GRINDSTONES

Technical elements

distance of resources

	1	2	3	4
local	<1 km	1-4 km	4-10 km	
zonal	10-50 km	50-150 km	>150 km	

local 1 2 3; <1 km 1-4 km 4-10 km

zonal 1 2 3 4; 10-50 km 50-150 km >150 km

index of wear

height (min) : height (max)

macrowears microwears

Attributes and their classification

raw materials

economy of obtaining resources

local 1A (crumbling)	local 1B (concrete)
zonal 2A (fine- to medium grains)	zonal 2B (coarse grains)

functional classification

upper	index width/hight	<=3	<=4	<=5	>5
	functional types	UP1	UP2	UP3	
lower	index width/height	< 5	< 5	> 5	> 5
	width	<=200 mm	>200 mm	<=200 mm	>200 mm
	functional types	LO4	LO5	LO6	LO7

PRINCIPLE FORMS OF GRINDSTONES

Technical elements

raw materials

schists
sandstones
other

form

index width/length

size

weight
length
width
height

Attributes and their classification

score of quality

	principle form	lower 2	upper 1	other 3
raw materials	2 local	4	2	6
	1 zonal	2	1	3

formal classification

principal forms					
upper part	width	<=150 mm	<=200 mm	<=250 mm	>250 mm
		narrow	medium	broad	very broad
lower part	width	<=108 mm	<=126 mm	<=144 mm	>144 mm
		very narrow	narrow	medium	broad

Fig. 3.0.3.a. Scheme showing the situation analysis of the querns. - Schéma situační analýzy dvoudílných mlýnů.

The use/wear traces identified in the Bylany assemblage always consist parallel lines oriented on the lower stones along the longitudinal axis and on the upper stones perpendicular to this axis. These are macroscopically identifiable lines where the mineral surface has been scored off in one direction. Microscopically identifiable use/wear traces occur on the polished planes of various minerals, mostly quartzite; on these planes, fine parallel incisions are visible under magnification. Neither multidirectional use/wear traces on the lower stones nor longitudinal use/wear traces on the round hand-stones were identified. It was thus possible in this assemblage to rule out the oft-reconstructed grinding platforms, with small round hand-stones.

The size of both forms are characterised by the length, width, and height and sometimes the weight of the stones. While width and height were ascertainable for the majority of the fragments, length could be measured only for whole pieces, of which there were few. Linear Pottery Culture features yielded only 16 whole lower and 14 whole upper stones, only some of which could be assigned to particular phases. Weight was measurable for all of the finds, but its statistical characteristics in the main relate only to the fragment assemblage.

3.1.2. Metrics of the lower stones

Lower stones, even in small numbers, were divisible according to their length into two classes with a value limit of 38 cm. The quadrangular base from feature 1180 (inv. no. 270985, BYA2 not shown) is an exception with a length of less than 28 cm, which is the lower limit for all the other artefacts. The group of larger, lower stones is roughly twice the size of that of smaller ones, and it is possible to speak of small and large quernstones. The statistical distribution of the width is, however, very irregular, marked with several decreasing values repeating roughly every 5 cm after the value of 15cm. The height is heavily concentrated around an average of 46.1 mm, without any modal limits, even on a finer scale. Fragment weight has a greater range of values, and an unequal frequency distribution. The length-width index is clearly influenced by the lower number of classifiable pieces and the length range of the lower stones. For the time being, so limits for classification can be sought here.

All of the metric attributes correlate poorly. A strong relationship between the width of the lower stones and the length of the uppers stones only has been demonstrated elsewhere (Zimmermann 1988: 733-734), which is a consequence of the construction principles employed in these tools. The proportion of particular measures was obviously not particularly important, as it depended more on the random distribution of sizes in material available. In the lower stone assemblage, however, a statistically significant correlation appears between the width, sometimes height, and weight. This relationship is of course trivial for width if it is assumed that the specific weight of the raw materials used was more or less comparable. Regarding the height, this correlation was mediated through the width. From the behaviour of the metric attributes of the lower stones, it is evident that the length would be a suitable measure regarding their classification. However, since broken pieces were

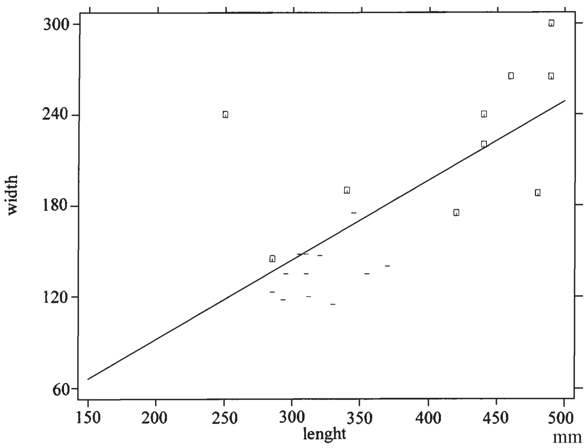


Fig. 3.1.2.a. Correlation of the length and width of preserved whole quernstones ([□] A-lower, [-] B- upper stones). -Korelace délky a šířky celých mlýnů (A-dolní, B-horní kameny).

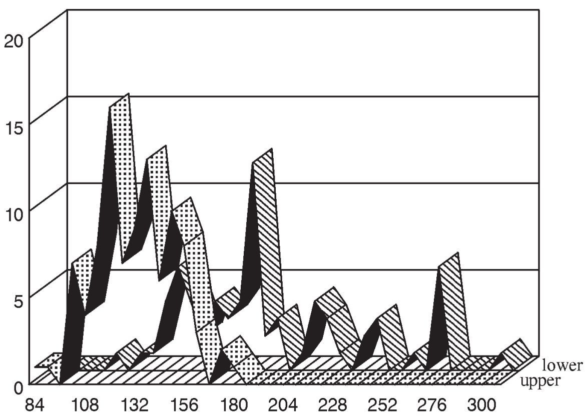


Fig. 3.1.2.b. Frequency distribution of widths in lower and upper stones on a detailed scale. - Rozdělení četností šířky horních a dolních kamenů na podrobné stupnici.

prevalent and their lengths could not be measured, width was taken as offering a firm alternative as a criterion of classification. ➔Tab. 3.1.2.A.

3.1.3. Metrics of upper stones

The frequency distribution of the length of the upper stones shows a marked interruption at the value of 34 cm, although the overall number of classifiable artefacts is only slightly higher than that for the lower stones. The minimum length of the upper stones (28 cm) exceeds the maximum width of the majority of the lower stones. This should imply that in the Bylany assemblage of upper stones the majority are larger than the lower. The primary division according to this criterion is not complete in this assemblage (Zimmermann 1988: 725). The width of the upper stones is unimodal at a coarse scale, as is the height. On a finer scale, however, width varies widely with the most obvious divisions at the values 108, 126, 144, 168 (Fig. 3.1.2.b). The statistical division of frequency of heights on the finer scale indicates just an unpronounced limit at the 4 cm value. During classification it appeared that upper stones could be divided into lower and higher roughly along this height limit, and this could later be confirmed. The length-width index has a bimodal distribution with a limit at 0.414. The average weight of the upper stones varies around 2.5 kg.

The metric attributes of the upper stones evidently do not correlate, as was the case with the lower stones. The correlation of the weight is lower, and is only statistically significant for the width for trivial reasons, as the wider stones are also necessarily heavier. When all of the three measures indicate some modalities, they could be useful for classification. The most apparent for the length is the least usable. The height modes will be used for functional classification. The width as a criterion for the classification of lower stones can be only when the group of upper stones is narrower on average. ➔Tab. 3.1.3.A.

3.1.4. Formal classification of double querns

If width is to remain a common criterion for the distinction of formal classes of lower and upper stones, then different limits must be used for both groups of tools, as described above. Four classes of lower stones of various widths, and four classes of upper stones, again of various widths, can then be distinguished. Classification was not possible, however, for around two-thirds of finds, as there was no reliable way of measuring their width. The remainder of the finds show regular divisions into the formal classes thus defined, demonstrating that the criterion of width is relevant for the formal classification of querns.

Finds of the middle size classes are the most numerous ones. An exception is represented by the very narrow upper stones which appear roughly half as often as the others. The proportion of broad upper stones is relatively low (1.8 %) in comparison to that of broad lower stones (5.5 %). Statistically significant differences in the tabulated values arise rather from the fact that both types of quernstones have been taken together. ➔Tab. 3.1.4.A.

3.1.5. The chronological variability of the formal classes

The relative occurrence of the basic forms in the sequence of settlement phases varies very irregularly, so that they form no clear chronological structure. Given the relatively stable level of subsistence during Linear Pottery Culture settlement, a structure similar cannot be expected of this basic classification. Of the finds, the lowest proportion (0.4 %) comes from the 24th phase, and the greatest from the 19th (17.9 %), while the numbers of quernstones occurring in phases 21 and 22 were also rather high.

The relative numbers of finds from one house of a phase is clearly more important, this being primarily evidence of the variability in the preserved waste of these artefacts. This variability, together with other signs (e.g. the proportion of polished industry and dominant orientation of the waste, cf. Pavlů 1989: 285) was the basis for a hypothesis on the continuity and discontinuity of building with the habitation area. After automatic data analysis, the numbers vary only in the details, with the exception of phase 4, where four houses were now counted and the proportion per house was relatively low (originally 4.0, now 2.2). A proportion of greater than four quernstones per house is now seen in phases 8, 12, 19, 21, 22 and 25. As noted above, a similar waste dynamic is also apparent for other artefacts, which supports the original hypothesis of clear breaks in the development of the settlement. These breaks, however, do not in themselves confirm long-term hiatuses in the use of a given residential area. →Tab. 3.1.5.A.

The relative appearance of formal types within the phases varies still more, which, however, is rather an indication of the small number of classifiable finds; only a fifth of all the artefacts could be placed within formal classes based on the width of the tool. It can be adjudged only that the broader lower stones dominate in the earlier development, with the exception of phase 21 where there is a certain proportion of broad lower stones, and phases 19 and 22, in which broader upper stones appear. These differences in the appearance of the formal types are, perhaps, accidental. The concentration on medium forms in later phases may indicate a certain standardisation in the quernstones. →Tab. 3.1.5.B.

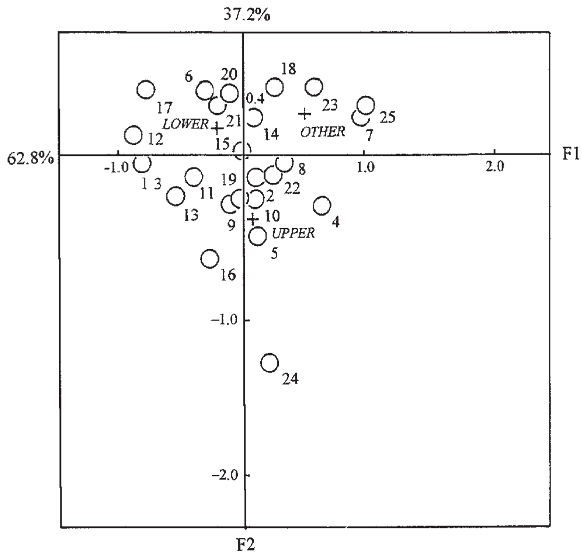


Fig. 3.1.5.a. Correspondence analysis of basic forms in phase spaces. - Korespondenční analýza základních forem v prostoru fází.

The correspondence analysis of the basic forms in space phases confirms their dichotomy, which, however, is not simply related to particular phases. This rather manifests itself as a random distribution of finds with the space of settlement phases. Lower stones are concentrated in the later phases, which may indicate the impregnation by refuse of this tool type of the residential area over a longer period of time. The group labelled as "others", considered separately, consists of unspecified fragments and occasional atypical finds; of these, by no means all must belong among the bipartite querns, and a certain disruption to the information contained within the data can be assumed.

3.2. Economics of the raw material procurement and quern production

3.2.1. Quernstones as refuse within households

The position of querns in the refuse found around houses changed during individual phases, and clearly formed non-random groupings. This could be traced during the course of four phases (19 - 22), from which the majority of finds come. In phase 19 the majority of discarded querns concentrate on the eastern side of the houses, equally across the NE and SE quadrants. The lower stones were only discovered in these positions. Pit 343, on the SW side of house 361, represents an exception to the rule, but the quernstones are part of an oven lining, not all must come from the period in which this structure was built. This is testified to by the related finds of two fragments of the same upper stone (feature 311: inv. no. 220097, phase 10 of house 306 and feature 343: inv. no. 224378 phase 19 of house 361). The piece from phase 19 was clearly a secondary use of waste from phase 10. At the same time, this provides evidence of the extraordinary dispersal of a single artefact over a distance of 90 m with the framework of a single area. A similar model was elaborated for the quern wasters of phase 20, which however concerns a smaller number of finds.

In phase 21, which probably followed a hiatus in the occupation of area BY1, an entirely different model of quern refuse was created, where the majority of finds come from the western side of the house, with a bias towards the SW quadrant of the houses. This is also the case for lower stones. The concentration of 17 lower stone fragments in the south part of pit complex 913 is exceptional. As is the case with the others, it can be assumed that these were originally part of the inventory of the adjacent houses, and that their original deposition is represented. In the case of house 913, which is also exceptional for other reasons, such as its architecture, the number of lower stones may represent the need for querns over the whole life of the building, and might also be an argument for estimating the length of the whole phase. The phase 21 refuse model is repeated in phase 22. In view of the conspicuously lower number of finds from other phases, waste distributions cannot be traced over longer periods.

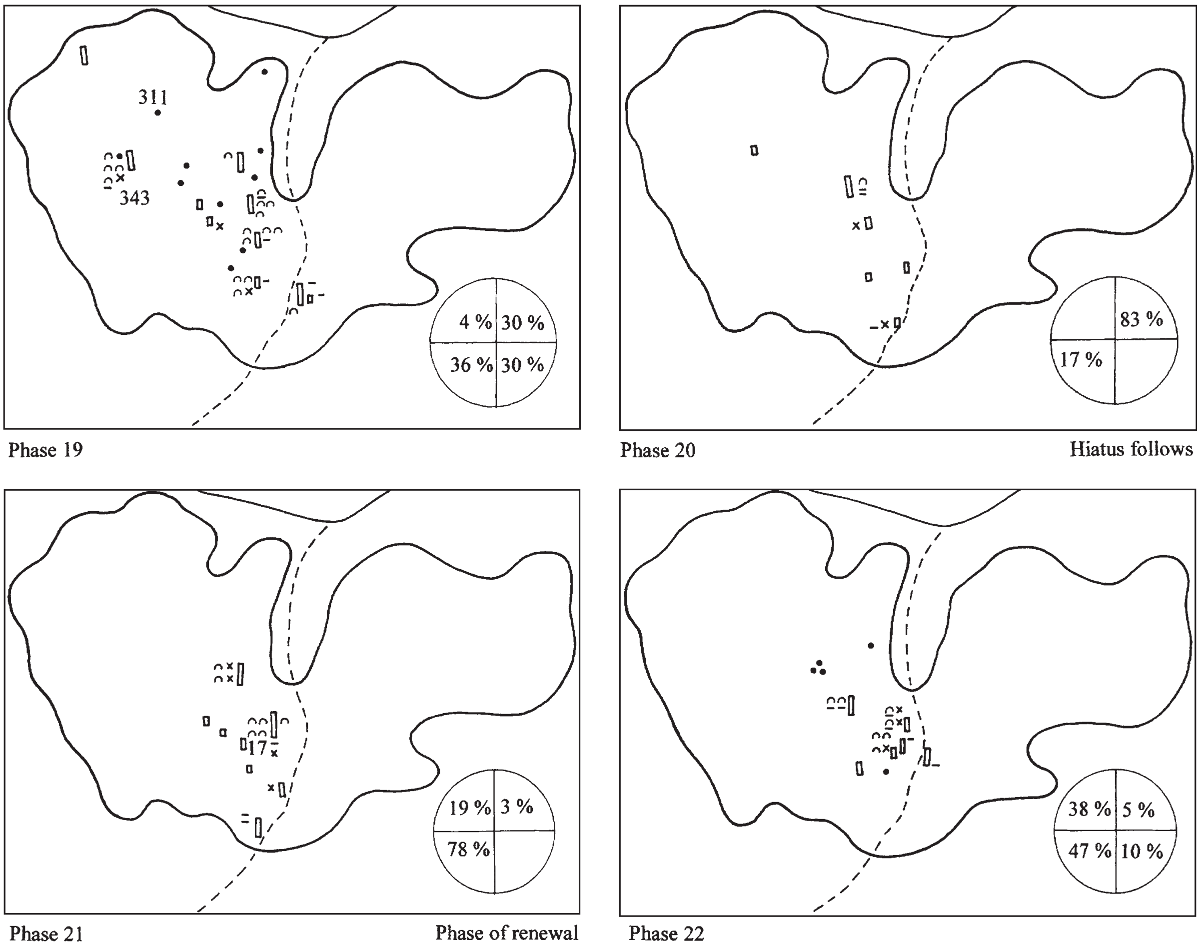


Fig. 3.2.1.a. Location of basic quernstone forms in the house complexes (phases 19-22). Relative proportion of refuse in sectors of the outer areas of houses. - Umístění základních forem mlýnů v komplexech domů (fáze 19-22). Relativní podíl odpadu v hlavních sektorech vnějšího prostoru domů.

3.2.2. Local and zonal raw materials of the upper stones

Even during the earliest studied of the raw materials used for quernstones, the minerals from the immediate vicinity of the Bylany area were different to those from more distant sources. Three classes of local minerals were defined according to their geological origin (LOCAL 1 - 3). Minerals from further afield divided into four classes by the increasing distance that they had travelled (ZONAL 1 - 4). The third and the fourth classes of the latter consisted of minerals used exclusively for the chipped industry. The querns were produced from minerals available within a few days' walking distance (Pavlů 1991: 331 - 335). For the purposes of this analysis, only local and zonal minerals were differentiated.

The local raw materials are evenly distributed between the basic forms of lower and upper stones. They also represent 88% of all of the processed materials. Neither does the distribution of these raw materials differ greatly within the framework of the formal types, fluctuating between 2 and 6 % for the individual types. The core of these accord with the quantity of forms of medium sized types. Non-local raw materials significantly concentrate in the upper stones, where they reach 6 %. Their use for lower stones is rather exceptional. Within the formal types, they are distributed evenly. →Tabs. 3.2.2.A, 3.2.2.B.

3.2.3. The proportions of querns in houses with simple and double mid-sections

The absolute and relative distributions of the basic quernstone forms found in houses with a simple or double mid-section is roughly equal, and no statistically significant differences are evident in the tables. What is quite different, however, is the proportion of finds per house. This, conspicuously, is twice as great in those houses with a double mid-section - and for lower stones the numbers are two and a half times higher. As is the case with other artefacts, it can from this be assumed that querns played the role of an icon of the number of inhabitants in individual houses. Although they are characteristic of female population, in this connection they relate to all of the inhabitants, as they were used in the preparation of food for the whole household. Again, this can be considered a certainty in view of the standardised system of subsistence; however, it is important that it is significantly reflected in the composition of the refuse. →Tab. 3.2.3.A.

3.3. Organisation of quern production and their use

3.3.1. Formal types within phase space as genotypes

Because the group of "OTHERS" includes unspecified types, it was excluded from the correspondence analysis of formal types in phase spaces. The first resultant factor which should have been chronological is almost entirely absent in the majority of the differentiated types. An exception is the broad, lower quernstone which relates to phase 14, and in occasional instances to phases 10 and 23. Even this clustering, however, has no greater chronological value. The second factor is conspicuous size, reflecting the gradual broadening of the forms. This applies to both lower and upper stones. The broadest forms have the highest positive values.

According to these results, the middle forms of lower and upper stones can be labelled as genotypes, because they are stable within phase spaces. The narrower forms appearing with phases 1, 2, 9 and 18, while broader forms occur in phases 3 - 5, 1 and 14. The latter may indicate a phase with a greater need for grinding-broader grinding surfaces could bring greeter working efficiency. This, however, would have meant applying greater energy, and would have made the work more laborious. Another reason might have been a lower number of workers contributing to the grinding.

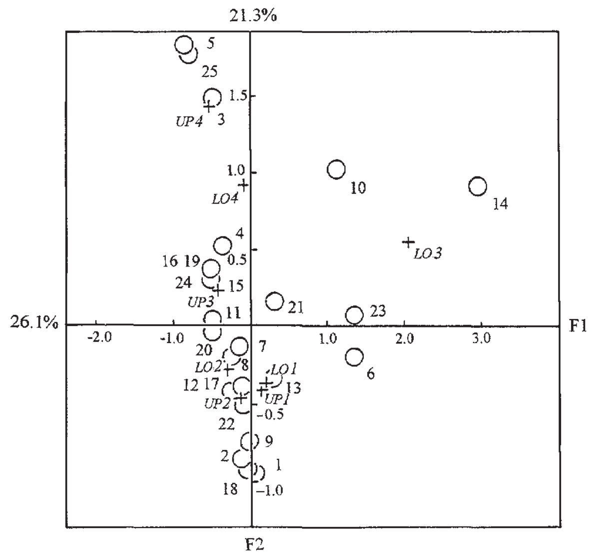


Fig. 3.3.1.a. Correspondence analysis of formal types within phase spaces. - Korespondenční analýza formálních typů v prostoru fází.

3.3.2. Formal types in complexes of phases 19 to 22 as phenotypes

Variability within phases can be evaluated from the results of correspondence analysis of formal types within the space of house complexes. Because of the lower number of artefacts in the majority of phases, this analysis was carried out only for period of phases 19 - 22. With the exception of phase 20, all of these other phases each contain more than

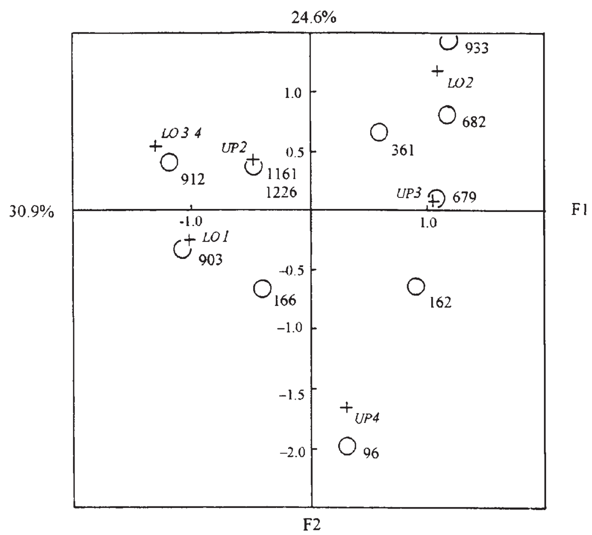


Fig. 3.3.2.a. Correspondence analysis of formal types within the space of non - empty complexes of phases 19-22. - Korespondenční analýza formálních typů v prostoru neprázdných komplexů z fází 19-22.

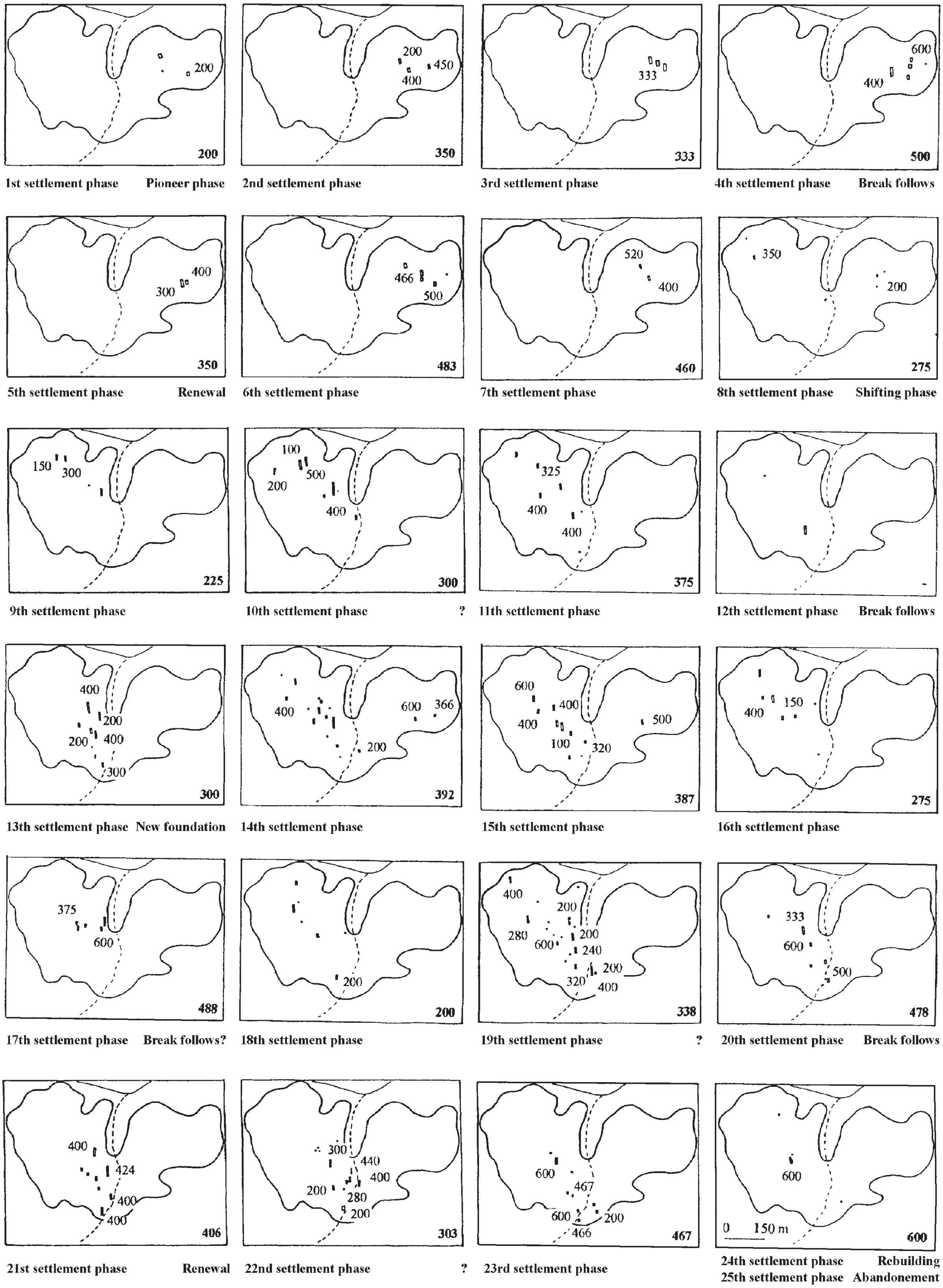


Fig. 3.3.3.a. Quality scores for querns in houses and phases. – Skóre kvality mlýnů v domech a fázích.

thirty quernstones or their fragments. The fist two factors are difficult to interpret. Complexes of phase 19 concentrate in the middle of the spaces of factors 1 and 2, and characterised mainly by medium sized (UPper form 2 and house 1161) and broader (UP4 and house 96) of upper stones. Complexes of phases 21 and 22 are divided within this space into two groups. In phase 21 this is house 912 opposite house 679, and in phase 22 houses 903 and 933. All of the formal quern types display variability between complexes and can thus be described as phenotypes.

3.3.3. Quality of querns in individual houses and phases

The score measuring the quality of quern working was developed as a product of the attributes of the basic forms and raw materials. The basic forms are evaluated in stages from upper stones (1), to lower stones (2), and others (3), and raw materials from zonal (1) to local (2). The upper stones required more work and greater skill to produce. Zonal raw materials are clearly of better quality than the local ones. The products of these scores and the relative frequencies of individual forms in households yielded a coefficient of the quality of querns within given houses. This coefficient varies between 100 for upper stones made of zonal materials as being of the highest quality, to 600 for other stones made from local materials as being of the lowest quality. The averages of these coefficients within phases were then taken to calculate a value score for the whole phase.

Within individual phases, quality scores vary irregularly in complexes. If the average numbers for each phase in the whole sequence are compared, however, then the variability corresponds with the hypothesis of the dynamics of continuity and discontinuity of settlement in residential area BY1. The best-quality coefficients appear in the first phase, and the lowest-quality in the last. In the intervals between renewal of the area, a decline in quality is always shown over the course of the several succeeding phases, and an improvement in phases of renewal. This could reflect the dynamics of renewing the inventory of querns in individual houses. During periods of continual settlement, querns were brought in or renewed from local resources. In renewal phases, the proportions always increased of completely new and higher quality artefacts, also perhaps from imported raw materials.

3.4. Classification of basic functional categories of grinding slabs in the subsistence system, and divisions of labour

3.4.1. Design of the working surface

The efficiency of an artefact that consists of two surfaces, between which the different materials are ground, will be proportional to the size of the two mutually touching surfaces. The size of this was optimised firstly by certain ergonomic requirements, such as the most convenient distance at which hands move with the upper stone, or the strength needed for such movement (Adams 1994: 81). The properties of the material itself, such as strength and specific weight, are less important from this point of view; the resistance of the materials against the grinding was clearly much more important. Lastly, the coarseness of the surface was also important, and in several cases was altered using special percussion tools.

Of the measurable attributes suitably visible even on fragments, for the function of the querns width and height, which is partly dependent on it, are particularly diagnostic. The values of both measures in both the upper and lower stones partly overlap. The prevailing higher values for lower stones are the result of their being more massive. The ratio of width to height remains very similar for both parts, which indicates that both upper and lower stones were produced in the same metric proportions. The width-height index does not, how-

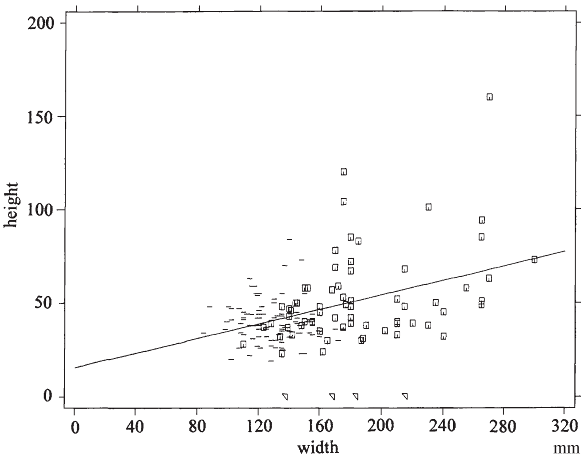


Fig. 3.4.1.a. Correlation of height and width of quernstones ([□] A - lower stones, [-] B - upper stones). - Korelace délky a výšky dolních (A) a horních (B) kamenů.

ever, provide any sufficient criterion for classification in its own right; use/wear traces and details of the form of the upper stones virtually rule out their potential swapping of roles, though.

The shape of the lower stones was roughly prepared as a flat quadrangular block, sometimes with sloping sides, resulting in a trapezoidal section standing on a shorter base. The overlapping upper plane made it easier for the ground material to fall to the floor. If the stone stood on the floor, it might have been on a hide pad, but was more likely to have stood on an earth platform as was the case in the Near East.The upper stones were usually worked on all sides either into regular ashlars or into the characteristic plano-convex "loaves". The flat, rectangular shapes still often had asymmetrical short sides. One side was straight, another narrowed into a sort of handle, which facilitated the grinding process. Quadratic lower stones and loaf-like upper stones were usually used on one plane. By contrast, the quadratic upper stones are sometimes polished on both sides.

3.4.2. Working plane use/wear

During grinding, as a result of the mechanical forces employed on the surface of the stones, various types of wear occurred. The principles of tribology, the study of surfaces worn during grinding, were applied by J. Adams to archaeological artefacts (Adams 1994: 26). The main mechanical force consists of two components, vertical pressure and horizontal motion, which combine with the microscopic fatigue of material. The four types of tribochemical wear, each leaving a different polish or gloss on the surface, as a consequence of the chemical reactions of different materials, have not yet been traced at Bylany.

A characteristic curvature of the surfaces is a remarkable consequence of use/wear traces, similarly in both upper and lower stones. As a result, in both cases there is a tendency for a concave dish-like section to be created along the longitudinal axis. In accordance with this, the cross-section of the transverse axis is convex. Depending on the ratio of the length of the upper stone to the width of the lower, the curve of the lower stone may be either concave, if the upper stone is shorter, or convex, when the upper stone is longer (Zimmermann 1988: 741).

In the Bylany assemblage, however, transverse concave sections virtually never appear. These sections are either straight, which should mean that the length of the upper stones was more-or-less comparable to the width of the lower, or convex. The former case is more frequent where the upper stone is loaf-like, and the latter where it is rectangular. The cross-section of upper stones is usually convex, due to pressure on both sides of the quern (Adams 1993, 1994: 83), perhaps due to the subconscious changing of its position.

A measure of wear is the ratio of the maximum height of the stones, usually measured at the ends of ashlars, to the minimum preserved height. It is possible to measure this along both axes, in the length and width of the stones, but for practical reasons it was measured only in the longitudinal axis. The distribution of this index is, in the case of upper stones, self-evidently bimodal, varying from values of 0.34 to 0.64 and 0.96. This means that the querns were worn down to two thirds of their original size before breaking. This applies to all of the rectangular types made from various types of local gneiss, particularly mica schist. An interpretation of the second group, which were worn down by a third or less, has yet to be undertaken. It is possible that some of these are tools discarded before being worn out and secondarily broken.

The index values of wear for the lower stones ranges from 0.22 to 0.96, the maximum level of wear therefore being higher. This corresponds to their stationary nature, which made possible use for longer period before breakage. Frequency distributions have been traced only for a small number of artefacts, and their division into groups in thus not simply demonstrable. The average wear of both parts of the querns are approximately the same, at about 60 % of their original heights.

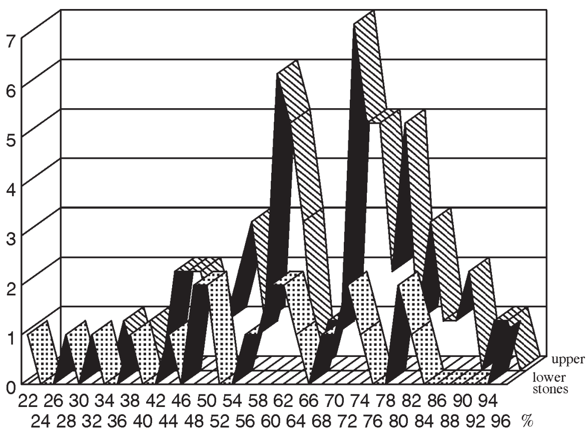


Fig. 3.4.2.a. Frequency distribution in the wear indices of upper stones and lower stones. - Rozdělení četností indexu opotřebení pro horní a dolní kameny.

Chronologically, the wear index forms no significant sequence. When only two levels of wear are distinguished - the above-average (less than 60 % of the height was preserved) and the below-average (more than 60 %) - the phases fall into three. The quernstones found in phases 4, 10, 15 and 22 were average. The above-average prevail in phases 1, 7, 11 - 17 (except phase 15 - see above) and phase 20. Below-average wear dominates in other phases. Above-average wear is concentrated in phases before hiatuses, and in intervals of relatively stable development during periods of post-optimal stages in ceramic chronology. Below-average wear, on the other hand, concentrates in the phases of earlier development, from the close of the earliest stages to the optimum of the middle stages. ➔Tab. 3.4.2.A.

Individual functional types are not worn equally. The wear of individual functional types is different for the lower and higher forms. The 'shorter' stones are worn rather below the average, in the case of both upper and lower stones. Lower heights clearly did not permit of so much wear. The upper stones of higher forms are more or less evenly worn, with a slight prevalence of below-average wear. The lower stones of the higher forms are, by contrast, markedly worn to an above-average degree, which bears witness to the maximum use of the stationary elements of bipartite querns. In the main, at least, upper stones tend to be worn to a below-average degree; in lowers tones this applies only to the smallest type, LOwer 5. This indicates that smaller forms were on average used less than larger, as if they represent a convenient, complementary tool. ➔Tab. 3.4.2.B.

3.4.3. Functional classification

Seven functional classes of querns were defined on the basis of the correlation of the width and width-height index (FUNT). The correlation of width and width-height index in the upper stones is a given average value R = 0.550 (N = 95). Because the range of width values is narrow, their division was possible only by index values. The limits where width is thrice or four times greater than the height divided the measurable upper stones into three groups. The three classes can be described as functional types of upper stones.

The correlation of width and the width-height index of lower stones is far lower, with a given value of R = 0.237 (N = 65). The value limits can be assumed to be a width of 20 cm and, at the same time, a width five times the height. Four functional classes of lower

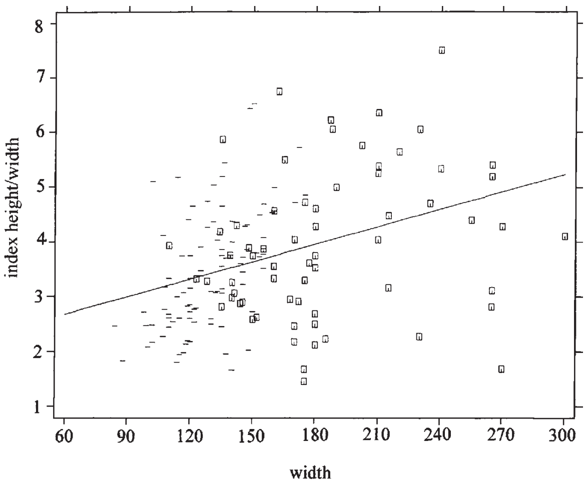


Fig. 3.4.3.a. Correlation of width and the width - height index for lower [□] (A) and upper [-] (B) stones. - Korelace šířky a šířko-výšového indexu pro dolní (A) a horní (B) kameny.

stones were defined in this way. It can be supposed that the width limit of c.20 cm represents the maximum dimension for lower stones combined with upper ones exceeding this width. The broader, lower stones seem rather to have been combined more with upper stones that were shorter or similarly sized. Intact finds to confirm this thesis are, however, lacking at Bylany.

3.4.4. The chronological variability of functional classes

The number of finds classifiable by functional criteria and at the same time into settlement phases is relatively small (N = 99). Individual functional types of upper stones appear randomly in all of the phases. In phases 19 and 22, where more than 10 artefacts were preserved, low lower stones dominate, and more than a third of all finds were discovered. Higher types prevail in phases 1, 3, 14, and 23, which contain a minimal quantity of artefacts, so that interpretation of these maxima is at the level of the random occurrence of functional types. ➔Tab. 3.4.4.A.

3.5. Identification of activities in the framework of complexes

3.5.1. The economics of the procurement and use of raw materials

Because only two kinds of raw materials were used for the production of querns, classified by their origins as Local 1 and Zonal 2, they categories were further broken down on the basis of their mechanical properties. In the first group the harder minerals, such as, for example, orthogneisses or migmatites, were separated from the more brittle minerals such as mica schists or biotites. The fine and medium-grained sandstones were separated from the coarse in the second group. These groups formed clearly polarised pairs within the spaces of settlement phases.

If the first factor in the correspondence analysis is influenced by the chronology, at least in certain periods, the second factor is related more to raw materials. The local materials used for both lower and upper stones are positioned at the core of this second factor, and at the edges the sandstone types are separated according to the size of their grains. Those materials from more distant resources were used exclusively for upper stones. From the functional point of view, the choice of raw materials was clearly a conscious one, as the import of minerals from afar indicates in itself. Fine sandstone types and softer gneisses oppose, in the second factor, coarse-grained sandstones. This shows the deliberate selection of raw materials for upper stones tracing functional variants of upper stones. This may mean two phases of grinding cereals, or the separate grinding of different materials.

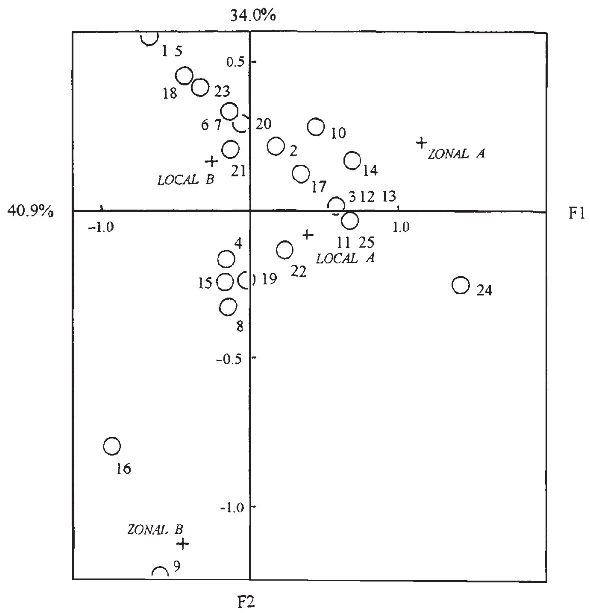


Fig. 3.5.1.a. Correspondence analysis of raw materials (LOC1A - harder gneisses, LOC1B - softer gneisses, ZON2A- coarse-grained minerals, ZON2B - fine - and medium-grained minerals) in the spaces of phases. - Korespondenční analýza surovin (LOC1A - pevnější ruly, LOC1B - drobivější ruly, ZON2A - hrubozrnné horniny, ZON2B - jemno a středozrnné horniny) v prostoru fází.

3.5.2. Identification of household activities

The number of basic forms studied in the refuse beside the houses with a divided mid-section (see 3.2.3) demonstrates that the proportion of upper stones in houses with double middles is almost double (1.66 x), while the proportion of lower stones in these houses is noticeably higher (2.38 x). The proportion of functional types is, however, well comparable in both cases (Tab. 3.5.2.A). The influence of the markedly lower classifiability by functional attributes must be considered (only 66 % of upper and 38 % of lower stones were thus classifiable). This ratio was later taken as evidence of cultural transformations or post-depositional processes, rather than the remains of the original household economy. This result differs from both the composition of the ceramic waste and from that of the chipped and polished industry (see above). It can be supposed that quernstones were an index of the number of women who participated in the processing of food in the household. The behaviour of the basic forms of stationary lower stones agrees with this supposition. The lower proportion of upper stones pertaining to houses with a doubled middle marks rather their mobility-it is possible that pieces not yet been worn down were transported to newly-built structures, or that they were inherited.

The incidences of above-average and below-average wear are distributed comparably between houses with simple and divided mid-sections (Tab. 3.5.2.B), in a ratio of 80 % : 20 %, while the ratio of such house types is 82 % : 18 %. The average use/wear index is 0.618 +/ - 0.172 (N = 33) for the houses with a simple mid-section, and 0.632 +/ - 0.159 (N = 8) in the houses with a double mid-section. The latter case is a higher value, butt not double as might have been be supposed. The available data imply that activities connected with quernstones in both types of house were similar, regardless of the higher number of women or all inhabitants in the houses with a double mid-section. Some sort of collaboration between the inhabitants on contemporaneous in this kind of work cannot be excluded.

Somewhat different relationships were found in houses with a southern part and the proportion of functional types per house, in some cases above-average quernstone wear with less than 60 % of the original height of the stone preserved. The proportions of broad and relatively flat upper stones (UP3) and of higher broader lower stones (LO5) and conspicuously greater. At least within these types the supposition can be proven that in the houses with a southern part more intensive grinding was carried out than in houses without such construction features (see chap. 7.4.2). On the other hand, these tools in houses with a southern part were considerably less worn than those in other houses. In one house with a southern part the proportion of querns with below-average wear is double (Tab. 3.5.2.D). This can perhaps be explained by different rhythms of grinding in these houses, differing from the standard approach used in other houses. →Tabs. 3.5.2.A, 3.5.2.B, 3.5.2.C, 3.5.2.D.

3.5.3. The indicative value of querns as an index of the age of women in the household

In view of the inconclusive evidence of the quernstone refuse in those houses with a double mid-section, only the houses with a simple mid-section were studied in following analysis. The ordering of functional types within the phasal spaces shows clustering in the second and third factor around the medium sized types (LO4 and UP3), from which low upper stones (UP1), high lower stones (LO7) and others (UP2, LO5, LO6) can be separated out. The second and the third factors can be assumed to be less likely to be influenced by chronology.

The classification of the upper stones, in particular, by their massivity shows that average stones prevail in most phases. The phases dominated by low upper stones (UP1, UP2) may represent a higher proportion of very young, or alternatively old, women, whose physical strengths were lower than those of adult women of average age. The functional ratio of quern width and height would then correspond to the different capabilities of age groups.

The correspondence analysis of functional types within the space of phases 19 - 22, from which came a greater number of quernstones, provides a different picture. Phases 19, 21, and 22, which were included above in the groups of standard assemblages, are now separated primarily by the third factor. The second clearly represents the contrast between the upper and lower stones. In the third, the functional massivity of upper stones (UP1 - UP2 - UP3) appears. While phases 19 and 20 are focused around average artefacts (UP2), broader and more efficient upper stones (UP3) are typical for phase 21, but in the subsequent phase 22 only the smallest upper stones (UP1) appear. Thus across the whole period of four phases there is a clear tendency to increase the efficiency of grinding, followed by a decline. If the functional types within the third factor correspond to the physical capability of women, then the last phase of this period would have had a marked decrease in average age. It is supposed overall that the principal use of the

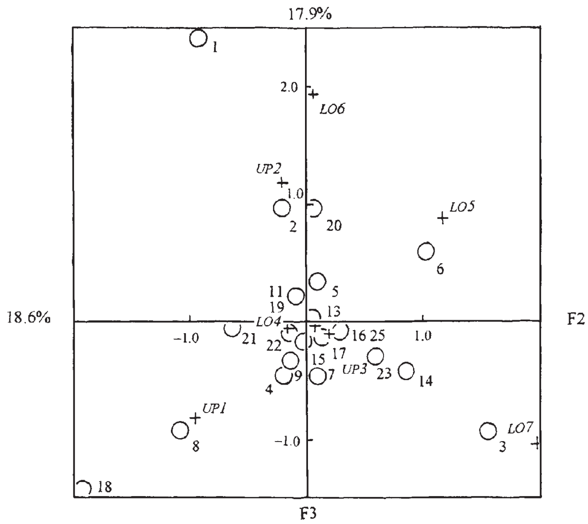


Fig. 3.5.3.a. Correspondence analysis of functional quern types in houses with simple mid-sections in phasal spaces. - Korespondenční analýza fukčních typů mlýnů v domech s jednoduchým středem.

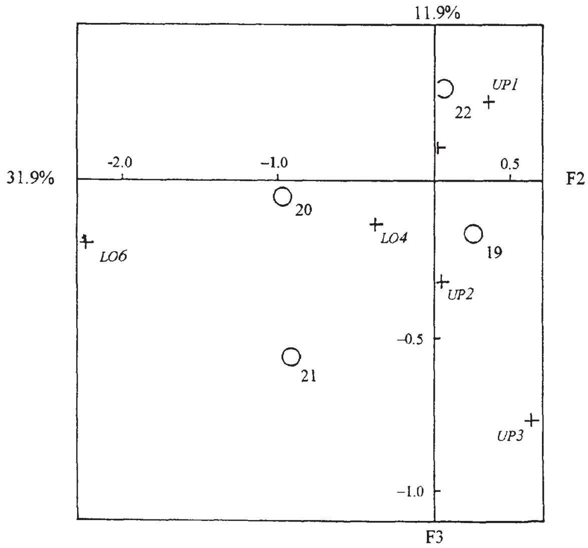


Fig. 3.5.3.b. Correspondence analysis of functional quern types in houses with a simple mid-section in the space of phases, 19-22. - Korespondenční analýza funkčních typů mlýnů v domech s jednoduchým středem v prostoru vybraných fází 19-22.

stones for food processing did not change over the phases.

3.6. Informative content from the point of view of continuity and discontinuity in techniques for ensuring subsistence

3.6.1. Functional classes within the space of the phases

The functional types of upper stones comprise three separate groups within the space of the phases, representing more their efficiency than their chronological sequence. In the first factor, the sequence starts with the least massive stone and goes through to the most massive, in the second the medium-sized stones (UP2) are separated from the others. Phases 13 and 19, and perhaps 11 and 15, show an equal proportion of all functional types. The class marked "others" is evidently connected only with some of them. The procurement of subsistence, in this case the processing of corn, was clearly well adapted to the social potential, and the efficiency of the tools did not remain constant. The overall tendency towards the most effective forms, which were represented by relatively broad upper stones (UP3), did not rule out the use smaller forms when necessary.

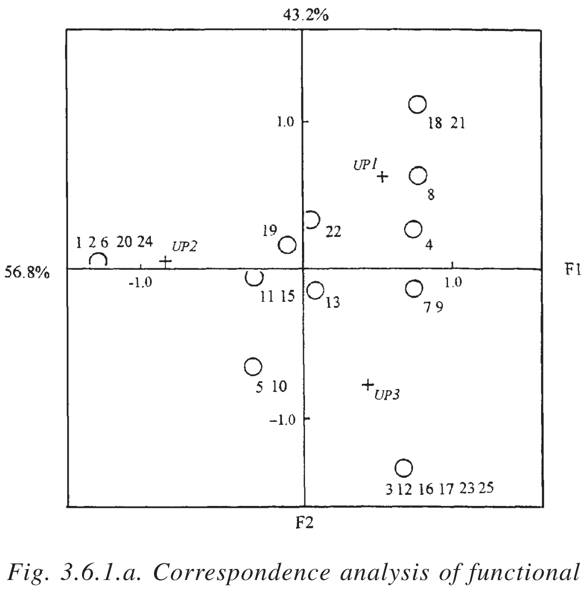


Fig. 3.6.1.a. Correspondence analysis of functional types of upper stones within the space of the phases. - Korespondenční analýza funkčních typů horních kamenů v prostoru fází.

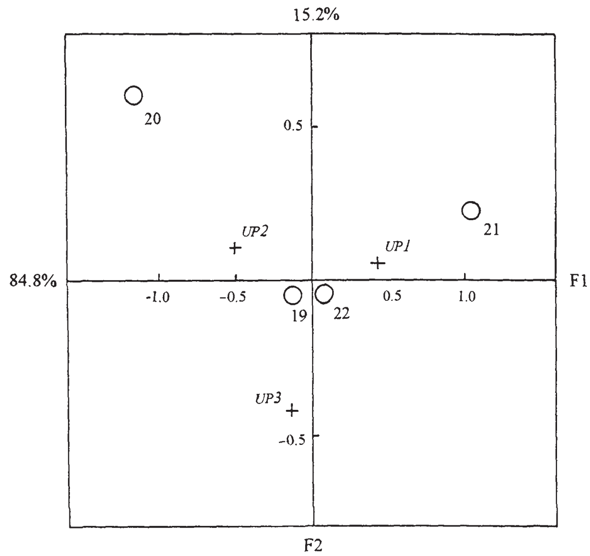


Fig. 3.6.1.b. Correspondence analysis of functional types of upper stones within the space of phases 19-22. - Korespondenční analýza funkčních typů horních kamenů v prostoru fází 19-22.

The correspondence analysis of the upper stones within the period of phases 19 - 22 showed that cycles of functional types among small (UP1) and medium-sized (UP2) stones were created in the second factor, balanced by the most massive types (UP3). The economic role of the smaller stones was complementary, and appeared only in some periods. The continuity of the social role of the querns was marked by the return to the category of optimal types, which from the point of subsistence and its procurement represented stable and efficient implements.

3.6.2. Functional classes in the spaces of complexes

Similarly as in the phasal spaces, the correspondence analysis of functional types of upper stones in house spaces markedly divided such areas. The houses are divided into types according to their size and their probable economic role at a given time. The principal type (UP3) grouped houses 96 and 162, which demonstrated above-average economic activity. The other types of stones were average or below average in their socio-economic significance within the house clusters.

The distribution of lower stones within the space of houses differs because the contemporary occurrence of lower and upper stones was not evidenced in all houses. The majority of the houses are focused around the small (LO4) and large (LO7) lower stones. The forms among these groups are more exceptional, LO5 corresponds with house 912 and LO6 with house 682. Both houses are exceptional for other reasons in phases 21 and perhaps 20. The interpretation of the economic significance of these types of lower stones is difficult within this context. If the majority of houses fall into groups with larger and smaller stones, then the latter two cases may connect the advantages of both forms situated between the extremes of the width-height index.

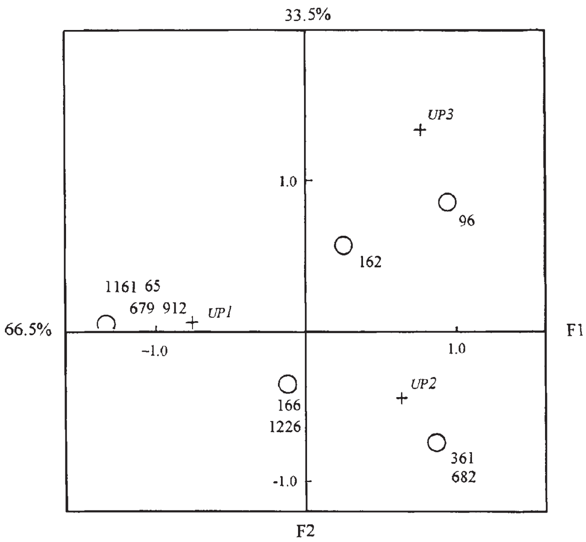


Fig. 3.6.2.a. Correspondence analysis of functional types of upper stones in the space of houses in phases 19-22. - Korespondenční analýza funkčních typů horních kamenů v prostoru domů z vybraných fází 19-22.

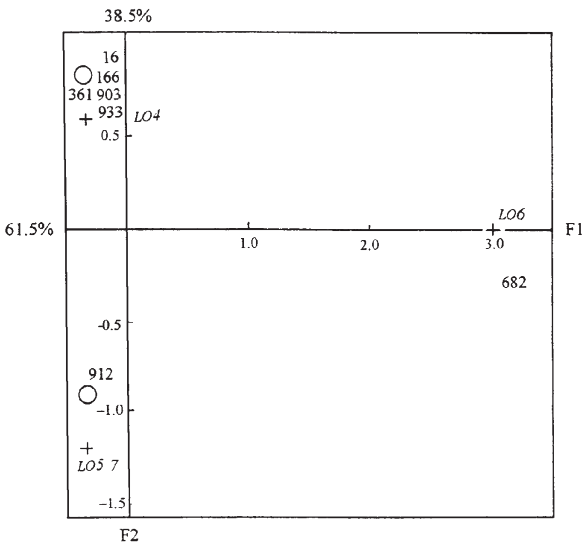


Fig. 3.6.2.b. Correspondence analysis of functional types of lower stones in the space of houses in phases 19-22. - Korespondenční analýza funkčních typů dolních kamenů v prostoru domů z vybraných fází 19-22.

3.7. The style of production technology for both parts of the querns in the context of ideas and the imagination

3.7.1. The symmetry of lower and upper stones

From the point of view of stylistic classification, the bipartite querns need to be considered as a unit. This makes it difficult in the majority of settlement refuse cases, when it is not common to find both pieces together. The most important find for these purposes remains the group of nine stones found in the construction pit complex of the Neolithic house at Irchonwelz dated to the Belgian Omalien (Constantin - Farruggia - Plateaux 1978). The majority of classifications to date can be described as morphological/stylistic, as they deal mostly with differences in the shaping of the working planes of the stones. Greater technological variability of forms is emphasised, which explains the absence of more chronologically sensitive quern types.

The Irchonwelz assemblage shows that the primary stylistic forms of querns divided by the length of the upper stones have unclear, overlapping limits. Form 2 (Zimmermann 1988: 724) which has two straight surfaces and the length of the upper stone equal to the breadth of the lower, can be described as the initial form. Straight surfaces are also supposed for other types at the beginning of their use. The classification criterion is thus useful only for pieces that have been sufficiently worn down. The first form is characterised by an upper stone that significantly overlaps the lower, with a resultant convexity in the polished surface in the transverse cross-section of the lower stone. The second form has similar polish on both stones, and the length of the upper stone corresponds to the width of the lower. The third form, on the other hand, has a polished concavity, where the upper stone is considerably shorter than the width of the lower (Zimmermann 1988: 724).

This basic classification, which can be labelled as stylistic, is weakened by the low standardisation among quern forms in the European Neolithic. The lower stones in particular are not entirely quadrangular, and their width is usually not the same along their length. A convex polish can also result if the upper stone only slightly exceeds the width of the lower (Irchonwelz, pit 3, fig. 15:1). On the other hand, a concave polish results from an upper stone equal in length to the width of the lower (Irchonwelz, pit 3, fig. 15:4). In the western region of the European Neolithic cultures, shorter upper stones are clearly prevalent, and after a certain period of use lower stones have a transverse section that is concave.

At Bylany, just as in LW8, longer upper stones prevail, themselves polished into a saddle shape, and the lower stones have a convex transverse section. Nevertheless, lower stones do not differ morphologically as much as, for example, querns from the south-western USA, where three forms have been distinguished: dish-like, true and flat (Adams 1993: 336). A. Zimmermann tried to throw light on the chronological and geographical distribution of primary stylistic forms in Europe. He formulated two hypotheses: 1) that high technology represented by saddle-like stones penetrated Central Europe in the earliest Neolithic, 2) that concave forms with shorter upper stones occur in the northern areas of Neolithic cultures, which had closer contact with coastal cultures (Zimmermann 1988: 741). In Greece, however, the classic bipartite flour quern appeared from the Bronze Age onwards. Earlier forms may have been used for pressing olives or grinding other foodstuffs (Runnels 1985: 35).

3.7.2. Stylistic classification of the lower stones

The original classification system used for querns (Pavlů 1991: 340) was based on the main stylistic characteristics of their form. These are primarily the form of the working surface in longitudinal and transverse section, a means of repairing individual sides differentiated for lower and upper stones, and sometimes the overall shaping of the stone. The descriptive classification was intended to provide a universal description of all of the theoretically possible forms and their fragments. For stylistic classification, it possible to draw out some of these basic classes.

For the time being, three stylistic groups of lower stones can be defined. These are, above all, the larger flat stones, usually without prepared bases and sides (codes 110+120). The second group consists of medium-sized and smaller flat stones, with evident preparation of the whole form into a quadrangle, and particularly the conspicuous preparation of the sides. Sometimes the underside too had been prepared, to make it parallel with the top. The sides might be angled (codes 210+220+310). The third group consists of less frequently occurring types of lower stones, of oval plan with carefully prepared sides. They resemble similar plano-convex forms of upper stones, but they differ in their use/wear traces (code 350).

3.7.3. Stylistic classification of the upper stones

As with the lower stones, the descriptive classifications employed for upper stones have been published previously (Pavlů 1991: 340). The first stylistic class of upper stones consists of saddle-like forms characterised by polished central sections so that the surface has a markedly convex shape. From the stylistic point of view it is not necessary divide according to height, as done for functional classification. Neither were the details of the preparation of the shorter sides considered, as they cannot ascertained for the majority of broken pieces (codes 510+530+550). The saddle-shaped stones polished on both sides were drawn out as a separate class (code 520). The author believes that the double-sided use required the deliberate preparation of the upper plane, which in the preceding types was usually left unprepared.

The third class is represented by plano-convex forms which were deliberately worked into a characteristic loaf-like form (codes 610+620). The less frequent flat upper stones comprise a separate class, and must represent stones with a straight cross-section (code 710). In a small number of cases at Bylany these need not have come from double querns; alternatively, they may be tools used for grinding other materials, such red-ochre.

3.7.4. The chronological variability of stylistic classes

Individual stylistic classes of upper and lower stones are sufficiently unevenly distributed within the phases that they form no regular pattern. The greatest number of stones appears in phase 19, with the great majority of stylistic classes. More than 10 % of the stones also appear in phases 21 and 22. Stylistic classes do not directly copy the variability of the settlement development dynamic, as was formerly assumed on the basis of the overall occurrence of the stones.

The first class of upper stones is the most frequently represented (22.3 %), and except for a maximum in phase 19 appears in smaller numbers in almost all of the phases. Saddle-like stones, as expected, are the most common type. Their numbers in subsequent phases vary between 2 and 6 %. Upper stones worn on both sides are only found in 6 examples, concentrating on the closing phases beginning with phase 21; an exception is a single find from phase 11. The remaining stylistic types of upper stones are represented equally in the majority of phases. The plano-convex loaf-like types concentrate in the middle and later period, and exceptionally in the 4th phase. The flat stones are absent in many phases, but appear more often in the later period. Among the stylistic types of lower stones the smaller stones with prepared sides are the most frequent (29.4 %) Their occurrence varies from 2 to 8 %, with local maxima in phases 19 and 21, which proves their overall exceptionality. ➔Tab. 3.7.4.A.

3.8. Kin and working groups in stylistically different presentations of querns

3.8.1. Quern prototypes

Because insufficient data made it impossible to define prototypes on the basis of their appearance in individual length and width groups, frequency in width and height classes was selected as a criterion. As demonstrated above, both measures are significant, both from the functional and stylistic points of view. The prototypes as the basic representatives of their tool categories, should contain everything from this point of view.

The majority of the lower stones concentrate within a width range of 140 mm - 220 mm, and height of 40 - 60 mm. Within this range, two classes of prototypes were also defined, when more than three examples in the given category. The first of these is defined with width limits of 140 - 180 mm and a height of 40 - 60 mm. The second prototype has a width of 220 mm and a height of 40 mm. Beyond these limits artefacts appear only exceptionally. One of these exceptions is a stone 280 mm wide and 160 mm high (feature no. 974: inv. no. 267 786).

The upper stones are focused more within the widths of 100 - 180 mm, and heights of 30 - 60 mm. The only class of prototype is defined by an appearance of more than three examples with widths of 100 - 160 mm and heights of 30 - 60 mm. Because, however, the height of the upper stones expressed bimodality, there were two subgroups defined for this prototype, with a height limit of 40 mm. ➔Tabs. 3.8.1.A, 3.8.1.B.

3.8.2. Prototypes within the spaces of phases and households

In the first factor of the correspondence analysis of prototypes within the spaces of phases, upper stones are separated from lower ones. In the second, two pairs of prototypes appeared: Prototype11+P32 and P20+P31. The third factor again separates the upper from the lower stones, but negatively. Both factors explain c.80 % of the variability on the prototypes. From the point of view of attribute values, the space of the second and the third factors appears to be significant, as within it the individual phases comprise three groups. The majority of phases concentrate in the centre around the pair P20+P31: phases 1 - 5, 7 - 8, 10, 13, 16, 20 - 22 and 24. Pairs of these querns represent the main prototypes of deliberately shaped millstones. These clearly have the highest informative potential within this artefact category, and thus covers the majority of the lifetime of the site.

The rest of phases are divided around P10 (phases 6, 9, 12, 17) or around P32 (11, 12, 18, 19). During these periods, the informative value of the querns could have been transposed to either the lower or the upper stones. The former case is of little relevance, as artefacts are made mainly from natural forms of raw materials. The latter case demonstrates greater interest in more elaborate and efficient upper stones. If these were larger, they could have been used better. During these periods, the informative impact was also at its peak.

Correspondence analysis of the prototypes in the space of houses of phases 19 - 22 yielded almost identical results. Along the second axis, only P31 is positively separated, while along the third axis the P10/P32 pair is separated from P31, and even more so from P20. In the centre of the second and the third axes lie houses 16, 96, 162, which are characterised by equipment of a higher informative value due to the presence of prototype P32. The situation of houses 361 and 682 is average. Houses

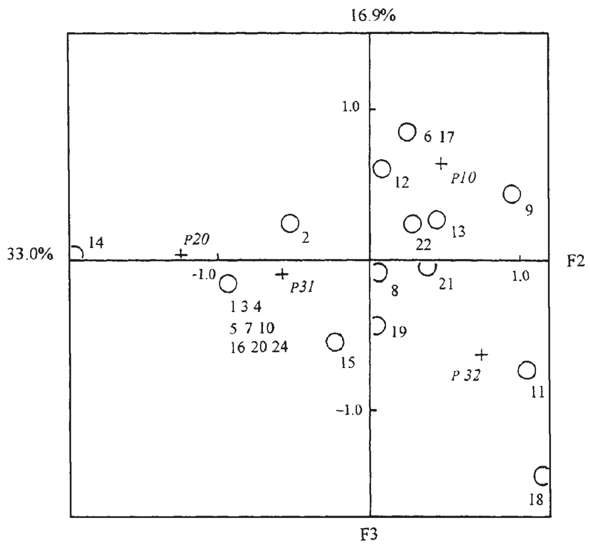


Fig. 3.8.2.a. Correspondence analysis of prototypes in the space of the phases. - Korespondenční analýza prototypů v prostoru fází.

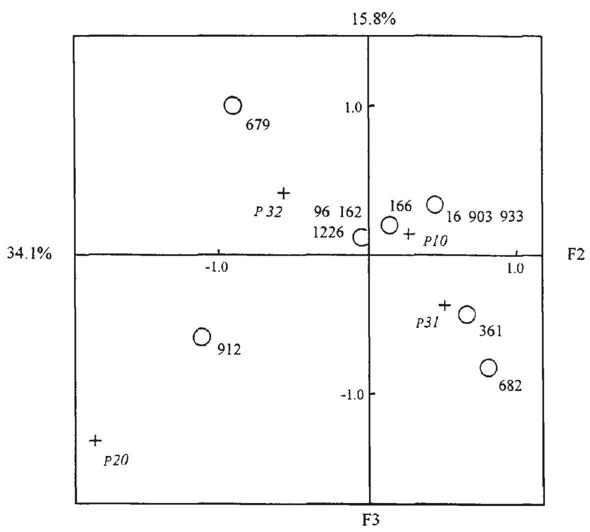


Fig. 3.8.2.b. Correspondence analysis of prototypes in houses of phases 19-22. - Korespondenční analýza prototypů v domech z fází 19-22.

912 and 679 are again extremes, as it was in these that the largest groups of quernstones were found; they are also unusual in their construction.

3.8.3. The index value of quernstones as a symbol of life

The indices at our disposal for tracing the Neolithic might be taken as indicating that querns carry the value of a symbol of life and death in different contexts. In the Bible it is said: "No man shall take a mill or an upper millstone in pledge; for he would be taking a life in pledge" (Deuteronomy Ch.24,v.6 - Rev. Std. ed.). If this began with the Neolithic, then it is doubtful that the transcendental role of quernstones was developed. Current analysis enables a more collective view than that of the individual symbolic nature of querns; they only exceptionally form part of grave inventories (cf. Zápotocká 1998a).

The refuse made up of quernstones was dispersed randomly at a site, at least in terms of their symbolic role; nor does the hoard from Irchonwelz (see above) tell us anything more about this. The situation is different in the fills of Neolithic roundels, where quernstones have been found in high concentrations many times. At Vedrovice (Moravia), a whole pile of quernstones was found in the centre of the ditch fill near the gate (Podborský 1999). In an Early Medieval context, querns might have been used as a symbol of the closing of one Slavic hill fort (Thunau, Austria) after its capture by the Bavarians, as interpreted by Friesinger-Friesinger (1991: 22). The prehistoric roots of the Roman Lex cannot be ruled out.

3.9. The historical content of the category of quernstones in terms of the expression and preservation of cultural tradition

3.9.1. Stylistic classes in the phases

The stylistic classes create a unified cluster in the space of the phases, from which only types SU2, SU4 and SL7 were separate; all of these can be considered formal, non-standard types. The isolation of settlement phases 24 and 25 can be interpreted by their extraordinary position at the end of the site's development.

3.9.2. Stylistic types in the space of houses

Within the space of the households from the period of phases 19 - 22, which are better equipped with quernstones, a standard core of lower stone stylistic types (SL5, SL6) forms. The houses are average members of the core representing their phases; house 912, however, is exceptional because of the stone refuse concentration which consisted exclu-

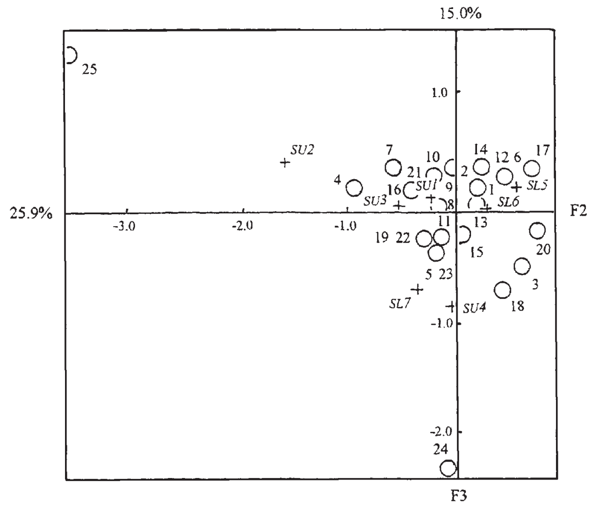


Fig. 3.9.1.a. Stylistic types in the phases. - Stylistické typy ve fázích.

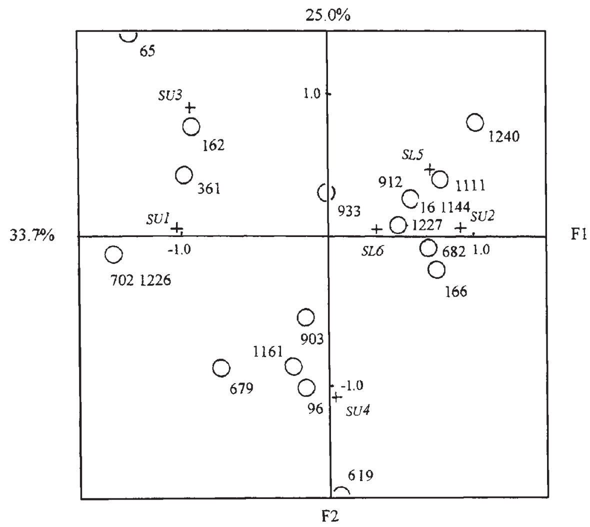


Fig. 3.9.2.a. Correspondence analysis of stylistic types of quernstones in households of phases 19-22. - Korespondenční analýza stylistických typů mlýnů v domech z fází 19-22.

sively of lower stones. Around the core of houses with lower stones, other groups of houses are dispersed according to individual types of upper stones.

An interesting position is held by houses 166 and 682, which would represent double saddle querns.

3.9.3. The informative value of quernstones

The communication mediated by the bipartite querns had, according to the results of correspondence analyses of different levels of classification, the character of collective artefacts rather than of individual ones. This differentiates them from ceramics, which provide more information about individual artefacts. The stones - the utility of which is inseparable from the process of food preparation and consequently from the level of subsistence provision for human groups-became at a symbolic level a medium of communication for household members, regardless of whether they themselves were a tool used by women. The absence of finds in women's graves, the supposed collaboration of men and women during the production of these stones, and their relations to demographic size, e.g. in houses with a double mid-section, all lead to the conclusion that they were, from the informative point of view, connected more with the household as a whole than with its individual members. This conclusion also corresponds to the higher numbers in households with a southern, economically exposed section.

The quernstones can be considered as representatives of group characteristics that in some way hide the communication between groups, and in a sense confuse each other; consequently the space of houses is markedly divided. As a medium of cultural traditions, they act only during the limited periods when the more detailed attributes are followed. The morphological development of primary stylistic forms in space and time is not remarkable and contains many exceptions. The form of collective communication mediated through these artefacts is very peculiar and it differs from individual communication mediated by another artefacts.

Attribute	Range	Average	Standard dev.	N=	Modus
LENGTH IN MM	252 - 490	409.5	+/-87.1	10	
WIDTH IN MM	114 - 300	185.2	42.7	69	150,200,250
HEIGHT IN MM	20 - 160	47.6	20.8	136	44
WEIGHT IN G	3600 - 16400	8798.0	5289.1	10	
INDEX W/L	.396 - .972	.561	.156	10	

Tab. 3.1.2.A. Summary of the statistic characteristics of the attributes measured on lower stones. - Statistické charakteristiky měřených znaků na dolních kamenech.

Attribute	Range	Average	Standard dev.	N=	Modus
LENGTH IN MM	287 - 371	319.2	+/-26.1	12	
WIDTH IN MM	84 - 180	129.4	18.9	96	108, 126, 144
HIGHT IN MM	20 - 84	40.8	11.7	151	
WEIGHT IN G	2000 - 4000	2425.4	557.5	12	
INDEX W/L	.36 - .522	.429	.050	12	.414

Tab. 3.1.3.A. Summary of the statistic characteristics of the attributes measured on upper stones. - Statistické charakteristiky měřených znaků na horních kamenech.

Grindstones	LOWER	UPPER	OTHER	%	N=
VERY NARROW	3.9	0.0	0.0	3.9	17
NARROW	6.9	0.0	0.0	6.9	30
MEDIUM	3.2	0.0	0.0	3.2	14
BROAD	1.8	0.0	0.0	1.8	8
NARROW	0.0	3.0	0.0	3.0	13
MEDIUM	0.0	7.1	0.0	7.1	31
BROAD	0.0	6.4	0.0	6.4	28
VERY BROAD	0.0	5.5	0.0	5.5	24
OTHER	19.5	14.9	27.6	62.1	270
%	35.4	37.0	27.6	100.0	
N=	154	161	120	435	

Tab. 3.1.4.A. Relationship of the basic forms (comp. Fig. 3.0.3.a) of quernstones and formal types. - Vztah základních forem (srov. obr. 3.0.3.a) mlýnů a formálních typů.

Phase	LOWER	UPPER	OTHER	%	N=	%	No. of houses	Ratio
1	66.7	33.3	0.0	100.0	3	1.1	2	1.5
2	28.6	42.9	28.6	100.0	7	2.5	3	2.3
3	66.7	33.3	0.0	100.0	3	1.1	3	1.0
4	0.0	55.6	44.4	100.0	9	3.2	4	2.2
5	20.0	60.0	20.0	100.0	5	1.8	2	2.5
6	57.1	14.3	28.6	100.0	7	2.5	4	1.8
7	0.0	28.6	71.4	100.0	7	2.5	2	3.5
8	20.0	40.0	40.0	100.0	15	5.4	2	7.5
9	33.3	50.0	16.7	100.0	6	2.1	3	2.0
10	25.0	50.0	25.0	100.0	8	2.9	6	1.3
11	50.0	40.0	10.0	100.0	10	3.6	5	2.0
12	75.0	25.0	0.0	100.0	4	1.4	1	4.0
13	55.6	44.4	0.0	100.0	9	3.2	7	1.1
14	37.5	25.0	37.5	100.0	8	2.9	11	0.7
15	35.3	35.3	29.4	100.0	17	6.1	9	1.9
16	33.3	66.7	0.0	100.0	3	1.1	5	0.6
17	77.8	11.1	11.1	100.0	9	3.2	5	1.8
18	33.3	16.7	50.0	100.0	6	2.1	4	1.5
19	30.0	50.0	20.0	100.0	50	17.9	9	5.5
20	50.0	16.7	33.3	100.0	6	2.1	5	1.2

Phase	LOWER	UPPER	OTHER	%	N=	%	No. of houses	Ratio
21	51.4	18.9	29.7	100.0	37	13.2	8	4.5
22	23.3	43.3	33.3	100.0	30	10.7	7	4.3
23	18.8	18.8	62.5	100.0	16	5.7	6	2.7
24	0.0	100.0	0.0	100.0	1	0.4	1	1.0
25	0.0	25.0	75.0	100.0	4	1.4	1	4.0
%	34.6	36.1	29.3	100.0				
N=	97	101	82		280	100.0		

Tab. 3.1.5.A. Relative occurrence of basic forms within the phases. - Relativní výskyt základních forem ve fázích.

Phase	VERY NARROW	NARROW	MEDIUM	BROAD	NARROW	MEDIUM	BROAD	VERY BROAD	OTHER	%	N=
1	33.3	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	100.0	3
2	14.3	0.0	0.0	0.0	0.0	42.9	0.0	0.0	42.9	100.0	7
3	0.0	0.0	0.0	33.3	0.0	0.0	0.0	33.3	33.3	100.0	3
4	0.0	0.0	0.0	0.0	11.1	0.0	11.1	11.1	66.7	100.0	9
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	60.0	100.0	5
6	28.6	0.0	28.6	0.0	14.3	0.0	0.0	0.0	28.6	100.0	7
7	0.0	0.0	0.0	0.0	14.3	0.0	14.3	0.0	71.4	100.0	7
8	6.7	6.7	0.0	0.0	6.7	13.3	6.7	6.7	53.3	100.0	15
9	16.7	16.7	0.0	0.0	16.7	16.7	0.0	0.0	33.3	100.0	6
10	0.0	0.0	25.0	0.0	0.0	0.0	12.5	12.5	50.0	100.0	8
11	0.0	10.0	0.0	0.0	0.0	20.0	10.0	10.0	50.0	100.0	10
12	25.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	50.0	100.0	4
13	0.0	33.3	11.1	0.0	22.2	11.1	0.0	0.0	22.2	100.0	9
14	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	75.0	100.0	8
15	0.0	5.9	0.0	0.0	0.0	5.9	11.8	5.9	70.6	100.0	17
16	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.7	100.0	3
17	11.1	11.1	0.0	0.0	0.0	0.0	11.1	0.0	66.7	100.0	9
18	28.6	14.3	0.0	0.0	0.0	14.3	0.0	0.0	42.9	100.0	7
19	0.0	6.0	0.0	2.0	0.0	6.0	8.0	6.0	72.0	100.0	50
20	0.0	16.7	0.0	0.0	0.0	0.0	16.7	0.0	66.7	100.0	6
21	5.3	0.0	2.6	5.3	0.0	2.6	2.6	0.0	81.6	100.0	38
22	9.4	3.1	0.0	0.0	3.1	9.4	3.1	3.1	68.7	100.0	32
23	0.0	0.0	6.2	0.0	0.0	6.2	0.0	0.0	87.5	100.0	16
24	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	1
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	75.0	100.0	4
%	5.3	4.9	3.2	1.4	2.8	7.0	6.3	4.6	64.4	100.0	
N=	15	14	9	4	8	20	18	13	183		284

Tab. 3.1.5.B. Relative occurrence of formal types (comp. Fig. 3.0.3.) in the phases. - Relativní výskyt formálních typů (srov. obr. 3.0.3.a) ve fázích.

Raw materials	LOWER	UPPER	OTHER	%	N=
L1	33.5	30.0	25.2	88.7	384
L2	0.5	0.5	0.2	1.2	5
L3	0.0	0.2	0.0	0.2	1
Z1	0.2	0.0	0.0	0.2	1
Z2	0.9	6.0	0.7	7.6	33
OTHER	0.2	0.2	1.6	2.1	9
%	35.3	37.0	27.7	100.0	
N=	153	160	120		433

Tab. 3.2.2.A. Correlation of basic forms and raw material ranges (L-local, Z-zonal). - Korelace základních forem mlýnů a surovinových okruhů (L-lokální, Z-zonální).

Raw materials	VERY NARROW	NARROW	MEDIUM	BROAD	NARROW	MEDIUM	BROAD	VERY BROAD	OTHER	%	N =
L1	4.1	6.4	3.4	2.1	2.3	6.2	6.2	4.8	53.4	88.8	389
L2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.7	1.1	5
L3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	1
Z1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	1
Z2	0.0	0.2	0.0	0.0	0.7	0.7	0.2	0.7	5.0	7.5	33
OTHER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1	9
%	4.1	6.8	3.4	2.1	3.0	7.1	6.6	5.5	61.4	100.0	
N=	18	30	15	9	13	31	29	24	269		438

Tab. 3.2.2.B. Correlation of formal types (comp. Fig. 3.0.3.a) and raw material ranges (L-local, Z-zonal). - Korelace formálních typů (srov. obr. 3.0.3.a) a surovinových okruhů (L-lokální, Z-zonální).

House mid-section (N=)	LOWER	UPPER	OTHER	
	N/ratio	N/ratio	N/ratio	N/ratio
SIMPLE (111)	470.42	560.50	410.37	1441.30
DOUBLE (24)	241.00	200.83	160.67	602.50
N=(135)	710.52	760.56	570.42	2041.51

Tab. 3.2.3.A. Occurrence of basic forms of querns in houses with a simple and double mid-sections. - Výskyt základních forem mlýnů v domech s jednoduchou a zdvojenou střední částí.

Phase	A=<.60	B>.60	N=
1	100.0	0.0	1
2	25.0	75.0	4
3	0.0	0.0	0
4	50.0	50.0	2
5	0.0	100.0	2
6	0.0	100.0	2
7	100.0	0.0	1
8	0.0	100.0	4
9	0.0	100.0	1
10	50.0	50.0	4
11	67.0	33.0	3
12	0.0	100.0	2
13	100.0	0.0	1
14	100.0	0.0	1
15	50.0	0.0	4
16	100.0	0.0	1
17	100.0	0.0	1
18	0.0	100.0	1
19	40.0	60.0	12
20	100.0	0.0	1
21	0.0	100.0	1
22	50.0	50.0	8
23	0.0	0.0	0
24	0.0	0.0	0
25	0.0	100.0	1
N=	23	35	58

Tab. 3.4.2.A. Wear indices by phase (A-above-average, B-under-average). - Index opotřebení ve fázích (A-nadprůměrný, B-podprůměrný).

Index	UP1	UP2	UP3	LO4	LO5	LO6	LO7	N=
A=<.60	20.0	42.0	45.0	20.0	80.0	0.0	100.0	26
B>.60	80.0	58.0	55.0	80.0	20.0	0.0	0.0	45
N=	20	17	18	10	5	0	1	71

Tab. 3.4.2.B. Wear indices of functional types (codes comp. Fig. 3.0.3.a, A-above-average, B-under-average). - Index opotřebení funkčních typů (kódy srov. obr. 3.0.3.a, A-nadprůměrný, B-podprůměrný).

Phase	UP1	UP2	UP3	LO4	LO5	LO6	LO7		N=
1	0.0	50.0	0.0	0.0	0.0	50.0	0.0	100.0	2
2	0.0	75.0	0.0	25.0	0.0	0.0	0.0	100.0	4
3	0.0	0.0	50.0	0.0	0.0	0.0	50.0	100.0	2
4	66.7	0.0	33.3	0.0	0.0	0.0	0.0	100.0	3
5	0.0	50.0	50.0	0.0	0.0	0.0	0.0	100.0	2
6	0.0	20.0	0.0	40.0	40.0	0.0	0.0	100.0	5
7	50.0	0.0	50.0	0.0	0.0	0.0	0.0	100.0	2
8	57.1	0.0	14.3	28.6	0.0	0.0	0.0	100.0	7
9	25.0	0.0	25.0	50.0	0.0	0.0	0.0	100.0	4
10	0.0	33.3	33.3	0.0	33.3	0.0	0.0	100.0	3
11	20.0	40.0	20.0	20.0	0.0	0.0	0.0	100.0	5
12	0.0	0.0	50.0	50.0	0.0	0.0	0.0	100.0	2
13	14.3	14.3	14.3	42.9	14.3	0.0	0.0	100.0	7
14	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	2
15	20.0	40.0	20.0	20.0	0.0	0.0	0.0	100.0	5
16	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	1
17	0.0	0.0	33.3	66.7	0.0	0.0	0.0	100.0	3
18	33.3	0.0	0.0	66.7	0.0	0.0	0.0	100.0	3
19	28.6	28.6	14.3	21.4	7.1	0.0	0.0	100.0	14
20	0.0	50.0	0.0	0.0	0.0	50.0	0.0	100.0	2
21	28.6	0.0	0.0	28.6	28.6	0.0	14.3	100.0	7
22	30.0	20.0	10.0	40.0	0.0	0.0	0.0	100.0	10
23	0.0	0.0	50.0	0.0	0.0	0.0	50.0	100.0	2
24	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	1
25	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	1
%	21.2	20.2	18.2	26.3	7.1	2.0	5.1	100.0	
N=	21	20	18	26	7	2	5		99

Tab. 3.4.4.A. Functional types types (codes comp. Fig. 3.0.3.a) of quernstones by phase. - Funkční typy (kódy srov. obr. 3.0.3.a) ve fázích.

House mid-section (N)	Functional types							
	UP1	UP2	UP3	LO4	LO5	LO6	LO7	(N/ratio)
SIMPLE (111)	150.14	140.13	90.08	140.13	30.03	10.01	30.03	590.53
DOUBLE (24)	30.12	30.12	30.12	40.17	30.12	00.0	10.04	170.71
N=(135)	180.13	170.12	120.09	180.13	60.04	10.01	40.03	760.56

Tab. 3.5.2.A. Number and proportion of functional types (codes comp. Fig. 3.0.3.a) of quernstones in houses with simple and double mid-section. - Počet a podíl funkčních typů (kódy srov. obr. 3.0.3.a) mlýnů v domech s jednoduchým a zdvojeným středem.

House mid-section (N)	Average index of wear			
	<=0.60	>0.60	(N/ratio)	of wear
SIMPLE (111)	170.15	160.14	330.30	0.618+/-0.172
DOUBLE (24)	40.17	40.17	80.33	0.632+/-0.159
N=(135)	210.16	200.15	410.30	

Tab. 3.5.2.B. Number and proportion of stones by wear in houses with simple and double mid-section. - Počet a podíl kamenů podle opotřebení v domech s jednoduchou a zdvojenou střední částí.

House (N)	Functional types							
and southern section	UP1	UP2	UP3	LO4	LO5	LO6	LO7	(N/ratio)
ABSENT (101)	120.12	120.12	60.06	110.11	20.02	0	20.02	450.44
PRESENT (37)	60.16	50.14	60.16	70.19	40.11	10.03	20.05	310.84
N=(138)	18	17	12	18	6	1	4	76

Tab. 3.5.2.C. Number and proportion of functional types (codes comp. Fig. 3.0.3.a) of quernstones in houses with a southern section. - Počet a podíl funkčních typů (kódy srov. obr. 3.0.3.a) mlýnů v domech s jižní částí.

House and southern section	Average index of wear		
	<=0.60	>0.60%	(N/ratio)
ABSENT (101)	160.19	120.12	280.28
PRESENT (37)	40.11	90.24	130.35
N=(138)	20	21	41

Tab. 3.5.2.D. Number and proportion of stones by wear in houses with a southern section. - Počet a podíl kamenů podle opotřebení v domech s jižní částí.

Phase / stylistic types	SU1	SU2	SU3	SU4	SL5	SL6	SL7	%	N=
1	33.3	0.0	0.0	0.0	0.0	66.7	0.0	100.0	3
2	60.0	0.0	0.0	0.0	20.0	20.0	0.0	100.0	5
3	0.0	0.0	0.0	33.3	33.3	33.3	0.0	100.0	3
4	40.0	0.0	60.0	0.0	0.0	0.0	0.0	100.0	5
5	50.0	0.0	0.0	25.0	0.0	25.0	0.0	100.0	4
6	20.0	0.0	0.0	0.0	20.0	60.0	0.0	100.0	5
7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2
8	33.3	0.0	22.2	11.1	11.1	22.2	0.0	100.0	9
9	20.0	0.0	40.0	0.0	20.0	20.0	0.0	100.0	5
10	50.0	0.0	16.7	0.0	16.7	16.7	0.0	100.0	6
11	11.1	11.1	11.1	11.1	11.1	44.4	0.0	100.0	9
12	25.0	0.0	0.0	0.0	25.0	50.0	0.0	100.0	4
13	22.2	0.0	11.1	11.1	22.2	33.3	0.0	100.0	9
14	20.0	0.0	20.0	0.0	40.0	20.0	0.0	100.0	5
15	16.7	0.0	16.7	16.7	8.3	41.7	0.0	100.0	12
16	33.3	0.0	33.3	0.0	0.0	33.3	0.0	100.0	3
17	12.5	0.0	0.0	0.0	37.5	50.0	0.0	100.0	8
18	0.0	0.0	0.0	33.3	0.0	66.7	0.0	100.0	3
19	28.2	0.0	17.9	17.9	10.3	23.1	2.6	100.0	39
20	0.0	0.0	0.0	25.0	50.0	25.0	0.0	100.0	4
21	7.7	3.8	3.8	11.5	42.3	30.8	0.0	100.0	26
22	20.0	10.0	10.0	25.0	10.0	25.0	0.0	100.0	20
23	0.0	16.7	0.0	33.3	33.3	16.7	0.0	100.0	6
24	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	1
25	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	1
%	22.3	3.0	12.2	13.7	18.8	29.4	0.5	100.0	
N=	44	6	24	27	37	58	1		197

Tab. 3.7.4.A. Stylistic types (codes comp. Fig. 3.0.3.a) in the phases. - Stylistické typy (kódy srov. obr. 3.0.3.a) ve fázích.

Height / width in mm	100	120	140	160	180	200	220	240	260	280	300	>300	N=
20	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	1	1	0	2	1	0	0	0	0	0	0	5
40	0	0	**4**	**5**	2	2	**5**	2	0	0	0	0	20
50	0	0	3	**5**	**4**	0	1	2	0	1	0	0	16
60	0	0	0	2	**4**	0	1	0	1	1	0	0	9
70	0	0	0	0	2	0	1	0	0	1	0	0	4
80	0	0	0	0	2	0	0	0	0	0	1	0	3
90	0	0	0	0	1	1	0	0	0	1	0	0	3
100	0	0	0	0	0	0	0	0	0	1	0	0	1
110	0	0	0	0	1	0	0	1	0	0	0	0	2
120	0	0	0	0	1	0	0	0	0	0	0	0	1
130	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	1	0	0	1
N=	0	1	8	12	19	4	8	5	1	6	1	0	65

Tab. 3.8.1.A. Prototypes (bold) of lower stones. - Prototypy (tučně) dolních kamenů.

Height / width in mm	100	120	140	160	180	200	N=
20	0	1	1	0	0	0	2
30	0	3	**8**	2	1	0	14
40	**4**	**9**	**11**	**13**	2	0	39
50	2	**12**	**10**	**5**	0	0	29
60	0	**5**	2	1	0	0	8
70	0	1	1	0	0	0	2
80	0	0	0	1	0	0	1
90	0	0	1	0	0	0	1
100	0	0	0	0	0	0	0
N=	6	31	34	22	3	0	96

Tab. 3.8.1.B Prototypes (bold) of upper stones. - Prototypy (tučně) horních kamenů.

"Jeune ou vieux, le potier doit son style et son savoir-faire à la maisonnée où il vit..."
(Claude Lévi-Strauss 1985: 237)

4. Vessels as implements

4.0. Principles of Linear Pottery Culture ceramics morphology

4.0.1. Classification of forms

The study of Linear Pottery Culture ceramic forms remained for a long time under the shadow of decorations analysis, being a category that is less variable and thus unsuitable for spatio-temporal classification constructions. The basic developmental trend from bi-conical forms to pear-shaped forms (Modderman 1988: 112) has regional variations which have not yet been characterised in any detail. The morphology of forms in the Neolithic period has been far better elaborated for Stroke Ornamented Pottery Culture ceramics (Zápotocká 1970, Kazdová 1988) and for Moravian Painted Pottery Culture ceramics (Podborský, Kazdová - Weber 1977). Within later cultures, morphology is considered an important category for knowledge of these forms. The importance of the analysis of forms grows in later prehistoric periods, when rich decoration disappeared: this is the case, for example, of the late Neolithic Late Lengyel Horizon in Bohemia. For later cultures, more detailed metrics are used (Burger 1988: 42) or an alternative classification, based on the multi-dimensional analysis of such metrics, is constructed (Whallon 1982).

4.0.2. The morphology of the Bylany ceramics

The descriptive system originally elaborated for the Bylany ceramics separately described the particular parts of the vessel forms. Rims were classified according to their angle, vessel walls according to their form and the position of the belly, and bases according to their relation to the walls. In the event that a whole artefact was discovered, the separate descriptive parts could be added together (Soudský 1967). Recently, a hierarchical taxonomic system was developed, which begins with the metrics of whole vessels. The following categories are defined within this system, in decreasing order: classes, forms, series, types and variants. Within these concepts, the materials of the Elbe (Labe) region were classified first, and the relationships of this region to neighbouring regions were then characterised (Rulf 1997b).

A similar descriptive system to that employed at Bylany had previously been developed for the Rhineland region of the western LnK area. The principal forms were defined as paradigmatic classes according to the index of the maximum diameter of the neck and the diameter of the belly. In addition, other variants were recognised according to the details of the base and walls. The system was completed with detailed variants of rim terminations and preparation (Gabriel 1979, I:12, II: supplement 3, 4).

Later, another sophisticated descriptive system was constructed for the same area. Data concerning the description of the forms were stored automatically - points in polar co-ordinates were measured at regular distances, which later enabled automatic classification. This was selected as the optimal method from among the various possibilities for automatic description (Stehli - Zimmermann 1980). This descriptive system has not, however, been used for the chronology of forms. In combination with linear decoration, it became the base for a sizeable study of social relationships at Neolithic sites. This study is in fact the first one of its kind at the Frankfurter School (Frirdrich 1994). In connection with this, it should be noted that socio-economic forms had already been abandoned (Van der Velde 1979:13).

4.0.3. Situational analysis of forms

In this chapter, the attributes are organised according to the design of the situational analysis, where attributes are selected according to their interpretative potential. The physical substance of vessels is

	TECHNIQUES AND MEASURES	ATTRIBUTES				
STYLE	prototypes	GEOMETRY	globular	elipsoid	ovoid	Q
	arrangement of rim					
	binding	SYMMETRY	rotate	ovaloid	asymmetrical	P
	real symbolic none	ORIENTATION	pots	covers ...		O
		COMPOSITION	IJ+G+"TO" IJ+"LO"+"PO" IJ ("NO")			N
	classes of pottery	FORMING	slabs, modelling, moulding			M
		FIRING	oxydising, reduction, combined			L
DESIGN	rim angle with neck (N/A) without neck hemispherical b. (<95°) bowls (>95°) rim diameter orifice diameter	SAFETY AND ACCESSIBILITY OF CONTENT				I J
	volume	CAPACITY				K
	protrusions lugs handles	PORTABILITY				G
		LIFE SPAN				H
	base	STABILITY				F
	round flat flat with round edge	MATERIAL AND TEMPERING				D E
FORM	characteristic points (1-2-3)	ANATOMY				C
	wall thickness (<7 mm) weight					
	index = maximum diameter/height	DIMENSIONS AND PROPORTIONS				B
	fine/coarse	WARE				A

"SHASI" code		small	large	
		6 < 18 cm	18 < 50 cm	bowls
a	very open	1	2	
b	open	3	4	
c	slightly open	5	6	
		4 < 14 cm	14 < 46 cm	hemisph. b.
d	slightly enclosed	7	8	
e	enclosed	9	10	
f	very enclosed	11	12	
g	neck 4 < 16 cm / 16 < 40 cm	13	14	jars

"MATE" code	organic	anorganic	none
floated	1	3	5
unfloated	2	4	6

"ANAT" code	bowls	hemispherical bowls	jars
thin-walled			
thick-walled			

Fig. 4.0.3.a. Design of the situation analysis of the shapes of vessels. - Schéma situační analýzy tvarů nádob.

described by their anatomy, based on simple metrics. The design of forms is described, where functional attributes such as the angle of the rim or rim diameter were proven (Pavlů 1997). From these attributes many other properties of the vessels can be analysed: security and accessibility of the content, capacity, stability, portability, life-span, and so forth.

Finally, other attributes were used for the characteristics of the style of LnK forms. This system of technical elements, metrics and attributes (Fig. 4.0.3.a) enables the interpretation of data in spatio-temporal contexts, and answers to be sought to a standard set of questions, overcoming the common problems of cultural chronology (Pavlů 1997: 97). The functional analysis resulted into the definition of functional sets, while stylistic analysis resulted in the definition of prototypes and their role at the site. The earliest known Neolithic vessels in Central Europe represent, from this point of view alone, a sample of the forms that were also known in other Neolithic cultures.

4.1. Principal classification of forms

4.1.1. The forms of the earliest examples of pottery

The earliest pottery forms were derived from the natural forms of objects that could be used as models, or can be compared with forms made from other materials. In the case of the Central European Neolithic period, precursors can be sought in the Near East and in the Balkans, where such pottery was produced several thousand years earlier. The early Neolithic pottery from the Franchthi Cave on the south-eastern shore of the Peloponnese, contains highly diversified forms (Perlès - Vitelli 1994: 230) comparable with geometric forms of different symmetry. From the rich diversity of forms in the early Neolithic cultures of South-eastern Europe, only the principal formal spectrum appeared in Central Europe.

4.1.2. The characteristic points of forms

The profile of the vessels can be completely described as part of a geometric curve (Smith 1985: 260, Juhl 1995, 50), and can theoretically be described by a more or less complicated mathematical equation. Such a description is, however, not particularly practical, and regarding hand-made pottery is inadequate. On every mathematical curve, however, characteristic points can be distinguished which are important for mathematical description, usually representing its extremes or points of limitation. In the case of prehistoric pottery, the complete mathematical curve thus elaborated is relatively durable, and therefore the importance of several simple diagnostic points increases (Shepard 1961: 226). The following types of such points can be distinguished: ends, inflections, vertical tangents and edge points (Rice 1987: 218).

4.1.3. Descriptive system for vessels

The vessels of the Linear Pottery Culture are much less differentiated than the vessels of later prehistoric cultures; their content can be compared to the genetically earlier Starčevo-Körös culture (Pavúk 1980: 50). In their forms of ceramics, both cultures represent a stylistic assemblage consisting of globular rotated forms. The differences between the ideal geometric forms, usually a sphere or its parts, cannot be evaluated as stylistically different types. The respective flattening or asymmetrical curve of the wall results rather from the non-standardised production by hand, than from the deliberate shaping of the vessels.

The more striking differences, such as, for example, the bi-conical bellies of the earliest LnK vessels or the pear-shaped forms of the later period, are limited to shorter time periods and to only some of the regions. The sphere comprises of the principal anatomic plan of the Neolithic forms. There is an optimal relation between the amount of material used for this purpose, and the space enclosed by the vessel. It is not possible to suppose that the women producing the pottery were conscious of these relations - they were more likely the result of lifelong experience, reflected in motor-habit capabilities. Spheroid characteristics form the basis of the descriptive systems for Neolithic forms.

4.1.4. Vessels of the Linear Pottery Culture

A classification of forms for the purpose of analysing the finds at Bylany was developed at the beginnings of the 1960's, together with a formal

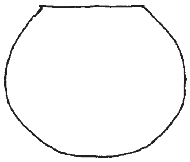
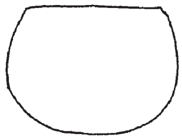
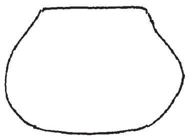
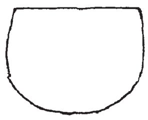
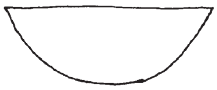
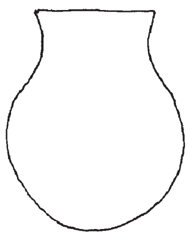
	FORMS		CODES		DESCRIPTION	
HEMISPHERICAL POTS	A		100 121 131 132 140 141	1	hemispherical pots with inverted rim	1.0 %
	B		200 230 231 232 233 240 241 242 243 210	2	hemispherical pots with slightly inverted rim	57.8 %
	C		600 631 362 633 640 641 642	3	inverted or slightly inverted pots with s-formed rim	1.0 %
	D		300 310 330 331 332 333 340 341 343	4	high hemispherical pots with slightly inverted rim	9.6 %
BOWLS	E		250 251 350 359	5	small spherical bowls	1.6 %
	F		400 410 412 430 431	6	high opened deep bowls	7.0 %
	G		450 451 458 459	7	small opened shallow bowls	13.0 %
	H		500 510 540 550 558 559	8	very opened bowls	0.9 %
JARS	I		220 320 322 323 420 423 520	9	necked pots = jars	8.0 %
	J		234 238 239 271 435 439 490 720 730 743 800 999	0		0.1 %

Fig. 4.1.4.a. Classification of BY67 forms and their relative occurrence in the overall regional assemblage (N = 14113). - Klasifikace tvarů BY67 a jejich relativní výskyt v celém souboru okrajů.

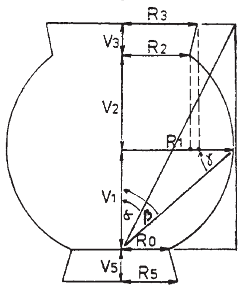
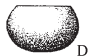
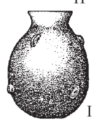
variants	types	series	kinds	classes
a: protrutions *b: feet*	*a: neck* *b: base*	RS RS1=R1/V1 D1b=V1/R1 I3	RS Ninfl.(1-3) nick I3=R3/R1 I2=R2/R1	RS=R1/(V1+V2+V3)
		A1 RS<2.7 0.4 % **A2** RS>2.7 0.4	2.9<RS **A plates** 0.7	 A **broad pots 1** 15.2
		B1 1.0<RS>1.3 8.3 **B2** 1.3<RS<1.7 5.0 **B3** 1.7<RS<2.0 1.2	1.0<RS<2.0 **B dishes** 14.3	 B 1.0<RS
		C1 0.5<RS1<0.75 1.7 **C2** 0.75<RS1<0.95 6.4 **C3** 0.95<RS1<1.0 1.7	N=1 **C little dishes** 9.8	 C
dimensions:  		**D1** D1b<1.0 41.7 **D2** D1b>1.0 4.5	N=2 **D hemispherical** 46.2	 D
		E1 R3/R1<0.63 3.1 **E2** 0.63<R3/R1<0.77 6.8 **E3** 0.77<R3/R1 6.8	N=3 & 0.5<R3/R1 **E S-forms** 16.8 neck undeveloped	 E **middle pots 2** 77.4
		F1 RS1<1.2 1.3 **F2** 1.2<RS1<1.4 1.3 **F3** 1.4<RS1 0.2	N=3 & 0.5<R3/R1 **F small bowls** 2.6 neck developed	 F
Proportions:		**G1** RS<0.54 0.8 **G2** 0.54<RS<0.62 0.6 **G3** 0.62<RS 0.6	N=3 & R3/R1<0.5 **G small bottles** 1.8 neck developed	 G 0.5<RS<1.0
RS=R1/(V1+V2+V3) /TANGENTS ALFA/ I3=R3/R1 I2=R2/R1 RS1=R1/V1 /TANGENS BETA/ D1b=V1/R1 /TANGENS GAMA/		**H1** RS<0.44 1.3 **H2** 0.44<RS<0.46 0.7 **H3** 0.46<RS 2.5	N=3 & 0.5<R2/R1 **H bowls** 4.5	 H
		I1 RS<0.36 0.2 **I2** 0.36<RS<0.44 1.3 **I3** 0.44<RS 1.4	N=3 & R2/R1<0.5 **I bottles** 2.8	 I **high pots 3** 7.4 RS<0.5
		QUADRI-FORM BAG-FORM SHIP-FORM POURINGS MORTAR-FORM FIGURAL	**S special forms**	

Fig. 4.1.4.b. Classification of forms and the metric scheme of the Elbe (Labe) LnK groups (after Rulf 1997b, Figs. 1-4). - Klasifikace tvarů a schéma metriky polabské skupiny LnK.

classification of all of the other attributes. This consists of separate descriptions of the rim variants, walls and bases of the vessels. The description of whole vessels is then a summary of the descriptions of the other parts. This system is here called the BY67 (Soudský 1967: 14). Because the descriptive system for the ceramics was aimed originally at chronological problems, only the system of describing the decoration was developed in a more detailed manner for the site's internal chronology.

Other regions of the LnK culture are similar, even where better developed, more sophisticated descriptive systems exist (Gabriel 1979, Stehli - Zimmermann 1980). The principal form of the rotated sphere did not undergo any substantial changes for several hundred years, and the prevalence of broken sherds did not allow a more detailed classification of the variants of the forms. It has been practically impossible to develop any detailed structure of forms at one site, either to study their development or consequently to generalise the results as was the case for linear decoration. It has been proven that the variability of forms depends on the primary aims of the pottery makers and the proposed function of the vessel. Because the functions were usually very common, and unchanged, it is theoretically difficult to develop any chronological classification of forms.

The BY67 descriptive system remained in essence later, but newly found detailed forms were not systematically added in. It was, however, never used for site chronology (Pavlů - Rulf - Zápotocká 1986) as the attributes never expressed any sufficient chronological variability comparable to that of the decoration. The quantitative distribution of the finds according to this classification is given in Fig. 4.1.4.a. It seems to be superior to present efforts. A solution is provided by a detailed hierarchical system of forms that was developed for the Elbe (Labe) region LnK (Rulf 1997b, Fig. 4.1.4.b.). A separate system of several stages of formal, functional, and stylistic classification is offered here, enabling the interpretation of attributes and their structures in the contexts of several dimensions of the situational analysis. It may be the next development of the ceramic morphology.

4.1.5. Anatomy of principal forms

The anatomy of LnK forms is based on the differences between the vessels with and without necks, and on the number of characteristic points (Shepard 1961: 225). The first criterion separates the jars from the whole assemblage or storage jars. It was necessary to define the limit between vessels with a neck and vessels with a slightly "S"-shaped rim. With the exception of isolated finds (436: 18841, cf. BYA1: supplement 199; 852: 65909, cf. BYA2: 254), the limit was empirically well stated. The second criterion separates the forms into hemispherical vessels with one characteristic point and end-points, and bowls with end points only. The bowls with an inflected upper body originally considered in the Bylany description, are virtually absent. Some of the unclear cases (such as, for example, 7:16858, cf. BYA1: supplement 7; 181a: 29334, cf. BYA1: supplement 118) were classified as hemispherical vessels with an inflected rim.

4.1.6. Ratio of individual principal forms

The appearance of the three main forms, defined according to the presence of a neck and the number of characteristic points, differs in assemblages with differing content. The LnK assemblage, containing mostly vessel sherds, contain stray examples representing a piece or several pieces from a single vessel, as could be distinguished by their colour, material structure and wall width when they processed in the laboratory. The assemblages of individual items may be distorted by the quality of their identification, depending on the experience of the staff working in the laboratory. The degree of distortion cannot be quantified, but it is presumed that it is no greater than a few percent. A much greater distortion of the original structure of the attributes was undoubtedly caused by formative processes, as has been argued elsewhere (Schiffer 1987, Sommer 1991, Neustupný 1996, Rulf 1997a). All of the data published in this work are related to individual items, in the context described above, and to refuse that is archaeologically identifiable.

Of all of individual pieces classified as LnK ceramics (N = 68405), the attribute of form can best be recognised in the assemblage of whole or finished vessels. The relative proportions of the principal forms (bowls-spheres-jars) within the assemblage are, respectively, 50.8 % - 46.2 % - 3.0 % (N = 305). In the subset of rim sherds, comprising about 20 % of the total, the same relationship is expressed by different proportions: 21.5 % - 69.4 % - 8.0 % (N = 14102, unidentifiable forms being excluded). The number of bowls is over-represented in the assemblage of reconstructed vessels because there is a greater probability of the preservation of the whole section for smaller and simpler pottery, such as bowls. By contrast, the jars are under-represented in the same way, but for exactly the opposite reasons. A similar under-representation of jars has also been discovered under quite different conditions (Scarborough 1992: 328).

Because jars are identifiable not only from rim sherds but also from sherds that come from the neck, another sub-assemblage was constructed which also contained the latter; the overall proportion of classifiable sherds increased to only 22 %. The ratio of the principal forms is thus: 21.2 %-65.1 % - 13.4 % (N = 15076). The number of jars increased accordingly, but their number in the live structure could have been higher - they are relatively numerous in cemeteries. The under-representation of jar rim sherds might also be caused by different formative processes in relation to the different parts of the vessel body. Jars, while they have a relatively lower rim diameter than other forms, have on the other hand a much greater body mass. In the usual situation - the breaking of a piece of pottery - the jars produce relatively higher numbers of unrecognisable body sherds.

4.1.7. Thickness of the vessel walls

The thickness of vessel walls is an important technological and functional characteristic. The relatively simple pottery created in the earliest period, with a prevalent organic temper, did not allow for the production of vessels with walls that were too thin. A technological change is represented by sand tempering, and another by the formative technique of coiling (Vandiver 1987). Such technologies enabled the production of vessels with thin walls. The producers tried to obtain an optimal thickness for their pottery because this influenced the thermal shock resistance when the item was used over a fire, and the permeability of the walls, used in practice for water storage when cooling water content. On the other hand, the walls of the vessel had to be sufficiently thick not to collapse before firing, but not so large that they could not be carried. The different thickness also influenced the life-span of the pottery.

In the Bylany assemblage the production of pottery had a relatively high range, as the extremes of thickness are 2 mm and 34 mm (feature No. 2123). This marks in different assemblages a sloping frequency distribution, with average values around 7-8 mm. In the earliest eight phases, the range varies around a higher average of 9 mm; this can be explained by the organic temper, the majority of which occurs in these phases. ➔Tab. 4.1.7.A.

The thickness of the walls in the assemblage of reconstructed vessels (N = 305) reaches an average for bowls of 7.4 mm (+/-1.9), for hemispherical vessels 6.4 mm (+/-1.8), and for jars 8.2 mm (+/- 2.3). The higher values for jars identify the heterogeneity of this group, which comprises vessels of rather different sizes. The same values are a little higher within the assemblage of all the sherds. Comparable relationships were found in the BY67 classification assemblage (Tab. 4.1.7.A), where only in the case of jars was the average of 9.6 mm stable. Vessel wall thickness varies, of course, along the vessel section, and is lower around the rim than at the base. Seeming differences in the average vessel wall thickness are apparent between fine and coarse ware because of the definition of these categories. In terms of the overall average, and regardless of the chronology, the 7 mm limit defines the categories of these coarse and fine wares.

Vessel wall thickness is an important technological attribute which can be classified in 99 % percent of the artefacts in the Bylany assemblage. It does not display great chronological variability, only a division between the early and later periods being visible across the whole period of development (Tab. 4.1.7.B). An average value of wall thickness of under 8 mm was found in phase 9, but for different reasons phase 10 was also included in the earlier period - in this latter phase, the earlier slab formative technique, together with earlier organic tempers, survived. The coiling technique, together with floated paste and non-organic temper, is known from the beginnings of the Bylany site, but it is only in phase 11 that it can start to be described as stable. ➔Tab. 4.1.7.B.

4.1.8. Average height and width of vessels

Proportions are undoubtedly an important characteristic of pottery anatomy, and are usually described as a width-height index. The ratio between the maximum diameter of the belly and the height of the body, including the neck, is more precise regarding jars. For the LnK, the maximum diameter is measured at the point of the vertical tangent, and it is considered as an independent variable. Height is a dependent variable, because it depends on the primary foundation of the vessel's construction.

The ratio of the width and the height of the forms does not usually exceed particular limits, correspondent to aesthetic and functional impressions. The correlation of both measures may vary, in particular cases, between a very strong linear one to being a slight one, as can be seen in the production of baskets from two different groups in Zambia living in close proximity to one other (Hodder 1982: picture 3.12). The overall proportions are considered a suitable classification criterion, but only in the case of simple forms (Shepard 1956: 238). They are used as a divisive attribute of primary forms in different regions (Rice 1987: 216). In the case of the Bylany assemblage, these measurements evidently correlate in a linear manner.

For the analysis of pottery from Bylany pottery, the index is only of limited value. It can be used only for the reconstructed forms, which themselves comprise no more than 0.5 % of the total. The uneven nature of particular forms within the assemblage, as demonstrated above, does not hinder the definition of the proportional limits among forms, but cannot be used i mmediately for rim sherds. The correlation of the width and height of reconstructed vessels from Bylany is high, and has a value of R = 0.768 (Fig. 4.1.8.A).

The distribution of index values differs markedly from the normal frequency distribution, as can be seen from a comparison of empirical and theoretical values. Preliminarily, the proportional limits for lower-middling - and higher bowls can be defined at values of 3.8 < 2.2 and for hemispherical vessels at 1.1 < 1.6. The value of the index equal to 1.0 as a criterion for distinguishing between bowls and hemispherical vessels is too simplistic. In the case of jars there is little data available, and the value of 0.9 can only be taken as a preliminarily estimate of the limit between the taller and shorter jars. The respective classification based on these values can only be considered as an alternative to those based on wall thickness and the anatomy of the form (see below 4.2.2). The proportional classification of this type was not used for further analysis, but was used for the definition of prototypes (see chapter. 4.7.1.). A variant of the proportional indices was successfully used for the classification of whole vessels within the Elbe (Labe) group of the LnK (cf. Fig. 4.1.4.b, Rulf 1997b).

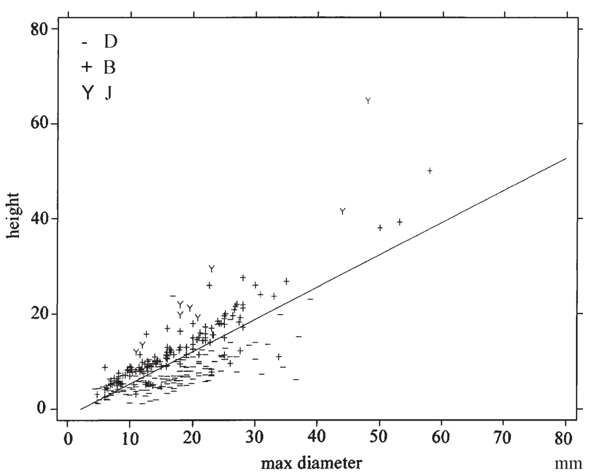


Fig. 4.1.8.a. Correlation of the width of the maximum bulge of ceramic vessels and their overall height (D-bowls, B-hemispherical bowls, J-jars). - Korelace maximální výdutě nádoby a její celkové výšky (D-mísy, B-polokulovité, J-lahve).

4.2. The archaeological and systems context of pottery production

4.2.1. Vessel proportion as a cognitive attribute

Forms ordered by proportions were used for ethno-classification analysis, which proves the reliability of cognitive classification principles. This differs from taxonomic analysis by considering all of the attributes as equals. Cognitive classification defines prototypes as groups of class members which are more important members than others (Rosch 1978: 40). The classifications recorded on the basis of information from informants among indigenous populations show that continuous variables such as the width and height of vessels do not necessarily lead to the definition of disjunctive classes. Vessel forms can be perceived differently by different groups within society (Kempton 1981: 121; Rice 1987: 280). Women place a greater emphasis on the presence of handles than on the form itself, for example, and this shows that the proportional limits of formal classes need not correspond with the classification principles used in society. This is another reason to set this point aside for the later classification of prototypes (Fig. 4.7.1).

4.2.2. Classification of primary forms

We are unable to perceive simple Neolithic forms in any other way than to compare them with ideal geometric forms. The measuring of the profile curve could make the classification process precise, but is limited in the case of vessel sherds. For the assemblage of rim sherds, it seems to be more practical to construct a classification of primary forms based on the principle of paradigmatic classes defined by characteristic points, and on the simple differentiation between fine and coarse wares.

This type of classification is labelled ANAT (Fig. 4.0.3.a - C). It consists of six principal anatomic forms, where bowls, hemispherical vessels and jars are divided into thin-walled (< = 7 mm) and thick-walled (>7 mm). It represents a simplified classification of BY67, and enables the study of the subset of rim sherds together with neck sherds within different site contexts.

4.2.3. Adaptability of the range of forms

The composition of the primary range of forms corresponds to the common characteristics of the LnK economy. The division of the three main forms was typical for a stable settlement in the centre of a continent, where subsistence depends on farming and herding. It also bears witness to the relatively settled nature of inhabitation. The prevalence of hemispherical vessels over bowls and jars shows a very low coefficient of mobility, which has been defined in another case as the ratio between jars and bowls (Scarborough 1992: 328).

In the earliest period in which ceramics occur, a similar range is encountered in situations where basic food processing is combined with storage and serving. Less differentiated forms appear in coastal regions or in non-agricultural inland areas. The ceramics here were an additional tool, and did not assume a primary role within the subsistence system. In those areas near deserts a higher number of jars is common, and they have a high variability. This is a result of the dominance of water manipulation, far more important in these regions than elsewhere.

4.2.4. Primary forms within site refuse

From the point of ANAT classification, the Bylany site refuse is homogenous. This is proven by the relative numbers of primary forms found in complexes, isolated pits and other features. In all of these cases, thin-walled hemispherical vessels make up over 70 % of the refuse content featured. The number of thick-walled bowls is higher, which is also the case for thick-walled jars (Tab. 4.2.4. A). The primary forms are dispersed regularly - in a complex there is an average of 251 individual pieces, and in isolated pits this figure comes to 227 individual pieces.

Among the types of features, there is no difference in the appearance of individual pottery components. Rim sherds comprise 22 % , bases 7 % and reconstructed vessels less than 1 % (Tab. 4.2.4. B) of the total. The group of "others" consists of typologically incomparable features, from large loam-pits to small empty pits. Stability in the secondary refuse has previously been found at least for the individual ceramic components. Differences in refuse structure were discovered for different fills, but not in features with a function that was interpreted differently (Rulf 1993: 18). →Tabs. 4.2.4.A, 4.2.4.B.

4.2.5. Refuse in household complexes

The household complexes represent either houses with a simple mid-section, or houses with the a double mid-section (Modderman 1986, Fig. 29). Because the middle part is interpreted as the living space, its doubling may be interpreted as double the living space for double the number of inhabitants. The refuse coming from these two kinds of different house complexes provides the same ratio of primary forms and component parts. This corresponds to a regular dispersion of refuse forms and their appearance in secondary assemblages.

There are different behavioural patterns in the various parts of the houses (Tab. 4.2.5.A). The refuse in those houses with a double mid-section provides doubled values in comparison with numbers from those houses with a simple mid-section. The latter is similar to the values from isolated pits and for other houses, which are prevalent for houses with a simple mid-section. This apparent correspondence of facts enables us to formulate a unique relationship between the number of inhabitants and the number of vessels discovered in the refuse. On the other hand, while the suitability of settlement refuse for inferring past events can be proven, the relationship of refuse to original structures has been rejected (Neustupný 1998a: 77). ➔Tabs. 4.2.5.A, 4.2.5.B.

The same picture as for particular vessel parts was found among primary forms, and the average absolute values of classes. In household complexes with a double mid-section there is, on average, twice the amount of corresponding forms, even though their ratios to one another are maintained (Tab. 4.2.5.B). The fragmentary nature of the primary forms and their simple classification using ANAT gave the number of house inhabitants. This is the sign value of primary forms, the icon of the individuals who were the users of the vessels. The significance is preserved in the quantitative relations of the refuse, regardless of the multiple transformations that have been undergone since the vessels were broken and the households were abandoned.

4.2.6. Iconography of forms

The forms used were likened to the human body. Therefore, the different parts are similarly named in many languages - the body, the neck, the belly. In some languages, the following can be added to this list, too-legs, ears (handles), navels (lugs). A direct analogy can be found in effigy vessels, one example of which is the anthropomorphic jar from Močovice (Pavlů 1998c). Besides having a realistic face, it is characterised by the unusual position of the neck, which is separated from the body. A special metaphoric relation between vessels and the human body has been proven in many ethnographical papers (Lévi-Strauss 1985: 239). It can be supposed that this metaphor was not expressed explicitly in the case of daily use, and that it thus diminished steadily.

At Bylany, only two comparable fragments were found. The first (from feature 719: 251558, BYA2: 158) was found in the complex of house 41, which was special from the point of view of its construction. The second was dated by the materials used to the Late Lengyel Horizon in context 198 (212205, BYA1: 133), which contained only four other late intrusions. Surviving special forms could be demonstrated when ceramics of daily use attained relatively common forms. In the case of an unusual item from the inventory of feature 198, an oven model, for example, it seems that the vessel fragment can be dated back to the LnK.

4.3. The informative content of primary forms

4.3.1. Variability between phases: phenotypes and genotypes

The relative chronology of the site developed for household complexes and several isolated pits (Pavlů - Rulf - Zápotocká 1986) makes it possible to study the evolution of artefacts in their post-systematic context. The refuse in a complex's fill is in some way the result of relationships in the context of the original culture of the inhabitants of a household complex. The clustering of attributes is, in many of cases, non-random. This enables an interpretation relating immediately to those original states which would, regardless of the transformations that they underwent, have remained fixed. The refuse from isolated pits behaves differently, but only in some detailed aspects. Its structure was perhaps more distorted because the refuse underwent more transformational steps than did the refuse nearer the houses.

For an explanation of artefactual developmental variability, a model drawn from the evolution of biological systems seems to be appropriate. Its application is based on the study of the different patterning of attributes within synchronic households of a particular phase, and within asynchronic households between the phases. In the evolution of the artefacts (cf. 1.3.1.,1.3.2.), the genotypic attributes can be distinguished on the basis of genetically shared information, and the phenotypic attributes representing information transfer exclusively by means of cultural mediations (Rindos 1989; Neff 1992). The resulting genotypes form the process of learning passed on between relatives within a house, most often based on the relationship between mother and daughter, and less often on the relationship between mother and daughter-in-law. The interaction of the household's inhabitants and the environment is expressed by differences between the synchronic households of the settlement phase. Phenotypes at the phase level are created in this way. Even if between the asynchronic houses a degree of relativity can be presupposed, the artefacts behave more like genotypes, which fact is expressed by their low asynchronic variability. Phenotypic variability can therefore be regarded as the variability within the synchronic complexes; alternatively, it can be regarded as the difference between two synchronic phases of different sites, and different evolution within the region.

Primary forms provide a different structure for Bylany genotypes between phases, differing in the categories of thin-walled and thick-walled pottery. This follows the more detailed arrangement of the data, where an originally more stable structure was found (Rulf 1986: 235). The genotypes differ markedly in the earlier periods, from phase 1 to phase 10. The ratio of thin-walled bowls and hemispherical vessels varies between the phases, with the quantity of jars remaining constant (Fig. 4.3.1.a). The appearance of thick-walled forms varies in all three types (Fig. 4.3.1.b). Mutual relationships between both categories according to the thickness of the walls are preserved, except in phase 3 where the ratio of thin-walled to thick-walled bowls is even.

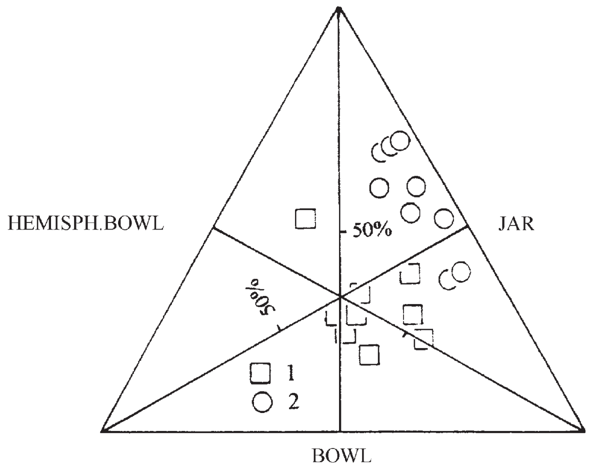


Fig. 4.3.1.a. Relative occurrence of basic forms in phases 1-9 (1 - thin-walled, 2 - thick-walled). - Relativní zastoupení základních forem v 1.-9. fázi (1 - tenkostěnné, 2 - silnostěnné).

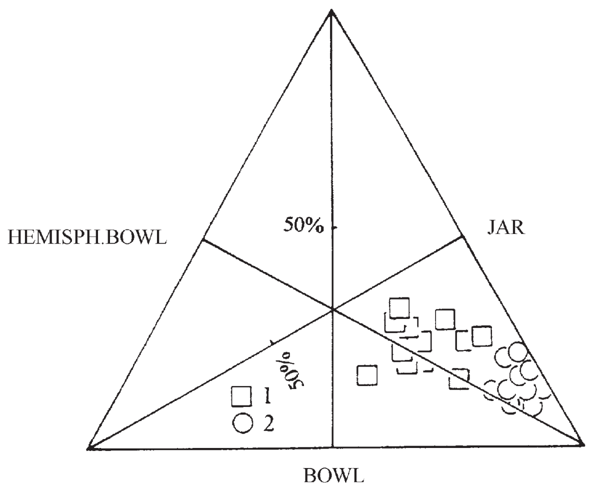


Fig. 4.3.1.b. Relative occurrence of basic forms in phases 10-25 (1 - thin-walled, 2 - thick-walled). - Relativní zastoupení základních forem v 10.-25. fázi (1 - tenkostěnné, 2 -silnostěnné).

In the later phases, the structure of thin-walled genotypes stabilised, as did the structure of the thick-walled forms. Smaller changes appeared among the latter during the last four phases, when the proportion of hemispherical vessels increased. The relationship of primary forms as synchronically stable genotypes is expressed to a greater degree in the later phases, rather than in the earlier phases. However, quantitative occurrences do not follow any regular chronological sequence, and the strong variability of the ratio between the hemispherical vessels and bowls is remarkable.

4.3.2. Genotypes and the role of complexes in ceramic production

It is supposed that the finds from a household complex represent part of the inventory of the associated house. There is debate from the chronological point of view as to whether this covers the whole period of a household's existence, and how great the ratio of finds preceding a building may be. The absence of finds in complexes corresponds more to the absence of pits in their vicinity. The complex of house 2277, one of the earliest houses discovered, contained very a small number of finds. However, the shortage of material could also have been caused by the removal of the greater part of the inventory during the sudden abandonment of a house, as is the case with house 32 from the Miskovice 2 site (Pavlů 1998b).

Houses in the sense of households can be considered as social units, where the production of pottery was concentrated for the purposes of social use within the household. Assuming that domestic production was typical for the Neolithic, simple forms of exchange can be proposed, but not on a larger scale. The composition of the pottery set in a household can thus be seen as an expression of genetically shared information. The composition of primary forms represents a house as one producer even if, as mentioned above, it corresponds more to the number of inhabitants using it. This is marked only by the higher averages of refuse for a single house with a double mid-section. The correlation of the collective volume of refuse to the length of the lifetime of a house was very low (Rulf 1993: 17).

4.3.3. Phenotypic variability between complexes

The variability of primary forms is pronounced during phases 1-10, but practically disappears during the later phases. Within the phases, or among the synchronic complexes in all of the phases, increasing variability appears. This intra-phase variability can be described as phenotypic, and the causes of this can be seen under different conditions in particular houses. The range of this phenotypic variability is up to 20 % of the composition of forms.

Inter-phase variability during the earlier period can be explained by the different technologies common in those phases. Another factor might be the different organisation of pottery production, which may have been common for several households. The similar intra- and inter-phase variability of ANAT forms has a phenotypic character in both synchronic and asynchronic households. As genotypes within phases 1-9, only the forms-regardless of the thickness of the walls-need be described.

4.3.4. Skill coefficient

The motor-habit theory may explain the variability of products, and in particular can measure the amount of work, and therefore of production "expenditures". For the ANAT classification, a simple skill coefficient was formulated by the evaluation of work expenditure for classifiable attributes. It is evident that making a bowl will be easier than the forming of a hemisphere, and that both of are easier to make than a jar. Regarding the thickness of the walls, it is easier to make a thick-walled vessel than a thin-walled one. Multiplying these points results in scores for all of the primary forms, and these scores were used as weights for the relative frequencies of forms in different contexts. Because the points range from 1 (a thick-walled bowl as the easiest bowl to make, requiring the least amount of skill) to 6 (thin-walled jars as the most difficult vessels to make, requiring the greatest amount of skill), and the frequencies from 0 to 100, the scores range than from 0 to 600. As a result, some evaluation is possible of the level of skill present within a household - the better the producers the higher the score, and this of course means a more elaborate production of pottery. ➔Tab. 4.3.4.A.

4.3.5. Genotypes in site development

The stable occurrence of the three primary forms represents the tradition of a settlement area. Bowls, hemispherical vessels and jars can be designated the main genotypes of the settlement area, each having their own cultural and therefore phenotypic consequences within the whole Linear Pottery Culture. Formal identification is among the constant attributes of Neolithic settlement areas, as are the breadth of the range and the thickness of vessel walls (Rulf 1986: 235). This is important if it is known that the individual localities differ in the quantity of ceramics discovered. The number of vessels is usually connected more to the volume of excavated refuse (Rulf 1986: 238-243), which can differ, than to differences in the number of ceramics produced.

The unity of genotypes at Bohemian LnK sites allows for the creation of a hypothesis that the different number of inhabitants in settlement areas was the main cause of differences in the amount of pottery discovered there. For a more precise comparison, it would be necessary in some way to weight the quantity of ceramics with a coefficient of refuse that can be different for individual sites. A clue for Bylany can be found in the average number of preserved pieces from a vessel, which is around 1.6 (Rulf 1986: 243). The respective coefficient of refuse must be a function of this number, even if it characterises secondary refuse prior to its final multiple transformations. The reconstruction of system assemblages on the basis of archaeological complexes has yet to be carried out (Sommer 1991: 145).

4.3.6. Phenotypes of synchronic complexes

When a skill coefficient with a final value of 300 marks the median degree of a producers' skill, the majority of the values from individual houses vary around this median, within the range of 200 - 400. Because the coefficient has the character of a score rather than of a statistical value, it was also calculated for each house containing a number of pieces of pottery insufficient for chronological purposes. The maximum value of 600 appears in phase 1 for house 2277, but house 2244 has a score of only 180. In the complex of the former house, only one piece of a thin-walled jar was found.

In none of the complexes from phases 1-4 does the coefficient exceed the median value, as if the earliest production was focused on the forms that were easier to produce. Phases 5-8 represent a similar case, where a maximum value of 278 appears in complex 2299 in phase 6. After moving the site from section F to sections B and A, the coefficients of skill level increased. The majority of houses in phases 9-12 have values that are above the median. The same standard continues in the subsequent phases, and its range does not exceed 100 points.

Phase 21 is exceptional, in that the skill coefficient manifested reaches a value of 410 points in house 16. This phase has been interpreted as a renewal of the settlement (Pavlů 1989: 285), because the high number resembles the first phase. In contrast, in phase 13, which also represents renewal, there is no household with a higher coefficient (the highest being 382 in house 999). The level of the skill coefficient decreases conspicuously in phase 23, dropping below the median, but ultimately returns to a standard value of around 350.

4.3.7. Production circles?

The coefficients of skill level, representing the level of production quality in each household, are not dispersed randomly within synchronic complexes. Rather, they comprise certain circles of increasing quality around one house or small group of houses. The interpretation of these circles is difficult, because of the small number of synchronic houses and the unknown number of presumed houses which have not been excavated. Within two groups of the earlier phases (1-4 and 5-9) only one such circle was created. Another ordering is found within the group of phases 9-12. Three circles have been reconstructed around houses 224, 620 and 9002 in phase 11; this is a little heterogeneous from the point of view of production, as phases 9 and 10 continue in the older tradition, and the circles of houses in phase 11 are completely independent. This situation continues in the subsequent phases, 13-15, represented by an appropriate number of houses. There are one or two production circles in each (Fig. 4.3.7.a: B-D), with above-average coefficients in their centres.

A similar situation occurred during phases 19-22 (Fig. 4.3.7.a: E-H). Adding some phases with a small number of houses together (16-18, 23-25) gave a less clear picture, but it can be supposed that the houses behave similarly. The circles of houses showing mutually distant productive skill levels can be interpreted as some production centres based on a less solid kinship or neighbourhood relationship. This hypothesis supposes that the grouping of coefficients is not random, and that it cannot be repeated in any random house clustering.

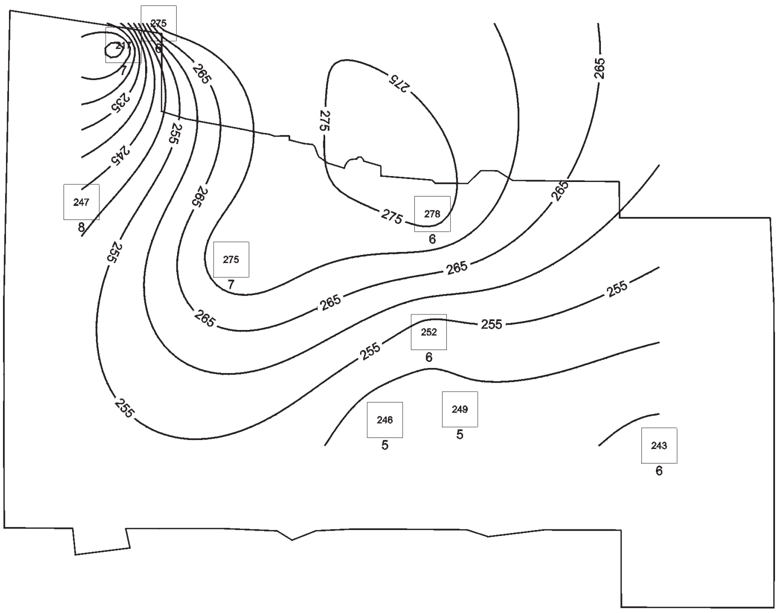


Fig. 4.3.7.a-A. Division of skill scores for ceramic production in phases 5-8. - Rozložení skóre zručnosti vytváření keramiky ve fázích 5-8.

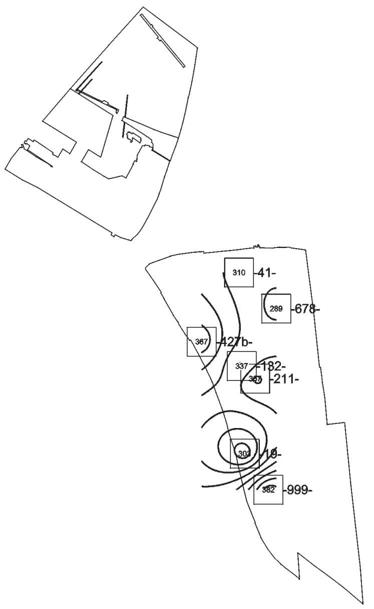


Fig. 4.3.7.a-B. Division of skill scores for ceramic production in phase 13. - Rozložení skóre zručnosti vytváření keramiky ve fázi 13.

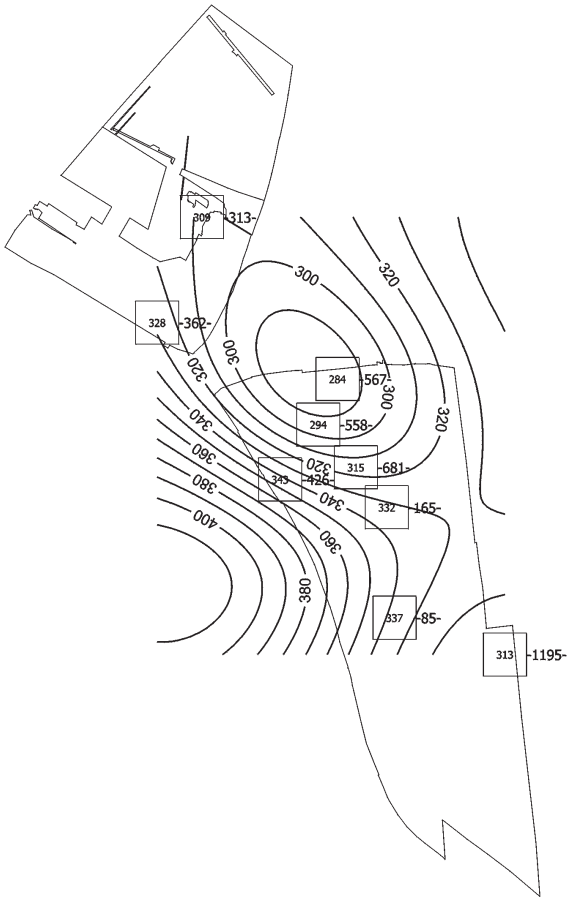


Fig. 4.3.7.a-C. Division of skill scores for ceramic production in phase 14. - Rozložení skóre zručnosti vytváření keramiky ve fázi 14.

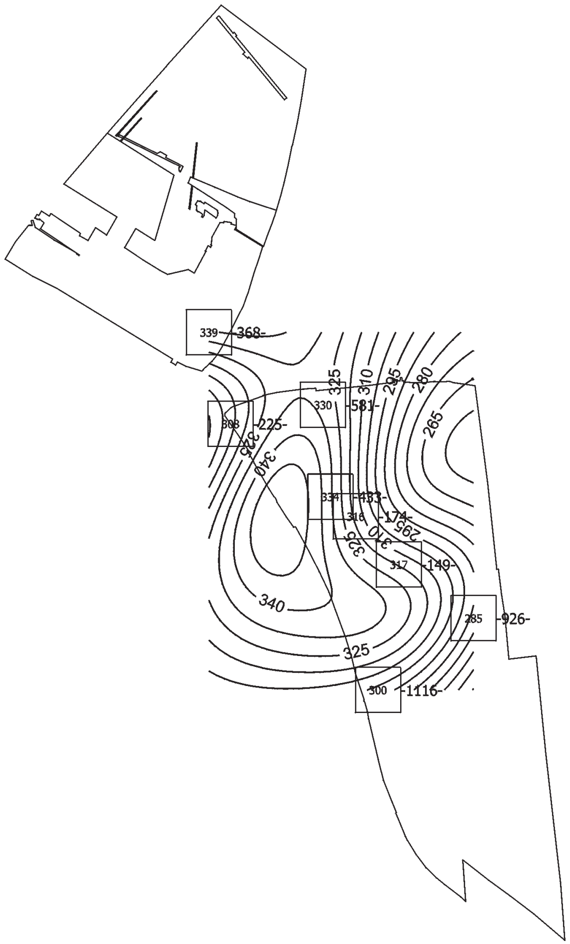


Fig. 4.3.7.a-D. Division of skill scores for ceramic production in phase 15. - Rozložení skóre zručnosti vytváření keramiky ve fázi 15.

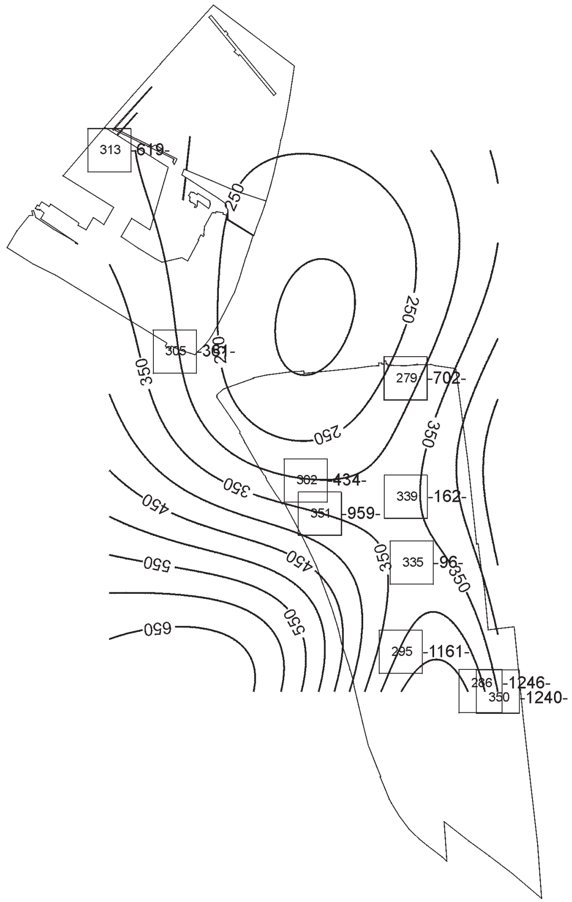


Fig. 4.3.7.a-E. Division of skill scores for ceramic production in phase 19. - Rozložení skóre zručnosti vytváření keramiky ve fázi 19.

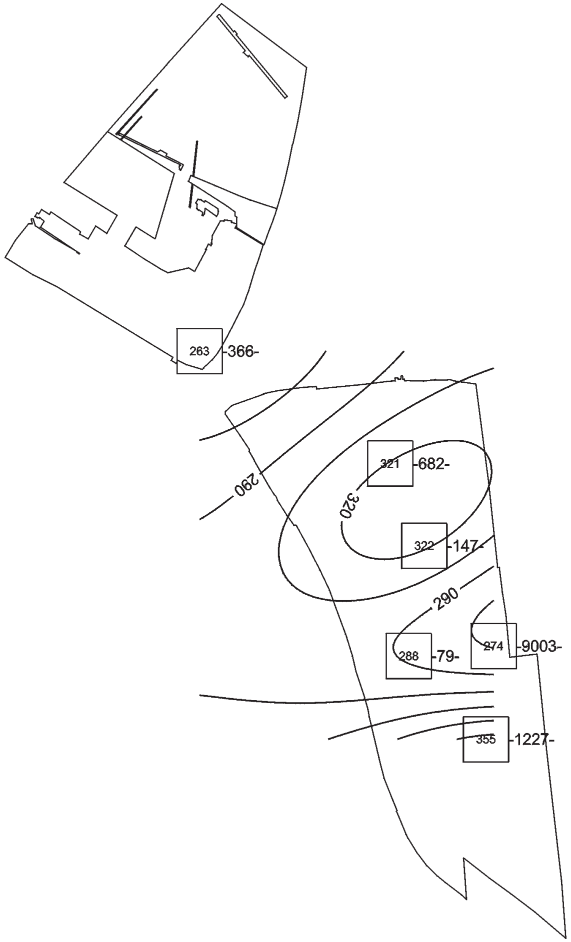


Fig. 4.3.7.a-F. Division of skill scores for ceramics production in phase 20. - *Rozložení skóre zručnosti vytváření keramiky ve fázi 20.*

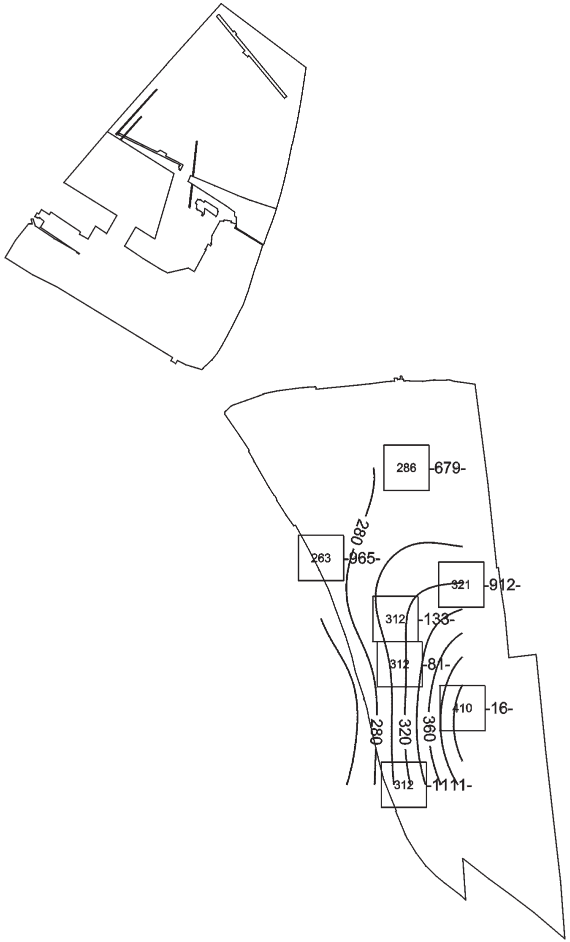


Fig. 4.3.7.a-G. Division of skill scores for ceramics production in phase 21. - *Rozložení skóre zručnosti vytváření keramiky ve fázi 21.*

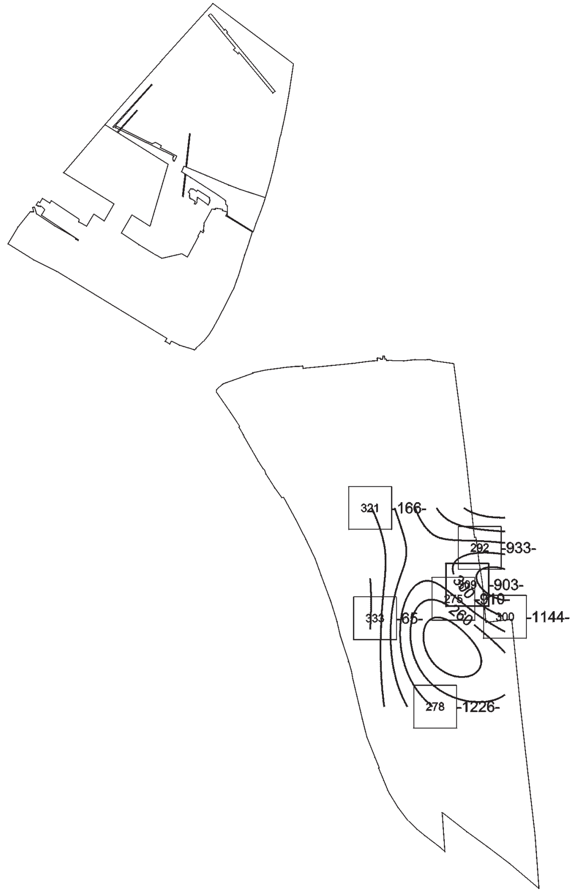


Fig. 4.3.7.a-H. Division of skill scores for ceramics production in phase 22. - *Rozložení skóre zručnosti vytváření keramiky ve fázi 22.*

4.3.8. Production continuity

Like the variability of genotypes within the sequence of settlement phases, continuity of production is studied and was evaluated according to the ratio of primary forms. Their correspondence analysis in the space of the phases showed the central position of thin-walled jars in the first axis (77.5 % of variability). Phases 11-16, 19-20, and 22-23 are focused around this centre of labour-consuming production. The most positive values appear with the thin-walled hemispherical vessels, together with phases 1-9. Negative values are associated with thin-walled bowls and other phases. The explanation of the first axis is not easy, but it might be explained as the degree of demand for different forms. When thin-walled jars, together with thick-walled hemispherical vessels, were demanded as standard forms, the demand for bowls was lower than that for thin-walled hemispherical vessels. This trend was emphasised during the earlier phases (Fig. 4.3.8.a).

On the second axis (11.78 %), the extremes of forms are represented by thick-walled jars with positive values, and thin-walled bowls with negative values. This factor can be interpreted as the sequence of increasing consump-

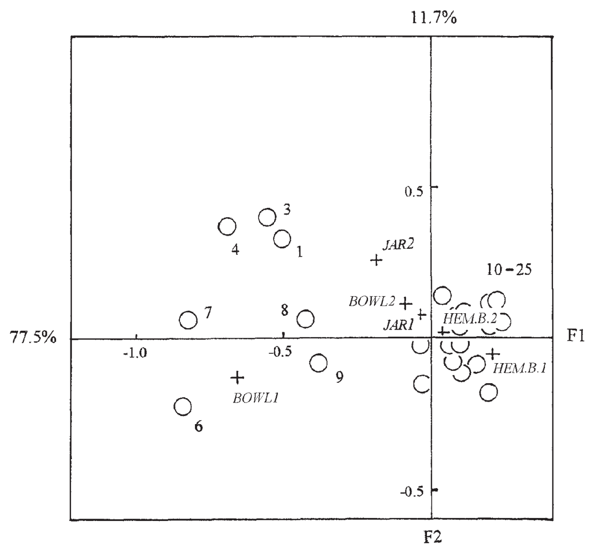


Fig. 4.3.8.a. Correspondence analysis of basic forms (ANAT) within the space of phases 1-25 (factor 1 = need for vessels with different forms, factor 2 = material consumption?). - Korespondenční analýza základních tvarů (ANAT) v prostoru 1.- 25. fáze (factor 1 = potřeba nádob různých druhů, factor 2 = spotřeba materiálu?).

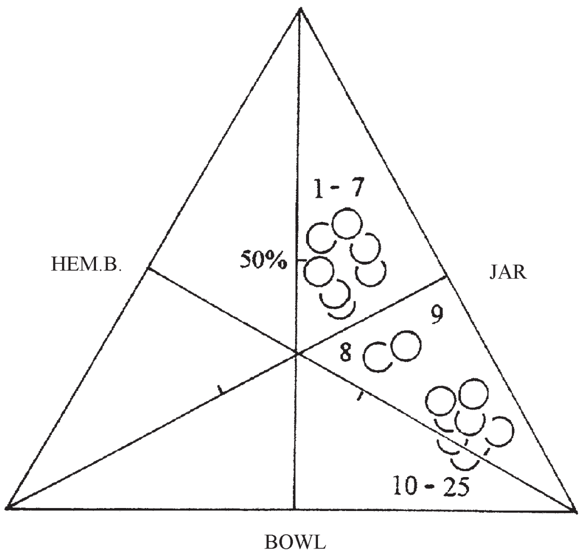


Fig. 4.3.8.b. Basic forms according to the number of inflection points (0 = bowls, 1 = hemispherical vessels, 2 = jars). - Základní formy podle počtu inflekčních bodů (0 = misky, 1 = bombovité nádoby, 3 = lahve)

tion of material. The sequence of forms within the third axis (6.5 % of variability) corresponds to the values of the skill coefficient-towards negative values, the coefficient increases. This interpretation can be seen in relation to accessibility and the ability to produce certain forms. Extremes are represented by thick-walled bowls with positive values, and thin-walled jars with negative values. The tradition of pottery production varied during the earlier phases - more efficient production concentrates between phases 11 and 14, while on the other hand less efficient production is found in the later phases, 20, 22, 23, and 25.

A much more striking production tradition was expressed at the Bylany site in regard to primary anatomic forms. There is an apparent structure according to the number of inflection points on the vessel profiles. Zero represents bowls, and one hemispherical vessels. Jars are in most cases represented by two inflection points where their profiles change. The earlier and later phases make up two clusters, divided by the transitional 8th and 9th phases (Fig. 4.3.8.b, cf. Fig. 4.3.1.a,b). The tradition during earlier development, by contrast, is not tied to a long tradition during later phases. The differences of forms in the early period are of statistical significance (chq = 600.6, d.f. = 48, p = 0.0) within the framework of the table of data. →Tab. 4.3.8.A.

4.4. Classification of the principal functional categories of pottery in the subsistence system and division of labour

4.4.1. Rim angle

Vessels are used as tools in the economic system, and in providing subsistence for society, because of their utility. This was determined by the women making the pottery, when they decided the forms and sizes of the Bylany vessels. The frequency distribution of principal technological characteristics, and their clustering in the contexts bears witness to such deliberate decision-making. The modality of distribution can serve as a definition of functional classification, at least in the intent of modern-day perceptions of prehistoric refuse structures. These show that the well-based functional classifications are highly likely to copy the original system of artefact categorisation.

The vessel form is characterised by the openness of its mouth, which is measurable with the angle of the rim. For the Bylany assemblage, the angle of the rim was measured as the angle between the axis of the rim and the plane of the aperture. It was measured for all of the shapes, including jars, with the except of small pieces. In the case of asymmetric rim forms, the rim axis was replaced with the axis of the wall. The statistical frequency distribution is clearly bimodal, with the limit represented by the value of 95°. It differs from the former empirical value of 90° (Soudský 1967: 15; Fig. 2), where several pieces originally described as bowls went beyond the range of 95-87 degrees. The classification of these individual pieces was revised; they were mostly small rims, without unique orientation, or pieces whose wall continuation was difficult to assess. In some cases, bowls and jars with an open neck cannot be separated. Other confusing finds were excluded from the analysis.

The frequency distribution was calculated separately into two groups, defined by the value limit of 95°. The limits of the first and the third quartile served to make the next subdivision of these groups, as they divide the whole into equal groups of items. The distributions themselves, using a 1° scale, had several irregular peaks caused by irregularities in the measuring process. The distribution was more regular using a 5° scale, which seems to be the limit of occurrence of the measurement. It can be supposed that the women producing ceramics did not use any exact device, and therefore it is also a sufficient measure of the original rim angle.

The quartiles in the first group are given with values of 65° and 76°, which is taken as the division of rim angle for the hemispherical vessels. The quartiles in the second group are 106° and 119°, and these comprise the limits for the division of the bowls. The rims of jars were excluded, and remained undivided. Seven classes of rim angle were defined in this way (Fig. 4.0.3.a). The sequence of extremely open bowls through very closed hemispherical vessels to jars comprises a scale of degrees of content safety against leaking or pouring.

4.4.2. Orifice diameter

The next measurable characteristic of every vessel is its orifice diameter, partly representing its size. The definition of this measurement sometimes differs from the measurement of the rim diameter. The measurement of more complicated rims can be confusing, although this does not concern the majority of Neolithic pottery. The orifice is defined as the lowest level of vessel opening allowing its contents to be accessed for subsequent manipulation. In the case of Bylany, it practically overlaps with the rims of bowls and hemispherical vessel. The respective detail of the rim, such as narrowing or an "s"-shaped rim, is not taken into consideration.

The measurement of jars, when the orifice is taken as the diameter of the neck, is a little confused. In many cases, it is identical to the tangent of the opened neck. Sometimes it is not defined, as the sloping of the neck is very shallow. In view of the irregularities in the modelling of the neck of the majority of the jars in the LnK, the diameter of the rim was not used for the overall evaluation. It need not be functionally comparable in every instance with the rims of bowls or hemispherical vessels.

In the statistical frequency distribution of the rim diameters, a similar fact was discovered, with its graph was irregular at a 1cm scale. The kind of measurement is responsible for this result, and subconsciously the pair of values are preferred when the segment of the rim is not large enough, and its comparison with a template is unique. The measurements for rims with a segment of less then 5 % preserved were removed from the analysis. Consistent distribution without modalities was obvious at a 2 cm scale.

Thus, the following distribution was calculated for the two largest groups of BY67 classification hemispherical vessels (Fig. 4.1.4.a: code 2) and bowls (Fig. 4.1.4.a: code 7). Both distributions are bimodal, which conforms to the limits of the classification. The values differ, however, according to the primary forms. Bowls can be divided at a limit of 18 cm, and hemispherical vessels at a value limit of 14 cm. The number of measurable values in the assemblage of jars was smaller, and distribution had a flatter form. The limit of the orifice diameter was fixed above the median (M = 13.6 cm), at a value of 16 cm. In this way, two size subclasses were defined within each class of primary forms. These represent the accessibility of the vessel content. For the closed forms, the limit is the minimum size necessary for hand manipulation. For the lower diameters, other implements would have had to be used, such as spoons, or the liquids inside could have been poured out.

4.4.3. Vessel volume

The best functional measure for vessels would be their volume. Measuring the volume is only possible for whole forms, and in the case of Bylany could thus be carried out on only a limited number of vessels. These were filled with a suitable material and their volume measured as the volume of that material. Another method was also applied, by drawing a circle in the section, and calculating a sphere of adequate diameter. A sphere segment must then be subtracted that exceeds the aperture of the vessel. This method is less precise, because the circle need not exactly correspond with the curve of the sherd section. Greater deviations occur in the cases of jars and some bowls. The subtraction of another segment under the base is only approximate.

The correlation for verification of the volumes measured by both methods was very high (R = 0.996, P < 0.001, N = 305). Volume was calculated without subtracting the lower segment (Fig. 4.4.3.a) when it was found that the upper and the lower segments did not correlate to one another (R = -0.048, P< 0.673, N = 80). The second method could also be used for calculating the volume from rim sherds, which greatly enlarged the volume of available data. A circle was drawn in using a template, and a curve exceeding it by 10 % was used; this enabled the classification of the vessel in question by both rim angle and volume.

The frequency distribution of the volume within particular subclasses of the rim angle are in most cases fairly asymmetrical. Despite this, the quartiles were used as criteria for subdivision of the groups into small, medium and large vessels. The values of the quartiles were rounded to a whole hundreds of cm^3. From the last quartile, another group of very large vessels was designated, as the items concentrate around lower values, and are

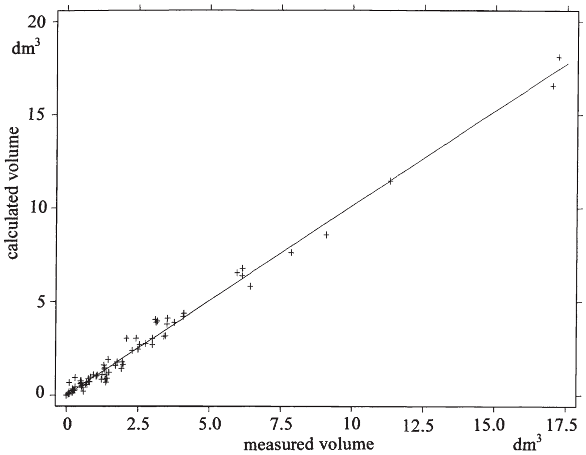


Fig. 4.4.3.a. Correlation of the vessel volume measured using different methods. - Korelace objemů nádob měřených různými metodami.

highly dispersed around the large values. For every subclass of rim angle another set was defined in this way, by making size groups. The vessels in every subgroup are on average 4-5 times more voluminous than those in the preceding group.

The relationships between volume and the other two measures of size can be correlated. Volume and orifice diameter correlate well (R = 0.637, P < 0.001, N = 9786), but volume and rim angle do not (R = -0.206, P < 0.001, N = 9768). Equally, rim angle and orifice diameter correlate slightly (R = 0.216, P < 0.001 N = 12000). It follows that volume and orifice diameter can be mutually interchanged and any classification based on them will be informatively redundant. The volumes expressed by the vessel sherds can be considered as being less precise than those obtained by measuring the diameter of the rim.

By combining the classes of rim angle and volume, a classification of forms resulted. For the aforementioned reasons, this classification is considered as an alternative one, and is used only as an illustration of the whole size of the forms, confirming the authors' theories about vessel sizes (see below 4.5.3.).

4.4.4. Knobs, handles, projections

All projections are considered to be important components of forms, the role of which is mainly to make handling and transporting the vessels easier. They are not particularly numerous in the Bylany assemblage, but they are well identified. The total number of knobs is 3363 (4.9 % of all finds), while 1234 handles were discovered 1234 (1.8 %). There are only five cases where both were found on one vessel, and most of were on jars, but their position has not been proven on reconstructed pieces and therefore these combinations are only probable (BY 94: 205350, 293:231652, 451: 219987, 717: 245348, 815: 257174). In view of their common first plane function, they can be evaluated together.

In the assemblage of broken rim and neck sherds the number of projections is relatively low, as they were usually placed further down from the orifice. The independence test of the values in the table proved no especial significance (chq = 4.88, d. f. = 1, p = 0.0271). These values provide more information about their occurrence in the refuse than about the real numbers. The probability of finding a sherd with a projection will naturally be lower than the probability of finding a sherd without a projection. ➔Tab. 4.4.4.A.

Within the SHASI functional classes (see definition below, section 4.5.2), the vessels with projections are distributed irregularly, and the differences are significant (chq = 502.18, d.f. = 13, p = 0.00). Almost two-thirds of them were found with forms 10 and 12 (each 28 % of the total with projections), and others were found with forms 9 (12 %) and 11 (11 %). The majority of the knobs were found with hemispherical vessels, with other types representing only 9 % (Tab. 4.4.4.B). Of the individual forms, type 12 has the highest proportion of knobs (17 %), and this is followed by type 10 (12 %). For types 8 and 11, 7 % have knobs, and for type 9 only 6 %. The other forms have knobs in less than 3 % of cases, the least being for the opened bowls, with only 1 %. ➔Tab. 4.4.4.B.

During the temporal sequence of the Bylany phases, vessels with knobs or handles behave similarly. The higher numbers appear only during the earlier phases and a decreasing trend is conspicuous. Some 10 % of vessels have knobs in the first eight phases, but later only 3-5 %. The ratio of vessels with handles varies in the earlier phases from 2-6 %, but in later phases is less than 2 %. ➔Tabs. 4.4.4.D, 4.4.4.E.

4.4.5. Vessel feet

In the BY67 descriptive system, different types of the vessel base were included (Soudský 1967), but without a more detailed assessment of their consequences to the chronology. The earlier ideas about progressive development from round bases to elaborate flat bases had to be put aside after the recognition of the earliest LnK period. The quantification of the Bylany find proves an opposite trend, with an increasing number of round bases over the whole period of development.

Round forms of the lower vessel parts were formally distinguished from flat lower parts. It seems more important for the classification process to distinguish the form of the transition between the vessel side and base. Besides the round transition described as a round base, many other variants exist: the most common is a rounded edge between the side and base. A sharp edge is less common, as are different kinds of edge forming. Concave bases were distinguished as being typical for some forms of fine ware, as were two forms of offsetting, full and shaped. Examples of the latter are less frequent, mostly appearing on coarse ware in the earliest period (e.g. BY 376: 225322, 439: 219697, or 2151: 277645). They give the impression more of a poorly formed vessel than of a deliberately formed base.

During the Bylany phase sequence, the increasing occurrence of round bases is conspicuous, as is the simultaneous decrease in the proportion of flat bases with a rounded edge. The exceptional numbers in phase 6 may be caused by the difficulty in distinguishing between these categories, or by systemic differences. The flattening of a base might also be caused unconsciously during the drying of unfired vessels. The appearance of other base forms varies irregularly, and only ever represents a low percentage of the whole. ➔Tab. 4.4.5.A.

4.4.6. Pedestals and feet

Ring feet can be designated a special type of base formation, and are not particularly common in the Bohemian LnK. Higher feet of this kind are concentrated in the fine ware. Lower rings appear on coarse ware vessels, often in the early Neolithic cultures of the Balkans and the Carpathians, but have not been demonstrated at Bylany. Vessels with pedestals are relatively common in phase 3, but isolated examples also appear later.

Separately formed feet can be distinguished from the ring feet that are characteristic of the LnK. The latter are typical for deep bowls, the former for shallow bowls (e.g. 66: 201611, BYA1: 43). No feet have been demonstrated in connection with hemispherical vessels. In the settlement refuse cylindrical feet are rare, and their sherds are usually associated more with figural ceramics (see Appendix 1).

4.4.7. Material and tempering

The classification of the Bylany material has been undertaken only according to macroscopic criteria, and the coarse categories distinguished. In view of the absence of any microscopic analysis that would have more precisely determined the limits between the categories, it is necessary to accept the results presented as preliminary. The selected criteria came from practical experience with ceramic finds, and from an empirical view of the structure and texture of the material. Before the appropriate analyses are performed, their degree of significance is impossible to determine. The first experiment in this direction was based on the independent classification of temper and the experimental firing of the materials (Franklin 1998).

According to the supposed preparation of the material prior to the creation of the vessels, two main categories, floated and non-floated materials were distinguished. The floated material is relatively homogeneous, which might be a natural state and not deliberate-soil could, for instance, naturally be floated in some spot after rain. In the majority of cases, however, the material was deliberately homogenised for the production of fine ware. Temper was recognised according to the kind and size of particles included. For these characteristics, the original distinguishing classes (Soudský 1967) were summarised into three main categories of material without temper, material with organic temper, and material with an inorganic temper and others. The first group consists of fine floated material, which does not by any means exclude temper, but this must have been fine and to some degree homogenised as it is not macroscopically visible. A simple classification is created as the conjunction of the preparation of the material and temper, and is labelled MATE (MAterial x TEmpering).

In the case of Bylany, organic tempering includes crushed straw or natural impurities from the soil. The organic temper has not been analysed for botanical types. In addition, the preparation of the temper has been considered only hypothetically. Ethnographic case studies do not rule out the possibility that straw temper could have been added secondarily, for example as a components of poultry or cattle excrement.

The inorganic temper consists of sandy or fine gravel particles of different minerals. It is macroscopically easily recognisable, and can be simply quantified. Petrographic analyses of this type also have yet to be undertaken. Local materials are identifiable, primarily the different types of suitable schist which have a high proportion of mica particles. These were available in the immediate vicinity, and besides this were used mainly for the production of grindstones. The dominant minerals are migmatite schist, double mica schist and biotite schist. Larger pieces of quartzite may have been introduced into the material secondarily, from the migmatite schists. →Tab. 4.4.7.A.

The chronological trend of the tempering is not particularly expressive. During the whole period of development of the settlement area, the proportions of floated and non-floated materials varies at around 50 %, while it is only in the later phases that non-floated material reaches a proportion of greater than 60 %. The organic tempering that is prevalent in the earliest phases has a decreasing trend until the middle period. The ratio of inorganic tempering increases in accordance with this, and reaches 80 % at the beginning of the later period.

During the individual periods, the relative occurrence of MATE classes also changes. In the earliest period, class 2 prevails in phases 1-7. This represents non-floated material with organic temper, typical for coarse ware. Class 5 reaches its peak occurrence in part of the middle period, in phases 8 and 9-11; it consists of floated material without a coarser temper, and is the typical material used for fine decorated ware in the LnK. From phase 12 onwards, the maximum was represented by category 4 non-floated material with inorganic temper. This material is typical later for both fine and coarse wares. From the point of view of technology, three traditions can therefore be distinguished: an early, a transitional (classic) and a later. →Tab. 4.4.7.B.

4.5. Identification of activities within complexes

4.5.1. Ethnographically proven classifications

Archaeologically defined classification can in some cases be checked against ethnographically documented artefacts. The finds arising from the construction of transmission lines in northern Arizona (the "Navajo Project") were classed by orifice diameter and rim shape, and their metric characteristics were then compared to ethnographically documented vessel functions from the Pima, Yuma and Pueblo areas in northern and western Arizona (Braun 1980). However, the classes defined for rim shapes were not strictly disjunctive, and a general trend appeared that exceeded the cultural situation within the regions and times (Tab. 4.5.1.A).

Similar analyses are based on the supposition that the formal and technological characteristics of the vessels correspond directly to their utility. In another paper, eight attributes were used: relative accessibility, content, volume, rim diameter, heat wearing (after use over an open fire and over coals), centre of gravity, base and elongation of form. By performing discrimination analysis on the data, eight specific functions were then separated out: storage of dry materials, storage and transport of liquids, cooking, washing, serving and processing, and individual eating (Smith 1985: 303). These functions were then, according to further ethnographic criteria, generalised into: storage (duration), processing (according to types of material), transportation (distance). Six main categories of utility cover the entire subsistence system. These are: short-term and long-term storage, processing with fire or cold, transport over long and short distances, including the serving of food (Rice 1987: 208).

For the purposes of the analysis of the Bylany vessels, some general knowledge can be used as analogous of the whole functional system. In the south-western United States, in particular, there is a striking correlation between the primary forms, consisting of bowls, hemispherical vessels and jars. The ratio and the local utility of forms are obviously, as concerns both culture and time, quite separate, in different regions. Jars were prevalent, which corresponds to the greater need for water manipulation (in the Spanish regions "olla") or long-term storage. The hemispherical vessels are not common but are used solely for the storage of loose material, which influenced their terminology (seed jar, Spanish "tecomate"). The bowls can be considered as being a universal form, the utility of which exceeds the limits of time and space.

4.5.2. Security and accessibility of content (functional classification SHASI)

The form and size of the rim are considered to be the two primary measures of a vessel’s utility, as are the degree of security against leakage or spilling during manipulation whilst full, and frequency of access to the contents. The security of the contents is measurable for LnK vessels with the rim angle, and accessibility of their content with the orifice diameter (cf. sections 4.4.1 and 4.4.2 above). The significance of these measurements increases with the possibility of their measurement not only for whole vessels, but also for sherds, which is generally important for any archaeological application (Braun 1980: 173). On the other hand, the informative content of the rim sherds is increasing, and their thorough publication should therefore be a priority (cf. Milisauskas 1986: 13).

With the help of the disjunction of these measurements, as defined by their distribution among the Bylany finds, the paradigmatic classification, SHASI (SHApe x SIze), was developed. It consists of 14 shape categories, six small and large bowls, six small and large hemispherical vessels and two types of jars (Fig. 4.0.3.a: I, J). This classification was used as the starting point for the functional analyses.

4.5.3. Pot capacity (the SHAVO alternative classification)

Along with the disjunction of subclasses of rim shape and pot volume another classification can be defined, labelled SHAVO (SHApe x VOlume), which comprises 28 categories. Four subclasses of volume were defined for each subclass of shape (cf. above). The comparable classes of the three classifications (BY67, SHASI, SHAVO) defined thus far were compared to each other; subsequently, it was found that the categories from the latter two overlapped well. It can be inferred from this that the informative content of both classifications is more or less equal, and that therefore the SHAVO classification is acknowledged as an alternative to the SHASI. In the following analysis the latter is used exclusively.

The relationship of both of the newly defined systems to the historically older BY67 classification was not unique, and particular categories overlapped to a greater degree. This may have been caused by the greater subjective element in the BY67 data, where the rim angles were not measured individually; the original data were revised in this sense. In order to retain the basic information on volumes, the average volumes were calculated for each SHASI class (Tab. 4.5.3.A); the range of volumes is, however, much greater, from 5 cm³ (small bowl 2159: 278289, BYBF: 275) to 87 l (storage jar 2123: 276849, BYBF: 262). →Tab. 4.5.3.A.

4.5.4. Pot size and shape as an index of household activities

The SHASI and the alternative SHAVO classifications are based on functionally significant pot attributes. Because there are no data other than the archaeological for the Central European Neolithic, the functional behaviour of forms must be inferred from their structuring within contexts of different levels. It is supposed that the pots comprised a functional set in each household, corresponding to the set of activities performed there; as stated above, the number of pots is related to the number of inhabitants. From the point of activities a similar relationship may be proposed, even if the households were mainly habitation spaces.

The distribution of individual SHASI forms was analysed by correspondence analysis within the space of the households. The quantitative threshold was 10 classifiable pieces in the later phases and 5 in the earlier ones. These numbers were in the case of the statistical evaluation used as a threshold of contexts brought into the analysis. Two groups of households were analysed, coming from phases 2-10 and 11-25, as after the forms analysis ceramics played a further role in the earlier and later periods. There was no household above the threshold in phase 1.

The analysis resulted in the structuring of the 14 functional SHASI categories within the 13 axes of both groups. The variability was regularly distributed, and 70% of it lay in the first case on four axes and in the second on six. Formal interhemispherical bowls (12). These are separated out by their size. In both spaces they have positive score values.

To all of the aforementioned groups an interpreted function can be ascribed, and the groups can be named as functional sets indexing the activities inside the houses (Tab. 4.5.4.A, Fig. 4.5.4.c). The ascribed function is a broad outline because the specific function at any given moment need not be tied solely to the interpreted activi-

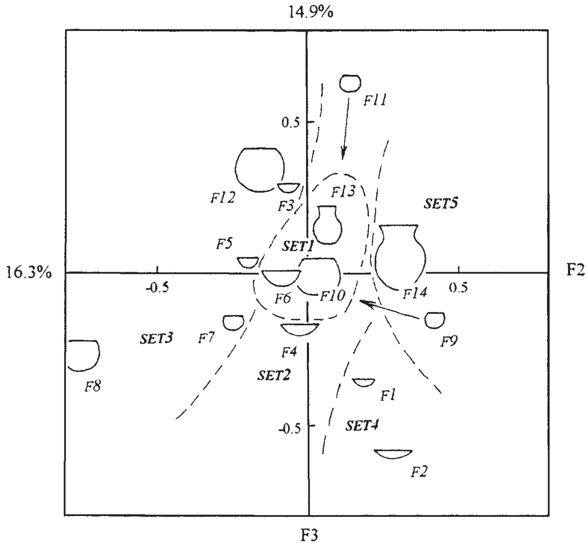


Fig. 4.5.4.a. Correspondence analysis of the SHASI functional classifications in the space of phases 2-10 - Korespondenční analýza funkční klasifikace "SHASI" v prostoru fází 2-10.

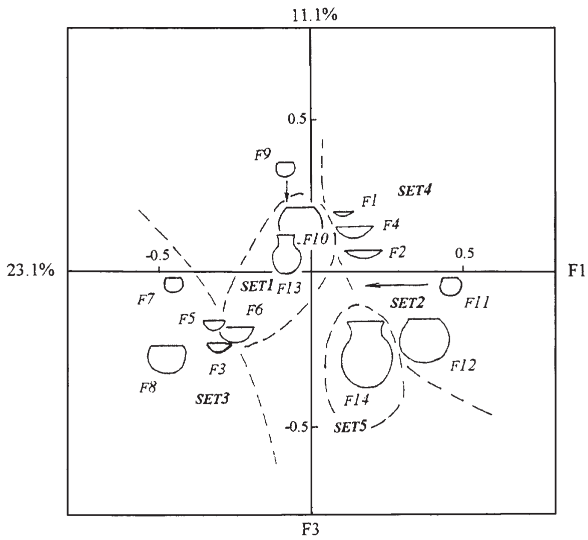


Fig. 4.5.4.b. Correspondence analysis of the SHASI functional classifications in the space of phases 11-25. - Korespondenční analýza funkční klasifikace "SHASI" v prostoru fází 11-25.

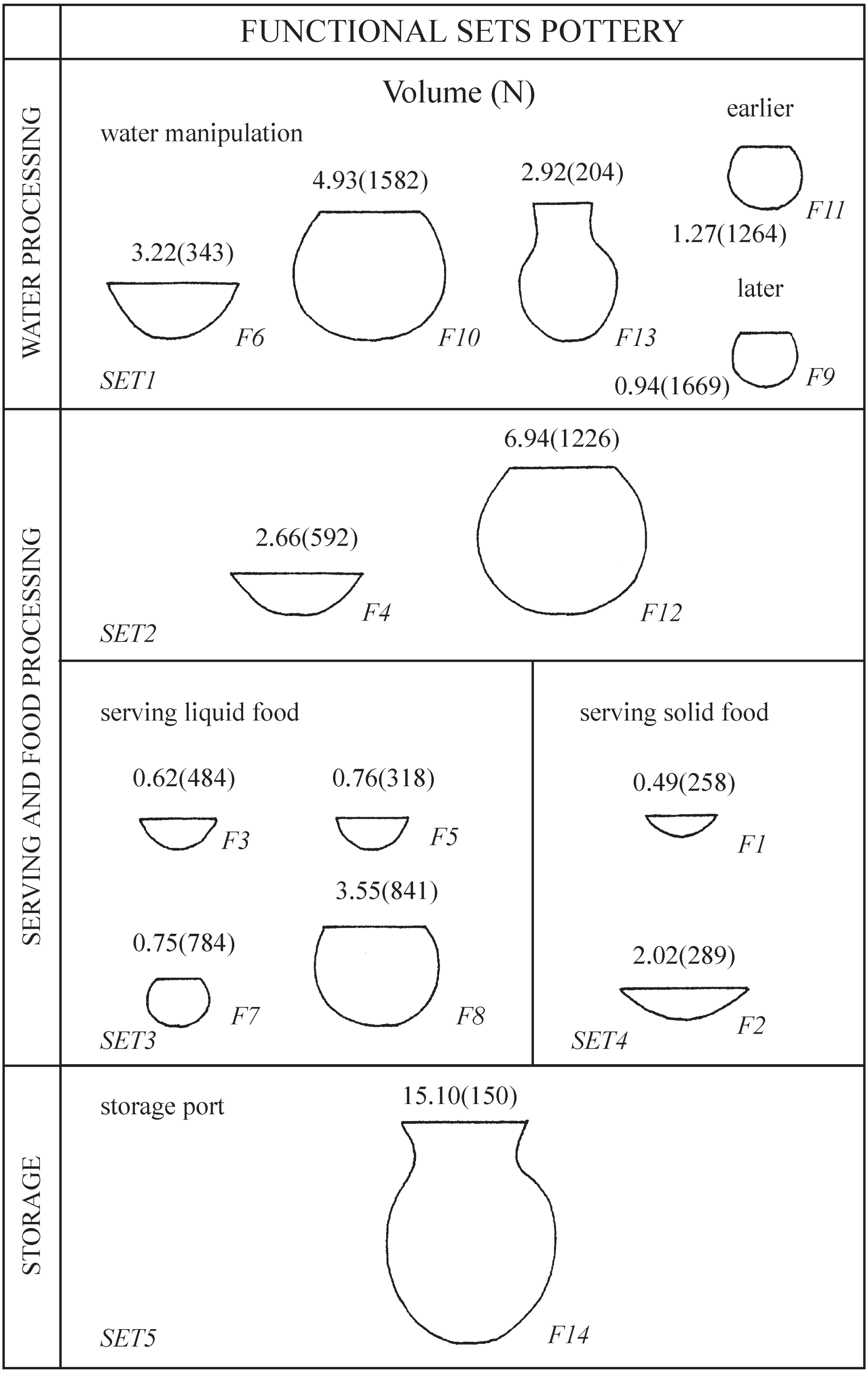


Fig. 4.5.4.c. Interpretation of the functional sets of Linear Pottery forms. - Interpretace funkčních sad tvarů lineární keramiky.

pretation is difficult, but was successful for the first four axes.

The SHASI forms are arranged on the first axis in the space of households from the earlier phases (30.8 % of variability), according to the characteristic points. The small jars have a score of 0, the hemispherical bowls have positive values, and the bowls have negative values. This sequence emphasises the significance of formal characteristics in the early period of the Bylany settlement. It is witnessed by the prevalent formal criteria influencing the form of the early pots. The fourth axis (9.4 %) corresponds to the size of the pots.

In the households of the later groups of phases, the classes are ordered according to their size on the second axis (12.4 %). The medium-sized pots are in the centre, on the positive side are the small pots, and on the negative side are the larger pots. The ordering does not exactly match the average volumes of the forms. The fourth axis (9.4%) has not been interpreted.

Most important for the functional classification are the ordering on the second axis of the early period (Fig. 4.5.4.a, 16,3 % of variability), and the first axis (Fig. 4.5.4.b, 23.1 % of variability) of the later period, labelled as function A. The type sequence is almost the same in the opposite direction, with the exception of type 12. To this order another can be attached from the third axes of both cases (14.9 % and 11.1 %), which is labelled as function B. The central cluster consists of a pair of small jars (13) and closed hemispherical bowls (10), together with open bowls (6). To this cluster either small closed hemispherical bowls or very closed hemispherical bowls (11) can be attached, because of their position on the functional axis A.

The next group recognisable in both analyses consists of small open (3) and slightly open (5) bowls, together with small (7) and large (8) slightly open hemispherical bowls. In the earlier households these evidently attained negative values, while by contrast in the later households they had both positive and negative values.

The third group comprised small (1) and large (2) very open bowls. These also have in the earlier households opposing values to those in the later, at least in the second functional factor, B. The large storage jars (14) comprise an independent group because of their storage attributes.

The last recognised functional group consists of large open bowls (4) and large very closed ties. The central group of small pots around small jars comprises a set connected with water manipulation; this refers not only to water procurement but also to its storage (10, 13), drinking (9, 11), and other uses, such as for washing (?10).

The large jars are interpretable as a means of long-term storage, with an extreme example from Bylany coming from house 96, where one was buried and preserved until the building was excavated. The group of open bowls was probably used for the serving of solid foods, according to ethnographic models either for individuals (1: plates, average volume of 0.5 l) or groups (2: average volume four time greater). Other functions can be ascribed to the remaining pots. The large closed hemispherical bowls (12) together with the open bowls (4) correspond to the idea of food processing or short-term storage. The last group of forms (3, 5, 7), together with closed hemispherical bowls (8) can be marked out as used for the serving or processing of liquid foodstuffs. →Tab. 4.5.4.A.

The different behaviour of the functional sets in the early and later periods requires explication, and may be the result of the differential significance of the activities. Processing and short-term storage (PROCessing) was always significant, throughout the entire history of the site. The same is true of the central role of water manipulation (WAter PRocessing). The consumption of liquid and solid foodstuffs may have changed. If the former (SErving LIquids) is prevalent in the earlier period, the in the later it is the solid foodstuffs (SErving SOlid) that were the more important. The function of the large jars (STORage) was also different - they may have alternated with storage pits more often in the later periods. During the earlier periods the majority of stored wheat could be preserved within the houses; because of the prevalence of autumn seeding, the amount of stored wheat was not great. The jar from phase 19 is exceptional, unless it is a marker of a different specific function within the household.

4.5.5. The coefficient of portability

The portability of pots can be measured in the appearance of handles and lugs, and their ratio within the functional classes is a kind of undefined coefficient of transportability. Other attributes would perhaps need to be included in such a coefficient, such as the weight of the pot, which is hardly discernable from sherds. The hemispherical bowls without projections were not destined for frequent portage; to enable their transport, other devices would have to have been used e.g. nets or baskets. Lugs and handles are the only tangible indices connected with particular forms; their additional meanings will be described below (see 4.7.3). The numbers from the table (Tab. 4.5.5.A) may be distorted by the preservation of pots mainly in form of broken rims. However, if the absence of projections is distorted by this, then at the same level it can be supposed the relationships will remain.

The highest ratio of these projections appears on the set of pots interpreted as being ceramics for processing food or for short-term storage (PROC), and the next highest on the set for water manipulation (WAPR). This matches the predicted results. The lugs and handles are mutually exclusive except in a few instances (see above 4.4.4). These exceptions are from the latter group of pots for water manipulation. The other forms have rather low numbers of projections for use in transportation, which influenced their utility. Exceptionally, projections are found on pots used for serving solids (SESO); the low ratio is unsurprising because the small bowls were easy to handle without additional devices. ➔Tab. 4.5.5.A.

4.5.6. Stability

The functional groups of vessels were differentiated according to the three stability classes in the group of storage vessels and others. The least stable were vessels for long-term storage, because they were immobile, partly sunken into the soil. The group of 'others' differs in the details. Relatively speaking, the most stable forms are bowls for serving solid foods, which are supposed to have stood on a flat mat which might have acted like a table; the unique existence of a table cannot be proven using this theory alone, however. There may have been shelves of some kind or a ledge within the house where vessels were stored during those times when they were not in use. All other groups of vessels have more or less middling degree of stability, which means they were mostly used in another manner, either held in the hands or suspended, and placed on a flat surface. It is also assumed that pottery that was not in use was stored in an upside-down position. This would have been relatively stable because of the straight rim, but of course not in the sense of content stability. Such a position is sometimes proven only in graves, albeit for other reasons.

During the sequence of phases, the stability differs in the earlier period and in the later periods in accordance with the base forms. For the majority of the earliest phases, a medium level of stability is characteristic, exceptions being phases 3 and 4, when the stability was higher. These phases contain more bowls for the serving of solid food, which may mean that it was, exceptionally, consumed

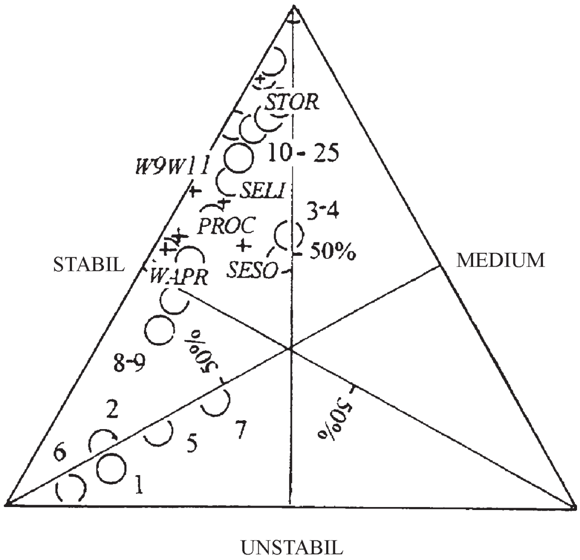


Fig. 4.5.6.a. Developmental trend in vessel stability (unstable = round base, medium = flat base with a rounded edge, stable = flat surface with a prepared edge or foot) in the phases and functional groups of forms. - Vývojový trend stability nádob (unstable = oblé podstavy, medium = ploché podstavy s oblou hranou, stable = ploché podstavy s upravenou hranou nebo nožkou).

more often than at other times. The later phases copy the trends towards the lower stability of pottery. ➔Tabs. 4.5.6.A, 4.5.6.B.

4.5.7. Life-span of pottery

Pottery is considered in modern ethnographic studies to be a permanently renewing set of elements, each with their own life cycles; it had previously been studied using demographic methods. The individual parameters of such a study can hardly be carried out for archaeological assemblages, because of the many unknowns such as, for example, the precise point of vessel production within a phase. Theoretically, the existence of a vessel starting from the point when its use began until it was thrown away could be described as its life-span. The theoretical range for a vessel's life-span is unlimited, from zero for vessels broken during production, to vessels preserved to the present day. An example of the latter case occurs at Bylany with the storage vessel from house 96, which survived until the time of the excavations in 1957. In practice, however, the life of the vessels was, on average, limited by their functioning in a living culture, in relation to their size, form and function.

The results of correspondence analysis of the functional groups within the space of the settlement phases allow the interpretation of the third factor as a factor of the life-span. Meanwhile, the first factor is interpreted as chronological, and the second was assigned as generally structural in the sense of the functional structure of the assemblage. The order of the vessels along the third axis, surprisingly, follows the supposed durability of forms. The shortest time was shown for vessels used for serving solid food, and for the hemispherical vessels employed for food processing. Both of these would have been carried more often by hand and transported, which increased the likelihood of their being broken and thus shortened their life expectancy. According to ethnographic analogies, the life-span for these would have been about 1 year.

The group with the longest life-span consists of the large storage vessels that could survive several years in a stationary position. The likelihood of their breaking, because of their situation, was very low. A middling life-span is designated for that group employed for the manipulation of water, and to forms used for serving liquids. Both were transported often, but less often than the first group. The were probably better looked after by individuals. Their life-span is estimated at 1-2 years.

The life-span of pottery has yet to be considered in terms of its chronological consequences. The lower number of jars at the site than at the cemetery could also be explained by their longer life-span. From the point of view of detailed chronology based on decorative techniques, the life-span of vessels need not be limited. The majority of decorated pottery belongs to the group with a medium life-span, and it is most likely that the assemblage contains mainly synchronic pottery.

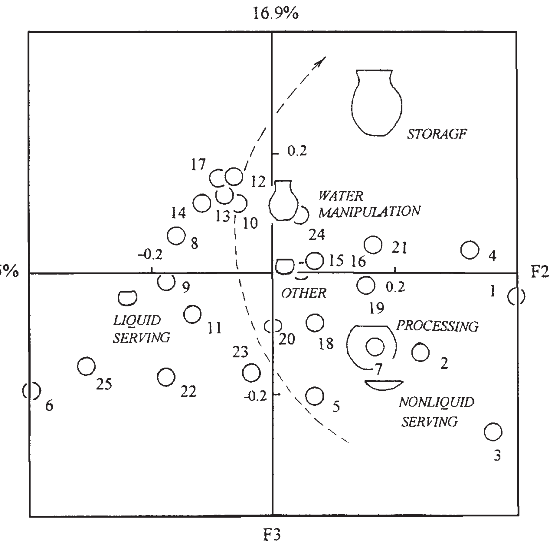


Fig. 4.5.7.a. Functional groups within the phases (factor 2 = structural?, factor 3 = life-span). The arrow indicates the trend from vessels with a short life-span to vessels with a longer life-span. - Funkční skupiny v prostoru fází (faktor 2 = strukturální?, faktor 3 = životnost). Šipka naznačuje trend od nádob s krátkou životností k nádobám s delší životností.

4.6. The informative content of functional classification from the point of view of the continuity and discontinuity of the subsistence process

4.6.1. Continuity of vessel function within the phases

The functional sets of vessels comprise several clusters within the space of the phases, which reflect the individual aspects of pottery behaviour in the subsistence system at the Neolithic site. In the earlier period a developmental sequence can be observed, beginning with food processing to the serving of mainly liquid foods. Processing and long-term storage are prevalent in the first four phases. The subsequent period of development in phases 5-7 varied between the aforementioned extremes, and tends through the transitional phases to emphasise the water manipulation function in phase 10 (Fig. 4.6.1.a).

During the later periods, ceramics played a central role in water procurement, storage and consumption, and indeed did so for other liquids also. This is relevant to the majority of the later phases (phases 11-18, 20 and 22-24). The other area in which the role of pottery is represented is in the processing and consumption of solid food - as in phases 19 and 21 - according to their position along the second axis. Liquids are again emphasised in

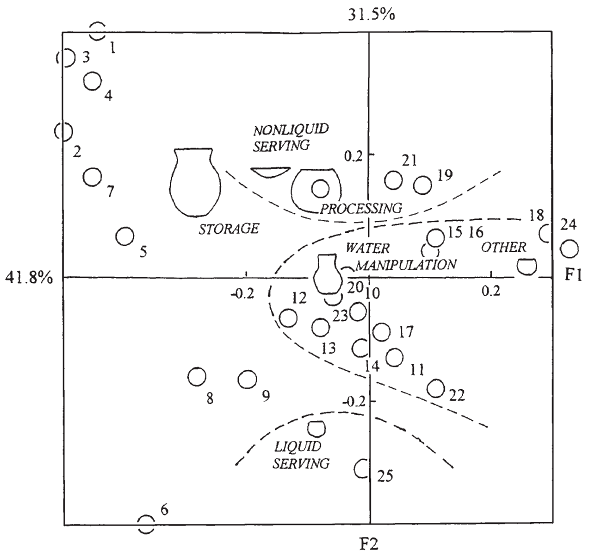


Fig. 4.6.1.a. Functional groups within the phases (factor 1 = chronological, factor 2 = "functional and structural"). - Funkční skupiny v prostoru fází (faktor 1 = chronologický, faktor 2 = "funkčně strukturální").

phase 25. Both the functional group and phase 25 are slightly more distant from the other elements, which can be related to the site's final phase.

The separate position of the earlier phases, which was also visible in the space of the primary forms, now shows the principal difference of the earlier period of the Bylany site. This difference primarily concerns the different management of subsistence resources and the storage of food. The role of the latter when grain was stored mainly in the large jars corresponds to the absence of storage pits. It was more common for grain to be used for food to be stored in jars than that to be used for seeding the following year, which proves again that seeding took place rather in the autumn than in the spring (see below). Later, long-term storage is connected with the greater proportion of spring seeding. With this transition in farming technology and more storage in silos, the demand for large jars decreased.

4.6.2. Variability of vessel functions within households

The functional variability appears greater within households than within phases. Functional sets of vessels containing the index of activities carried out in the household form the space for distinguishing the houses according to these criteria. The corresponding variability of households in the earlier period (phases 1-10) is sufficiently explained by three axes (75.9 % of variability). The significance of each of the three axes is similar to the others. The central position is taken by the water manipulation set, and in extreme positions sets for the consumption of solid or liquid food alternating with vessels with alternative functions. In the first factor (34.3 %), the importance of the water manipulation set is emphasised, along with storage. The second axis (22.3 %) specifies the consumption of liquid and solid foods, functions opposite to water manipulation and food processing. The third axis (19.3 %) separates consumption from storage and the water manipulation set.

Within the space of specific factors on the second and third axes, the households are divided into four groups:

a) with a prevalence of water manipulation and food processing (nos. 302, 306, 525, 569, 703, 2198, 2200, 2278);

b) with a prevalence of solid food and liquid serving (nos. 604, 741, 2199, 2201, 2209, 2210, 2244, 2294, 3199, 9004);

c) with a prevalence of food processing (nos. 405, 2225, 2277, 2299);

d) with a prevalence of storage (nos. 680, 2197, 2223, 2224, 2226, 2227, 2290, 2295). Apart from these households, house 2202 is isolated, corresponding to the food processing set of vessels (Fig. 4.6.2.a).

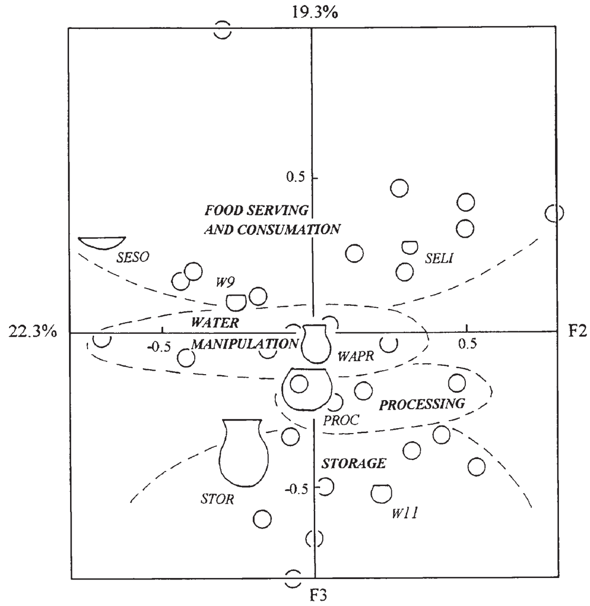


Fig. 4.6.2.a. Households from phases 1-10 within the space of the functional groups of vessels (factor 2 = different types of food consumption, factor 3 = consumption as opposed to storage). - Domy z fází 1-10 v prostoru funkčních skupin nádob (faktor 2 = různé druhy konzumace potravy, faktor 3 = konzumace oproti skladování).

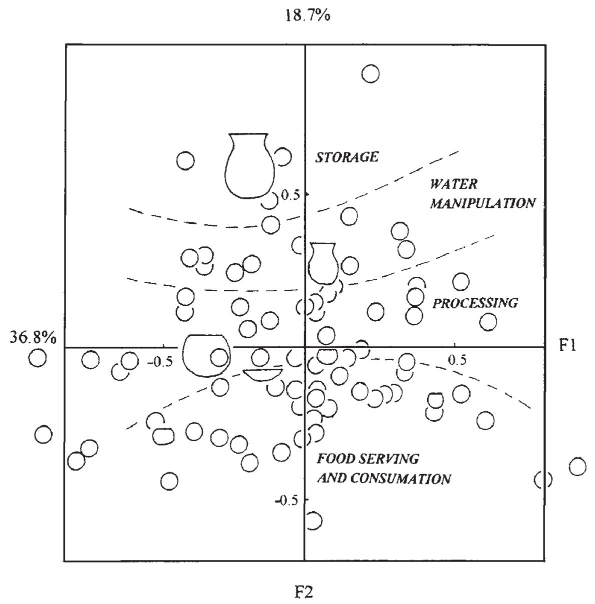


Fig. 4.6.2.b. Households from phases 11-25 within the space of the functional groups of vessels (factor 1 = consumption as opposed to preparation of food, factor 2 = consumption as opposed to manipulation of water). - Domy z fází 1-10 v prostoru funkčních skupin nádob (faktor 1 = konzumace oproti zpracování potravy, faktor 2 = konzumace oproti manipulaci s vodou).

The households of the later period behave rather differently within the space of functional sets. The first axis (36.8 %) corresponds to the axes of the early period, where a central position is held by water manipulation. The second axis (18.7 %) has the food processing set in its centre, and the storage and consumption sets at the extremes. The third axis of the later space (16.1 %) is similar to the first, but with an opposite ordering. The fourth axis (11.0 %) mirrors the second. The households form four groups (a - d) in the space of the two most significant factors of the first and second axes (55.5 % of variability), which are not so strictly separated as in the case of the early period:

a) prevalence of solid and liquid food consumption (nos. 0065, 0079, 0081, 0096, 0165, 0211, 0224, 0225, 0263, 0277, 0278, 0312, 0372, 0426, 0433, 0434, 0580, 0581, 0688, 0740, 0903, 0910, 0926, 0933, 1100, 1144, 1236, 2192, 2196, 9001, 9003).

b) prevalence of food processing (nos. 0016, 0019, 0080, 0085, 0133, 0149, 0166, 0174, 0245, 0272, 0313, 0361, 0366, 0369, 0558, 0571, 0610, 0619, 0620, 0621, 0682, 0739, 0877, 0912, 0959, 0982, 1111, 1129, 1161, 1192, 1226, 1227, 1240, 1246, 2292).

c) prevalence of water manipulation (0041, 0132, 0147, 0162, 0362, 0368, 0567, 0677, 0678, 0679, 0681, 0702, 1195, 9002).

d) prevalence of long-term storage (0088, 0427, 0999, 1116).

Households 910, 965, 1289 and 2292 lie outside these groups; the majority of them do not have sufficiently defined assemblages.

4.6.3. Distribution of functional sets within synchronic households

The differentiation between households according to the emphasised role of pottery enables the description of each in the sense of prevalent activities. On the basis of the functional sets, four such activities may be distinguished. The medium- or long-term storage of food was a problem during the earlier period. The manipulation of water encompasses its carrying, short-term storing and usage for cooking, drinking or hygiene. Food processing includes the preparation of both hot and cold meals. A study of mechanical wear and tear or other such factors has yet to be undertaken at Bylany (cf. Skibo 1992). The last group consists of vessels used for the consumption of meals, including their serving and short-term storage. The majority of the functional sets of vessels can be related both to individuals and to groups of people. Processing and consumption are complementary functions that are mutually conditioned; therefore, they appear as the most common.

4.6.4. Social interactions between households and phases

The evaluation of households according to the prevailing activities as reflected in the refuse does not necessarily indicate the absence of other activities. It follows more that interactions between the different members of the households may possibly have co-operated within kinship groups or a type of division of labour across the neighbourhood. In some of the cases described below, a simple distance relationship to water resources can be demonstrated. It should be noted here that all of the deduced relations are based on a very generalised interpretation of the behaviour of the vessels at the LnK site. It was not possible to determine any secondary or random functions. Moreover, the relationships to containers of any other materials can only be guessed at.

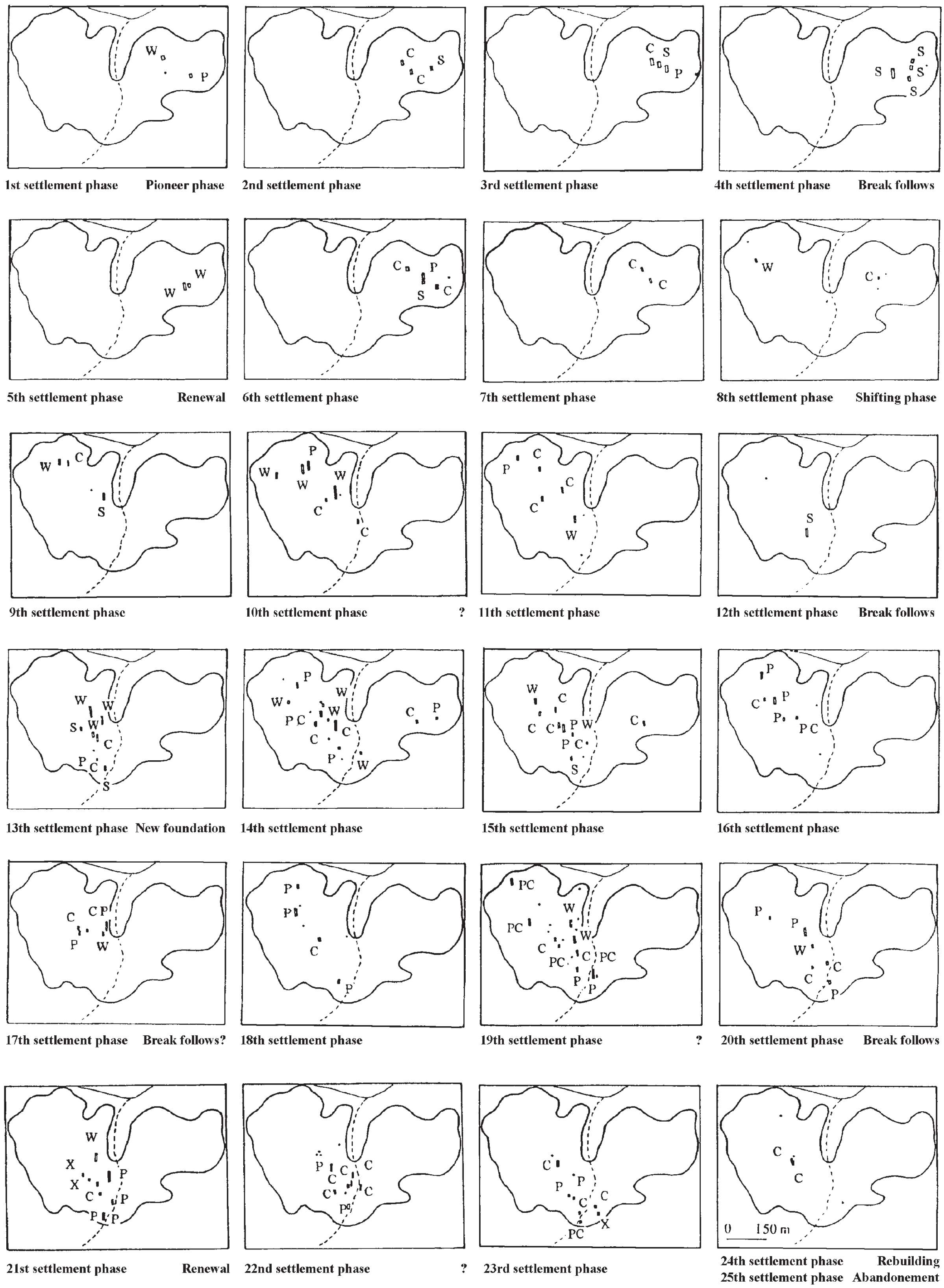


Fig. 4.6.4.a. Prevalent functional sets in households (W-water processing, P-processing, C-consumption, S-storage). - Převažující funkční sady v domech (W = manipulace s vodou, C = konzumace, S = skladování).

Houses with a higher ratio of storage vessels occur frequently in the earlier phases, prior to phase 15 (house 1116). In the other phases, only one such house typically exists, while in some phases there are none (1, 3, 8, 11, 12, 14). The lower ratio of storage pottery in the later phases relates both to the use of a different kind of long-term storage container (storage pits or silos) and to economic changes. Where more houses are dated to within one phase, then the houses with an average capacity are concentrated on the fringes of the area.

The households with a prevalence of consumption in the later period are linked to food processing. In the earlier period, they merge with water manipulation. They seem to be dispersed randomly across the area. By contrast, households with a prevalence of water manipulation are strikingly focused on the fringes of the area, in close proximity to the streams. This seems to be natural, because of the more frequent and easier access to water resources. The average distance to streams of houses with water manipulation sets, about 100 m, is generally shorter than the distance from houses with a prevalence of storage pottery.

4.7. The context of ideas and imagination

4.7.1. The cognitive significance of pottery proportions

The proportions given above were not considered in detail (see 4.2.1), in view of the difficulties of assessing them using only whole vessels. Additionally, vessel volume was measured only on the rim sherds, by inscribing a circle into a section of the rim. This method of measurement means that the radius of the inscribed circle provides a sufficient approximation of the proportions of the vessels. A doubled radius can be used to substitute for the actual maximum diameter, except in the case of bowls where this is measured by the rim diameter. The height of a vessel can be measured by subtracting the semicircle above the aperture from the doubled radius. The measurement of the circle was subjectively distorted by using a manual template. Some of the discrepancies are caused by bowls which have straight sides. An unknown base form, not fitting the inscribed circle, is a source of failures. The agreement between the directly measured and indirectly calculated volumes was demonstrated (see 4.4.3). This confirms the usefulness of the calculation method employing an inscribed circle.

It can be supposed that the ratio of the circle diameter to the calculated "height" is a good approximation of the width-height relationship of the vessels. This measure was used for defining the "prototypes", where cognitive significance for ethnical classification has been proven (Kempton 1981). Prototypes, then, are such variants of the forms within continuous measures (width and height), and are in some way emphasised. The prototypes represent a hierarchy of the members of the studied category, which is a typical fact for cognitive categorisation (Rosch 1978, Pavlů 1999).

The Bylany assemblage of vessels and rim sherds can in this way be quantified for an estimation of the n-classes of their width and height. A 2 cm scale was accordingly used for the diameter of the rims. The LnK vessels have a tendency to be focused along the diagonal, which means that their proportions were roughly preserved with increasing volume.

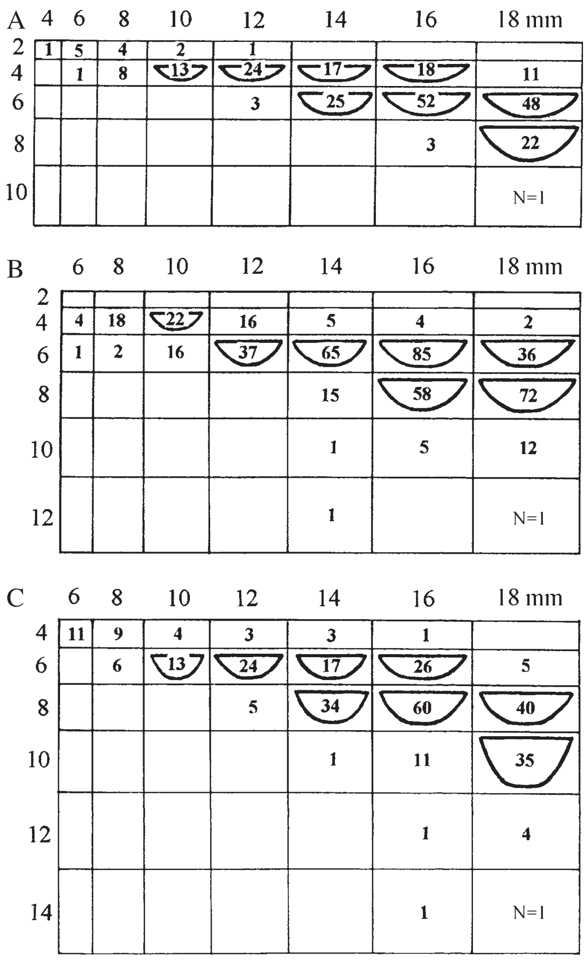


Fig. 4.7.1.a. Prototypes of bowls (A-SHASI1, B-SHASI3, C-SHASI5). - Prototypy misek.

A

	4	6	8	10	12	14	16	18	20	22	24 mm
4	**1**	**11**	**3**		**2**						
6		**20**	**51**	**22**	**10**	**4**	**1**				
8			**19**	**101**	**93**	**21**					
10				**16**	**116**	**132**	**5**				
12					**16**	**53**	**45**				
14						**8**	**19**				
16							**6**	**1**	**1**		**N=1**
18								**1**	**5**		

B

	4	6	8	10	12	14	16	18	20	22 mm
4	**1**	**1**								
6		**7**	**20**	**1**						
8			**37**	**89**	**6**					
10				**48**	**215**	**44**	**1**			
12					**63**	**293**	**64**			
14						**33**	**174**	**37**		
16							**14**	**72**	**2**	**1**
18									**24**	
20									**4**	**3**
22										**N=3**

C	4	6	8	10	12	14	16	18	20	22 mm
4	2	3								
6		23	59	4						
8			56	184	46	1				
10				54	385	195	4			
12					31	289	155	1	1	
14						11	128	8		
16							6	16	1	
18								2	2	
20									1	N=2

Fig. 4.7.1.b. Prototypes of hemispherical vessels (A-SHASI7, B-SHASI9, C-SHASI11). - Prototypy polokulovitých nádob.

Disproportions are caused by the measurement method when the longer forms are simplified, becoming rounded ones. In this way, the frequencies for all of the categories within the SHASI classification were calculated for each class of width and height. Those finds from classes where the number of members exceeded the average number of sherds belonging to a class were designated prototypes. In the majority of the cases, the members were focused within several classes and consequently about two thirds of the finds can be described as prototypes.

4.7.2. Rim preparation

LnK vessels do not express a great variability in the termination of the walls around the rim, as is the case in other cultures. In a narrower sense, the rim most frequently terminated in a symmetrical arch - both the inner and outer sides symmetrically approach their end at the rim. Less often, the sides tend towards the rim asymmetrically, and the inner side is slightly flared at the end. An "s"-shaped termination is a characteristic rim preparation, differing from the deliberate "s"-shaped form of the neck. The horizontal cut-off of the rim is an exceptional attribute within LnK pottery; on rare occasions this may be caused by the secondary levelling of a broken primary rim. With few exceptions, broadened rims do not appear in the Bylany assemblages. More detailed variants are used to distinguish between the theoretically possible asymmetrical termination of the rims (Gabriel 1979: Anlage 5).

4.7.3. Composition: real and symbolic ligatures

The stylistic value of any artefact increases in accordance with the time expended on its production, and with the time over which it is used (Wiessner 1983: 260). The greater time that is needed for a larger number of steps in production, the more social information is embodied into the artefact. The more the artefact was used, the greater the amount of social information that was mediated by it. Given this, the ligature or binding of a vessel must be considered an important stylistic attribute, as is known from historical records (Štajnochr 1998). It means that more work was required to produce the vessel, and the vessel therefore must have undergone more production operations.

The composition of the forms, of additional protrusions and of the different types of decoration comprise the stylistic classes of the pottery, the symbolic and informative role of which can be linked to the concept of ligature. Both real and symbolic roles can be distinguished. The aforementioned knobs and handles can be considered here, along with technical decoration. The covering of the surface with fingernail impressions was, in some cases, a preparation for the additional covering of the vessel surface with a further level of clay, protecting the vessel against direct contact with fire. The zigzag impressions typical of LnK coarse pottery usually follow the strings between knobs or handles. By contrast, other linear or relief decorations can be designated as being symbolic ligatures. A real ligature extended the functional capabilities of the vessel, and at the same time its informative action. A symbolic ligatures had to protect the vessel itself, as well as its contents, against any possible physical or symbolic damage; it too had its own informative value (see below).

Vessels with real ligatures comprise 12.2. % (N = 40056) of the total number of finds that could be dated into phases at Bylany. They comprise all of the vessel sherds with knobs and handles, and technical fingernail decoration which follows their position on the sides. The latter has no alternative motive than to provide a zigzag pattern. The vessels with symbolic ligatures comprise 34.3 % of the total, and include vessels with linear and relief decorations. Both appear not only as zigzag motifs simulating real ligatures, but also as other types of ornamentation. Plain ware without any ligatures makes up 53.5 % of the total. In terms of the sherds, the number may be an overestimate, as it is not possible to separate out the undecorated sherds which nevertheless come from decorated vessels. The attributes of the ligatures are very stable at the Bylany site. No differences are apparent in this regard between the earlier and the later phases. Ligatures can therefore be described as a culturally standardised stylistic attribute.

4.7.4. The quality of technological processing and surface finishing

General outward appearance is understood as the decisive stylistic characteristics of each artefact. This corresponds to the level of respecting culturally conditioned regularities in the working procedure, and the effort required for production. The classes of ceramic ware at Bylany were distinguished, in the first instance, by the colour of the sherds on the inner and outer surfaces, as well as in each section. The colour recovered today does not necessarily reflect the original one, as such original coloration may have been altered by use over an open fire, or by the different environmental conditions following the discontinuation of vessel use. For this reason, the classification of the colour of the sherds into categories is not unique.

The original, more detailed classification of the materials (BY67: Soudský 1967) can be summarised here into four groups (Tab. 4.7.4.A, B). In the first two groups, the vessels fired in a reduced atmosphere can be distinguished (REDU), and are characteristically a grey-black colour; those fired in an oxidised atmosphere (OXYD) have a lighter, ochre colour. During the development of the classic LnK, the proportion of both is approximately equal, stable at around a level of 30 %, with some exceptions. The colours within both groups are not uniform, however, and may be interspersed with one other, this bearing witness to the fact that the firing procedure in the LnK was not stabilised, and about two thirds of the pottery was fired in an uncontrolled atmosphere. The remaining third of the ware is part of two classes that were more standardised: the first of these is the archaic (ARCH), and consists of red-black-red coarse and fine ware, mostly with organic tempering. The second consists of standard ware with a grey-black surface and a red-brown section (STAND), the proportion of which increases gradually over time; it includes both fine and coarse vessels.

The effectiveness of a common product, and therefore its informative value, was increased by the use of a surface finish. For the pottery, this consists of a surface polish or a covering with a finer material, a later kind of slip. Both the practical and the symbolic effectiveness of the vessels was emphasised by surface polishing, which has not been preserved in all cases. The covering of a surface with a graphite finish had a similar effect (Tab. 4.7.4.C, D). Unpolished decoration has been demonstrated, but such evidence has been discovered only very rarely, in stray finds from East Bohemia, in the upper Elbe (Labe) region (e.g. Jeřice, inv.no.930: Pavlů - Vokolek 1992: Fig. 29).

The reduction of ware is slightly more common across the assemblage as a whole (Tab. 4.7.A: 36.6 %), which corresponds to other surface finishing techniques excepting burnishing and polishing. Generally, 30 % of the vessels with a burnished surface were reduced and standard fired. The archaic standard firing does not occur in particularly noteworthy proportions (1.9 %). It may also be that the earliest phases generally have smaller numbers of finds; furthermore, development of the Bylany settlement began later, during the second half of the earliest period.

Surface polishing is also not present in conspicuously large quantities (Tab. 4.7.B: 3.6 %), which reflects more the soil conditions for material preservation than the real proportion of the finds. The absence of other surface finishing techniques, such as a red finish or an organic finish later on, can be explained in a similar way. The vessels with an apparently polished surface reached a level of 40 %, while other vessels accounted for 56 %, of the assemblage. The latter group contains mostly coarse ware, prepared using "wet hands", and "semi-burnished" items with irregular burnishing. ➔Tabs. 4.7.4.A, 4.7.4.B, 4.7.4.C, 4.7.4.D.

4.8. The social groups in different stylistic manifestations

4.8.1. Prototypes as a symbol of prestige status among household members

The average proportion of prototypes within all of the SHASI categories per house comprises 75 % of all of the rims. The remainder consists of less common variants of proportions, or of extreme forms, sometimes together with incorrectly classified items. The relative occurrence of prototypes in comparison to other forms is, as a total for all of the phases, relatively uniform - in the earlier phases it is 50 %, increasing to a maximum of 71.4 % in phase 18. In the later phases it varies in lower values.

A greater variability in this attribute appears among synchronic households within phases. The range of values varies between 10-20 %; in phase 18 it is only 4 %. This proportion is about 83-87 % of the prototypes within the houses, just as is also the case for the two preceding phases in which, however, the values are less equal. The prototypes and their proportion can be interpreted as a symbol of the social prestige of the members of each household, which might follow their age, gender or family relations. Higher social status allowed, and presupposed, the use of more standardised vessels. The variability of the ratio of the prototypes within synchronic houses has the character of socially conditioned variability. This differential conditioning can also be proven using the lower correlation of the relative values of prototypes to the related values of skill levels in households (cf. section 4.3.7.). These coefficients were conditioned by the individual skill of the pottery producers.

In the majority of the phases, between two and three houses appear with the maximum proportion of prototypes, while the values for other houses are lower (Fig. 4.8.1.a). Only in phases 13 to 18 some of the houses have proportionally higher values of prototypes. From the point of view of standardisation, these phases reached very a high level. The spatial distribution of the houses with a higher percentage of prototypes is not regular in either phase, and does not permit of any speculation as to kinship or status clustering within the phases.

4.8.2. Houses with a predominance of symbolic ligature

The variability of the real and symbolic ligature on vessels within the phases is similar to the variability of the prototypes. Within the phases it is low, but it is higher among synchronic households. The real ligature shows a declining trend over the course of its development, from 16 % in the early phases down to 9 % in the final phase (Tab. 4.8.2.A). The appearance of symbolic ligatures is more varied, ranging from 18 % in phase 1 to 30 % in the final phase. The maximum figure for linear and relief decoration taken together is in phase 11.

In the majority of the phases, the values indicating the presence of symbolic ligatures range

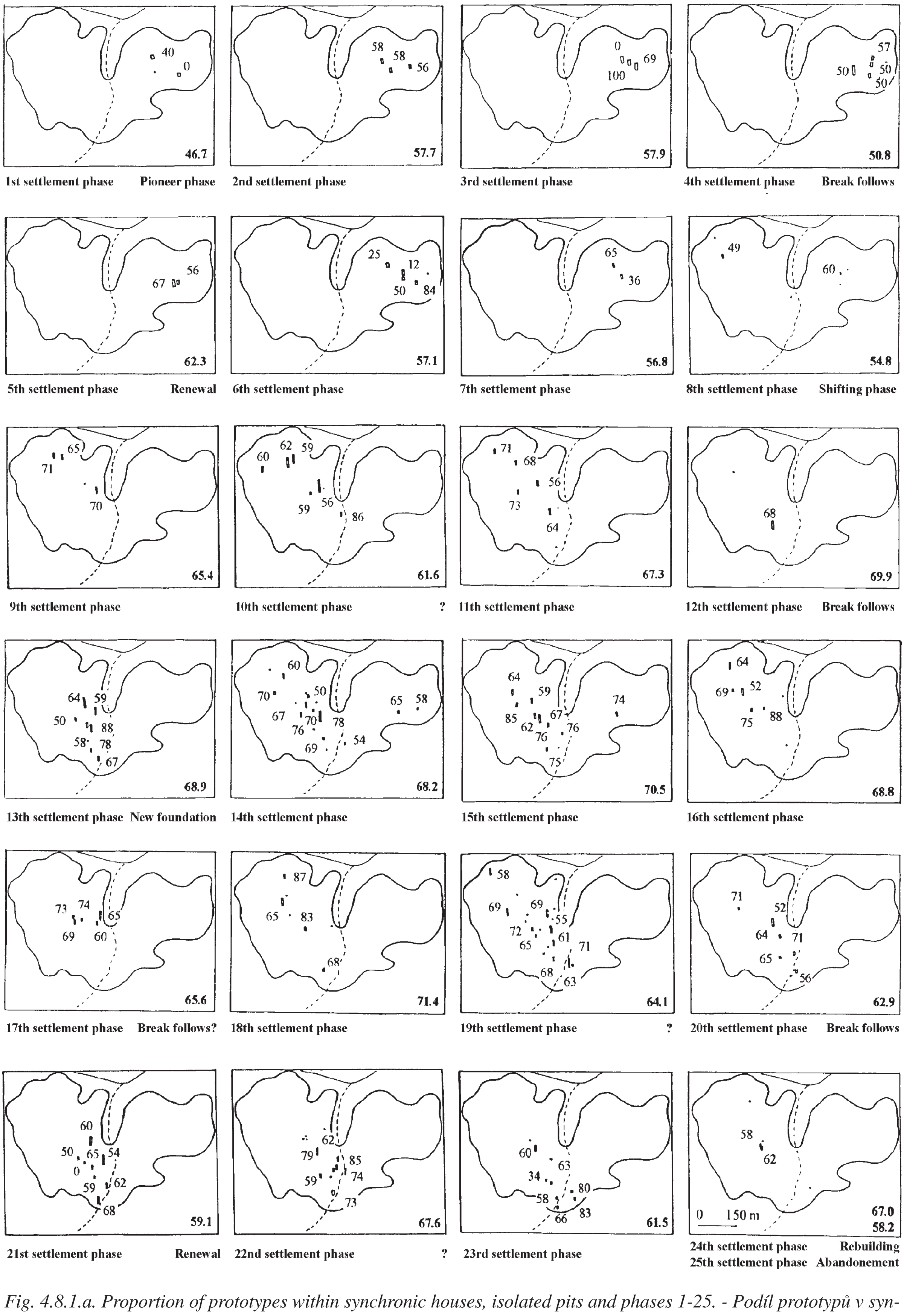


Fig. 4.8.1.a. Proportion of prototypes within synchronic houses, isolated pits and phases 1-25. - Podíl prototypů v synchronních domech, izolovaných jamách a fázích 1-25.

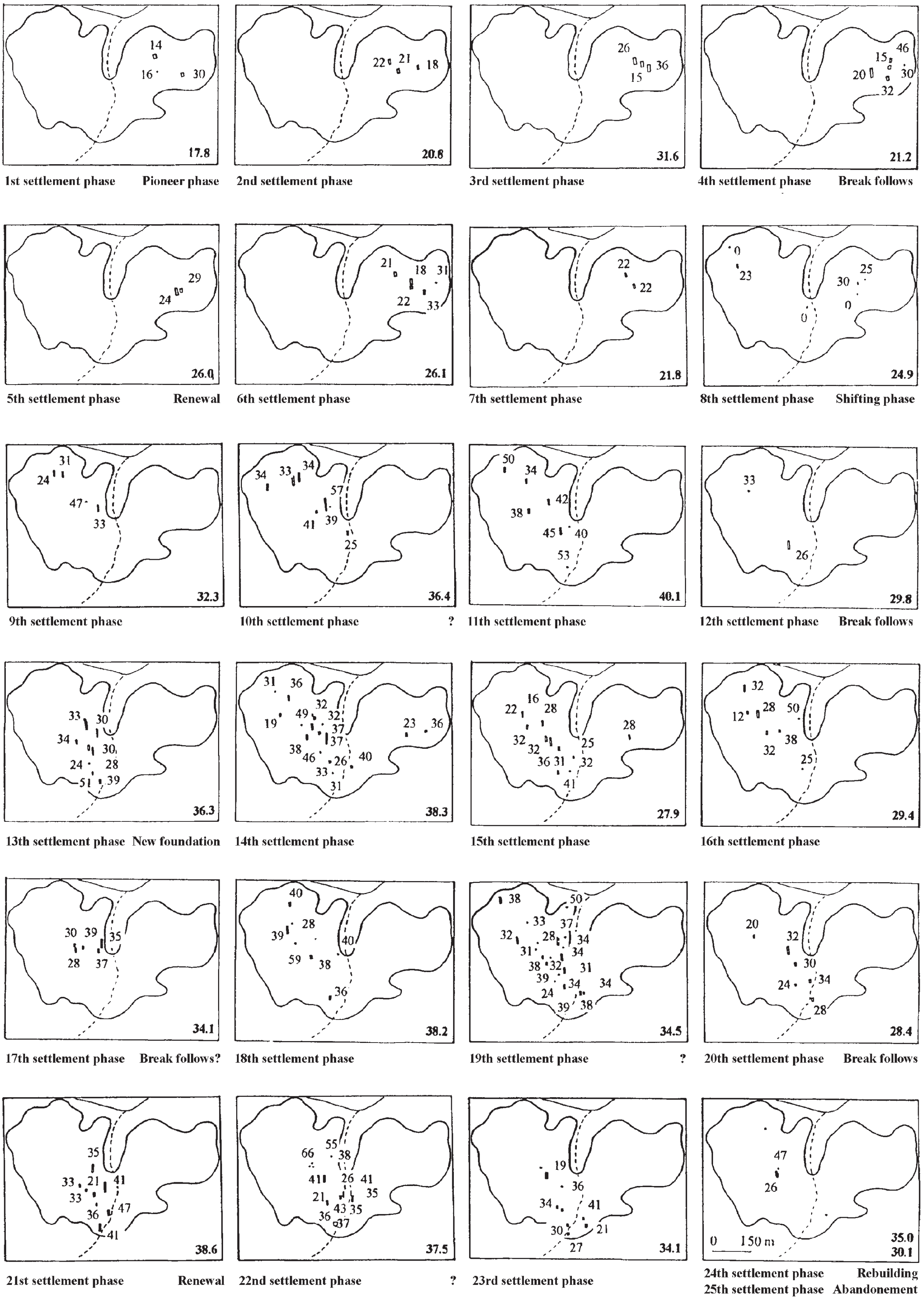


Fig. 4.8.2.a. Proportion of symbolic binding ligature in synchronic houses, isolated pits and phases 1-25. - Podíl symbolického ovazování v synchronních domech, izolovaných jamách a fázích 1 - 25.

from 15-20 %. It is clear that a lower range of minimum and maximum values was found in phases 16-18, where they reached levels of 4-11 % (4 % within houses in phase 18). In this phase, the occurrence of the symbolic ligature is stable, and approaches an average of 38 % in all of the households. Phase 18 appears to be exceptional both from the point of ligatures, by which is meant LO PO decoration, and from the point of view of prototypes. The quantitative levels are equal in all of the households of this phase.

The proportion of the symbolic ligatures on vessels in individual houses evidently does not correspond to the proportion of prototypes (Fig. 4.8.2.a). When the prototypes are taken as symbolising a position of prestige for household members, then ligatures must be interpreted in different social contexts. Because vessel decoration has in societies recently the subject of ethnographic studies been considered as an expression of the protection of the contents against transcendental influences (Štajnochr 1998: 36), even in the Neolithic period it is possible to consider "decorative nature" as being the symbolic preservation of the contents of the vessels. Moreover, this symbolic protection was just as important as physical protection, and was expressed in the shape of the orifice (cf. section 4.4.1.). The prototypes and the ligature therefore represent two different systems of socially conditioned symbols. →Tab. 4.8.2.A.

4.9. The creation and preservation of cultural tradition

4.9.1. Prototypes in the process of information exchange

The variability of phases as concerns prototypes was plotted as a result of correspondence analysis. Because the space is relatively simple, it contains only the classification of the vessel sherds according to their compatibility with the modelled proportions. The results of the analysis show simply on the first axis those phases where prototypes are prevalent, and on the second axis the phases where prototypes fail (Fig. 4.9.1.a). Within the space of the first and second factors explaining the full variability of the space of the prototypes, the phases can be classified as either present, absent or indifferent. In consequence, a sequence of these stages appears. →Tab. 4.9.1.A.

This categorisation expresses the mutual relationship between the classification of forms within the phases (for data see Tab. 4.8.2.A).

The interpretation of the resulting sequence can be compared to the preliminary interpretation of the dynamics of the phases, based in turn on the dynamics of the stone tools (Pavlů 1989: 285). For the individual phases, the level of information exchange achieved between synchronic houses is concentrated. The assemblage of vessels from several synchronic houses then comprises a unit, the quality of which from the point of view of the proportionality of forms is a result of social interaction against a background of concrete historical events.

The phases labelled as "indifferent" precede changes in the course of the phases (4, 17, ?10), or periods of area renewal (1, 8). Around two other changes in site dynamics (between phases 12/13, and 20/21 respectively) prototypes are prevalent (category "yes"). The sequences of the phases are constituted by prototypes (phases 11-15 and 18-21), and are considered as very stable periods in the settlement of the area. The historical backgrounds could be described as very quiet periods without any population or other pressures. Both periods represent a core in the development of the Bylany area, during which local resources were used in an optimal manner.

A higher proportion of non-standardised forms (prototypes = "no") was observed at the beginning

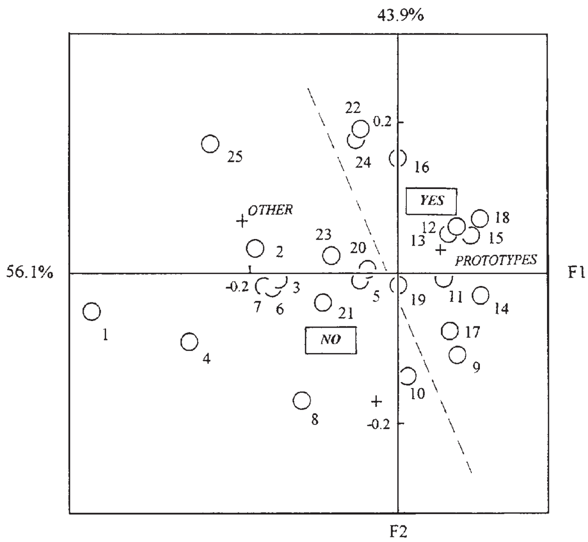


Fig. 4.9.1.a. Correspondence analysis of prototypes within the phases (factor 1 - frequency of prototypes, factor 2 - negative frequency of unclassified sherds). - Koresponenční analýza prototypů v prostoru fází (faktor 1 = četnost prototypů, faktor 2 = negativní četnost neklasifikovaných zlomků).

(phases 1 and 6), at the end (phases 22, 24, and 25) and exceptionally prior to such changes (phases 7 and 16). The reduced social role of prototypes appears, as expected, in the periods of lessened security in the area. As historical backgrounds, these could be described as "unsettled" milieux - there might be ensuing crop or population changes. In the beginning, the area was recognised from the point of view of local resources, and in the end a kind of long-term settlement could be discerned. The number of houses built in the area, and the pits dug, might have had an undesirable effect on the local environment, which was finally abandoned by the end of the StK period.

4.9.2. Composition as a message from our ancestors

The position of the phases within the simple space of compositions represented by ligature stages (of "real", "symbolic" and "non") differs according to the results of correspondence analysis (for the data, see Tab. 4.8.2.A), finding their position according to the prototypes. The vessels with a symbolic ligature are pronounced on the first axis, while those with a real ligature are pronounced on the second axis. Within this space the phases are divided into two groups that explain their full variability (Fig. 4.9.2.a), which can be distinguished from the presence of prototypes at a value of 31 %. The synchronic households behave in this case as a unit, describing their orientation at a given moment. This description could be important within the process of genetic sequencing, and may be a source of "inherited variability" (descent with modification).

The classification of the phases according to the prevalent type of ligature indicates great variability (Tab. 4.9.1.A). All ligatures are suppressed at the beginning, except during phase 3. Later on, the phases with real and symbolic ligature change. The lower ratio at the beginning could equally be interpreted as a mark of common insurance. The historical background, concerned more with the collective preservation of principal subsistence, placed less emphasis on the symbolic ligature that was directed more towards individuals.

Subsequent development shows symbolic alternation, but this never lasts too long-certainly no longer than a single phase (with the exception of phases 15 and 16). If a phase corresponds to the length of a generation, changes at the moment

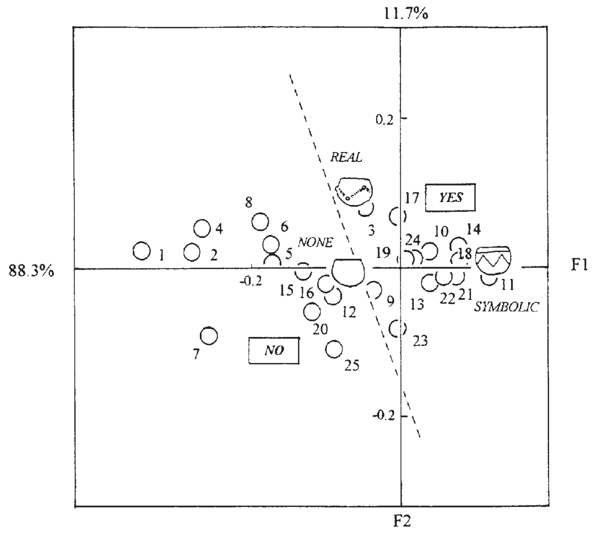


Fig. 4.9.2.a. Correspondence analysis of the composition of the vessels (binding) in the space of the phases (factor 1 = symbolic binding, factor 2 = true binding). - Korespondenční analýza kompozice nádob (ovazování) v prostoru fází (faktor 1 = symbolické ovazování, faktor 2 = skutečné ovazování).

of the transition between generations could be inferred. On only four occasions did the succeeding generation accept a pronounced ligature, i.e. decoration in the narrower sense. These cases are concentrated in the stable periods. Between phases 12 and 13 was the common factor of an absence of ligature, when both phases were divided by some temporal hiatus.

The role of the symbolic ligature was more evident in individual expression, and was dependent on immediate demands. This variability reflects more the changes in the generations among the women producing the pottery, as they wished to protect their own vessels with their own style of transcendental defence, in contrast to the styles of their ancestors. The similarities follow the rules of the phases of renewal (phases 18-19 or 21-22), the time when a new model of settlement life was constituted. It can be observed that the message of one's ancestors carried a greater weight than the modifying efforts of their successors.

4.9.3. The tradition of technological style in Neolithic pottery

During the period of Neolithic development at Bylany, the tradition of the technological style of the pottery and its production evolved and changed. Given the great similarity in technology over a huge area which is one of the reasons for the easy identification of LnK ceramics, it is to be expected that the changes will not be particularly pronounced. This is further confirmed by a comparison of the proportions of reduction and the standard firing of vessels with a burnished surface. These vessels belong mostly to the category of fine utensils, where a greater variability could be expected, as changes in fashion continue to show today.

The quantitative representation of these classes is fairly variable at the level of synchronic

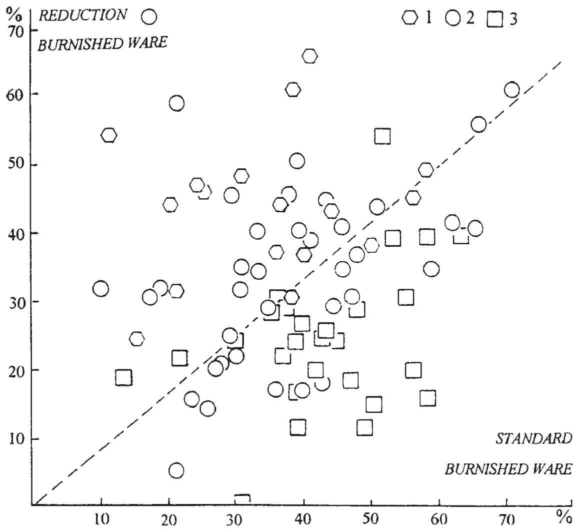


Fig. 4.9.3.a. Correlation of the fine standard and reduction firing of goods in individual households. (1-phases 8-12, 2-phases 13-16, 3-phases 17-21) - Korelace jemného standardního a redukčně páleného zboží v jednotlivých domech. (1-fáze 8-12, 2-fáze 13-16, 3-fáze 17-21)

households. The average presence values are 33 % for reduction firing, and 40 % for standard firing (Tab. 4.7.4.B). Such average values for reduction firing are found only in phases 13-16. In the earlier period these values are higher, due to the higher values of reduction firing in phase 8-12. In the later periods the values are lower, due to the higher values of standard firing in phases 18-21. This development is fluent, and is significant in that it connects the whole development of the occupation of the site. This is a consequence of the known conservatism of the technological styles in any given culture. The tradition of technology was previously very strong.

Within the studied relationships between the technological types of firing, only isolated similarities between neighbouring houses from subsequent phases were found. (Fig. 4.9.3.a). These cases are from phases 14-15-16 (houses 426-433-245), phases 14-15 (houses 681-149 and 1195-926), phases 19-20-21 (houses 96-682-912) and phases 19-20 (houses 1121-79 and houses 1240-1227). Such similarities could be interpreted as the transferring of technological habits between genetically related members of the households concerned, but are unexpectedly very infrequent. The succession of houses sited close to each other is predicted by Neolithic settlement models (Tringham - Krstič 1990: 587). Nothing, however, is known about the technological similarities in houses where kinship relations are presumed. The infrequent examples from Bylany must thus be seen as exceptional. The apparent similarities between more distant houses, if they appear, cannot be genetically interpreted without further evidence.

4.9.4. The geometry of Neolithic forms and lasting traditions

The geometric properties of pottery are also numbered among the stylistic attributes. The vessels were usually formed along a symmetrical axis, normally vertical. This kind of manual production leads to rotated forms with a globular shape, although they might also be either ovate or asymmetrical. The geometry of the profile curve follows either a circular form, or forms such as ellipses, ovoids, or others. The functional point is implemented by opening the forms upwards, except for special forms like covers. The use of inverted pottery has been proven only in graves, and it is supposed that empty vessels were stored in this way. Geometric variability in the LnK forms does not appear on the sites, and indeed is rather limited within the culture as a whole. Greater differences appear outside the LnK region, for example in the eastern branch of the LnK in the Carpathian Mountains. In those regions, quadrangular apertures appear often, as do ovoid forms etc. (cf. Strobel 1997).

The forms of the Bohemian LnK from Bylany belong to the unified category of rotated spherical vessels (Fig.4.0.3.a). They represent a uniform and unchanging style which lasted for several hundred years. The principal differences are to be found between the structures of the earliest forms and some quantitative characteristics of the pottery of the later periods. The subsequent StK development, continuing these traditions, is not represented in the Bylany 1 area. The structural differences between forms of the earliest LnK periods and the classic LnK on the one hand, and between those of the classic LnK and the early StK on the other, are comparable. The earliest LnK period, in this context, appears at the level of a separate culture. At Bylany this movement was represented in the minor but sufficiently marked movement of houses from the habitation area at section F to section B in area BY1.

File	AVERAGE	STANDARD DEVIATION	Size of file N=
FROM WHOLE POTS	6.98	2.00	328
FROM RIMS	7.08	2.44	13418
FROM BOTTOMS	8.53	3.09	4125
FROM WALLS	8.00	3.09	50534
N=			68405 (including 0)
Ware			
FINE	5.92	1.73	31981
COARSE	9.53	2.98	36424
Forms of the typology BY67			
BOWLS	7.70	2.23	3198
HEMISPH. BOWLS	6.70	2.30	9805
JARS	9.57	3.62	2039
N/A	8.00	3.14	53363

Tab. 4.1.7.A. Average thickness of vessel walls from various assemblages. - Průměrná síla stěny nádob z různých souborech.

Phase	AVERAGE	STANDARD DEVIATION	(N= only datable)
1	11.10	5.47	191
2	10.14	5.11	539
3	9.39	4.20	117
4	10.17	4.81	571
5	8.88	4.06	539
6	8.84	3.88	276
7	9.94	4.11	142
8	7.89	3.71	1101
9	7.71	3.13	1131
10	7.52	3.02	2817
11	7.32	2.77	2741
12	7.68	2.83	416
13	7.77	3.05	2683
14	7.60	2.87	3508
15	7.90	2.87	2706
16	7.93	3.04	745
17	7.80	2.84	851
18	7.43	2.67	1950
19	7.61	2.79	7689
20	7.60	2.68	1192
21	7.62	2.84	2907
22	7.55	2.55	2738
23	7.60	2.49	1605
24	7.99	2.62	406
25	7.98	3.10	495

Tab. 4.1.7.B. Average vessel wall thickness in individual settlement phases. - Průměrná síla stěny nádob v jednotlivých sídlištních fázích.

		HEMISPH. BOWLS	BOWLS	JARS	N=
In house complexes	THIN-WALLED	73.8	19.4	6.7	100.0
	THICK-WALLED	51.0	25.6	23.4	100.0
	%	64.9	21.8	13.3	100.0
In isolated pits	THIN-WALLED	78.7	16.1	5.3	100.0
	THICK-WALLED	51.5	26.7	21.8	100.0
	%	68.2	20.2	11.7	100.0
Other	THIN-WALLED	74.8	17.1	8.1	100.0
	THICK-WALLED	49.7	26.4	23.9	100.0
	%	64.2	21.0	14.7	100.0

Tab. 4.2.4.A. Representation of basic forms in various features. - Zastoupení základní tvarů v různých objektech.

	WHOLE	RIM	BOTTOM	WALL+B	WALL	%
In house complexes	0.5	21.8	6.7	1.5	69.5	100.0
In isolated pits	0.6	21.9	5.9	1.4	70.2	100.0
OTHER	0.4	18.4	5.6	1.5	74.1	100.0
%	0.5	20.4	6.1	1.5	71.5	100.0

Tab. 4.2.4.B. Representation of different vessel parts in various features. - Zastoupení různých částí nádob v různých objektech.

House mid-section / MNV	Pots	Rims	Bottoms	Parts	walls	N=
SIMPLE	1.30	43.13	12.58	3.00	141.08	62
DOUBLE	1.38	97.23	28.85	6.77	288.85	26
UNCLASSIFIED	1.00	39.03	13.90	2.22	124.34	32
ISOLATED PITS	1.31	48.80	13.25	3.02	153.92	48

Tab. 4.2.5.A. Average number of vessel parts discovered per complex (MNV - Minimum Number of Vessels). - Poměrný počet částí nádob na jeden komplex.

House mid-section / MNV	Form	BOWLS	HEMISPH. BOWLS	JARS	No. of houses
SIMPLE	THIN-WALLED	5.53	21.90	1.61	62
SIMPLE	THICK-WALLED	4.11	9.00	4.34	
DOUBLE	THIN-WALLED	9.58	46.15	4.50	26
DOUBLE	THICK-WALLED	11.58	21.19	10.81	

Tab. 4.2.5.B. Average number of basic forms (MNV - Minimum Number of Vessels) per household. - Poměrný počet základních tvarů na jeden dům.

Coef. of quality / score	BOWLS/1	HEMISPH. BOWLS/2	JARS/3
THIN-WALLED/2	2	4	6
THICK-WALLED/1	1	2	3

Tab. 4.3.4.A. Score of the quality (comp. Fig. 4.0.3.a) of producing a shape. - Skóre obtížnosti (srov. obr. 4.0.3.a) zhotovení tvarů.

Phases	BOWLS	HEMISPH. BOWLS	JARS	%	N=
1	40.8	38.8	20.4	100.0	49
2	53.2	27.2	19.6	100.0	158
3	47.8	30.4	21.7	100.0	23
4	41.6	33.1	25.3	100.0	154
5	56.5	29.9	13.6	100.0	177
6	48.4	39.1	12.5	100.0	64
7	52.4	33.3	14.3	100.0	42
8	30.4	49.6	20.0	100.0	230
9	32.1	51.6	16.3	100.0	246
10	18.8	67.7	13.4	100.0	632
11	17.0	71.4	11.7	100.0	643
12	21.3	63.7	15.0	100.0	80
13	13.5	72.0	14.5	100.0	585
14	18.2	67.1	14.7	100.0	845
15	20.2	66.8	13.0	100.0	554
16	22.0	67.4	10.6	100.0	141
17	17.3	68.0	14.7	100.0	231
18	16.8	77.0	6.2	100.0	434
19	18.7	68.5	12.8	100.0	1785
20	21.5	64.0	14.5	100.0	289
21	15.8	70.4	13.8	100.0	695
22	22.3	70.2	7.5	100.0	642
23	24.2	69.2	6.7	100.0	451
24	11.2	74.8	14.0	100.0	107
25	15.1	77.8	7.1	100.0	126
%	21.4	65.8	12.9	100.0	
N=	2004	6173	1206		9383

Tab. 4.3.8.A. Basic forms according to the number of inflexion points (0 = bowls, 1 = hemispherical, 2 = bottles). - Základní formy podle počtu inflekčních bodů v prostoru 1. až 25. fáze (0 = misky, 1 = polokulovité nádoby, 2 = lahve).

Phase	ROUND	ROEDGE	SHAEDG	PEDES	CONC	FOOTED	%	N=
1	7.1	78.6	7.1	7.1	0.0	0.0	100.0	14
2	13.5	78.4	4.1	0.0	0.0	4.1	100.0	74
3	50.0	28.6	14.3	0.0	0.0	7.1	100.0	14
4	22.0	55.9	10.2	3.4	5.1	3.4	100.0	59
5	15.2	67.4	6.5	0.0	2.2	8.7	100.0	46
6	4.0	88.0	0.0	8.0	0.0	0.0	100.0	25
7	21.1	52.6	21.1	0.0	5.3	0.0	100.0	19
8	35.4	56.1	6.1	2.4	0.0	0.0	100.0	82
9	41.5	50.0	2.4	0.0	3.7	2.4	100.0	82
10	48.4	45.2	1.9	0.6	1.9	1.9	100.0	155
11	48.5	43.6	2.0	0.5	4.9	0.5	100.0	204
12	78.9	15.8	0.0	0.0	5.3	0.0	100.0	19
13	58.6	34.6	3.7	0.0	2.5	0.6	100.0	162
14	65.7	29.8	0.8	0.4	1.6	1.6	100.0	248
15	69.4	27.9	2.7	0.0	0.0	0.0	100.0	147
16	51.4	48.6	0.0	0.0	0.0	0.0	100.0	37
17	70.5	24.6	0.0	0.0	3.3	1.6	100.0	61
18	50.5	43.8	1.0	0.0	4.8	0.0	100.0	105
19	76.3	19.0	0.3	0.6	2.0	1.8	100.0	342
20	71.4	22.9	1.4	0.0	4.3	0.0	100.0	70
21	77.1	21.7	0.0	0.6	0.6	0.0	100.0	166
22	81.6	10.4	0.6	0.6	4.3	2.5	100.0	163
23	86.5	9.6	1.0	0.0	1.0	1.9	100.0	104
24	90.9	9.1	0.0	0.0	0.0	0.0	100.0	22
25	100.0	0.0	0.0	0.0	0.0	0.0	100.0	25
0	60.1	34.0	2.6	0.5	1.8	1.1	100.0	1405
%	60.3	33.5	2.2	0.5	2.1	1.3	100.0	
N=	2322	1291	86	21	81	49		3850

Tab. 4.4.5.A. Proportions of different forms of base (ROUND, flat with ROund EDGE, flat with SHArp EDGe, PEDEStal, CONCave, FOOTED, comp. Fig. 4.0.3.a) in the settlement phases. - Podíl různých forem podstavy (srov. obr. 4.3.0.a) v sídelních fázích.

Handles	Lugs		
	NONE	PRESENT	N=
NONE	63813	3358	67171
PRESENT	1229	5	1234
N=	65042	3363	68405

Tab. 4.4.4.A. Appearance of lugs and handles on all sherds. - Výskyt pupků a uch na všech zlomcích.

Code	Functional type	ABS.	PRES.	%	N=
1	SMALL VERY OPENED	2.6	0.2	2.4	305
2	LARGE VERY OPENED	3.2	0.2	3.0	377
3	SMALL OPENED	,4.6	1.0	4.3	543
4	LARGE OPENED	6.3	1.5	5.9	747
5	SMALL SLIGHTLY OPENED	2.9	1.4	2.8	349
6	LARGE SLIGHTLY OPENED	3.4	1.1	3.3	412
7	SMALL SLIGHTLY CLOSED	7.1	3.5	6.8	857
8	LARGE SLIGHTLY CLOSED	8.3	8.5	8.3	1041
9	SMALL CLOSED	14.6	11.8	14.4	1809
10	LARGE CLOSED	14.3	27.5	15.3	1916
11	SMALL VERY CLOSED	11.0	11.3	11.0	1379
12	LARGE VERY CLOSED	10.4	28.4	11.6	1460
13	SMALL WITH NECK	7.0	1.9	6.6	830
14	LARGE WITH NECK	4.5	1.6	4.3	538
%		100.0	100.0	100.0	
N=		11689	874		12563

Tab. 4.4.4.B. Appearance of lugs on SHApe SIze functional types (comp. Fig. 4.0.3.a: I, J). - Výskyt pupků na funkčních typech SHASI (srov. obr. 4.3.0.a: I, J).

Code of the type SHASI	ABS.	PRES.		N=
1	2.4	1.7	2.4	305
2	3.0	0.9	3.0	377
3	4.4	0.9	4.3	543
4	6.0	1.7	5.9	747
5	2.8	2.6	2.8	349
6	3.3	3.5	3.3	412
7	6.9	0.9	6.8	857
8	8.4	0.9	8.3	1041
9	14.5	4.3	14.4	1809
10	15.4	3.5	15.3	1916
11	11.0	6.1	11.0	1379
12	11.7	3.5	11.6	1460
13	6.3	38.3	6.6	830
14	4.0	31.3	4.3	538
%	100.0	100.0	100.0	
N=	12448	115		12563

Tab. 4.4.4.C. Appearance of handles on SHApe SIze functional types (comp. Fig. 4.0.3.a: I, J). - Výskyt uch na funkčních typech SHASI (srov. obr. 4.0.3.a: I, J).

Phase	Lugs		%	N=
	NONE	PRESENT		
1	87.4	12.6	100.0	191
2	88.9	11.1	100.0	539
3	88.0	12.0	100.0	117
4	90.0	10.0	100.0	571
5	90.7	9.3	100.0	539
6	89.1	10.9	100.0	276
7	91.5	8.5	100.0	142
8	90.0	10.0	100.0	1101
9	94.9	5.1	100.0	1131
10	95.1	4.9	100.0	2817
11	95.5	4.5	100.0	2741
12	96.6	3.4	100.0	416
13	95.3	4.7	100.0	2683
14	94.4	5.6	100.0	3508
15	94.9	5.1	100.0	2706
16	94.9	5.1	100.0	745
17	94.2	5.8	100.0	851
18	95.4	4.6	100.0	1950
19	95.6	4.4	100.0	7689
20	95.4	4.6	100.0	1192
21	95.4	4.6	100.0	2907
22	96.2	3.8	100.0	2738
23	95.1	4.9	100.0	1605
24	94.8	5.2	100.0	406
25	94.3	5.7	100.0	495
0	95.5	4.5	100.0	28349
%	95.1	4.9	100.0	68405
N=	65042	3363		68405

Tab. 4.4.4.D. Proportions of vessels with / without lugs in the individual phases. - Podíl nádob s pupky a bez pupků v jednotlivých fázích.

Phase	Handles		%	N=
	NONE	PRESENT		
1	93.7	6.3	100.0	191
2	95.5	4.5	100.0	539
3	94.0	6.0	100.0	117
4	93.5	6.5	100.0	571
5	96.3	3.7	100.0	539
6	95.3	4.7	100.0	276
7	97.9	2.1	100.0	142
8	96.4	3.6	100.0	1101
9	96.0	4.0	100.0	1131
10	98.1	1.9	100.0	2817
11	98.4	1.6	100.0	2741
12	99.5	0.5	100.0	416
13	98.4	1.6	100.0	2683
14	98.0	2.0	100.0	3508
15	98.3	1.7	100.0	2706
16	97.7	2.3	100.0	745
17	98.8	1.2	100.0	851
18	98.8	1.2	100.0	1950
19	98.2	1.8	100.0	7689
20	98.3	1.7	100.0	1192
21	98.5	1.5	100.0	2907
22	98.9	1.1	100.0	2738
23	99.1	0.9	100.0	1605
24	98.0	2.0	100.0	406
25	99.2	0.8	100.0	495
0	98.4	1.6	100.0	28349
%	98.2	1.8	100.0	68405
N=	67171	1234	68405	

Tab. 4.4.4.E. Proportion of vessels with / without handles in the individual phases. - Podíl nádob s uchy a bez uch v jednotlivých fázích.

Material / temper		NONE	ORGANIC	ANORGANIC	OTHER	N=
FLOATED	MNV	14366	580	17382	1	32329
	%	21.0	0.8	25.4	0.0	47.3
UNFLOATED	MNV	2	4431	31642	1	36076
	%	0.0	6.5	46.3	0.0	52.7
N=	MNV	14368	5011	49024	2	68405
	%	21.0	7.3	71.7	0.0	100.0

Tab. 4.4.7.A. Summary occurrence of the main types of ceramic material and temper (MNV = Minimal Number of Vessels). - Souhrnný výskyt hlavních druhů keramického materiálu a ostřiva.

1.-7. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	75.9	0.0	1.3	0.0	77.1	1832
FLOATED	10.2	8.0	4.6	0.0	22.9	543
%	86.1	8.0	5.9	0.0	100.0	
N=	2044	191	140	0		2375
8. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	22.8	0.0	24.2	0.0	47.0	517
FLOATED	2.7	32.2	18.1	0.0	53.0	584
%	25.5	32.2	42.2	0.0	100.0	
N=	281	355	465	0		1101

9.-11. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	4.3	0.0	33.4	0.0	37.7	2521
FLOATED	0.5	41.2	20.6	0.0	62.3	4168
%	4.8	41.2	54.0	0.0	100.0	
N=	320	2757	3612	0		6689
12. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	3.6	0.0	44.0	0.0	47.6	198
FLOATED	0.2	27.6	24.5	0.0	52.4	218
%	3.8	27.6	68.5	0.0	100.0	
N=	16	115	285	0		416
13.-14. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	1.4	0.0	43.6	0.0		2785
FLOATED	0.3	29.7	25.1	0.0	55.0	3406
%	1.7	29.7	68.7	0.0	100.0	6191
N=	103	1836	4252	0		
15.-16. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	4.7	0.0	50.4	0.0	55.1	1900
FLOATED	0.4	16.5	28.1	0.0	44.9	1551
%	5.0	16.5	78.4	0.0	100.0	
N=	174	569	2707	1		3451
17.-18. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	1.2	0.0	43.4	0.0	44.6	1250
FLOATED	0.2	19.7	35.5	0.0	55.4	1551
%	1.5	19.7	78.8	0.0	100.0	
N=	41	552	2208	0		2801
19.-21. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	0.6	0.0	53.5	0.0	54.2	6386
FLOATED	0.1	14.7	31.0	0.0	45.8	5402
%	0.8	14.7	84.6	0.0	100.0	
N=	90	1731	9967	0		11788
22. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	0.1	0.0	57.5	0.0	57.7	1579
FLOATED	0.0	11.5	30.8	0.0	42.3	1159
%	0.2	11.5	88.3	0.0	100.0	
N=	5	315	2418	0		2738
23.-24. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	A=
UNFLOATED	0.6	0.0	59.8	0.0	60.4	1215
FLOATED	0.1	12.7	26.8	0.0	39.6	796
%	0.7	12.7	86.6	0.0	100.0	
N=	15	255	1741	0		2011
25. phase	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	0.6	0.0	57.6	0.0	58.2	288
FLOATED	0.0	11.7	30.1	0.0	41.8	207
%	0.6	11.7	87.7	0.0	100.0	
N=	3	58	434	0		495
Undated	ORGANIC	NONE	ANORGANIC	OTHER	%	N=
UNFLOATED	6.0	0.0	49.0	0.0	55.0	15605
FLOATED	0.8	19.9	24.3	0.0	45.0	12744
%	6.8	19.9	73.4	0.0	100.0	28349
N=	1919	5634	20795	1		28349

Tab. 4.4.7.B. Relative proportions of MATErial classes in time periods of the settlement. - Relativní podíl tříd materiálu (MATE) v časových úsecích sídliště.

Rim form / orifice diameter	0-3 3-6 7-12 13-25 26-31 32-38 >39 cm
NECKED	.. water jars -.-.-.-.-.-…………………………….......…….........
	…………….. storing -.-.-.-.-.-.-…………...………….……......
	……………….. cooking -.-.-.-.-.- (for more people) ….......…
INTERMEDIATE	
FORMS	long term storing -.-.-.-.-.-.-.-……………………...……....….
	………water cooling ………………………………...….....
RESTRIC	……………………... meal processing ……………….......….
	………………………………… occasionally cooking .....….
SIMPLE	……… storing -.-.-.-.-.-..-. short term storing ………...….….
RESTRIC	……… "seed jar" ………. of solid materials ………....…….
SIMPLE	………….. food processing………………………….......……
	…. specialized -.-.-.-.-.-.-.-.-.-.-.-.-.- communal …..........……
SHALLOW	…… drying -.- serving -.-.-.-.-.-.-.-.-.- short term storing ....
FORMS	…… for individuals .-.-.-.-.--.-.-.-.-.-. of solid materials ..…...

Tab. 4.5.1.A. Ethnographically controlled model of domestic ceramic functions (according to Braun 1980:182-183). - Etnograficky kontrolovaný model domácích funkcí keramiky (podle Braun 1980:182-183).

Codes SHASI of the functional types	Volume in litres (standard deviation)	N=
SMALL		
1	0.49(0.38)	289
3	0.62(0.42)	484
5	0.76(0.44)	318
7	0.75(0.55)	784
9	0.94(0.55)	1669
11	1.27(0.80)	1264
13	2.92(4.36)	204
LARGE		
2	2.02(1.86)	289
4	2.66(2.05)	592
6	3.22(2.48)	343
8	3.55(2.99)	841
10	4.93(4.18)	1582
12	6.94(5.45)	1226
14	15.10(15.99)	150

Tab. 4.5.3.A. Average vessel volume in SHApe SIze (comp. Fig . 4.0.3.a) categories. - Průměrný objem nádob v kategoriích SHASI (srov. obr. 4.0.3.a).

Code of interpreted functional types	Code SHASI	Interpretation of prevailing function
SESO	1-2	SErving of SOlid food
SELI	3-5-7-8	SErving of LIquid food
PROC	4-12	Food PROCessing and Short term storing
WAPR	6-10-13	WAter PRocessing
WAP9	9	WAter Processing (alternative)
WA11	11	WAter processing (alternative)
STOR	14	Long term STORing

Tab. 4.5.4.A. Interpreted functional classification of pottery forms. - Interpretovaná funkční klasifikace tvarů keramiky.

Interpreted functional types / tranportability	Handles + lugs	Without handles	N=
SESO	1.0	99.0	681
SELI	4.7	95.3	2794
PROC	12.1	87.9	2205
WAPR	10.0	89.9	3159
WAP9	6.0	94.0	1808
WA11	7.7	92.3	1378
STOR	9.3	90.7	538

Tab. 4.5.5.A. Share of equipments increasing the transportability of functional sets (codes comp. Tab. 4.5.4.A) of pots. - Podíl zařízení zvyšujících přenositelnost funkčních sad (kódy srov. tab. 4.5.4.A) nádob.

Stability / interpreted functional types	SOLI	SELI	PROC	WAPR	OTHER	STOR	N/A	%	N=
UNSTABIL	88.2	1.3	3.7	2.0	1.7	2.7	0.3	100.0	2322
MEDIUM	86.6	1.6	3.6	2.9	2.6	2.6	0.1	100.0	1291
STABIL	88.6	3.4	5.1	1.3	1.2	0.4	0.0	100.0	237
%	87.7	1.6	3.7	2.3	2.0	2.5	0.2	100.0	
N=	3377	60	144	87	76	97	9		3858

Tab. 4.5.6.A. The stability of the functional sets (codes comp. Tab. 4.5.4.A) of forms. - Stabilita funkčních skupin (kódy srov. tab. 4.5.4.A) tvarů.

Phase	UNSTABIL	MEDIUM	STABIL	%	N=
1	7.1	78.6	14.3	100.0	14
2	13.5	78.4	8.1	100.0	74
3	50.0	28.6	21.4	100.0	14
4	22.0	55.9	22.0	100.0	59
5	15.2	67.4	17.4	100.0	46
6	4.0	88.0	8.0	100.0	25
7	21.1	52.6	26.3	100.0	19
8	35.4	56.1	8.5	100.0	82
9	41.5	50.0	8.5	100.0	82
10	48.4	45.2	6.5	100.0	155
11	48.5	43.6	7.8	100.0	204
12	78.9	15.8	5.3	100.0	19
13	58.6	34.6	6.8	100.0	162
14	65.7	29.8	4.4	100.0	248
15	69.4	27.9	2.7	100.0	147
16	51.4	48.6	0.0	100.0	37
17	70.5	24.6	4.9	100.0	61
18	50.5	43.8	5.7	100.0	105
19	76.3	19.0	4.7	100.0	342
20	71.4	22.9	5.7	100.0	70
21	77.1	21.7	1.2	100.0	166
22	81.6	10.4	8.0	100.0	163
23	86.5	9.6	3.8	100.0	104
24	90.9	9.1	0.0	100.0	22
25	100.0	0.0	0.0	100.0	25
0	60.1	34.0	5.9	100.0	1405
%	60.3	33.5	6.2	100.0	3850
N=	2322	1291	237	3850	

Tab. 4.5.6.B. Vessel stability (after categories of bottoms) in the phases. - Stabilita (podle kategorií tvaru den) nádob ve fázích.

Surface	Technological class				
	REDU	OXYD	ARCH	STAND	%
OTHER	42.4	23.9	3.3	30.4	100.0
POLISHED	30.4	38.6	0.2	30.7	100.0
BURNISHED	15.9	42.4	0.1	41.6	100.0
%	36.6	30.5	1.9	30.9	100.0

Tab. 4.7.4.A. Relative occurrence of technological classes (REDUction, OXYDizing, ARCHaic, STANdard) according to the design on the surface of the vessels (N = 68376). - Relativní výskyt technologických tříd podle úpravy povrchu nádob (N = 68376).

Surface	Technological class				
	REDU	OXYD	ARCH	STAND	%
OTHER	64.9	43.8	95.3	55.1	56.0
POLISHED	33.6	51.2	4.5	40.1	40.4
BURNISHED	1.5	5.0	0.2	4.8	3.6
%	100.0	100.0	100.0	100.0	100.0

Tab. 4.7.4.B. Relative occurrence of the individual types of surface design in different technological classes (REDUction, OXYDizing, ARCHaic, STANdard). - Relativní výskyt jednotlivých druhů úpravy povrchu nádob v různých technologických třídách.

Surface	Technological class					
	REDU	OXYD	ARCH	STAND	%	N=
OTHER	36.7	30.5	2.0	30.8	100.0	67917
GRAPHITITED	20.3	29.2	0.0	50.5	100.0	459
%	36.6	30.5	1.9	30.9	100.0	68376
N=	25033	20856	1327	21160	68376	

Tab. 4.7.4.C. Relative occurrence of graphite coated surface in different technological classes (REDUction, OXYDizing, ARCHaic, STANdard). - Relativní výskyt tuhovaného povrchu nádob v různých technologických třídách.

Phase	Surface			
	OTHER	GRAPHIT	%	N=
1	100.0	0.0	100.0	191
2	99.8	0.2	100.0	539
3	100.0	0.0	100.0	117
4	99.6	0.4	100.0	571
5	99.6	0.4	100.0	539
6	99.6	0.4	100.0	276
7	100.0	0.0	100.0	142
8	99.5	0.5	100.0	1101
9	99.7	0.3	100.0	1131
10	98.2	1.8	100.0	2817
11	99.1	0.9	100.0	2741
12	99.3	0.7	100.0	416
13	98.7	1.3	100.0	2683
14	98.7	1.3	100.0	3508
15	99.4	0.6	100.0	2706
16	99.5	0.5	100.0	745
17	99.3	0.7	100.0	851
18	99.5	0.5	100.0	1950
19	99.4	0.6	100.0	7958
20	99.5	0.5	100.0	1192
21	99.6	0.4	100.0	2907
22	99.8	0.2	100.0	2738
23	99.6	0.4	100.0	1605
24	99.8	0.2	100.0	406
25	100.0	0.0	100.0	495
0	99.4	0.6	100.0	28096
N=	67962	459	100.0	68421

Tab. 4.7.4.D. Relative occurrence of grahite coated vessel surface by settlement phase. - Relativní výskyt tuhovaného povrchu nádob v sídlištních fázích.

Phase	REAL	SYMB	NONE	%
1	15.7	17.8	66.5	100.0
2	15.4	20.8	63.8	100.0
3	15.4	31.6	53.0	100.0
4	16.3	21.2	62.5	100.0
5	13.7	26.0	60.3	100.0
6	14.9	26.1	59.1	100.0
7	11.3	21.8	66.9	100.0
8	15.8	24.9	59.3	100.0
9	11.3	32.3	56.4	100.0
10	12.5	36.4	51.1	100.0
11	10.8	40.1	49.1	100.0
12	11.5	29.8	58.7	100.0
13	11.0	36.3	52.6	100.0
14	12.6	38.3	49.1	100.0
15	13.0	27.9	59.1	100.0
16	12.2	29.4	58.4	100.0
17	14.7	34.1	51.2	100.0
18	12.0	38.2	49.8	100.0
19	12.7	34.5	52.8	100.0
20	11.1	28.4	60.5	100.0
21	11.0	38.6	50.5	100.0
22	11.1	37.5	51.4	100.0
23	9.6	34.1	56.3	100.0
24	12.6	35.0	52.5	100.0
25	9.3	30.1	60.6	100.0
N=	12.2	34.3	53.5	100.0

Tab. 4.8.2.A. Relative occurrence of vessel "binding" (REAListic, SYMBolic) within phases. - Relativní výskyt "navazování" nádob ve fázích.

Phase	Prototype	Binding	Original interpretation of affairs on settlement area
1	unknown	real	foundation
2	absent	real	
3	present	real	
4	unknown	real	
			interruption
5	present	symbolic	renewal
6	absent	real	
7	absent	none	
8	unknown	real	shifting
9	present	none	
10	unknown	symbolic	
11	present	symbolic	
12	present	none	
			interruption
13	present	none	new foundation
14	present	symbolic	
15	present	symbolic	
16	absent	none	
17	unknown	real	
			interruption
18	present	symbolic	
19	present	symbolic	
20	present	none	
			interruption
21	present	symbolic	renewal
22	absent	symbolic	
23	present	none	
24	absent	symbolic	
25	absent	none	
			desertion

Tab. 4.9.1.A. Prevalent character of prototypes and binding within the phases (interpretation after Pavlů 1989: 285). - Převažující charakter prototypů a navazování ve fázích.

"…She told me that every design is significant…" (Bunzel 1972: 69)

5. Pottery decoration

5.0. Introduction

5.0.1. The study of linear decoration

The study of Linear Pottery Culture decoration has a tradition going back a hundred years, as it was the main and only taxonomic feature of the Culture from the very beginning (Jenny 1928). Much later, the Central European Neolithic period was marked by large buildings constructed using posts, the remains of which have been excavated in several thousand cases (Coudart 1998). Even today, the relationship of the houses to the ceramics remains the main topic of study, and a departure point for any other interpretation. Decorated pottery serves for the identification of settlement areas in vast regions that supersede modern political boundaries. The longhouses are guides to a knowledge of the internal structure of these areas. In view of their relatively good archaeological accessibility their role can be overestimated, or at least intuitively preferred to other features in cultural contexts that are less accessible. On the other hand, ceramics remain the main source for consideration in terms of chronological information, and their informative value has by no means yet been exhausted.

In tandem with the empirically accepted interpretations of the significance of the decorated ceramics, the sheer amount of different methods available has increased the potential for using all of the possibilities that the decorations provide. The stylistic method coming from the decorative techniques, and defining synthetic styles, took began this process (Buttler - Haberey 1936: 98-106, Dohrn-Ihmig 1974). This contained an implicit interpretational element, as it was supposed in this way that the spatio-temporal limits, by which cultural limits are meant, could be defined. Today, similar methods are used for the definition of the regional grouping of areas (Kneipp 1994).

Several systems of detailed description have been developed for the analysis of linear decoration, comprising all of the elements usually arranged according to more or less similar attributes or categories. They usually respect the characteristics of linear decoration across the broader area, and are distinguished by different levels of complexity. A simple but effective system based on the different fills of the ribbon has been developed, and has been used for the majority of the western part of LnK (Waterbolk - Modderman 1959). On the other hand, a much more complex system, which also included the forms, was developed in the lower Rhineland; its aim was to encompass all of the possible variants of the attributes, but even the author was aware of the inequality of their values (Gabriel 1979: 12). Given the complexity of linear decoration in the western regions and the proposed aim, the system was rather formal.

The descriptive system for the main decorative categories developed for the chronological analysis of finds from the middle Rhineland attempted to overcome these formalities. The disadvantages of a formal system are replaced by a list of existing elements, ordered according to their position on the vessel. This system has been the most practical one to be employed. It was found to be workable not only in terms of the intra-site chronology of the region (Stehli 1994), but also in the analysis of interregional relationships (Zimmermann 1995), and in a deeper analysis of social conditions in the Neolithic period (Frirdrich 1994). The type of description used provided data combined with the controlled use of principal clusters that can be further interpreted later.

5.0.2. The decoration of Linear Pottery Culture ceramics from Bylany

At Bylany, a descriptive system was also developed with the aim of achieving an appropriate level of complexity and making future processing virtually automatic. It contains both formal attributes and elements of structural hierarchy. The individual variants were grouped according to separate properties, which followed on from each other or displayed an internal hierarchy (Soudský 1960, 1966: 40). In view of the simpler order of Bohemian linear decoration, this system is less complex, but was appropriate to the chronological analysis of the Bylany finds (Pavlů - Rulf - Zápotocká 1986: 315). For the spatial analysis of the broader Elbe (Labe) region in the LnK, another taxonomic system was later used which continued on from the structural elements of the earlier Bylany system. At different levels, the categories of forms and decoration branch out according to criteria established in advance. With the help of this system, the characteristics of the regions were elaborated and their relationships with other regions defined (Rulf 1997b).

A quite different descriptive system for linear decoration was developed for the purposes of the studies of social organisation carried out at sites and cemeteries in the Netherlands and Bavaria. This marks the theoretical preparation of the classification process. The attributes were ordered into a hierarchy of categories, some of which were being used for the first time. The majority of them coincide with the categories used elsewhere. Of equal importance was the statement that structural classification is in fact the structuring of the problem (Van der Velde 1979: 4). The use of such a system isolated within others leads to distinguishing between the elements and properties with high and low chronological variability. The latter were used for the interpretation of the social relationships that were reflected by linear decoration.

5.0.3. Situational analysis of linear decoration

In this section, it is necessary to demonstrate that the situational analysis of particular kinds of artefacts also leads to the proposed results for linear decoration. The individual techniques and attributes of linear decoration were classified into a complex system of elements of the decoration itself, and of the design and style of linear decoration (Fig. 5.0.3.a). By ordering in this way, an interpretation or some hypothesis has been presumed. It is expected that the qualitative and quantitative spatio-temporal analysis of individual attributes will answer the preliminary questions (Pavlů 1997: 97). The presupposed chronological problems have not been solved here (cf. Retrospective Introduction) because the earlier chronology is used (Pavlů - Rulf - Zápotocká 1986: 354 - 355), together with a preliminary interpretation of the sequence of the phases (Pavlů 1989: 284).

The questions posed here for the following analysis are concerned primarily with the material basis of the decoration. The interpretations of the clustering of attributes within archaeological assemblages will be studied, as will their relationship with the living culture. Besides the question of the work required by the decoration, the types of tradition involved in subsequent generations will be elucidated. The design attributes have to serve for the grouping of Neolithic society according to natural criteria such as age and gender, or the origin of the inhabitants of Bylany. Finally, the techniques and attributes of the linear style may reveal the movement of individuals settling in houses, and changing their homes during their lifetimes.

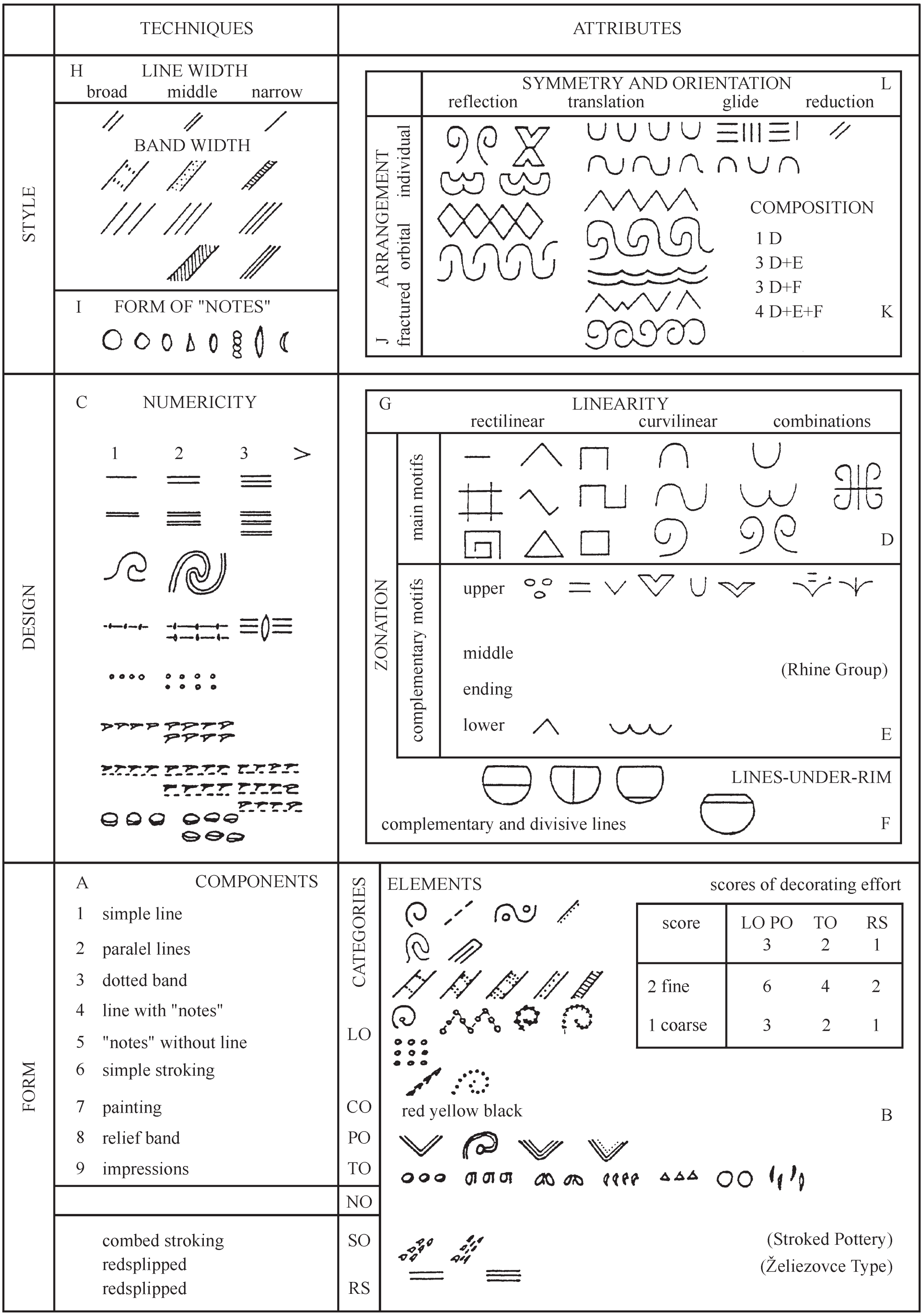
5.1. Primary classification of decoration

5.1.1. The decoration of the early pottery

Although it is considered that the decoration of the pottery is axiomatic, it was previously believed that a common concept for its definition is impossible (Van der Velde 1979: 13). The borderline between the final preparation of the surface and the decoration of this surface is sometime unclear. As an example of this, polishing can usually be made by irregular movements without any regular patterning on the surface. Sometimes the polishing is very regular, and it results in a pseudo-decoration on part of the surface, seen as very slight incisions. This seeming decoration is usually poorly visible, and is hardly recognisable on the unpolished patterns of the early LnK period (Makkay 1978, Pavúk 1980).

A decorative element can be defined as any item that is supplementary to a vessel's primary function, which is not necessary for the preparation of its surface, and which deliberately complements, enhances, or emphasises the social or ideological function of the vessel. Only a small proportion of the earliest Central European pottery is decorated in this sense, and the remainder can be considered undecorated. In a narrower sense, decoration describes such techniques as can be used to create ornamentation on the surface. →Tab. 5.1.1.A.

The primary categories of pottery decoration differ according to the roles that they play, together with the vessel (Tab. 5.1.1.A). The individual



score	LO PO 3	TO 2	RS 1
2 fine	6	4	2
1 coarse	3	2	1

Fig. 5.0.3.a. Schematic representation of the techniques and indicators of linear ornamentation in a situational analysis of the decorations, design and style of linear ceramics. - Schéma technik a znaků lineárního ornamentu v situační analýze výzdoby, desénu a stylu lineární keramiky.

roles are included in the common complex of decorativeness, and in the decorative product itself; therefore, categorisation must be considered to be a schematic division according to one dominant aspect. This is the case for decorative techniques. The limits between the social and ideological roles of the different kinds of decoration have not in the past been properly defined. The categories may exchange roles, and types of decoration may be combined on a single vessel. The decision as to which will be described as decisive is thus arbitrary; usually, it will be the layer on the outer surface regardless of the archaeological context, where layers that were originally covered appear more often.

5.1.2. Technical decoration

Such vessel surface finishes that impinge into it prior to firing are described as a technical decoration (TO). In the Bohemian LnK, technical decoration consists of different types of impressions, or of short incisions made either with the fingers or with the aid of wooden or bone implements. Initially they covered the whole vessel body, but they later became a decorative technique with a more refined intent. This was most often the connecting of knobs dispersed in a zigzag fashion around the vessel's body. Its original purpose was to achieve a roughening of the smooth surface which enabled the vessel to be covered with an additional layer of clay. This "technical" role was transformed into another role that of decoration, but the forms survived. This category comprises 7 % of the total number of Bylany pottery finds.

5.1.3. Incised linear decoration

Incisions made into a soft surface with a wooden or bone point (LO) are the most expressive type of LnK decoration, and indeed gave the entire culture its name. Regardless of this archaeological expressiveness, this type was valid only at a decorative level. It could often have been used as a kind of roughening for the application of coloured clays, resulting in painted ribbons making up their own decorative motifs (Modderman 1988: 112). In the conditions present in this country, traces of such coloration survive as a kind of coloured encrustation of lines (Vencl 1961: 115). In the later period, the lines were covered with organic materials that made up motifs which did not respect the lower layer. This has been explained as being special secondary symbolic decoration applied after the completion of the first (Vencl 1961: 120). In both cases, the incised linear decoration remains first and foremost a separate category. In Bylany, an entire third of all of the pottery (32 %) was incised.

5.1.4. Relief decoration

A variation on linear decoration is produced by striking bands of material on the sides prior to firing (PO). In this way, relief decoration was created with simplified motifs, otherwise incised or painted. The original purpose of these relief bands was apparently more "technical", since the earliest examples appear on large storage jars, mostly as a band on the neck with finger impressions. In such a position, they may have enabled the vessel to be more easily handled, or an organic material to be fastened over the aperture. Such a band is found only exceptionally, under the rim of a hemisphere (Holohlavy: Pavlů - Vokolek 1996: 43, Fig. 18: 5). Given its low frequency and similar function, relief decoration is analysed together with incised decoration.

5.1.5. Ceramics with a red slip

Pottery with a red slip must be separated out as an independent category (RS) in all Neolithic cultures. The slip was generally applied after firing, and is typical of the earliest pottery in the Carpathians, such as that of the Starčevo-Körös Culture, but also occurs in other early Neolithic cultures of the Near East. Fine ware was covered with this red slip. In the LnK this type of decoration survives only exceptionally, and the explanation previously accepted was that it resulted from a red dye having been kept in the vessel; this interpretation arose from the discovery of the red colouring on the inner faces of sherds (Vencl 1961: 116). Against all expectations, at Bylany such finds are known only from the later periods.

The RS category contains only sherds with traces of red coloration which are otherwise undecorated. Given the unpropitious soil conditions, as a result of which fine layers of haematite were lost from sherd substrata, only a limited number of such pieces can be presumed from the whole period of development at the site. The physical role of the red finish consists in bettering the properties of the sides of the vessel in question - it results in the vessel's having a better temperature conductivity and lower porosity. The addition of haematite into the material is very rare in European Neolithic cultures (Vencl 1961: 116, note 166). ➔Tab. 5.1.5.A.

5.1.6. Painted pottery

The painting of motifs (CO) with different organic materials prior to firing was a technique known from the beginning of the Neolithic period. In the early Neolithic Balkan cultures fine ceramics were usually painted with simple motifs (Perlès - Vitelli 1994: 230). Painted ware also occurs infrequently in the Körös culture of the lower Tisza region, e.g. at Becsehely in lower Transdanubia (Kalicz 1979). In the LnK, separate painting of this type is not known.

Four sherds were found at Bylany (Tab. 5.1.6.A) which had traces of dark stripes apparent, which may have been the remains of painted motifs. They are, however, barely distinguishable from the various traces of soot that made the rim and sides of the vessel dirty during cooking. Therefore, these pieces were not included into the total numbers of the different decorative categories.

The numerous small sherds bearing the remains of black pitch are also not included here. These occur generally on pieces with linear decoration, and are therefore classified together with the latter. In the majority of cases no distinguishable motifs survived (for details of pitch decoration see Vencl 1961: 114-123). ➔Tab. 5.1.6.A.

5.1.7. Other types of decoration

Among the other types of decoration which might appear during the LnK are polishing and fluting. These categories occurred in the early LnK in the Carpathian region - typical examples come from the Hungarian site of Biscke (Makkay 1978). In Bohemia, these categories are less common than painting (Holohlavy: Pavlů - Vokolek 1992). The first examples were recovered from feature 3 at Nové Dvory in 1983 (Pavlů - Rulf - Zápotocká 1986: Fig. 17: 11, 17: 8). The shallow, broad, vertical flutes were found on the upper part of the body of a hemispherical vessel. In a second case, very fine fluting made up a parquet motive over an incised spiral. The site is situated near the Vrchlice stream, and belongs to the Bylany microregion. It can be inferred that the kind of decoration known during the earliest LnK was not longer in use by the time the Bylany settlement was established.

5.1.8. Undecorated pottery

The pottery without any of the described decorative categories is important because of its quantity. At Bylany, it accounted for 60 % of the finds. This number may be distorted in comparison to the living structure in two ways. Firstly, by great fragmentation, as the finds from the site generally do not exceed a size of 2-6 cm. This means in particular that vessels with technical decoration might yield greater numbers of "undecorated" sherds if the decoration as a whole covered only a minority of the vessel surface. Within the NO category, parts of the TO and possibly also of the PO categories are hidden. From the category LO, only a small percentage will have disappeared in this way. A second distortion of NO numbers may be caused by the category of the red-slipped vessels. It can be supposed that this was proportionately more numerous than the finds available today indicate.

The archaeological evidence for undecorated vessels needs to be estimated as a sum partly arising from pieces of other categories, and partly from the undecorated vessel themselves. After separating the red-slipped ware as technologically more developed, the role of undecorated ware lies mainly in the sphere of social relations and ideologically informative symbols. The fact is that pottery non-decoration must be evaluated as an important and quantitatively prevalent expression of Central European Neolithic society. This may be related to the different roles of that pottery played in prehistoric cultures (Rulf 1997a).

5.1.9. Decoration of fine and coarse wares

The LnK pottery at Bylany was divided into fine (JMN) and coarse (HRB) wares, these categories corresponding to the quality and size of the vessels. Smaller, relatively thin-walled vessels belong to the class of fine ware, and this term is required to distinguish between fine table ware and kitchen ware (Soudský 1967: 9-10). By definition, it follows that the linear and relief decoration concentrates on the fine ware (60 %), while the coarse ware was mostly undecorated (80 %, Tab. 5.1.9.A). The coarse ware bore almost 13 % of the technical decoration, but only 8 % of incised linear decoration. Traces of a red slip were found in less than 1 % of both types of ware. ➔Tab. 5.1.9.A.

5.1.10. Stability of decoration during the development of the LnK

The variability of the primary decorative categories is relatively low during the development sequence at the site. It ranges at around 10 % on average (Tab. 5.1.10.A). The lowest proportion of LO was found in phase 1 (17.8 %), and the highest in phase 11 (40.1 %). The lowest proportion of TO is in phase 3 (1.7 %), and the highest in phase 17 (11.2 %). The range of the undecorated pottery is relatively higher, and naturally opposes that of the LO (53.1 % in phase 11 and 79.6 % in phase 1). The minimum value is repeated in phase 18, and lower values also appear in phases 14, 17, 21, and 22. (Note: the table published here differs slightly from that published previously by J. Rulf (1993: 10), who used a slightly different assemblage with more features.)

While the extremes of LO and TO have no relationship to the interpreted changes in site development (Pavlů 1989: 285), the lower values for the undecorated pottery are focused around the interpreted breaks in development, in both the earlier (phases 10, 17) and later (phases 11, 13-14, 18-19, 21-22) periods. The primary decorative categories do not define a high variability. The aforementioned decrease in undecorated pottery after the breaks in settlement development are to be considered as important.

Settlement development corresponds more, however, to the variability of the refuse, the composition of which might have been influenced by the longer life-span of coarse ware. Further reasons for irregularities in the site refuse may be the same as those found for the total quantities of LnK pottery. In some periods, the volume of pottery refuse generally decreased. It can be supposed that household inventories were moved, as the households themselves moved within the settlement (Rulf 1993: 19). It can also be supposed that after the area was renewed as a settlement, a new period of refuse accumulation began. In the beginning phases, the structure of the refuse might better correspond to the original one. ➔Tab. 5.1.10.A.

5.2. The archaeological and systemic contexts of pottery decoration

5.2.1. Distribution of decoration in site refuse

The relative distribution of individual decorative categories within the main finds complexes is more or less even. It ranges from 40 % of decorated, to 60 % of undecorated ware equally for households, isolated pits and other features (Tab. 5.2.1.A-a). In the absolute values, the households on average contained ten times more pieces from all of the categories than the isolated pits. About 40 % of all of the decorative categories also come from the households. The red-slipped ware is an exception, the appearance of which is distorted by its lower numbers (Tab. 5.2.1.A-b). The refuse of the primary decorative techniques is, in terms of the different types of features, homogeneous. ➔Tab. 5.2.1.A.

There are significant differences in the decoration of an individual vessel's parts. The probability of the breaking down of a decorated vessel into decorated sherds differs according to the situation of its decoration, concentrated on the middle parts of the vessel body. Whole vessels (COMplete) and rim sherds are decorated to the same degree in roughly 50 % of cases. By contrast, sides (WALls), profiled walls (SECtions) and bases (BOTtoms) are decorated in about 30 % of cases, and undecorated in about 50 % of cases (Tab. 5.2.1.B-a). Less significant differences appear if the vessel's parts are compared to the individual decorative categories. Their distribution differs in the undecorated pottery against the incised or technically decorated pottery (Tab. 5.2.1.B-b). In the undecorated ware there is a markedly lower percentage of rim sherds and a higher number of sides in comparison to the decorated ware.

An estimate of the distribution of decoration can be obtained from the values within the assemblage for the whole vessels, where there 36 % have LO and 14 % TO. The values from the assemblage of rim sherds agree with this: 40 % have LO and 11 % have TO. A less reliable estimate from the assemblage of profiled sections yields values of 31 % for LO and 13 % for TO. Other estimates are distorted by the fragmentary nature of the pottery. This is the case in particular for bases, where TO has almost disappeared. It appears natural for decoration to terminate far above the base. ➔Tab. 5.2.1.B.

5.2.2. Primary decorative categories in the spaces of phases, households and isolated pits

The behaviour of the primary decorative categories is, within the spaces of the phases, households and isolated pits, more or less equivalent (Fig. 5.2.2.a). In the second axis, the incised and undecorated vessels are separated from those with technical decoration in a positive direction. This factor can be interpreted as the factor of technical decoration. In the first axis, incised and undecorated ware occupy positions opposite households and isolated pits. Within the households, incised ware has a positive score (0.196), but in pits a negative one (-0.279). The first factor can therefore be labelled as a generally decorative one, because as usual the most variable factor copies the main property of the assemblage.

The different behaviour of decoration along the first axis of isolated pits deserves special explanation. The relative occurrence of primary categories is equal for households and isolated pits, even when in latter periods the absolute values are noticeably lower (Tab. 5.2.1.A). Simultaneously, the relative occurrence of vessel parts is the same in both assemblages (Tab. 4.2.4.B). The "negative" behaviour of sherds in the isolated assemblage of pits cannot be explained simply by the different quality of the refuse content in the features.

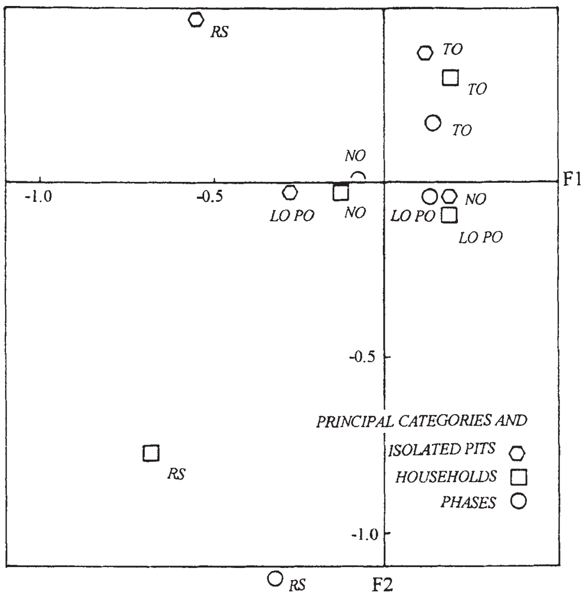


Fig. 5.2.2.a. Decorative categories within the phase, complexes and isolated pits. - Základní kategorie výzdoby v prostoru fází, komplexů a izolovaných jam.

The quoted relationships reflect the behaviour of the elements only after the complete summarisation of their values. Correspondence analysis considers the relationships between elements in the assemblages of households and, on the other hand, in isolated pits. The different character of the first factor can therefore be explained by the qualitative differences between the refuse in a pit beside a house and one set at some distance from a house. The former refuse from construction pits is "linear" in the first axis (67.3 % of variability), because it contains mainly household waste, the sign value of which was based on the incised decoration. In contrast to this, the refuse from isolated pits behaves in a "non-linear fashion" in the first axis (75.6 % of variability), because it was more transformed in terms of the original house ware structure in the negative sense of the linear decoration and its sign value. The structure of the refuse near the houses is more personal than that of the refuse from the distant features.

5.2.3. Components of linear decoration within the spaces of phases, households and isolated pits

As linear decoration was the most numerous decorative category, it was divided according to its individual components. There are six of these: simple lines, simple ribbons, dotted ribbons, line with notes, separated notes, and lines composed of strokes. →Tab. 5.2.3.A.

The behaviour of the main components of linear decoration within the spaces of phases, households and isolated pits resembles in some ways the behaviour of the primary decorative categories. In the first two dimensions of resulting pattern, all of the spaces are equivalent (Fig. 5.2.3.a). The first axis formally respects the chronological sequence, starting from the simple line through the dotted ribbon to the stroked line. The second axis separates the directions of the notes and strokes in the positive direction, and the ribbons and incised lines in the negative direction. This picture corresponds to the prevailing character of the components and elements in the linear decorated pottery at Bylany. In the third factor, the lines with notes together with the incised lines on the one hand, and the separate notes together with the ribbons on the other, are in opposite positions. Their behaviour in the spaces of households is the reverse of that in the spaces of the isolated pits. Regardless of the weighting,

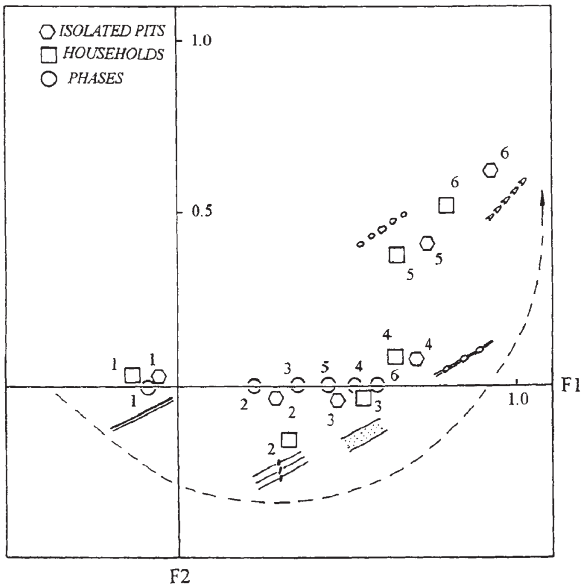


Fig. 5.2.3.a. Decorative components in the spaces of the phases, complexes and isolated pits. - Základní komponenty výzdoby v prostoru fází, komplexů a izolovaných jam.

the third factor is not particularly large (only 6.9 % of the variability in households and 8.9 % in isolated pits), and supports the interpretation of the linear decoration components.

Because the simple line assumes the role of a complementary component with respect to the other components, its behaviour is equivalent in the spaces of the households and the isolated pits. Around the simple line, the other components differ. In addition to the decreasing weight of the later components in the households, the significance of the earlier components also decreases in the space of the isolated pits. This reflects the long-term settlement of the area and a kind of refuse accumulation. The different position of the isolated pits in relation to the refuse is proven. The distribution of components of linear decoration within the spaces of households and isolated pits simply copies the principal chronological trends upon which the chronology of the Bylany phases was based; therefore, the space of the phases is practically one-dimensional. The second axis within the space of households and pits can be labelled as the factor of the note element, tending towards stroked pottery decoration (Fig. 5.2.3.a).

Besides those common components, the stamped double line is considered a foreign element at Bylany, demonstrating contacts with the Želiezovce region in south-western Slovakia. The special linked notes (codes BY67: 467, 468, Tab. 5.2.3.A) can also be related to this separate component. On the other hand, a vessel from feature 900 (BYA2: 280) was also described as an "import", in view of its material and form. The use of pointed implements for creating linear decoration is not common in the Bohemian regions. It was used in the Danubian region, and is characteristic of the Želiezovce group and, further to the east in the Eastern Linear Pottery culture. In Bohemia, this technique applied to an impressed line is considered the key attribute of the beginning of the Stroke Ornamented Pottery Culture (Pavlů - Zápotocká 1979).

5.2.4. The adaptability of decoration to conditions in settlement areas

In terms of the comparison of the pottery content of Bohemian sites, it has already been stated that the proportion of decorated pottery varies noticeably, and displays significant statistical differences between the relevant sites (Rulf 1986: 244). Such a phenomenon cannot be explained by either geographical or chronological differences, nor by the different volumes of fine and coarse wares. Its causes are more deeply rooted in the structure of the culture.

One possible explanation may be sought in the different adaptability of the population of particular sites to the environment. Having a more adaptable populace offers more time for activities outside those concerned with the immediate provision of subsistence. In particular, the women producing the pottery may have taken part in such activities after being freed from other more necessary tasks, such as working in the fields, childcare or taking care of the household. The number of ceramics, and particularly of decorated ones, could be related to the degree of such adaptability to its environment on the part of a given community. The lowest value of decorated pottery from the first pioneer phase may correspond to this. It should be noted that the amount of pottery was a function of many factors, including wastage and the movement of pottery during the abandonment of houses (Rulf 1993: 19, Pavlů 1998b).

5.2.5. Pottery decoration in the context of Neolithic decorativeness

It is highly likely that ceramics were not the only items in the household inventory that were decorated. Judging from examples from the Near East, the most decorated planes would have been the household walls inside the house, but perhaps also on the facade. Small items were also decorated, as were those made of organic materials, such as wooden vessels and clothing. The ritual decoration of the human body cannot be excluded in this vein; the archaeological record is lacking here, and it is therefore not possible to answer the question of whether all of these items were decorated in the same style. The pottery decoration merely allows us to speculate about that which cannot be proven.

In addition to the variability of decorated ware, the decoration of other items supposedly also varied. There is a general perception that vessels were decorated like the human body (David - Sterner - Gavua 1988), but this is less realistic in the European Neolithic period. It is more likely that the decoration of items including the human body had a long-term tradition, during which different styles could have developed. The development of pottery decoration bears witness to this, being richer in components in the early period, but less rich in the quantity of decorated vessels. The later development of linear decoration has something of the character of a stereotype. The transition toward Stroked Pottery in the Late Neolithic period, with the only comparable decorative component being stamped impressions, shows a development without stronger outer impulses.

5.3. The informative content of the formal categories

5.3.1. Genotypes of decoration within the phases

The appearance of the primary decorative categories in composition with types of wares can be considered as a sequence of genotypes, analogous to the relationship of forms within phases. Technical and linear decoration, or relief decoration, appear in different proportions on the fine and coarse wares. Linear or relief decoration is prevalent on the fine ware over the whole period of development. Exceptionally, the amount of fine ware with technical decoration exceeds 3 % in the total of all the phases; in phase 7 only it reaches 10.5 %. The coarse linear decorated ware occurs in a slightly greater proportion than the technical decoration during phase 1-7. From phase 8 onwards, the proportions are reversed - the amount of technical decoration on the coarse ware reaches up to 20 % in some of the phases, while during the majority of the later phases it is about 15 %.

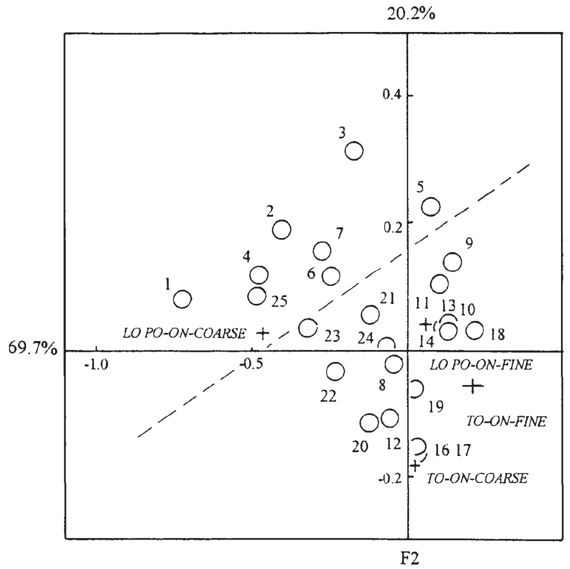


Fig. 5.3.1.a. Decorative composition categories in the space of the settlement phases. - Kompozitní kategorie výzdoby v prostoru sídelních fází.

From an assemblage uniform in terms of its genotype decoration content, as reflected by the composite categories in the phases, a higher proportion of coarse linear decorated ware appears only in the early phases (Fig. 5.3.1.a). The same proportions appear again in phase 25. The coarse linear decorated ware forms two different genotypes in this way; by contrast, the other categories perform as uniform genotypes over the site development sequence.

5.3.2. Decorative difficulty

The decoration of the vessels, i.e. their surface finishing, such as red-slipping, required a skilled hand. The stage of decoration differs from the stage in which the vessel is formed, and can be evaluated separately. The lowest value is ascribed to the red slip, while the technical decoration was more complicated, and the linear incisions were the most difficult to execute. It is supposed that experience in drafting the motifs, and particularly the regular use of the implement for the line, were unified. The decoration of the coarse ware was less difficult to accomplish than that of the fine ware. The multiplication of these points results in scores of decorative difficulty (Tab. 5.3.1.A), which can weigh the relative frequency of the categories appearing in each household. Summarising these scores then provides a coefficient for each household (Fig. 5.0.3.a). ➔Tab. 5.3.2.A.

5.3.3. Decorative difficulty in synchronic households

The variability among the households is higher than that within the phases. The scores range from 0 to 600. The level in the houses is higher, at about 500, which is caused by the prevalence of linear decoration with a higher score. The red-slipped pottery has practically no influence, and its actual value is unknown. Comparison of the coefficients of decorative difficulty with the analogous coefficient of the skill level required for the forms shows that both are independent (R = 0.216). They appear very irregularly in households, and it is impossible to formulate any relationship between them. The particular houses that behave in this way are relatively independent.

The phenotype variability of the primary decorative categories is higher than that of the primary forms. This is a reflection of the different roles of decoration as opposed to forms acting as tools. The decorative difficulty score must reflect the degree of sophistication in the linear decoration of a given household. It may also reflect the complicated relationships between the houses, as well as between them and the environment. It enlarges the picture of the site area. Accordingly, differences in the decorative techniques were stated at the level of intra-site analysis (Rulf 1986: 235).

5.4. Classification of primary decorative categories within the subsistence system and division of labour

5.4.1. The design of linear pottery

Any active attitude to the production of decoration is represented in its design. The creation of decoration did not depend only on the individual abilities, skill level and experience of the women who took part in the decoration of pottery in the Neolithic period. The decision as to whether men or women produce ceramics is conditioned in all cultural environments by social habits, traditions and customs. Because in this case the social background is unknown, social conditions in the Bylany area can be simply interpreted back from the arrangements of the decoration and its production, and analogously in the European region of this culture.

5.4.2. Frequency (numericity)

The relatively simple principles of linear decoration did not provide too much space for individual inventiveness. The sufficient stereotypes of a strong cultural tradition in linear design prove that changes were not socially demanded. Several generations of pottery makers preserved a relatively limited index of primary motifs. Its broadening or filling in was more an exception, which showed lower social acceptability in return for such an effort. This cultural limit could be overstepped both in design technique and some other attributes.

The number of parallel lines marks the main design technique used to create motifs. The general trend in Central European cultures was to increase the number of lines, which enabled in a simple way the covering of most of the side with a design. The next trend was to exchange the pointed implement used for a sharper implement. The typical incision with a "comb" is a characteristic design technique of the Bükk culture, which lived alongside the LnK. In the eastern LnK, in the Tisza region, a two-pointed implement was common, and in the later Tisza culture this became the standard. In the Western European LnK, the more pointed implement appeared for the first time in the late LnK, for example in the Rhineland. More points were common in the coastal regions of the Mediterranean and the Western Atlantic regions, where this design was applied with the use of sea shells.

At Bylany the comb-like implement was practically non-existent. The multiplication of lines was realised by repeated incisions with one pointed tool. From the two parallel lines, either a ribbon or a double line was made, these barely being distinguishable on sherds except in those cases where the ribbon was filled in with points. Three lines together are also characteristic for the LnK. Four lines are exceptional, and more than four lines are practically non-existent (Tab. 5.4.2.A). The prevalence of lines with notes on the linear decorated vessels can be overestimated, because in these cases it is

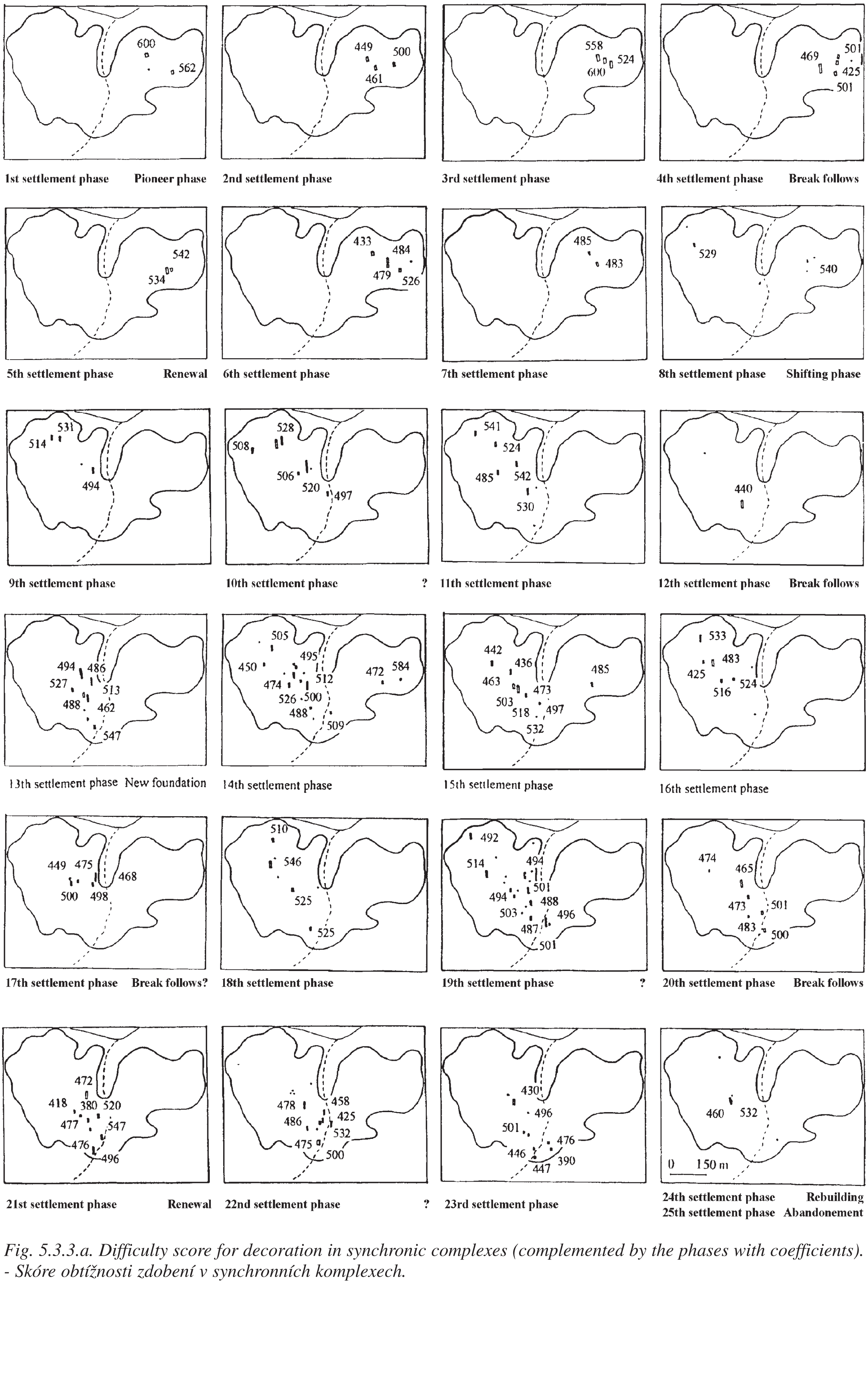


Fig. 5.3.3.a. Difficulty score for decoration in synchronic complexes (complemented by the phases with coefficients). - Skóre obtížnosti zdobení v synchronních komplexech.

difficult to distinguish whether the lines comprise a ribbon or if they are incised independently. Multiple parallel lines made with fingernail impressions are not very common. ➔Tab. 5.4.2.A.

The variability of the number of lines is concentrated in 95 % of the incised decorations (Tab. 5.4.2.A-a). Different decorative components appear within the frequency irregularly. In single-line design, the simple lines and lines with notes are prevalent, which proves that both were the most common components, both in the early period without notes and later when the notes appeared (Tab. 5.4.2.B). Double-lines occur most frequently in ribbons, by definition, but are less common in conjunction with notes. Although theoretically possible, a ribbon incised with a true double-line was not proven at Bylany. Triple-lines, as well as designs with more than three lines, are conspicuously prevalent in individual components. The line with notes is three time less likely to be made with a three-line design and two times less likely with a design with more than three lines. The four-line design is relatively common in the earliest period. The differences in the quantities are of statistical significance (chq = 3361.02, d.f. = 16, p = 0). ➔Tab. 5.4.2.B.

5.4.3. The chronological variability of frequency

The chronological variability of frequency is not too great, but some trends are apparent. The relative occurrence of a one-line design increases in time, from 41.2 % in phase 1 to a peak of 93.8 % in phase 21. The double-line design has the opposite, declining tendency, moving from 50.0 % in phase 1 to 5.4 % in phase 21. The trends generally decline from a design with multiple lines in the beginning to the one-line design in later periods. Both design techniques are to be considered complementary from the chronological point of view. The relative occurrence of more lines is not quantitatively important. Only the three-line design reached higher values in the early period (Tab. 5.4.3.A). All of these values can be projected into the original cultural context only with difficulty, because of the fragmentary nature of the pottery. ➔Tab. 5.4.3.A.

5.4.4. Linearity

The forms of the lines represent a noteworthy attribute of linear design-producing motifs. These consist principally of only straight and curved lines and combinations of the two. In the Bohemian LnK, it has been previously stated that the relationship between rectilinear and curvilinear design is roughly equal, and that motifs differing only in linearity do not indicate any regional differences (Rulf 1993: 309). In the Bavarian and Dutch LnK, linearity is not a notable chronological trend (Van de Velde 1979: 65). A general trend inclines to the prevalent rectilinear design. An analogous transition is conspicuous in several neighbouring Neolithic cultures in Europe, but in a different chronological sequence. In the eastern LnK, this type arrived first. The Želiezovce group provides a relatively well-followed transition from curvilinear to rectilinear in the cultural scale (Pavúk 1994: 154), together with preservation of such original motifs as the "s"-shaped spiral. In the majority of regions, such a transition marks a cultural change; this was the case for the transition between the eastern LnK and the Tisza culture in Eastern Europe, between the LnK and the StK in Central Europe, and between classic and late LnK in Western Europe.

In the Bylany assemblage, curvilinear (CU) designs are prevalent in the category of incised decorations (Tab. 5.4.4.A-a). Rectilinear designs are prevalent in the category of technical decoration. Within all of the decorative categories, the rectilinear design (RE) is prevalent, even if the undistinguished lines under the rim are separated out. The latter are always rectilinear. The RE : CU ratio is about 2 : 1, which is caused by adding all of the decorations, including the technical decoration, together. Elsewhere, in relation to incised decoration, the ratio is 1:1, (Van de Velde 1979). ➔Tab. 5.4.4.A.

5.4.5. The chronological variability of linearity

The curvilinear designs, however, slightly exceed the rectilinear for the whole of the LnK development period, and the simple index from these two values is not a constant. The index varies mostly around a value of 0.60 (Tab. 5.4.5.A), but in some of the earliest phases it exceeds 1.0 (phases 1, 4, 5, and 7). The lowest values of under 0.50 were attained in phases 10, 13 and 17, in a trend toward rectilinear design that appeared several times during the development sequence. In every case the proportion of curvilinear designs was equalised by the higher difficulty encountered in producing them. The index of linearity ranges between values of 0.45 and 1.40 (in phase 1). ➔Tab. 5.4.5.A.

5.4.6. Lines under the rim

The next design characteristic comprises the framing of the main motifs by lines following the vessel's aperture. These can also appear above the base, but this more exceptional, and is apparent in only a limited number of cases. The lines occur under the rim in about half of the cases, with the remainder comprised of plain rims. The Bohemian LnK does not show any more detailed partitioning of the main motifs, either vertically or horizontally, except in the rare cases of zigzags in the later period. Such divisive lines are common, for example, in the eastern LnK and in the Tisza region, and surviving in the later Tisza culture.

The lines under the rim have another special feature of technical treatment. Their technical elements are almost completely equivalent to the technical components of the main motifs on the walls. This is not true in the Moravian LnK, where the lines under the rim are frequently made of further simplified components, such as a simple line against a lines with notes providing the main decoration. For the most part, the motifs are used so that they can be completed with a simple row of notes under the rim, regardless of the arrangement of the notes on the main motif. They behave, from the point of view of the chronological sequence of the components, in a delayed fashion, as if rim design preserves an earlier component. The most pronounced cases of discrepancies between the components of the main motifs and the lines under the rim are common in the western LnK. In Bohemia, similar finds are known from the Plzeň (Pilsen) area. In the Rhineland LnK, the lines under the rim comprise a component preceding those of the main motifs - for example, rows of points appeared there from the middle of the LnK period, much earlier than such components provided a main motive.

The multiplication of lines under the rim is characteristic, first and foremost for incised decoration (Tab. 5.4.6.A-a). In both incised and relief decoration lines under the rim are predominantly absent (Tab. 5.4.6.A-b). In terms of technical fingernail decorations, one line under the rim is the most common (Tab. 5.4.6.A-b). Within the principal components of the lines, the lines under the rim are equal (Tab. 5.4.6.B). They differ from ribbons, where an absence of lines is prevalent, and from point rows, where more than one line is the norm. ➔Tabs. 5.4.6.A, 5.4.6.B.

5.4.7. Chronological variability of lines under the rim

The frequency of one line under the rim does not exceed 15 % in the earliest phases, where these contain an above average number of pieces (>12). Three lines under the rim appear from phases 8-9 onwards, but in the known cases it is most likely that the rim design comprises a three-line ribbon, rather than three isolated lines, and must strictly be considered as one (Tab. 5.4.7.A). As an organic part of the structure, the two-line rim design appears from phase 10 onwards, and the three-line rim design from phase 13. The multiplication of the lines may be considered during the chronological sequence as a progressive phenomenon, keeping the other half of the decorated vessels free of any lines. The lowest number of rim designs (40.9 %), in phase 12, is rather a result of the lower number of finds for this phase.

The limiting of the main motifs under the rim and over the base to a stripe on the vessel's body developed during the origin of the orbital style of linear decoration, and this could also have been the real reason. A safety zone could be delimited in this way, for which it would be possible to see how full the vessel was from the outside. No measurements have yet been made with this intent. Another reason for such rim designs may have been the separation of the rim zone from the symbolic decorated zone on the belly, which stayed clear and free of possible additional layers of decoration. ➔Tab. 5.4.7.A.

5.5. Identification of social groups within the households

5.5.1. Numericity and linearity within the space of phases

The principal picture of design techniques and attributed behavioural patterns is provided by the distribution of their variants within the spaces of phases and households. Six paradigmatic classes of design are produced by the multiplication of linearity

(CU, RE) and numericity (1, 2, 3, and more lines), complemented by rim design, included just as RE-lines. The last category plays a neutral role, additional to that of the former classes.

On the first axis of the correspondence analysis (67.9 % of the variability), the simple one-line decoration, regardless of linearity, is opposed to slightly negative scores compared to two-line decorations and a ribbon with slightly positive scores. The multiple line decorations behave completely differently to the preceding cases. This is a factor of design frequency that decreases over time. Later, the sides tended more to be covered with multiple motifs made up of simple lines, rather than multiple lines. On the second axis (16.7 % of the variability), the relationships are similar to the first, but the proportions of single-lined and double-lined decoration is reversed. On the third axis (7.3 %), there is a lower frequency of single- and double-lines, as compared to multiple (triple- or greater) lines, including the linearity. The contract space is undertaken with a combination of the 1st and 3rd axes. In this space, the early phases (1-7) are separated out around the other phases, comprising one cluster (Fig. 5.5.1.a). The earlier phases can be divided into those with more prevalent RE-lines (phases 1, 3 & 4) and those with more prevalent CU-lines (phases 2, 5,6 & 7), while the greatest contrast is that between phases 4 and 7.

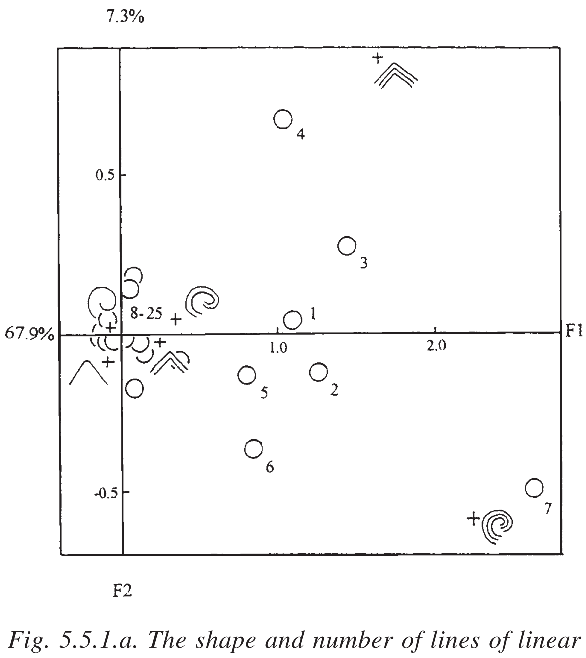


Fig. 5.5.1.a. The shape and number of lines of linear and technical decoration within the space of the settlement phases. - Tvar a počet linií LO a TO v prostoru fází osídlení.

5.5.2. Numericity and linearity in the space of households in phases 1- 7

Because the variability in the later phases is not particularly great, the variability of synchronic households was judged as being supplementary to intra-phase analysis. The results shows that the role of linearity and frequency changes. The design techniques changed over time, according to the social role of the decoration. Within the earliest group of phases (phases 1-7), the positive score of the single RE-line contrasts on the first axis (35.9 % of the variability) to the negative scores of the double CU-line. The second axis (25.5 % of the variability) is similar to the second axis of the phases described above, while the third axis (16.1. % of the variability) is analogous to the preceding ones, but in the opposite direction. The majority of households could be plotted within the space made up of the 1st and 3rd axes, (Fig. 5.5.2.a), together with sparse lines (A), and only a small group of phases with denser lines (B).

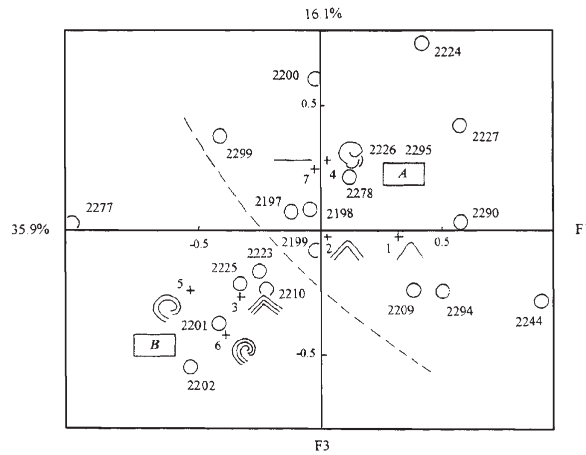


Fig. 5.5.2.a. Shape and number of lines of linear and technical decorations, and the space of the complexes of the oldest settlement period (phases 1-7). - Tvar a počet linií LO a TO v prostoru komplexů nejstaršího období (fáze 1-7).

5.5.3. Numericity and linearity in the space of phases 8-17

Within the chronologically central group of phases (phases 8-17), neither the frequency nor the linearity are distinguishable on the individual axes. On the first (34.4 % of the variability), the single-line form, regardless of the shape, is opposed with a negative score to the double-line form with a positive score. On the second (20.4 % of the variability) and third (17.3 % of the variability) axes line shape is emphasised, together with the number of lines. In the space formed by the 1st and the 4th axes (10.9 % of the variability) the households in which the single-line design prevails (A) can be distinguished from those in which the double and multiple-line designs are prevalent (B) (Fig. 5.5.3.a).

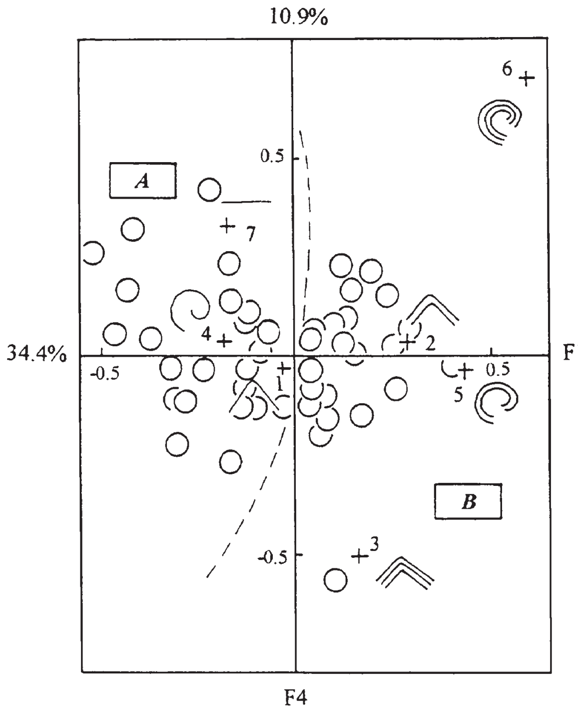


Fig. 5.5.3.a. The shape and number of lines of linear and technical decoration in the space of middle period complexes (phases 8-17). - Tvar a počet linií LO a TO v prostoru komplexů středního období (fáze 8-17).

5.5.4. Numericity and linearity in the space of households in phases 18-25

In the group formed by the later phases (phases 18-25), the first axis (47.8 % of the variability) separates the double-line design with its positive scores from the single-line design with negative scores, and can be described as being a numericity factor. The multiple lines are in opposition to the preceding ones, and multiple CU-lines have conspicuously positive scores. The second axis (16.9 % of the variability) expresses similar ordering, but the multiple lines are in an inverted position. Judging from the negative scores of the RE-lines, the second axis describes the linearity factor. Within the space made up of the 1st and 2nd axes there are two distinguishable groups of households. The first (A) comprises households with a prevalence of single lines, while the second (B) comprises households with a prevalence of multiple lines.

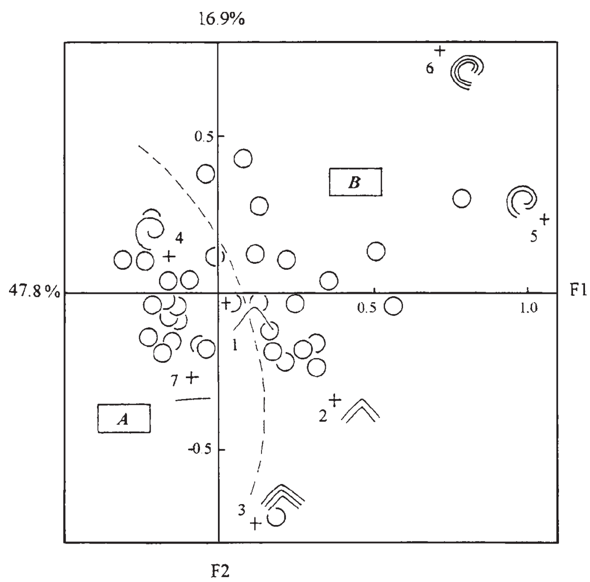


Fig. 5.5.4.a. The shape and number of lines of linear and technical decoration in the space of later period complexes (phases 18-25). - Tvar a počet linií LO a TO v prostoru komplexů mladšího období (fáze 18-25).

5.5.5. Changes in the social perception of linear design

During the development of the Bylany site, the techniques of linear design are perceived individually within each household. This is dependent on the concrete composition of the household members, relating perhaps to their ages and genders. Because both of these parameters changed during the existence of a given house, the composition of the pottery assemblage decoration changed accordingly every time that it was used. In an archaeological context, this reflects the sum of some period during which short-term differences were equalised, resulting in an averaged out composition. Irrespective of any possible confusion, a significant difference was found in the earliest phases between simple and multiple lines in different combinations with RE and CU-lines. A similar difference is also visible in the households of the later phases. The households of the middle period, belonging to the classic LnK, differ in the number of multiple lines. The analogous perception of line shape in the early, middle and later periods may not have had the same underlying reasons, given the

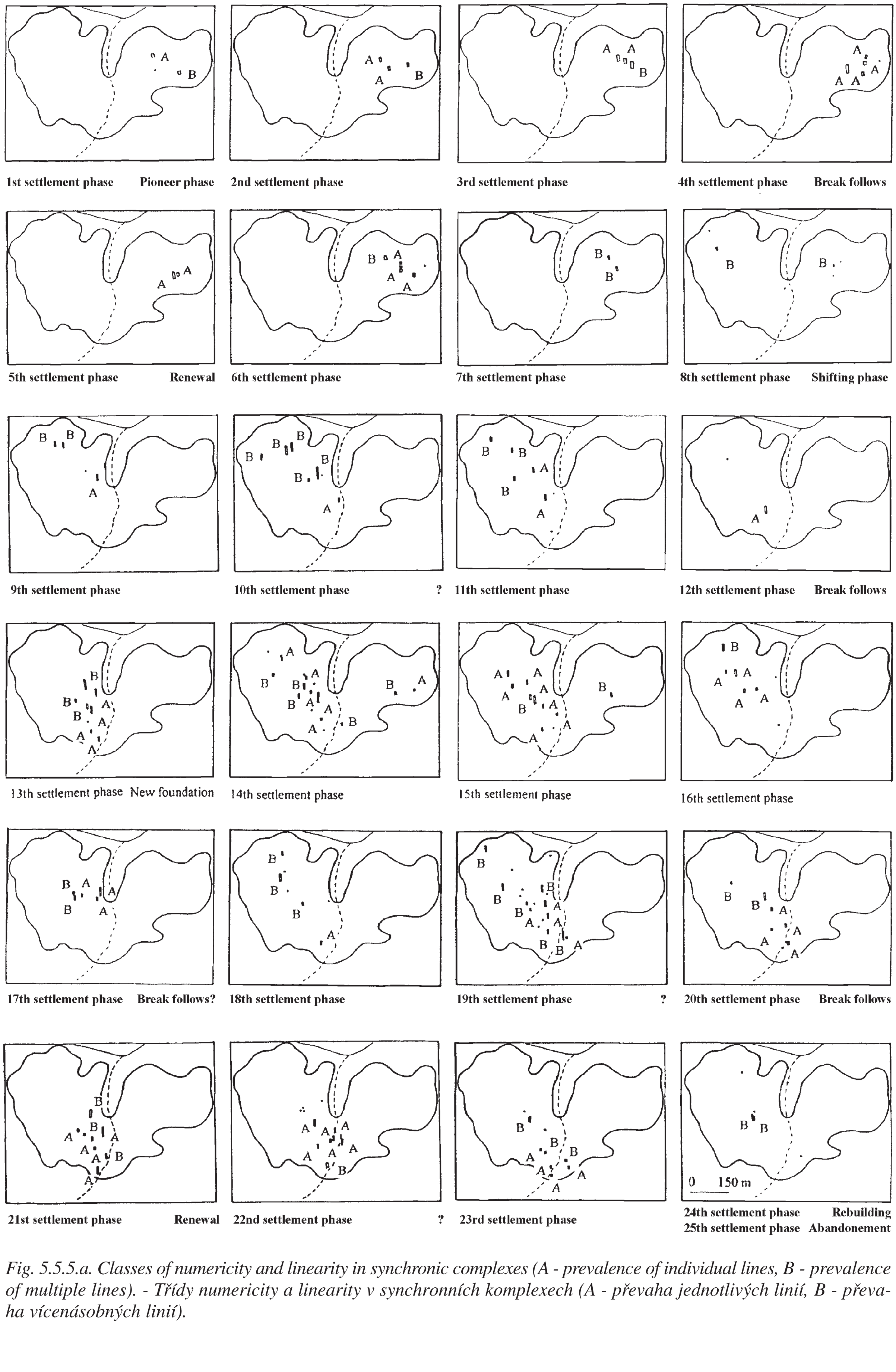


Fig. 5.5.5.a. Classes of numericity and linearity in synchronic complexes (A - prevalence of individual lines, B - prevalence of multiple lines). - Třídy numericity a linearity v synchronních komplexech (A - převaha jednotlivých linií, B - převaha vícenásobných linií).

differences in the isolated main motifs that were more realistic in the early period, and later became more abstract.

The households can be divided into two groups on the basis of the particular frequency/numericity of design types in all of the phases. In the first group (A) simple lines are prevalent, including doubled lines in the earlier phases. In the second group (B) lie households with a prevalence of multiple lines. The division of the houses into these two groups in synchronic households does not lead to any noticeable ordering. Therefore, it is unclear whether any social or economic interpretation of design frequency/numericity can be accepted. The proportion of houses in the second group is slightly higher in the phases coming after breaks in site development. It is as if the producers tried through the multiplication of lines to make designs more quickly in periods when there was less time for making pottery.

5.5.6. The sign value of design shape (linearity)

The bi-polarity of the RE and CU-design has been explained as the division of Neolithic society into gender groups following the duality of the matrilineal pattern. The origin of the population was on one side defined through the women, while men respected the principles of exogamy by entering the families of women. This interpretation has been proven by the distribution of vessels with RE or CU-decoration at the cemetery in Elsloo (Van de Velde 1979: 112). LnK society must have respected matrilineal descent, but the families' ware settled in the places where men were born as a type of virilocal residence, as can be inferred from the analysis of the pottery decoration in the settlement (Van de Velde 1979: 171). Men were therefore buried with an inventory coming from both lines of descent, and part of that of their wives. This is reflected by the statistically significant appearance of a combined design in the graves of men, while in the graves of women a simple design prevails, either with RE or CU-lines (Van de Velde 1979: 195, Tabs. 39, 40).

A different situation appears in the settlement refuse. In the Bohemian LnK, the combination of RE or CU-design in the main motif of a single vessel occurs rarely. Where the main motif comprises CU-lines, some complementary RE-lines may be included. If the main CU-design is interpreted as the index of the male element in the population then higher numbers would reflect higher numbers of men, while the opposite would also be true. Only during the early period would these changes logically correspond with the supposed changes in the phases - after phase 1 there is a higher quantity of CU-design, in phases 4 & 5 there are an equal proportions of CU and RE-designs, and in phase 7 there is once again a higher quantity of CU-design (Tab. 5.4.5.A). In the later periods, on the other hand, there are lower quantities of CU-design, in the phases around the supposed settlement changes. Therefore, a relationship between line, shape and gender representation within the population cannot be excluded. The index of RE and CU-line designs may be an indicator of the variability of gender structure in the Bylany area.

5.5.7. The sign value of lines under the rim

The changes of the number of lines under the rim have hitherto been considered from the chronological point of view, and the trend towards the multiplication of these lines in later periods has been noted. This chronological trend appears mainly in the Moravian LnK. At Bylany, also, such lines are absent in the early phases, but their numbers do not increase in a linear fashion over the subsequent period of development. Plain rims still account for some 50-60 % of the course of the subsequent phases (Tab. 5.4.7.A).

An alternative explanation for the changing number of lines under the rim might be sought in consideration of the age-group proportions of producers, i.e. the age of the women at the time when they produced the vessels. As an example, a relationship between stripes and the age of women can be found in modern Kalinga pottery - their numbers are limited by the information shared among the group of collaborating women (Graves 1985: 31). In the case of pottery from the village of Dangtalan in the Philippines, a multi-dimensional correlation between the number of stripes, the sizes of the vessels and the age of women was studied. No correlation was found between pottery attributes and kinship relations within the producer groups, and the intra-group relations differed. In some, the younger women used more stripes than the older ones. The number of stripes also increased on larger vessels (Graves 1985: 18).

At Bylany, the archaeological conditions mean that the attributes form a whole, but not in relation to producers or users. The situation in every household was different, but regardless of the numbers of lines under the rim may be representative of an overall picture. If the number of lines under the rim corresponds to the age of producers, and the shape of the line with the gender of the users, then the majority of the vessels without lines under the rim would correspond to a majority of older women producing ceramics (Tab. 5.5.7.A-a). Overall, the sum of the female RE-element would have been slightly prevalent (Tab. 5.5.7.A-b: 57 to 43), as would be supposed in an average population. The production of vessels with lines would be carried out by younger women within their training period, respectively for contributing to the household. →Tab. 5.5.7.A.

5.6. The informative content of design from the point of view of continuity and discontinuity in the interaction of social groups

5.6.1. Lines under the rim within the space of households

The number of lines under the rim provides great variability within the space of the households; correspondence analysis of this space shows the great influence not only of the first factor. On the first axis (38.4 % of the variability) the number of lines is ordered, so that the decreasing significance of their frequency is shown. On the second (28.5 % of the variability), and third (21.7 % of the variability) axes, the unadorned rims concentrate in the centre. On the second axis, the lower numbers of lines have positive values, while the higher numbers have negative values. In the third axis the odd (1,3) numbers of lines are divided from the even numbers (2,4). The households can be divided approximately by their position in the quadrants of the second and the third axes. The first group consists of houses with a prevalence for even numbers of lines, while the second group consists of houses with a prevalence of odd numbers.

While the first factor can be interpreted in connection with the decreasing age of the women making the pottery, the second and the third factors lack any logical indices for an interpretation. The proportion of households with a prevalence of an even number of lines or of plain rims varies within the phases. During the earliest phases, lines are absent from the households, as is also the case in phases 9 and 12. In the majority of the phases, this proportion is very low (10-30 %), although in other phases it may be relatively high (60-80 %: phase 10, 16-17 and 19-21). In phase 16 it is 100 %, and the same phase also differs from the others in the space of the motifs (see below, section 5.6.4). It seems that the positioning of these households is not random, but to date no correspondence has been found to any other attribute, and it cannot be explained as isolated patterning. The only statement possible at present is that the prevalence of odd or even numbers of lines under the rim creates two parallel rows of households continuing throughout the development sequence at the Bylany site.

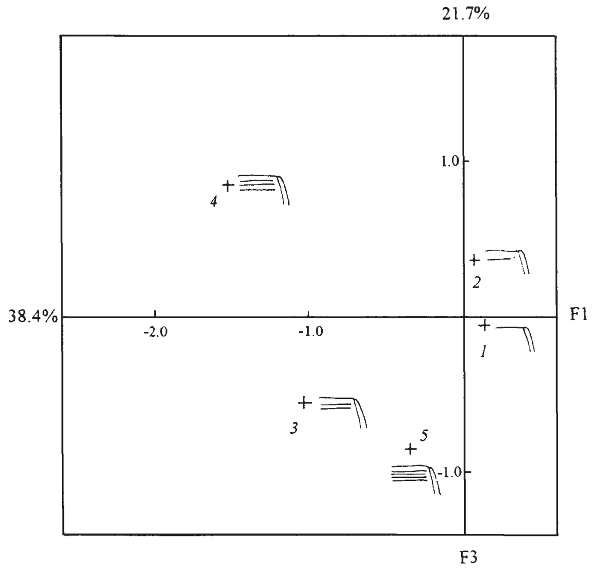


Fig. 5.6.1.a. Lines under the rim within the space of households. - Linky pod okrajem v prostoru domů.

5.6.2. The continuity of complementary decorative elements

Complementary decoration comprises a part of the Bohemian LnK design usually positioned in the upper free field between the main decorative motifs. Its positioning is less common in the lower field, and in the Bylany assemblage it is almost absent in other positions, such as on the belly. Analogous complementary decoration is less common in the Moravian LnK, but appears very often in the Rhineland area of the western LnK. In the later periods its use in the Bylany assemblage became indispensable, and its variants grew in number. The principal complementary motifs last throughout the whole development sequence, beginning in phase 8. They correspond mainly to the earliest motifs of the primary decoration; these includes short lines, individual points or notes, and "U"-shaped segments later connected with "garlands". A separate complementary motif is created by a "V" depicted, also in a ribbon variant, in both RE and CU-lines. Of the main motifs, the spiral or its variants are lacking in complementary roles. Only the "V" formed by a CU-line could be considered as a shortening of the A-spiral.

The vessels with complementary decoration do not appear regularly in all of the households. Within a phase, however, the motifs may be repeated among different households. Their number and variants increase in later phases. Variants similar to the letters "X", "Y", "W" and an inverted "V" are rare. Short lines appear in combination with other complementary motifs, or with a garland. When the appearance of the complementary motifs is compared to the sequence of interpreted events in the phases, then it is apparent that their use decreases during periods of supposedly uninterrupted site development. The number of complementary elements decreases markedly in phases 12, 17, 20 and 25. The sequence of complementary elements has the character of repeated renewal, quantitative waves and small formal changes.

5.6.3. The continuity of principal motifs

Analysis of the principal motifs of the main decoration is complicated by the fragmentary nature of the finds. The knowledge of the whole, or at least of most, of the parts of the decoration is generally random, and it is difficult to quantify the individual variants. It is necessary to be satisfied with a probable reconstruction, and to define particular categories more broadly. In the RE-lines, single lines or groups of short lines are distinguishable, followed by zigzags, rhombuses and rectangular meanders. The greatest variability is apparent in the zigzags, but the possibilities for identifying the variants are somewhat limited. The rectangular central motifs can be added to the aforementioned RE-motifs, which may also be either CU-lined or combined. The segments are separated in the CU-motifs from the garlands, which may be considered orbital variants of the segments. The classic spiral, and its orbital variant in particular, can be classified in more detail, according to different criteria - e.g. according to the direction of the curve (A-, S-, or hoof-like, etc.) or according to the frequency of curving, which is practically unrecognisable on the sherds.

5.6.4. Pottery sociology

Reflections on the possible relationship between primary design motifs and the genealogy of the inhabitants at Bylany lead to tracing the motifs and variants of the main and complementary decoration within the context of the phases and households. In the latter case of complementary motifs several dozen variants were found, perhaps because these are relatively small drawings that are better preserved on ceramic fragments. All of the variants can be divided into a lesser number of motifs, corresponding to the motifs of the main decoration.

The sign value of spiral may differ from sign value of other CU-motifs. The derivation of the A-spiral from the horns of aurochs or wild goat has previously been proven at Bylany (Pavlů 1997: 108), and it can be explained as an index of the male population within the households. The generalisation of such an explanation is complicated by other motifs such as segments, garlands, waves or other spiral variants. It would be more acceptable to explain the line shape and its symbolic value as an index of kin groups, as has previously been proposed for the central motifs (Soudský - Pavlů 1966).

On the basis of correspondence analysis of the motifs in the space of the phases, the spiral is a central motif (M7) in the earliest period, where the A-spiral (M6) is in opposition to the segments (M4), (Fig. 5.6.4.a). The zigzags (M2) and short lines (M1) appear between these extremes. The order of these motifs is less chronological than sociological, and comprises a genealogy of the Bylany site's two lineage groups. The first is represented by the A-spiral, together with short lines, and the second by a classic spiral and zigzag. The U-motive has no RE-counterpart, and it possibly alternates with the A-spiral if it is not a residuum of the a lineage.

During the later period of development, this bi-polarity of the main motifs is maintained but in a different order. Motif A comprises a distant alternative to the U-motif, which is nearer to the short lines (Fig. 5.6.4.b). Only phase 16 is attached to this pair of motifs, which was striking because of the prevalence of an even number of lines under the rim (see above, section 5.6.1). The rectangular motifs then appear, and the central motifs on the bases are separated. The spiral and the zigzag may in a similar way cover, as in the earlier period, several parallel and unrecognised variants.

It appears as if the complementary motifs conserved the main motifs from earlier periods, particularly short lines (D3) and the U-motive (D4). The notes (D2), or groups of notes (D1), come to

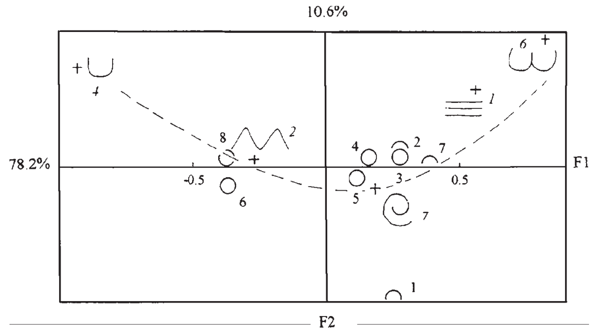


Fig. 5.6.4.a. Motifs (M1, M2, M4, M6, M7) of linear ornamentation within the spaces of phases 1-8. - Motivy lineárního ornamentu v prostoru 1.- 8. fáze.

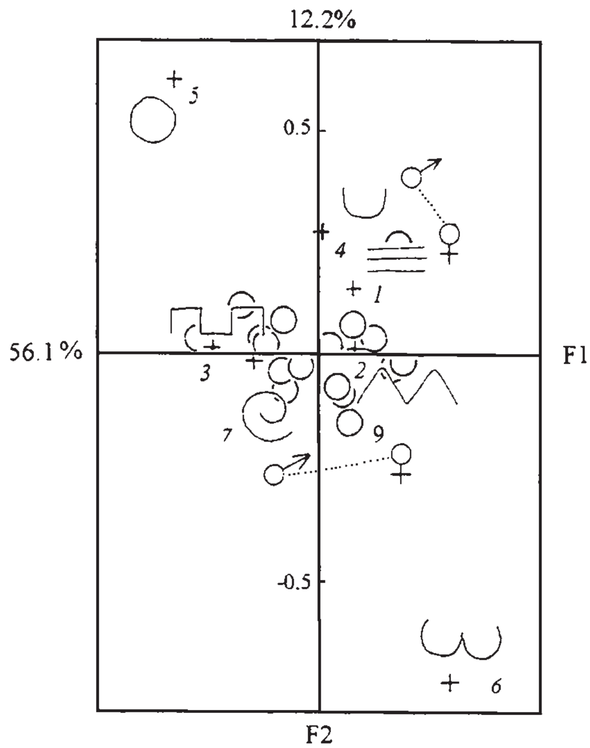


Fig. 5.6.4.b. Motifs (M1-M7) of linear ornamentation within the space of phases 9-25. - Motivy lineárního ornamentu v prostoru 9.- 25. fáze.

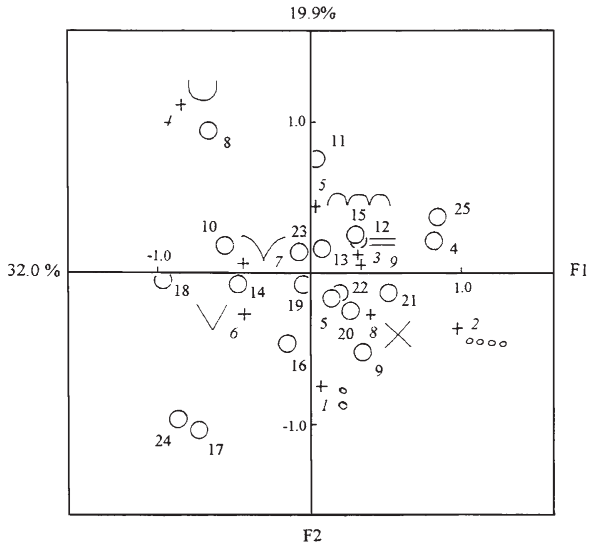


Fig. 5.6.4.c. Supplements (D1-D8) within the space of the phases. - Doplňky v prostoru fází.

the preceding group as additional motifs having no parallel at Bylany in the main motifs. The separate, complementary "V"-motifs are made up of RE and CU-lines (D6, D7). The latter are sometimes more a type of shortened garland than the curvilinear variant of a "V". The principal complementary motifs may overlap in combination with the main motifs. They correlate predominantly with the spiral motifs of the main decoration (Tab. 5.6.4-A.). In total, 2.2 % of cases have no complementary decoration. →Tab. 5.6.4.A.

In the separate group of rim sherds, complementary motifs behave conspicuously as an opposing system of decoration (Fig. 5.6.4.c). If the main decoration is interpreted as a record of the origin of the vessels' users, the complementary motifs may be a sign of the earlier roots of such origins. The relationship would be similar to that of modern names and surnames, but in the much more complicated condition of oral traditions. Some of the complementary elements may be described as of unknown or indistinguishable origin. A quite different role for this decoration, however, cannot be ruled out.

The appearance of particular complementary elements in the households of the phases (Tab. 5.6.4.B) shows the affiliation of inherited houses. Because the picture in the relevant table is not complete, or limited to spirals, the sequence of the kinship group can be followed only with difficulty. The multiplication of complementary elements in later phases can be explained by the increasing traditions of kinship relationships.

Some of the complementary elements cross over several phases. The most frequent are the RE and CU "V"-motifs (D6, D7). The development of short lines (D3) was interrupted several times, but the garlands can be followed continuously from phase 10 (D5: house 9004) through to phase 22 (houses 65 and 933). The repetition of different variants in the same house would not be at all resistant to supposed notices from grandparents, or indeed other ancestors, with the forms of the diminished motifs accompanying the main ones. The later forms of complement motifs mostly correspond with the early forms of the main motifs. →Tabs. 5.6.4.B, 5.6.4.C.

5.7. The context of ideas and imagination

5.7.1. The style of the incised decoration

The principal stylistic characteristic of linear decoration is the type of line, dependent primarily on the type of implement used in its execution. In the beginning, wooden burins were used, as is evident from the traces of a frayed point in some of the lines. These implements were probably difficult to make into a point, and grooves were therefore preferred. Later, bone points were used, which could be honed into a very sharp point and as a result very thin lines could be incised. The overall chronological trend is reflected in the narrowing of lines that became very fine.

In the first seven phases a grooved style is prevalent, defined as having lines broader than 3 mm. Thin lines, those narrower than 1 mm, are as rare as the very fine lines. The latter are more frequent from phase 132 onwards, and their proportional occurrence increases over time (Tab. 5.7.1.A). From phase 10 onwards the proportion of medium incised lines varies from 15-20 %, and the proportion of fine incised lines from 45-55 %. Only as of phase 24 do different values appear. →Tab. 5.7.1.A.

The distribution of individual styles of incision is virtually the same in the different types of features, such as households, isolated pits and others. The fine line is prevalent, the proportion of grooves is lower, and other styles do not exceed 10-20 % (Tab. 5.7.B-a). In contrast, the distribution of incised decoration - regardless of the style of incision - is more or less even. Some 45 % of the incised decoration and over 65 % of the grooves were recovered from households. The isolated pits that were datable to particular phases yielded only 2 % of all of the incised decoration; the remainder came from other features (Tab. 5.7.1.B-b). →Tab. 5.7.1.B.

5.7.2. The chronological variability of incision style

Correspondence analysis in the space of the phases reflects the chronological variability of the incision styles. The first part of the variability is accounted for by the grooves typical for the initial seven phases. This follows logically from the definition of those phases, and the result merely copies the variability which was the criterion for establishing this (Pavlů - Rulf -Zápotocká 1986: 329). From phase 8 onwards the first factor is ineffective and chronological variability is concentrated in the second factor (Fig. 5.7.2.a). The medium and fine incisions are in opposition around the very fine lines in the centre of this factor. The overall trend towards the narrowing of the lines is preserved. The individual provision of the lines is designated as a change in the culturally conditioned style of incision. This marks principal changes in the technique of linear decoration and, together with the decorative components, is the most chronologically diagnostic attribute in the LnK decoration.

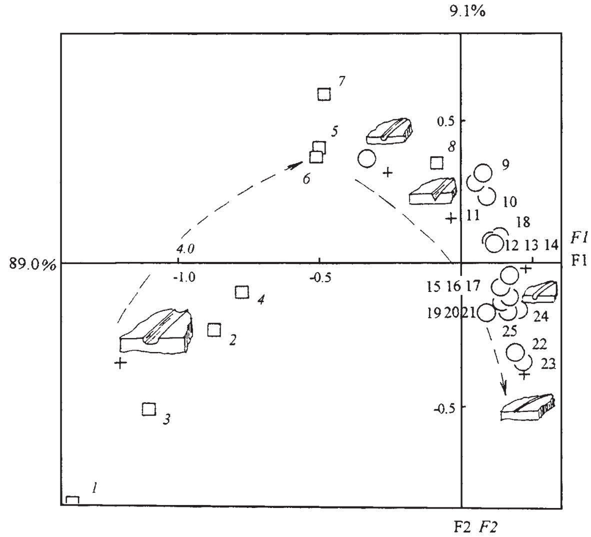


Fig. 5.7.2.a. Style of line engraving in the space of the phases (F1 - grooves and engraving, F2 - strength of the engraving, for phases 1-8 there is a different scale in factor 1). - Styl ryté linie v prostoru fází osídlení (F1 = žlábkování a rytí, F2 = síla rytí, pro fáze 1-8 použito jiné měřítko v 1. faktoru).

5.7.3. Style of notes

The notes became an organic part of LnK decorations at Bylany from phase 8 onwards, after the earliest settlement area was abandoned and moved from section F to section B. The types of notes (Pavlů 1998: Pl.XXIX) were originally classified according to subsequent improvements in the Bylany chronology. In Moravia, a type of large round note (type 1) survives longer, until the later period, while at Bylany the same type does not account for more than 1 % of the whole assemblage (Tab. 5.7.3.A). It developed through formal deformation into a slightly oval note (type 2), which was quickly replaced by irregular oval notes (types 3 and 5). The latter represent over 80 % of the decoration at Bylany. Efforts to distinguish these two types have been less successful, because of the rather subjective definition of both. The division was, from the chronological point at least, not a success. →Tab. 5.7.3.A.

Besides the notes themselves, a group of incised points or short cuts can be distinguished (type 4), which reach about 8 %. The other formal types of notes are rarer, including finger or fingernail impressions similar to technical decoration (types 6 and 8). An exceptional type, coded as 584, was included in type 9. Type 7, called the "proto-Želiezovce" type, was mentioned above (see 5.2.6). It represents connected small notes that do not respect the number of lines, and is characteristic of Southwest Slovakia; note decoration in this region has also been classified into much more detailed types (Pavúk 1994: 142-143).

The style of the notes is quantitatively more or less equal in all of the feature types, as the majority of note types do not differ between households or isolated pits (Tab. 5.7.3.B). Slight differences were found in type 3, which appears in isolated pits in lower numbers, to the advantage of type 5. Given the aforementioned subjectivity of these classifications, both types can be considered complementary. The only striking feature is the higher proportion of note 6 in isolated pits. According to this information, the style of technical decoration appears more often on vessels demanding a greater amount of transportation, and therefore having a greater likelihood of being placed in the refuse away from the houses. →Tab. 5.7.3.B.

5.7.4. The chronological variability of notes

Correspondence analysis of the notes in the space of the phases shows that the variability follows formal points rather chronological ones. As a result, the sequence of phases expressed is not regular (Fig. 5.7.4.a). The first axis contrasted types 1 and 6, which formally represent the most distant of the round and fingernail notes (the sequence of note types is 1-2-3/7--5/8-4---6). On the second axis, the positions of types 1 and 7 are opposed (the sequence of note types is 1--2-4-3-5/6/8--7), while on the third axis, the fingernail impressions and pointed incisions are opposed (the sequence of note types is: 6-8-2-1-3/5-4/7).

The first and third factors can be considered noteworthy stylistic variables, the second factor corresponding to the expected initial popularity of the individual types of notes. At the same time, it reflects changes in the notes executed with a blunt implement and by fingernails in the later period. The second factor is therefore the most chronologically sensitive. The phases do not cluster within the space of the first and the second factors (Fig.5.7.4.b), which means that the stylistic differences between them are not significant. The range of the style of the notes is represented on the one hand by phases 5 and 8 - with a prevalence of types 1 and 2, of round and oval notes - and on the other by phase 25 with a prevalence of points (type 4). The majority of the other phases concentrate around the most frequent types (3 & 5) of oval notes. In phase 4, isolated notes outside the line were more common.

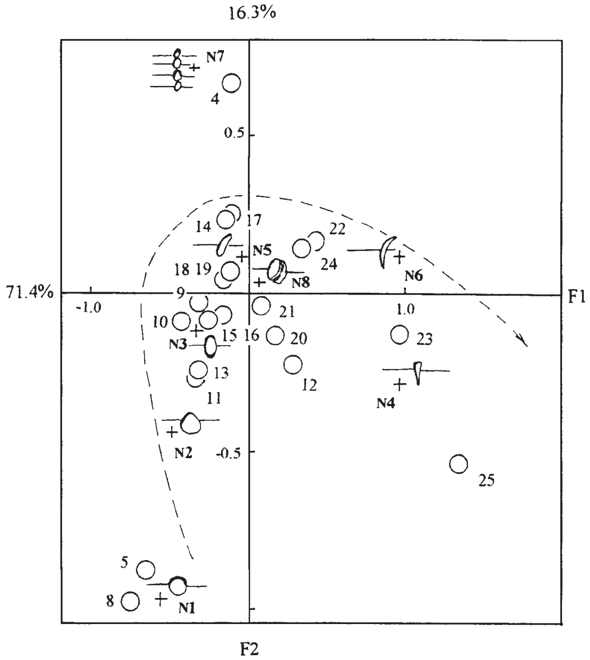


Fig. 5.7.4.a. Style of note holes within the space of the phases. - Styl notových důlků v prostoru fází.

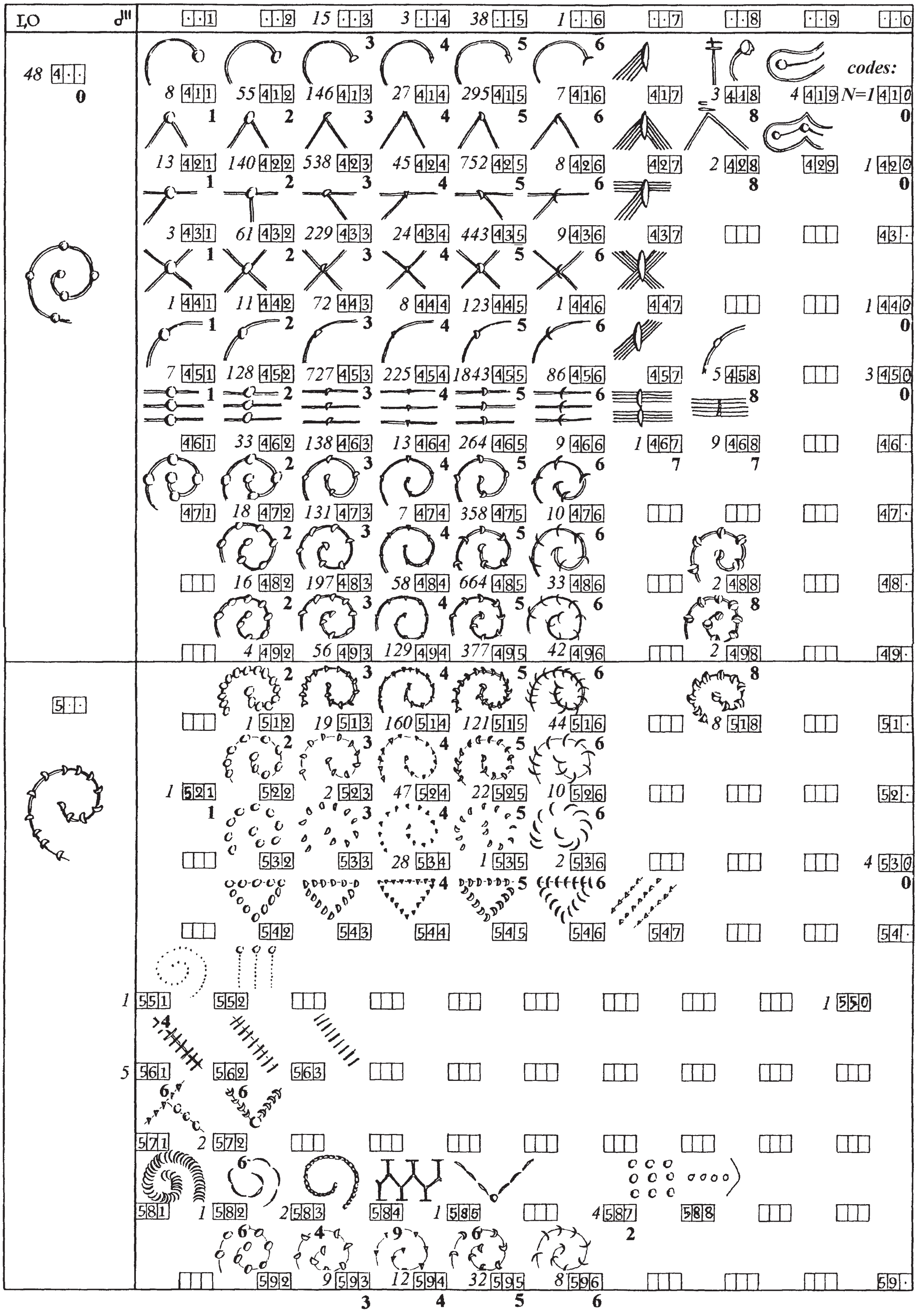


Fig. 5.7.3.a. Codes for note holes, and their numbers. - Kódy notových důlků a jejich počty.

5.8. The kinship or labour groups in different stylistic manifestations

5.8.1. Households of the earliest LnK period and incision style

Stylistic variability in the techniques of linear decoration is limited during the earliest period to the variability of different kinds of incision. It is therefore based on a more detailed classification than that used for the definition of the phases (Pavlů - Rulf - Zápotocká 1986: 329). The households are conspicuously ordered in one row, following the techniques of a narrowing incision. In the correspondence analysis of the households from phases 1-4, the first axis (55 % of the variability) represents the width of the line, while the second axis (25.8 % of the variability) represents the sharpness of the line. This corresponds to the overall position of the earliest period at Bylany, which is proven here in its final phases, when grooving is no longer the prevalent decorative technique. Apart from this primary picture, households with below average LO are also found (2277, 2209), as are households which are not sufficiently defined (2199). The other houses that are clustered within this space are sufficiently close to one other, fitting within the sequential phases of settlement, that they can be interpreted as the continuation of the same stylistic tradition.

From the initial phase the households with stylistic kinship are as follows:

(a) 2200 (phase 1) - 2199 (phase 2) - 2225, 2227, 2244 (phase 3).

(b) 2223 (phase 2) - (phase 3) - 2197, 2295 (phase 4).

Households 2224 and 2290 are only distantly related to both. The incompleteness of this series is to be explained by the incompleteness of the excavated area. The multiplication of the households sharing the same style could be explained as the genetic growth of an earlier family, and may correspond to the presumed model of a matrilineal society, with the mother's lineage. The residence pattern must be virilocal, when women moved after marriage into the home of a man (Van de Velde 1979: 170). One supposition of this explanation of kinship groups in sequential phases is the strict transmission of stylistic techniques within succeeding generations. The same quantitative model must be respected. In the first instance, the sequence of four generations would prove to be an extreme case of the preservation of stylistic techniques over a period of about a century.

The houses in phases 5 and 8 are clustered into two (not very clearly separated) groups, which differ only in the sign of the score of the second factor (12.9 % of the variability). This represents the grooving, whilst the other, first factor (80.5 % of the variability) corresponds to the same factor from the preceding group of phases. The first group of households is: 2278 (phase 5), - 2299 (phase 6)

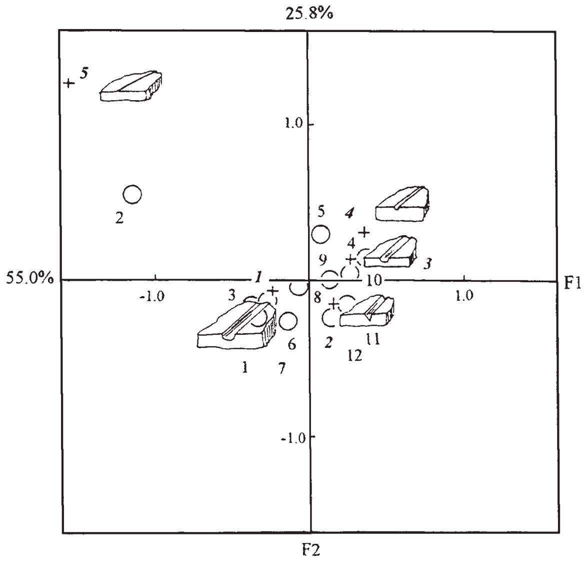


Fig. 5.8.1.a. Households in phases 1-4 within the stylistic space of engraving. - Domy 1.- 4. fáze ve stylistickém prostoru rytí.

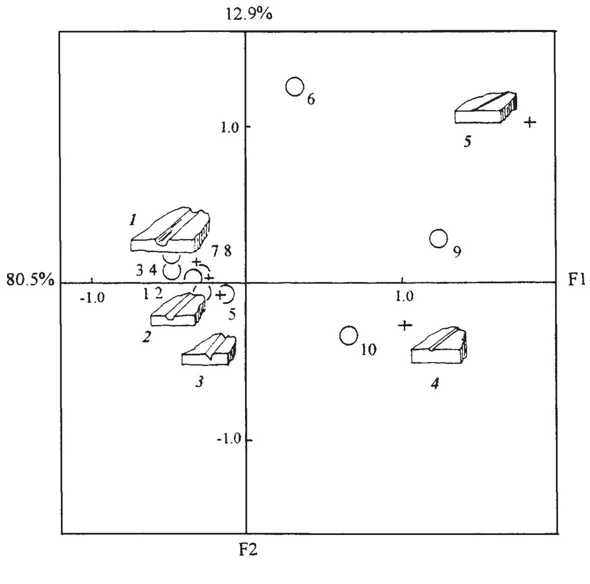


Fig. 5.8.1.b. Households of phase 5-8 in the stylistic space of engraving. - Domy 5.- 8. fáze ve stylistickém prostoru rytí.

- 2201, 2210 (phase 7), and the second is: 2198 (phase 5) - 2294 (phase 6). The houses of phase 8 phase are relatively distant from the other households in terms of the style of incisions. The type of incision in the earlier phases forms a continuity of stylistically different households. At the end of the early period, this implies that the inhabitants of the contemporary Bylany households were very closely related to each other, and that kin relationships surpassed neighbourhood relationships among them.

5.8.2. Households of the middle LnK period and stylistic techniques

For the phases from the classic LnK period, the space of the stylistic techniques was simplified even more. Grooves were excluded as they appeared only as a residual technique or early intrusions, and the medium width line was not differentiated into sharp and blunt because such divided classification is loaded with subjective failure, and can be changed for one vessel by the individual incision techniques. Also, the large round and oval notes (types 1 & 2) on the one hand, and the oval notes (types 3 & 5) on the other, were connected to one type for similar reasons. Formally different but technically similar finger and fingernail impressions were also merged (types 6 & 8).

The households from phases 9 and 12 were found to be close to each other in the reduced space of stylistic techniques (Fig. 5.8.2.a). If the households from the following phases are considered, three groups can be distinguished:

a) 680 (phase 9) - 525 (phase 10) - 620 (phase 11);
b) 604 (phase 9) - 405 (phase 10) - 620? (phase 11);
c) 302 (phase 9) - 306 (phase 10) - 312 (phase 11).

All of these were found in section B, and they are therefore close to each other in the field. The following pairs with a similar style can be linked to them:

d) 703 (phase 10) - 9001 (phase 11)
e) 9004 (phase 10) - 224, 9002 (phase 11).

Only households 741 (phase 10) and 88 (phase 12) are removed from any of the groupings representing the later techniques. The clusters of stylistically related households are not greatly separated, and larger clusters could be considered, such as (a) & (d) which overlap, or (b) & (c), connected only by household 620 from phase 11. The development of kinship groups within these phases accorded with the picture of incision style and notes in relatively narrow limits, and a sequence of around four to five families in one Bylany area.

The households from phases 13-17 behave quite differently. In the reduced space of stylistic techniques, they are very dispersed and form only a limited number of kinship groups (Fig. 5.8.2.b). Phase 14, in particular, is a watershed, with a diverging

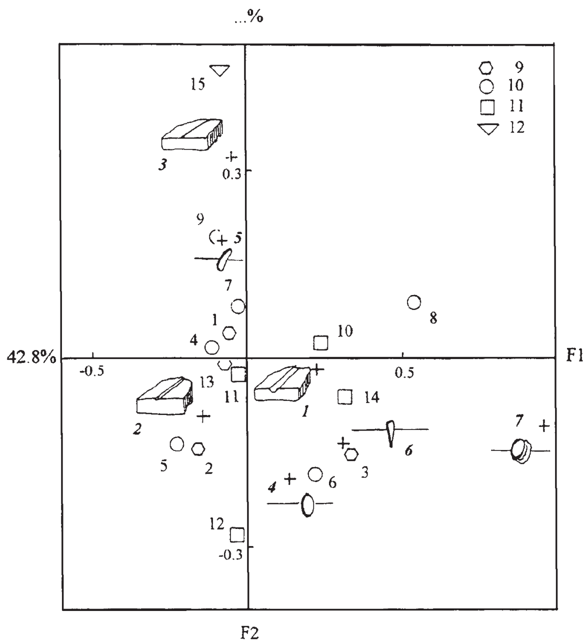


Fig. 5.8.2.a. Households of phases 9-12 in the stylistic space of the engraving of lines and notes. - Domy 9.-12. fáze ve stylistickém prostoru ryté linie a not.

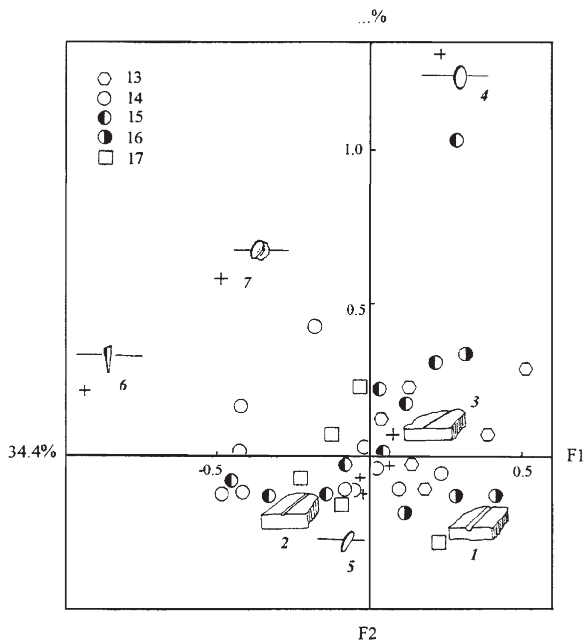


Fig. 5.8.2.b. Households of phases 13-17 within the stylistic space of the engraving of lines and notes. - Domy 13.-17. fáze ve stylistickém prostoru ryté linie a not.

style of incision and notes. Only the following three groups have common traits in common:

(a) 211 (phase 13) - 681 (phase 14) - 225 (phase 15);

(b) 132 (phase 13) - (313), 1195 (phase 14) - 433 (phase 15) - ? - 677 (phase 17);

(c) 2196 (phase 14) - 149, 926 (phase 15) - 571 (phase 15).

The other households are dispersed around these central groups. Interpretation following on a consequence of the preceding development leads to the conclusion that from phase 13 onwards, when the Bylany area was newly constituted, the population changed profoundly, perhaps because of an influx of women from neighbouring areas. They brought with them the pronounced differences in stylistic techniques that appear in the following phases.

5.8.3. Households of the later and terminal LnK periods and stylistic techniques

The households of the late and terminal periods behave similarly to the households of the preceding period. The distribution of the attributes in the reduced space of stylistic techniques and incisions changed; three main types of incision are now ordered almost exactly along a line, starting with the medium to fine incision (on the second axis, with 25.3 % of the variability). Among the notes, the pointed and finger types are now separate (on the first axis, with 49.1 % of the variability), and notes can no longer be differentiated between large and small. The households from phases 18-20 are stylistically very close to each other on the first axis (Fig. 5.8.3.a). The more apparent clusters consist of houses:

(a) 610 (phase 18) - 1240 (phase19) - 1247 (phase 20);

(b) 369 (phase 18) - 1246 (phase 19) - 79 (phase 20).

Apart from individual households, two other stylistic groups freely surrounding these two cores were created in phase 19 (361-434-702 and 96-619-959). Both may represent a denser production centre based on kinship relations. They also express a similar coefficient of skill level (see Fig. 4.3.7.e). Household 9003, which initiates the trends of the following period, is not sufficiently defined. The overall picture corresponds to the stylistic behaviour within phases 13-17, and its interpretation would mean a lower frequency of women moving from other site areas.

In phases 21 to 25, after the renewal of the settlement area, stylistic vigour returned, this period being marked by the movement of households in the first two phases (Fig. 5.8.3.b). In phase 23, the next stylistic change trended toward pointed notes (1st axis, 51.9 % of the variability). The reason for this must be ascribed to a chronological change that overlapped the stylistic variability

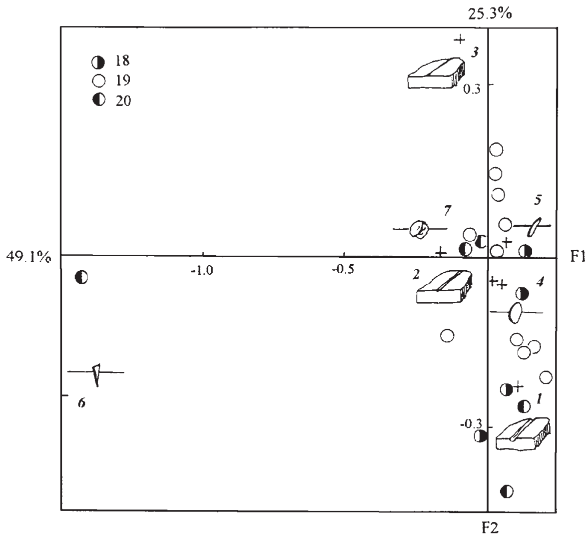


Fig. 5.8.3.a. Households of phases 18-20 in the stylistic space of the engraving of lines and notes. - Domy 18.-20. fáze ve stylistickém prostoru ryté linie a not.

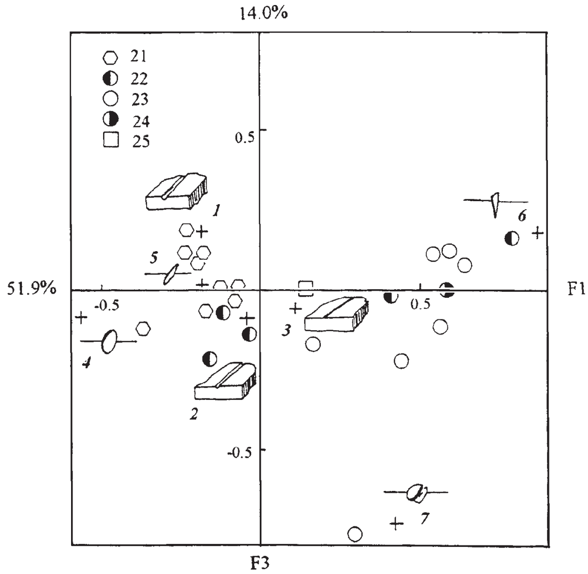


Fig. 5.8.3.b. Households of phases 21-25 in the stylistic space of the engraving of lines and notes. - Domy 21.-25. fáze ve stylistickém prostoru ryté linie a not.

among related asynchronic households. It might also be an augur of the initial popularity of the strokes that appeared in following generation, such as the stroked lines of the Šárka type decoration, and shortly afterwards the relatively quick transition to the stroked technique of the decoration. This transition has not yet been documented at Bylany. It is not possible to state just how far the changes from phase 23 can be interpreted as an influx of women or whole families from other areas. The development of the Bylany area, at least in its excavated part, was terminated quickly in phases 24 and 25. Each of these is represented only by one house, which means that the inhabitants from phase 23 had abandoned the area.

5.9. The constitution and preservation of tradition

5.9.1. The composition of linear decoration

The symmetry and orientation of the decoration of a vessel can be termed the main attributes of the decorative style. They prove the individual perception of the geometry of a particular ornament (Washburn 1995). In the Bylany assemblage, given the lower number of whole or reconstructed ornaments, this property is not sufficiently represented. It can be replaced to certain extent by a study of the composition of the linear decoration that can be carried out on the rim sherds of decorated vessels. The total number of classifiable sherds is 575, representing 11.4 % of all of the decorated rims. ➔Tab. 5.9.1.A.

As a composition, the presence of a main decorative element in combination with supplementary elements and rim lines is understood (Fig. 5.0.3.a). There are four combinations that are theoretically possible, showing that the second composition is the most frequent, encompassing more than half of the decorated vessels, having both main and complementary motifs (Tab. 5.9.A-d). The fourth composition is a less frequent representation of a complete combination of all of the decorative parts, accounting for one third of the vessels. Only in 5 % of cases are the vessels decorated without either complementary motifs or rim lines. The majority of these appear in the earliest LnK period. The relative numbers of this third composition of main decoration with rim lines are roughly double. ➔Tab. 5.9.1.B.

The first composition is prevalent in the initial phases, and was influenced by the stepwise development of decoration as the complete composition had not yet been created at all. In the following phases (8-11), the second type of composition is more common than the others (Tab. 5.9.1.B). The numbers from phase 9 are probably distorted by the lower number of classifiable cases. From phase 13 onwards the second composition of main and complementary decoration was used on one half of all of the decorated vessels. The other half comprised 3rd or 4th types in combination with rim lines. The proportion of classifiable sherds in the phases is lower still.

5.9.2. Cultural tradition in linear composition

In the composition of linear decoration, a stable cultural tradition appears at the beginning of the earliest period. The isolated motifs of the first composition might contain information on remote origins. If the second composition is interpreted - in accordance with the above argument - as providing information on the gender and kinship of users, then the next piece of information regards origin, and is added to in the third composition. Finally, information on the age of the producer, or even better on that of the user, was contained in the fourth composition. According to such an interpretation, almost one third of all of the vessels provide comprehensive information on the origin, kinship and age of the user.

This would correspond either with the facts that the vessel-maker needed to know, or with the degree of perceived importance attached to those facts. The producer's own intention for the forms may be the next informative value of pottery production. Not all articles were intended for a concrete user, nor was this demanded. A part of the production may have been anonymous. Similarly, the loss of decoration at the end of Neolithic period could be explained in the same way. Once the pottery ceased to be produced predominantly for individual use but for exchange or for meeting other universal social demands, the informative decoration lost its raison d'etre.

Decorative function	DECORATED CERAMICS	UNDECORATED CERAMICS
TECHNOMIC SOCIONOMIC IDEONOMIC	TO: technic decoration LO: incised - linear decotion PO: relief decoration	RS: red slip NO: undecorated (plain ware) ? other slips

Tab. 5.1.1.A. Basic categories of linear pottery decoration. - Základní kategorie zdobení lineární keramiky.

Feature No.	Inventory No.	Figure	Phase
a) Linear decorated			
269	214142	BYA1:166	25
292	214857	BYA1:173	22
435	218386	BYA1:194	14
780	262437	BYA2:184	10
b) Undecorated			
269	214145	BYA1:166	25
269	214345	-	25
298	215165	BYA1:182	22
564	236483	-	-
996	268805	-	21
1180	270846	BYA2:357	23

Tab. 5.1.5.A. List of sherds with traces of red colouring. - Seznam zlomků se stopami červeného barviva.

Feature No.	Inventory No.	Phase	Ware	Decoration	Figure
12	200689/1	-	COARSE	NO	BYA1:19
53	201535	-	COARSE	TO	BYA1:39
834	265225	11	COARSE	NO	BYA2:246
2170	278867	4	FINE	NO	-

Tab. 5.1.6.A. List of sherds with traces of a dark colouring from an organic material. - Seznam zlomků se stopami tmavého organického barviva.

Ware	LO PO	TO	NO	RS	%	N=
FINE	60.1	1.4	38.5	0.0	100.0	31991
COARSE	8.2	12.8	79.1	0.0	100.0	36426
%	32.5	7.4	60.1	0.0	100.0	
N=	22212	5095	41104	6		68417

Tab. 5.1.9.A. Basic decorative categories (comp. Fig. 5.0.3.a) on fine and coarse ceramics. - Základní kategorie (srov. obr. 5.0.3.a) výzdoby na jemné a hrubé keramice.

Phase	LO PO	TO	NO	RS	%	N=
1	17.8	2.6	79.6	0.0	100.0	191
2	20.8	2.4	76.8	0.0	100.0	539
3	31.6	1.7	66.7	0.0	100.0	117
4	21.1	3.0	76.0	0.0	100.0	570
5	26.0	3.2	70.9	0.0	100.0	539
6	26.1	3.6	70.3	0.0	100.0	276
7	21.8	4.9	73.2	0.0	100.0	146
8	24.9	5.9	69.2	0.0	100.0	1101
9	32.3	5.0	62.8	0.0	100.0	1131
10	36.4	7.8	55.8	0.0	100.0	2817
11	40.1	6.8	53.1	0.0	100.0	2740
12	29.8	9.4	60.8	0.0	100.0	416
13	36.3	7.2	56.5	0.0	100.0	2683
14	38.3	8.1	53.7	0.0	100.0	3508
15	27.9	8.9	63.2	0.0	100.0	2706
16	29.4	8.2	62.4	0.0	100.0	745
17	34.1	11.2	54.8	0.0	100.0	851
18	38.2	8.7	53.1	0.0	100.0	1950
19	34.3	9.1	56.6	0.0	100.0	7958
20	28.4	7.7	63.8	0.0	100.0	1192
21	38.6	7.2	54.2	0.0	100.0	2907
22	37.5	8.4	54.1	0.0	100.0	2738
23	34.1	6.5	59.3	0.1	100.0	1605
24	35.0	8.6	56.4	0.0	100.0	406
25	30.1	4.6	64.8	0.4	100.0	495
-	29.9	7.1	63.0	0.0	100.0	28094
N=/%	32.5	7.4	60.1	0.0	100.0	68417

Tab. 5.1.10.A. Basic decorative categories (comp. Fig. 5.0.3.a) in the chronology of the Bylany settlement phases. - Základní kategorie výzdoby (srov. obr. 5.0.3.a) v posloupnosti bylanských fází osídlení.

Feature	Categories of decoration					
a)	LO PO	TO	NO	RS	%	N=
COMP	33.6	7.7	58.8	0.0	100.0	29614
ISOL	33.9	7.6	58.5	0.0	100.0	1158
OTHER	31.6	7.3	61.2	0.0	100.0	37645
%	32.5	7.4	60.1	0.0	100.0	
b)	LO PO	TO	NO	RS	%	
COMP	44.7	44.6	42.3	66.7	43.3	
ISOL	1.8	1.7	1.6	0.0	1.7	
OTHER	53.5	53.7	56.0	33.3	55.0	
%	100.0	100.0	100.0	100.0	100.0	
N=	22212	5095	41104	6		68417

Tab. 5.2.1.A. Decorative categories in various feature types (house COMPlexes, ISOLated pits, comp. Fig. 5.0.3.a). - Kategorie zdobení v různých druzích objektů.

a)	LO PO	TO	NO	RS	%	N=
COM	36.5	13.8	49.7	0.0	100.0	318
RIM	40.2	10.9	48.9	0.0	100.0	13972
BOT	29.6	1.7	68.7	0.0	100.0	4201
WAB	17.9	13.3	68.8	0.0	100.0	1006
WAL	30.8	6.8	62.4	0.0	100.0	48905
%	32.5	7.4	60.1	0.0	100.0	
b)	**LO PO**	**TO**	**NO**	**RS**	**N=**	
COM	0.5	0.9	0.4	0.0	0.5	
RIM	25.3	29.9	16.6	33.3	20.4	
BOT	5.6	1.4	7.0	16.7	6.1	
WAB	0.8	2.6	1.7	0.0	1.5	
WAL	67.8	65.2	74.3	50.0	71.5	
%	100.0	100.0	100.0	100.0	100.0	
N=	22205	5093	41098	6		68402

Tab. 5.2.1.B. Basic decorative categories in settlement refuse (COMplete pots, RIMs of pots, BOTtoms, WAlls of reconstructed Body, WALl sherds). - Základní kategorie zdobení v sídlištním odpadu.

Feature No.	Inventory No.	Phase	Figure
436	218739	14	BYA1:197
436	218809	14	BYA1:198
436	218835	14	BYA1:199
436	219289	14	BYA1:204
377	225463	11	BYBF:142
592	241862	-	BYBF:206
715	244482	19	BYA2:153
869	259467	19	BYA2:259
865	266018	-	BYA2:255
868	266251	17	BYA2:257

Tab. 5.2.3.A. List of codes 467, 468 (linked notes and stamped lines) see Fig. 5.7.3.a. - Seznam kódů 467, 468 (spojené noty a kolkovaná linie) viz obr. 5.7.3.a.

Categories / numericity	NU01	NU02	NU03	NU04	XX	%	N=
LO	95.9	99.7	99.0	100.0	96.4	96.4	20537
TO	4.1	0.3	1.0	0.0	3.6	3.6	763
%	100.0	100.0	100.0	100.0	100.0	100.0	
N=	18205	2598	207	14	276		21300
b)	**NU01**	**NU02**	**NU03**	**NU04**	**XX**		
LO	85.0	12.6	1.0	0.1	1.3	100.0	
TO	97.5	0.9	0.3	0.0	1.3	100.0	
N=	85.5	12.2	1.0	0.1	1.3	100.0	

Tab. 5.4.2.A. Relative number of lines (code NU comp. Fig. 5.0.3.a: C) in the design of linear and technical decoration. - Relativní počet linek (kód NU srov. obr. 5.0.3.a: C) v desénu lineární a technické výzdoby.

Numericity / components	LINE	BAND	NLIN	NOTE	STRO	%	N=
NU01	46.2	6.6	46.3	0.7	0.2	100.0	17462
NU02	33.8	41.5	22.9	1.5	0.3	100.0	2592
NU03	66.8	12.2	17.1	2.4	1.5	100.0	205
NU04	50.0	28.6	21.4	0.0	0.0	100.0	14
XX	12.1	55.8	27.2	3.8	1.1	100.0	265
%	44.4	11.7	42.8	0.9	0.2	100.0	
N=	9115	2412	8784	182	45		20538

Tab. 5.4.2.B. Relative number of lines (code NU comp. Fig. 5.0.3.a: C) and decorative components (LINEs, BANDs, Notes-on-LINes, NOTEs, STROkes). - Relativní počet linek (kód NU srov. obr. 5.0.3.a: C) a komponenty výzdoby.

Phase / numericity	NU01	NU02	NU03	NU04	XX	%	N=
1	41.2	50.0	8.8	0.0	0.0	100.0	34
2	62.2	21.6	15.3	0.0	0.9	100.0	111
3	52.8	30.6	16.7	0.0	0.0	100.0	36
4	63.0	24.4	9.2	3.4	0.0	100.0	119
5	64.5	26.1	8.7	0.0	0.7	100.0	138
6	57.7	35.2	5.6	1.4	0.0	100.0	71
7	46.7	23.3	26.7	0.0	3.3	100.0	30
8	80.7	16.2	2.3	0.0	0.8	100.0	259
9	76.6	19.1	3.4	0.0	0.9	100.0	350
10	77.6	19.1	0.9	0.0	2.4	100.0	972
11	81.7	16.0	0.2	0.0	2.1	100.0	1057
12	85.5	11.1	0.0	0.0	3.4	100.0	117
13	83.2	15.0	0.3	0.0	1.5	100.0	920
14	80.0	17.8	0.6	0.0	1.6	100.0	1266
15	88.3	9.7	0.6	0.0	1.4	100.0	699
16	88.1	10.4	1.0	0.0	0.5	100.0	201
17	88.5	9.6	1.2	0.0	0.8	100.0	260
18	87.9	10.3	0.7	0.0	1.1	100.0	701
19	90.8	8.2	0.3	0.0	0.7	100.0	2525
20	91.8	5.9	1.3	0.0	1.0	100.0	306
21	93.8	5.4	0.3	0.0	0.5	100.0	1001
22	91.6	7.3	0.2	0.1	0.9	100.0	937
23	87.8	9.3	1.4	0.0	1.4	100.0	493
24	83.8	14.6	0.8	0.0	0.8	100.0	130
25	82.5	14.2	2.5	0.0	0.8	100.0	120
0	84.8	12.9	0.8	0.1	1.4	100.0	7685
%	85.0	12.6	1.0	0.1	1.3	100.0	
N=	17462	2592	205	14	265		20538

Tab. 5.4.3.A. Chronological variability of the number of lines (code NU comp. Fig. 5.0.3.a: C) in the chronology of the settlement phases. - Chronologická variabilita počtu linek (kód NU srov. obr. 5.0.3.a: C) v posloupnosti fází osídlení.

Linearity / categories	LINEAR	PAINTED	RELIEF	TECHNIC	%	N=
REKTI	78.6	0.0	2.7	18.7	100.0	15054
CURVI	94.1	0.0	3.9	2.0	100.0	8961
RIM	59.6	0.0	2.8	37.6	100.0	1468
%	83.0	0.0	3.1	13.9	100.0	
N=	21148	1	792	3542		25483
b)	LO	CO	PO	TO	%	N=
REKTI	56.0	100.0	50.9	79.4	59.1	
CURVI	39.9	0.0	43.9	5.0	35.2	
RIM	4.1	0.0	5.2	15.6	5.8	
%	100.0	100.0	100.0	100.0	100.0	

Tab. 5.4.4.A. Relative occurrence of line forms and basic types of decoration (linearity comp. Fig. 5.0.3.a: G, code REKTIlinear, CURVIlinear, RIM-line). - Relativní výskyt tvaru linek (srov. obr. 5.0.3.a: G) a základní druhy výzdoby.

Phase / linearity	REKTI	CURVI	RIM	%	N=	index C/R
1	39.5	55.3	5.3	100.0	38	1.40
2	55.6	41.9	2.6	100.0	117	0.75
3	59.0	35.9	5.1	100.0	39	0.61
4	48.4	48.4	3.1	100.0	128	1.00
5	47.3	48.0	4.7	100.0	150	1.01
6	59.5	34.2	6.3	100.0	79	0.57
7	41.2	55.9	2.9	100.0	34	1.36
8	59.7	35.2	5.0	100.0	318	0.59
9	57.5	37.5	5.0	100.0	400	0.65
10	64.8	29.2	6.0	100.0	1150	0.45
11	60.4	35.0	4.5	100.0	1216	0.58
12	48.6	45.8	5.6	100.0	142	0.94
13	65.0	30.0	5.0	100.0	1103	0.46
14	58.0	36.1	6.0	100.0	1522	0.62
15	59.0	34.3	6.7	100.0	905	0.58
16	61.4	34.0	4.6	100.0	259	0.55
17	62.8	29.3	8.0	100.0	352	0.47
18	60.4	34.0	5.6	100.0	843	0.56
19	60.0	33.3	6.7	100.0	3230	0.56
20	59.9	33.2	7.0	100.0	401	0.55
21	56.5	37.4	6.1	100.0	1278	0.66
22	53.7	41.1	5.2	100.0	1180	0.76
23	53.0	42.3	4.7	100.0	615	0.80
24	55.8	37.6	6.7	100.0	165	0.67
25	55.9	37.3	6.8	100.0	161	0.67
0	59.3	35.1	5.7	100.0	9662	0.59
%	59.1	35.2	5.8	100.0		
N=	15057	8962	1468		25487	

Tab. 5.4.5.A. Chronological variability of the forms of lines (comp. Fig. 5.0.3.a: G) in the phase sequence. - Chronologická variabilita tvaru linek (srov. obr. 5.0.3.a: G) v posloupnosti fází.

a) Lines-under-rim/categories	LINEAR	RELIEF	TECHNIC	OTHER	%	N=
LR00	86.3	4.3	9.4	0.0	100.0	2797
LR01	59.0	2.4	38.6	0.0	100.0	1410
LR02	95.9	0.0	4.1	0.0	100.0	292
LR03	97.6	0.0	2.4	0.0	100.0	85
LR04	83.3	0.0	16.7	0.0	100.0	6
%	78.7	3.4	17.9	0.0	100.0	
N=	3613	155	822	0		4590
b)	LINEAR	RELIEF	TECHNIC	OTHER	%	N=
LR00	66.8	78.1	32.0	0.0	60.9	
LR01	23.0	21.9	66.2	0.0	30.7	
LR02	7.7	0.0	1.5	0.0	6.4	
LR03	2.3	0.0	0.2	0.0	1.9	
LR04	0.1	0.0	0.1	0.0	0.1	
%	100.0	100.0	100.0	0.0	100.0	

Tab. 5.4.6.A. Relative number of Lines under the Rim (comp. Fig. 5.0.3.a: F) and basic decoration categories - Relativní počet linek pod okrajem (srov. obr.. 5.0.3.a: F) a základní kategorie výzdoby.

a) Lines-under-rim / components	LINE	BAND	NLIN	NOTE	STRO	%	N=
LR00	37.8	8.8	52.1	1.2	0.1	100.0	2413
LR01	34.7	20.0	44.6	0.6	0.1	100.0	832
LR02	7.1	8.6	81.8	0.4	2.1	100.0	280
LR03	3.6	1.2	92.8	0.0	2.4	100.0	83
LR04	0.0	0.0	100.0	0.0	0.0	100.0	5
%	33.8	11.2	53.7	1.0	0.3	100.0	3613
N=	1223	403	1940	36	11	3613	
b)	LINE	BAND	NLIN	NOTE	STRO		
LR00	74.5	52.6	64.8	83.3	18.2	66.8	
LR01	23.6	41.2	19.1	13.9	9.1	23.0	
LR02	1.6	6.0	11.8	2.8	54.5	7.7	
LR03	0.2	0.2	4.0	0.0	18.2	2.3	
LR04	0.0	0.0	0.3	0.0	0.0	0.1	
%	100.0	100.0	100.0	100.0	100.0	100.0	

Tab. 5.4.6.B. Relative number of Lines under the Rim and components of linear decoration (LINEar incision, BANDs, Notes-on-LINe, NOTEs, STROking). - Relativní počet linek pod okrajem a komponenty lineární výzdoby.

Phase / lines-under-rim	LR00	LR01	LR02	LR03	LR04	%	N=
1	75.0	25.0	0.0	0.0	0.0	100.0	8
2	92.6	7.4	0.0	0.0	0.0	100.0	27
3	66.7	33.3	0.0	0.0	0.0	100.0	6
4	85.2	14.8	0.0	0.0	0.0	100.0	27
5	85.1	14.9	0.0	0.0	0.0	100.0	47
6	70.0	30.0	0.0	0.0	0.0	100.0	20
7	90.9	9.1	0.0	0.0	0.0	100.0	11
8	77.3	19.7	0.0	3.0	0.0	100.0	66
9	64.5	34.2	0.0	1.3	0.0	100.0	76
10	67.7	31.3	1.0	0.0	0.0	100.0	201
11	67.8	31.3	0.9	0.0	0.0	100.0	227
12	40.9	54.5	4.5	0.0	0.0	100.0	22
13	58.3	36.3	3.9	1.0	0.5	100.0	204
14	54.3	38.1	5.5	2.1	0.0	100.0	291
15	58.7	38.1	2.5	0.6	0.0	100.0	160
16	52.5	37.5	10.0	0.0	0.0	100.0	40
17	50.0	35.9	9.4	4.7	0.0	100.0	64
18	50.0	39.4	10.0	0.6	0.0	100.0	160
19	60.9	28.7	9.5	0.9	0.0	100.0	568
20	60.6	27.3	9.1	3.0	0.0	100.0	66
21	61.8	27.6	7.3	2.4	0.8	100.0	246
22	58.0	25.1	9.5	6.9	0.4	100.0	231
23	53.8	25.9	11.9	7.7	0.7	100.0	143
24	56.1	24.4	12.2	7.3	0.0	100.0	41
25	48.5	12.1	33.3	6.1	0.0	100.0	33
0	61.2	31.0	6.2	1.5	0.1	100.0	1607
%	60.9	30.7	6.4	1.9	0.1	100.0	
N=	2797	1412	292	85	6		4592

Tab. 5.4.7.A. Chronological variability of the number of Lines under the Rim in the phase sequence. - Chronologická variabilita počtu linek pod okrajem v posloupnosti fází.

a) Linearity/lines-under-rim	LR00	LR01	LR02	LR03	LR04	%	N=
REKTI KURVI %	56.0 77.8 65.4	33.8 15.4 26.0	8.3 4.6 6.7	1.6 2.1 1.8	0.2 0.1 0.1	100.0 100.0 100.0	
b)							
REKTI KURVI % N=	49.1 50.9 100.0 2298	74.6 25.4 100.0 913	70.8 29.2 100.0 236	51.6 48.4 100.0 64	80.0 20.0 100.0 5	57.3 42.7 100.0	2013 1503 3516

Tab. 5.5.7.A. Lines forms and number beneath the rim (comp. Fig. 5.0.3.a: F, G) in the SHApe SIze type vessels (outside SHASI 4, 12 and 14). - Tvar linie a počet linek pod okrajem (srov. obr. 5.0.3.a: F, G) ve skupině okrajů nádob typu SHASI (mimo SHASI 4, 12, a 14).

Complementary / main motifs	1	2	3	4	5	6	7	N=
D1	0	9	0	0	0	0	24	33
D2	0	0	0	0	0	0	4	4
D3	0	21	2	1	0	0	59	83
D4	0	1	0	1	0	0	12	14
D5	0	0	0	0	0	0	32	32
D6	0	22	3	2	1	0	109	147
D7	0	1	0	0	0	0	117	118
D8	0	3	1	1	0	0	12	17
D9	4	130	5	22	5	1	95	262
D0	62	2800	66	107	17	0	967	4019
N=	66	2987	77	134	23	1	1431	4719

Tab. 5.6.4.A. Correlation of samples of the main (1-lines, 2-zig-zags, 3-meanders, 4-segments, 5-circles, 6-A spirals, 7-spirals) and supplementary (D0-none, D1-notes, D2-strokes, D3-lines, D4-U shape, D5-girlands, D6-V shape, D7-uV, D8-other, D9-unclassified) designs. - Korelace vzorů hlavního (1-úsečky, 2-klikatky, 3-meandry, 4-obloučky, 5-kruhy, 6-Áčkové spirály, 7-spirály) a doplňkového desénu (D0-žádný, D1-důlky, D2-vpichy, D3-úsečky, D4-obloučky, D5-girlandy, D6-véčka, D7-oblá véčka, D8-jiné, D9-neklasifikované).

Phases and house	D0	D1	D3	D8	D4	D6	D7	D5	D2
	none	notes	lines	other	U	V	uV	girl.	stroke
9		604	604						
10						703	703		
						741	741		
			9004			9004		9004	
								/306/	
11						9002	9002	/224/	
			312				312		
			620				620		
12							/88/		
13	/211/					/19/	/41/		
							/132/		
				678	678	678		678	
							/999/		
							/427/		
14	165					165			
			426	426		426	426		
						313	313		
							558	558	
						/85/			
						/124/			
15	/926/		/368/			/581/	/225		
							/2192/		
							/1116/		
							174	174	
16		/739/							
17		877					877		
						/677/	/580/		

Tab. 5.6.4.B. Complexes with basic supplementary designs (explanations comp. Tab. 5.6.4.A) and a spiral ornament (phases 9 - 17). - Komplexy se základními vzory doplňků (srov. tab. 5.6.4.A) a spirálovým ornamentem (fáze 9 - 17).

Phases and houses	D0	D1	D3	D8	D4	D6	D7	D5	D2
18			263			263		263	
						982	982		
19	96				96	96	96	96	
	162		162			162	162	162	
						959	959		
						1246	1246		
						/361/	/702/		
						/619/			
						/434/			
						/1161/			
20	/9003/		/1227/			/79/		/682/	
		147				147			
21		16		16			16		
		81	81			81		81	
	912	912	912			912		912	
			1111			1111	1111		
22	65		65			65	65	65	
	166					166	166		
	903		903						
	910	910				910			
	933					933	933	933	
		/1226/							
23						/1129/	/1192/	/80/	

Tab. 5.6.4.C. Complexes with supplementary designs (explanations comp. Tab. 5.6.4.A) and a spiral ornament (phases 18 - 23). - Komplexy se základními vzory doplňků (srov. tab. 5.6.4.A) a spirálovým ornamentem (fáze 18 - 23).

Phase / lines	GROOVES	INCISONS				%	N=
		middle		narrow	fine		
		sharp	blunt				
1	73.5	2.9	20.6	0.0	2.9	100.0	34
2	45.5	17.3	28.2	7.3	1.8	100.0	110
3	58.3	19.4	19.4	2.8	0.0	100.0	36
4	42.0	20.2	29.4	8.4	0.0	100.0	119
5	24.8	25.5	42.3	7.3	0.0	100.0	137
6	25.0	25.0	41.7	6.9	1.4	100.0	72
7	23.3	26.7	50.0	0.0	0.0	100.0	30
8	4.5	25.8	25.4	38.3	6.1	100.0	264
9	0.0	21.9	20.3	51.9	5.8	100.0	360
10	0.0	20.8	18.3	53.5	7.4	100.0	989
11	0.3	24.7	18.6	50.0	6.3	100.0	1063
12	0.0	17.2	16.4	51.7	14.7	100.0	116
13	0.0	18.9	13.9	55.4	11.7	100.0	945
14	0.1	20.6	14.1	52.1	13.2	100.0	1302
15	0.1	15.5	12.7	53.5	18.1	100.0	722
16	0.0	19.7	20.2	47.6	12.5	100.0	208
17	0.0	17.6	9.9	57.7	14.7	100.0	272
18	0.0	16.3	16.3	55.3	12.1	100.0	725
19	0.0	16.3	11.3	53.3	19.1	100.0	2630
20	0.0	15.3	8.8	57.8	18.1	100.0	320
21	0.1	19.5	11.6	45.8	23.0	100.0	1043
22	0.0	14.9	6.3	54.3	24.5	100.0	972
23	0.0	13.3	6.2	54.6	25.8	100.0	496
24	0.0	9.8	9.1	65.2	15.9	100.0	132
25	0.0	15.8	13.3	46.7	24.2	100.0	120
0	0.9	18.6	13.3	50.9	16.2	100.0	7899
%	1.4	18.5	13.9	50.7	15.4	100.0	
N=	296	3911	2934	10715	3260		21116

Tab. 5.7.1.A. Style of line engraving (comp. Fig. 5.0.3.a: H) in the chronology of the phases. - Styl rytí linie (srov. obr. 5.0.3.a: H) v posloupnosti fází.

a) features / lines	GROOVES	SHARP	BLUNT	NONE	FINE	%	N=
HOUSE COMPLEXES	2.0	18.5	15.4	48.8	15.2	100.0	9489
ISOLATED PITS	0.8	19.9	14.9	53.8	10.6	100.0	377
OTHER	0.9	18.5	12.6	52.3	15.8	100.0	11250
%	1.4	18.5	13.9	50.7	15.4	100.0	
b)							
HOUSE COMPLEXES	65.5	45.0	49.7	43.2	44.4	44.9	9489
ISOLATED PITS	1.0	1.9	1.9	1.9	1.2	1.8	377
OTHER	33.4	53.1	48.4	54.9	54.4	53.3	11250
%	100.0	100.0	100.0	100.0	100.0	100.0	
N=	296	3911	2934	3260	10715		21116

Tab. 5.7.1.B. Style of line engraving (comp. Fig. 5.0.3.a: H) in the various types of features. - Styl rytí linie (srov. obr. 5.0.3.a: H) v různých druzích objektů.

Phase / form of notes	N1	N2	N3	N4	N5	N6	N7	N8	N0	%	N=
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
4	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100	1
5	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	100	2
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
8	3.5	29.8	38.6	1.8	26.3	0.0	0.0	0.0	0.0	100	57
9	0.0	6.0	36.0	2.0	54.0	0.0	0.0	0.0	2.0	100	50
10	0.0	8.9	37.1	0.8	52.9	0.0	0.0	0.0	0.0	100	259
11	0.8	12.1	34.6	3.7	45.8	1.3	0.4	0.0	0.8	100	240
12	0.0	6.2	21.9	18.8	50.0	3.1	0.0	0.0	0.0	100	32
13	1.0	8.6	38.3	4.1	45.5	0.7	0.0	0.3	1.0	100	290
14	0.0	3.3	21.1	4.3	67.6	1.6	0.0	0.8	1.4	100	513
15	1.0	6.7	33.0	3.2	54.3	0.3	0.0	1.0	0.6	100	315
16	0.0	5.2	35.1	6.5	53.2	0.0	0.0	0.0	0.0	100	77
17	0.0	4.3	20.2	3.1	69.9	1.8	0.0	0.6	0.0	100	163
18	0.3	5.2	29.9	3.6	58.5	1.8	0.3	0.0	0.5	100	388
19	0.3	5.5	27.0	3.8	60.1	2.3	0.0	0.4	0.5	100	1570
20	1.5	2.1	25.1	14.4	54.4	2.1	0.0	0.0	0.5	100	195
21	0.2	5.2	23.5	10.0	57.6	2.7	0.0	0.0	0.8	100	620
22	0.2	0.8	13.5	14.0	62.8	7.4	0.0	0.6	0.6	100	635
23	0.0	1.4	7.2	28.1	48.4	13.2	0.0	0.3	1.4	100	349
24	0.0	4.9	9.8	11.0	67.1	7.3	0.0	0.0	0.0	100	82
25	1.1	0.0	5.3	48.9	39.4	3.2	0.0	0.0	2.1	100	94
0	0.5	5.0	24.3	9.2	57.6	2.6	0.1	0.2	0.5	100	3345
%	0.4	5.1	24.6	8.5	57.5	2.9	0.1	0.3	0.6	100	
N=	39	471	2281	787	5334	270	5	31		59	9277

Tab. 5.7.3.A. Style of note (code comp. Fig. 5.0.3.a: I) holes by phase. - Styl notových důlků (kód srov. obr. 5.0.3.a: I) ve fázích.

Features / form of notes	N1	N2	N3	N4	N5	N6	N7	N8	N0	%	N=
COMPLEX	0.4	5.3	26.2	9.0	55.3	2.6	0.0	0.4	0.7	100	4195
ISOL	0.6	6.5	13.7	4.2	62.5	11.3	0.0	0.0	1.2	100	168
OTHER	0.4	4.9	23.6	8.2	59.2	2.8	0.1	0.3	0.5	100	4914
%	0.4	5.1	24.6	8.5	57.5	2.9	0.1	0.3	0.6	100	
N=	39	471	2281	787	5334	270	5	31	59		9277

Tab. 5.7.3.B. Style of note holes (code comp. Fig. 5.0.3.a: I) in various types of features. - Styl notových důlků (kód srov. obr. 5.0.3.a: I) v různých druzích objektů.

Composition	Additinal decoration		N=
a) lines	ABSENT	PRESENT	
PRESENT	64	184	248
ABSENT	29	:298	327
N=	93	482	575
b)	ABSENT	PRESENT	%
PRESENT	25.8	74.2	100.0
ABSENT	8.9	91.1	100.0
%	16.2	83.8	100.0

Composition	Additinal decoration		N=
c)	ABSENT	PRESENT	%
PRESENT	68.8	38.2	43.1
ABSENT	31.2	61.8	56.9
%	100.0	100.0	100.0
d)	ABSENT	PRESENT	%
PRESENT	11.1	32.0	43.1
ABSENT	5.0	51.8	56.9
%	16.2	83.8	100.0

Tab. 5.9.1.A. The composition of linear ornamentation (comp. Fig. 5.0.3.a: K) in the whole assemblage of rim sherds from decorated pots. - Kompozice lineárního ornamentu (srov. obr. 5.0.3.a: K) v celém souboru okrajových zlomků zdobených nádob.

Phase	Composition				
	1	2	3	4	N=
1					-
2					-
3					-
4	100.0				1
5	66.7	33.3			3
6					-
7					-
8		83.3		16.7	6
9		20.0		80.0	5
10	5.3	73.7	5.3	15.8	19
11		80.0	6.7	13.3	15
12			50.0	50.0	2
13	3.3	53.3	20.0	23.3	30
14		53.6	7.1	39.3	28
15		50.0	25.0	25.0	20
16	12.5	50.0	25.0	12.5	8
17		40.0		60.0	5
18		69.6		30.4	23
19	3.5	43.0	15.1	38.4	86
20		54.5	18.2	27.3	11
21	13.2	39.5	13.2	34.2	38
22	3.6	45.5	10.9	40.0	55
23		56.2	12.5	31.3	16
24		60.0		40.0	5
25	100.0				1
N=					377

Tab. 5.9.1.B. Relative number of the main types of linear ornament composition (comp. Fig. 5.0.3.a: K) in the settlement phase sequence. - Relativní četnost hlavních druhů kompozice (srov. obr. 5.0.3.a: K) lineárního ornamentu v posloupnosti sídelních fází.

"...le plan des hôpitaux psychiatriques nous en apprend plus sur les individus qui les dessinent, les bâtissent et les dirigent que sur ceux qui y sont enfermés"...(Rapoport 1972: 177)

6. Houses of the Linear Pottery Culture

6.0. Introduction

6.0.1. Neolithic architecture in Temperate Europe

The history of the study of the Neolithic period between 1917 and 1978 has been reviewed by D. von Brandt (1988: 36-38). The years 1946 and 1958 are generally considered to have been key moments in this process. O. Paret in his now classic paper refuted the theory of habitation pits as too impractical for the Neolithic society; around houses he marked out the rectangular systems of potholes, recognised at that time as granaries. In the same place he reconstructed the saddle-form roof and placed the entrance in the short southern wall. The principles of modern typology were established by H. T. Waterbolk and P. J. R. Modderman (1959). They established their typology on the basis of the different arrangement of the three parts of the houses, and on the configuration of the central part thereof. Over the past two decades three doctoral theses have been written on this subject, two of which have been published (Brandt 1988, Coudart 1998, Stäuble 1994).

The work by D. von Brandt during the 1980's (1988) marks the beginning of an analysis of Neolithic architecture which is mainly concerned with metric characteristics, as well as reconstruction from the standpoint of an architect. The author elaborated a very detailed descriptive system of the ground-plan, its parts and details. For these purposes, he placed the known terminology in order (Brandt 1988, Abb. 42), and proposed an original labelling of the long and cross axes of the house's substructure (Brandt 1988, 64-65). He used this system for the analysis of house metrics from the Langweiler 8 site, and in this way presented the first data for one assemblage of Neolithic architecture. Besides this, he treated all of the elements of the construction of Neolithic houses in detail.

A subsequent dissertation by A. Coudart, finished in 1987 (1998), completed the study of the social dimension of Neolithic architecture, and was based mainly on parallels from other cultural areas. This work can be considered as fundamental to the anthropology, especially of Neolithic architecture; the anthropology of the architecture had been described only in general terms previously (Rapoport 1972). For the analysis of attributes, she used her own variant of the qualitative description of the ground-plan and its parts. Besides the different measures, she also defined many indices and coefficients. For the indices of variability, she composed information on the particular qualitative characteristics in the assemblages (Coudart 1998: 80). The coefficients of performance measure the information in the following variables: the number of postholes in the ground-plan, the size of the roofed area, and the whole surface covered by the house's walls (Coudart 1998: 78). She was able to follow the broad variability of attributes over a vast range of time and space, because she summarised data from the whole area of the Linear Pottery Culture until the late Neolithic period.

The last of the dissertations (Stäuble 1994) used data from the chronologically earliest architecture of a specific type, which is characterised by small trenches along the walls. The author created his own variant of the descriptive system, in which he slightly simplified the system of D. von Brandt (Stäuble 1994: 9). For the ordering of attributes, he was inspired by theoretical linguistics. He tried to distinguish the material empirical data (significant) from their functional interpretation (signified). His attributes are divided into the following categories: the ground-plan and its parts, constructional axes, details of the ground-plan with accompanying pits. The detailed metrics focused on these attributes, and the interpretation of the trenches and parts of the house. The author interpreted the outer trenches as preparation of the ground against the weight of the wall, in accordance with the interpretation of J. Luning (1988: 290). Together with other authors, he agreed with the interpretation of the middle part as the habitation area. H. Stäuble brought an original explanation of the southern part, which may have been open at the sides and where the wall posts were merely the supports for a platform or veranda (Stäuble 1994: 201). In this way, he posed the question of unified and single axis roofing in the houses. For the interpretation of the northern area, he argues for several different varieties of storage area. The majority of authors differ on this point.

6.0.2. Neolithic architecture at Bylany

The fundamentals of the interpretation of Neolithic houses were presented by B. Soudský in his paper on the Neolithic house from Postoloprty (1969). He analysed the ground-plan of the Lengyel house, where besides a foundation sacrifice - not known anywhere else - he also interpreted the remaining four ovens (Soudský 1969: 43). Their connection with the house was later considered to be doubtful (Modderman 1988: 96). Today, an interpretation as oven pits is more probable than that of ovens proper. It can merely be assumed that there were also ovens inside the house that have not been preserved. Their interpretation as family fireplaces was important, subsequently, for the interpretation of the middle part of the houses. The variable length of this part was explained in relation to the different number of families assumed to be living inside.

Another ground-plan belonging to the Linear Pottery Culture represents a very long building. The author demonstrated in this case the impossibility of cross binding in this type of construction (Soudský 1969: 12). He did not continue with analysis of the houses, but produced a treatise on this with Prof. P.J.R. Modderman. By the beginning of the 1960’s the latter had great experience with excavations of Neolithic houses in the Netherlands, and their typology as traditionally oriented in a chronological sequence. Agreement was reached a long time later, some twenty-five years after the first study of the Bylany houses was published (Modderman 1986). The data from this study have been enlarged here. It was necessary to correct them in just a few cases, where the interpretation of mostly incomplete ground-plans was doubtful or alternative (houses 132, 2192, 2210). The most important conclusions were the proving of the rather limited variability of the middle part in two variants, with three or five cross rows respectively (Modderman 1986: 389). This variability repeats in all of the types of houses and represents buildings inhabited by one or two families.

6.0.3. Situational analysis of Neolithic architecture

Similarly as in the cases of other artefacts, the main idea of a situational analysis is the possibility of a different classification, ordered according to the attributes used, into three categories: form, design, and style. Within each category, whenever possible the attributes were quantified and their behaviour within time-space contexts followed. The interpretation of relevant patterning in the different spaces turns towards the characteristics of form, design and style in the worlds of physical experiences, sign values and ideational process (Pav1ů 1997: 96).

The characteristics of a house’s ground-plan are measured using the length-width index. In the situational analysis, the definition of formal classification is stated first, which is based on classes defined with the index characteristics of shape and length as characteristics of size. In the formal classification, regional differences appear. Bylany houses partly overlap the measurements of the houses of the Rhineland area, where the group of short ground-plans fails. By contrast, on the eastern border of the Linear Pottery Culture at Štúrovo, the late Linear Pottery Culture houses are markedly broader (range 6.5-8.6 m) than those in western regions. This means that the architecture of the eastern region represents on average a greater roofed area than that in the western regions (Pavúk 1994: 66). The statistics of construction can be characterised using the ratio of post diameters and their insertion (Meyer - Christian 1976: 4). The difficulty of the work was assessed through the relationship between the diameters and the lengths of the posts used for construction.

The functional classification represents a tripartite division of the ground-plan and its combinations. The functional typology was developed for Bylany by P.J.R. Modderman (1986) on the basis of prior experience gained from his excavations in Bavaria and the Netherlands. It is based on distinguishing the core of the house’s mid-section. The southern part of a house need not be present in every instance. It represents an entrance area that was also roofed, but could have a lighter wall construction. The frequently dense positioning of the internal posts used to be interpreted as part of the construction of a second floor. Such as second floor might have been another storage area, as the amount of smoke would have meant that it was not suitable for living in. The most controversial is-

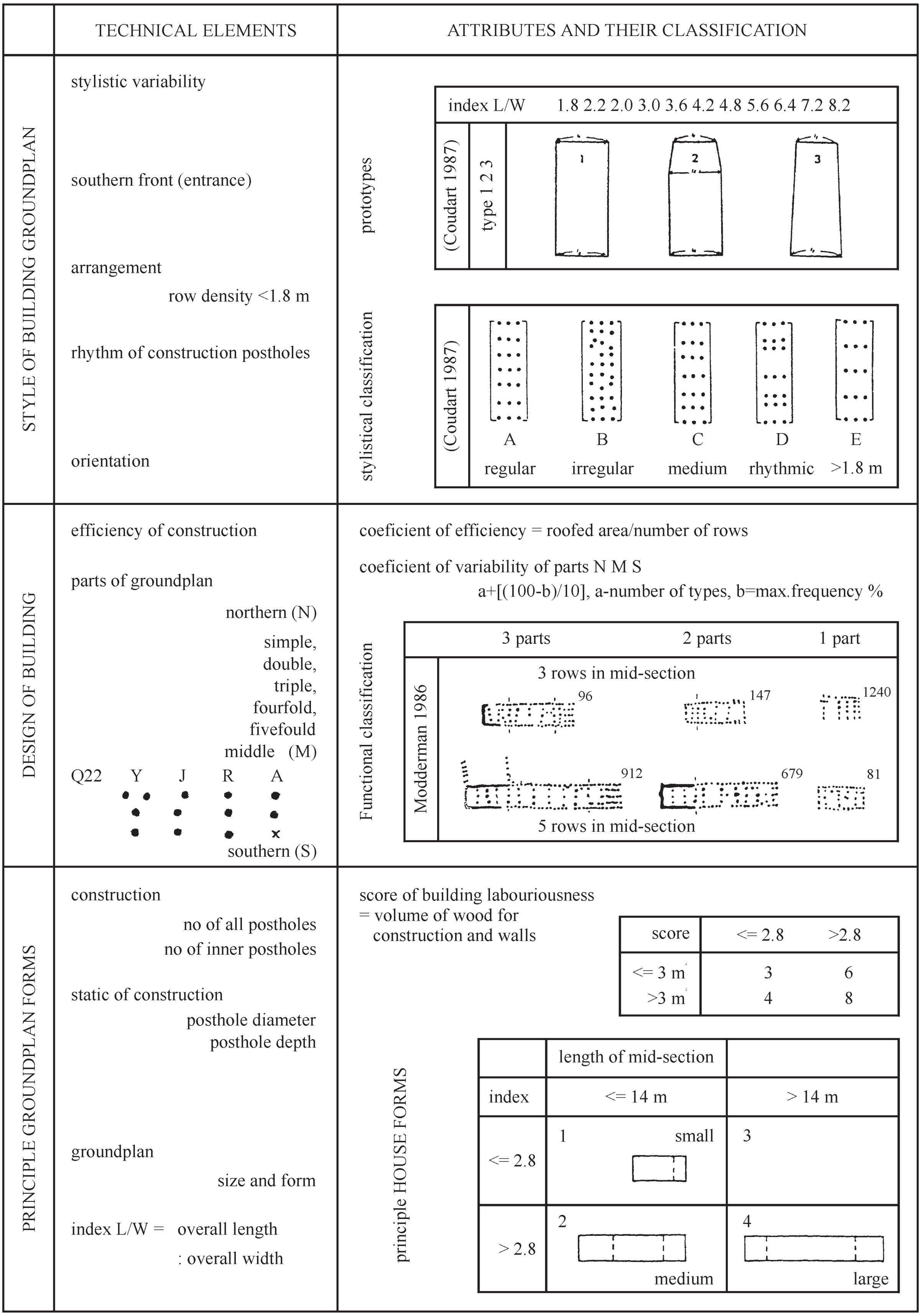


Fig. 6.0.3.a. Outline of the situational analysis of the houses. - Schéma situační analýzy domů.

sue is the very frequent interpretation of the northern parts of the houses, which are also the most variable. The efficiency of construction was measured by the ratio of the roofed area to the total number of construction posts (cf. Coudart 1998: 78). The coefficient (QEa1) also characterises the economy of the building.

Stylistic variability is measured using the different configuration of the inner cross axes, which differ in the three main regions (Coudart 1998: 28). The regularity and density are distinguished. For the western region, the rhythmic configuration typically has marked corridors at the limits of the mid-section. The later, trapezoidal, are characterised by a regular but very sparse partitioning of the posts. In the mid-section, there is a highly differentiated situation in the Bohemian region (Coudart 1998: 39-62). The cross axes are more or less ordered regularly, which supports the thesis about the absence of cross binding (Soudský 1969: 66). In the eastern region, dense placements are prevalent in both regular and rhythmic examples. In the case of Bylany the limit of dense and sparse cross axes is calculated using an average value of 1.8 m for their distance. In combination with the shape in plan, which developed towards the trapezoidal form, the prototypes of the houses could thus be defined. With the relationship of the most common variant of a construction style, overall variability can be studied within spatial and temporal contexts.

6.1. Primary classifications: small, medium and large

6.1.1. Primary classification of the ground-plan (length and width)

The lengths of the whole ground-plans (N=95) varies from 4.3 m (house 926) to 48.2 m (house 912) with an average of 15.4 m (s=8.8). The distribution frequency is not quite regular, and its course decreases to a value of 13.5m. This is the limit for short ground-plans. The long ones are counted from the 26 m limit. The overall width of the ground-plans measured in the mid-section varies from 4.0 m (house 80) to 6.8 m (house 41) with an average of 5.3 m (s= 0.5). Its frequency distribution decreases to values of 4.8 m and 5.2 m. The main dimensions, length and width, do not correlate with each other particularly well (R=0.568, N=92). The extremely low values for length and width were measured using not very well preserved plans (80, 926), and cannot be considered real minima. By contrast, the extremely high values (houses 41 and 912) were found to be reliable, and must be taken as maxima.

Given these facts, it seems that the lengths and widths of the houses themselves are not the most reliable measure of the shape of the ground-plan. Therefore, the dimensions of the mid-section were studied separately; for all of the ground-plans, this comprises the core of the house. Apart from this, the overall length is measurable in a smaller number of cases than is the width.

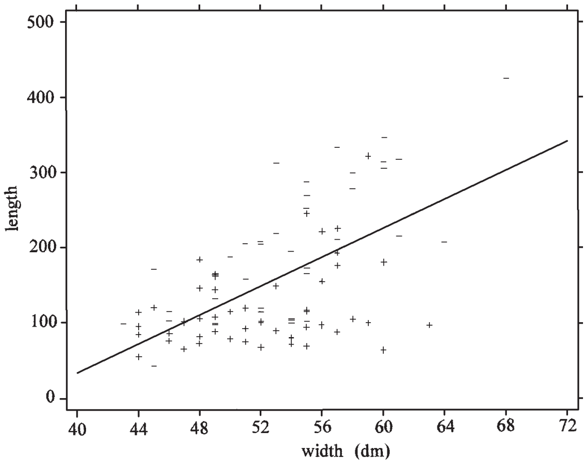


Fig. 6.1.1.a. Correlation of the overall length of the house and the width (+≤5, ->5 cross rows). - Korelace celkové délky domu a šířky.

6.1.2. Primary characteristics of the shape of the ground-plan (index), and the length of a house's mid-section

The frequency distribution of the length-width index that was calculated using the reverse formula varies from 0.96 (house 926), or 1.07 (house 1193), to 8.2 (house 912), and attains an average value of 2.9 (s = 1.4). The course of the distribution is rather unequal, with mode values of 2.8 - 3.6 - 4.4. The frequency distribution of the length of the mid-section is noticeably compact, and ranges from 4.3 m (house 926, or 5.3 m for the house 2209) to 28.9 m (house 877), with an average value of 14.2 m. For the lower extremes, similar doubts exist as apply to the incomplete ground-plan of house 926. The maximum of the index for house 912 is reliable, as is the second value for house 41 (6.25 m). The length of the mid-section in house 877 is not secure, given its doubtful division (Modderman 1986: 389). The length of the mid-sections exceeds 25 m only in exceptional cases (house 703: 25.2 m).

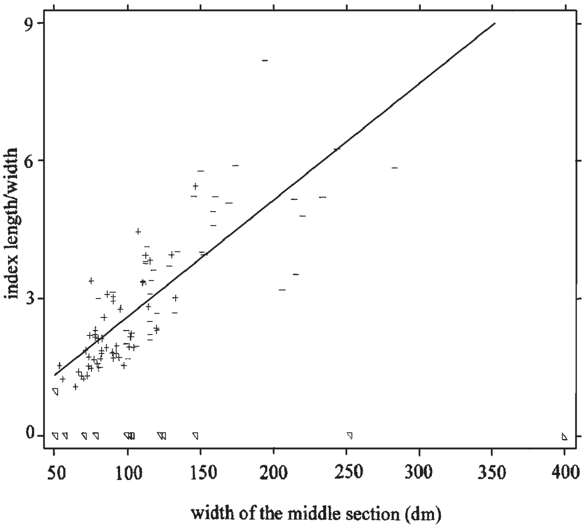


Fig. 6.1.2.a. Correlation of the length-width index and the width (+⩽5, ->5 cross rows).- Korelace délko-šířkového indexu a šířky.

6.1.3. Formal classification of houses

All of the aforementioned characteristics of a house's shape, such as length (L), width (W), the index of these (W/L) and the length of the mid-section, show a modality of frequency distribution. One possible formal classification of the paradigmatic classes of length (with limits at 4.3 m - 13.5 m - 26.0 m - 48.5 m) and width (with limits at 4.0 m - 4.8 m - 5.2 m - 6.8 m) is provided by this. With regard to the clear structuring of ground-plans used below for functional classification, it would be more appropriate to construct a formal classification based on more complex attributes. These are the paradigmatic classes of the index, and the width of the mid-section.

The modes of the index have values across the range 2.8 m - 3.6 m - 4 m, and the modes of width have values across the range 9.6 m - 14.0 m. The distribution of broader intervals (0.4 m, 2 m) was studied because the distribution at narrower intervals (0.2 m, 1 m) was too irregular. After scale comprimation, a sufficiently regular distribution appears in the lower values, as does a less irregular one in the higher values. Therefore, the values of 2.8 m for the index and 14.0 m for the length of the mid-section were selected as limits of paradigmatic classification.

Regarding the correlation of the attributes, the resulting paradigmatic classification consists of four classes of houses: 1 - shorter/broader, 2 - shorter/narrower, and 4 - longer/narrower (which can for the sake of brevity be referred to as small, middling and large houses), with the third class of longer/broader houses not yet having been observed at Bylany. Houses in which the index would have been lower than 2.8 and the length of the mid-section over 14 m do not appear here. Both in the Rhineland and at Štúrovo ground-plans with an index of lower than 2.8 are absent (Pavúk 1994: 62, Abb. 30). House 140 from Štúrovo may be an exception, as it has an index equal to 2.0 and a length of 14.0 m; it may belong to the first class.

6.1.4. The chronological variability of the ground-plans

The relative distribution of the formal classes of the houses does not show any regular trends in the chronological sequence of the settlement phases. In five of these (nos.1, 8, 12, 24, and 25) there is only one classified ground-plan. Overall, the first, small type of shorter/narrower house is prevalent (61.9 %), with the other cases divided fairly evenly between the other types (20.6 % & 16.5 %). The large type is absent in the majority of the phases (nos.1-3, 5-10, 11, 16, 20 and 23-25), while the middling type is absent in about half of the phases (nos.1-3, 6, 8, 12, 16, 18, 21, 23-25). The deviation in the presence of formal types does not correlate with the respective changes in the development of site BY1. The differences in the table are not statistically significant (chq = 42.3, df = 48, p = 0.7042), proving that the formal classification has no chronological value.

Given the absence of any chronological regularities in the relative values of the formal types, a variable coefficient was calculated according to a formula (Coudart 1998: 80) considering both the number of types in the phases and the maximum presence of the type. The sequence of these coefficients shows some regularities. The maximum values appear in a phase where the types are equally distributed (phase 4). If two groups of values are distinguished with a limit of VAR = 7, then a regular variation of the coefficients appears. At the beginning and the end of the development of the site, a lower variability in synchronic buildings is apparent. During the classic period, and up until the late Linear Pottery Culture period, i.e. in phases 9

- 22, the regular interchange of lower and higher coefficients is pronounced. Some shorter cycles can also be distinguished, with a tendency of increasing or decreasing values. After a phase of differentiated buildings, a period of smaller and formally less differentiated buildings follows. This may be an indicator of some pulsation within the composition of families and their sizes during the limited number of successive generations. ➔Tab. 6.1.4.A.

6.2. Economy of house construction

6.2.1. Adaptation of construction and house models

The Neolithic house is characterised by a post construction that carries a roof and comprises the skeleton of the walls. In this architectural principle, some adaptation to the local climatic conditions of Temperate Europe can be seen, as well as to the local building materials available. However, the archaeological evidence of the substructures of such houses brings little in the way of variability, with four solutions distinguishable during the Bylany site's development. First among these are the earlier and later Linear Pottery Culture house constructions (Stäuble 1994: 179), the alternation of which can be followed during the earlier part of the middle Linear Pottery Culture period.

At Bylany, the earlier type is found during phases 1 to 8, and its residuals are found in the peak of the middle period at the Miskovice 2 area (Pavlů 1981, 1998b). In subsequent development during the earlier Stroke Pottery Ornamented Culture period and in post-Linear development in the western regions, constructions with doubled, slightly convex, walls dominate. The final period of the Neolithic house is represented by trapezoidal ground-plans with noticeable wall trenches, typical of the Late Lengyel horizon (Soudský 1969, Coudart 1998).

In the aforementioned construction types, the development of different forms of roofing of particular areas is reflected in the intentions of Neolithic architecture. The optimal construction of the roof was found, after initial searching, to be a variant placed on an inner system of posts. During this time, the main weight of the roof was transported to the walls, and the inner space of the house was freed from the posts. At Bylany, the development of the earlier and classic constructions is well documented. All of the recovered buildings show equally visible elements of this construction type. These elements are best visible in selected houses, the construction of which was very carefully worked out - these are houses 41, 912, and 2197. The impressions of the posts in these houses are well documented in the ground-plans, and can serve as a basis for the reconstruction of an idealised structural skeleton for the houses. In other cases, the structure can be inferred only from the postholes themselves. An attempt will be made here to correlate posts and the postholes as the main characteristics of this construction.

The problem of structural strength, as well as of the consumption of materials, relates to reconstruction above ground. The premises of such reconstruction are first and foremost the height and the pitch of the roof. The majority of authors agree that a pitch of 45° is optimal for Central European conditions (cf. Pavlů 1987, which estimates 35°), but on the question of the height of the walls they disagree. A very low estimate (0.65 m) appears in a paper by Meyer-Christian (1976: 11). As a result of this, the existence of a second floor was ruled out in the southern sections because it would be impassable. D. von Brandt estimated the wall height from the possible overhang of the roof and the position of the construction pits, and came up with a compromise estimate of 1.50 m (1988: 262). Higher estimates are known to have reached up to 1.75 m (Startin 1978: 153). Construction experiments have shown that the wall height could have reached the average height of the persons who would be using the space near the wall on the inside (Pleinerová 1984). For the purposes of this analysis, wall height is assumed to be 1.65 m, which leads, together with the assumed pitch of 45°, to an estimated height of the roof ridge of 5 m.

House 41 represents a model construction (Modderman 1986: 383), with well documented post impression. Exceptionally, the wall posts of the mid-section are absent, as they were not found at the excavation level. The inner construction was so strong that the walls could be lighter, as they were constructed in a different manner. A covering layer of 0.30 m was added to the evidenced depth, together with an assumed level of erosion of about 0.15 m. Given this, the total depth of the posts reaches about 0.80 m, which is equal to the assumed minimum (Meyer-Christian 1976: 5). The eastern inner row is on average deeper than the central one. The relative depth of the posts is higher (percentage-wise) for the walls, with the following values west to east: 28-17-13-22-25 % of the reconstructed post length.

The reconstruction shows that the sturdiness of the building was very good. The overall average volume of the deep parts of the inner posts would be 164.7 dm^3, and the overall average volume of whole posts would be 959.0 dm^3. The relationship of the soil resistance of the post is leaned on to the power of the posts prized out of the posthole is given these values. Another necessary value (Meyer-Christian 1976: 5) for the estimation of building conditions is the resistance of the loess, which can be considered a constant at Bylany.

For house 912, there is a comparable total to the volumes of the deeper parts of the lateral row of the lower inner posts, attaining an average of 93.8 dm^3. At the same time, the total reconstructed volume of the posts is also lower (589.0 dm^3). The ratio of post volumes in one lateral row to their buried parts is very similar (0.17 for house 41, 0.16 for house 912). This coefficient may characterise the sturdiness of a house's construction: the higher this coefficient, the greater a house's stability. If, for example, the posts were sunk to a depth of half of their length, the coefficient would be 0.50.

A different structure was found to apply to house 2197. Firstly, the majority of posts are thinner than those in the preceding two cases: they had on average a diameter of 14 cm. They were also not so deeply sunk, which fact may also be linked to the greater erosion in section F. The relative depths, however, are similar, attaining values of: 30-18-13-22-30 % along the whole length. The ground-plan is characterised by a single lateral row of very deep posts at the interface of the northern and mid-sections, with depths of 0.40-0.70 m and diameters of 0.25-0.30 m. Along the mid-section narrow trenches without vertical traces of posts were found. The hypothesis can be accepted (Stäuble 1994: 166) that these supported longitudinal boarding for the strengthening of the wall: some wooden planks could have been inserted here, roof timbers could have led onto them. This may have been an attempt to find some kind of structural strengthening even in this earliest period. Later structures were strengthened in a different manner for which there is no archaeological evidence. A similar role is shown for the deep lateral row: it is considered to be the structural core (Stäuble 1994: 155), to which other parts were attached. Regardless of the differences in the construction of house 2197, the coefficient of the sturdiness, i.e. the ratio of the volumes of the interred parts of the posts to the volumes of the reconstructed post lengths, is on average the same for this row as it is in house 912 (0.17).

For the following text, the coefficient was calculated for all of the houses. Because it was not possible to reconstruct more precisely either the height of the ploughsoil at all points or the presumed erosion, a common lost layer above the excavation level of about 0.60 m was estimated. The coefficient was then recalculated for the five complete posts in one row as an average, giving values of 41 = 0.22, 912 = 0.22, and 2197 = 0.19 for the houses already mentioned. After such changes in the calculation method of the coefficient of the buildings' sturdiness, the stability of the earliest house appears to have been the lowest. This would further correspond to the role of the side trenches used as a necessary strengthening device for construction. →Tabs. 6.2.1.A, 6.2.1.B, 6.2.1.C.

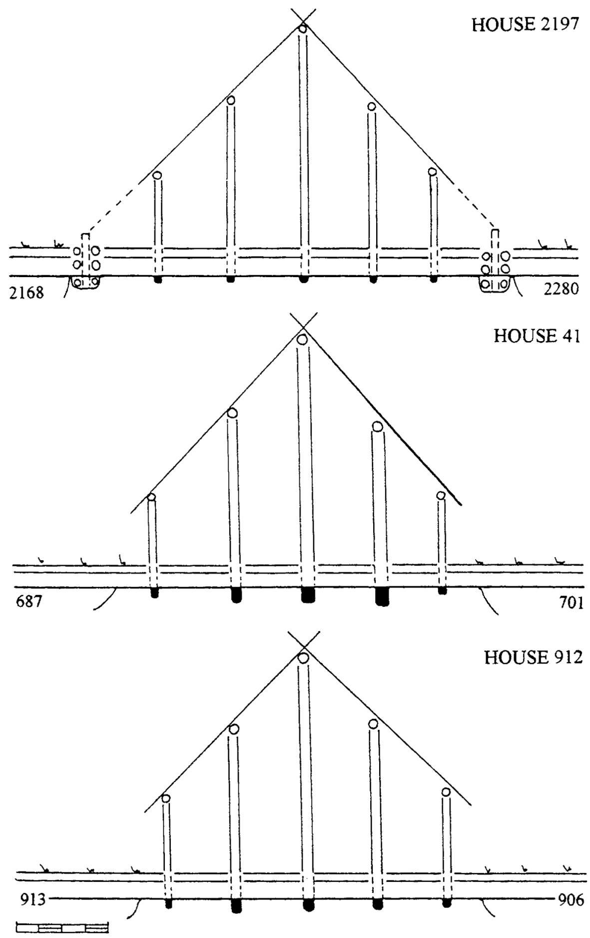


Fig. 6.2.1.a. Idealised reconstruction of an average cross-section through the structures of houses 41, 912 and 2197. - Ideální rekonstrukce průměrného příčného řezu stavbami domů 41, 912 a 2197.

6.2.2. Construction materials and their volume

To estimate the materials used for constructing the buildings, it was necessary first to estimate the diameters and lengths of the inner supports and those of the wall posts. The estimates of the lengths of the posts were made in the same way as described above, with a presumed wall height of 1.65 m and an angle for the pitch of the roof of 45°. The overall length of the posts is then equal to the sum of the assumed height above the terrain, the estimated erosion including the soil uncovered by excavation, and the evidenced depth of the posts (Lp = 165+60+x cm). In order to calculate the length of the inner supports, this must be summarised as the height of wall and the height equal to the distance of the wall rows from the central row, or from the inner rows.

Estimates of the real depth and diameters of the posts are based on the correlation of these measures for postholes and the preserved post impressions. There were 286 such cases, including the houses modelled above (41, 912, 2197). In order to avoid any possible chronological variability, the correlations were calculated separately for three chronological groups, comprising phases 1 - 8, phases 9 - 16 and phases 17 - 25. It was shown that the correlation varies adequately. The diameters correlate to a lesser degree than do the depths (Tab. 6. 2. 2. A). According to the average values, posts occupied about one third of the diameter of the holes, and two-thirds of the depth of the holes. These relationships were calculated for each long row separately within the three groups of phases. The values for the diameters range from 0.24 - 0.32 m, and for the depths from 0.56 - 0.78 m. The average values for each long row in each house were multiplied using these coefficients. As a result, an estimate of the real size of the posts for particular houses was arrived at. It was not possible to use regression equations from those assemblages with a lower correlation for such estimates. →Tabs. 6.2.2.A, 6.2.2.B.

On the basis of these calculations, the diameters support estimates of the structure of each long row, which characterises the variable construction of the individual buildings. Given the series of cumulative errors included in the calculation, the following estimates are limited to the structure of the supports. Any other materials and work consumed will be related to this principal part of the building, and therefore to add them would only accumulate other errors and confuse the picture obtained. In the assemblage of Bylany houses, the estimated lengths of posts varied from 460 - 580 cm (houses 604 and 703), the diameters of the central supports from 10-31 cm (houses 910 and 41) and the depths of the central long rows from 7 - 35 cm (houses 80 and 41).

By contrast, the skeletons of the western walls were calculated to have had a lower range of diameters (7 - 20 cm in houses 910 and 2244) and depths (5 - 26 cm in houses 1111 and 312). The resulting numbers are in some way influenced by the method of excavating the postholes, and their visibility in field. Regardless of the many disadvantages of all of the estimates, it is argued that the data can be used for the study of variability in construction. The data for individual houses is more detailed than it would be in the case of summarised estimations, such as are common in the literature on the subject. W. Startin has published (1978: 153) estimates of the diameter of wall posts (15 cm), and of inner supports (25 - 30 cm). The real variability of the materials used in construction would however have been higher: the inner posts could have been much thinner in some cases, e.g. house 2197, without this having had any great influence on the sturdiness of the structure.

6.2.3. The inner structure in the phases

The reconstruction of the volume of posts in houses enables us to judge inner construction as well as the construction of walls on an individual basis. The size of the inner construction, if the volume of all of the posts is summarised, differs of course according to the number of posts. The frequency distribution is relatively uniform, with an average value of 3.18 m^2 (s = 2.57), in a range of 0.5 (house 361) to 17.4 m^3 (house 41). House 361 was not recovered in its entirety; house 2290 follows this, and the volume of its inner construction is equal to 0.8 m^3. This an acceptable minimum for the construction of a house with five lateral rows, i.e. a house with one section, with relatively small postholes. The maximum for house 41 shows that this was an extraordinary building. Those houses with a total volume of the inner supports above 3.0 m^3 can be described as massive structures.

Roughly one third of the recovered groundplans were classified according to these criteria (73 houses). The ratio of massive constructions is noticeably lower in the phases of the early part of the middle Linear Pottery Culture period. Starting from phase 13 such houses appear in greater numbers, but their ratio in subsequent phases varies. The appearance of more massive and less massive houses is not dependant on the chronological sequence. It corresponds naturally with the amount of work necessary for building the house, and the variability of the sides of the structures show the varying building potential at each point in time. The lighter structure of the early period may prove the lower efficiency of polished stones in cutting wood: in the implements of this period, there have yet to be found marked distinctions between axes and adzes (cf. 2.5.1). Another reason may be that it was more difficult to obtain suitable medium range tree trunks amongst adult oak trees. ➔Tab. 6.2.3.A.

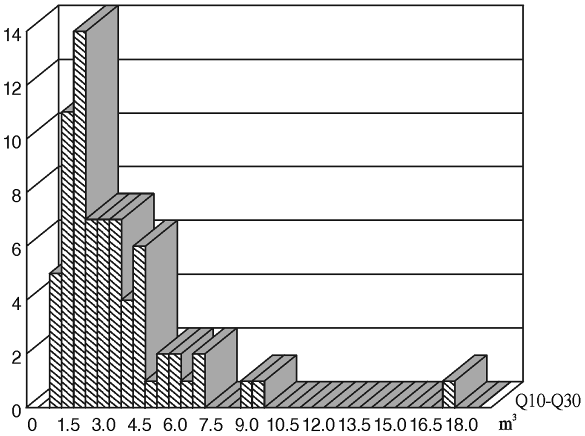


Fig. 6.2.3.a. Total overall volume of supports in all interiors of tripartite houses. - Četnosti celkového objemu podpěr ve všech vnitřních trojicích domu.

6.2.4. The construction of walls in the phases

The volume of the walls is measured as the sum of the volumes of all of the reconstructed posts on the western and eastern sides of the house, together with the estimated number of posts in the wall trenches. Given the possible chopping of trunks in the trenches, their volume was divided by four. The number of these trunks was calculated by dividing the length of the trench by the average diameter of the wall posts. The frequency distribution of the wall skeleton volume is noticeably bimodal, with a limit of 1.0 m³: this ranges from 0.2 m³ (house 1240) to 5.1 m³ (house 41), with an average value of 1.3 m³ (s = 0.99). The somewhat lighter construction of the walls correlates naturally with the lighter construction of the inner supports, but not uniquely. The ratio of the construction of heavier walls varies within the phases similarly to that of the inner volumes, and accordingly shows no chronological dependency. ➔Tab. 6.2.4.A.

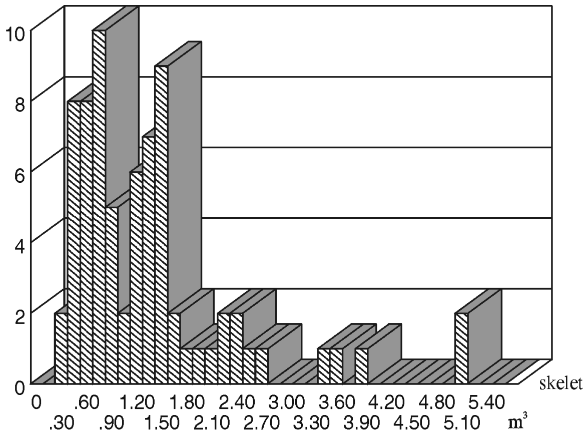


Fig. 6.2.4.a. Total overall volume of wall posts of the houses including the trenches. - Četnosti celkového objemu kůlů kostry stěn domů včetně žlábků.

6.2.5. House structures within phases and their sturdiness

The frequency distribution of the overall construction volumes is influenced by the bimodality of wall construction when the inner structure is the main component. The range of values is represented by the same houses as noted above, and ranges from 1.3 m³ (house 2290) to 22.3 m³ (house 41) with an average value of 4.5 m³ (s = 3.5). The consumption of wood for the primary structure of the house is estimated in this way to average around five cubic

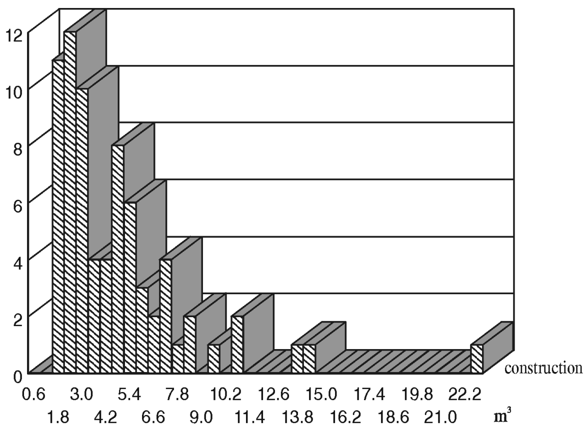


Fig. 6.2.5.a. Total overall volume of all of the postholes in a structure. - Četnosti celkového objemu všech kůlů konstrukce.

metres. Taking these values as a starting point, the consumption of work per house could be calculated. The overall structures can at a limit of 4.0 m^3 be divided into more subtle and larger buildings, the chronological variability of which is comparable to those of the inner and outer wall structures. At the beginning and the end of the site sequence, the more subtle buildings prevail. In the earlier part of the middle period, all of the houses are larger. From the end of the middle period until the end of the late Linear Pottery Culture period, the ratio of both construction types varies without any regular chronological trends. The sturdiness of the construction measured using the ratio of the sunken volume of the posts to the overall volume of the posts also varies with time; both the size and sturdiness of the houses are, however, independent variables. ➔Tab. 6.2.5.A.

6.2.6. Estimation of material consumption for the construction of houses

The Bylany houses were constructed using wood that came exclusively from oak woods (Rulf 1998), which has also been demonstrated elsewhere (Startin 1978: 153). The felling of an oak tree with a diameter of 30 cm could take 15 - 30 minutes (Velímský 1969: 142). The adult oak has a diameter of 60 cm, and a diameter higher up of about 25 cm, and provides around a 15 m length of wood, which represents about 0.5 m^3 (according to information provided by experts on trees). This could produce roughly three supports. Further tree felling would thus have been required, which would have taken about 2 hours if calculated according to the longer estimates. Another 2 hours can be added for stripping the branches from the trunk, removing the piece, preparing the post and transporting it to the building, which altogether comes to around 4.5 hours per tree. Thereafter, the preparation of the wood for an average house would have taken 4.5/0.5 x 4.5 = 40.5 hours. Even such an estimate seems to be low, with regard to all of the other unknown but necessary manipulations, and can be doubled. As a result, the preparation of the wood for an average structure may have required up to 80 man hours. T. Velímský calculated the use of one tree per post, and for an average house with 100 posts, he assumed an average of 50 hours per post (Velímský 1969: 141 - 142).

The preparation of the construction materials represented about one third or one quarter of the total time required for the building, as the construction had to be supported, the walls plastered and the roof prepared. This includes all of the other necessary work in the field, such as digging out the holes or other woodwork. The building of an average house might therefore take 3 x 80 - 4 x 80 hours. The construction of a large house with fives time greater consumption of material would thus take 1200-1600 man hours, which is 2 - 3 times less than the estimates put forward by W. Startin (e.g. 3900 hours for the building of house 41 at Bylany, 1978: 155). It is possible that the estimates for the different sizes of houses under consideration are not equal to simple multiplication of the time used for the primary construction. Regardless of these uncertainties, however, the hundreds of hours required to construct a house were not in any way an insurmountable obstacle to one family with a minimum number of adult members.

6.3. The informative content of the formal categories

6.3.1. Score of the labour used in building particular houses

The physical skill level of Neolithic builders was, in the same way as in the case of the artefacts, expressed by an optimisation of the demands of the architecture in relation to the necessary effort required to meet these demands. As this continued throughout the development under conditions of minimum effort, this can be considered according to the character of the buildings and the labour required to construct them. The coefficient of the labour used can be calculated by evaluating the individual building stages. The preparation of wood for the inner structures was undoubtedly more laborious than that for the wall skeleton. The score can thus be calculated as the conjunction of the scores for the individual parts: 1 - a wall with a volume less than 1.0 m^3, 2 - a wall with a volume greater than 1.0 m^3, 3 - supports with a volume less than 3.0 m^3, and 4 - supports with a volume greater than 3.0 m^3.

The score provides values of 3 or 6 for the lighter wall structures, and of 4 or 8 for the larger inner structures. In the Bylany assemblage only half of the ground-plans can be classified according to these criteria. Of these, the evaluated buildings had an overall ratio (scores 3-6-4-8) of: 43.8 - 16.4 - 1.4 - 38.4 %. After adding up the multiplication of the scores and these relative values, the resulting coefficient, 542.6, is calculated as the general characteristic of the amount of labour used in constructing Bylany houses within a theoretical range of the coefficient of 300 - 800. ➔Tab. 6.3.1.A.

A similar calculation was carried out for the scores of the synchronic houses within the phases. In the first seven phases, below average values of between 300 - 600 appear. This shows a generally lower consumption of wood and lighter structures. House 2197, which is acceptable as a model for this period, is no exception. At the beginning of the middle period, in phases 9 - 12, the labour coefficient obtains a maximum value of 800: houses were constructed with much larger supports, to hold up the timber roof. In the following phases (13 - 22), the values of the coefficient vary, which corresponds to the different constructions of synchronic buildings. This period represents variable architecture in relation to the varying demands of the society. Simultaneously, this period can be described as the optimal adaptation of habitation to changes in the age and kinship structures of the population. The architectural possibilities and the demands of Neolithic society were deliberately kept in harmony. In the final phases, the coefficient again decreases to a minimum, as a result of the decadence of the architecture in the final period of the Linear Pottery Culture.

6.3.2. The core of the ground-plan

The formal core of Neolithic ground-plans comprises the mid-section, which provides the primary information on the buildings. Both the northern and southern sections can be considered penthouses, which have their own informative value. The mid-section is usually well separated, and is evidenced sufficiently in the majority of the well excavated cases.

In the case of the Bylany ground-plans, the lengths and numbers of lateral rows were analysed. It has been argued that two variants of larger and smaller house existed (Modderman 1986: 394). These can be interpreted as houses inhabited by one or two families, which may be occupied as the common home of two generations or two related families. The second case is more likely, given the average life-span of the Neolithic population. The original interpretation, which supposes a different length according to the number of inhabitants, needs to be revised. Here it has been assumed that the different number of family ovens corresponded with the case of the Postoloprty Late Lengyel period house (Soudský 1969: 91-92). About 8 - 12 m of the length of the house's mid-section must correspond to that required by one family. The more probable simple and doubled modes of the mid-sections also correspond to the ceramic refuse (see Chapter 4).

The principal forms of the ground-plan were studied by H. Stäuble (1994: 177) within the detailed space of ten or seventeen attributes. Regardless of some inconsistency in the spaces of the attributes, the author arrived at definitions of the older and later types of houses (Stäuble 1994: 179), differing mainly in the presence or absence of outside trenches. Another conclusion was the irrelevant value of the northern and southern sections as independent attributes, in connection with the attributes of the mid-section. The latter were formulated as qualitative attributes (presence/absence of a specific middle cross row) or quantitative ones (number of cross rows, their distances apart, lengths and widths of sections). From the point of view of informative value, some of these overlapped (e.g. number of cross rows and length of parts), which leads to the strong correlation of factor scores in the analysis.

6.3.3. Genotypes and phenotypes of ground-plans within the space of the settlement phases

The following attributes can be described as the main characteristics of the mid-section: the size of the construction, (see 6.2.5), modal size (see 6.3.2), the presence of outer trenches, the depth of the lateral row Q20/Q21 and the arrangement of the posts in the Q22 lateral row. Given the aforementioned experiences with the analysis of qualitative attributes, only one of the alternating states was used. Its absence implies the presence of opposite values.

For the names of the lateral cross rows, the system of D. von Brandt was employed (1988: 65) even though in some cases it may be doubtful. This is particularly the case for those houses which have an additional row in the northern wall (house 81). The configuration of Q22 into Y is not proven at

Bylany, and this absence is considered typical for the eastern regions of Linear Pottery Culture (Modderman 1986: 390). Other variants appear, such as a broken row or the diagonal setting of a row. The incomplete row was assigned as an independent attribute, which is in most cases a result of the deliberate exclusion of one post. Hitherto, these cases have been interpreted mainly as incomplete field evidence.

Correspondence analysis of the seven qualitative attributes (GRACILE+ (< 4 m^3), DOUBLE MIDSECTION+, DITCHES, DEEP Q20/Q21, BROKEN Q22, STRAIGHT Q22, ABSENT POST Q22) was carried out for 82 houses. The result demonstrates the central position of size attributes in the first two factors (54 % of variability), represented by lighter and doubled mid-sections. These can be described as genotype attributes, passing through the whole developmental period, and are not construction dependent but socially dependent. The next group consists of houses with trenches or deep Q20. The other types of Q22 differ from the preceding two, not greatly dissimilar, cores.

The resulting order of the houses in the space of the qualitative attributes of the mid-section can be interpreted as the conjunction of two structures. The first represents the trenches and deep Q20. This group is described as the genotype of the earlier buildings if present, and of the later buildings if absent. Both of the genetically different principles of Bylany architecture were used alternately for a period. The second structure is represented by particular variants of Q22, which assign the phenotypic variability. In the majority of the later phases, the synchronic buildings differ mainly in these attributes. They are a phenomenon of the individual solution of the demand for enlarging the central space of the house. ➔Tabs. 6.3.3.A, B.

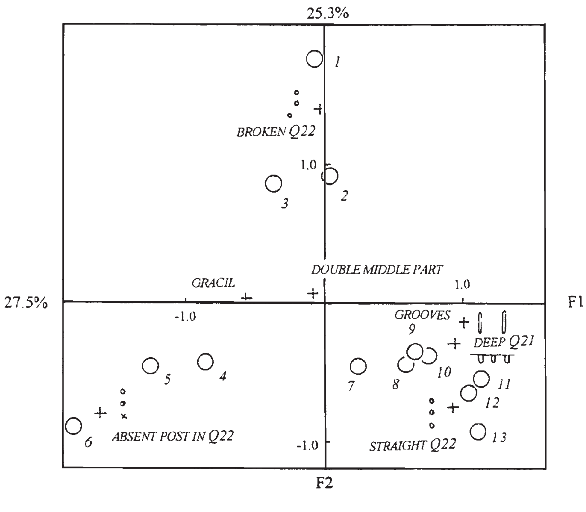


Fig. 6.3.3.a. Houses within the spaces of genotype and phenotype indicators. - Domy v prostoru genotypických a fenotypických znaků.

6.4. Classification of the principal functional categories in the system of subsistence and labour division

6.4.1. The functional subdivision of buildings

During the first analyses of Neolithic sites, the possibility of dividing the ground-plans into one, two, or three sections was proven. In the initial conception this tripartite subdivision was considered the prototype of structures characteristic of the earliest houses, and the absence of sections its reduction (Waterbolk - Modderman 1959: 168). Such an interpretation of ground-plan structure has been accepted (Soudský 1966: 36) and remains valid even today. The mid-section is currently considered the key one, and the others as penthouses, not necessarily with any chronological meaning. Of course, not every ground-plan can be subdivided, and subdivision is not always evident, which is also the case in well-preserved houses. The same applies to the Bylany houses, the partition of which can sometimes be reinterpreted (Modderman 1986: 385).

The preservation of buildings differs according to the field situation. Given the geomorphological changes that have occurred in the majority of Linear Pottery Culture regions during post-Neolithic periods, the level of floors has not been found anywhere. An exception is provided by Hrdlovka, for house V (Beneš 1998: 189), which may be an extraordinary case but has not yet been published in detail. In places with later alluvial deposits, postholes are preserved with a similar depth as at Bylany, which means that the floor level was washed out earlier (Nové Dvory, Hlízov). On higher sites such as Bylany, and the majority of the known areas, the ground-plans have been damaged to a greater or lesser degree by erosion. As a result of such erosion the majority of the postholes of the walls, and sometimes of the southern sections, have disappeared. At Bylany, the mid-sections are the best preserved, and sometimes the short walls are poorly visible. The preservation of

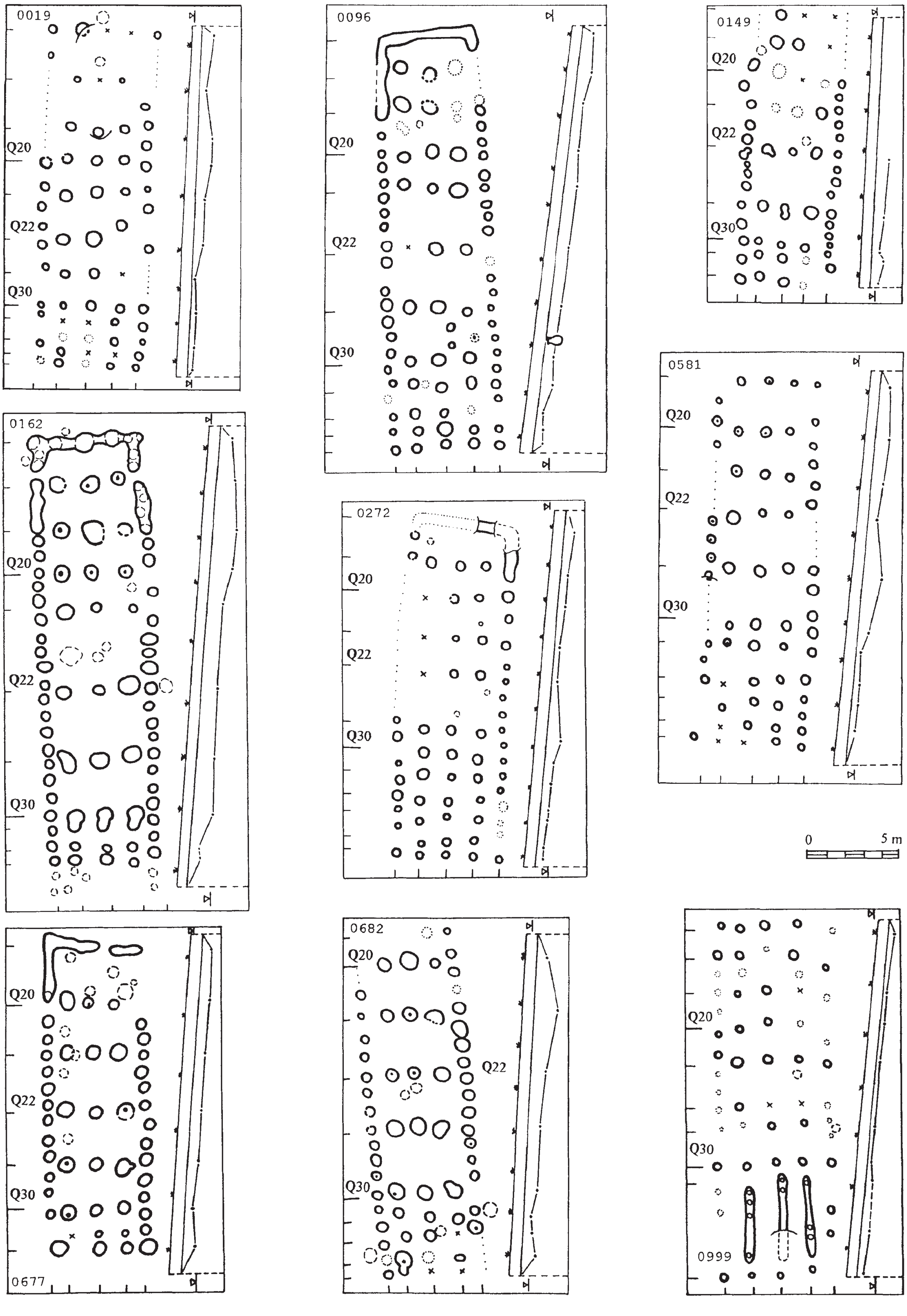


Fig. 6.4.1.a. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

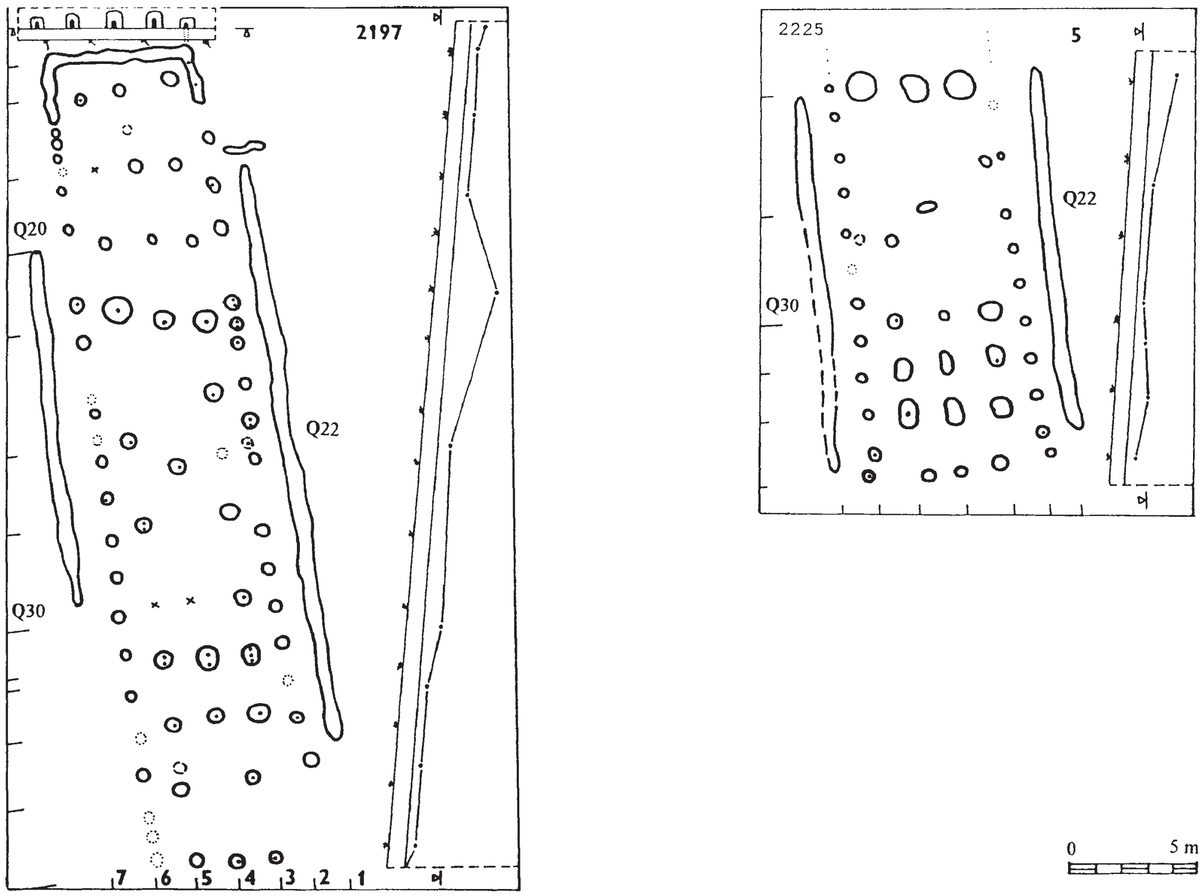


Fig. 6.4.1.b. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

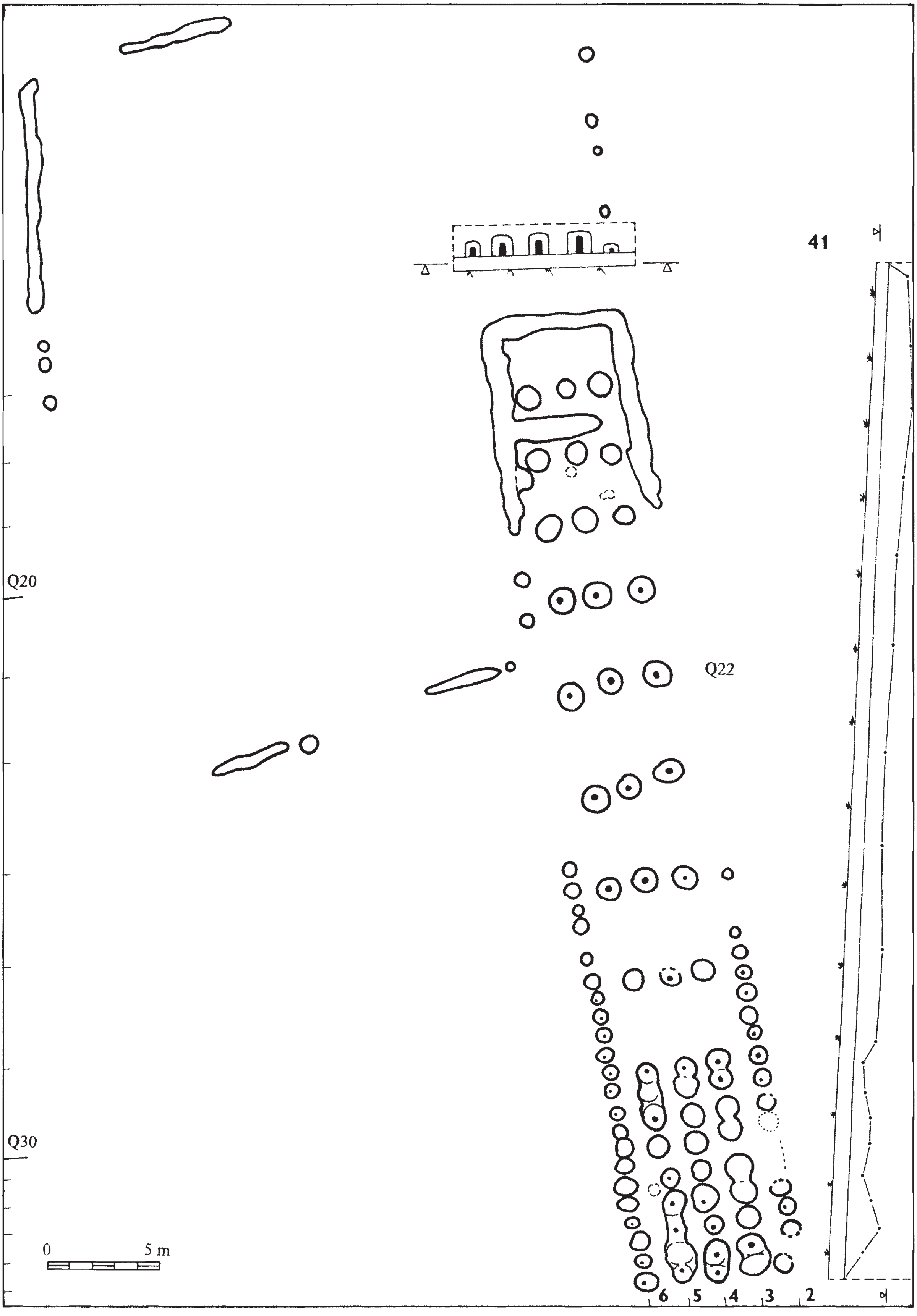


Fig. 6.4.1.c. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

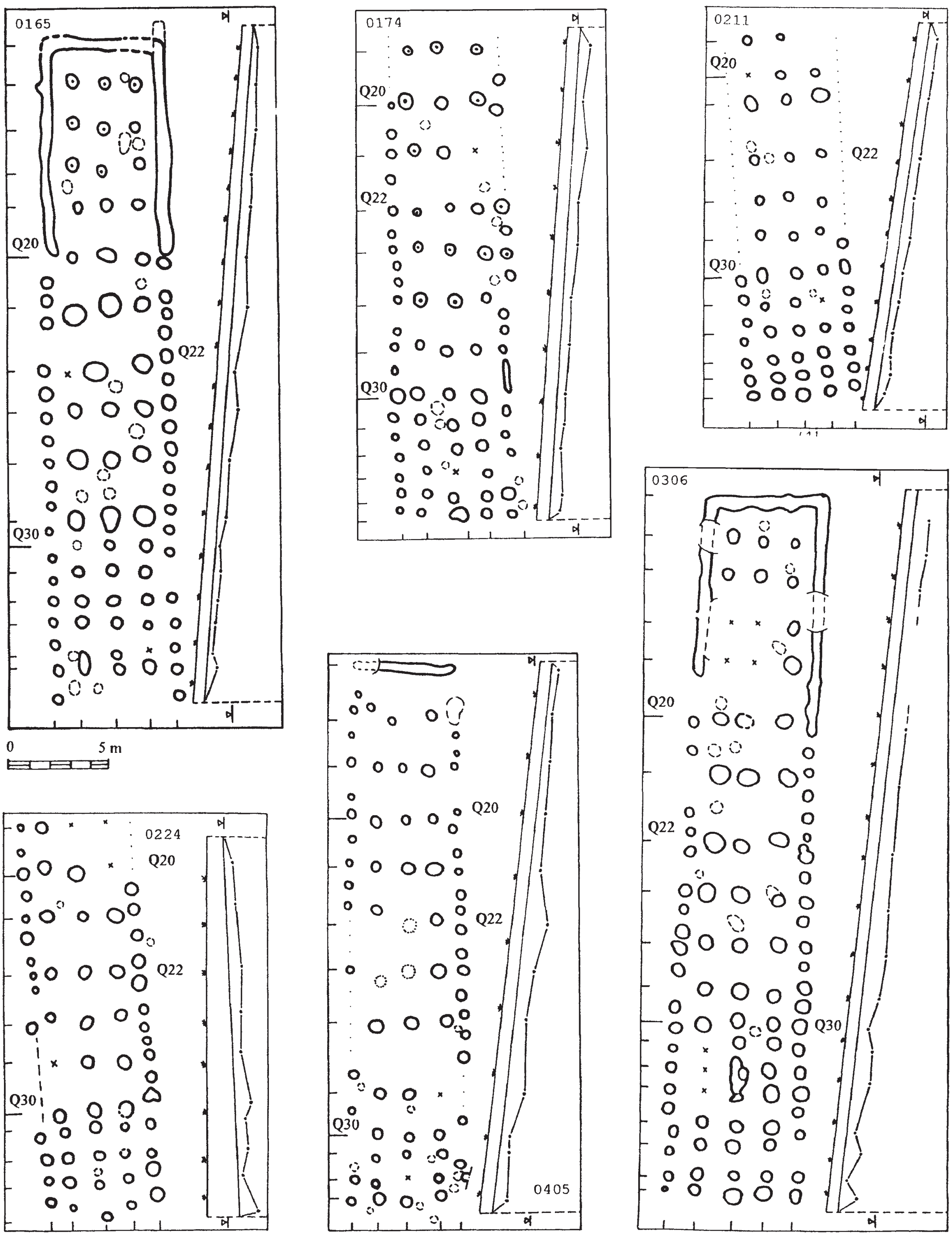


Fig. 6.4.1.d. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

Fig. 6.4.1.e. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

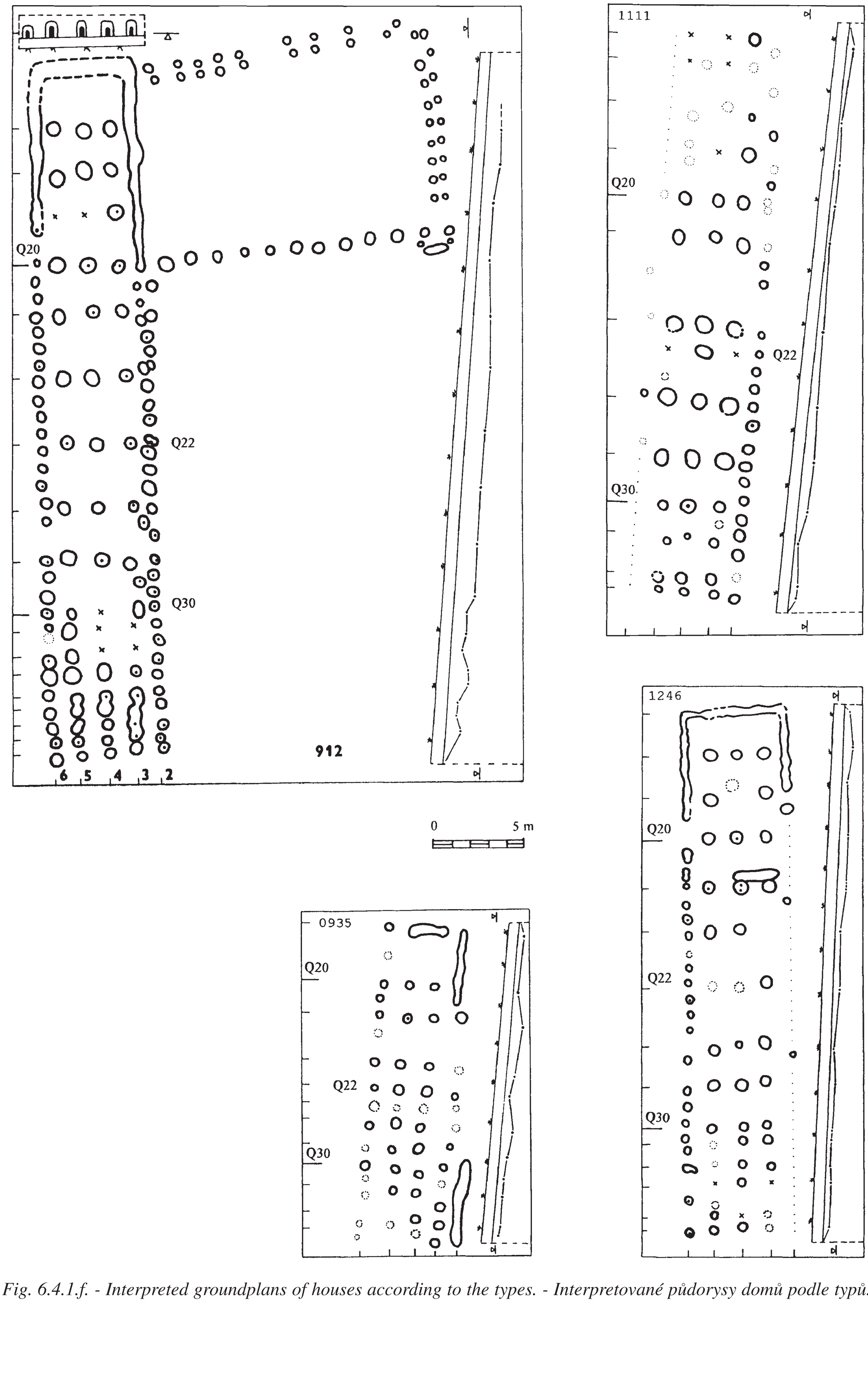


Fig. 6.4.1.f. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

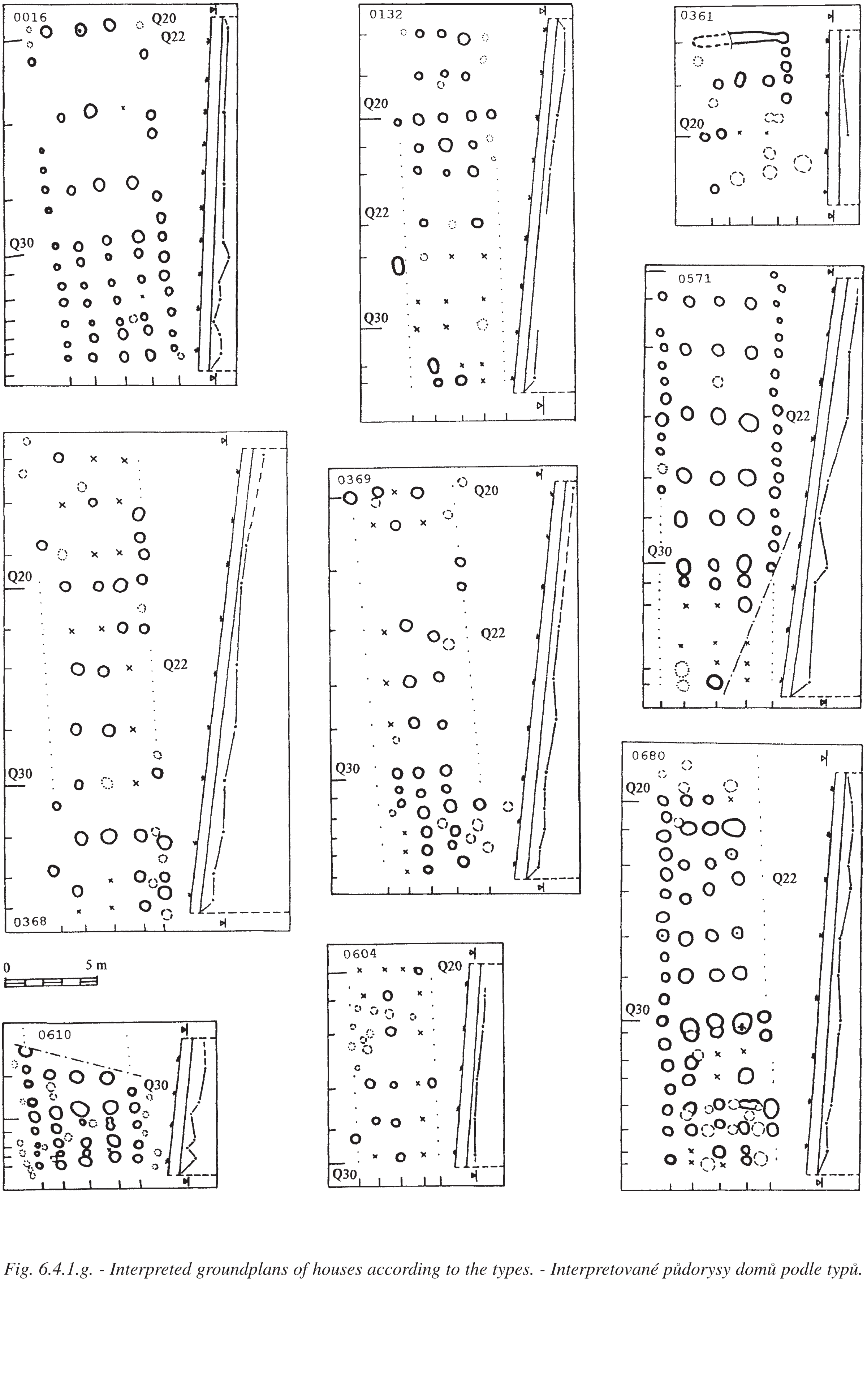


Fig. 6.4.1.g. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

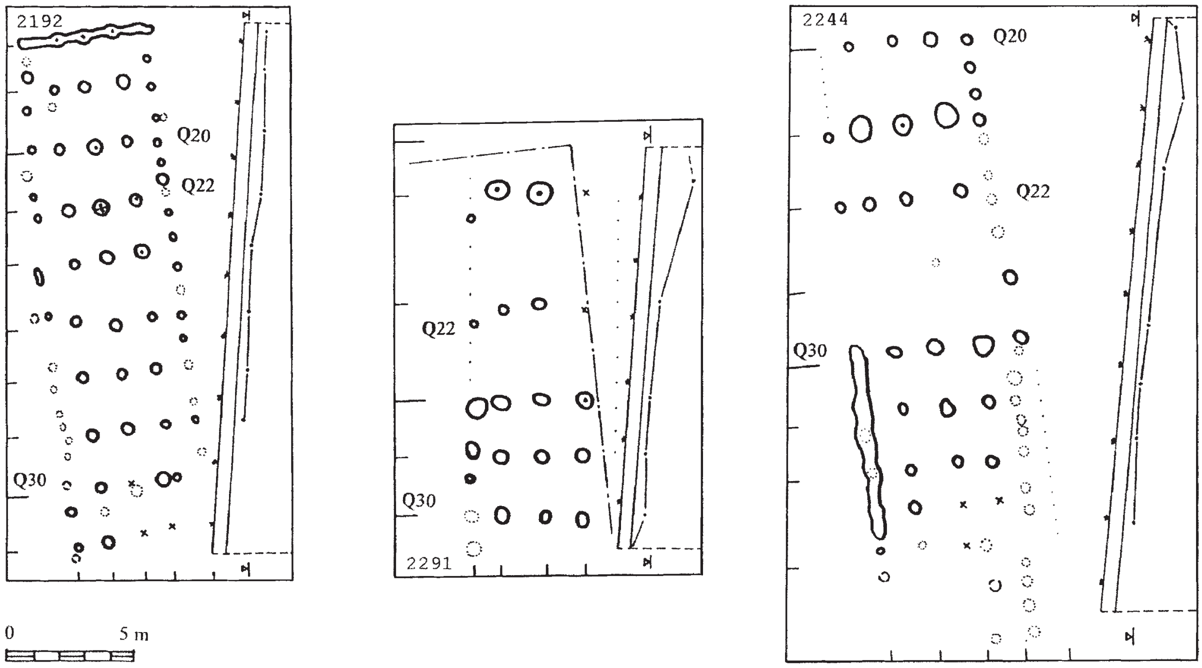


 Fig. 6.4.1.h. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

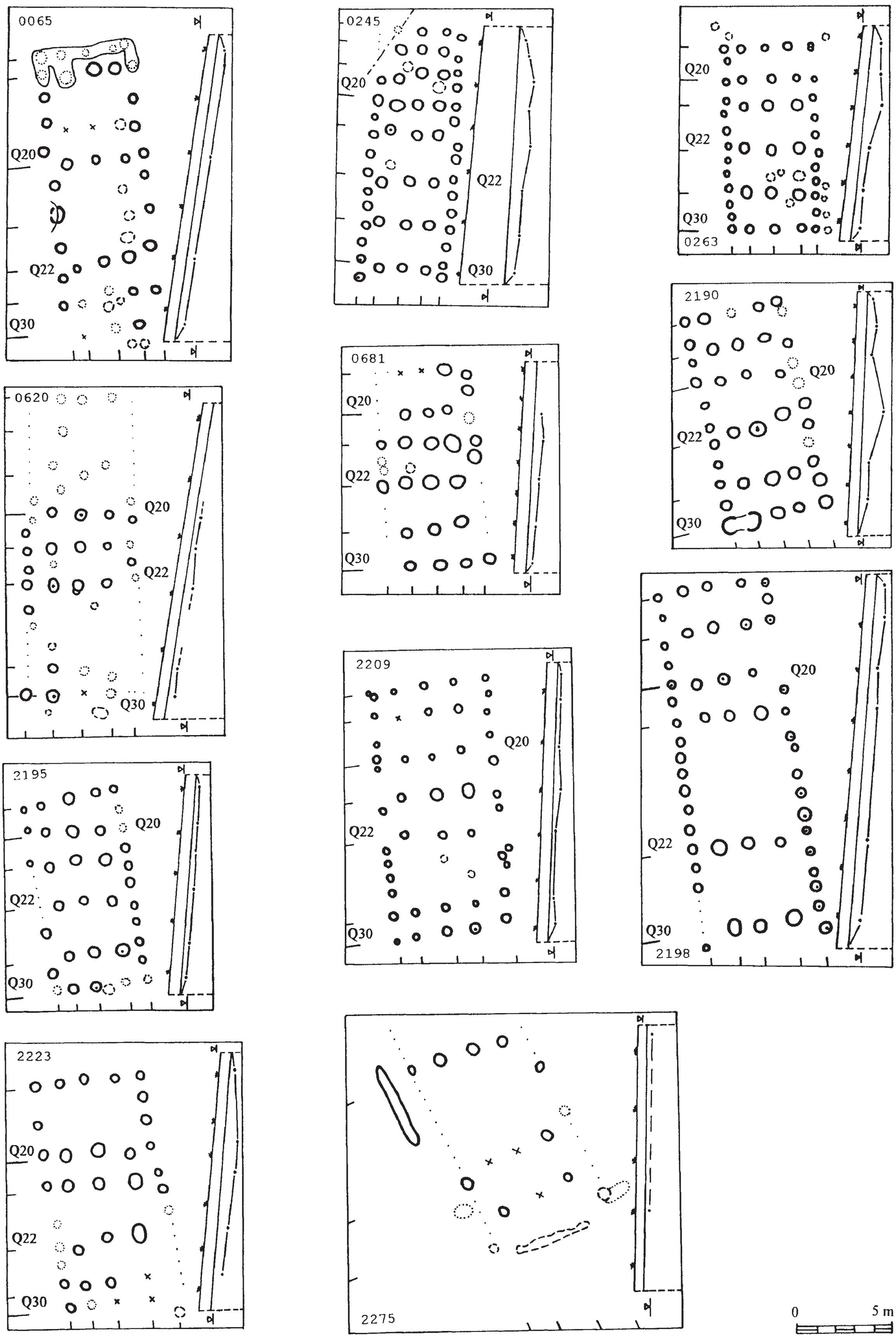


Fig. 6.4.1.i. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

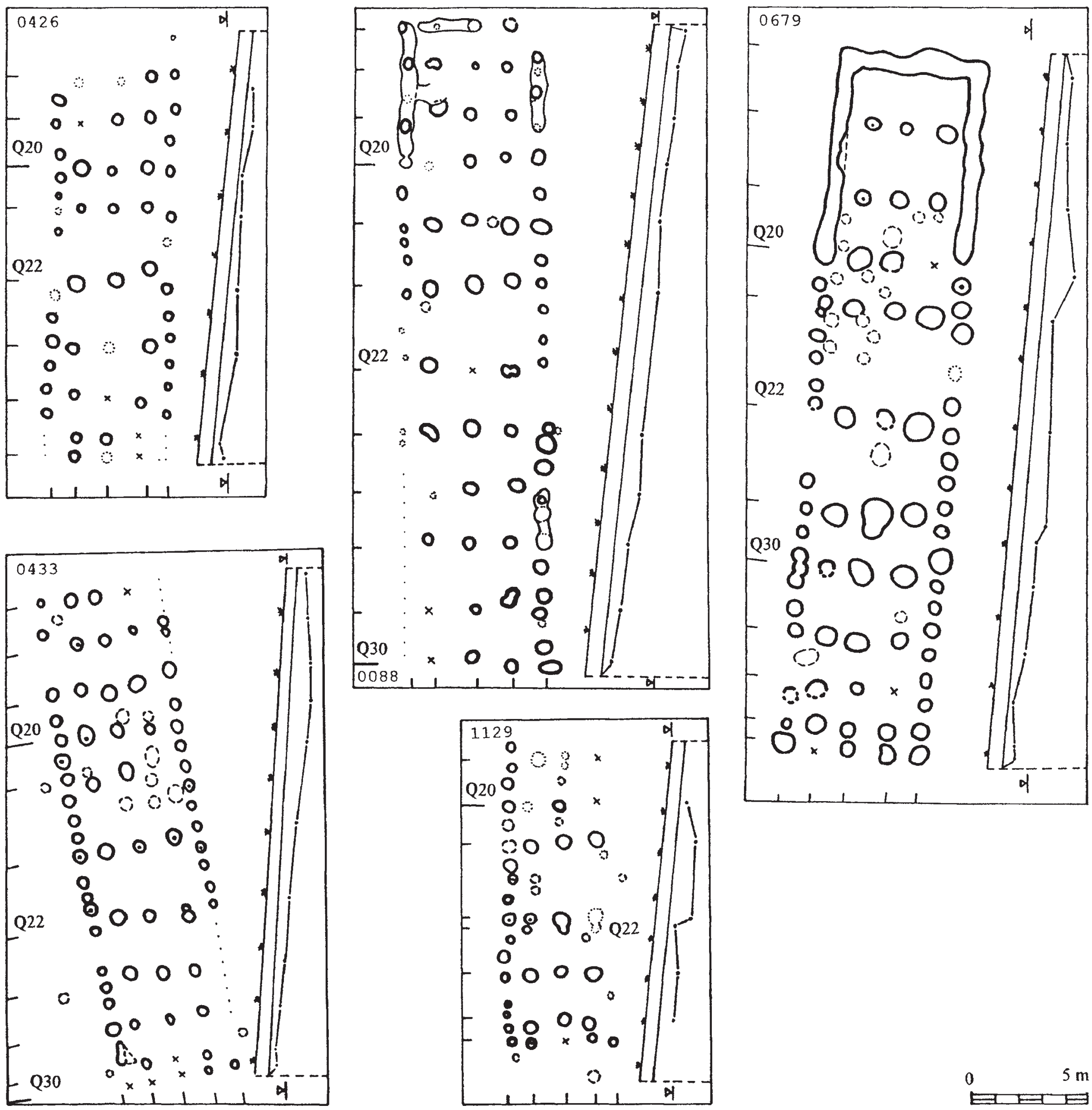


Fig. 6.4.1.j. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

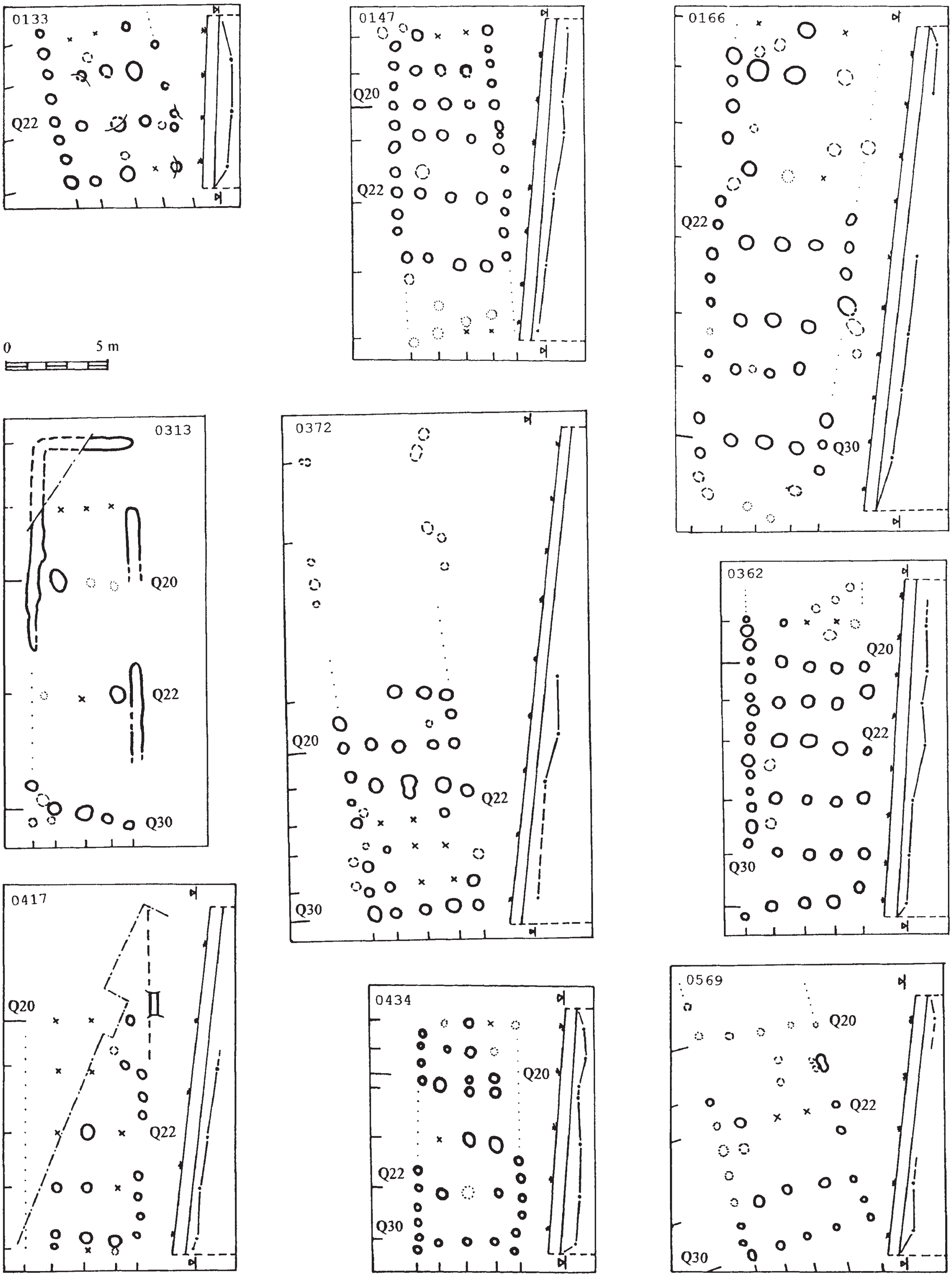


Fig. 6.4.1.k. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

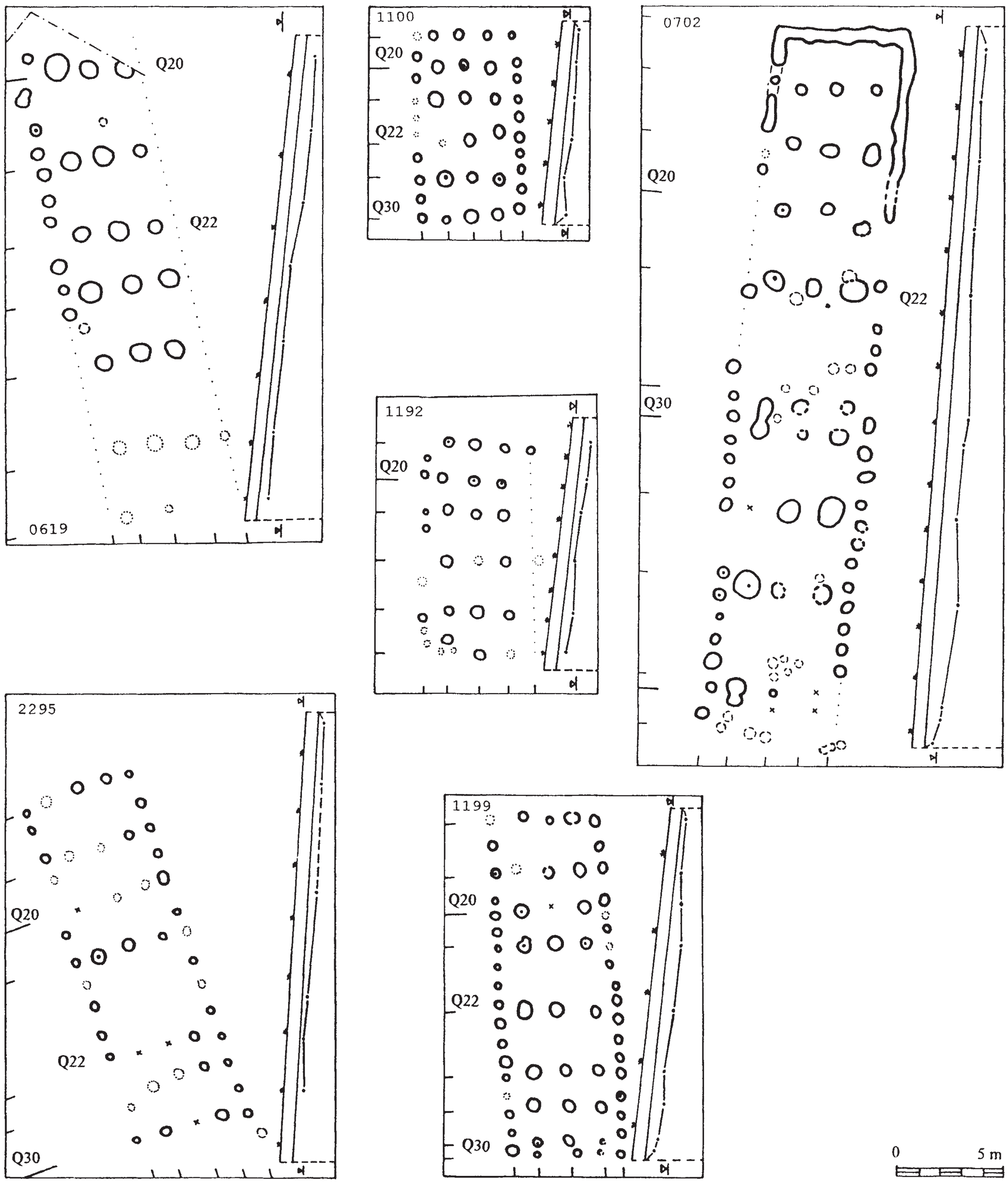


Fig. 6.4.1.l. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

Fig. 6.4.1.m. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

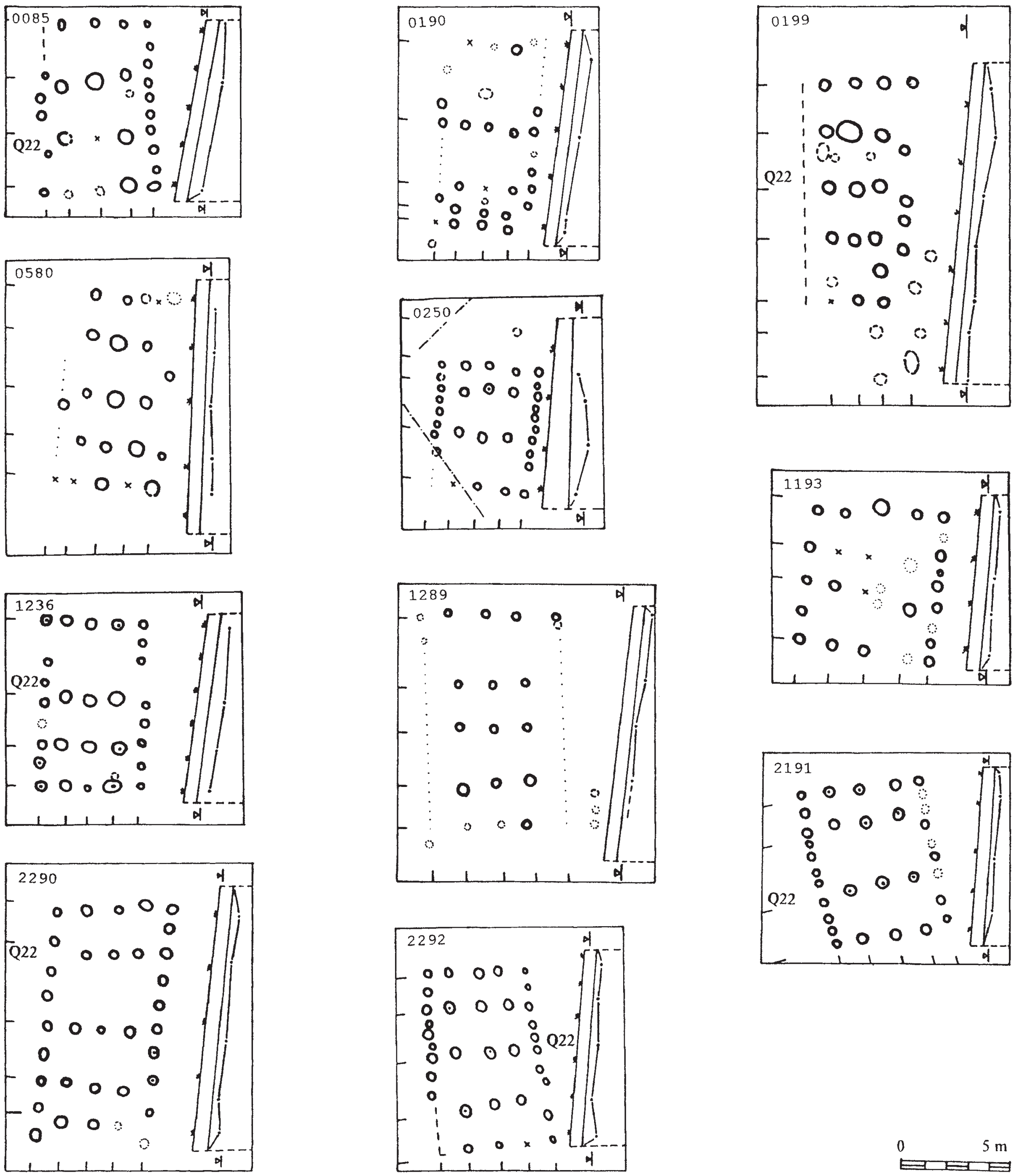


 Fig. 6.4.1.n. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

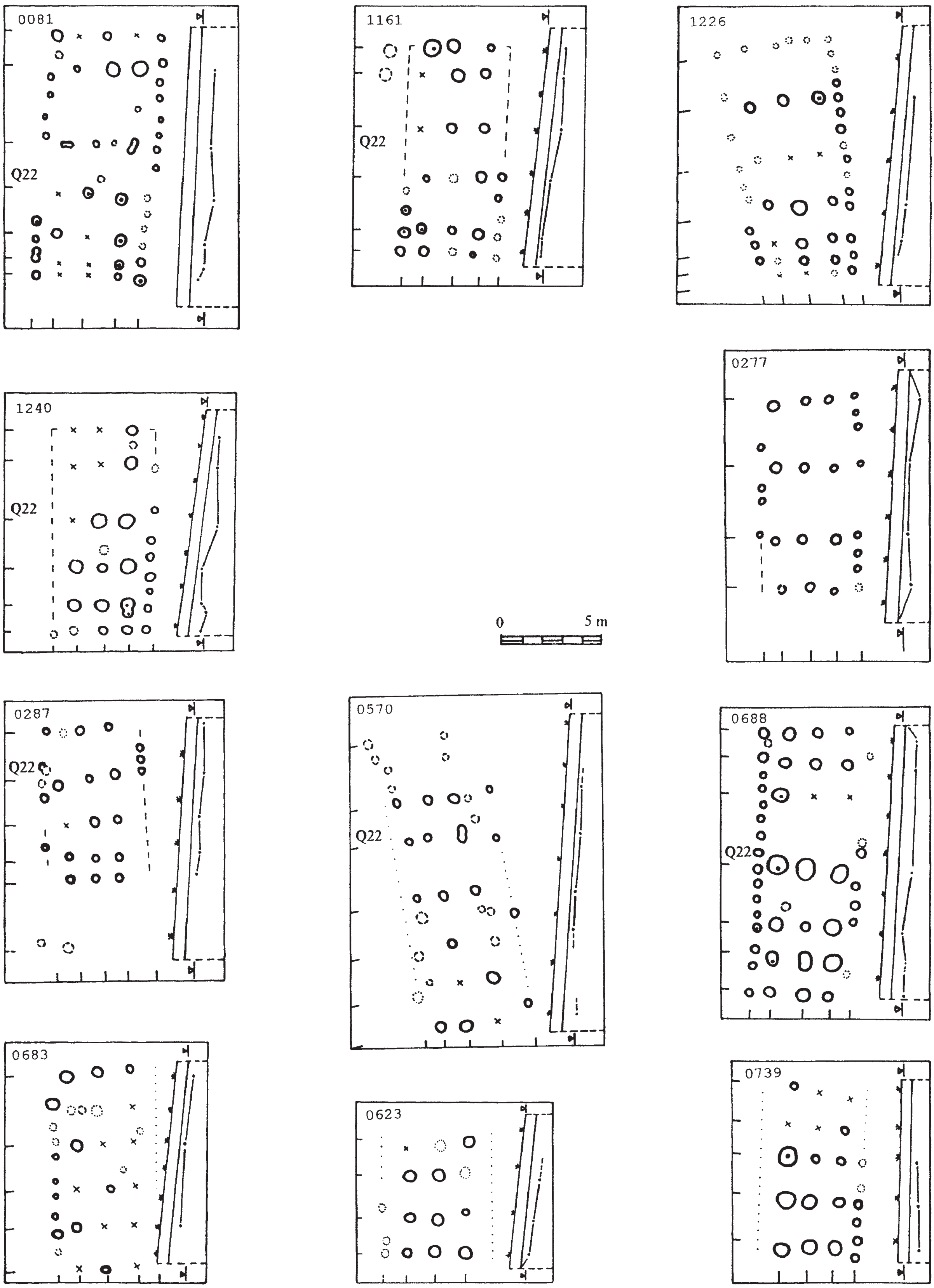


Fig. 6.4.1.o. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

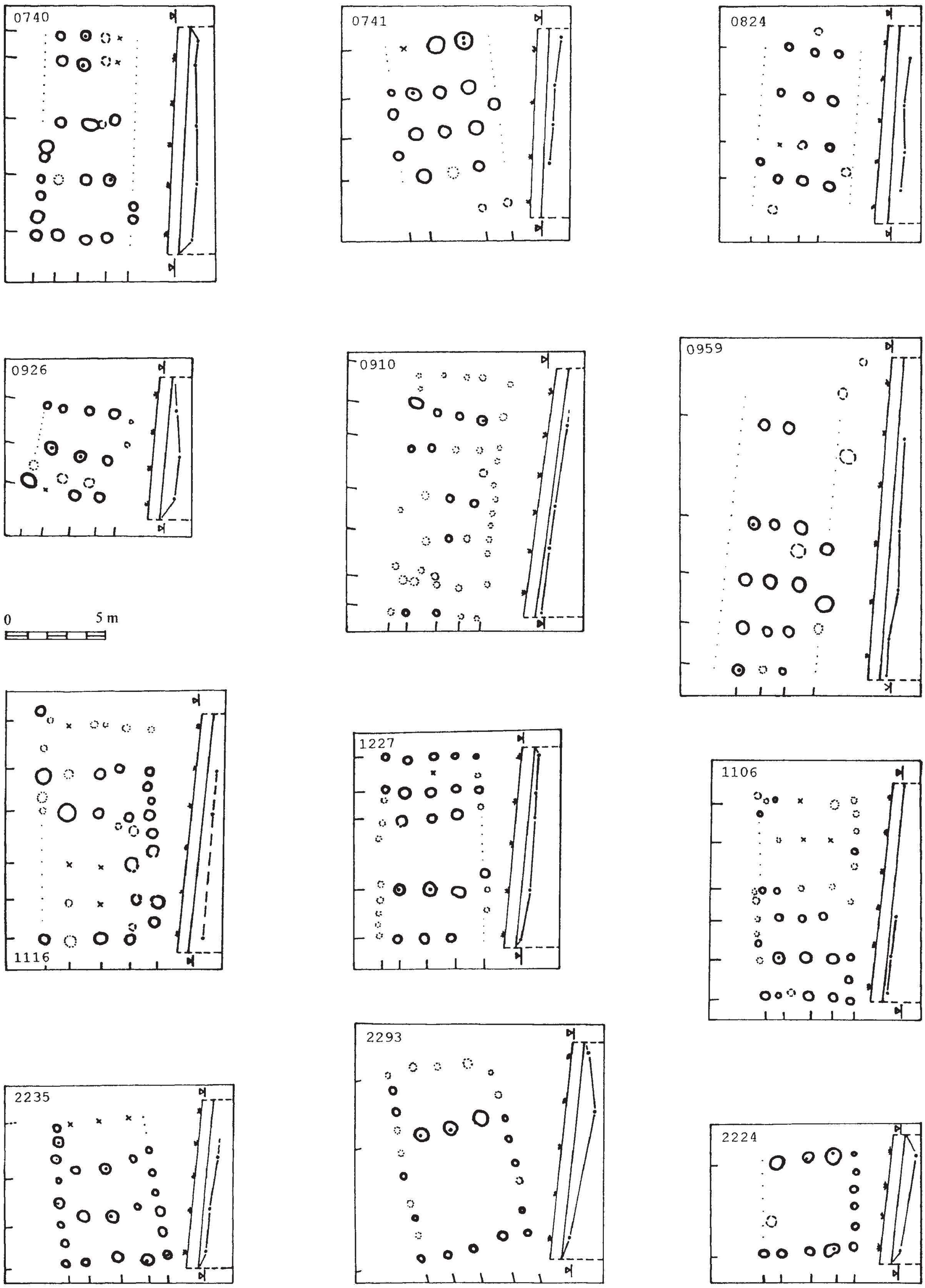


Fig. 6.4.1.p. - Interpreted groundplans of houses according to the types. - Interpretované půdorysy domů podle typů.

ground-plans at Bylany is rather mediocre, especially in comparison to the much better ones in North-West Bohemia (e.g. Březno, Hrdlovka, Chotěbudice).

Two cross rows are used as the criterion of subdivision, displaying a relatively short distance apart in comparison to the others. This space between the rows is termed a corridor, and used to be interpreted separately; at Bylany, it is not clear in all cases (e.g. 96 or 162) whereas by contrast in the western region such is typically found on both sides of the mid-section (Coudart 1998: 27). The emphasised row is more often sunken, particularly in the early period. Another criterion could be the wall trench, which does not necessarily accompany the whole northern section. Therefore, at Bylany the negative criterion for distinguishing between penthouses was used after the identification of the mid-section by an odd number of cross rows (Modderman 1986: 389). If the corridor is visible, either on the northern or on the southern side of mid-section, it is added to it.

The individual sections of the Neolithic house are undoubtedly structures that are connected with each other, because the supports of the timber roof are well connected lengthways. This, however, does not exclude the existence of walls between the sections, or the variable construction of walls. Witness to this is borne by the wall trenches on the northern side, where planks were (Beneš 1995: 65), and also the free space of the walls in house 41, where a lighter wall construction was possibly applied. The walls of the southern part may in some cases have been partly open (Stäuble 1994: 202). The tripartite subdivision itself has an unavoidable significance for the functional interpretation of each section.

6.4.2. The northern section

The area of the northern sections of the houses ranges from 8 - 58 m^2 (houses 263 and 165, or 306). Its frequency distribution is irregularly bimodal, with a limit at the value of 30 m^2. The average is 26 m^2 (s = 13.4). Variants of the northern part are distinguished according to the number of cross rows, from one to five (Coudart 1998: 30). For the simple variant, a zero can be added when an odd space is found between the last row and the northern wall. This variant differs from the absence of the northern section in its own sense (19 %), in those houses which have only a mid-section.

The most common variant is that with two northern spaces (29.6 %), and this is followed by the variants with one or three (28.3 & 20.8 % respectively). The four or five-spaced sections are exceptional (5.5, 1.0 %). The defined variability reflects the number of rows, and corresponds to the length of this section. The Bylany cases agree with occurrences across the whole Linear Pottery Culture area (Coudart 1998: 40). The total variability is carried out with a coefficient of 12.4, which is a relatively high value, and means that the northern section was the most variable.

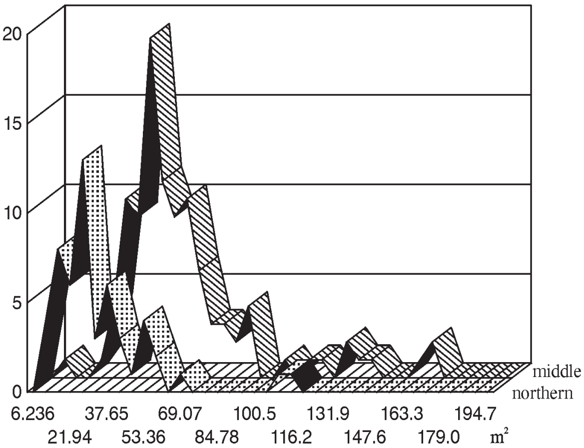


Fig. 6.4.2.a. Distribution of the space of the northern and middle sections of the houses. - Rozložení plochy severní a střední části domů.

6.4.3. The mid-section

The area of the mid-section ranges from 10 m^2 (926) to 162 m^2 (41), with an average value of 60 m^2 (s = 29.8). The frequency distribution is again irregularly bimodal, with a limit at 40 m^2. This bimodality corresponds to the simple and doubled mid-sections. The variants of the mid-section are distinguished according to the configuration of Q22 (see 6.3.3). These variants appear in about the same proportions (34.4, 39.1 & 26.0 %), and their total variability is expressed with the coefficient 9.1. The middle part of the structure is thus the least variable one in comparison with the southern and northern sections.

6.4.4. The southern section

The area of the southern section ranges from 10 m^2 (677) to 62 m^2 (2197), with an average value of 12.7 m^2 (s = 30.4). The variants of the southern section are distinguished by the density of the cross rows, from trenches to very dispersed ones (Coudart 1998: 29). The frequency distribution of the variants of the southern sections is rather irregular, without any possibility of dividing the categories. The most common variant, if such can be said to exist at all, is that with dense but separated postholes (30.1 %). The others appear in lower proportions: trenches 6.1 % rare, regular 6.9 %, irregular 3.8 %. The structure of the postholes of the southern section is never so regular as is the case in the western regions, where ground-plans are more standardised. It is absent in 45.1 % of all cases. The variability is measured by a coefficient of 10.5, which is higher than the variability of the mid-section, but lower than that of the northern section. The structure of the southern part of the houses can thus be described as the median in terms of variability.

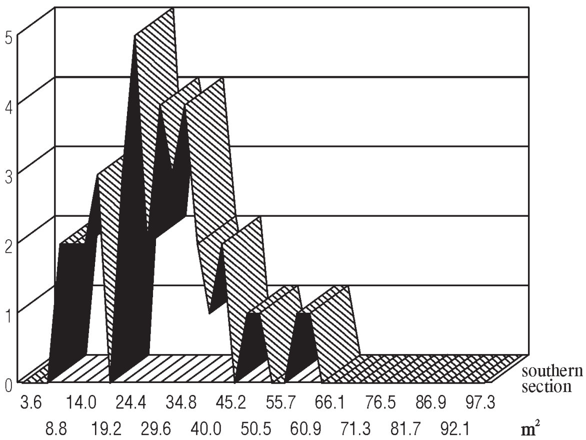


Fig. 6.4.4.a. Distribution of space of the southern section of the houses. - Rozložení plochy jižní části domů.

6.4.5. Functional classification

The overall area of the houses ranges from 10 m^2 (926) to 25.9 m^2 (41), with an average of 76 m^2 (s = 51.8). The roofed area of the largest house is accordingly 26 times greater than that of the smallest. House 926, however, is not among the well documented houses. According to the frequency distribution, a small group of incomplete ground-plans with an area of 10 - 20 m^2 can be separated out. Standard houses may be taken to be those with an area of greater than 24 m^2. In this case, the range would cover about 10 times that of the smallest building. The main distribution comprises houses with areas of 24 - 92 m^2. The next group consists of large buildings with an area of up to 158 m^2, followed by a small group of the largest houses.

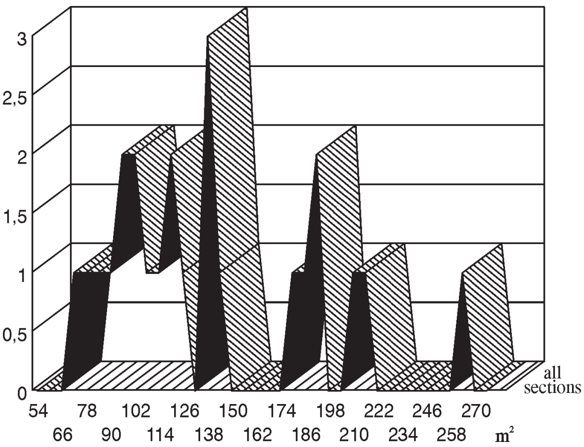


Fig. 6.4.5.a. Distribution of the overall space of the houses. - Rozložení celé plochy domů.

The distinction between one to three house sections can be described as the main functional division. This was previously formulated Bylany in combination with the size of the mid-section (Modderman 1986: Fig. 29). Because the size of the mid-section does not alter anything in terms of its function, the main functional types 1-3 are those having the respective number of parts (3-2-1). The plotting of the variants within the spaces of those types also shows the trivial relationships between a grouping of variants around types 2 and 1. The smaller northern section, together with the broken line Q22, is concentrated around type 2. With type 1, the large and rare section corresponds to the separately emphasised southern section and the large northern one. This double grouping of the tripartite houses may indicate a possible further functional subdivision.

6.4.6. The variability of functional classes

The variability coefficient of the northern and mid-sections is between 5 and 9, and concentrates in the phases of the middle and late Linear Pottery Culture periods. The maximum for the northern part is found in phases 13 and 15 (9.71), and then later in the 23rd phase (9.0). The variability of the southern part has a rather greater range (3-10), with its maximum value in the late Linear Pottery Culture period. Its maximum is found in phases 19 and 21 (10.25), and earlier in phases 13 and 17 (Tab. 6.4.6.A). Another extraordinary feature of phase 13 appeared amongst the stone artefacts. The synchronic houses of this phase created an organised grouping for the first time, which may be connected to a strengthening of organisational principles greater than a single household.

The correspondence analysis of the functional attributes within the space of the phases is marked by the relatively low weight of the axes (Fig. 6.4.6.a). The first (21.3 % of the variability) is a factor of the decreasing number of rows in the northern section, from the positive values of four rows to the negative values of no rows. Five cross rows are found in the centre of this axis, and are as exceptional as the irregular arrangement of postholes in the southern section. The second axis (18.4 % of the variability) is a factor of the regularity of the posts in the southern section, from the regular posts in the positive values to the irregular in the negative. The dense posts in the southern section are in the centre of the second axis. The phases with negative values in both factors are characterised by irregular penthouses (2, 4, 5, 9, 12, and 20). →Tab. 6.4.6.A.

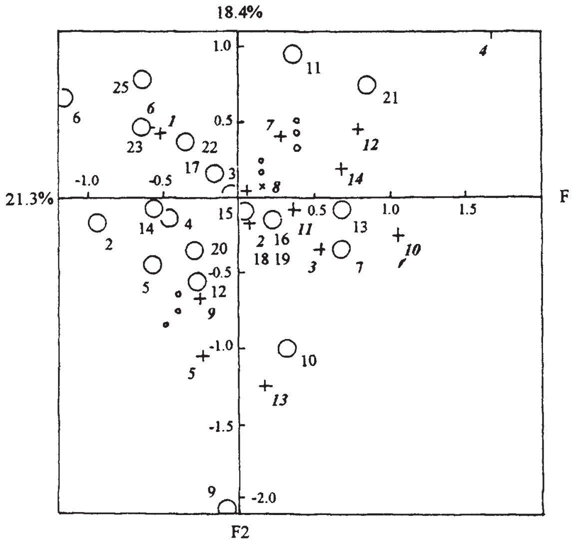


Fig. 6.4.6.a. Correspondence analysis of the functional indicators within the space of the phases. - Korespondenční analýza funkčních znaků v prostoru fází.

6.5. Identification of activities within households and phases

6.5.1. The economic efficiency of the buildings

The efficiency of the structure of houses was defined as the ratio of the roofed area to the supports (QEa1, Coudart 1998: 78). In addition to this, geometric efficiency was defined as the ratio of the roofed area to the surface of the house (QEa2, Coudart 1998: 78). The ratio of both of these values results in the efficiency of the whole construction. All of the coefficients have a low variability during the Linear Pottery Culture period. The coefficient of the structure varies between 2 and 5, and depends partly on the arrangement of the posts. The larger houses have relatively few posts compared to the largest, and more profound changes appear during post-Linear Pottery Culture development. It is stated that substantial information on house efficiency is contained in the ratio of the area to the number of cross rows, which explains the area size supported by one row.

The efficiency of particular house parts differs in the way that the lowest figure is given, for the southern section with an average of 6.9 m^2 per cross row. All rows were calculated, including those that may not have supported the roof. The highest efficiency is seen in the northern sections, with an average of 10.9 m^2 per cross row, while for the mid-section it is 10.6 m^2 per row. The frequency distribution of the coefficients for the southern section is regularly unimodal, but irregular for the northern and mid-sections, with modes of a limit of 10 or 8 respectively. The efficiency of those sections is comparable, which corresponds with their similar interpretation as living areas differing only in the degree of intimacy (cf. below). The additional posts in the southern section disturb the calculation, and this section can be excluded from all estimates.

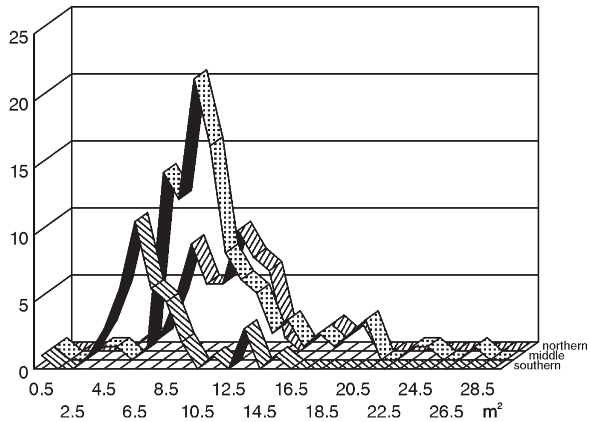


Fig. 6.5.1.a. Efficiency of the northern sections of the houses. - Výkonnost severní části domů.

The values of the efficiency coefficient for the inhabited sections reach those of the mid-section, which had the highest significance. The overall frequency distribution is irregular, with a limit of 8 m^2

per row and an average of 10.4 m^2 per row. In comparison with the coefficient of the structure that from the definition will reach a third of that of the efficiency, the average should be about 3.5, which is a little lower than for the whole of the Central European Linear Pottery Culture region (Coudart 1998: 93). If the houses must be classified by this coefficient, then the values of 8 and 12 would separate the category of houses with moderately efficient construction.

6.5.2. The interpretation of activities in particular sections of the houses

The preserved and archaeologically evidenced traces of the wooden structures do not provide any unambiguous proof for the interpretations of the activities that were carried out in particular sections of the houses. The observable details in the arrangement of the supports indicates some assumed functions, but the precise definition of them is based on the combination of different indices and speculative arguments. Whilst the initial arguments for the interpretation of the southern, mid- and northern sections as the granary, living and storage spaces were quite simple, the current debate is now more profound.

A. Coudart uses the traditional interpretation, supported with ethnological knowledge of the division of space within houses into outer and inner spaces, with a growing degree of intimacy. The southern section, as the entrance area, is not presented with extensive privacy features, whilst on the contrary, the storage space assumed here on the second floor could be part of the common economy of neighbouring households. The mid-section shows greater features of privacy, but could also serve for the reception of visitors. It is reserved for housework and managed by the womenfolk. For the northern section, A. Coudart rejects the interpretation of storeroom or stable. As the least accessible part of the house, it displays the greatest degree of intimacy, and at the same time a low stylistic variability. This was not necessary if it was not accessible to strangers. It served for sleeping, which corresponds to the number of inhabitants and its division is dominated by the men (Coudart 1998: 105).

H. Stäuble attempts to develop a different interpretation, using different line of argument. For the southern section, he emphasises the longitudinal division of the space with denser posts. The posts need not prove the existence of any second floor, but may indicate the construction of a raised floor. A second floor could be tied to any of the roof supports. The walls of the southern section may have had a light construction, or the space may have been open in the style of a veranda. The longitudinal subdivision might correspond to separate entrances for men and women. The mid-section space is undoubtedly a living space, and its division may be analogous to that of Neolithic houses in the Balkans. It was subdivided into a male and female part. The northern section is apparently a penthouse, although proof that it was a stall for a herd is absent (such proof not coming, indeed, until the late prehistoric period). This section was cross-subdivided into smaller rooms for the storage of different domestic facilities. The size thus corresponds to the wealth of the households. The wall trenches provide no proof of a more stable wall, because the posts in them were less stable (Stäuble 1994: 199 - 209).

The arguments using contemporary or earlier analogies from the Near Eastern and Balkan Neolithic are undoubtedly more relevant than reasoning based on current ethnology. It is argued here that direct analogies can be misleading in the details, this concerning both of the cases mentioned above. By contrast, analogies of some general principles may be useful in both cases. As such, the subdivision of a house according to the degree of intimacy may be considered, because it represents compact and universally useful principles. The Linear Pottery Culture houses represent, in comparison with earlier Balkan architecture, buildings of original construction (Lenneis 1997: 144).

It is assumed that a southern entrance will be generally accepted, with its great archaeologically evidenced variability (cf. 6.7.2 below). Side entrances, however, cannot be ruled out. The idea of a stepwise degree of intimacy along the long axis can be traced until the end of the Neolithic period, when it was emphasised in trapezoidal buildings. The increasing degree of spatial intimacy is a reverse function of its size. The northern ("back") space, which must be the most intimate one, is also the smallest.

The functional interpretation of particular parts can be supposed, sometimes in great detail. There is first of all the storage pot buried under the floor of house 96, placed in the separate south-eastern corner of the mid-section. It may have been used as a separate storage pot for wheat, or for water. Similar static storage pots might also have been placed in the southern section. In some cases, a pit is placed in the northern section, respecting the ground-plan, which might have been a kind of cellar or an isolation space below a sleeping floor. Originally, both cases at Bylany were explained as stratigraphically non-contemporary, particularly pit 143 in house 96. The ceramic assemblage within this pit differs slightly from the content of the corresponding long pits, which may be related to the specific role of these cellars, and consequently to the refuse found in them. Similar features were found in houses 306 (pit 305) and 679 (783, 825). The northern part itself is explained as a store room (Soudský 1966: 32)

The living character of the mid-sections is indicated by the cross rows, namely on Q22. All arrangements of this section for which there is evidence show the intention of the house's builders to broaden the middle space, probably in order that more people could meet, and to avoid having too many posts, which in other parts of the house did not hinder normal communication. The cross rows need not always represent a lateral division of the inner space, as has been proven with the trench in the northern section of the house 41. This trench lies outside the lateral rows, but was most probably the divisive element. The double northern section of this house may be compared to a doubled mid-section. Therefore the hypothesis on the correspondence between the size of the northern part and the number of inhabitants can be accepted (Coudart 1998: 105). Similarly, the idea of divided houses representing more wealthy people with higher status in the community (Stäuble 1994: 209) is also acceptable. Similar functions were preserved in more simple buildings in more modest measures, which was not reflected in the archaeological features.

6.5.3. The role of house parts according to gender and age

If the efficiency of building and the size of the mid-section are compared, then statistical differences among the classes are visible. Overall, houses of average efficiency prevail (41.5 %), as is also the case with simple mid-sections. In double sections, representing more people, structures with a higher efficiency prevail (50.0 %). The fact that the buildings differ in their structure as well as in their numbers of inhabitants may also reflect the gender and age composition of families. It can be assumed that the houses built by younger men would be constructed to be more efficient buildings. Such a contrast could be ascribed to simple houses with a high coefficient of efficiency (11.7 %), as opposed to double houses with a lower coefficient (18.2 % in total). In the first case, these represent families with a higher ratio of younger, stronger men, with a higher work efficiency. In the second case, the average age would be higher, and the number of younger men in the family lower. The greater experience of older men had been used. ➔Tab. 6.5.3.A.

The division of the mid-section by gender and age can only be judged speculatively. In the Bylany Linear Pottery Culture houses longitudinal division is more acceptable, but not fixed like the points on a compass. The enlarged middle space, according to the Q22 configuration, or absence of a post, is turned towards the eastern wall (60 %) and less towards the western wall (40 %). This space must have been used more by men. On the opposite side were the ovens or fireplaces, and this space would have been reserved for women.

In the hypothesis of the lateral division of the mid-section, ovens are assumed to have been placed along the short wall, at the outer limits of the mid-section (Lüning 1995: Fig. 2). The part reserved for the men would then either be in the centre or by the long wall, and the rest of space was reserved for communication between the two groups. The breaking of the Q22 row sometimes frees a space where an oven could have been built. In the Bylany houses, such breaks are not fixed in a particular direction; for the directions NE-SE-SW-NW, the division is 30-33-20-17 % respectively. A lack of posts, where deliberate, is more often found by the eastern (9 cases) than the western wall (7 cases), and least often in the centre (4 cases). The space for the women would then be in the open in some corner of the mid-section.

According to both hypotheses, the subdivision of the mid-section according to gender and age is highly probable, but with individual variability and without any fixed rules. The subdivision of the northern section according to gender and age is also speculative (Coudart 1998: 105). If the interpretation of lateral subdivision is accepted together with that of a respect for intimacy, then for those houses with more divisions the additional stepwise system of intimacy can be assumed. Near the centre, it would then be expected that the space for the women and children would be further towards the northern end of the house, and probably also the space for the elderly members of the family.

6.6. Informational content, from the point of view of continuity and discontinuity of shelter

6.6.1. Functional classes within the space of the phases

Within the space of the phases, the basic functional types of houses are separated from the complete ground-plans with southern and northern penthouses. Phases 7-11 and 13 concentrate around this. An extreme group of houses with only a northern section is focused around phases 2, 5, 6 and 12. In between these lie phases 3, 16, and 18-20. Phase 25 is also an extreme phase as it contains a house with only one section. Phases 4, 14, 15, 17, and 21-23 lie between all of the other groups. There is no chronological trend, which is natural for functional types. One- and two-section houses are assumed to have arrived later (Coudart 1998: 38), which corresponds to the course of development at Bylany beginning with phase 21. Phases 4, 14 and 17 differ from such a model. Because the definition of the tripartite house need not be unambiguous, the complete ground-plan is prevalent over the other two.

The central position of the tripartite house is proven at Bylany throughout the whole development of the site area. The significance of its socio-economic role depends on the roles of the separate sections. The basic functions were fulfilled even in a house with only one section, so houses with other parts must have conducted non-standard tasks. The additional building of the northern section or the features of its construction demonstrate the emphasis on the activities of the house's inhabitants. These were separate from the activities also carried out by strangers. This appears both in the group of synchronic houses in area BY1, and in the isolated houses of area MI2 (Pavlů 1998), and reflects the emphasis on the social role of a house.

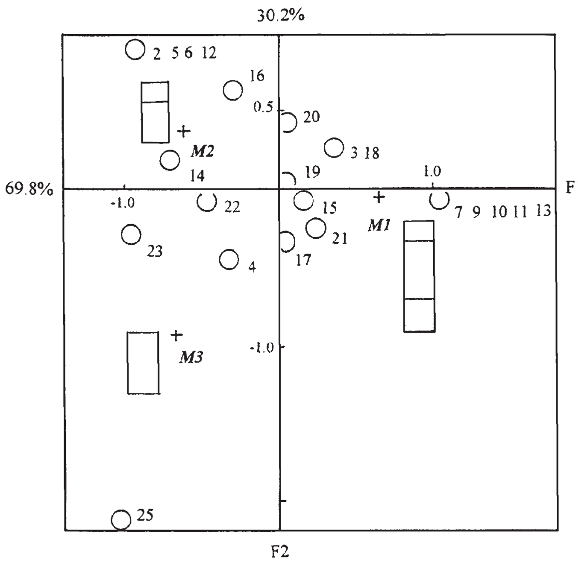


Fig. 6.6.1.a. Correspondence analysis of functional types (Modderman 1986) within the space of the phases. - Korespondenční analýza funkčních typů v prostoru fází.

A greater economic role is emphasised in the southern section. With the exception of house 877, this part appears only in combination with a northern section. It expressed an openness towards co-habitants of the site area, who were probably only distant relatives. It was not elaborated in the earlier period, when only an alternation with silos is apparent (Soudský 1966: 29, Coudart 1998: 76), these being rare in this period (Šumberová 1996: 80, feature 2257, p.72). The synchronic houses of the earliest phases may have been inhabited by more closely related family members, this not requiring any economic assertion. The southern sections are also absent in the isolated houses at MI2 at the beginning of the middle period, at the time when at BY1 the tripartite houses were being constructed. In this sense, the grouping of the different functional types of houses shows the co-habitation of social groups of different kinship bonds. The feeling of unity may have been loose, and the prevalence of one section of the house at the end of the development might reflect the estrangement or economic isolation of members of individual houses.

6.6.2. The efficiency of houses within the space of phases

The efficiency of Linear Pottery Culture ground-plans was divided into three categories with limits at the values of 9 and 12. Because the coefficient is equal to the roofed area in relation to one lateral row, a low structural efficiency can be defined as being less than 3 m^2 per supporting post or 1.8 m^2 per post when all are taken together. With increasing efficiency, the area roofed with one post also increases.

The distribution of houses according to the efficiency of their construction within the phases shows that their variability is not significant during the development of the Linear Pottery Culture.

The most numerous houses are those with an average efficiency (13x), and the least numerous those with great efficiency (6x). Overall, the houses with different coefficients are distributed fairly; 38 % have the least efficient structures and 26 % the most efficient. ➔Tab. 6.6.2.A.

The architecture of the Linear Pottery Culture at Bylany does not indicate any obvious trends towards deliberate efficiency. Structures of lower efficiency increase in the later periods, and are absent in the early period. It is not really possible to generalise this statement. The Bylany architectural tradition is therefore very stable over a period of several centuries. The differences between standard structures have socio-economic reasons behind them, rather than being caused by profound technological change.

6.7. The context of ideas and imagination

6.7.1. The orientation of houses

The striking, common facing of the long sides of the houses towards the north has repeatedly been the subject of discussion concerning its significance. The last time that this point was analysed in great detail (Mattheusser 1991) was in the region of the Lower Rhineland, and in the Linear Pottery Culture area as a whole. The relationship was traced between the orientation and the dimensions of houses, as well as the structural details of the mid-section in the dimensions of time and space. No relationship was found to construction, or to any construction principles, as had previously been suggested (Pavlů 1986: 398).

Two compact rows appeared chronologically in the average values of orientation, those of the early and later phases (Mattheusser 1991: 30). It was argued that the unified direction of the houses towards the prevailing wind direction cannot be proven, as had also been suggested earlier (Soudský 1969: 82). Because no correlation between the orientation and practical construction was discovered, the author argues in favour of a purely cultural attribute. Therefore, increasing regionalisation is reflected in the Linear Pottery Culture region (Mattheusser 1991: 39). The orientation roughly follows the direction toward the coast, which might be connected to the winds that brought rain (Coudart 1998: 89). The culturally conditioned

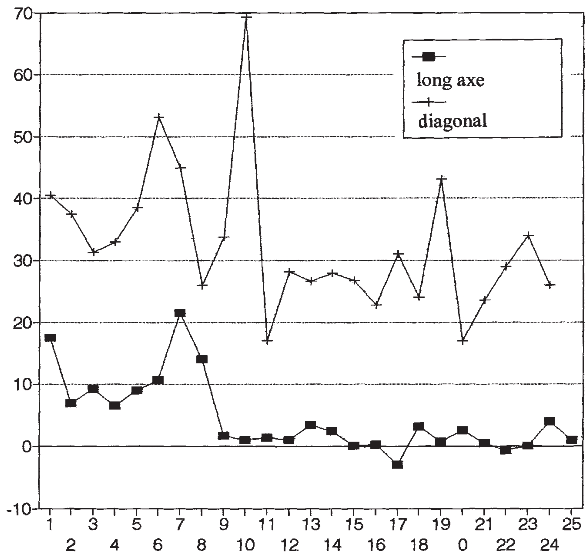


Fig. 6.7.1.a. Orientation of the long axis and the diagonal of the mid-section. Average values within the phases. - Orientace dlouhé osy a diagonály střední části. Průměrné hodnoty ve fázích.

moving of the long axis westwards was proven at the Březno site, for the period stretching from the Linear Pottery Culture to the Únětice Culture. Orientation must be included in the list of stylistic attributes of Neolithic architecture.

The development of the average values of the long axis and of the mid-section diagonal (Fig. 6.7.1.a) have already been compared once (see Pavlů 1986: 394). Both are mutually interdependent, because the long axis varies with little deviation to the north (Mattheusser 1991: 9). Regardless of the orientation of the middle diagonal, it developed more consistently, which corresponds to the ratio of simple and doubled mid-sections. The orientation of houses cannot of course provide any indices for the chronology of individual groundplans, as has recently been recognised (cf. Modderman 1987: 342), and subsequently proven again (Boelicke et al. 1988: 927).

The development of the average values at Bylany provides a similar trend to that seen at Merzbachtal. During the first seven phases, there is an increasing deviation to the west. Starting from phase 9, both average values vary around the central, long axis with a deviation of two degrees towards the west. The greatest difference between the axis and the diagonal is in phase 12, represented in only one house, house 88, with a doubled mid-section. The extremes apparently correspond to the phases in which changes in development were interpreted, i.e. disruptions in the continuum of house building. This may indicate that the orientation of houses with a relative number of inhabitants was dependent. The deviations in orientation might then indicate the limits of Neolithic builders' capabilities. Simultaneously, they carry information on the relationship between structures.

The orientation deviations could also be explained as the negative influence of perspective - i.e. that the ability existed to point out two parallel lines at a distance of several dozen metres. When the houses were renewed in one direction, then the deviation regularly increases, at least over a limited time period. Buildings with strictly parallel foundations, such as at Cuiry lès Chaudardes (Ilett, Constantin, Coudart - Demoule 1982) may prove both much better building capabilities and kinship on the part of the builders. In this way, changes in orientation within one culture can be explained, but the long-term trend of cultural crossover cannot. Cultural deviations in house orientation show more the tendency towards cultural identification with architectural style than individual structural deviations.

6.7.2. The style of the southern facade of the houses

It was stated above that the southern section has greater variability than the northern section. The southern wall is the most variable, sometimes as if it were constructed independently like a frontal screen, separate from the main wall. The special configuration of the postholes may bear witness to this. Apart from the known "antes", when the posts are moved forward along the southern front (houses 245, 434, 2198), at Bylany the ends of the long wall are most often broadened out, and the front is doubled (houses: 165, 427, 525, 678, 679, 681, 702, 703, 1106, 1111 and the type feature 2225). Less common are the cases when the ends of the long wall are narrowed (houses 19, 1129). Besides the aforementioned variants of the southern section, a kind of ship's bow appears with its centre slightly moved out (houses: 96,174, 211, 224, 624, 903, 1100, 1226, 2209).

The unusual arrangement of postholes in the southern wall used not to be very striking and requires very detailed and careful evidence in the field. The southern end is usually poorly visible, and the details difficult to identify. A special case is represented by house 2197, where it is difficult to state whether there is a penthouse entrance or merely insufficiently recorded postholes. Several doubled postholes in the southern wall can be added to the aforementioned variants, which often merge with the supports of the southern section. The evidence shows that the special structures of the southern walls of houses at Bylany were individual, and stylistically differed from the other houses. A decorative front wall can be assumed in some of the cases, as has been proven in ethnographic examples (Rapoport 1972: 62). With some exaggeration, a parallel between the much later historical houses and those of the Neolithic can be spoken of.

6.7.3. The stylistic classification of houses

The style of house structure is marked by the arrangement of the supports. A. Coudart distinguished ten types of lateral cross row organisation, according to their density and the regularity of the distance between them (1998: 28). The density can be objectively defined, and from the frequency distribution the acceptable limit is 1.9 m of the house's length to one cross row (see 6.0.3 above). A lower value marks a dense arrangement, whilst a higher value indicates a sparse one. The regularity or irregularity, i.e. the rhythm of the arrangement of the rows is a subjective point of stylistic classification (STYLTY). Moreover, it also depends on the degree of preservation and quality of documentation of the ground-plan. In keeping with the aforementioned typology of the cross rows, an series of five classes were distinguished at Bylany:

A-regular dense, B-irregular dense, C-regular, middling dense, D-rhythmic, E-irregular sparse.

Because the efficiency of house construction is comparable to the row density, a high correlation was expected (Tab. 6.7.3.A). In fact, the differences between both values are not of statistical significance (chq = 16.8, df = 8, p = 0.0325). The houses of type C are the most frequent (middling post density), but their proportion (66.7 %) is highest among the houses with a low efficiency (less then 8 m^2 of roofed area per row). By contrast, the highest ratio of houses with a structure of type A is connected to the middle degree of efficiency (28.1 %). The discrepancy that resulted may stem from the subjective limits between styles A and C, which are not precisely quantitatively distinguished by the density of posts, but only by their subjective classification into classes. Another disturbing element is the different rhythm of posts that can be found in the house's sections.

At Bylany there is a small number of houses with apparently irregular post rows (19, 405, 525, 581, 680) and only three houses (250?, 434, 688?) with markedly rhythmic rows. This Bylany house style differs from that of houses in the western regions, where rhythmic rows are prevalent. The overall variability of style is represented by a value of 9, which is a high value for this attribute. The style of the Bylany houses can be evaluated as being extremely variable even if generally concentrating around a post arrangement of middling density (60 %). The sign value of the construction style was not high, as it was not particularly visible to the inhabitants of other houses. ➔Tab. 6.7.3.

6.7.4. The chronological variability of stylistic classification

Given the prevalence of the stylistic structural types A and C, these two also alternate as being the most frequent within the phases. Phase 5 is an exception to this rule, with type E dominant, as is phase 9, with type B dominant, but the number of classifiable houses in the phases is very low. Also, the variability of the style within the phases is low only during the middle period, and increases in the later period (phases 13 - 22). No regular trends are indicated, and the lower and higher values vary very rapidly. The changes in the coefficients of variability of the stylistic classes follow the rhythm of variability expressed by the formal classes (cf. Tab. 6.1.4.A). If the formal classes correspond to the size of the families in the houses, then the stylistic classes of house construction would be the next expression of population variability. They have become a bearer of demographic information not only to the external observer, but also to visitors or guests invited into the house.➔Tab. 6.7.4.A.

6.8. Kinship or labour groups in different stylistic manifestations

6.8.1. Prototypes of houses

As the prototypes are the most frequent, combinations of the size and shape of the ground-plan can be described. Eleven classes within the range of the length/width index were distinguished according to their frequency distribution. The classes have a rising interval of 0.4 - 0.6 - 0.8 - 1.0. The types of ground-plan were taken from the work of A. Coudart (1998: 27), who distinguished six types according to the convergence of the long walls. At Bylany, only three of these were used when the difference between the narrowest northern walls and the broadest walls distances is below 1.59. In total, 46 ground-plans were classified from the total of 92 houses with a measurable index. For the smaller houses, the short walls are poorly preserved, and they are therefore less easy to classify within the cognitive types.

When the combinations that appear only once are excluded, then the ground-plans can be grouped into four classes that can be designated prototypes. The greater weight is for the index rather than for the degree of convergence of the walls because the latter is low, a result more of imprecision in the building techniques than deliberate planning. The highest difference in the width is 1.2 m for house 2196. The slight convergence of the walls at the northern end bears witness to its separate construction as a supplementary part of the house (type 2). The later tendency towards trapezoidal ground-plans might appear randomly earlier, but is typical only of the final stages of the Neolithic period. ➔Tab. 6.8.1.A.

6.8.2. Prototypes of houses within the phases

Only a third of all of the houses were classified using the space of the length/width index and types of ground-plan. The others are either incomplete or are incompletely documented cases for which the values are impossible to calculate. This diminished the strength and consequences of the prototypes. In total, only 15 % of all of the classifiable houses appeared in a class once, and were not included with the prototypes. This low figure seems to prove the high standardisation of Neolithic architecture. Prototypes 1 and 3 include both ground-plans with parallel walls and those with slightly convergent walls. The differences between them are in fact those of size, and they include small, medium-sized and large houses, which are thus differently defined than those of the formal classes (cf. 6.1.3). Prototype 4 differs in its narrow northern end. The ratio of prototypes in the overall figures decreases: 1-2-3-4: 33-26-20-6 %. The overall variability is 11.6.

The proportion of prototypes within the phases varies in the earlier period, until phase 12. It is either low or at zero (1, 3, 6, 8, 9, 11), or greater than half of the synchronic buildings. In the later period, it is usually lower than 40 %. These relationships are disturbed by the classification possibilities for individual houses, and the number of houses in a given phase. It can be adjudged that the architectural style of the early period was less standardised than the later style. The plotting of the results of the correspondence analysis proves this. Prototype 1 remains in the first axis (50.7 % of variability), in opposition to the others. In the second axis (28.3 %) of variability, the pairs of the 1st and 2nd and the 3rd and 4th prototypes differ. The first axis corresponds to size, the second more to the irregularity of the walls. Because no chronological trends appear, the dispersion of prototypical buildings falls within the long-term tradition of the Linear Pottery Culture.

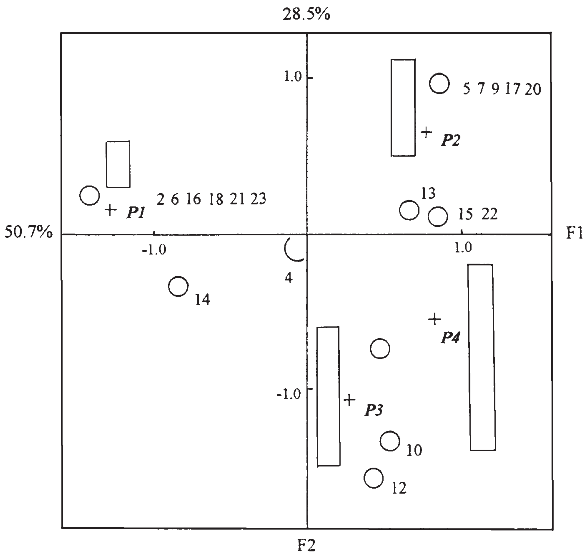


Fig. 6.8.2.a. Prototypes within the space of the phases. - Prototypy v prostoru fází.

6.9. The informative significance of Neolithic architecture for creating and preserving cultural tradition

6.9.1. Stylistic classes of houses within the space of the phases

The correspondence analysis of the stylistic types within the space of the phases explains 65 % of the variability on the first two axes. Both type B with dense irregular posts, and type E with relatively sparse but regular posts, lie in extreme positions. Neither are commonly found among the Bylany houses. Type C, with an average density of arranged posts appears, as expected, in the centre of the ground-plan styles, around which type A with its denser posts and type D with sparse posts were plotted. The stylistic types do not provide any chronologically regular sequence. The phases are plotted irregularly. Phase 5 is close to type E, and phase 9 to type B. This is the greatest difference between the style of post density. Phase 9 comes after the habitation area was moved westwards within area BY1, so some uncertainty in construction style may appear.

6.9.2. Information and communication within Neolithic architecture

The arrangement of the items helps in the discovery of the regularities that people accept as their own and as given facts. A. Rapoport quoted (1972: 176) the case of furniture arranged in a court hall, which corresponds to the judicial principles in each country, and which shows the positions of and relationships between the participants in a legal trial. Analogously, culturally conditioned architecture can also be considered, and its forms tell us more about the builders of the houses than about the dwellers within them. In the case of Neolithic houses the situation is simplified because the builders and the occupants were in general the same people.

The information and the exchange of information mediated by Neolithic architecture can be divided according to its range and destination. This information is limited by the size of the social groups living within the houses and by the size of the contacts both within and without a house. The roofing of a relatively large area for what was presumably a large number of people living inside was interconnected to the still larger free space between the houses outside the roofed area. This bears witness not only to the accessibility of the free space and the absence of land ownership, but also to the adequate capability and independence of social groups within the households. This characteristic is typical of all Central European Neolithic architecture, in comparison with the architecture of the Near East or the Balkans.

The house, with its hierarchical internal ordering of space, accordingly mediated hierarchical

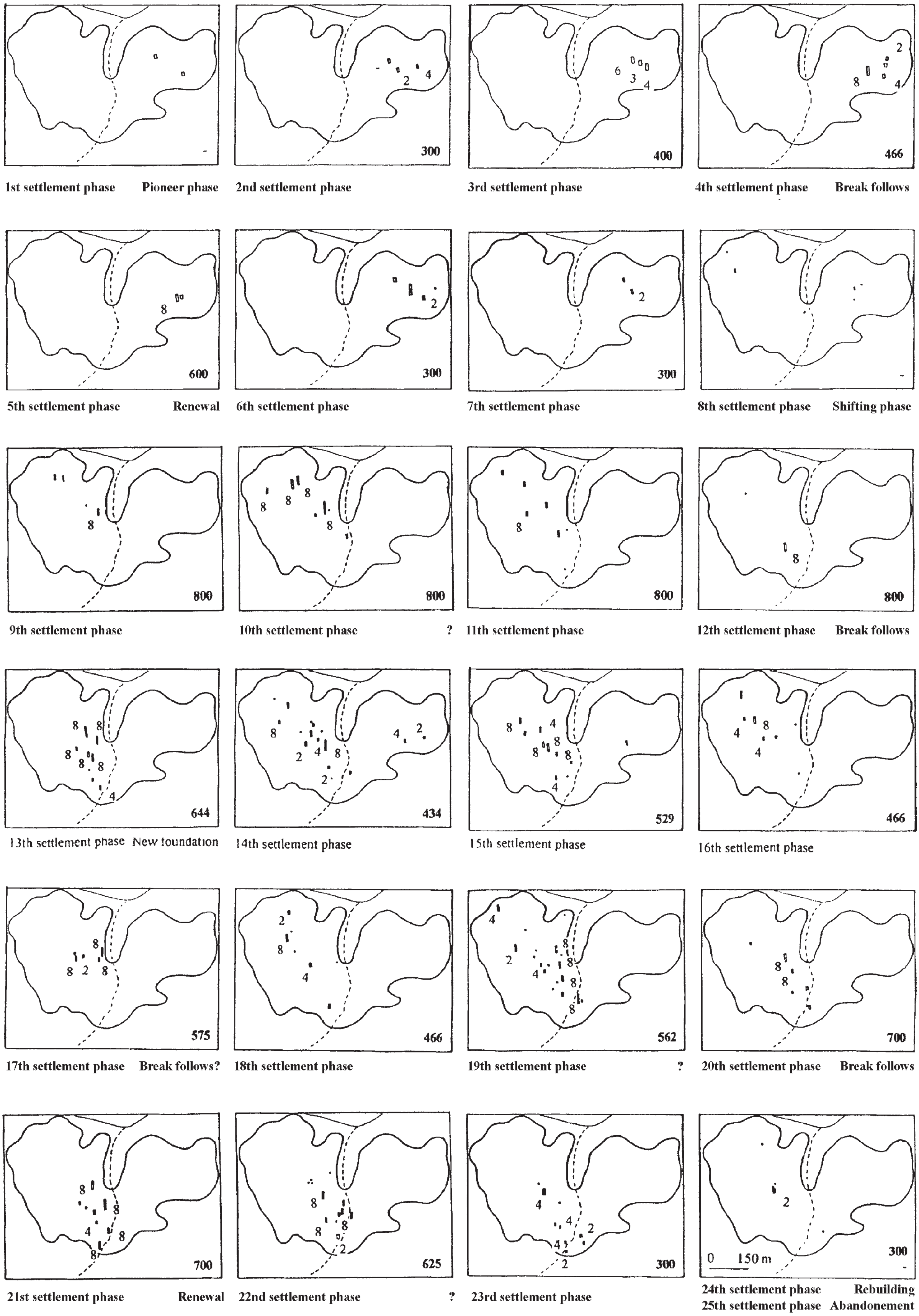


Fig. 6.9.1.a. Stylistic classes within the space of the phases. - Stylistické třídy v prostoru fází.

graduated exchange of information, the influence of which decreased from the entrance towards the northern rear area, depending on the possible number of recipients. The southern entrance area was sufficiently open in relation to the residents of other houses. The positioning of staple food stores on the second floor may have had not only practical reasons, such as security against humidity or pests, but also a reason in hampering the information available to strangers on the real amount of storage in a house. The opposite argument, advanced by H. Stäuble (1994: 199), is that storage space lay on the southern veranda, as this was an open space accessible to all.

The mid-section of the house mediated the main information relating to the inhabitants, not only because of its arrangements, but most probably because of its decoration. From the now famous interiors at Çatal Hüyük, it is possible to suppose that inside the Bylany houses too there was specific decoration relating to concrete situations in the history of the social group that had inhabited the house over preceding generations (Soudský - Pavlů 1966). Such information was destined for the family members but could also have been open for visitors to see. It can be supposed that some limitations existed towards men, women and juvenile family members. The most limited information was mediated by the rear northern area, the least accessible and probably the least well lit section of the house. Not only personal belongings, but also real health conditions, and perhaps other information were protected against the prying eyes of visitors. The recent evidence of violent events at Neolithic sites in Austria allows the assumption that there were different forms of information regulation both inside and outside Neolithic society.

Unlike internal communication, which focussed on individuals or small groups of people, communications outside the house were much broader. Not only the size of the house, but also the overall arrangement of the structure represented the status and prestige of the household and the families dwelling within. Current reconstruction models are limited to a universal house model, but the details that have been archaeologically evidenced show that each house gave individual signs about its inhabitants. The southern section itself marked a house with a higher social status, and the construction of the southern wall undoubtedly represented a deliberate credit. This is also the case for the northern section. Those houses with all three sections had a compact outlook in comparison with simple houses. The most prestigious houses with a strong structure (2197, 41, 96, but also 306, 679) bestowed their prestige upon their inhabitants. For some of them, an enclosure was also attached, a sign indicating a wealthy family, rather than "club" houses as originally interpreted (Soudský 1966: 59).

6.9.3. The cultural tradition of the Neolithic house

The Bylany Linear Pottery Culture houses prove that there was a tradition of architecture that lasted uninterrupted for several hundred years, and which in principle changed not at all. Space and genetic unity is ascribed to permanent information exchange accompanying an exchange of wares that has been proven in some other way (Stäuble 1994: 221). The house's structure can be considered as being an artefact in the system of cultural values, being subject to fewer stylistic changes than ceramics, for example. In this low frequency of change it is comparable to the stone industry, even if the reasons were different in both cases. The stone industry was predominantly individual both to producers and users, while architecture was produced and used by a group of people. In this way, buildings express rather their generalised social and cultural consequences.

The stepwise narrowing of the northern section did not lead to any substantial changes within the ground-plans of houses during the development of the Linear Pottery Culture. The earlier period was characterised by a type with trenches and a rather non-standardised structure. This construction was strengthened over time, so that the trenches for side panelling were no longer necessary. Apart from this, the details of the roof timbers were elaborated. Construction also became more standardised, which step was followed by simple and less variable cross rows. The narrowing tendency latent from the beginning was apparent only at the end of the Neolithic period. It seems that only in the world of the regional Stroke Ornamented Pottery Culture, influenced by the Lengyel Culture region, was the peculiarity of cultural tradition marked more by immovable buildings than by the portable objects that were used on a daily basis. The house of the Linear Pottery Culture preserved its cultural tradition and particularly its construction principles, and its individuality was expressed more in stylistic details that have been less well grasped archaeologically.

Phase / house forms	1 SMALL	2 MEDIUM	4 LARGE	%	N=	Var	Stat
1	100.0	0.0	0.0	100.0	1	1.00	-
2	100.0	0.0	0.0	100.0	2	1.00	300
3	100.0	0.0	0.0	100.0	2	1.00	400
4	33.3	33.3	33.3	100.0	3	9.67	466
5	50.0	50.0	0.0	100.0	2	4.50	800
6	100.0	0.0	0.0	100.0	2	1.00	200
7	50.0	50.0	0.0	100.0	2	4.50	200
8	100.0	0.0	0.0	100.0	1	1.00	-
9	66.7	33.3	0.0	100.0	3	5.33	800
10	40.0	20.0	40.0	100.0	5	9.00	800
11	80.0	20.0	0.0	100.0	5	4.00	800
12	0.0	0.0	100.0	100.0	1	1.00	800
13	28.6	42.9	28.6	100.0	7	8.71	743
14	76.8	11.1	11.1	100.0	9	5.22	433
15	42.9	42.9	14.3	100.0	7	8.71	628
16	100.0	0.0	0.0	100.0	3	1.00	533
17	40.0	40.0	20.0	100.0	5	9.00	650
18	66.7	0.0	33.3	100.0	3	5.33	466
19	44.4	22.2	33.3	100.0	9	8.54	600
20	80.0	20.0	0.0	100.0	5	4.00	800
21	40.0	0.0	60.0	100.0	5	8.00	720
22	56.1	28.6	14.3	100.0	7	6.29	650
23	100.0	0.0	0.0	100.0	6	1.00	320
24	100.0	0.0	0.0	100.0	1	1.00	-
25	100.0	0.0	0.0	100.0	1	1.00	200
%	61.9	20.6	16.5	100.0			
N=	60	20	17		97		

Tab. 6.1.4.A. Relative occurrence of formal types (comp. Fig. 6.0.3.a) of houses within the phases.
Var: The coeficient of variability of formal types within phases is (A. Coudart 1987:156) VAR=a+(100-b)/10) , where a is number of types within a phase, b is for maximal frequency of a type within a phase.
Stat: The coeficient of statics is equal to the ratio of whole volume of average fifth of posts in a house and their reconstructed interred part.
- Relativní výskyt formálních typů (srov. obr. 6.0.3.a) domů ve fázích.
Var: Koeficient variability formálních typů ve fázích (A. Coudart 1987:156) VAR=a+(100-b)/10), kde a je počet typů ve fázi, b je maximální výskyt jednoho typu ve fázi.
Stat: Koeficient statiky je roven podílu celkového objemu průměrné pětice podpěr v domě a objemu jejich rekonstruovaného zahloubení.

House 41	W ditch	W wall	W supports	Central supports	E supports	E wall	E ditch
Distance of the long axis in cm	-	180	160		160	130	-
Size in cm -	18	26	31	31	16		
Depth in cm -	21	30	35	40	11		
+cover (30cm) +erosion (15cm)							
Depth in cm -	66	75	80	85	56		
Reconstructed height in cm	-	165	360	490	315	170	
Heigh in cm -	231	435	570	395	226		
% interred -	28	17	13	22	25		
Volume dm^3 -	59	231	430	298	21		
Volume of the interred dm^3	-	-	39,8	60,4	64,1	-	

Tab. 6.2.1.A. Idealised reconstruction of an average cross-section through house 41 as seen from the south. The average values of the size and depth of the postholes. - Ideální rekonstrukce příčného řezu pro dům 41 při pohledu od jihu. Průměrné hodnoty velikosti a zahloubení kůlů.

House 912	W ditch	W wall	W supports	Central supports	E supports	E wall	E ditch
Distance of the long axis in cm	-	150	160		150	150	-
Size in cm	-	15	26	24	21	14	
Depth in cm	-	21	30	24	21	20	
+cover (30cm) +erosion (15cm)							
Depth in cm	-	76	85	79	76	75	
Reconstructed high in cm	-	165	320	470	330	190	
Height in cm	-	231	395	539	396	255	
% interred	-	28	19	13	17	25	
Volume dm^3	-	41	209	243	137	39	
Volume of the interred dm^3	-	-	39,8	31,2	22,8	-	

Tab. 6.2.1.B. Idealised reconstruction of an average cross-section through house 912 as seen from the south. The average values of the size and depth of the postholes. - Ideální rekonstrukce příčného řezu pro dům 912 při pohledu od jihu. Průměrné hodnoty velikosti a zahloubení kůlů.

House 2197	W ditch	W wall	Wsupports	Central supports	E supports	E wall	E ditch
Distance of the long axis in cm	160	160	160		150	130	130
Size in cm	60	14	14	14	15	14	70
Depth in cm	24	12	12	10	13	10	32
+cover (30cm) +erosion (15cm)							
Depth in cm	84	72	72	70	73	70	92
Reconstructed height in cm	-	165	320	480	320	165	-
Height in cm	-	237	392	550	323	235	-
% interred	-	30	18	13	22	30	-
Volume dm^3	-	36	60	85	57	36	-
Volume of the interred dm^3	-	-	11,1	10,8	12,9	-	-

Tab. 6.2.1.C. Idealised reconstruction of an average cross-section through house 2197 as seen from the south. The average values of the size and depth of the postholes. - Ideální rekonstrukce příčného řezu pro dům 2197 při pohledu od jihu. Průměrné hodnoty velikosti a zahloubení kůlů.

House long-rows / periods	early				middle				later			
	N	R	d.PH	d.post	N	R	d.PH	d.post	N	R	d.PH	d.post
EW	35	.436	44.6	12.6	15	.230	61.6	16.4	23	.082	55.5	13.3
ES	21	.394	59.0	16.3	29	.685	76.0	21.5	27	.255	61.4	18.6
CS	13	.627	58.2	16.5	31	.802	69.4	22.4	22	.456	59.1	18.2
WS	20	.675	54.6	16.0	39	.729	70.0	20.9	32	.291	61.5	19.5
WW	9	.074	44.4	12.8	26	.383	54.2	15.3	25	.231	49.3	14.9

Tab. 6.2.2.A. Correlation of posthole diameter (d.PH) and the post (d.post) impressions in the houses of the early, middle and later phases (EW - east wall, ES - east supports, CS - central supports, WS - western supports, WW - west wall). - Korelace průměru kůlových jamek a otisků kůlů v domech starších, středních a mladších fází (EW-východní stěna, ES - východní podpěry,CSK - středové podpěry, WS - západní podpěry, WW - západní stěna).

House long.rows / periods	early				middle				later			
	N	R	d.PH	d.post	N	R	d.PH	d.post	N	R	d.PH	d.post
EW	35	.681	16.9	12.2	15	.753	21.1	11.9	23	.457	32.3	16.8
ES	21	.895	26.4	18.2	29	.797	32.2	23.4	27	.638	36.3	23.9
CS	13	.585	32.3	16.6	31	.818	33.3	24.9	22	.806	32.8	23.3
WS	20	.938	25.4	19.4	39	.697	31.5	21.7	32	.670	30.6	18.9
WW	9	.242	19.3	12.1	26	.711	23.4	18.3	25	.738	24.4	16.6

Tab. 6.2.2.B. Correlation of the of the postholes depth and the post impressions in the houses of the early, middle and later phases (EW - east wall, ES - east supports, CS - central supports, WS - western supports, WW - west wall). - Korelace hloubky kůlových jamek a otisků kůlů v domech starších, středních a mladších fází. (EW-východní stěna, ES - východní podpěry, CS - středové podpěry, WS - západní podpěry, WW - západní stěna).

Phase	(A)<=3.0m³	(B)<=1.0m³	(C)<=0.2	(D)<=4.0m³	%	N=
1	0,0	0.0	0.0	0.0	0.0	0
2	100.0	100.0	100.0	100.0	100.0	2
3	100.0	66.7	33.3	100.0	100.0	3
4	66.7	66.7	66.7	66.7	100.0	3
5	100.0	0.0	100.0	100.0	100.0	1
6	100.0	100.0	100.0	100.0	100.0	1
7	100.0	100.0	100.0	100.0	100.0	1
8	0.0	0.0	0.0	0.0	0.0	0
9	0.0	0.0	0.0	0.0	100.0	1
10	0.0	0.0	75.0	0.0	100.0	4
11	0.0	0.0	0.0	0.0	100.0	1
12	0.0	0.0	0.0	0.0	100.0	1
13	56.1	14.3	42.9	42.9	100.0	7
14	83.3	66.7	50.0	83.3	100.0	6
15	71.4	42.9	56.1	56.1	100.0	7
16	66.7	66.7	33.3	66.7	100.0	3
17	75.0	25.0	50.0	25.0	100.0	4
18	66.7	66.7	0.0	66.7	100.0	3
19	36.5	50.0	62.5	36.5	100.0	8
20	50.0	0.0	0.0	50.0	100.0	2
21	20.0	20.0	60.0	20.0	100.0	5
22	50.0	25.0	75.0	25.0	100.0	4
23	100.0	100.0	40.0	100.0	100.0	5
24	0.0	0.0	0.0	0.0	0.0	0
25	100.0	100.0	100.0	100.0	100.0	1
%	60.3	45.2	52.1.	53.4	100.0	73

Tab. 6.2.3.A. Relative occurrence of houses with more subtle (<=3.0 m³) and larger interior constructions. - Relativní výskyt domů se (A) subtilnější konstrukcí (<=3.0 m³), (B) lehčí stěnou (<=1.0 m³), (C) nižším koeficientem statiky, a (D) nižším podílem celkového objemu konstrukce.

	Wall		
Construction	LIGHT	HEAVY	%
SUBTIL	43.8	16.4	60.3
MASSIVE	1.4	38.4	39.7
%	45.2	54.8	100.0

Tab. 6.3.1.A. The relationship of the houses according to the amount of labour required (massivity of the walls and the interior structure, comp. Fig. 6.0.3a). - Vztah domů podle pracnosti (masivnosti stěny a vnitřní konstrukce, srov. obr. 6.0.3.a).

Phase / central cross-row	Q22							
	earlier constructions			later constructions				
	BROKEN	RIGHT	UNCOMPL	BROKEN	RIGHT	UNCOMPL	%	N=
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
2	0.0	0.0	0.0	100.0	0.0	0.0	100.0	2
3	33.3	33.3	0.0	33.3	0.0	0.0	100.0	3
4	50.0	0.0	0.0	0.0	50.0	0.0	100.0	2
5	0.0	0.0	0.0	100.0	0.0	0.0	100.0	1
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
7	0.0	0.0	0.0	100.0	0.0	0.0	100.0	1
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
9	0.0	0.0	0.0	100.0	0.0	0.0	100.0	1
10	0.0	0.0	0.0	50.0	0.0	50.0	100.0	4
11	0.0	0.0	0.0	0.0	100.0	0.0	100.0	1
12	0.0	0.0	0.0	100.0	0.0	0.0	100.0	1
13	0.0	0.0	0.0	0.0	50.0	50.0	100.0	4
14	0.0	0.0	0.0	40.0	40.0	20.0	100.0	5
15	0.0	0.0	0.0	42.9	42.9	14.3	100.0	7
16	0.0	0.0	0.0	50.0	50.0	0.0	100.0	2
17	0.0	0.0	0.0	50.0	25.0	25.0	100.0	4
18	0.0	0.0	0.0	50.0	50.0	0.0	100.0	2
19	0.0	0.0	0.0	14.3	28.6	56.1	100.0	7
20	0.0	0.0	0.0	50.0	50.0	0.0	100.0	2
21	0.0	0.0	0.0	0.0	80.0	20.0	100.0	5
22	0.0	0.0	0.0	0.0	66.7	33.3	100.0	3
23	0.0	0.0	0.0	0.0	20.0	80.0	100.0	5
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
25	0.0	0.0	0.0	0.0	100.0	0.0	100.0	1
%	3.2	1.6	0.0	31.7	36.5	26.0	100.0	
N=	2	1	0	2	0	23	17	63

Tab. 6.3.3.A. The appearance of earlier (outer ditches or deep posts) and later (deep posts or none) genotypes and phenotypes (Q22 comp. Fig. 6.0.3.a) within the phases. - Výskyt variant trojice Q22 (srov. obr. 6.0.3.a) jako fenotypů ve fázích v rámci genotypů starších (s vnějšími žlábky nebo hlubokými kůly) a mladších (hluboké kůly nebo nic) konstrukcí domů.

Genotypes	Score of labor				
	3	6	4	8	N=
EARLIER	0	1	1	1	3
LATER	0	0	14	36	50
N=	0	1	15	37	53
3	6	4	8	%	
EARLIER	0.0	1.9	1.9	1.9	5.7
LATER	0.0	0.0	26.4	66.9	94.3
%	0.0	1.9	28.3	69.8	100.0

Tab. 6.3.3.B. The relationship of genotypes and amount of labor required (score comp. Fig. 6.0.3.a). - Vztah genotypů a pracnosti stavby (skóre srov. obr. 6.0.3.a).

Phase	N of classifiable			Variability		
	Q10	Q22	Q30	Q10	Q22	Q30
1	0	0	0	0	0	0
2	1	2	2	1	1	1
3	2	3	3	6.0	5.33	9.67
4	3	2	3	5.33	6.0	5.33
5	1	1	1	1	1	1
6	1	0	1	1	0	1
7	1	1	1	1	1	1
8	0	0	0	0	0	0
9	0	1	1	0	1	1
10	3	4	4	9.67	6.0	8.0
11	1	1	1	1	1	1
12	1	1	1	1	1	1
13	7	5	6	9.71	6.0	9.0
14	4	5	6	8.0	9.0	3.67
15	7	7	6	9.71	8.71	5.33
16	1	2	3	1	6.0	8.0
17	4	4	4	8.0	8.0	9.67
18	1	2	3	1	6.0	6.0
19	6	7	8	5.33	6.29	10.25
20	2	2	2	6.0	6.0	6.0
21	4	5	5	8.0	4.0	10.25
22	2	3	4	6.0	5.33	4.5
23	5	5	5	9.0	4.0	1
24	0	0	0	0	0	0
25	1	1	1	1	1	1
N=	58	64	71			

Tab. 6.4.6.A. The variability (comp. Tab. 6.1.4.A) of functional classes of the northern (Q30), middle (Q22) and southern (Q10) sections of synchronic structures. - Chronologická variabilita (srov. tab. 6.1.4.A) funkčních tříd ve fázích.

House mid-section	Efficiency			
	SMALL	MIDDLE	LARGE	N=
SIMPLE	26	27	7	60
DOUBLE	4	7	11	22
N=	30	34	18	82
	SMALL	MIDDLE	LARGE	%
SIMPLE	43.3	45.0	11.7	100.0
DOUBLE	18.2	31.8	50.0	100.0
%	36.6	41.5	22.0	100.0

Tab. 6.5.3.A. Correlation of the efficiency (comp. Fig. 6.0.3.a) of the residential sections and the size of the mid-section of the houses. - Korelace výkonnosti (koeficient výkonnosti konstrukce srov. obr. 6.0.3.a) obytné části a velikosti střední části domů.

Phase / efficiency	SMALL	MIDDLE	LARGE	%	N=
1	0.0	0.0	0.0	0.0	0
2	0.0	100.0	0.0	100.0	2
3	0.0	100.0	0.0	100.0	1
4	0.0	66.7	33.3	100.0	3
5	0.0	0.0	100.0	100.0	1
6	50.0	0.0	50.0	100.0	2
7	50.0	50.0	0.0	100.0	2
8	0.0	0.0	100.0	100.0	1
9	50.0	50.0	0.0	100.0	2
10	25.0	50.0	25.0	100.0	4
11	0.0	100.0	0.0	100.0	1
12	0.0	0.0	100.0	100.0	1
13	60.0	20.0	20.0	100.0	5
14	28.6	42.9	28.6	100.0	7
15	33.3	50.0	16.7	100.0	6
16	100.0	0.0	0.0	100.0	3
17	20.0	60.0	20.0	100.0	5
18	50.0	0.0	50.0	100.0	2
19	50.0	12.5	36.5	100.0	8
20	33.3	66.7	0.0	100.0	3
21	40.0	0.0	60.0	100.0	5
22	40.0	40.0	20.0	100.0	5
23	60.0	20.0	20.0	100.0	5
24	100.0	0.0	0.0	100.0	1
25	0.0	100.0	0.0	100.0	1
%	38.2	35.5	26.3	100.0	
N=	29	27	20		76

Tab. 6.6.2.A. Category of efficiency within the phases. - Třídy výkonnosti obytných částí ve fázích.

Efficiency / construction style	A	B	C	D	E	N=
SMALL	7	1	21	1	1	31
MIDDLE	9	2	19	1	1	32
LARGE	2	1	8	0	6	17
N=	18	4	48	2	8	80
SMALL	22.6	3.2	66.7	3.2	3.2	100.0
MIDDLE	28.1	6.2	59.4	3.1	3.1	100.0
LARGE	11.8	5.9	46.1	0.0	35.3	100.0
%	22.5	5.0	60.0	2.5	10.0	100.0
SMALL	38.9	25.0	43.7	50.0	12.5	38.7
MIDDLE	50.0	50.0	39.6	50.0	12.5	40.0
LARGE	11.1	25.0	16.7	0.0	75.0	21.3
%	100.0	100.0	100.0	100.0	100.0	100.0

Tab. 6.7.3.A. Ground-plan style (comp. Fig. 6.0.3.a) and classes of structural effectiveness. - Styl půdorysu (srov. obr. 6.0.3.a) a třídy výkonnosti konstrukce.

Phase / construction style	A	B	C	D	E	%	N
1	0.0	0.0	100.0	0.0	0.0	100.0	1
2	0.0	0.0	100.0	0.0	0.0	100.0	2
3	33.3	0.0	66.7	0.0	0.0	100.0	3
4	0.0	0.0	100.0	0.0	0.0	100.0	3
5	0.0	0.0	0.0	0.0	100.0	100.0	1
6	0.0	0.0	100.0	0.0	0.0	100.0	1
7	0.0	0.0	100.0	0.0	0.0	100.0	2
8	0.0	0.0	0.0	0.0	0.0	0.0	0
9	0.0	100.0	0.0	0.0	0.0	100.0	1
10	40.0	40.0	0.0	0.0	20.0	100.0	5
11	0.0	0.0	100.0	0.0	0.0	100.0	1
12	0.0	0.0	100.0	0.0	0.0	100.0	1
13	42.9	14.3	42.9	0.0	0.0	100.0	7
14	16.7	0.0	83.3	0.0	0.0	100.0	6
15	56.1	14.3	28.6	0.0	0.0	100.0	7
16	75.0	0.0	25.0	0.0	0.0	100.0	4
17	40.0	0.0	40.0	0.0	20.0	100.0	5
18	100.0	0.0	0.0	0.0	0.0	100.0	2
19	12.5	0.0	50.0	25.0	12.5	100.0	8
20	0.0	0.0	100.0	0.0	0.0	100.0	2
21	0.0	0.0	80.0	0.0	20.0	100.0	5
22	25.0	0.0	25.0	0.0	50.0	100.0	4
23	0.0	0.0	100.0	0.0	0.0	100.0	6
24	0.0	0.0	100.0	0.0	0.0	100.0	1
25	0.0	0.0	0.0	0.0	100.0	100.0	1
%	25.3	6.3	55.7	2.5	10.1	100.0	
N=	20	5	44	2	8		79

Tab. 6.7.4.A. The occurrence of stylistic types (comp. Fig. 6.0.3.a) within the phases. - Výskyt stylistických typů (srov. obr. 6.0.3.a) ve fázích.

(A) House No.										
Index length/width	1.8	2.2	2.6	3.0	3.6	4.2	4.8	5.6	6.4	6.7	8.2
TYPE 1	250	263	81		65	162		165	41		
	1193	1100	245		272	427		702			
	1236	2195			999	433		1246			
	2191	2290			2295	680					
	2209										
TYPE 3	85	2190		147	677	96	88	405	306		912
	2292	2223		2210	2198		624	2197	678		
TYPE 2			2227		1199	525		679	877		
						903					
						2192					

(B) Number of houses											
Index length/width	1.8	2.2	2.6	3.0	3.6	4.2	4.8	5.6	6.4	6.7	8.2
TYPE 1	5	4	2	-	4	4	-	3	1	-	-
TYPE 3	2	2	-	2	2	1	2	2	2	-	1
TYPE 2	-	-	1	-	1	3	-	1	1	-	-
Total	7	6	3	2	7	8	2	6	4	-	1
Total of houses	21	12	10	2	15	13	3	7	4	-	1

Tab. 6.8.1.A. Prototypes of Neolithic houses (A - houses No., B - number of houses). - Prototypy neolitických domů (číslo domů (A) a počet (B) domů).

"Living in the twentieth century, we can hardly imagine what Europe looked like round 5500 BC." (Modderman 1988: 79)

7. The Linear Pottery Culture settlement area

7.0. Introduction

7.0.1. The concept of site in archaeology

In a certain part of the current theoretical literature, the classic concept of an archaeological site is suppressed and replaced with other, more general terms. This is argued for by an actual view of a prehistoric settlement as a whole, when it is not possible to put any accurate limits between the settled and non-settled areas. It operates using terms like component, which describes the synchronic finds in a selected area (Kuna 1994: 21), or the area itself, which includes more the functional units in the field (Neustupný 1986, 1998: 10). In the majority of cases, when a space was used more than once for different purposes, such terminology requires at least preliminary analysis of the artefacts located in that space. Therefore, more often the situation is described with the neutral concept of multicultural locality, and other similar general terms. This term, which was common up until recently, can in the narrow sense of current archaeological theory be considered a settlement area.

The term site contains an element of interpretation and was from the beginning anachronistic. The generalisation of the term village brings a term more suitable for the unknown prehistoric situation; the medieval village, however, has a definite content, not only of historically recorded organisation but also of archaeologically evidenced attributes. These attributes separate a village from other units such as a court, a hill fort, or later units such as a town or castle. In the beginning, the term "Neolithic site" described unknown facts, perhaps only a place where potsherds has been found. As of the 1930's the kind of interred features that might be expected there became more obvious.

With increasing amounts of evidence, the meaning of the term "Neolithic site" changed, and the details of its structure multiplied. The large-scale excavations conducted both in Bohemia and elsewhere in Europe in the 1950's and 1960's contributed profoundly to this process. The content of the term also changed less obviously with changes in archaeological theory. The cultural/historical concept focused on intra-site chronology, while the functional/processual concept brought more detailed study of intra-site structure and inter-site relations within micro-regions. This was the theoretical trend of the 1970's and 1980's, both in this country and abroad. The settlement and other areas were defined, and intra-regional relations were studied. Current trends towards cognitive/procedural theory have not influenced the study of sites too a particularly great degree. The different theoretical issues currently overlap with the practical problems of the analysis of site artefacts, in contrast to the purely theoretical literature, where different theories are separated and placed against each other.

7.0.2. Neolithic sites and archaeological theory

Cultural/historical theory had to work in the beginning with a point of information in the landscape. Usually isolated finds of portable artefacts were considered proof of a given settlement culture at a given place and in its unspecified surroundings. The aim was to achieve a typological chronology that did not exceed the category of culture in the Neolithic period, e.g. the Linear Pottery, Stroked Pottery and later Painted Pottery Cultures. When interpretation followed it was more speculative, and generally constructed as if independent of the empirical facts.

The functionalist theory brought about an interest in intra-site analysis. It required the excavation of whole settlement areas, which was soon found to be unrealistic, and not only for practical reasons: even theoretically it was difficult to state where the limits of a site were. Settlement areas were defined fairly early on (Taylor 1948, see: Trigger 1992: 276), but within this archaeological field the concept was used in the primary analysis of large sites (Bylany: Pavlů 1977), and described theoretically later (Neustupný 1986, 1994, 1998). Large scale excavations made it possible to work with large assemblages of finds stretched over limited areas of the landscape. The separate components of the area with finds of architectural traces were interpreted as the records of different activities on the part of the prehistoric society. The point of settlement refuse appeared later (Schiffer 1987, Vencl 1995), influencing the interpretation of the structure of finds from archaeological cultures.

The subsequent theoretical contribution of processual archaeology to settlement theory was the focus on geographically limited parts of the landscape - micro-regions. Analysis moved towards being intra-regional, and field excavations towards sampling. There was a tendency to find general regularities, proving the universal behaviour of the culture and its ability to adapt itself to different environments (Binford 1972). A universal model was sought for Neolithic sites, corresponding to a system of initial agriculture as a principle of subsistence. The regions, naturally limited parts of the landscape, were considered as spaces used by individual human groups (Pavlů - Zápotocká 1979). Consequently, the archaeological situation is complicated if these groups were living separately in separate places. or if one group lived in several different places.

Recently, the theory has moved to the stage of cognitive (post-) processual concepts (Renfrew 1995). The space of finds is considered at different levels of complexes which are hierarchically ordered. It is interpreted as the deliberately used and formed space meeting different demands of Neolithic society and its members. The analysis of different levels and the interpretation of the documented structuring of facts and data lead to many different subjective interpretations (Gardin 1997), and to the comprehension of the broader symbolic meanings of empirical facts (Whitley 1993). Neolithic sites are perceived according to this theory as a deliberate use of a landscape for habitation and other purposes, namely social and individual activities (Kuna 1998: 106). Any given landscape was affected by these activities without interruption over long periods. Portable and immovable artefacts are dispersed there irregularly, but not randomly.

7.0.3. Current concepts and situational analysis

The current concepts of site result from the ability to answer a whole set of questions included in the situational analysis (Popper 1993: 184, Whitley 1993: 61) of a Neolithic site. Such concepts includes a list of questions relating to the different dimensions of the world in the Neolithic period, and the present world of archaeology. Not only portable finds such as implements or other products, are considered to be artefacts, but also any other immovable monuments or other human creations. The site begins to be an artefact in just the same way as the cultural landscape, and all of these can be analysed within the framework of situational analysis. While other theories have focused on one aspect of the empirical facts, the method of situational analysis enables the creation of a multidimensional view, as well as changes in the viewing scale.

Inferences on the original cultural context can be drawn from the intra-site structure and its position in the landscape. Within the sphere of the physical facts, this concerns mainly the size of the site, which means the number of synchronic households. The shape of a site comprises either of the natural limits of habitation, productive, economic or other areas, or is deliberately limited by an enclosure, ditch or other form of restriction. The dispersion of settlement refuse inside or outside the site influences the particular types of analysis, as well as the principle chronology. The refuse was originally, in fact, dispersed irregularly on the site, and fell down into the excavated features through complicated and unknown processes. Residual information on the original structure of the artefacts can be studied from this. From the material, different types of correlation are quantified, even such phenomena such as the individual skill level used in the construction of a house or the production of artefacts.

The sphere of subjective experience is documented at the Neolithic site by the scope of division inside and outside the buildings, and by the functional diversity of the different sections. The frequency and the positions of the particular features, as well as their primary functions, are the next important pieces of knowledge that can be obtained from the site. The dispersion of settlement refuse differs according to the kinds of artefacts and their life-span. The number of people in the houses and on the site can be studied using prehistoric demography. Interest in interpretation can even focus on individuals or specific groups defined by gender and age. The inhabitant's ability to adapt to the environment is studied mainly through artefacts. From the complex data now available, the overall socio-economic dynamics of the studied site begin to appear.

The conscious manifestations of a culture - as a common, accepted type of physical organisation of the world within the people's minds - appear in the regularities of the internal and external arrangement of the sites, or also, for example, in the unified orientation of houses. The next cultural expression is in the stylistic elements of Neolithic architecture or symbolic elements in the settlement refuse. It is possible to trace a hierarchy among the buildings and settlements which corresponds to the stratification of social prestige or rank among the inhabitants. Intra- and extra-site information exchange is connected with the evolution of cultural traditions. For the present, Neolithic sites are an important component of unconscious landscape changes over a long period of time. The current cultural landscape may be perceived as an artefact of a special kind, marked by the global scale of anthropogenic changes.

7.1. Primary functional classification: residential houses and their neighbours

7.1.1. The size and shape of a site according to the distance from each house to its nearest neighbour

The archaeologically evidenced unit of the Neolithic settlement is undoubtedly the single house with its surroundings, comprising a household (cf. Tringham - Krstić 1990: 607). The excavations of the Neolithic site and the results show that these households are to some extent grouped together within space and time. As a result, settlement areas are found with different sizes and densities of buildings, representing the grouping of asynchronic features (Pavlů 1977: 11). Their comparison is not possible without a primary analysis of the data to provide the chronological positioning of the buildings or functional elements, and the size of the area built up in comparable time periods. The house itself is the core of family territory in the time scale of a generation of adult individuals. The other components of the economic background of a house might survive longer; family tradition is thus tied more to a place than to a house alone.

The excavations of the BY1 area were not complete, as they uncovered no more than about a third of the total area. The minimum size of this is 23,480 m^2, including sections A-D (14,200 m^2) and sections E-H (9,280 m^2).The density of the buildings is relatively equal according to the survey, and decreases only in limited areas of the site, mainly in section D. Quite exceptionally, several features belong to the Funnel Beaker Culture (Zápotocký 1998). Apart from this, three groups of early medieval features appear. The built-up area was the most dense in the northern part of section A, was relatively dense also in section F, but a survey carried out before the excavations began revealed a lower number of features. They were discovered after deep ploughing, which was not even and did not affect all of the features.

The groups of houses that are contemporary according to the ceramic chronology of the long pits are distributed very irregularly within BY1. To state in a unified way the range of the area used outside the houses would be completely inconclusive regarding the density of asynchronic features. Exceptionally, this happened in the case of the MI2 area (Pavlů 1988b, 1998). In area BY1, data that is perhaps more reliable, which would be useful for the evaluation of the size and shape of the site during particular phases, is lacking. The only reliable fact quantifying the grouping of the houses is the distance of each house to its nearest neighbour (Haggett 1966: 231). The statistical testing of a non-random grouping of houses is, however, strongly influenced by the limits of the excavated sections.

These values can be calculated for all of the houses within a phase. They vary considerably, being calculated from the centre of each house. The lowest value is 30 m in phase 17, and the greatest 110 m in phase 18. In the majority of the phases the values range around 50 m, and are larger in phases 11 (95 m) and 20 (75 m). The distance to the nearest neighbour could be used for a random test, but when the total built-on area is unknown this is not possible. If, however, it were related to the overall limits of the BY1 area or its parts (A-D, E-H), then the distance indicates a non-random clustering of houses. The creation of settlement cores cannot be quantified (Haggett 1966: 89). →Tab. 7.1.1.A.

7.1.2. The temporal dynamics of asynchronic house clusters

It is necessary to distinguish between the horizontal clustering of synchronic houses within an area and the vertical clustering of the asynchronic houses in one place. The former is labelled as a settlement phase, whilst the latter is interpreted - based on the excavations at Merzbachtal (Lüning 1991: 70, 1997: 38) - as a result of the stepwise reconstruction of a house within a relatively small area. In the LW8 area (a locality in the Langweiler cadastre of the Lower Rhineland) irregular habitation spaces were created of about 130x60 m, and after a relatively long period of reconstruction contained up to twelve generations of houses. According to the quantity of houses that were reconstructed, concentrations of houses are created in areas of different size (Milisauskas 1978: 98), which, in accordance with the situation in the Rhineland, can be classified as a) separate courtyards (LW9), b) small site cores (Olszanica) and c) large site cores (LW8). This classification comes from the primary definition of a courtyard, which comprises a house and the contemporary features in its vicinity (about 20-30 m) (Lüning 1991: 69, 1997: 37). This classification has been accepted for different regions (Bogucki 1988: 63).

The situation in some of the regions shows that this model is not necessarily a universal one. In the Limburg region of the Netherlands, stepwise reconstructed buildings were constructed in one direction, and the resulting picture is of the creep of the whole site. At large sites this was complicated by several cores (Modderman 1988: 101). Unidirectional site creep is visible at Cuiry lès Chaudardes (Ilett 1983), but also at Strachów (Kulczycka-Leciejewiczowa 1993: 66), where the situation is limited by the geomorphology of the site (Kulczycka-Leciejewiczowa 1989: 328). Simple rebuilding in one direction was also discovered in Miskovice 2 (Pavlů 1998), even when the houses did not follow any regular ordering. An apparent asynchronic clustering of houses with overlapping ground-plans has been discovered at Štúrovo (Pavúk 1994: 182); individual habitation spaces are maintained there, as if on one spot surrounding a free space in the centre. Continuity of space is considered to be the principle idea of Neolithic sites in the Balkans (Stevanović 1997: 388).

The sequence of 25 phases is devised using the dynamic of the site area BY1 in 6 parts (Pavlů 1989: 284), which were separated by marked changes in house distribution. These changes were interpreted as movements or renewals of the settlement with preceding interruptions. It was shown above how the development of different quantities of artefacts corresponds to such an interpretation. The temporal components better enable the tracing of the groups of asynchronic houses. In the first three of these (phases 1-4, phases 5-8, and phases 9-12) it should be possible to a certain extent to think of these as groups of consecutive houses in limited places. The continuity of the settlement is therefore connected more to place than to one house. The consciousness of a genetic belonging to the place could have survived in family tradition in those periods when no house was actually in use at that place. The abandoned house or its ruins could be considered as the home of ancestors, for example.

The concept of the household presented here as the continuity of a place differs slightly from the concept of the courtyard in the Lower Rhineland. One household might comprise more asynchronic components, as is the case for area MI2, where the production area of pit 41 (Pavlů 1998: 75) survived at least through a period when the houses were rebuilt twice, and was finally filled in with refuse, the chronological structure of which seemingly comprises an independent phase coming after the construction of the final house. Under such conditions, and together with the aforementioned hypothesis, many different phenomena within the Linear Pottery Culture can be explained. If the earlier houses could represent the homes of the ancestors, then they could remain buried ("lived in") there, and their remains disappear over time, together with the destruction of the upper horizon. By contrast, in the eastern region where the rebuilding of houses at a site is more frequent (Štúrovo, Mohelnice), deceased persons could be secondarily buried in new houses, as is known from Near Eastern examples, or a separate burial area could be established. This might be one of the reasons for the separate cemeteries in the Danube region.

It can be accepted that two or more synchronic houses existed in a phase on the site of one household. This does not contradict the hypothesis about family branches as a reason for settling new areas (Soudský 1966: 53). In the first part of the phase sequence, the position of house 2224 is too close to house 2290. The latter house could represent a group of buildings from an area to the northeast of this that has not yet been excavated. In the second part of the phase sequence, houses 2198 and

Fig. 7.1.2.a. Groupings of buildings within the dynamic intervals of the phases. - Seskupování staveb v dynamických úsecích fází.

2278 from the initial phase also remain relatively close to each other. Phase 4 corresponds best to this model. The number of settled households would be about four or five during the first eight phases, if a similar density of buildings is calculated for that part of section E that has not yet been excavated.

The five settled places may also have been constructed in the third part of the phase sequence, after the site was removed to the western part of area BY1. Several places must be assumed for the parts of sections C and D that have not yet been excavated, namely to the north-east and south-west of the excavated area. The renewal of buildings in phase 13 and the relatively dense distribution of houses in the fourth part of the phase sequence do not permit isolated settled places to be reconstructed. During this time, the habitation area apparently enlarged from the south-east towards the north-west.

In the fifth period of the phase sequence, the western part of area BY1 was settled with more regularly rebuilt houses. A possible grouping is apparent in section B, where the buildings follow each other (361,366 a 369), and there is one pair, 610 and 619. The last period of the phase sequence shows very concentrated settlement in the centre of area BY1, again without an apparent grouping of asynchronic houses.

The distribution of the houses at Bylany does not show any universal model of the grouping of asynchronic houses. Rather, it proves more the regional differences (Modderman 1988: 101), but does not exclude changing rules during the period of development. The groups of asynchronic houses are more apparent in the earlier periods of the phase sequence than in the later. In the third and the fifth periods (phases 9-12, 18-20) a grouping is visible even if it does not necessarily imply the continuation of the households (cf. Pavúk 1994: 251), but rather stable building places (Pavúk 1994: 182). When the places were reserved for the replacement and rebuilding of houses belonging to one family, this would mean the deliberate division of a space for the households and their descendants.

7.2. The economy of the building area in an environmental context

7.2.1. Groupings of synchronic houses

The majority of the houses datable with ceramics to particular phases represent 86 % of the uncovered ground-plans, which can be classified into 25 settlement phases. The synchronic buildings are grouped in irregular patterns in every phase. These vary from random ordering to the accumulation of houses around a core. Sometimes the deliberate displacement of buildings is assumed around a free central space (Štúrovo: Pavúk 1994: 243), or around a place surrounded by an enclosure (LW8: Lüning 1991: 70). At Bylany, only a few phases show any regular distribution of houses.

Other than in the initial phases with their lower numbers of houses, regular displacement is found in phases 11 and 18. In both, the greatest distance to the nearest neighbouring house appears. Beginning in phases 9 and 10, houses were dispersed at greater distances, with the exception of one or two that stood closer together. In phase 11 the houses stand in positions similar to a checkerboard pattern. However, at least two further houses can be assumed in the area of section D to the south-west that has not yet been excavated, but may not necessarily have distorted the scheme. A similar situation was found in phase 18, representing the renewal of a settlement in the western part of habitation area BY1.

In other periods the houses are arranged more in a compact cluster, as for example in phases 17, 22 or 23. In phase 21 the houses are situated in a double segment which was open to the south-east. In phase 13 a similar segment comprising ground-plans is open towards the north-east. Both of the latter phases represent the renewal of the BY1 built-up area. The phases of renewal (phases 13, 18 & 21) are distinguished by the very regular partitioning of the built-up area; in the majority of the other phases no deliberate regular partitioning is visible. It follows that there was an absence of any higher form of organisation in the settlement areas.

7.2.2. Space outside the houses

The regular partitioning of the houses in some of the phases preserves adequate space between the individual buildings. The potential space at the disposal of a given house can be measured using Thiessen polygons (Haggett 1966: 247). Their limits pass through the middle of the distance between each pair of houses. In this way, the limited area for house 312 in phase 11 is calculated at 1.40 ha. In the phases with a more densely built-up area, the polygons are much smaller - for house 133 in phase 21, for example, the calculated value is less than

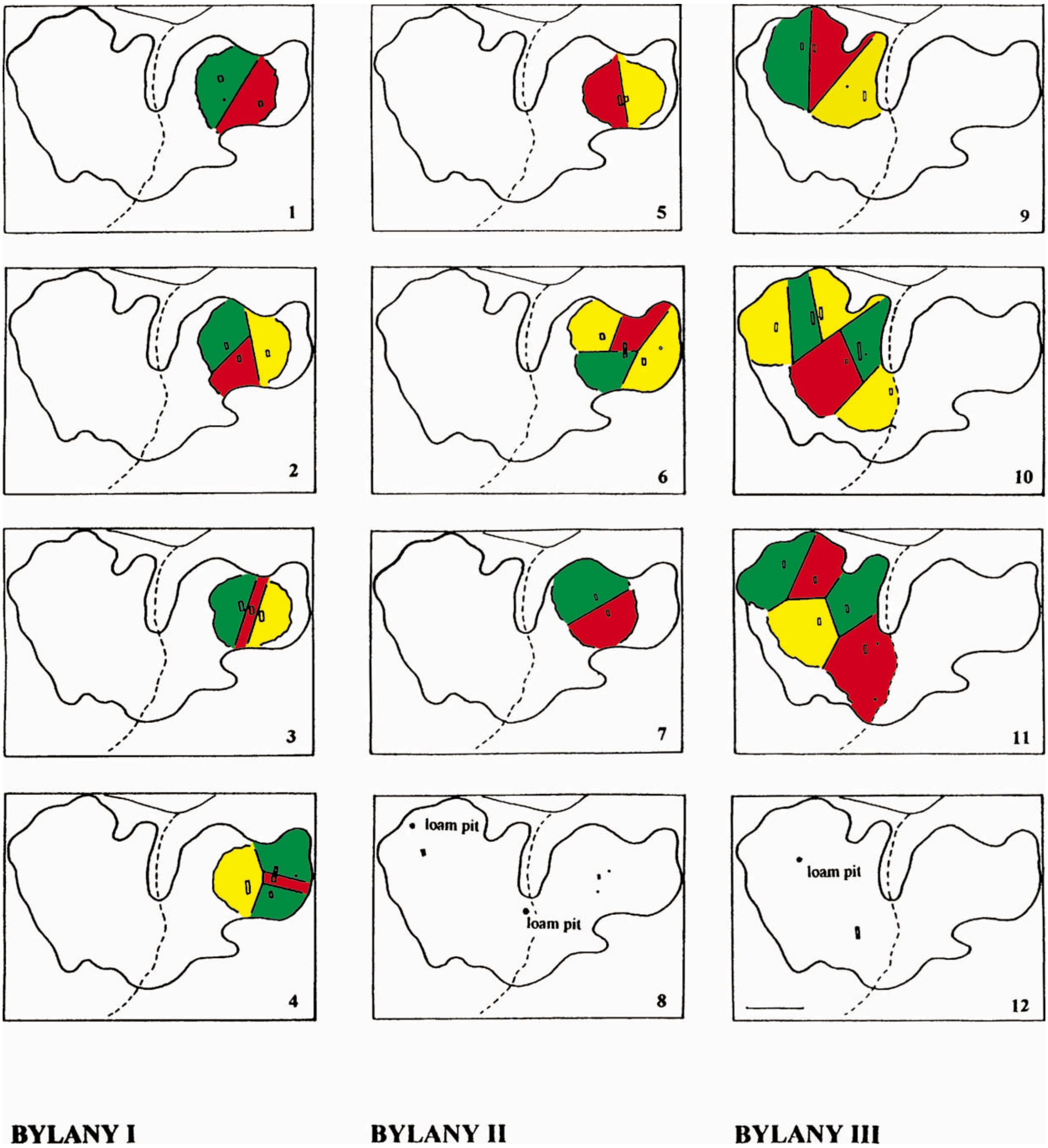


Fig. 7.2.1.a. Thiessen polygons in the grouping of contemporary houses (interval Bylany I - III). - Thiessenovy polygony v seskupení současných domů (I - III).

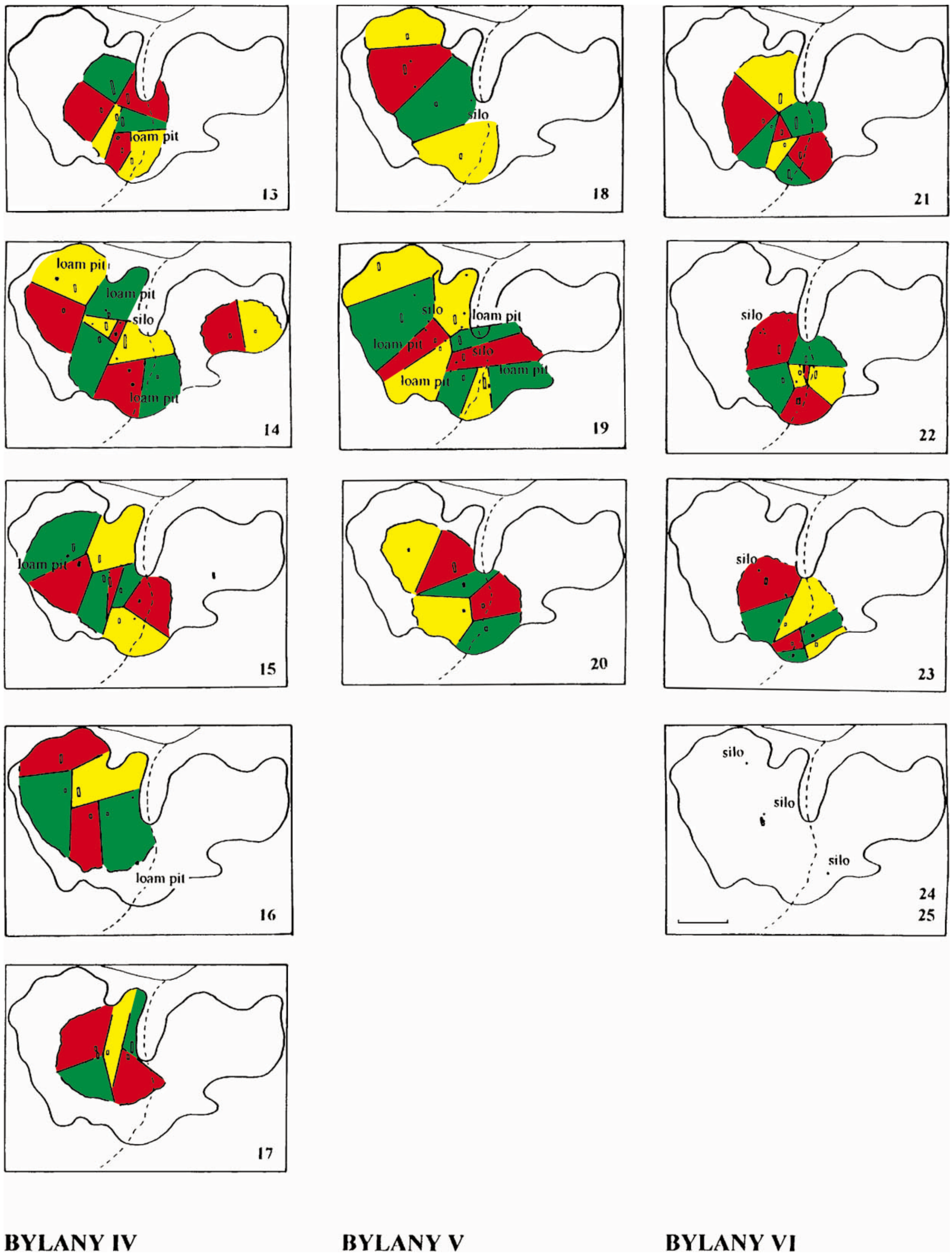


Fig. 7.2.1.b. Thiessen polygons in the grouping of contemporary houses (interval Bylany IV - VI). - Thiessenovy polygony v seskupení současných domů (IV - VI).

0.22 ha. The aforementioned division of the space between the houses, however, is only a rough estimation, and shows that synchronic buildings could use quite different portions of the spaces in their vicinity.

At least some of the households required a space outside the built-up area. If they had the role of self-sufficient and fully independent courtyards (Lüning 1991: 68), then the immediate vicinity would not be sufficient for them. Apart from the built-up space beside the house and the nearest spaces used mainly during the construction period (Pavlů 1974: 470), other working or production places existed. These production areas were not necessarily connected with only a single house. The identification of these is, however, complicated in the densely built-up areas. When some of the isolated pits can be dated into phases, they are found in different positions in relation to the houses. Only exceptionally are they to be found in a polygon, and more often they are on the edge of the settled area.

Sometimes their function can be related to a house, as for example in phase 8, where the individual building places are relatively distant from each other. In other cases, they played a common role and are situated at the limits of the polygons. This is the case for loam pit 7 in phase 13, and for the smaller pit 137 in phase 22. A similarly common function was also displayed by silos 292 and 293b in phases 22 and 23: these are situated at the limit of the polygon around the largest house in each phase. The smaller features with a lower number of finds are difficult to date at the level of the phases, or to attach to any particular building (Pavúk 1994: 251); the refuse assemblages from the isolated pits behave differently from the point of view of the statistics provided by decorative elements. An example of this comes from area MI2, where the group of pits to the south-west can be dated to the end of this area (Pavlů 1998b). According to their configuration, they represent a production area that was probably used for an extended period over the lifetimes of several buildings (cf. section 7.1.2.). →Tab. 7.2.2.A.

On the basis of the uncovered houses that can be dated into the phases, a minimum number of these can be estimated for area BY1. In the first three periods of the phase sequence, the number of building places can be reconstructed as 3-5 in the eastern part of the area and 4 in the western part of the area. In the fourth period, at least two must be added as non-excavated and in the sixth at least one such house. In the fifth period of the phase sequence 1-2 building places were added, excepting phase 12: this is represented by house 88, just as is the case in phases 24 and 25. The isolated house may be taken as characteristic of the final phase of the third period of the settlement's development, and came to an end a long time before the area was abandoned. The number of houses is estimated at 4 - 13 for the other phases. In the first two periods, there are on average 5 houses in an area of 9 ha. In the rest of the periods, the estimate is of 8 houses in an area of 14 ha.

7.3. Informative content of functional categories

7.3.1. Individual houses, their development and rebuilding

Overlapping ground-plans appear in only one instance at Bylany, in the final phases. In general, such overlapping has been noted to be more common in the Linear Pottery Culture (Štúrovo: Pavúk 1994: 242, Mohelnice: Stäuble 1994), although in the western regions it is not so frequent (Lüning 1991: 68), and in the Netherlands is completely absent (Modderman 1970: 203; 1988: 97). At Bylany the deliberate searching out of suitable and not yet built-on areas is evidenced throughout the whole development of area BY1. The rebuilding of the house in phase 24 is unique. In this case, the limits of an optimal area not exceeding an altitude of 315 metres a.s.l. were respected. The ruins of the older building must have been visible for a long time, and perhaps throughout the remainder of the culture. This is witnessed in the case of the Stroke Ornamented Pottery Culture cemetery at Miskovice 2, lying within the space of a much earlier Linear Pottery Culture house, or the building of the Lengyel Culture house at Roztoky which merged with an earlier Linear Pottery Culture house (Kuna 1991: 31). The continuity of space could exceed the time limits of a culture, or the real genetic kinship of a social group.

There is a question as to how far construction materials were useful and transferable into new houses. This relates mainly to the posts of inner structure, which demanded a higher work input. Some social limits must be considered, such as taboos regarding houses where people died of infectious diseases, or for other reasons. These cases were an exception to the continual development of a period in the phase sequence. They might cause the transfer of the site area, or the interruption of building activity during the final stage of such a period. A more acceptable idea is that the earlier houses survived for a short time, during which the new houses were built; firewood could also be picked out of their ruins. The records of house fires are sporadic, as in the case of house 41. Within the Linear Pottery Culture it is doubtful that there was a process of deliberately firing old houses, such as is supposed in the Vinča Culture (Stevanović 1997: 385).

7.3.2. House clusters, their development and relationships between the generations

The clustering of asynchronic houses either within a building place or in one part of an area is the result of the rebuilding of houses in close proximity to one other (Modderman 1988: 101). This bears witness to the fact that the builders of a new house were aware of genetic relationships to the earlier house, and this consciousness survived at least over one interval of phases. A kind of long-term tradition bridging several phases cannot be ruled out, according to the isolated houses in section F from phases 14 and 15. The BY1 settlement area can be divided according to the configuration of the terrain and the stepwise settling into the eastern and western parts. Both of these have the character of settlement genotypes. The differences in the built-up spaces during individual phases correspond to settlement phenotypes. The origins of settlements are in this way evidenced at the level of micro-regions; particular components, or different functional areas, represent a concrete form of the usage of the area at a given moment.

7.4. Classification of primary functional areas in the settlement system according to a definite subsistence pattern and division of labour

7.4.1. Functional areas

Individual, functionally different areas can be distinguished at Bylany only at the level of the excavated sections. These were the originally treated names for those parts of the Bylany cadastre, usually the field complexes in which the excavations and survey were conducted. Concerning areas BY1 to BY5, these parts of the terrain were recently labelled when continuous traces of archaeological features were found. Their subdivision into a system of micro-areas and functionally separate components is not possible without a more detailed analysis of the artefacts. Different kinds of features or the parts thereof contribute to our knowledge of an area's function, characterising habitation, production, economic, storage or other components.

The analysis presented includes the subdivision of the BY1 area into two parts. The first comprises the eastern area (roughly sections E-H) with 7 habitation components of the Linear Pottery Culture and probably one of the Stroke Ornamented Pottery Culture (Lengyel Culture), (Pavlů - Zápotocká - Soudský 1987: 189). The second one comprises the western area (roughly sections A-D) with 18 habitation components of the Linear Pottery Culture and at least 3 habitation components of the Stroke Ornamented Pottery Culture (Lengyel Culture). Apart from these, there is one economic component of the Lengyel Culture, including several loam pits and a palisade enclosure, in the south-eastern part of section B (Pavlů - Zápotocká - Soudský 1987: Fig. 10).

The known finds from area BY4 were analysed in part. Two habitation micro-areas can be distinguished there (sections S-U, and V-Y), along with one economic/cultural area. The functional components have not been separated out in detail. From these the following are assured: 1-2 habitation components of the Linear Pottery Culture, 2 economic (Linear Pottery Culture and Stroke Ornamented Pottery Culture) and one economic/cultural (Stroke Ornamented Pottery Culture) component (= roundel, Pavlů - Rulf - Zápotocká 1993). The known evidence proves the duration of the inhabitation of the micro-area in the south-eastern part of BY4 only in the early stage of the middle Linear Pottery Culture period, two buildings of which were uncovered by excavations in the roundel (in 1990-91). At least three further buildings existed there, uncovered under the western segment of a larger trench (in 1992). All of these finds prove the 2-3 components of the Linear Pottery Culture from the final part of the early period, until the beginning of the middle Linear Pottery Culture period.

Analogously, the habitation micro-area MI2 with three Linear Pottery Culture components, and economic micro-area MI2 with one Linear Pottery Culture component, can also be distinguished (Pavlů 1998a), as can one Stroke Ornamented Pottery Culture burial micro-area in the same place (Zápotocká 1998a). The Linear Pottery Culture components from the south-eastern part of BY4 are roughly contemporary with the house development in the MI2 area. The other Linear Pottery Culture features are later (Zápotocká 1995a) and have more the character of storage or economic components (Rulf 1995). Therefore, a functionally different micro-area in this part of BY4 is assumed (Rulf - Zápotocká 1995: 86). Another separate micro-area was uncovered (in 1993) in the northern part of section S with the remains of about 4 houses. These may prove that several other components of the Linear Pottery Culture, or Stroke Ornamented Pottery Culture, are later than those in the habitation area in the south-eastern part of BY4.

These results are important from the point of the interpretation of the BY1 area in two ways: (1) in at least part of BY4, the density of the survey finds is not comparable with BY1 in the sense of the interpretation of the number of buildings. (2) according to preliminary evidence, the larger economic area of BY4 was partly contemporary in function with some of the settlement components in BY1. The individual, smaller economic components belonging to the habitation components in BY1 are, to a limited degree, interpretable according to the appearance of silos and loam pits, when they are dated into phases. Other economic features such as tan-pits (narrow trenches) were also distinguished there (Zápotocká 1989b: 193), but for the most part they could not be dated.

7.4.2. Functional variability

The structures of the southern house sections are an important attribute of the socio-economic function of individual buildings and their synchronic groups. Their existence is connected to the social status of their inhabitants, who decided on the division of crops (Modderman 1988: 97). Important evidence was discovered at Merzbachtal, where these houses are related to food and chipped stone industry production (Boelicke 1982: 27). This is proven by the concentrations of decorated pottery and, in particular, botanical remains relating to wheat processing (Lüning 1997: 38). In the earlier period of sites in the Netherlands such buildings are prevalent, and later there is only one in each period (Modderman 1988: 96). At Štúrovo, the buildings with southern sections were rebuilt in the same place and had a greater width. They were also marked by the absence of long pits (Pavúk 1994: 246).

If the southern sections of the houses represent focused wheat processing and the location of household storage, then the silos are complementary features for the long-term storage of crops (Soudský 1966: 29). It seems better to assume that they were the storage facilities for both winter and spring wheat; winter wheat did not require longer storage (Willerding 1983: 213). The earliest Neolithic agriculture was based on winter wheat, as this corresponds with the genetic ancestors of domesticated types of vegetation in the Near East (Willerding 1983: 204). Therefore, in the earliest phases at Bylany buried silos are absent. The finds of Neolithic features of this kind have been analysed (Šumberová 1996) in the context of all of the storage facilities, including more than one hundred features from Bylany. ➔Tab. 7.4.2.A.

7.5. The identification of activities within households and phases

7.5.1. The economic role of household and habitation components

Every household fulfilled an economic and socio-economic role as an independent unit in relation to the house's inhabitants and to the inhabitants of other houses. The focus of the primary internal economic function was based on providing primary living requirements, including housing and subsistence. Any processing of material followed these primary requirements. The question remains as to how far the use of the natural capability of people to process all of the materials was changing. It was used at its maximum during the pioneer phases of foundation or renewal of the houses or components, in which periods the maximum amount of unprocessed raw materials also appears in the refuse. The early specialisation of processing the materials for chipped stone and polished industry outside the houses because they were not available locally is logical. In critical periods, the short term interruption of long distance contacts must be presumed; in these instances, these activities temporarily returned to the households.

The exchange of products is not supposed within the house, which does not rule out the mutual exchange of personal belongings, such as decorated pottery, for example. The majority of implements were probably held in common, as the sets of stone implements, mainly grindstones, testify. Undoubtedly, simple rules of inheritance were applied mainly to portable artefacts. Respectively, the limitations of these rules can also be assumed, but their institutionalisation, like a taboo, remains too speculative.

The focus of the secondary external economic function of a household was generally on processing materials - not only stone industry, but many other materials also. First of all, there was clay procurement for ceramics. The first isolated loam pits appear in phase 8, and they are not exceptional later; they comprise one production or economic component commonly used by several households. The frequency of buried features outside the houses demonstrates the permanent demand for this material for many reasons, and this is not only true for ceramics. It could have been used in the construction of ovens, for material to repair house walls or to permanently renew pottery sets. Other commonly processed materials would have included the raw materials for grindstones, or for producing textiles or baskets. The procurement of wood, especially for constructing houses, was undoubtedly also common.

The external economic role of the household varies according to its particular situation, and mainly according to successful annual crops. A kind of redistribution of staple foods also cannot be ruled out. This probably depended on the unequal social rank of the households. Exchange between the households was probably not great: they had the same access to long-distance resources. Some system of gifts among relatives, or rituals held on the occasion of ceremonies, can be assumed.

7.5.2. Index of activities

Socially separated activities comprise a horizontal social differentiation (Van de Velde 1990: 36), and can characterise complementary groups of people differing according to gender or age (Van de Velde 1990: 20). The proofs of such social subdivision are sought in grave furnishings. It is assumed that neither the implements for daily use nor local materials were placed in graves. At the Nitra cemetery, a significant correlation between Spondylus ornaments and older men was found; the chipped stone industry is associated more with adult men (Milisauskas 1978: 115). No social differences can be inferred from the outfitting of individual graves in Bohemia. If an exceptionally equipped grave appears, e.g. that of the child from Vejvanovice, then this is more likely to mean that the deceased was an exceptional person (Zápotocká 1998: 182).

An isolated experiment was carried out on the division of an outside house space according to the average frequency of the different kinds of artefacts discovered. From the differences found, an ideal model of three working zones was constructed. The first comprises the southern and side space, and is characterised using ceramics. The second consists of the northern and the side space, and is represented by chipped stone industry. The third and last is formed by the north-western space outside the houses, where the majority of hand-stones concentrate (Boelicke 1982: 24; 1988: 348). Such a subdivision may indicate a gender division of the outside house space, where the first one would be for women and the latter two for men. Because the appearance of artefacts in these contexts is not unique, it is possible to speak more about tendencies than about a strict division. It corresponds, however, with the accepted idea of gender divisions in working or production areas.

In the densely built-up BY1 area at Bylany, the successful identification of similar subdivisions is less probable. A usable model is inferred from the situation at Miskovice 2. A group of irregular pits was found outside a group of three houses southwest of house 32, which could be interpreted as an isolated production area. In pit 37, a whole two-part grindstone was found together with a blade, pit 39 contained axes and two grinders, and pit 41 contained a large number of stone implements of different kinds. The collection is datable by the ceramics after ascertaining the period of the houses. Regardless of this, it can be connected to the habitation area (Pavlů 1988b).

The houses are datable by ceramics from the long pits, most probably representing refuse from the initial period of the house's existence. The production area was filled in with refuse from the end of whole habitation area, which would correspond to the end of house 23. The production area is close to house 32, but the other houses have an independent northern pit, which has a comparable interpretation. A similar space could be attached to them, theoretically invisible in the southern section, without buried features. Another interpretation is also

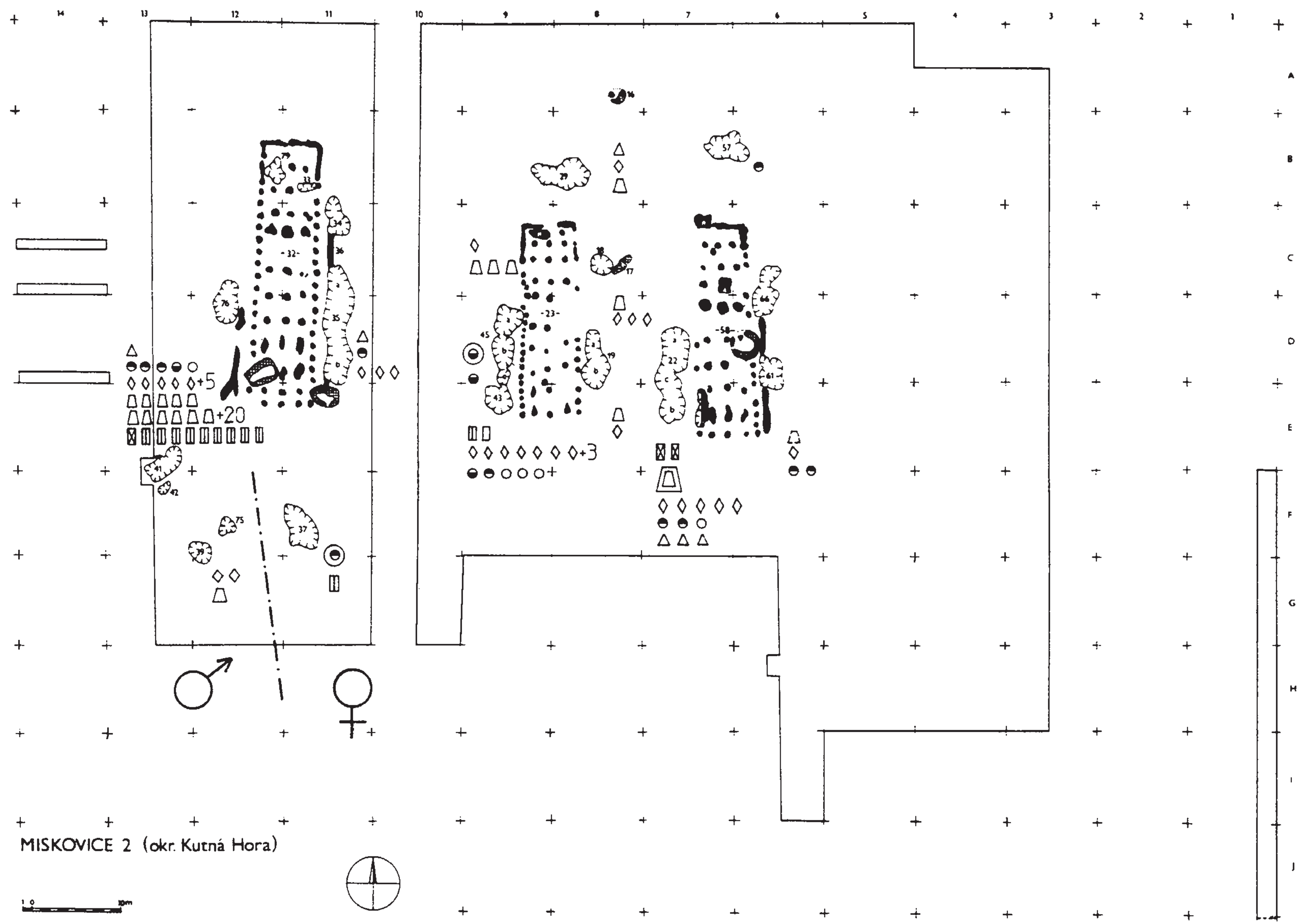


Fig. 7.5.2.a. - Working area with male and female components at the Miskovice 2 site. - Pracovní areál s mužskou a ženskou komponentou na sídlišti Miskovice 2.

acceptable: the production area was founded during the existence of house 58, or with house 32, and survived until the end of the lifetime of house 23. The model of the refuse structure corresponds to this latter interpretation (Last 1998: 27, Fig. 8).

The Miskovice case is proof of the possible data for horizontal social division on the sites. The western section would be for men, the eastern section for women. Its continual duration is highly probable. Once founded, it was not necessary to transfer the production area with the renewal of houses - only the distance from the entrance increased. In such a model, the habitation and production components lasted parallel to and longer than single settlement phases.

7.5.3. Site demography

The number of inhabitants per house has for a long time been a subject of speculation, and one of the bases for the demography of Neolithic sites. Estimates are based on the relationship between the roofed area and the number of people in recent ethnographic societies. A formula is quoted that states that about one tenth of a living area was occupied by one man (Milisauskas 1978: 92). Another theory involves the comparison of the number of ovens or family hearths in a house with its plane (Soudský 1966: 55; Milisauskas 1978: 104). Some results have been reviewed before (Pavlů 1977: 8), and the methods have been critically evaluated (Pavúk 1994: 256). The estimated numbers vary considerably, and range more within the logical limits conditioned by use of the method applied, than within more accurate empirical values.

A slightly different method consists of estimates based on unknown Neolithic cemeteries (Milisauskas 1978: 116 - 118; Neustupný 1983: 106 - 109; Modderman 1988: 74 - 79). Many unknown factors are considered which influence the incompleteness of the age composition of the buried population (Pavúk 1994: 258). Therefore, the majority of authors agree with the estimate of one family per house, and for each 5-10 inhabitants (Modderman 1988: 77) with an average of about 6 (Milisauskas 1978: 116). The lowest estimate of 4.11 people (Neustupný 1983) per house comes from a pessimistic evaluation of the death rate of the Neolithic populations.

From the current hypotheses on the development of components of the Linear Pottery Culture in area BY1, it is possible to make such a calculation using datable houses, which represent 86 % of all of the uncovered buildings. The construction sites can be completed, with one or two in each phase (Tab. 7.1.1.a); in the last phase there is only one. At Bylany there is another element influencing number of inhabitants, which is the doubled living space in some of the houses (Modderman 1988: 94).

Based on the reconstructed number of houses within a phase, the minimum number of families can be calculated (Tab. 7.2.2.a). Estimated numbers vary within the periods and generally, with the exception of the first, numbers decrease towards the end of each period of the phase sequence. This would enlarge the hypothetical interpretation of the site dynamics, in which periods of stable development were replaced by demographic changes. The habitation micro-area reveals a tendency toward the optimisation of the settlement when its size was increasing. The hypothesis about the birth rate of the site's population leading to the periodic abandonment of the site (Soudský 1966: 58) can be applied well in this situation. The principal hypothesis about the growing Neolithic population (Modderman 1988: 98) takes on a concrete form at Bylany, with fluctuation in the size of the habitation areas.

The question remains as to the length of the hiatuses, if any. The changes were sometimes represented by a phase with only one house in which the last generation lived before being replaced by a new group of younger families. The same form of site change is found at the point where cultural change between the Linear Pottery Culture and the Stroke Ornamented Pottery Culture took place. A further question exists as to the dynamics of the economic areas, which might be different from those of habitation areas. The currently less well-known area BY4 at the roundel space presents a concentration of storage pits; the reasons for this accumulation of large loam pits have not yet been explained (Zápotocká 1995: 71).

7.6. The informative content of continuity and discontinuity in subsistence patterns

7.6.1. Socio-economic structure within the phases

Unequal access to raw materials leads to a vertical social hierarchy that can be traced in three dimensions of inequalities. According to one model, these are power, authority and prestige. In pre-state societies, the leading person corresponds with such names as Chief, Big Man or Old Man: the first has inherited, genetic power, the second prestige earned by his own endeavours, and the third one prestige in accordance with his age (Van de Velde 1990: 21 - 24). In living societies of this kind the leading persons occupying the social peak appear in a more complex form.

On the basis of analyses of house structure at Neolithic sites in the western region and of the polished stone industry, one possible model of a social hierarchy has been worked out for the Linear Pottery Culture. Each self-sufficient part of a site had its own chief, one of whom would be the focus of power for the whole site. The inhabitants of the houses comprised a site council. The Chief represented authority, while the unequal distribution of the stone industry is a sign of power. The inhabitants of the largest houses had the highest prestige. Such an organisation was based on the household, and represented a relatively stable political structure (Van de Velde 1990: 37 - 38).

This model represents one possible interpretation of Neolithic site data. The corresponding data and its behaviour can be traced at Bylany. Overall, the houses without a southern section dominate in about three quarters of the cases, and houses with a simple mid-section account for about two-thirds of the total. In order to judge the relative frequency of stone artefacts, their average values were multiplied by the numbers of combinations of the houses with a southern section and a double mid-section. For houses with a simple mid-section and without a southern section, there are on average 48.9 linear decorated pots. For houses with a double mid-section, the average is 1.5x greater, and for the houses with a southern section, there are 1.8x more pots. Similar calculations were carried out for other types of decoration: the doubling of the mid-section has a greater influence on the proportion of relief and technical decorations, i.e. on the undecorated pots in comparison those bearing linear decoration. The existence of the southern section increases the proportion of linear decorated pots. This does not correspond to the results from Merzbachtal, where this ratio was surprisingly low (Boelicke 1982: 26). The decorated ceramics increase more in those the houses with a combination of southern section and larger mid-section.

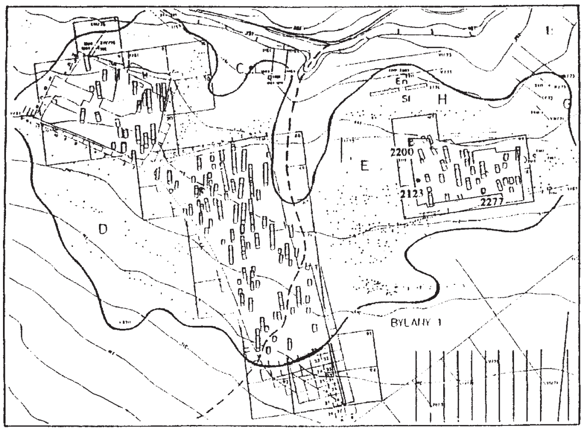
A similar quantitative structure appears in the stone industry. For example, those houses with a large mid-section but without a southern section yield on average 1.2 adzes and 1.9 axes. Houses with a large mid-section yield an average of 1.44 adzes (1.2x more) and 2.66 axes (1.4x more). The highest proportion of axes is found in those houses with a larger mid-section. For those houses with a southern section and a simple mid-section, the proportion is double. For those houses with both attributes there is an increase of the lower ratio. The increased proportion of polished stones is seen partly in those houses with a large mid-section and partly in those houses with a southern section.

At Bylany, two factors combine to increase the number of polished stones in the refuse. One can be described as a technical factor - in the larger houses there was relatively higher demand for axes and adzes. The second factor may correspond to socio-economic reasons - it shows the relatively more powerful position of the inhabitants of houses with a southern section. This might be the source of power of the head of the family in the house, and in this part of the site when the other smaller houses existed there. ➔Tabs. 7.6.1.A,B,C.

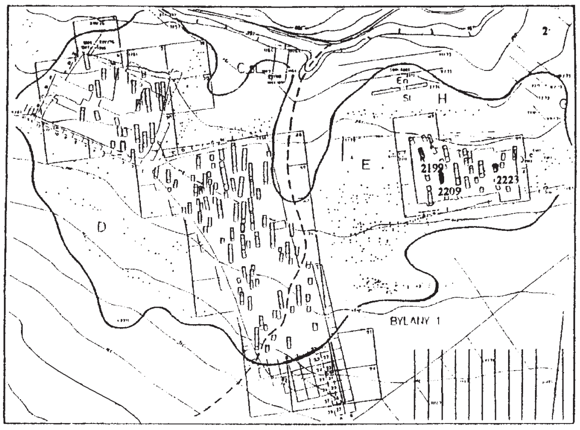
7.6.2. Socio-economic structure among the phases

During the first eight phases, no house with a southern section appeared, and accordingly in the first two periods of the phase sequence (phases 1-4, 5-8) there is no house with a seemingly higher economic status. The absence of this socio-economic attribute is not due to limited excavation: rather, it indicates the different social organisation of the earliest Linear Pottery Culture period. Individual houses were mutually less socially interdependent in comparison with later periods, regardless of their genetic relations. The leader had perhaps more the character of a Big Man, who gained authority by his own merits, and was therefore more of a temporary character than was a Chief with a hereditary position, whose authority would come from differences in the economic power of the houses. Within such an interpretation, the discovery of bored hammer-axes in house 2200 in phase 1 can be singled out (cf. section 2.8.3). This symbol of power and authority may have lost its value after the death of its owner, and found its way into the refuse because it was not a hereditary item.

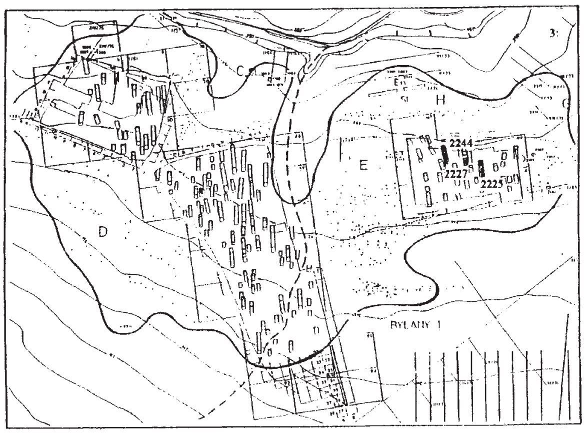
House 2197 in phase 4, with its strong, regular construction, differs from other buildings of this period. It may represent the houses of type 1a



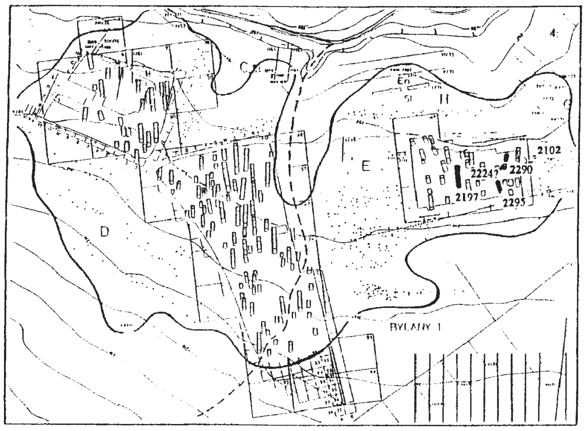
1st settlement phase **Pioneer**



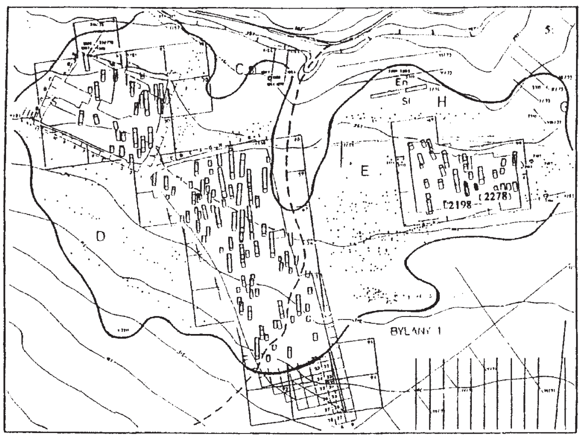
2nd settlement phase



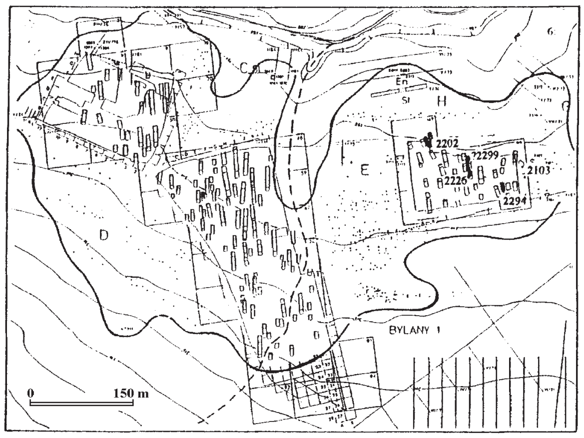
3rd settlement phase



4th settlement phase **Break**

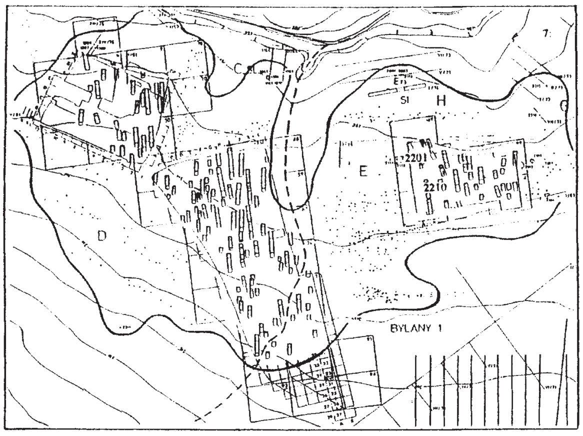


5th settlement phase **Renewal**

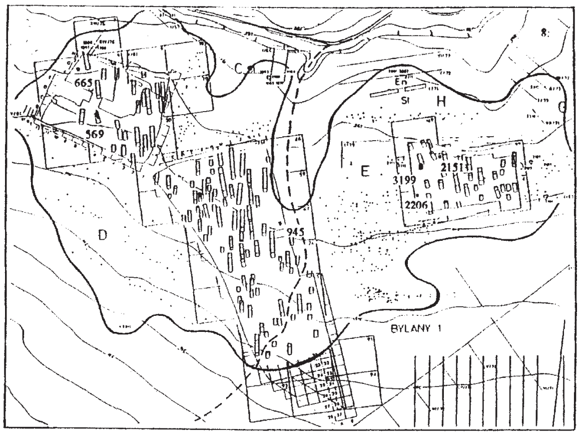


6th settlement phase

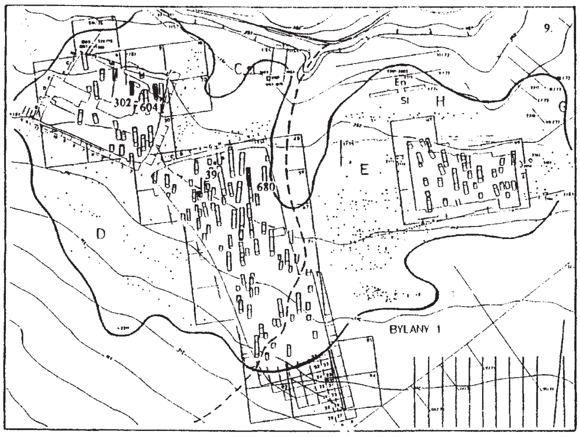
Fig. 7.6.2.a. Houses with doubled mid-sections, loam-pits and silos in individual phases (phases 1 - 6). - Domy se zdvojenou a jižní částí, hliníky a sila v jednotlivých fázích (fáze 1 - 6).



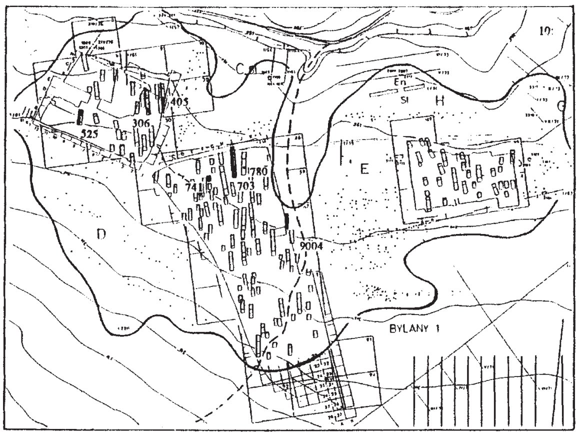
7th settlement phase



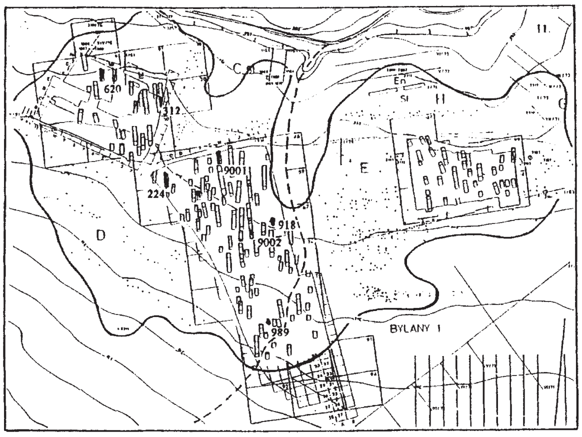
8th settlement phase **Shifting**



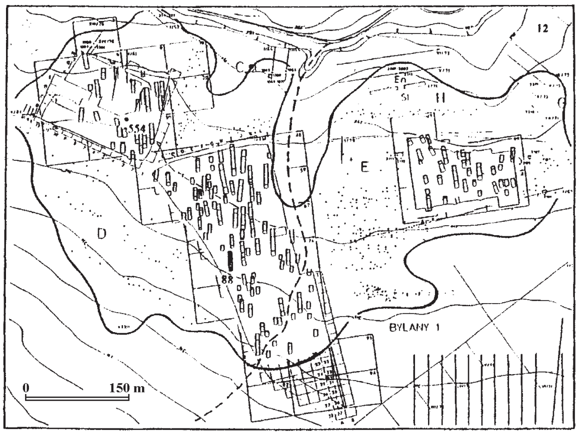
9th settlement phase



10th settlement phase **?**

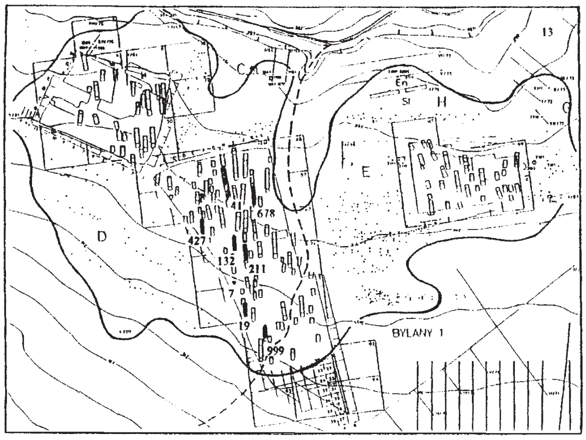


11th settlement phase



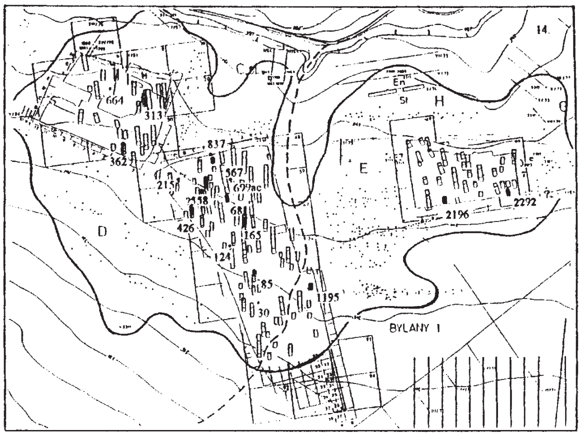
12th settlement phase **Break**

Fig. 7.6.2.b. Houses with doubled mid-section, loam-pits and silos in individual phases (phases 7-12). - Domy se zdvojenou a jižní částí, hliníky a sila v jednotlivých fázích (fáze 7-12).

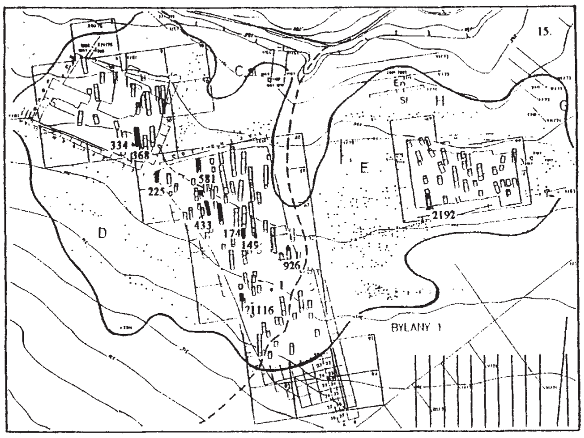


13th settlement phase

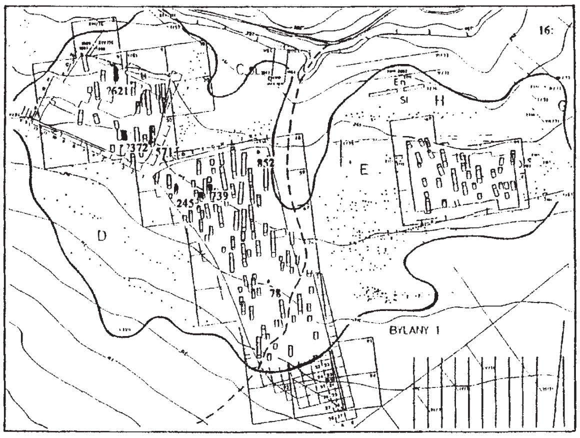
New foundation



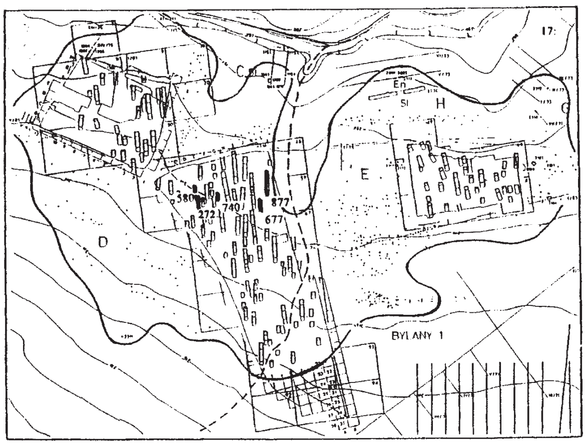
14th settlement phase



15th settlement phase

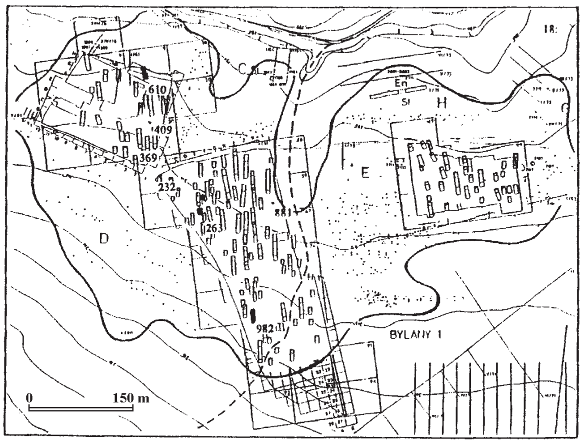


16th settlement phase



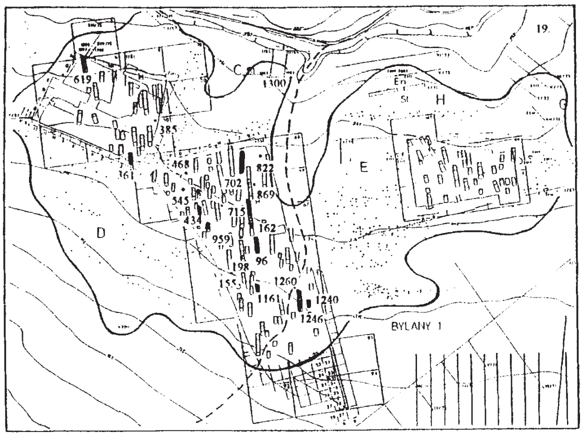
17th settlement phase

Break

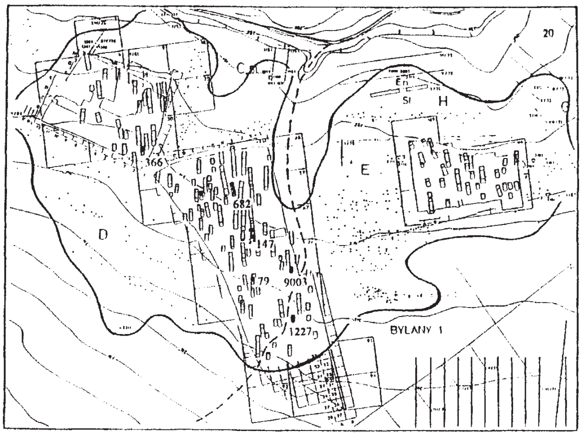


18th settlement phase

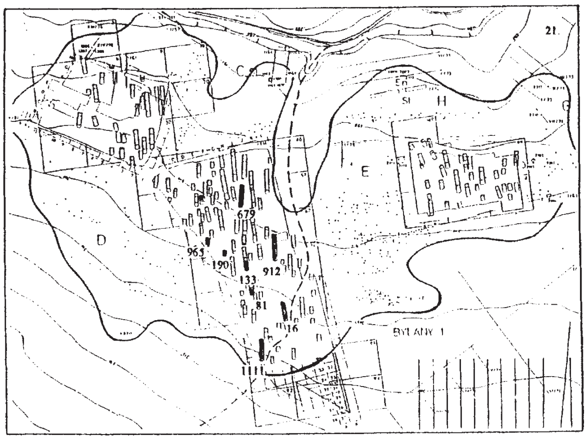
Fig. 7.6.2.c. Houses with doubled mid-sections, loam-pits and silos in individual phases (phases 13-18). - Domy se zdvojenou a jižní částí, hliníky a sila v jednotlivých fázích (fáze 13- 18).



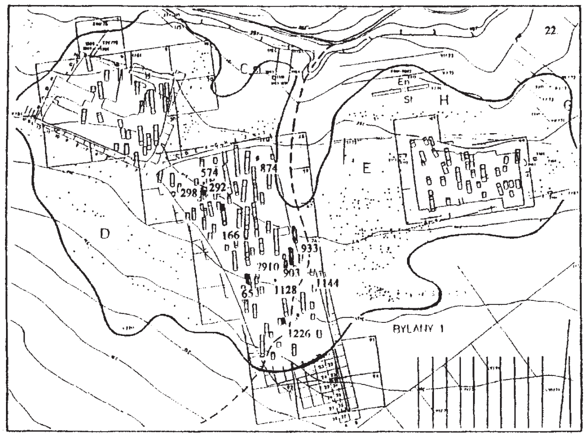
19th settlement phase **?**



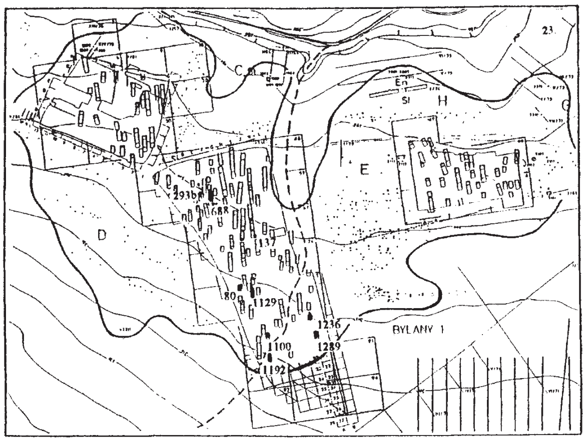
20th settlement phase **Break**



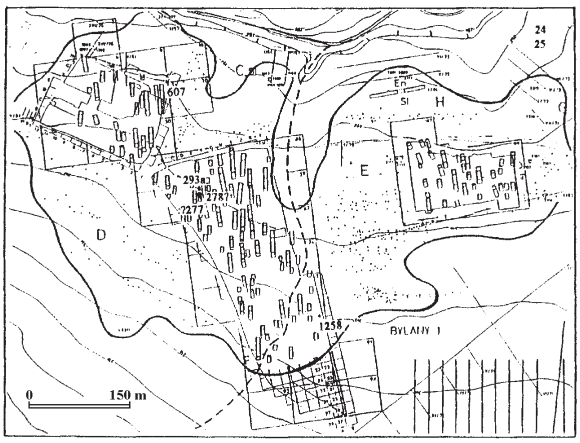
21st settlement phase **Renewal**



22nd settlement phase **?**



23rd settlement phase



24th settlement phase **Rebuilding**
25th settlement phase **Abandoment**

Fig. 7.6.2.d. Houses with doubled mid-sections, loam-pits and silos in individual phases (phases 19-25). - Domy se zdvojenou a jižní částí, hliníky a sila v jednotlivých fázích (fáze 19-25).

(Modderman 1988: Fig. 9) and their presumed social standing. In the fourth and sixth periods of the phase sequence, houses 41 and 912 occupied a similar position. In the third and perhaps the fifth periods of the phase sequence, this role was taken by houses 306 and 96. In the second period, no such house was discovered in the excavated area. During excavation, these houses were interpreted as club-houses or common houses, and as the home of the Old Man (Soudský 1966: 57, 59). A number of other common economic functions can be linked with them, primarily the enclosure at house 912, where the common herd might have been kept.

At the Elsloo site, one house of type 1a appeared in each phase, and must have been the home of a patriarchal local power (Modderman 1988: 122). At Bylany, exceptional buildings are found only once in each interval of the phase sequence, which is in some way comparable to the phases at Elsloo. In the sense of the Bylany phases, such houses are absent in most. Their occasional appearance would be a contradiction within the interpretation. On the other hand, it is hard to accept that the houses could last for a longer time, enduring several Bylany phases: this would require a fundamental revision of the ceramic refuse and its chronological interpretation.

A solution to these discrepancies might be found in a hypothesis on the existence of large houses in each phase, the majority of them situated in the as yet unexcavated area of BY1. This, however, is only acceptable for the second period of the phase sequence (phases 5 - 8). If the changing number of estimated families in the phases is compared (Tab. 7.2.2.a), it is shown that the exceptional buildings occur in every period in the phase with the highest estimated number of families. An exception is found in house 41 from phase 13, which has a lower estimate than does phase 14. The missing house in the second period must fall within phase 6. A more likely hypothesis is that the club-house or the house of the Big Man is an arbitrary institution, which was constructed in the phase when the number of families exceeds a particular value. In the earliest period, there would be 6 families, in the later periods 12. For this hypothesis, it is necessary to assume that the unknown house in phases 14 and 15 is somewhere in the area that has not yet been excavated. It is possible that the institution of a main, common Chief (Van de Velde 1990: 38) was also a function of the size of a community. He would be installed only during those times when the number of families living in the area exceeded a limit that enabled common, self-regulated life.

The number of houses with a southern section varies irregularly in the later periods (phases 9 - 12, 13 - 17, 18 - 20, and 21 - 25). In phase 13 there are seven houses with such a section; in the next phase only one of eleven houses has it. For this attribute too the hypothesis regarding the as yet unexcavated houses may hold true. The irregularity in their appearance is, however, apparent: it corresponds more to the concrete irregularities of the demographic development of the site. The variability corresponds significantly to the estimates of family sizes that were calculated according to the doubled mid-sections.

Phase 14 is exceptional in that a southern section is attached only to house 165. Houses 362 and 2196 lie at the edge of the excavated area, and the absence of a southern section in them is not proven. The lack of these house sections can be interpreted as reflecting a decrease in the economic efficiency of the whole habitation component, at least in comparison with preceding developments. On the other hand, the ubiquitous presence of southern sections in all of the houses in phase 13 may only be a formal or symbolic expression of expected authority, that each house could potentially take after the renewal of the site area without real economic weight. (By economic weight, the processing and checking of agricultural production is meant here.)

In accordance with the estimated minimum number of families, the period of phases 13 - 15 is the economically most successful in the development of the BY1 area. The presence or absence of southern sections need not imply changes in the representatives of particular components or a decrease in their authority. The ratio of houses of this type decreased organically over the last period of the phase sequence, and utterly failed to appear in the last three phases. It is not necessary to assume that there was an absence of people with authority, power or prestige in these phases. →Tab. 7.6.2.A.

7.7. Neolithic settlement style in the context of ideas and imagination

7.7.1. Symbolic attributes

The image of the houses and their arrangement into common groups changed in accordance with the climate and used construction materials that were available in the immediate area. It is not, however, immediately dependent on these conditions, but it is mainly determined by specific cultural traditions (Rapoport 1972: 65). The architecture, and in particular its inclusion into real space, represents a very important expression of cultural symbols, leaving archaeologically well readable traces (Hodder 1982: 34).

The regularity in the arrangement of the synchronic houses is an important symbolic attribute of Neolithic sites. At the first sight, they do not define any compact symmetry, in the same way as some later sites, for example, have a radial one. The raw arrangement documented at Cuiry lès Chaudardes is not repeated in the other places. The principle is only found in a basic form at Miskovice 2 - the arrangement of three houses there may simply be random, following more the configuration of the terrain than any planned row. A segment-like arrangement was observed in the Štúrovo houses or in the XIVth phase at LW8 (see above). The next form of possible arrangements is the checkerboard style, known from Březno (Pleinerová - Pavlů 1979: 106).

At Bylany the space of any component is not apparently planned. The combination of segment-like and checkerboard-like arrangements is prevalent, but rather irregularly. The individual houses use the optimal space in their vicinities. They are not in an arrangement whereby they are too dependent on each other, but they are mutually respected with a sufficient degree of individual space. It is as if no rules existed, and the placement of the new house depended only on the decision of the builders as to whether to attach it to a group of other houses, or to construct it in isolation. On the other hand, the symbolism of the division of space in a larger concentration of houses shows that there were no rules for how to be accepted into a group, and that there were no social rules either. A degree of kinship, both real and fictitious, was most probably respected. This may have been the case, for example, with the adoption of children as a solution to high mortality rates amongst parents.

7.7.2. Symbolic variability and the historical dynamics of the site area

The whole analysis of the BY1 site area is based on the splitting up of the settlement phases into intervals, as described earlier. This applies to the ceramic chronology, reflecting the quantitative changes in the different decorative techniques found in the site refuse. During the generalisation of this site chronology, a more detailed division of the periods of the Linear Pottery Culture was developed, which is valid for the Bohemian region (Pavlů - Rulf - Zápotocká 1986: 407). Later, the primary chronology was simplified in order to classify incomplete complexes of finds and isolated finds (Pavlů - Rulf 1996a: 125 - 126).

The first step in a real historical division into intervals is the elaboration of dynamic stages within the sequence of Bylany settlement phases. This was based on the quantitative changes in grindstones and the polished industry, and consequently on the interpretation of these elements (Pavlů 1989: 285; Rulf 1991: 327). The analysis carried out in this work shows that these "dynamic stages" of life at the Bylany site correspond to other attributes of different artefacts. The estimates of the minimum number of families living in the BY1 habitation area fluctuate very regularly within the periods of the phase sequences comprising those "dynamic stages". The rhythms of site fluctuation can be considered the real historical periods of the changes in the site area. Six such intervals can be defined (BY1: I-VI) each with a duration of three to five settlement phases.

The recapitulation of the method of transition from a formal ceramic chronology to the historical dynamic of the area, enables reliable interpretations within the symbolic spacing and changes therein. The first regular spacing appears in phase 11, and has a checkerboard-like formation. One or two other houses can be assumed in the area that has not yet been excavated. The symmetry of the spacing has for the first time reached an optimal expression. Next, similar regular arrangements appeared predominantly in the initial phases of the rhythms during later development. Phases 13, 18 and 21 phases can be labelled as prototypical of the Linear Pottery Culture site. They can be used as an example of the symbolic division of the site area within one component, and show the intermediate importance of such a division. This was not stable and did not survive the initial phase of the new rhythm. The subsequent rebuilding of the houses quickly destroyed the initial arrangement. →Tab. 7.7.2.A.

7.8. Kinship or labour groups in different stylistic settlement manifestations

7.8.1. Information exchange within the phases

The household is a key point, symbolising all of the facets of early Neolithic society (Hodder 1990: 114). It is not only the place of production, but for the archaeologists it is also an important representative of the domesticated social unit that shared a common physical space within for eating, sleeping, resting, free time, education and childcare (Tringham - Krstić 1990: 603). It symbolises the core of the cultural adaptation to nature, and is an expression of the social territoriality. The space both within and without is subject to a hierarchy and enables communications within this human group, as well as between different groups (Hodder 1990: 118). The houses arranged in an irregular checkerboard-like form enable almost perfect communications between them, when the assumed southern entrance is taken as the reference point.

7.8.2. Information exchange between phases

The rebuilding of the houses in subsequent phases was intended to maintain the same extent of communication. The individual movements of buildings could distort this opportunity within a single phase period. Therefore, it was sometimes restored in the middle of a rhythm, such as in phase 11. The Neolithic cultures in Central Europe never had a tendency to concentrate buildings into a compact form, as was the case in the Near East or the Balkans. This difference can be explained primarily by the character of the water resources that mostly had a point form in the East, whilst in Central Europe they were more linear. The latter type of site better preserved its freedom as concerned intra-site communications. The existence of communal production areas at the same time proves that the symbolism of the site area also enabled unlimited multifaceted communications over several generations.

The production areas originally symbolising only a horizontal social division according to gender and age, led probably later to circular roundel enclosures. During the period of fluidity, these roundels also symbolised a vertical social differentiation. This space was divided into an outer production and economic one, consisting of loam-pits, ovens, silos etc., and an inner one serving for meetings, ceremonies, or taking refuge. In this Late Neolithic period, the houses were much more individual in character, and separated the family's private life from the communal one much more strictly than during the Early Neolithic. The archaeological evidence for roundels provides a concentrated picture of different functional features, that enables the analogous interpretation of the isolated, functionally different pits dispersed outside Linear Pottery Culture houses.

7.9. The historical role of Neolithic houses and their grouping in the cultural landscape in creating and preserving cultural tradition

7.9.1. Site development: the site in a regional context

The Bohemian region of the LnK was originally divided into 17 sub-regions, according to the grouping of sites respecting environmental conditions. The Bylany site is situated in the 7th sub-region, comprising the area stretching from Český Brod to Čáslav in the south-eastern part of Central Bohemia (Pavlů - Zápotocká 1979: 284). Later, the whole region was divided for ceramics analysis purposes into only western, middle, and eastern parts, and in this division Bylany belongs to the middle part (Rulf 1997b).

LnK settlement is concentrated across the whole region, mainly along the right banks of tributaries of the Elbe (Labe), the network of which provided a natural communications network. As in other regions (Lüning 1991, Kulczycka 1993), the catchment area of a higher level of streams creates a potential space for the foundation of new settlements of different types, and divides the region into smaller micro-regions. In the seventh Bohemian sub-region the following streams flowing from the south northwards: the Šembera, Výrovka, Polepka, Klejnárka and Brslenka. Within the micro-regions, the areas follow the geomorphological situation, and are represented by dif-

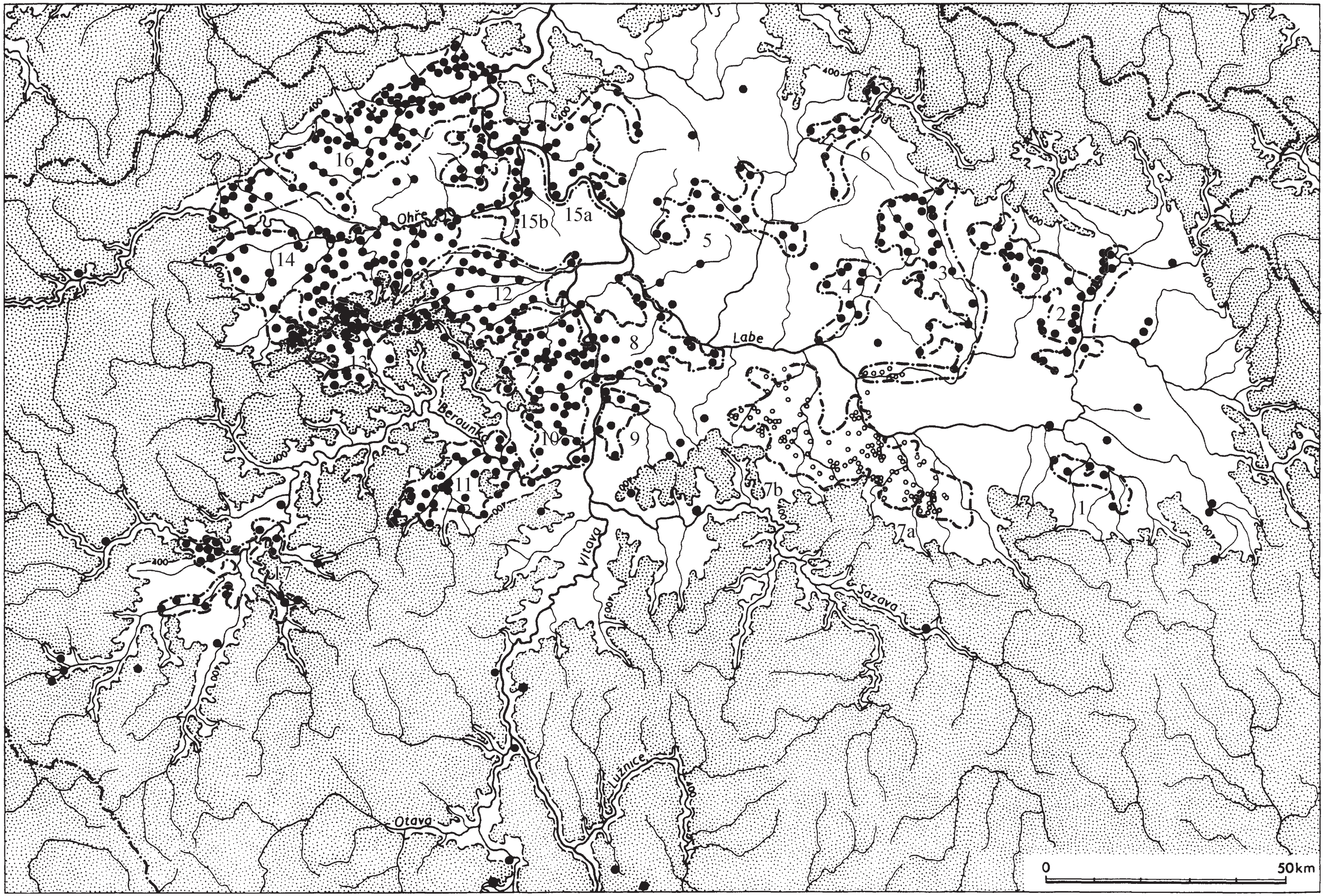


Fig. 7.9.1.a. The Bohemian LnK region and its division. - Česká oblast kultury s lineární keramikou a její dělení na regiony.

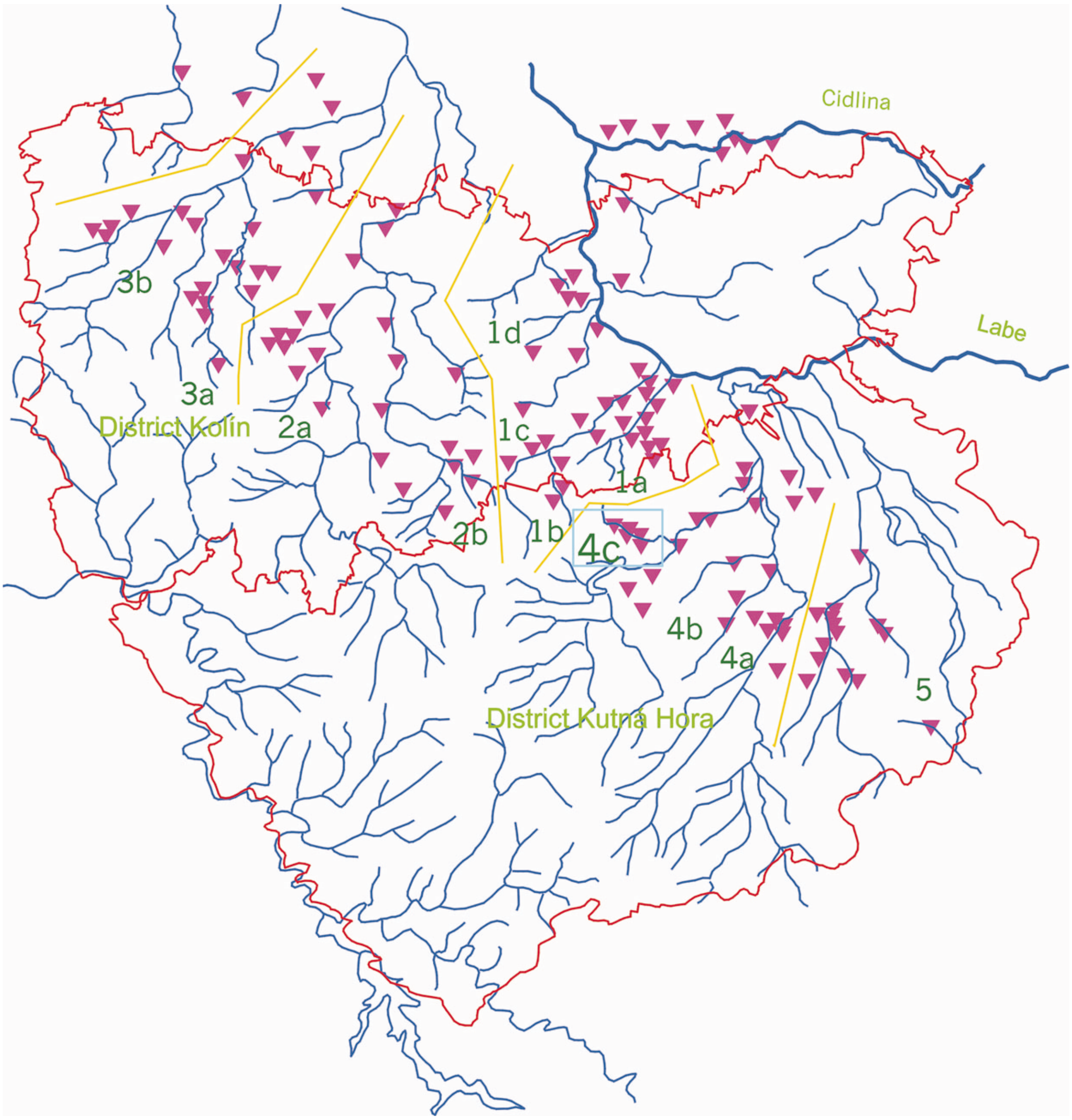


Fig. 7.9.1.b. Region 7 (Český Brod - Kouřim - Kolín - Kutná Hora - Čáslav) and its division into micro-regions.
- Region 7 (Český Brod - Kouřim - Kolín - Kutná Hora - Čáslav) a jeho dělení na mikroregiony.

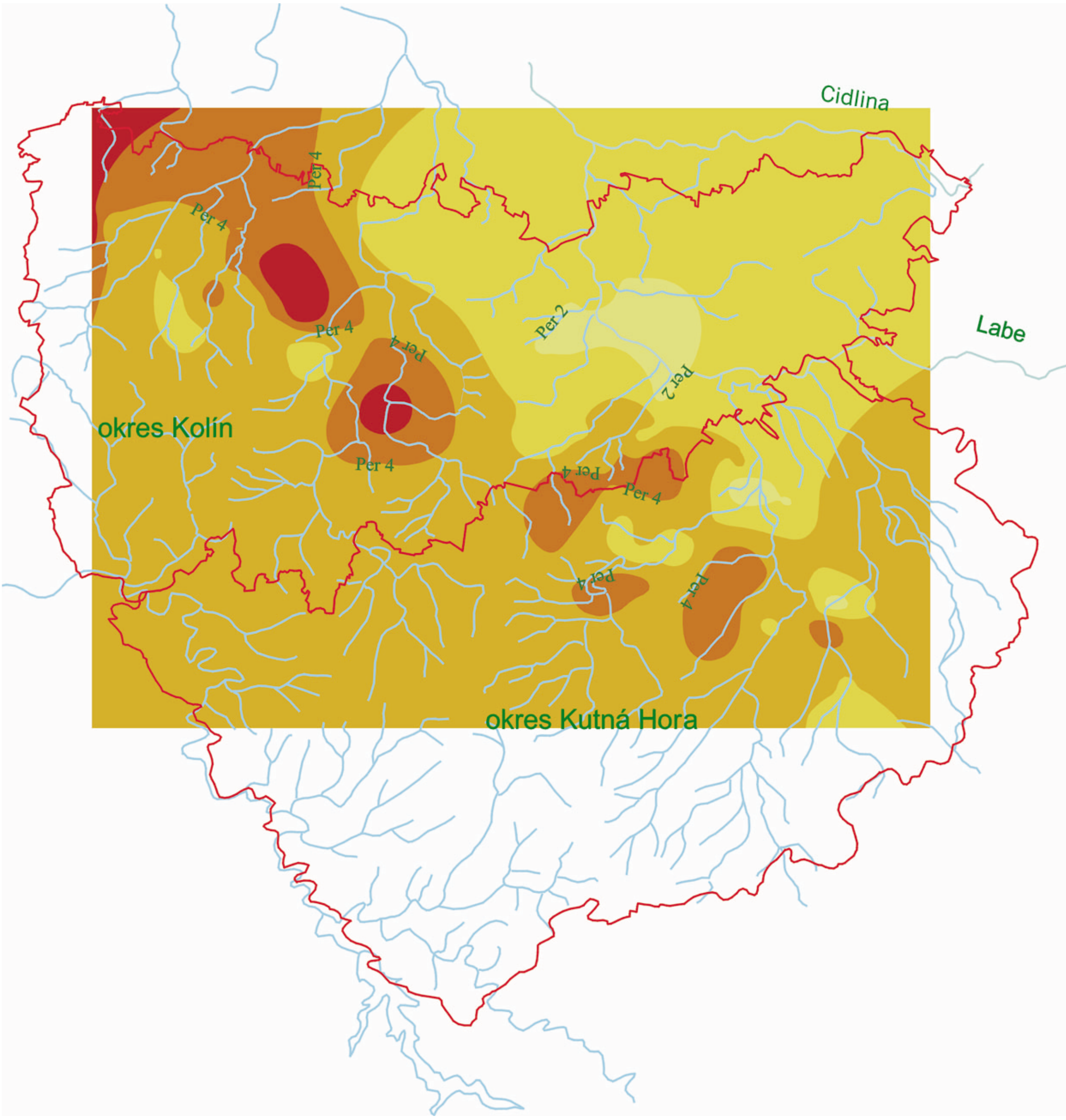


Fig. 7.9.2.a. Region 7 (Český Brod - Kouřim - Kolín - Kutná Hora - Čáslav) and its chronological structure. - Region 7 (Český Brod - Kouřim - Kolín - Kutná Hora - Čáslav) a jeho chronologická struktura.

ferent configurations of localities (Pavlů - Rulf 1996a; 1996b).

Within the LnK region, the clustering of site areas has been observed only in definite places at the scale of micro-regions. The smaller number of large and long-term settled areas is apparent, as are the more numerous but smaller and more short-term settled areas (Kulczycka 1993: 50). This situation has led to an interpretation of central and peripheral sites. The contemporaneous nature of these types is, however, never ensured. These problems have been studied in detail within the regions from the point of view of intra-regional communications mediated through the exchange of raw materials and chipped stone industry (Zimmermann 1995). It was demonstrated that the central sites participated in the procurement of raw materials and their processing, and that individual sites specialised in different kinds of artefacts, including ceramics (Lamersdorf 2, Zimmermann 1995: 105).

7.9.2. Site development in the context of the LnK

The situation in the lower Rhineland is described by A. Zimmermann:

"Die Besiedlung beginnt an einigen weit auseinanderliegenden Stellen (den zukünftigen zentralen Plätzen), wo allmählich die Anzahl der Häuser zunimmt und von denen aus, nach einigen Generationen, weitere Siedlungen gegründet wurden" (1995: 105).

The situation in the region where the Bylany site is located differs according to the presence of early LnK data. The lower Rhineland was settled later, starting in the Flomborn period that corresponds to the middle period in Bohemia. This is also the main reason why the picture of the stepwise occupation of the region can be interpreted in a different way. The pioneer areas along the right bank of the Elbe appeared as the earliest inhabited sites: Kolín, Nové Dvory 2 and also south-west Ohrada, and south-east Čáslav 6. These comprised the starting points for future micro-regions (Pavlů - Rulf 1996a, 1996b). Analogous localities can be expected near Kouřim and Český Brod in the catchment areas of the Výrovka and Šembera. Because the region near the Elbe is covered with a sandy soil, it can be excepted that the starting settlements there will be situated farther from the main stream and that, for example, Radim represent such a site on the Výrovka.

From starting points on the lower parts of the streams, the site areas were opened up in a stepwise fashion, and in other places further upstream. In optimal conditions, where more households were concentrated, including rebuilding, they comprised larger site areas. This is the case for the majority of areas situated by water sources, or by higher order streams (Vth or VIth). These became the centres of micro-regions. In comparison with the Rhineland, the present data does not enable the kinds of artefacts that would be characteristic of individual centres to be specified. Neither is this true for Bylany, where areas BY1 and BY2 are situated, or for the deep valley of Bylanka or Vrchlice, with the outcrop of Kutná Hora crystallinicum providing the opportunity for raw materials for grindstones. Sites BY2 and BY4 are situated on the slopes with limestone substrata, but the use of these raw materials has not been proven.

From Bylany and the situation of the whole region, it follows that not all large areas had to play the role of a centre distributing particular artefacts. On the contrary, these sites comprised important points in the Neolithic landscape communications system. Such communications were necessary for Neolithic integration of artefacts, mainly stone industry, ceramics (Bogucki 1988: 118) and architecture (Zimmermann 1995: 129). The original occupation of the landscape along small streams did not hinder contacts between centres in the near distance across the longitudinal subdivision. The catchment areas of streams and their settling had greater significance for the delimitation of interests among kinship and social groups.

Phase	Nearest neighbour	Minimal number of households	Households at unexcavated areas
1	.	3	2
2	.	3	2
3	.	3	2
4	.	3	2
5	.	2	2
6	.	2	2
7	.	2	2
8	.	2	2
9	.	3	2
10	57.0	3	2
11	95.0	3	2
12	.	1	2
13	40.0	.	.
14	56.3	.	.
15	54.3	.	.
16	52.2	.	.
17	30.0	.	.
18	110.2	4	1
19	64.6	4	1
20	75.4	4	1
21	47.5	.	.
22	47.8	.	.
23	41.1	.	.
24	.	.	.
25	.	.	.

Tab. 7.1.1.A. The average distance to the nearest neighbouring house. - Průměrná nejkratší vzdálenost mezi domy v rámci fází.

Phase	Dated houses (No. of the large h.)	Double mid-section N = (%)	Southern part N = (%)	Total of households (estimated)	Total of families (estimated)
1	2	.	.	5	5
2	3	.	.	5	5
3	3	.	.	5	5
4	4(2197)*	.	.	6	6*
5	2	.	2(100)	4	4
6	4?		.	6	6*
7	2	.	.	4	4
8	2	.	.	4	4
9	3	1(33)	1(33)	5	6
10	6(306)*	4(67)	4(67)	8	12*
11	5	?(-)	1(20)	7	7
12	1	1(100)	?(-)	1	2
13	7(41)*	3(43)	7(100)	9	12*
14	11?	1(9)	1(9)	13	14*
15	9?	1(11)	4(44)	11	12*
16	5	1(20)	1(20)	7	8
17	5	1(20)	3(60)	7	8
18	4	?(-)	1(20)	7	7
19	10(96)*	1(10)	3(30)	12	13*
20	6	?(-)	1(17)	8	8
21	8(912)*	3(38)	3(38)	9	12*
22	7	2(28)	1(14)	8	10
23	7	1(14)	?(-)	8	9
24	1	?(-)	?(-)	1	1
25	1	?(-)	?(-)	1	1

Tab. 7.2.2.A. Estimated number of households and families in the phases. - Odhadované počty domů a rodin ve fázích.

Phase	At the house	Isolated	Silo
6	2226	-	2257
9	680	-	781b
11	224	-	238a
13	41	-	686a
13	678	-	806d
14	426	-	435a
14	681	-	734
14	1195	-	1118
14	-	699c	-
15	926	-	900a
16	245	-	251
16	621	-	650
17	677	-	880
17	677	-	882a
17	677	-	882b
17	877	-	779a
17	877	-	779b
18	-	881	-
19	-	468	-
19	96		143
20	682	-	691a
21	679	-	689
21	679	-	691b
21	912	-	913d
21	912	-	915ef
21	1111	-	997
21	2192	-	2144
22	903	-	900b
22	933	-	919a
22	933	-	919b
22	-	292	-
22	-	298	-
22	-	574	-
23	-	293b	-
24	278	-	268
24	-	293a	-
24	-	607a	-

Tab. 7.4.2.A. List of silos datable to phases (after to Šumberová 1996: 69-72, with completed phases). - Seznam sil datovatelných do fází (podle Šumberová 1996: 69-72, fáze doplněny).

Mid-section / southern section		ABSENT	PRESENT	
	(%)	O	S	N=
SIMPLE	O	OO(22)	OS(1)	31(22)
	S	SO(46)	SS(13)	81(59)
DOUBLED				
	D	DO(6)	DS(13)	26(19)
N=		101(73)	37(27)	138(100)

Tab. 7.6.1.A. The numbers of houses with a double mid-section and a southern section. - Počty domů se zdvojeným středem a jižní částí.

	Comparisons		LO	PO	TO	NO	K
House with double mid-section without southern section(DO)	1	n-times	1.5	1.8	1.8	1.8	1.7
House with simple mid-section without southern section (SO)		N/house	48.9	2.0	11.4	86.6	148.4
House with simple mid-section with southern section (SS)		n-times	1.8	1.0	2.0	2.0	1.9
House with double mid-section without southern section (DO)	2	N/house	73.8	3.6	20.1	156.2	253.8
House with double mid-section with southern section (DS)		n-times	1.8	1.2	1.5	1.4	1.5

Tab. 7.6.1.B. Average numbers of decorated pots per house with a double mid-section (1) or a southern section (2). - Násobky zdobení průměrných počtů připadající na domy se zdvojeným středem (1) nebo jižní částí (2).

	Comparisons		adzes	axes	N=
House with double mid-section without southern p.(D0)	1	n-times	2.0	2.7	2.4
House with simple mid-section without southern p.(S0)		N/house	0.6	0.7	1.3
House with simple mid-section with southern part (SS)		n-times	2.0	2.3	2.2
House with double mid-section without southern p.(D0)	2	N/house=	1.2	1.9	3.1
House with double mid-section with southern part (DS)		n-times	1.2	1.4	1.4

Tab. 7.6.1.C. The average occurrence of polished implements in houses with a double mid-section (1) or a southern section (2). - Násobky broušených nástrojů v domech se zdvojeným středem (1) nebo s jižní částí (2).

Phase	House	Mid-section	Neighbour	Section	Note
0	0624	D		S	
0	0935	S		S	
0	2291		S		S
3	2225	S	2227	S	
3	2244	S	2227	S	
4	2197	S	2224	S	
9	0680	D	604	S	
10	0306	D	405	S	
10	0405	D	306	S	+603
10	0525	D	306	S	
10	0703	D	741	S	
11	0224	S	9001	S	
12	0088	D		O	
13	0019	S	999	S	
13	0041	D	678	S	
13	0132	D	211	S	
13	0211	S	132	S	
13	0427	S	132	S	
13	0678	D	41	S	
13	0999	S	19	S	
14	0165	D	681	S	
15	0149	S	174	S	
15	0174	D	149	S	
15	0433	D	174	O	
15	0581	S	225	S	
15	2192	D	926	S	
16	0571	D	372	S	
17	0272	S	580	S	
17	0677	JS	877	S	
17	0877	D	677	S	
18	0610	O	369	S	
19	0096	S	162	S	
19	0162	S	96	S	
19	0619	D	361	O	
19	0702	D	434	O	
19	1246	D	1240	S	
20	0682	S	147	S	
21	0016	S	81	S	
21	0679	D	965	O	
21	0912	D	133	S	
21	1111	D	16	S	
22	0166	D	65	O	
22	0903	D	910	S	
22	0910	D	903	O	
23	0688	D	80	O	

Tab. 7.6.2.A. List of houses (comp. Appendix 3) with a double mid-section or southern section (explanations: middle section: S = simple, D = double, O = unknown, southern section: O = none, S = exists /south, silo/, neighbour = nearest house). - Seznam domů (srov. apendix 3) se zdvojenou střední částí nebo s jižní částí. (vysvětlivky: střed: S = jednoduchý, D = dvojitý, O=neví se, Jčást: O = není, S=je/south,silo/, soused = nejbližší dům.)

Phases	Number of uncovered and datable houses	Estimated minimal No. of families	Settlement intervals at Bylany	Periodisation of Bohemian LnK	Regional periodisation
				Ib	1
01	2	5			
02	3	5	BY I		
03	3	5			
04	4	6		Ic	2
05	2	4			
06	4	6	BY II		
07	2	4			
08	2	4		I/II	
09	3	6		IIa	3
10	6	12	BYIII		
11	5	7			
12	1	2		IIb	
13	7	12		IIc	
14	11	14			4
15	9	12	BYIV	IId	
16	5	8			
17	5	8		IIIa	
18	4	7			
19	10	13	BYV		5
20	6	8		IIIb	
21	8	12			
22	7	10		III/IV	
23	7	9	BYVI		
24	1	1		IVa	6
25	1	1		IVb	

Tab. 7.7.2.A. Comparison of different types of development classification. - Porovnání různých druhů vývojových klasifikací.

"Není důležité, co se stane, důležité je jen to, co by se mohlo stát". (J. Rulf, ústní sdělení)

8. Life at the Neolithic site

8.1. The world of people and the world of artefacts (situational analysis)

The majority of modern analyses consist of a unified linear procedure beginning with data collection and construction, followed by some kind of their ordering within the different contexts, and ending up with an interpretation of such an ordering. The results of this route can be controlled by the author, as they depend primarily on the selected attributes, it being supposed that these lead to the proposed conclusions, e.g. a chronological sequence of the assemblage complex. An exception is provided by the analysis of Dutch and Bavarian materials carried out by Van de Velde (1979); he was conscious of the fact that not all of the attributes necessarily contribute to a chronology, and he therefore selected those which expressed very low chronological variability. On these attributes he founded his interpretation of the social structure of the Linear Pottery Culture. Different attributes may therefore be of markedly different use, and on the other hand may in different ways correlate to the individual parts of a culture.

Situational analysis provides broad theoretical possibilities for organising attributes into an arranged frame of questions and problems (Pavlů 1997: 97). It starts by distinguishing three worlds of knowledge: physical existence, subjective experiences, and theoretical knowledge processes (Popper 1993: 75). In each of these artefacts can be studied analogously within the three aspects of their own form, sign meaning and a theoretical model; a matrix of nine areas of situational analysis is defined in this way. It is, under specific conditions, usable for any kind of artefact. The best example is the analysis of ceramic decoration, where besides the physical body of decoration, both design and style can be recognised and isolated (Whitley 1993: 61). Because of the unified processing of different artefacts, the author has also analysed chipped and polished industry, although he has not previously dealt with them in detail. Details of the situational analyses carried out for different artefacts are discussed in the introductions to each chapter.

Because every human product can be considered an artefact in this way, seven well documented objects were selected for situational analysis. The analyses are relevant to houses as well as to the whole site, considered in the same way as the linear pottery. It is then possible to analyse in retrospect any landscape of the Bylany region as a specific artefact. In the analysis of artefacts, the principles of archaeology are currently not limited to typological classification, but remain an indispensable basis for any kind of theoretical view. Differing concepts of archaeology do not differ in relation to artefacts, considered in the broader sense as being any human creation (Neustupný 1998c: 134), but only in the scale and angle of the view taken. This situational analysis is thus analogous to the illuminating of problems with a bright light consisting of three basic colours. Individual views are similarly complementary and together result in a complete and valuable picture. This can be defined within a much broader matrix of questions than has been employed here. On the other hand, it also enables an alteration in the scale of the analysis: theoretically, it would be possible to construct another matrix with a higher degree of problems, over and above those of every field in the initial matrix.

While the physical principles of artefacts can be characterised by individual finds, the answers to other questions usually require an analysis of the structure of artefacts within particular contexts. In this case, there are complexes of finds from households in synchronic as well as in asynchronous contexts, within settlement phases and between them. The individual artefact types were processed using roughly similar procedures, starting with shape and size characterisation, continuing with design attributes and ending up with the symbolic attributes of style. When at all possible, attributes were quantified within the contexts used. Simple statistical methods were employed for such quantification, e.g. frequency distributions, correlations between attributes, and analysis of frequency tables. The internal structure of these tables can at best be described by correspondence analysis, as one of the most suitable multi-dimensional statistical methods. The majority of interpretations are based on the results of such analyses.

Within the framework of a situational analysis, it is necessary to distinguish the different kinds of classifications within particular fields of problems, which can be labelled formal, functional, and stylistic. The analytical practice in archaeology usually defines only one kind of classification, which must answer different questions. A hierarchy of attributes and the construction of different types of classification are preferred here; thus, the data can be processed from many angles and their particular structures are easier to understand when separated into their relevant parts. Artefacts are therefore studied, as noted above, under spectra of individual colours, the synthesis of which gives the final picture. The only disadvantage comes in the possibility of the insufficient and unequal classification of artefacts - this is caused by their fragmentary nature and by the higher number of attributes of these modes.

Alongside the opportunities for the automatic processing of data from refuse, a number of forms of secondary data arose which could not all be considered here - their patterning within synchronic households and asynchronous phases is not uniquely interpretable. Readers may, of course, accept or reject the author's interpretations, or may try to develop their own; in particular, the results of correspondence analysis have not been exhausted, as they offered a higher number of factors. This work must represent a concise analysis of those Bylany artefacts that are fundamental to an understanding of the history of the site; at the same time, it offers structured data for all students of settlement area.

The empirical facts in the previous chapters have been developed in large quantities of data according to individual types of artefacts, and all that remains now is to compare the groupings that have been discovered to provide a unified picture of life at one Neolithic settlement. This concluding step is not entirely straightforward, if it can be carried out at all - which many contemporary archaeologists doubt, some of them very much indeed. The possibility of recognizing facts about prehistoric times is not completely ruled out by other archaeologists and scientists, via the multiple interpretations of apparently objective empirical findings. Analyses from the past decade have shown that all of the elements, facts and data that have been accrued, and their ordering, are marked by such changes that it seems that it is not possible to rely on any finding whatsoever, even if this were the result of rigorous analysis supported by complex mathematical methods. The facts of the past are not only represented in archaeological sources in a fragmentary manner, but have also lost the majority of their original contexts, so that in the contexts that we examine today they correspond to completely different discoveries. The date that is extracted from this then multiplies this disproportion, so much so that it cannot be disregarded. On the other hand, however, other facts are not available and therefore depend on what data is extracted from them and on which methods are used to do so.

Life in a Neolithic settlement also includes, apart from the main assemblage, such as the collection of the individual fates of people, an assemblage containing the existence of the most varied of objects that these people created. The creation and survival of individual tools, weapons, decorations and other products, buildings and their furnishings, create a complex network of archaeological events which guided the fates of people in multi-faceted, mutually linked relationships. The lives of things and people, however, do not run along simple, parallel lines. While the former can be dealt with directly in archaeology through analyses and syntheses, the latter can only be perceived through changeable groups of items and their fates, which are always fragmentary and open to the most varied of interpretations. The analysis of individual types of artefacts has not only become the basis for one interpretation, but also the material for further attempts, whose concrete form is left to the free will of each reader. All of this only confirms the expectation that the following interpretation will remain but one of many, subjectively considered to be the optimal explanation for the available archaeological sources.

Every subject recorded through a whole system of indicators is actually replaced with a chain of data, and their assemblages in the diverse contexts of variants and other groupings provide an almost insurmountable quantity of information. The automatic processing of this data can generate more and more data of higher levels, from which the original facts must be extracted in different ways. The schema used so far to process the finds from a Neolithic settlement have usually been limited to basic summaries, and are most often placed in chronological order. The explosion of information taken from this data enables the consideration of other measurements for artefacts, and also record not only the different aspects of their lives, but also of the life of the whole settlement. Despite this, not all the possibilities have been exhausted and with the introduction of each new indicator it is possible to expand the entire process of the analysis of artefacts at a Neolithic settlement in all directions. In individual chapters the quantitative data on the contexts of individual types of artefact waste has been assessed, and from this the changing role of each category in life at a Neolithic. In the conclusion the developmental tendencies of the qualitative characteristics of the artefacts are compared, these being considered a characteristic expression of the activities of the Neolithic settlement.

A system of seven levels resulted from the situational analysis of the principal artefact types, organising the different artefactual attributes in contexts of components and phases. Components are defined here as synchronic complexes of equal function, in this case of house complexes as habitation areas together with further kinds of economic or other areas. Phases are consequently defined as synchronic components. At Bylany, the other economic areas can be attached to the house complexes, e.g. as silos or common loam pits. The resulting levels represent an ample mosaic of ordered data at the different degrees of the primary artefacts' attributes, as well as of secondary classifications at different horizons.

The quality of the stone tools was expressed by an evaluation of the effort that was necessary to invent the basic forms of the tools. The quality of the raw materials used was generally also taken into account. The quality of the buildings measures the estimated amount of wood required to build each house. From this data, which showed marked variability, the proportion of decorated and undecorated pots could be compared. This is also a measure of the symbolic binding of the ceramics. The variability of this indicator is much lower, because the frequency is low, around 30% of the component content. The last comparable indicator is the estimated minimum number of houses in one settlement phase, which is marked by the different dynamics of the artefacts.

The settlement waste was quantified in the context of the different levels. The lowest of these is represented by holes that have different original functions included under the title of the objects: a shallow depression, a pit and a joint pit. The refuse found within, if there in an amount sufficient for quantification, is, however, linked to the contexts of the higher order features around the houses. The house and its surrounding area form the lowest economic and social unit, within which the refuse was, according to predictions, irregularly divergent. Because, however, it is no longer possible to trace its original positioning in the levels in the holes, it is apparently regularly placed in the full corresponding pits, where the majority are found in the primary position. On the other hand, there are connections between the different pits in the area surrounding the ground-plan, at the lowest level of the uncovered area and the individual pits that appear in the terrain as mutually divided. Therefore the contexts were evidently always linked to their placement in relation to the house. The other pits in the broader surrounding area, which could potentially prove other activities from the lifetime of a given building, could not be traced given the depths at which the structures were sunk into the earth. An exception is provided by the interpretation of the economic layout at Miskovice.

According to this model, it will perhaps be possible to fill in some Bylany situations in the future, even if the facts are not necessarily governed by the same model. It seems in the Czech Neolithic that from the point of view of the space for organised economic and residential forms, no unified form was created which would allow the universal modelling of the development of a Neolithic settlement in the same manner as the Rhineland *Hofplatz* (Lüning 1991). The household was, on the other hand, undoubtedly the basis of the prehistoric settlement, and its development can be followed in the Balkans from the earliest Neolithic onwards (Tringham - Krstić 1990), and then in this country in the later phases. This household, with all of its social consequences, became the basis for the differentiation of country settlements, some of which later on took on the character of farmsteads. If Neolithic houses and their plots were to be given this title, this would then invoke a farmstead in the early phase, not yet differentiated by families' businesses. Ascertaining the differences in the size of the house's culture using linear ceramics is perhaps an expression of the economic and social differentiation between the types. The space of the settlement was probably divided on lines that were planned in advance, in the framework of which the homes were, at least for a certain amount of time, renewed. It can hypothetically be proposed that abandoned buildings played a supplementary role for a certain period of time as the remains of the ancestors, where they had in fact been left. This would also explain the lack of separate funeral sites during the development of the Czech Linear Pottery Culture.

8.2. A short history of the Bylany site (chronology)

The history of a prehistoric site is based on a chronology of the artefacts and features found there. Indeed, all of the preceding analyses of Bylany materials have been undertaken with this aim. The chronological sequence of the houses as the cores of habitation areas was elaborated, and its applicability to other regions of Linear Pottery Culture settlement was enlarged upon. It has been shown that the Bylany sequence can be used as a scale for the whole time range of this culture, but that the different regional characteristics and specialisations need to be defined.

The construction of six time periods (intervals) is an important result of the analysis. Each comprises several settlement phases, and they are an expression of the local history of archaeological artefacts as the correlates of real prehistoric events. For the purposes of distinguishing them from other periodisation terms like cultural periods, which usually describe a stylistic development of linear pottery and the culture as a whole, they have been termed intervals of the Bylany site or site periods. Within the different analytical levels of artefact characteristics these site periods are marked by related interruptions in development, which are then consistent in shorter time spans (Pavlů 1982), as proved later within the polished stone industry (Rulf 1991). The analytical levels of other artefacts can be attached to these, and a short site history can then be deduced.

Houses existing in roughly the same period create settlement phases, which can be considered as a construct of chronological contexts allowing a more detailed examination of local trends (Pavlů, Rulf - Zápotocká 1986). The settlement phases are therefore artificial slices of time, assigned a common recorded constant of 20 years, even though this could be different or even changeable. This constant forms a kind of relative measurement of time and represents roughly one generation of inhabitants, in the framework of which houses were usually reconstructed. This reconstruction was not of course mutually synchronised, as was originally thought, and therefore the absolute beginnings of contemporary buildings cannot be concurrent.

An exception might be represented by a site where a new settlement is founded, and the only such case identified was in the thirteenth phase, this resting on a short-term break in the development of qualitative characteristics; it seems, though, that this also breaks the overall long-term trend of the Bylany settlement. Other irregularities in these characteristics signalise the six basic developmental areas at the Bylany settlement (BYI-BYVI), which last over three to five groups of phases, and which can be considered as real historical periods corresponding to considerable changes in the life of the inhabitants of the Bylany settlement area. The temporal variability of the linear ornament, on the basis of which the phase length was calculated, is however confirmed by the short-term compact development of non-ceramic artefacts, from which it is possible to make guesses about the corresponding historical events at the Bylany Neolithic settlement. The grading of the phases today supplements the already fairly reliable absolute dating.

From the selected characteristics, the lowest variability appears in the proportions of all the decorated ceramics. These levels are almost stable throughout the whole development period of the Bylany settlement, which supports the symbolic expression of binding pots (see section 4.7.3) as a method for protecting the contents against real and imagined damage. Further variability seems to be almost hidden within the decoration in the relevant detail qualities, as has been demonstrated in the fifth chapter. On the other hand, the most changeable indicator is the quality score and the effectiveness of the construction of individual houses (see section 6.3.1) being reached in the third period, which as far as ceramic decorations are concerned represent the periods of the greatest development in well-worked decorations. The variability of the stone artefacts is also quite high. Surprisingly, in a number of phases the same fluctuations in the quality of the workmanship involved in making them was noted, without regard to the fact that the individual types of stone tools played different roles in the life of the settlement (see sections 1.3.3, 2.3.3 & 3.3.3). The last indicator for which the consequences are traced is the estimated development of the population of the Bylany settlement (see section 7.5.3). This is comparable in the first three phases, and increases in phase 10, only to drop in the third period to a minimum. At this moment, the development of the area was markedly interrupted, and was systematically renewed in the following phases, probably by the arrival of a completely new population or by the resettling of people from different parts of the whole Bylany micro-region. At the same time the population living in the Bylany area grew at a different rate in the following three phases, and then fell before the area was abandoned at the end of the Linear Pottery Culture period (Fig. 8.2.a).

The first period was marked by an almost constant population level, and a growing level of efficiency in house-building. This trend corresponds to the gradual transfer from houses of the oldest type with trenches along the sides but a relatively graceful wooden structural frame made of harder woods, which could stand alone even without extra supports. House 2197 was recovered from phase 4 with an exceptional structure that was comparable with later houses, and which may signal the first household with leading personalities. The level of the chipped and polished industries improved gradually, although grindstones the opposite trend, and their quality drops. This is also the main reason for considering change in phases 4 and 5, although the more specific form of this change can only be guessed at. First and foremost, a new division of the construction site appeared, after construction had occurred several times in the spaces of the originally restricted area in section F. The space that was open to individual houses for their own personal use has been estimated with the aid of Thiessen polygons; this has shown that the free space of houses of 2244 and 2224, in phases 3 and 4 respectively, had been reduced considerably, resulting in a need for additional building on the house or reconstruction during the course of the phase. The construction and social space of the more important house, 2197, however, is not markedly restricted in any way. From this, its residential and economic role appears to be less in accord with the others.

In the second period, the number of inhabitants remained comparable and the estimated minimum number of families did not exceed ten, while the quality of the construction of the houses dropped dramatically. Data is missing, however, from phase 8, and it is therefore impossible to ascertain whether the construction of the houses follows a similar trend as the stone tools. These all appear in the same way, with an initial quality decline, but by the end of the period this quality improves once more.

The chance convergence of all three types of stone instrument, including the chipped industry, can perhaps be explained by the narrow, limited social conditions of that period. These are present throughout the majority of the phases in a similar manner as in the preceding periods, through the individuality of the economics of individual houses, which, amongst other things, corresponds to the repeated receipt of construction loess in the area immediately surrounding the houses. The regularity of the long construction pits was halted in phase 8 by two large loam pits, which of course may have been created earlier. These might correspond to a transfer within the BY1 area after the point when its eastern part (section F) was already covered with the remains of more than thirty structures. At the same time they are proof of the first collaborative activities of the economies of more than one house, breaking down earlier individuality. These loam pits are unique because of the isolation of common pit 2101, which was created by expanding a pit during phase 2. The working areas documented beside the pit on the northern side of the house belong to the individuality of the old linear houses, as is the case in Miskovice. At Bylany these pits are missing, apart from the very clear case of a pit with an oven beside house 2223.

It was in the third period that there was an increase in the number of inhabitants for the first time, but numbers then dropped sharply. In phase 10 the minimum estimated number of families was twelve. House 306 was also recovered from this phase; with an exceptionally large structure, it may represent the residence of a chieftain (big man), free in time and place of greater population concentrations. House structures reached a stable maximum in this period, in all of the phases. Polished tools and grindstones showed the same decline in quality; the quality of the chipped industry, on the other hand, increased. The development of the settlement apparently reached its first terminus in phase 12, when the BY1 area was practically abandoned. It is likely, however, that cultural change was not among the reasons for the abandonment - rather, the reasons were probably to do with local interest, even though comparable data from other settlement areas are not yet available.

The regular reconstruction in phase 11 contrasts with the absence of subsequent reconstructions. The area was probably already abandoned in these phases, and its residential function changed to become an economic one, and therefore this is basically the functional hiatus. House 88, then, was occupied by a family which refused to leave, or perhaps had family members that were too old to do so, which would correspond to the exceptionally high number of single lines under the rims of pots, if this indicator can be interpreted as a sign of age (Tab. 5.4.7.A). In

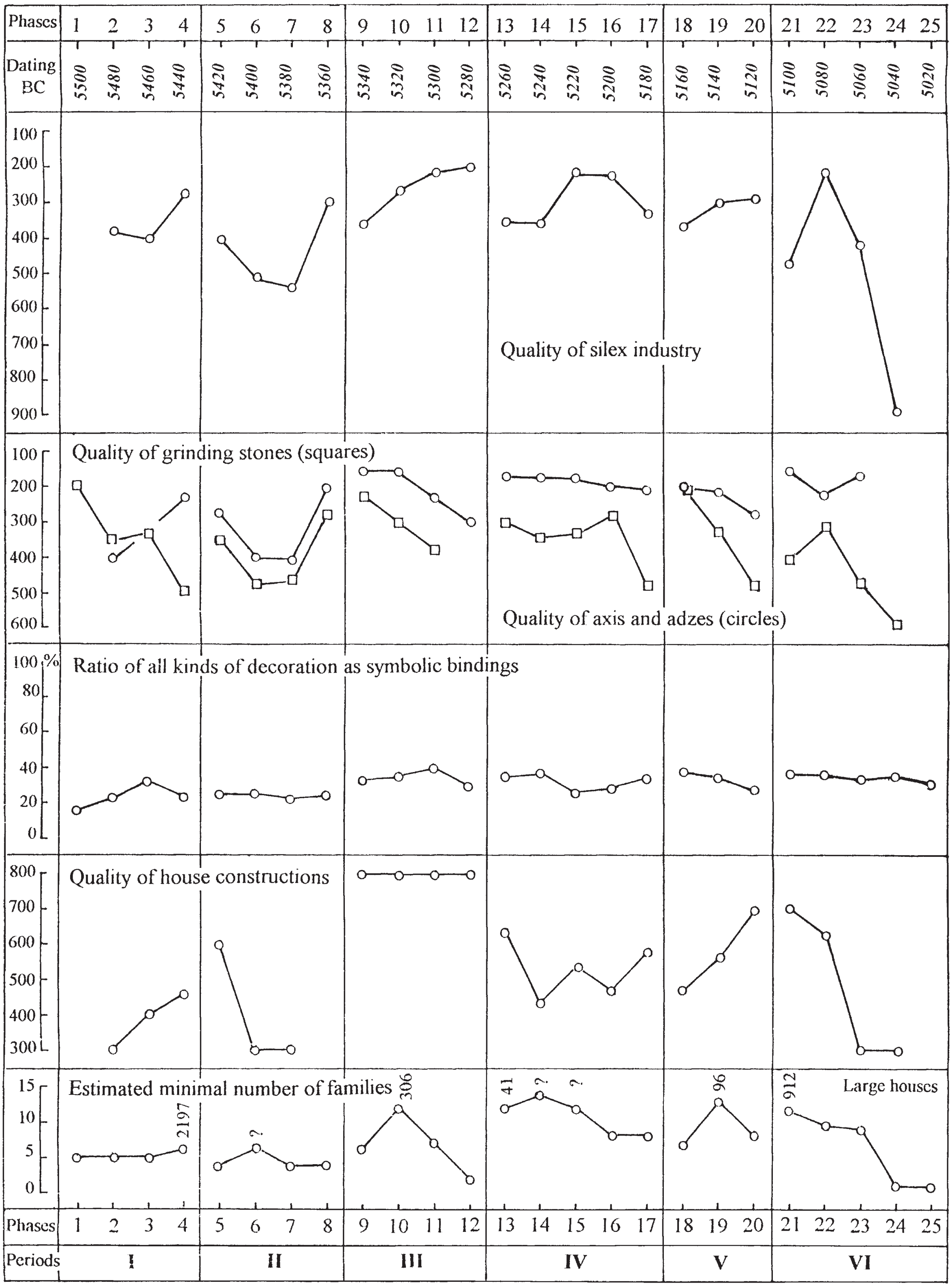


Fig. 8.2.a. The comparison of developmental trends of particular artefact types. - Porovnání vývojových trendů různých druhů artefaktů.

phase 12, another isolated loam pit appears. With regard to the mechanism of the creation of ceramic waste in long pits, joint pit 554, dating to phase 12, ceased to function in this period. Despite this, it is not possible to say that there was any collective activity involved in collecting the clay.

The end of this period is taken up by the peak in cultural development, which in the Czech Linear Pottery period is represented by, for example, the maximum fluctuation of decorations including filled-in bands with other elements. This probably represents the time span which had similar expressions throughout the Linear Pottery Culture of the whole region, and which indicates the onset of the later period of this ceramic type. In this area it does not represent a further cultural change, but in the Transdanubian region this meant the full entrance of the Želiez group. Part of this may also have been associated with the continuation of some sort of internal colonisation of the Czech region, which may have appeared since some of the inhabitants left the Bylany settlement. There is thus far no proof that the drop in population in phase 12 was caused by other factors, either internal, e.g. catastrophic population decrease, or external, such as the attacking of the inhabitants by another social group.

At the beginning of the fourth period it seems likely that there was a fundamental renewal of settlement area BY1, including a new division of the smallest private plots. Construction in phase 13 is marked by a great regularity in both the distances between the houses and their overall layout. House 41 is unique in its construction, as if it is the house of chief, although nothing similar was found in the following two phases, which had greater numbers of houses. Because it is not likely that house 41 lasted for more than one phase, it is necessary to predict that for these phases there are still undiscovered chieftains' houses in that part of the area that has not yet been excavated. At the end of the period the minimum number of families fell. The quality of the structures fluctuates irregularly over the course of the whole period, as does the quality of the stone tools. Overall there is a general trend here, but different types of stone tools cannot be mutually compared in the same way that they could, for instance, in the second period. The conditions for controlling the quality of the individual tools probably changed in the latter period, as compared to the earlier one.

In comparison with the previous period, construction in the area is much more complicated, particularly than was the case in the first three phases. These phases are also marked by the one or more loam pits placed in close proximity to the houses. Some spaces in the houses are, as it were, amidst the others, so their individuality did not have an open space like the others. In this limited space, a silo appears in phase 14 as further proof of socio-economic activities. It can be said that the economy of the home is marked in the later periods by limited individuality and broader mutual co-operation. The individual, long construction pits are not predominant, but they are typical first and foremost beside houses with unique structures, which underlines their exceptional role. Around other structures individual pits appear, rather than whole complexes.

In the fifth period the number of houses fluctuates, but the quality of the their structures has marked tendencies for the better. In phase 19 the minimum number of estimated families was twelve, corresponding to large house 96. In this case, the large house has a regular, though not particularly pronounced, structure, but no enclosure, while a large quantity of ceramics were buried within it. The grindstones and the polished implements are marked out by a declining tendency, whilst chipped tools improve gradually. In this period it was still possible to obtain high-quality materials, both from Czech quartzite sources, and of Polish silicates. Phase 19 is conspicuous first and foremost for its complex structure, with several loam pits. It can be compared to phase 14 in the preceding period. The majority of houses have a measured space immediately surrounding them, for household activities, and this leads to the presumption that there are further buildings in those parts of the area that have not yet been excavated.

The sixth last period is marked by an overall decline in all of the characteristics that have been evaluated. The estimated minimum number of families is still quite high in the twenty first phase, and it is thus that a large house 912 appears here. The chieftain was probably selected for the last time at Bylany for the needs of the cohabitation of a larger number of families, and the decision-making process essential to their common interests. The quality of the construction of the houses at the end of the development of the area reached its minimum values. This period is marked by an increasing concentration of buildings, an absence of large common loam pits and, on the other hand, by the presence of silos. The greater number of these in the concluding phases may also indicate some other role; apart of the function of providing supplies, this might be a preventative protection of foodstuffs against possible threats from without.

The development of the Bylany settlement area in the Linear Pottery Culture period ends in houses 278 and 277, which were quite exceptionally well-built in one place and represent a style of construction not seen before. The drop in the quality of the tools may of course be merely a reflection of the formation of the refuse at the end of the settlement period, when higher quality tools were taken away and did not end up in the contents of the pits. This would testify, on the other hand, to the peaceful abandonment of the settlement area, and the departure of the remaining inhabitants in a period which is characterised by a cultural divide. The residential function of the BY1 area was renewed in the latter period of the Stroke Ornamented Pottery culture, after a hiatus lasting some 250-300 years.

The range of absolute dating is constructed on the basis of the latest radiocarbon dating of several houses, first and foremost house 306 from phase 10. By using the phase constant of 20 years, on the one hand the beginning of the Bylany settlement is placed in section F in the first half of the sixth millennium BC and on the other hand phase 22 starts at around 5080/5090 BC, which is the latest dendrochronological date of the wood panelling of a well at Erkelenz. This well is apparently linked to the later Linear Pottery Culture in the Rhineland. This would correspond to the beginning of the last period of Bohemian Linear Pottery Culture, which in the chronological order of the Bylany settlement falls somewhere at the sixth interval. In this way, the Bylany chronology can be considered from the point of view of absolute data as a relatively reliable method with the addition of artefacts, as it is better with a number of buildings (comp. Appendix 2).

There are therefore no more time limits in which it would be possible to predict independent construction phases in other parts of the Bylany microregion. Despite this there are buildings recorded here, first and foremost in the three earliest periods, and not least in section S, which was examined in the roundel project. The shorter breaks in settlement could perhaps be construed as precursors of the shortening of the phase constant, for instance to 15 years with the remaining 5 years hypothetically lying beyond the BY1 area. Although this hypothesis cannot be ruled out completely it appears systematically to be quite improbable, since houses probably survived for longer periods, or at least their ruins were left standing for a certain period of time beside newer structures. Little is known thus far about construction in areas BY2-4. From the smaller excavations in BY4 is seems that buildings existed here in parallel to the houses of the first three intervals in BY1. The latter periods are marked by ceramics from silos, but in no way by the ground-plans of houses. This may imply a change in the function of the whole area or a major part thereof, from residential to economic, or perhaps even cultic purposes which may have lasted until the roundel period of the Stroke Ornamented Pottery Culture. Additionally, it is not possible to rule out the existence of the isolated houses such as were recorded at Miskovice 2, and which is predicted for other areas of the micro-region along the banks of the Bylanka and Vrchlice streams (such as Kutná Hora 2, Nové Dvory 2 or Hlízov). Their isolation might indicate a lower degree of kinship between the inhabitants, who could nevertheless have been subordinate to an influential chieftain - if this institution was set up in certain phases at Bylany, where his position was a consequence of a greater concentration of synchronic buildings in one area.

From the point of view of the whole Čáslav-Kutná Hora - Kolín region, a similar concentration of long-term settlement may be seen in the micro-areas of the majority of mountain streams or at the sources of smaller streams. To the north of Bylany is the Nebovidský stream in the Nebovidy - Dolany - Hořany - Malá Vysoká region, from which it is separated by the low spine of the Kaňkov belt. Further to the north-west there is a Neolithic site near Suchdol. To the south of Bylany similar sites were probably located in the Křesetice - Bykánec and the Malešov regions, which belong geographically to the region of the Křenovka river basin. Individual finds of linear pottery often form a detailed picture of the space covered by settlement areas. If these are traced in detail, then it can be shown that the finds in concentrated sites are actually linked in practise to connected sites, while the finds from smaller sites are isolated by large unsettled areas. The absence of objects buried in these places does not of course exclude the existence of any kind of activities outside the settlement. Although the main lines of communication were dictated by the network of waterways, which also determined the regional interests of the related groups of inhabitants, transversal connections between the large sites undoubtedly existed. The sites nearest to Bylany were within one hour's walking distance, which in practice would have allowed daily communication between their residents. Information about life in the region could, even without long-term progress, be exchanged in a relay fashion with a maximum delay of a few days.

The settlement area of the Linear Pottery Culture marked BY1, which was partially examined along with further information from the Bylanka micro-region and Vrchlice, provided a large amount of data and information about the lives of the inhabitants in the early Neolithic period. Not all of this could be used in this work to describe their lives and an interpretation of the multi-faceted events which took place here over the course of more than seven hundred years. The variability of the artefact remains has shown how the content of this period of history in just one place is differentiated, while at the same time reflecting the life of the inhabitants of an extensive portion of the Central European region. The archaeological view by means of broken pots and stone tools is to some extent complete and complex; it has been shown that not even detailed events are missed, and that it is possible to examine the fates of individual families or even individual members of the community. The assemblage of archaeological sources from Bylany also provides far from exhausted volumes relating to past events which are still topical, which also bring new and more in-depth images of our own experiences and can be considered similar to the sometimes uncompromising demands placed on the future. They have shown how little the needs of people change over the course of a millennium, and how favourable their living conditions are if they respect the rules of nature. The task for the future, therefore, is to describe life in a Neolithic settlement on the basis of ecological facts.

8.3. People and their homes (houses and settlement)

Although a situational analysis of the principal kinds of artefacts brings many hitherto unknown results and details, it was limited here by the limitation of a single site. It did not, therefore, bring a unique answer to the principal question as to who the inhabitants of Bylany in the Neolithic were and from whence their life style originated. In was in this sense that reference was made to the knowledge of other disciplines and sciences, in particular anthropology (Černý - Velemínský 1998). The inhabitants of Bylany were genetically part of the Central European population of the post-glacial period that has spanned the last sixteen thousand years. New results on the composition of this population are being obtained by molecular biology, the study of which is only now beginning. In the broad regions of Central Europe two extreme theories can be ruled out; the first supposes the immediate assimilation of local Mesolithic peoples while the second suggests a rather complex wave of colonists. A more complicated, long term process is set down here, of the slow diffusion of small groups of people comprising several families over relatively long distances. These groups settled down at the fringes of regions that had hitherto been of interest to Mesolithic peoples (Denell 1985: 170, Czerniak 1994: 184). The first Neolithic inhabitants had settled at four or five places in the Kolín - Kutná Hora - Čáslav region by the end of the first half of the sixth millennium, to c. 5600 BC.

The same question concerning Bylany, as to where the Neolithic people came from, is much easier to answer at a more detailed scale. The earliest house was found in section F, and its inhabitants came there by way of the Bylanka and Vrchlice streams, most probably moving upward from the place known in the archaeological records as Nové Dvory 2. This occurred after the broader space at the confluence of the Vrchlice and Klejnárka east of Malín had been used by several generations of people. In the wider area of the two ecosystems - between the relatively open landscape of the broad Klejnárka valley and the less passable landscape of the adjacent tertiary terrace of the Elbe (Labe) - a place was found that was deemed the most suitable for pioneer settlement in this area.

Without direct proof as yet, it is nevertheless possible to argue that the most decisive line of communication was the Elbe and its tributaries. The main axis of the region built up along the river Doubrava, which meanders through a broad valley between Týnec nad Labem and Čáslav, had not yet been settled. The only possible explanation of this situation could be the supposed pre-Neolithic inhabitation of the Doubrava region. This has not yet been proven by archaeology, but such evidence can be presupposed to be hidden in the deep alluvium of the Doubrava river. Most of the Kutná Hora region, as represented by the Doubrava valley, may have remainder for a longer period the domain of hunter gathers who only slowly adopted the new economic practices of the Linear Pottery Culture people. By contrast, the earliest agriculturists from Nové Dvory 2 acquired their subsistence on an extended scale by hunting game, as archaeozoological finds have demonstrated.

It was necessary for several generations to pass before the families in the pioneer area enlarged sufficiently for some of their younger members to settle the area upstream of the Vrchlice and Bylanka. The landscape there was less suitable, the present day loess with brownsoils or illimerized brownsoils was covered by sparse oaks that it would have been necessary to fell for not only for timber, but also to create space for new fields. There were about two or three of these generations before the first family settled down at Bylany sometime round 5500 BC. House number 2277 was one of the first houses built there at this time. Only three cross-rows of construction postholes are preserved from this building, but they show that it was a simple structure of a common style labeled in this analysis as type C. Its construction was rather gracile, but the structural dimensions of the rest of the building are not calculable. This house had a simple mid-section and no traces of eventual outbuildings on the southern or northern sides were found. The next house of this initial phase was number 2200, which was found some 120 m to the northwest. It had a similarly simple structure, single mid-section, and a small northern outbuilding. At the southern side, its long walls ran past the cross wall to form "antes". A third house may be represented by pit number 2123, another two houses may be presumed in the unexcavated part of section F.

The initial phase at Bylany, as is archaeologically proven, is represented by three or at the most five simple, single family dwellings comprising the usual dispersed built-up area in the eastern part of the Bylany 1 settlement area. Given the position of the houses in the subsequent two periods at Bylany, which altogether account for seven phases, it can be supposed that part of the large future area was divided from the beginning into several spots of interest, the continuity of which lasted three to four generations and repeated once more. The kinship of particular house residents was at the beginning closer, at least at the level of common ancestors. The families provided for their own subsistence individually, and collaborated only in the case of necessity e.g. by felling the trees for preparing residential and economic areas, or in activities during the agricultural year. Their blood ties died out over time, and neighbouring relations increased that were based more on symbolic kinship than on real. In the second Bylany period new building activities appeared in other areas of the micro-region. The kinship relationships to the residents of these new areas has not yet been considered; given the supposed relations within the whole micro-region the people were likely to come from kin-related families.

Consequently, a single settlement area grew that encompassed several repeated components. Rebuilt house structures gradually filled in originally delimited areas of interest. The loam pits dug out during house construction were rapidly and deliberately levelled not only because of intra-site communication between the dwellings, but also for other economic reasons. Besides the everyday activities conducted outside the house, a small field had to be nearby in order to be protected from various pests. By repeated and long term settlement within a relatively limited region large sites arose that in some cases are now designated central sites. Their central role can be described more as a economic one than a spatial one. They are usually placed in opposition to smaller sites within a definite micro-region. The normally short-term duration of small "satellite" sites is inconsistent with this opposition. Such smaller sites were more like episodic sites than real satellites of the settlements in the centre. Another central role is ascribed to those large areas where irregular artefacts appeared - usually a kind of specific raw material, the distribution of which was organized from the site (Zimmermann 1995).

The interpretation of large distributive or redistributive settlements as "central" within the micro-region is argued through a quantitative distribution of specific raw materials for the chipped stone industry. Other centres are considered, such as those connected with the production of grindstones or even ceramics for larger vicinities (Kneipp 1995). Such an interpretation is in the case of Bylany groundless, as no similar special materials have been found there. The Bylany settlement areas are partly situated by the sources of a limestone that was exploited from the Middle Ages until comparatively recently, but during the Bohemian Neolithic there are no traces of the limestone's use, e.g. for building purposes, even though the relevant technology had been in the broader Neolithic regions of the Old World for some time. In the cases of such an economic interpretation, the presence of larger and smaller Linear Pottery Culture sites cannot be refuted in some regions. These coincided more with the general social principles of settlement as it was practiced in all of the micro-regions. The optimal area was usually sought out in given environmental conditions, where houses could simply be rebuilt near each other with sufficient remaining space for other economic and social purposes. The ruins of older houses were considered the houses of ancestors in a figurative as well as in a real sense. In this way the absence of isolated burial areas in Bohemia can be explained.

The first inhabitants of Bylany brought into this new area the previously unknown art of managing natural resources in the vicinity, which they began to use much more intensively than had their Mesolithic predecessors. For the securing of subsistence for pioneer groups, small areas of alluvial soils at the edges of river terraces would initially have been sufficient. Permanent settlement over the course of two or three generations under favourable conditions caused an increase in population, and new areas began to be sought along the small rivers. It can be assumed that the broader area of the Vrchlice including the Bylanka was occupied from the earliest times. This did not necessitate more than two hours walking. This micro-region was originally served by the complementary hunting of game or the gathering of different wild vegetables, and was most probably delimited both by other Neolithic groups and former Mesolithic settlement. The earliest sites on the lowermost streams of smaller rivers are situated about ten kilometers from here at Čáslav on the lower Brslenka and at Kolín on the lower Nebovidy brook.

The settlement at Bylany presupposes a preceding period of successful settlement at Nové Dvory 2 before a situation arose where it was necessary to look for suitable new places for cereal cultivation within the delimited micro-region. The newcoming families which were allowed for kinship reasons to settle nearby, could contribute to this, as the sites at Hlízov, Kutná Hora 1 or Miskovice 2 bear witness. If at Bylany several intervals of increasing and decreasing population appeared, then the same might have happened elsewhere. At those places, though, settlement was not renewed and the families, if they survived, settled together near others. It can be presumed that the creation of large residential areas was caused not only by the optimal environment at Bylany, but also by progressive neighbour relations substituting for close family relations. Another larger area developed later at Kutná Hora 2. In other micro-regions the development may have been different but the principle demographic and socio-economic mechanisms were similar. This is shown by the similar distribution of large and small residential areas along the tributaries of the Elbe and Klejnárka in the study region.

The new settlement area made demands on cereal cultivation, which could in the case of section F at Bylany have been secured with little interruption of the trees, covering uninterruptedly the landscape. The building of houses demanded the immediate dealing of suitable trees, and at the same time enlargement of the free space for cultivation. The Neolithic house represents a completely new architectural style in prehistory to this time, one which survived with minor innovations several cultural changes over the succeeding millenia. The Linear Pottery Culture represents the first eight centuries in which the principle system of post construction stabilised. Only the specific technical resolution of individual parts of the structure changed, which is considered the optimal resolution of shelter given the local environment. This architecture can be considered as a reconstructive type of home for the Neolithic population of Central Europe, in comparison with the stone architecture of the Mediterranean or the mud brick architecture of the Near East.

Similar differences in material match the local environment but do not imply any substantial differences in the structure of artefacts. This can be demonstrated in the case of figurines, which from clay are very rare at Bylany; by contrast, they are common in regions with clay architecture, and in the Mediterranean the figurines are often made of stone. Therefore, is to be supposed that similar figurines were made of wood at Bylany.

For the earliest Linear Pottery Culture period, the characteristic house type is of a relatively weaker construction, using a smaller amount of wood than was employed later. In some cases this demanded strengthening the roof and the middle (habitation) section that is archaeologically marked by side trenches. This earlier type subsequently developed into a type with a more solid structure that with the same dimensions did not require additional structural support in the same way as the preceding type. The new construction is supposed to have given some improvements in internal structure, but these are not archaeologically visible.

The template of rectangular houses with a quadrangular lay-out must be recognised as a substantial innovation in Central Europe. A clay model of such a house appears only in the Late Neolithic Painted Pottery Culture at Střelice in Moravia. At

Bylany a model "oven" and similar sherds were found (Plates 8, 9), which is more typical of an earlier type of house archaeologically not demonstrated. The protrusions observed above the doorway may represent posts, therefore implying a residential structure rather then an oven. During the time of Linear Pottery Culture it would have existed only within cult structures as a memory of the preceding cultural era.

Besides the normal houses of defining sizes, exceptionally large houses are also found on Neolithic sites, including Bylany, the more solid construction of which is striking. They are usually well archaeologically documented. Their internal posts are extraordinarily strong, sometimes arranged for example by cutting to halfway along their long axes from bride posts. The structural posts are regularly arranged in the plan, and northern and southern walls well preserved. Within, different sunken features can be found that are not usual in other houses. These houses were labelled in the Netherlands type Ia, while in Bohemia they were interpreted as communal houses (Soudský 1966). It was supposed on the Dutch sites that each such building existed in each settlement phase as the house of a chief or other leading person. In any case, these houses are extraordinary buildings with exceptional structures and interior arrangements, and can be taken as type houses. From the point of view of spatial distribution within the site they hold no remarkable position, e.g. central. They play a normal occupational role in the same way as other houses, and their exceptional structure can be connected to the extraordinary social rank of the family or families that lived in them, rather than to some special function of the house itself.

Analysis of the size of the habitational parts of all of the houses at Bylany, together with other estimates of the built-on, unexcavated part of the Bylany 1 area, enabled the estimation of the number of families living there in each phase. Extraordinarily large houses appear only once in each settlement interval of several phases. It was found that the houses appeared only in phases where the number of estimated families exceeded some limit; for earlier intervals this limit is six families, and for later intervals twelve. The large houses themselves, according to the ceramic refuse from their complexes, are equivalent in temporal terms to one phase. These facts were previously unknown, and are somewhat at variance with the current logical conception of the position of leading persons in prehistoric communities. It may follow that these persons were established in Neolithic society only for a specific time when the number of families exceeded a reasonably exactly stated demographic limit. The communities with lower numbers of families might be organized in some self-sufficient manner, with the need to install a chief and without the unusual support of his family.

Archaeological records do not enable the specification of the status of such a leading person any more exactly, or assessment of whether such a person would have been a "Chief", "Big Man" or "Old Man". The differences in the status of these as ethnographically stated, according to Van de Velde (1979) inherited, gained by effort, or resulting from greater prestige respectively, are not in the evidence decisive. These differences are more due to a world view, and can be understood from the point of view of situational analysis. The temporally limited institution of chiefdom must be considered as one of the important characteristics of social organisation in the Neolithic Linear Pottery Culture.

The interior subdivision of buildings, as is best visible in the large type houses, can also be distinguished in other house plans. Every building was naturally divided along on one axis by long rows of structural posts into four spaces. The four aisled long house is the main architectural characteristic of the whole Linear Pottery Culture period, and lasted with slight changes into the time of the Stroke Ornamented Pottery Culture. The most profound change in interior construction came only in the late Neolithic period, when the number of lateral rows diminished so far that the longitudinal subdivision in fact disappeared. During the post-Neolithic development of wooden architecture, the number of internal aisles also decreased to three and finally to just two. The importance of longitudinal subdivision was however only complementary, with the exception of the main habitational mid-section of the houses, where the regular structural cross-rows were deliberately broken down, so that space could also be enlarged laterally.

For the main functional subdivision of a house lateral division is important, and is visible in different ways, most often as an irregular distance in interior structural cross-rows. The habitation section is in every instance the core of the house, labelled a mid-section when additional northern or southern penthouses were added to it. This main space was usually simple or double sized, and was separated by cross-rows from both northern and southern sections. This separation is marked by a narrower distance between cross-rows, and in some instances a similar separation of the main part from the wall is present. The centre itself, labelled in the descriptive schema of D. von Brandt (1988) as cross-row Q22, is emphasized by the deliberate off-setting of one post from the cross-row's line. It was proved at Bylany that as well as a different central cross-row arrangement such as a broken or diagonal position to the house long axis, an absence of one post may occur. This was hitherto considered the result of a lack of evidence, but now seems to have been the simplest way of enlarging the residential section of the house, where the greatest number of people would have assembled. This section may also be presumed to have contained a hearth or oven, where food for the whole family would have been prepared.

Both the northern and southern sections of a house can be explained in different ways, although selecting the explanation which is most likely is difficult. It is evident that the southern part played an important role in the communication of the house with its surroundings, and that the entrance was also placed here. From hence, it was possible to proceed along the long axis of a house inside, and those parts most remote from the entrance showed increasing intimacy in the environment. The southern part was the most open, while by contrast the northern part was the most closed and inaccessible to possible visitors. The explanation of this part as stabling for animals has not yet benefited from any archaeological proof. The keeping of domestic animals inside the houses cannot be ruled out in exceptional cases e.g. very heavy winters. At Bylany, no phosphate analyses have yet been conducted in an effort to resolve this question, but given other indices such stabling seems to be of low probability.

The external appearance of the houses can be inferred only indirectly, and on the basis of reconstructions. The walls were made of wattle and daub, and some small windows can be presumed - more for their light than for air conditioning. Entrances in the side walls were somewhat exceptional, at least at Bylany, where the irregular accumulation of refuse, as e.g. at Cuiry lès Chaudardes (Illet - Plateaux - Coudart 1986), cannot be proved. The smoke from open hearths or perhaps from indoor ovens must have passed through the roof, and all of the openings in the walls must have influenced the circulation of air inside; therefore, it cannot be presumed that many such openings existed. The arrangement of the southern wall was probably the most striking because the posts in this area are often arranged in different ways. Most commonly they are doubled, the posts of the long walls extend beyond the line of interior posts, or the middle post may disrupt the line of the cross-row. These details show that in some cases ornamental pre-walls were constructed, possibly playing the role of a house sign to be read from a greater distance away. Entrance to the house could in this manner be regulated against both the residents of neighbouring houses and strangers. The Bylany houses are oriented similarly as the houses at other Czech sites of the Linear Pottery Culture i.e. with a slight deviation to the south. In the terrain configuration the southern walls faced in the direction from which visitors were not expected. Therefore, the symbolic role of the external appearance of Neolithic houses has hitherto been poorly interpretable.

In the long houses were focussed all the activities that were necessary for Neolithic people, including the productive, economic and cultic, because all were connected with family life. If similar activities were done outdoors in front of the house or further away, they were limited by suitable weather conditions. By contrast, inside the houses sufficient space was needed so that when necessary all such activities could be conducted there. This was the main reason for building relatively large buildings for relatively small numbers of occupants. Apart from the houses, there were no other buildings or surface-level structures found at Bylany. The enclosure at house 912 is an exception to this rule, as are the remains of the similar enclosure at house 41; B. Soudský (1966) believed that these were for the corralling of a common herd, supposing them to be attached to communal houses. Given the aforementioned, different interpretation of large houses, such an explanation of enclosures is not unequivocal. Enclosures may be considered rather to be proof of the individual prestige of houses and their residents. They might also have fulfilled other functions, such as e.g. the enclosing of space for special, perhaps cultic, purposes. The enclosing of space is itself an attribute with very strong symbolic meaning in the Neolithic; it is relatively rare, but not unknown. Sites with large ditch enclosures are also known from the beginning of the Linear Pottery Culture; at Bylany such an enclosure has not been evidenced even though the perimeters have been excavated. Later Late Neolithic ditches or roundels, of which there are several at Bylany, had more a specific economic/cultic function. They cannot be compared functionally with earlier Linear Pottery Culture site enclosures as they appear several centuries later.

Every Neolithic settlement area, including Bylany 1, comprised components other than for habitation, e.g. for artefacts´ production, where the artefacts from perishable materials were made, storage (silos), materials (at the site mainly raw soils) and last but not least economic functions (fields not yet proven). Besides construction pits, which were part of house complexes, large loam pits appeared at the end of the second interval, and repeatedly at the end of the third interval of phases, beyond the construction areas. Their dating is, however, not unequivocal, as the refuse found within them may date to the end of their functional lifespan - they might have been opened much earlier and survived through several phases, for example. They may bear witness not only to technological changes, but also to the demand for more of the clay used in ceramic production or house repair, but they may also be the result of the dissolution of the individual positions of the houses. Large numbers of loam pits come from the third and the fourth intervals, repeatedly from the phases after the initial reconstruction of the area. They are often placed at the fringes of the spheres of interest of individual houses, which may imply a higher kinship of the people from these houses (section 7.2). On the other hand, it might follow on rather from a greater strength other than that of blood relations.

The round pits with their typical layered fill in the lower part of the section are striking among the recovered features. They have been interpreted as storage silos for cereals, and appear not too frequently in the later intervals of Bylany phases. Their chronological importance may originally have been overemphasized, and later the interpretation of the renewal of their bases using new pure clay was refuted. They demonstrate changes in the manner of cereal storage, this initially being done in the southern parts of houses. The need to store cereals for the Spring sowing appeared only with Spring cereal - initially, only a Winter crop was sown. The storage of cereal near the fields was not only practical, but also a safer defence against moulds, mice and other pests. Therefore, silos are one of the separate components proving the development of the earliest agriculture, and they also show that fields were situated among the houses.

Further primarily economic and productive components have not been reconstructed at Bylany in all cases, because of difficulties with the detailed chronology of small features. An exception was found at Miskovice 2, where in the productive area it was possible to reconstruct three nearby houses, rebuilt in three phases: the productive area was in use in all three phases. Analogous small features at Bylany 1 - not analysed together with houses - may prove similar components which thus far it was not possible to delimit.

8.4. The stone implements of men and women (chipped and polished industry, grindstones)

The main characteristics of the stone implements are distinguished by the fact that they were not produced at the places where they were later used, due to the naturally irregular spacing of raw material resources. The relative inaccessibility of materials in most of the potentially inhabitable areas quickly led to the appearance of specialized production areas, with other areas being designated consumptions areas. The exchange of semi-finished products as well as complete implements must therefore be considered an important characteristic of the Linear Pottery Culture from its earliest period. During the initial phases of micro-regional settlement at Bylany there was little time for the prospection of resources; knowledge of such places could have been mediated by the Mesolithic peoples who had occupied Bohemian regions earlier and for much longer. Production itself lay in the hands of Neolithic peoples because of the different technology concerned.

An alternative hypothesis is that Neolithic prospectors arrived before the earliest inhabitants of the sites; nor can it be ruled out that Bohemia was in some way traversed in the first half of the sixth millennium BC by peoples who came early into Central Germany. On the one hand, the settlement of the Harz region is very early, and on the other SGS (silicates of glaciogenic sediments) that may have originated there are prevalent in the earliest phases at Bylany, as they are also at most other early Linear Pottery Culture sites. Recently, one such area was excavated near Litice in the Plzeň (Pilsen) region, and the same raw materials were found there. Given the Elbe (Labe) as a possible primary line of communication, people could sale very quickly from East Bohemia up to Central Germany without interruption, and could become acquainted with raw materials that they could then import back into Bohemia, where they were lacking.

During the first settlement interval comprising the four earliest phases at Bylany, no chipped cores were found, and more than 80% of the chipped industry found was produced from the silicates of glaciogenic sediments. Raw materials of a southeastern origin appear sporadically, mainly radiolarite, and these may be a last vestige of connections to the southeast. The polished industry was produced mostly from a common type of green shale, but sporadically also from an imported light green shale with black grains, e.g the hammer axe from feature 2277. On the other hand, grindstones were made of local raw materials, even if they were not produced on site near Bylany at the place where the raw material was extracted. The Bylany site has yielded schists of Kutná Hora crystallinicum, obtained from the Vrchlice valley, upstream of its middle course.

Neolithic technology represents rather the attributes of its producers than of its users, in degrees according to the morphology of the type of industry. The ability to ensure for each group the production of all the necessary artefacts was an integral part of the Neolithic self-sufficiency. Therefore both men and women in every family would if necessary have been able to produce knives, axes, and also grindstones in point of fact, they used no more than the semi-finished products or parts of implements prepared by the inhabitants of production centres near the sources of the raw material. The morphological instability of the LnK chipped industry in Bohemia shows more the fact that the residents of the production centres had little experience with the initial processing the cores, and were not specialised on this. The extraction, processing, and distribution of raw materials, or of semi-finished products and new tools, were in the LnK period only a supplementary activity, at both the scales of local and long-distance contacts. This is true of all of the stone industries, and not merely the chipped industry.

The proportion of finished products among the Bylany tools is difficult to estimate, given the low number of semi-finished products found in the refuse. In the case of the chipped industry a small number of cores were found, while in the case of the polished industry a lower number of semi-finished products occurred. The real numbers would have been substantially higher, and would have changed during the development of the site. In terms of the lack of semi-finished products in the refuse, there was only rarely a real shortage of them. Eventually, a shortage of raw materials was expressed by the collection of local materials such as opaline or chalcedony that were never used later for tools. Most of the imported raw materials and semi-finished products were not wasted in the Linear Pottery Culture, as is expressed in the use of all of their usable edges on all forms, i.e. flakes, blades, and chips. For the Bylany polished industry retouching or re-sharpening is typical, as is the secondary use of artefacts with damaged edges as hammers or handstones.

The sources of the raw materials have, with the exception of those of green shale, been adequately localised, and it is thus possible to follow both the directions and the distances from whence these materials came. In summary, the materials came from all possible directions and over various distances. The most variable spectrum is of chipped materials, most of which came from points to the north. No southeastern long-distance connections existed, according to the evidence of the chipped stone composition and other tool materials. The Krumlovský Les type raw materials that appeared at Bylany were typical of sites in mid- and southern Moravia. The region further to the southeast is characterised by materials such as radiolarites and even obsidian. The latter is completely absent from Bylany features dated to the Linear Pottery Culture, and was found quite exceptionally in roundel contexts of the Late Stroke Ornamented Pottery Culture; it may have been rather a consequence of long distance exchange than of direct contact with the northeastern Carpathians.

For most of the raw materials it is difficult to decide whether they were brought to the area directly, or were indirectly relayed from one site to another prior to their arrival. No striking accumulation of materials at neighbouring sites has been observed that might correspond to this. Among cores, as the most important contact form between sources and users, raw materials from very distant locales dominate. These distant sources are represented by Baltic and Kraków silicates, but materials from sources in the middle distance such as Skršín also appear. Chips from sources of the latter type are virtually absent - from these areas, mostly tools in the form of blades or flakes came to Bylany.

Neither the relatively sophisticated techniques of chipped material processing of the Upper Palaeolithic nor the microlithic techniques of the middle Mesolithic were particularly conspicuous during the Central European Neolithic. The chipped industry of the Linear Pottery Culture is characterized by an irregular cutting of blades and flakes. This results from the equal proportion of left and right striking on the striking platforms, and the generally even use of blades and flakes. Blades were in principle preferred, but flakes were used as an entirely equivalent alternative. Retouching is not particularly conspicuous at Bylany, tools retouching was on a small scale used only for the shaping of tool parts. The shape of the edge was of course decisive, and the retouched edge was usually invisible after finishing shafting. The retouch evidently had in most cases no communicative role, and cannot be regarded in the Bylany assemblage as a classification criterion.

The edge angle remains the main functional criterion for both the chipped and polished stone industry. The sharpest silicate tools had an edge angle of about 10° and the highest angle of about 40° degrees appeared on scrapers. When the sides of the tools were in fact concave the angle near the edge was still profoundly sharper. Besides the principle attributes of chipped materials, they were very often made with extremely sharp edges, like glass sherds. The mechanics of the cutting of different materials, when microscopic particles are glided across and appear as if crushed, are efficient to such a degree that for tool production even lower quality materials such as quartzites with relatively blunt edges could be used.

The edge angle of polished tools is classified in a different manner. The shales used, with a very fine mineral structure, enabled the sharpening of the edges with grinders made of very fine sandstones into edges with double classes of the edge angles. The limit between more and less sharp edges is marked by a value of 68°. Stone axes with a greater angle were sufficiently effective to work with hard woods such as oak. Experiments have shown that in cutting the wood is more chopped than sawed, and that such a technique is also adequately efficient. Other tools with a lower edge angle served for the more intricate working of wood, perhaps for creating wooden pots. The skill of Neolithic workmen in wood working was generally higher, at Bylany too, than was hitherto supposed; wooden pails, well panelling and the details of other objects found in Neolithic wells bear witnesses to this.

The working surfaces were the effective parts of grindstones, in contrast to the working edges of knives or axes. The efficiency of grindstones is governed by the fitting together of both working surfaces, and by their sharpness. Therefore, the surfaces of the rocks employed, such as schists, were additionally sharpened. This surface could later be coarsened again if the height of the tool allowed. The upper grindstones made of coarse sandstones were arranged in a similar manner. These rocks were imported to Bylany from a distance of about 25 km. In settlement refuse, however, the unusable remains of bipartite grindstones dominate. The stone used also influenced the use of the tool. The height of stones was generally lowered by around a third to two thirds of their original height, but asymmetrically and not across the whole section.

The grindstones, and particularly their ergonomically shaped uppers, were considered precious implements which survived the period of a generation and therefore of a house phase. It was on the variability of their appearance within the phases that longer intervals of site development were defined; these subdivisions were subsequently proven by the analysis of other artefact types. The standard model of grindstone refuse contains upper and lower stones in a ratio of about 2:1. The higher numbers of upper stones shows not only their greater wear, but also the different quality of grinding. Two kinds of sandstone were used at Bylany, coarse and fine; accordingly, coarse and fine grinding can be distinguished, as carried out on the same lower stones. The ground materials included both the inorganic (coloured clays) and the organic. The latter included not only cereals but also healthy vegetables or even meal. At the end of every interval, usually in the phase before changes in the area, the numbers of grindstones decrease noticeably, particularly the upper stones. This shows that these upper parts were, if usable, transferred into new houses by younger women, or may have been regarded as an inheritance.

To understand the historical role of the stone industries of the Neolithic means to evaluate their social and specific sign values in the life of the Neolithic society, and of the Bylany site as a case in point. Firstly, their numbers are a sign (icon) of the number of people who took them into their hands and used them in their work. The functional classification of implements denote as a sign index particular activities in their intensity, as well as the attendance of gender or age groups at these activities. Different kinds of implements assume the role of sign symbol within different contexts of everyday life on a Neolithic site; such roles design the situation of whole groups of residents, either as individuals or grouped into kinships and families. A transparent view through all of the levels results from situational analysis, and by their overlapping the sign values of implements appears more visible.

The principle hypothesis presumes that the number of implements corresponds to the number of people who used them. Within one equation several parameters can be combined, e.g. the lifespan of the tools, the number of inhabitants, and the duration of the phase. By placing alternative values into such a equation it is possible to trace the logical relationships between them, and to judge the most probable results. For the polished stones this is as follows: 3-5 pieces are required per man per year, and an average of 6 pieces were found in the refuse of each house. If this range of refuse represents about 3-5% of the original number of artefacts used, then the optimum estimate of the duration of one phase is 15-30 years, and there was one family in each house, containing 1-2 men (Rulf 1991: 326). If the case is simplified, and demand is estimated as one axe per man per year, then the other parameters have optimum values of 3% found refuse, 20-30 years phase duration, and 1.4 - 2.2 men in each family house (section 2.5.3). Because the resultant estimates contain mutually consistent and logically acceptable numbers, these can be evaluated around the polished stones as a sign icon of the number of men living in each house.

The foregoing calculations contain several roughly estimated numbers, particularly the percentage of human refuse at the site and the demand for the implements, which might change irregularly. Therefore, it is impossible to directly interpret the numbers of implements found in a house into the number of persons who lived there. The sign value of polished stones is independently proven by their relative appearance in relation to the individual houses. Those types of houses with simple and doubled mid-sections were distinguished as houses for one and two families respectively. The relative proportion of implements in the latter is almost double also (section 2.2.3.), even if the small artefacts are calculated. In the case of the chipped industry, the relative increase is only about 50% (section 1.2.3), and in the case of the grindstones it is higher but is not quite 100% (section 3.2.3.).

The relationship between the number of implements and the number of inhabitants is not linear: it results from the different functions of the tools, and more especially from their different relations to men's and women's work, and that of the aged. Compared to the polished stone implements which were really only used by men, chipped tools were more common. It is possible to conceive that they comprised a set of cutting tools needed by the whole family; within a house they could be borrowed, and therefore in a two-family house there would not necessarily be exactly twice as many of them. On the other hand, grindstones were used mainly by women, for preparing food or other stuffs for the whole family. Their efficiency enabled the preparation of double the quantity of cereals with less than double the number of tools. It seems that families living together under one roof had a common kitchen as well as table, or at least that their womenfolk collaborated closely. Even if the different kinds of tools behave differently in their details, their relative numbers are in every case greater in the case of houses with doubled mid-sections, and their sign value is thus proven in this sense.

The sign value (index) of implements describing different economic activities in the hands of men and women of different ages can be traced through the patterning of their functional classification. In all of the categories of stone tools, this type of classification is defined in the relationship between height and width, equal in the case of the chipped and polished industries to the edge angle, and in the case of the grindstones the analogous relationship is in the massivity of the stone in cross section. Such a classification uses morphological attributes with functional meaning, rather than a firmer classification of microwears - the latter has yet to be applied at Bylany. Similar analyses completed elsewhere have shown that the chipped industry was polyfunctional; therefore, morphological classification based only on shape and size in not pertinent to functions.

Within the chipped industry, knives, scrapers and burins were distinguished in two size categories. Among the polished tools, sharp and blunt axes or adzes were also distinguished. Upper and lower grindstones were divided according to their massivity. In terms of gender division, only awls are ascribed to men and glossed tools predominantly to women. The men worked exclusively with polished stone, and the younger of them with large sharp axes. Of the grindstones, the higher upper stones were used more by younger women, as they required more effort to use. The relevant data on this are not, however, available for all contexts. Houses 302 and 604 with large burins are distinguished from house 680 with large knives in phase 9, when the large sharp axes dominate. This could mark a predominance of younger men, especially in house 680. In the later phases younger women predominate, judging from the greater proportion of higher upper stones in phase 22, and the prevalence of glossed tools in phases 23 and 24.

The stone implements of Bylany's Neolithic residents symbolised over several centuries the latter's position within kinship and family groups. The implements in individual use symbolised this role, and mediated the information on the person far better than those in common use. To the first group, the large sharp knives certainly belong, and could also be used as weapons - even if their length barely exceeded 5 cm; their composition into longer blades cannot be ruled out. Their communicative role was realised mainly through their handles, the forms and decoration of which increased their individuality. Tools did not comprise stable personal equipment, but might stay in the hands of those people who used them for longer periods; in one family house this might be just one adult man. The bored hammers are exceptional, and their role might end after their owner - whose prestige they symbolized - died, or his family died out.

A broader role symbolising the position of whole families is included in the grindstones, not only because of their common function but also because their weight ruled out transportability. The secondary use of them in, e.g., oven plaster beside amorphous stones is not common at Bylany. This resulted more from the secondary use of site refuse than to an owner relationship, because the plastering of an oven was in any case invisible. There are some exceptional accumulations of grindstones in the refuse of, for example, the pit in the southeastern part of house 912: this group is comprised of broken, unusable pieces, but their symbolic role in relation to the symbolic role of the house cannot be ruled out.

Stone implements were, finally, the subject of gifts both within the settlement area and beyond it. Grindstones, particularly the upper stones, might also have been part of the brides dowry. No direct proof of this can be found in settlement refuse, however.

8.5. Kins, families and proximities (ceramic pottery and its decoration)

Pots of the Linear Pottery Culture belong to the ware of a culture at the beginning of pottery production, as they are found in the continental inland. They comprise three main formal types, differing in the shapes of their rims. The dishes, hemispherical pots and jars demonstrate the different accessibility of their contents, sufficiently covered for their necessary functions in the life of a Neolithic society. The principle forms were made according to demand in different sizes - if for individual use, then with a volume of around 0.5 l, for group use about 4-6 l, and for storage with greater volumes. Approximately one third of the pots, mainly those of lesser dimensions, were covered on the outside with decoration incised into the walls before firing. The decoration does not appear to be merely an aesthetic complement of the form, but also has the character of a symbolic protection of the contents. Besides this function, the decoration describes with simple means and a limited number of motifs the kinship and family context of individuals.

The pots were produced by hand, mostly by the method of coiling strips of clay using an inorganic temper; in the earliest period some of the coarse ware was made of clay slabs with organic tempering. Ceramic production was not all-day or year-round work for the women concerend - it was rather short-term, seasonal work. The pots were made to meet demand, separately in each house; the general skill of the women is supposed, as it is for other artefact types. The calculated coefficient of skilfulness characteristic of this activity is, however, distributed non-randomly at Bylany - usually its values decrease in circles centred on one house. Thus, production centres are observed within domestic production, or some higher level entities of related families are described. Neither can a different age structure in the central houses be ruled out, as for instance where the women making the pottery were older and more proficient - women in surrounding houses would thus have been younger and less proficient.

Of all the artefact types, pottery is the most sensitive to the number of inhabitants. After the specific ratio of pot parts is calculated in relation to the houses with simple and doubled mid-sections as the ratio of sherd number and house number, then in the doubled houses their proportion is regularly doubled (section 4.2.5.). The resulting numbers completely agree with the hypothesis that double the number of people lived in the larger houses. In this way, the absolute number of inhabitants has not yet been estimated, but the sign value of pots as an icon of population has been proven. Consequently, it can be supposed that some pots were used individually, and others used commonly; accordingly, an individual set of personal ware could exist in each house that was steadily renewed and completed. The Linear Pottery Culture ceramics at Bylany therefore had a specific demographic function.

The forms classifiable according to their main functional attribute, e.g. rim angle, also comprise in the site refuse characteristic groups that were interpreted as sets for specific common use. These functional sets then indexed the main site activities where ceramics played a role (section 4.5.4). The large storage jars were separated out first, used for the storage of crops and perhaps also of other food or liquids such as beer produced from cereals. Besides these, a set of five forms existed that was interpreted as being used for water manipulation. In the main water was brought from the nearby brook, now called the Bylanka, but it could also have come from springs, two of which existed behind the southwestern limit of the Bylany 1 area. This related not only to drinking water but also to water for food preparation and hygiene. The remaining functional types of pottery can be divided into three less rich groups of forms including those used for food preparation and short term storage, and serving ware for both solids and liquids. From the composition of these sets the principle form of feasting can be inferred. Besides the presumed wooden pots at least one small bowl (type F1) and one small hemispherical pot (type F7) were reserved for an individual in the house. The latter are also important for the interpretation of decoration.

The particular functional sets of pottery were not distributed randomly in the house refuse, but in relationships resulting from the different activities in houses. Houses with a prevalence of pots for serving and houses with a prevalence of pots for food processing and storage can be distinguished. Lower numbers of feasting pots would have been complemented by wooden vessels which in the Neolithic would have been considered less precious because their production took less effort. The residents of such houses can therefore be considered in this way to have been poorer. A special position is characteristic of houses with a predominance of water manipulation sets. All of these are situated closer to the streams than other houses, in every phase. Thus, their interpretation is proven because the lower distance to the streams supports a more frequent carrying of water and consequently the higher demand for these pots.

The forms of Neolithic pottery at Bylany contributed to a large extent to the increase of communication both inside and outside the houses. From ethnographical records it is known that water procurement, when women are going to a brook or spring, leads to the most frequent daily communication between families. At Bylany no wells were discovered - and they are also very rare elsewhere - but the nearby brook, not accessible along its whole length, played the same role. The water routes are also considered the main cause of pottery breakage, and therefore the renewal of these sets needed permanent effort and attention during pottery production. External communication, where the forms played an important role, increased especially at times when strangers were invited to the table. If it was for these non-relatives that undecorated pots were saved can only be supposed.

In most Neolithic cultures, when the economy was represented by initial subsistence based on the consumption of domesticated crops and animals, decorated pottery appears from the start. Its decoration was effected using different techniques and with different decorative motifs. In the same way as the three principle forms covering all of the principle demands, the decoration of the Linear Pottery Culture can be considered as an adaptation to the environmental conditions of the temperate Europe. The decorative unity of ceramics over wide regions expresses more the functional and symbolic unity of this archaeological culture, than does a unified language for these people. The decoration of pots, which is very similar over the whole area of distribution of this culture, and which cannot be subdivided without detailed study, is supposed to be the result of common decorative principles and common social organisation, and ultimately the similar position of the women who made it. The model invented by Van de Velde (1979) of a virilocal society with matrilineal descent is acceptable; according to this, the local community is preserved by men, who built and guard the households, but the continuity of kinship and the consciousness of family membership is a matter for the women.

The broad cultural unity of the linear decoration appearing in the decorative techniques used was, from the beginning of its study, taken as the chronologically most variable attribute, according to which the cultural periods were elaborated. The reverse of the same coin is that the decorative techniques also comprise the spatial unity of the culture, and can be used for its geographical subdivision - the regionalisation of the whole area from the western Ukraine to Belgium. The decorative motifs, the chronological importance of which has never been proved, display greater sensitivity to internal social organization. From the beginning of the Bylany site, but all over Bohemia, a stabilised system of decorative elements is met with displaying very abstract forms of originally natural patterns.

An isolated case in which both natural and abstract motifs meet on one pot and enable their equality to be inferred is a pot from feature 2223 at Bylany (Pl.14:b). Besides the zoomorphic handles of a Capricorn shape, a doubled opposing "A" spiral appears. Their equivalent meaning/identity is evident. Because of the lack of other such cases, the same cannot be said for other motifs. The degree of abstraction of the natural model in the case described shows that linear decoration developed long before its producers came to Bylany. The interpretation of individual motifs and their arrangements on the pots of different chronological levels and geographical contexts became the base for the decipherment of Linear Pottery Culture decoration.

A more detailed view of the system of linear decoration at Bylany, which on the one hand lacks a geographical dimension but which on the other is chronologically structured, shows not only the chronological development of techniques but also of one of the motifs. Initially (5500-5440 BC), groups of lines or segments appeared on the deep bowls at Bylany. On hemispherical bowls opposing spirals were prevalent, while on the jars multiple spirals were incised, sometime in combination with an anthropomorphic motif under the rim. The number of basic motifs seems to be very limited, and all are incised separately. The deep bowels from their volume did not serve the purposes of individual persons, but the whole family. (Family members might use more wooden pots.) Therefore, the decoration created described the individual but, in the same way as with family names today, kinship might only be mythical, such as with relatively remote descent. This does not concern all of the pots, as some had less easily explainable decoration.

At the end of the earliest cultural period and in the classic period of the Linear Pottery Culture (5420 - 5180 BC), comprising the second to fourth Bylany intervals, the decorative style changed and the number of motifs increased - as did the number of their variants (section 5.6.4). The main role was now played by spirals and zig-zags, and the classic orbital style appeared where one motif repeats around the pot wall as if incised all in one go. The decoration of the smaller hemispherical bowls, primarily those used for individual purposes, might describe the genealogy of these persons - as if the decorative content ceased down one level of the social organisation and with a symbolic feature named the family of a person. The rectilinear and curvilinear linearity are in some way equivalent, and their proportions remain constant during the development. The curvilinear decoration might represent the father's kin, according to the Bylany pot mentioned above, whilst rectilinear decoration might find its counterpart in the mother's kin (section 5.5.4.). The earlier mythic descent might be described in the diminished motifs of the complementary decoration. Finally, age could be registered in some way by the number of lines beneath the rim, regarding the odd and even numbers of which the role is as yet unknown. These two different structures have been analytically proven (section 5.5.5.)

The principle decorative motifs of the main decoration comprises pairs in which it is possible to see the symbolic expression of the Bylany residents' descent, possibly with some other broader content and sometimes with a direct connection to individuals. Most of the pairs are of zig-zags and spirals without any possibility of tracing all their variants because of broken pots. The zig-zag is still connected to the opposing spiral, or to doubled segments that in the later period comprise garlands. Segments and short lines appeared as an independent pair; they play a peripheral role similar to the pair of the rectangular meander and closed circles (Fig. 5.6.4.a-b). Similar pairs are distinguishable among the complementary decorative motifs, but with greater variability (Fig. 5.6.4.c). Accordingly, the main motifs could also have had more variants, and might therefore have mediated more information than was possible to interpret.

In the later and the last periods (5160 - 5020 BC), the classic decorative system dissolved. On the one hand, the motifs multiplied as if they were incised with a fear of free space, and on the other the number of very irregularly incised decorations increased. This process could also reflect the process of increasing neighbour relationships in the settlement area gradually replacing familial relationships among the residents. In the case of the irregular style this might be due an increasing proportion of younger women at the site not having sufficient experience in executing the decoration. At the same time, the meaning of the decoration was perhaps lost. The former reason can be supported by other indices of a decrease in the average age in the last Bylany phases. The latter reason would correspond to the broader social changes that had accumulated over the preceding six centuries, leading to the origins of the Stroke Ornamented Pottery Culture. The decorative system of this archaeologically new culture, represented exclusively by zig-zags, played a quite different informative role.

The role of pottery in the life of the Neolithic population of Bylany must not be overemphasized, because it may not correspond to its archaeological meaning. The archaeologically high visibility of ceramics is caused by their physical durability and they thus have an advantage over other, perishable, artefacts, the roles of which might have been greater than that of the ceramics. The universality of the information mediated in the pottery is emphasized in the case of Linear Pottery by its decorativeness. The decoration and its motifs could have had an ethnic role comparable to language, given the condition that the ornamentation had sufficient informative value. If the linear decoration was so deeply connected to the different components of Neolithic social organisation as the Bylany site analysis indicates, then the ceramics would be a sufficient expression not only of the symbolic patterning of relative and kinship relations, but also of the age composition of the society and the social hierarchy. The ceramic inventory in the refuse by the large houses does not differ in this sense from that by other houses. Striking assemblages of pottery appeared exceptionally, but not at the houses, e.g. pit 198 with the model oven and other unusual elements.

The linear pottery at Bylany and its decoration can be considered a recorded tradition that is comparable in its quality to the spoken tradition of the place in which people had lived over several centuries. This tradition could be composed into decorative styles on the pots. Initially, this comprised only individual stories following the fates of individual persons coming onto the site; step by step its complexity increased as the fates of individuals and families started to mix; ultimately, the tradition was so complex and deformed that it lost its sense and had to be replaced by a new one.

8.6. The heritage of the Linear Pottery Culture

The Linear Pottery Culture represents the first long period of prehistoric settlement in this country by a population with a Neolithic economy. It is seen as a fully developed culture, already comprising all of the Neolithic attributes such as the cultivation of domesticated cereals, the herding of domesticated animals, the production of pottery, chipped and polished stone implements and last but not least the building of long houses or better complex and self sufficient households. The prehistory of the several small communities that lived their lives at latter day Bylany and in its vicinity was archaeologically well defined, although the area has not been excavated in its entirety. Neolithic Bylany thus represents the first six centuries in the cultural history of this region.

The role of the preceding Mesolithic settlement is more presumed than describable in detail. It cannot be ruled out that they in some way prepared the space for the Neolithic people. They used the temporary, deliberate burning of trees to support the intensive hunting of game (Zvelebil 1994: 49), and it could be supposed that shortly after such a firing the Neolithic people used an area thus cleared for the founding of their houses. This must have happened, if it happened at all, in section F of the Bylany 1 settlement area, but no direct evidence is available. The Mesolithic knowhow of the chipped stone technology was neither earlier nor later pronounced at Neolithic sites in Bohemia (Vencl 1971). Again, however, it cannot be ruled out that they helped their new neighbours orientate themselves in the new landscape, and with their knowledge of raw material resources. Nowadays, it is known that pottery technology was not necessarily a Neolithic invention, and rather that the Mesolithic people did not need it than that it was completely unknown for them. The presence of Mesolithic pottery in Bohemia could be resolved only by chance at perhaps contemporary habitation areas chronologically parallel to the Bylany area.

The continuation of the Linear Pottery settlement is better known than that which preceded it. Settlement continued during the early Stroke Ornamented Pottery Culture, but most probably in a different habitation area than the excavated Bylany 1. In this sense it is hard to point out exactly the location, and to which people moved after the final phase, phase 25. The striking, perhaps last, LnK house at Bylany is quite exceptional, having been rebuilt from the preceding phase on exactly the same site. The dying out of the last family cannot be ruled out, but it is more likely that they moved to another, more successful area outside Bylany. The people of this new culture settled again in the same area in one of its later periods, several centuries later.

The climate of the Neolithic settlement falls into the Late Atlantic period, when the landscape was covered with mixed oaks and undergrowth. Along the rivers, trees such as alder, poplar, and willow appeared (Peške - Rulf - Slavíková 1998). The Bylany landscape was no exception to this broadly reconstructed landscape, to judge from preliminary palaeobotanical analyses. The Neolithic has been described fairly recently as the biggest catastrophe in the history of modern cultural landscape constitution. Present day ecologists try to describe the Neolithic relative to the large scale impact on untouched ecosystems, primarily large-scale deforestation followed by soil erosion. In fact, though, anthropogenic impacts had begun earlier, e.g. the burning of trees by Mesolithic people, and indeed the Neolithic impact might have been slow and gradual given the low population density. When Bylany was founded c. 5500 BC, there were in Bohemia perhaps no more then a few dozen contemporary habitation areas, representing no more than a few families. The population undoubtedly increased subsequently due to the successful Neolithic economy.

The earliest agriculture was probably the most ecological type of landscape use when compared to other, later systems. Therefore, describing the Neolithic as catastrophic in relation to nature is, to say the least, inaccurate. It would be necessary to review whether the large-scale, fundamental changes observed in nature and dated to prehistory were really caused in the Neolithic, and not later by a combination of unpleasant human factors and natural condition, e.g. during the late Bronze Age. The Linear Pottery Culture people started to build - in an optimal part of the post-glacial landscape - settlement microregions that remained practically unchanged over long periods. This is shown, for example, by the high correlation of the first Neolithic settlement and the earliest Slavic settlement many millennia later.

The Neolithic in Bohemia thus established the basis of the present day structure of the landscape, and beginning in the sixth millennium BC the accumulation of anthropogenic influences is observable in the environment. Some genetic connection between the present day European population and the population of post-glacial periods has recently been accepted; what, however, the Neolithic contributed to modern genetic heritage will be shown only in the future. Ethnic heritage in the sense of linguistic similarities would be evident if the explanation were accepted that the Linear Pottery Culture people spoke similar Indo-European languages. The cultural influence of such a remote time, eight thousand years ago, is not directly observable, but many indicators imply that this cultural heritage is present at the subconscious level. The roots of many cultural traits can be traced back to the Neolithic. Whether they survived indirectly, mediated by remote areas such as Mesopotamia, where the Neolithic culture later participated in Christianity, or they survived directly in these regions in the cycles of the agricultural year, can only be speculated. In any case, the people who lived in the sixth millennium BC at Bylany can be considered, on the basis of the archaeological record, the first of those clearly distinguishable ancestors who prepared the route to our present.

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Appendix 1

Ceramic figurines and other isolated ceramic forms dated into Linear Pottery Culture

Within ceramic production of the Linear Pottery Culture vessels are completely prevailing. The other forms appear as well: spoons, wheels, weights, tables and supports of figurines and figurines themselves. In the following list only fonds dated into the LnK are listed. The spoon from the feature 401 is an exception, because of its archaic material, however the rest of the file belongs into Stroked Pottery Culture time. The support form the feature 708 was originaly dated into StK (compare BYA2: 146)

A. Spoons

Spoons (Pl. 1.-3) are the characteristic form of other ceramic artefacts including forms of different size. They are abundant witn StK but apper also during LnK made with the correspondent technology. They are smaller, round or oval, mostly shallow with characteristic short conic handle. They appear in small quantities during the whole development of LnK. Regarding their lower frequency they did not serve perhaps for the individuals but more as the common ladles by serving a food.

1	2	3	4	5	6	7	8	9	10	11	12
22	13	181	254382/0	3146	SPOON	0	0	0	20	3,9	1:1
22	13	401	227843/0	6103	SPOON	0	0	0	13	56,5	1:4
22	13	436	219020/0	3266	SPOON	14	426	0	0	0,0	1:2
22	13	689	242901/0	7168	SPOON	21	679	0	0	0,0	1:3
22	13	806	255176/0	7268	SPOON	0	0	0	1	0,4	2:1
22	13	836	265335/1	3267	SPOON	14	567	0	0	0,0	2:5
22	13	898	246085/0	7188	SPOON	22	903	0	0	0,0	2:2
22	13	913	249707/0	8187	SPOON	12	912	0	0	0,0	2:3
22	13	913	249756/0	7188	SPOON	21	912	0	0	0,0	2:4
22	13	2115	276235/0	6123	SPOON	0	0	0	0	0,0	3:2
22	13	2182	279254/0	6268	SPOON	14	2196	0	0	0,0	3:1

(Explanations: 1-culture, 2-code 22=LnK, 3-number of the feature, 4-inventory number, 5-class and material , 6-description, 7-phase, 8-house ,9-isolated feature, 10-number of StK sherds ,11-ratio of StK ,12-Plate.)
(Vysvětlivky: 1-kultura 22=LnK, 2-kód nálezu, 3-číslo objektu, 4-inventární číslo, 5-třída a materiál, 6-popis,7-fáze, 8-komplex domu, 9-izolovaný objekt, 10-počet StK, 11-% StK, 12-fototabulka.)

B. Wheels and smoothers

Wheels (Pl. 4 - 5) secondarily prepared from pot sherds belong to relatively often finds. The most of them has a small hollow in their center. They are labeled as spinwhealers, but because of their assymetric forms and smooth edges they cold be used for more purposes. They differ in size, the grater are usually without hollow and these could be used as smoothers for pot surface processing before firing.

22	15	66	202159/0	4157	WHEEL	14	85	0	0	0,0	4:1
22	15	143	209206/0	8185	WHEEL	15	0	143	0	0,0	4:4
22	15	377	225483/0	3266	BORED WHEEL	11	312	0	0	0,0	4:3
22	15	377	225484/0	3266	BORED WHEEL	11	312	0	0	0,0	4:2
22	15	592	284670/0	7187	WHEEL	0	0	0	4	1,2	4:6
22	15	780	262569/0	5166	BORED WHEEL?	10	0	780	0	0,0	4:5

22	15	805	252673/0	5156	BORED POLISHER	0	0	0	75	3,8	5:1
22	15	833	265141/0	3166	BORED WHEEL	11	9001	0	0	0,0	5:2
22	15	1138	269868/0	7288	BORED POLISHER	0	0	0	0	0,0	5:4
22	15	1230	259204/0	8188	POLISHER	22	1226	0	0	0,0	5:6
22	15	2151	277664/0	6202	WHEEL	8	0	2151	3	7,9	5:3
22	15	2243	281149/0	3166	BORED WHEEL	4	2295	0	0	0,0	5:7
22	15	2250	281307/0	6202	BORED POLISHER	5	2278	0	0	0,0	5:5
22	15	2284	282044/0	3243	BORED WHEEL	3	2227	0	0	0,0	5:8

C. Weights

Ceramic weights (Pl. 6) are rare in Bylany, mostly in fragments and usually without incised decoration.

22	16	138	209039/0	5136	WEIGHT	0	0	0	0	0,0	6:1
22	16	833	265142/0	3233	WEIGHT	11	9001	0	0	0,0	6:2
22	16	978	268243/0	-	WEIGHT	23	1129	0	0	0,0	BYA2:333
22	16	2163	278383/0	6103	WEIGHT	4	2197	0	0	0,0	6:3
22	16	2303	282136/8	6102	WEIGHT	0	0	0	0	0,0	6:4

D. Spindle whorl

Only one spindle whorl (Pl. 3: 3) was found at Bylany in LnK context. It proves the long tradition of such artefacts later very common in prehistoric cultures.

22	17	2115	276233/0	6102	SPINDLE WHORL	0	0	0	0	0,0	3:3

E. Figurines (oven/house models, tables, supports, figurines)

Figurines and their supports or tables (Pl. 10 - 12) of different function are realtively very common, but mostly saved only in fragments. Some fragments are difficoult to classify. Very characteristic are "clay models of owens" found in two fragments (Pl. 8 - 9). The tables are often with four or three legs. The hollow in the foot is characteristic, may be the rest of a wooden construction.

Figurines are not too commonthe best example comes from the feature 2168. The fragments published earlier are dated mostly into SPC periods. The most of figurins are sitting and belongs to fragments of tables or supports. Besides several feet from figurines with modelled sole were found.

22	18	44	240310/0	3157	TABLE	19	0702	0	0	0,0	7:3
22	18	64	202382/0	3266	FOOT OF TABLE	22	65	0	0	0,0	9:2
22	18	84	203118/0	3268	FOOT	0	0	0	0	0,0	10:1
22	18	129	208223/0	4156	MODEL	0	0	0	0	0,0	7:1
22	18	129	209167/0	3266	FOOT	0	0	0	0	0,0	9:1
22	18	169	211052/0	8187	FIGURINE?	15	174	0	0	0,0	BYA1:111
22	18	198	212017/0	4158	OWEN/HOUSE MODEL	19	0	198	5	1,2	8b
22	18	290	215218/	7268	FIGURINE				0	0,0	10:2
22	18	309	220594/0	8185	OWEN/HOUSE MODEL	10	306	0	0	0,0	8a
22	18	338	224413/0	-	FOOT OF TABLE	14	362	0	0	0,0	LACKING
22	18	436	219006/0	5136	FOOT OF TABLE	14	426	0	0	0,0	10:3
22	18	470	230561/0	3166	FOOT OF TABLE	0	0	0	0	0,0	10:4

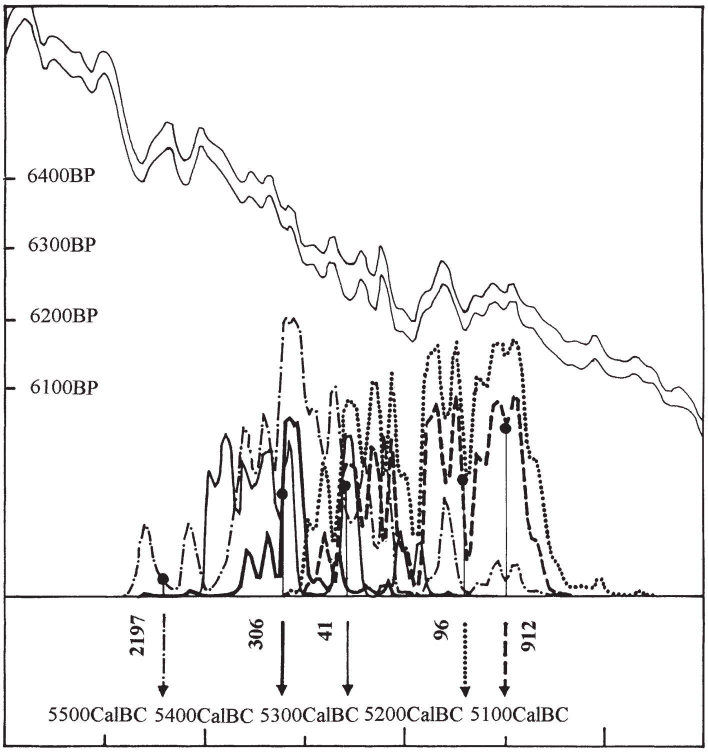
22	18	564	236239/0	xx67	PART OF FIGURINE	0	0	0	0	0,0	8:6
22	18	564	240275/0	xx68	TABLE	0	0	0	46	6,6	7:5
22	18	592	242649/0	3248	FIGURINE?	0	0	0	34	8,7	10:1
22	18	626	274356/0	xx68	FIGURINE	19	619	0	0	0,0	11:2
22	18	691	240272/0	4167	FOOT OF FIGURINE	0	682	0	3	3,6	10:5
22	18	691	240273/0	3267	FOOT	20	682	0	3	6,6	10:6
22	18	691	240274/0	4167	FOOT	20	682	0	30	6,6	10:7
22	18	691	243258/2	5166	FOOT	20	682	0	0	6,6	9:3
22	18	700	239364/0	4157	TABLE	13	41	0	0	0,0	7:2
22?	18	708	236239/0	7287	FIGURINE	0	0	0	0	0,0	9:5
22	18	805	252676/0	8185	FOOT?	0	0	0	75	3,8	BYA2:218
22	18	870	266354/0	5157	PART OF MODEL?	17	877	0	0	0,0	BYA2:258
22	18	894	245963/0	3268	FOOT	20	9003	0	0	0,0	11:3
22	18	950	251096/0	3257	TABLE?	19	959	0	0	0,0	7:4
22	18	2101	256971/0	5166	FOOT OF SUPPORT?	8	3199	0	24	36,9	9:4
22	18	2168	278437/0	6292	FIGURINE	4	2197	0	0	0,0	11:5
22	18	2173	279971/0	3168	FIGURINE	0	0	0	1	2,8	11:4

F. Clay ornament

22	19	1174	270698/0		CLAY ORNAMENT	0	0	0	0	0,0	-

Appendix 2

Radiocarbon dates: list of radiocarbon samples dated in AMS laboratory Vienna 2000



Appendix 2: Composed graph of calibrated ^{14}C dates. - Složený graf kalibrovaný ^{14}C dat.

Name of sample	Sample No.	Culture	Laboratory	Number	Alpha	BP	Sigma	Sigma2	Delta_C13	Sigma Delta_C13	Cal.1 Sigma BC/AD
Bylany_05	448	LnK	VERA	690		5825	35		-24,6	0,8	4770-4750,4720-4610
Bylany_12	455	LnK	VERA	697		6090	35		-24,3	0,9	5060-4920,4870-4850
Bylany_04	447	LnK	VERA	689		6210	35		-23,7	0,8	5260-5200,5180-5070
Bylany_02	445	LnK	VERA	687		6215	30		-26,9	0,7	5260-5200,5180-5070
Bylany_01	444	LnK	VERA	686		6230	30		-25,4	0,7	5280-5200,5170-5140,5110-5080
Bylany_10	453	LnK	VERA	695		6290	40		-26,2	0,9	5320-5210,5160-5150
Bylany_09	452	LnK	VERA	694		6300	35		-23,9	0,9	5320-5210
Bylany_11	454	LnK	VERA	696		6305	45		-25,9	0,9	5340-5210,5160-5150
Bylany_13	456	LnK	VERA	698		6320	50		-24,6	1,3	5370-5230,5220-5210
Bylany_08	451	LnK	VERA	693		6330	35		-26,0	0,9	5370-5290
Bylany_03	446	LnK	VERA	688		6335	40		-24,3	0,8	5370-5260
Bylany_07	450	LnK	VERA	692		6370	40		-25,7	0,8	5460-5450,5420-5400,5370-5300

Name of sample	Date of sample	Inventory No.	Species	Name	Coordinates
Bylany_05	1957	By 205318	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_12	1961	By 250371	indet.	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_04	1957	By 205315	indet.	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_02	1960	By 240692	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_01	1960	By 240677	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_10	1961	By 250363/1	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_09	1958	By 221011	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_11	1961	By 250365	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_13	1966	By 278651	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_08	1958	By 221009	Quercus sp.(Oak)	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_03	1960	By 240701	indet.	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O
Bylany_07	1958	By 221008	indet.	Gi	Lat.49.55.57-33N,Long.15.13.02-14.56O

Name of sample	Description	Period	Complex
Bylany_05	large loam pit, asynchronic filling	LnK IIIb	H.0096,Gr.93,T.c,Sch.2-3
Bylany_12	postshole	LnK IIIb	H.0912,Pf.5355
Bylany_04	large loam pit, asynchronic filling	LnK IIIb	H.0096,Gr.93,T.c,Sch.3
Bylany_02	postshole	LnK IIc	H.0041,Pf.4187
Bylany_01	postshole	LnK IIc	H.0041,Pf.4170
Bylany_10	postshole	LnK IIIb	H.0912,Pf.5329
Bylany_09	postshole	LnK IIa	H.0306,Pf.1054
Bylany_11	postshole	LnK IIIb	H.0912,Pf.5335
Bylany_13	construction pit	LnK Ic	H.2197,Gr.2168,T.a,Sch.3
Bylany_08	postshole	LnK IIa	H.0306,Pf.1031
Bylany_03	postshole	LnK IIc	H.0041,Pf.4205
Bylany_07	postshole	LnK IIa	H.0306,Pf.1030

Appendix 3

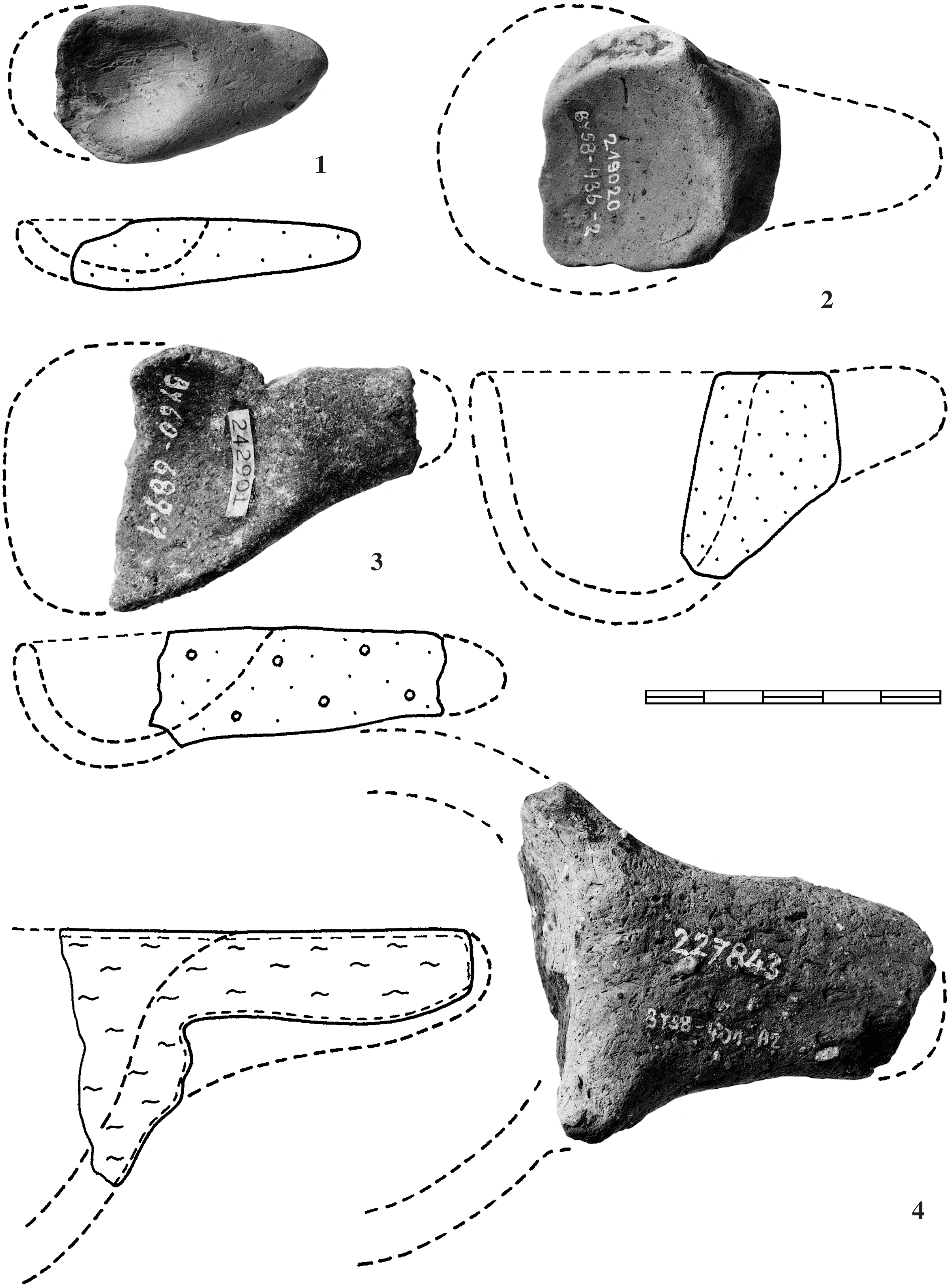
List of features included into house complexes

Phase Number	House	Mid-section	Features of the house complex	Figure 6.4.1.
P21	0016	CEN1	14-35abd	.g
P13	0019	CEN1	18-968-973-10	.a
P13	0041	CEN2	686-687-700-701-719ab-685b	.c
P22	0065	CEN1	64-105-107	.i
P20	0079	CEN0	59-108-6b	-
P23	0080	CEN0	49-52	-
P21	0081	CEN1	53b-72	.o
P14	0085	CEN1	66a	.n
P12	0088	CEN2	86-87-90a-98-157	.j
P19	0096	CEN1	93acde-94	.a
P13	0132	CEN2	127-129ad	.g
P21	0133	CEN1	156	.k
P20	0147	CEN1	160-182-187	.k
P15	0149	CEN1	135-139	.a
P19	0162	CEN1	152-798	.a
P14	0165	CEN2	164ab-167-176	.d
P22	0166	CEN2	168-179	.k
P15	0174	CEN2	169-173-175-704	.d
P21	0190	CEN1	122-123	.n
P00	0199	CEN1	-	.n
P13	0211	CEN1	91-99-100-103	.d
P11	0224	CEN1	216-217-220-21-238-223	.d
P15	0225	CEN0	23a-233	-
P16	0245	CEN1	246-251	.i
P00	0250	CEN1	-	.n
P18	0263	CEN1	259-270-274	.i
P17	0272	CEN1	275-267-288	.a
P25	0277	CEN1	269a	.o
P24	0278	CEN1	268	.o
P09	0302	CEN1	301	-
P10	0306	CEN2	307-309-316-318-320-329-330-397-403-328-386	.d
P11	0312	CEN0	376-377bc-378-382-392-398	-
P14	0313	CEN0	305-322-323	.k
P19	0361	CEN1	336-337-343	.g
P14	0362	CEN1	338-339-345-358a	.k
P20	0366	CEN0	331b-341	-
P15	0368	CEN0	331d-333a-340b	.g
P18	0369	CEN0	348-342-553	.g
P16	0372	CEN1	354-355	.k
P10	0405	CEN2	381-384-593-595-596-598-609	.d
P00	0417	CEN1		.k
P14	0426	CEN1	273-436-437-435	.j
P13	0427	CEN1	81e-439c	.e
P15	0433	CEN2	706-710-260	.j
P19	0434	CEN1	430	.k
P10	0525	CEN2	485-503	.e
P14	0558	CEN0	573-575-294	-
P14	0567	CEN0	836-841	-
P08	0569	CEN1	501-511	.k
P00	0570	xxxx	-	.o
P16	0571	CEN2	551-333b	.g
P17	0580	CEN1	467-572	.n
P15	0581	CEN1	751-36-536	.a
P09	0604	CEN0	395-399-599	.g

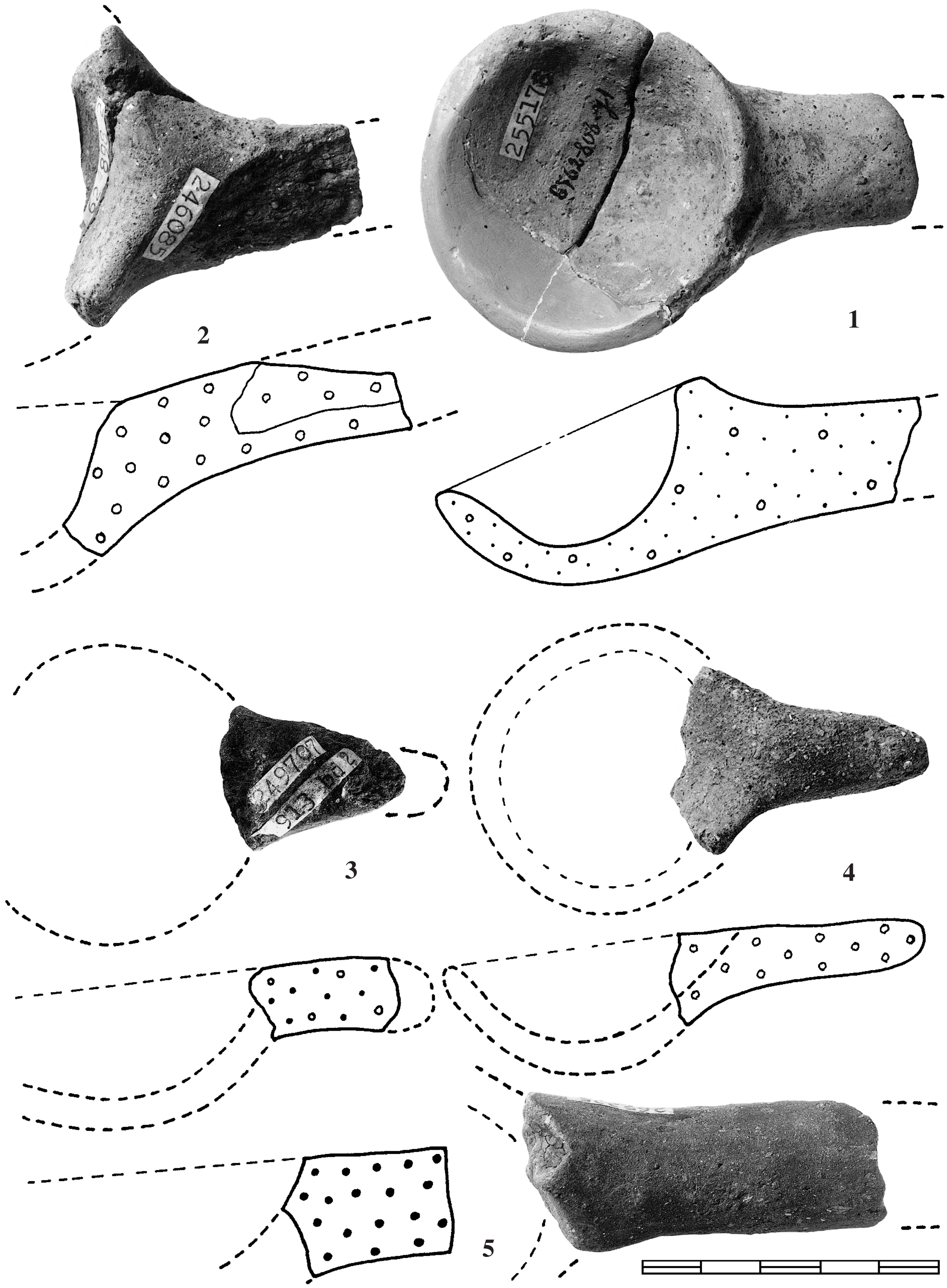
P18	0610	CEN0	588-590a	.g
P19	0619	CEN2	625-626-632-634	.l
P11	0620	CEN1	643-645	.i
P16	0621	CEN0	647-649-650-651	-
P00	0623	CEN1	-	.o
P00	0624	CEN2	-	.e
P17	0677	CEN1	797-880-882	.a
P13	0678	CEN2	806bcd	.e
P21	0679	CEN2	689-690-691b-790-801a-807	.j
P09	0680	CEN2	781ab-872	.g
P14	0681	CEN1	693-695-733-734-760	.i
P20	0682	CEN1	691ac-685c-801b	.a
P00	0683	CEN1	-	.o
P23	0688	CEN2	727-731-732	.o
P19	0702	CEN2	44-772ac-773-778-845-847	.l
P10	0703	CEN2	43-46-827b-846	.e
P16	0739	CEN1	735-744-742	.o
P17	0740	CEN1	729	.p
P10	0741	CEN1	743-746-748	.p
P00	0824	CEN1	-	.p
P17	0877	CEN2	779-868-870	.m
P22	0903	CEN2	895-900b-898	.e
P22	0910	CEN2	112-901	.p
P21	0912	CEN2	906b-913-914-915	.P
P15	0926	CEN1	900a-906a	.p
P22	0933	CEN0	919-922	-
P00	0935	CEN1	-	.P
P19	0959	CEN1	950-953	.p
P21	0965	CEN0	947a	-
P18	0982	CEN0	11-971-972-979-980	-
P13	0999	CEN1	1102ab-1103	.a
P23	1100	CEN1	993-994-1171	.l
P00	1106	CEN1	-	.p
P21	1111	CEN2	997-1163-1168-1181-996-1162-28-1101	.P
P15	1116	CEN1	8-23-976	.p
P23	1129	CEN1	978	.j
P22	1144	CEN0	1142-1115-1117	-
P19	1161	CEN1	1146-1160-1127	.o
P23	1192	CEN1	1180-1176	.l
P00	1193	CEN1	-	.n
P14	1195	CEN0	1118-1137-1139ab	-
P00	1199	CEN1	-	.l
P22	1226	CEN1	1230-20	.o
P20	1227	CEN0	1248	.p
P23	1236	CEN1	1235	.n
P19	1240	CEN1	1239	.o
P19	1246	CEN2	1244bc-1268-1273-1278	.P
P23	1289	CEN1	1217-1222	.n
P00	2190	CEN1	-	.i
P00	2191	CEN1	-	.n
P15	2192	CEN2	2142-2144-2145-2146-2143	.h
P00	2195	CEN1	-	.i
P14	2196	CEN0	2181-2182	-
P04	2197	CEN1	2163-2168-2268-2279-2280-2281-2242-2170-2194c-2282-2173c	.b
P05	2198	CEN1	2248-2249-2194ab-2173g	.i
P02	2199	CEN0	2105-2121	-
P01	2200	CEN1	2126	.m
P07	2201	CEN0	2120	.m
P06	2202	CEN0	2127ab-	-
P02	2209	CEN1	2164-2165-2175-2189-2157a	.i
P07	2210	CEN0	2157cd-2193-2160-2162	.m
P02	2223	CEN1	2213-2214-2215-2216-2217-2218	.i
P04	2224	CEN1	2212	.p

P03	2225	CEN1	2204b-2204c-2219	.b
P06	2226	CEN1	2257-2258-2259	.m
P03	2227	CEN1	2284	.m
P00	2235	CEN1	-	.p
P03	2244	CEN1	2159ab-2174	.h
P00	2275	xxxx	-	.i
P01	2277	CEN0	2232	-
P05	2278	CEN1	2245-2250-2204a	.m
P04	2290	CEN1	2303	.n
P00	2291	CEN1	-	.h
P14	2292	CEN1	2238-2253	.n
P00	2293	CEN1	-	.p
P06	2294	CEN1	2236-2240-2255-2262	.m
P04	2295	CEN1	2243-2267	.l
P06	2299	CEN0	2260	-
P08	3199	CEN0	2101bcd	-
P11	9001	CEN0	828-829-833-834-840	-
P11	9002	CEN0	136-159-191-193	-
P20	9003	CEN0	893-894	-
P10	9004	CEN0	929-938-942-943	-
P01	none	xxxx	2123	
P04	none	xxxx	2102	
P06	none	xxxx	2103	
P08	none	xxxx	2151-945-665-2206	
P09	none	xxxx	39	
P10	none	xxxx	780	
P11	none	xxxx	918-989	
P12	none	xxxx	554	
P13	none	xxxx	7	
P14	none	xxxx	124-837-30-215-699ac-664	
P15	none	xxxx	334-143-1	
P16	none	xxxx	78-852-354	
P18	none	xxxx	232-409-881	
P19	none	xxxx	385-715-198-1300-545-822-869-155-1260-468	
P22	none	xxxx	874-854-298-292-1128	
P23	none	xxxx	293b-137	
P24	none	xxxx	293a-607	
P25	none	xxxx	1258	

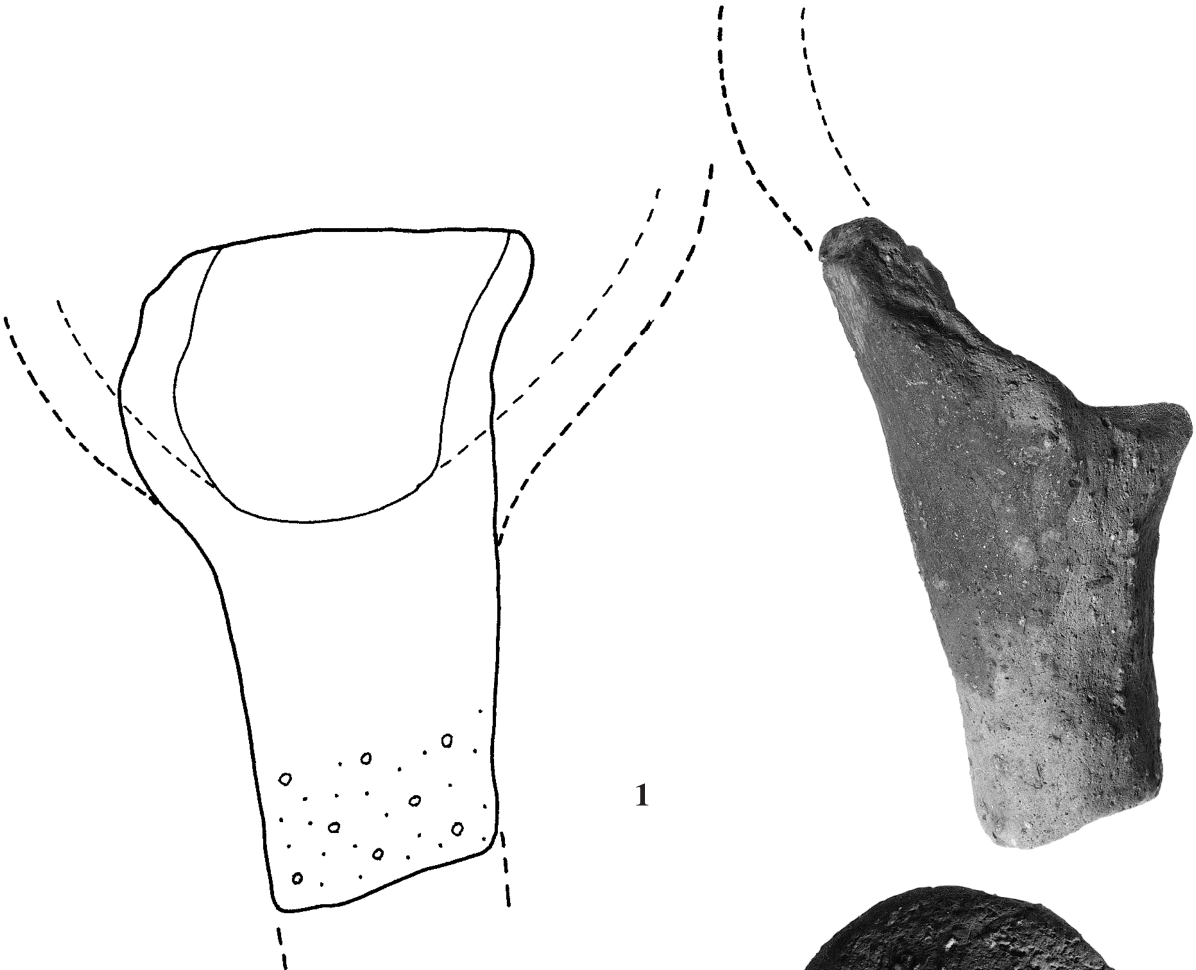
Plates



Pl. 1. Spoons. (feature number: inventory number) – Lžíce. (číslo objektu: inventární číslo, 1-181: 254382, 2-436: 219020, 3-689: 242901, 4-401: 227843)



 Pl. 2. Spoons. – Lžíce. (1-808: 255176, 2-898: 246085, 3-913: 249767, 4-913: 249756, 5-838: 265335/1)



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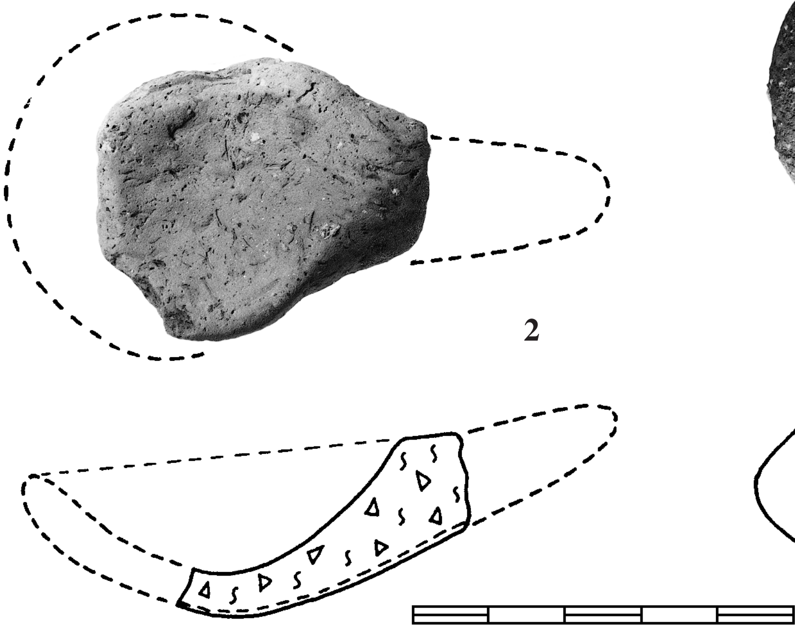

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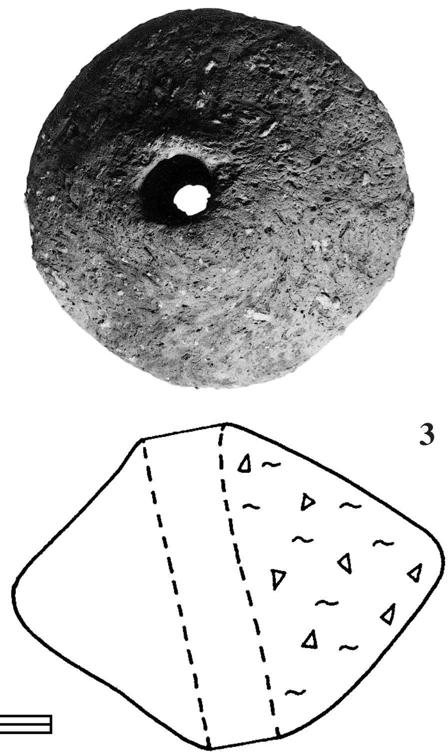

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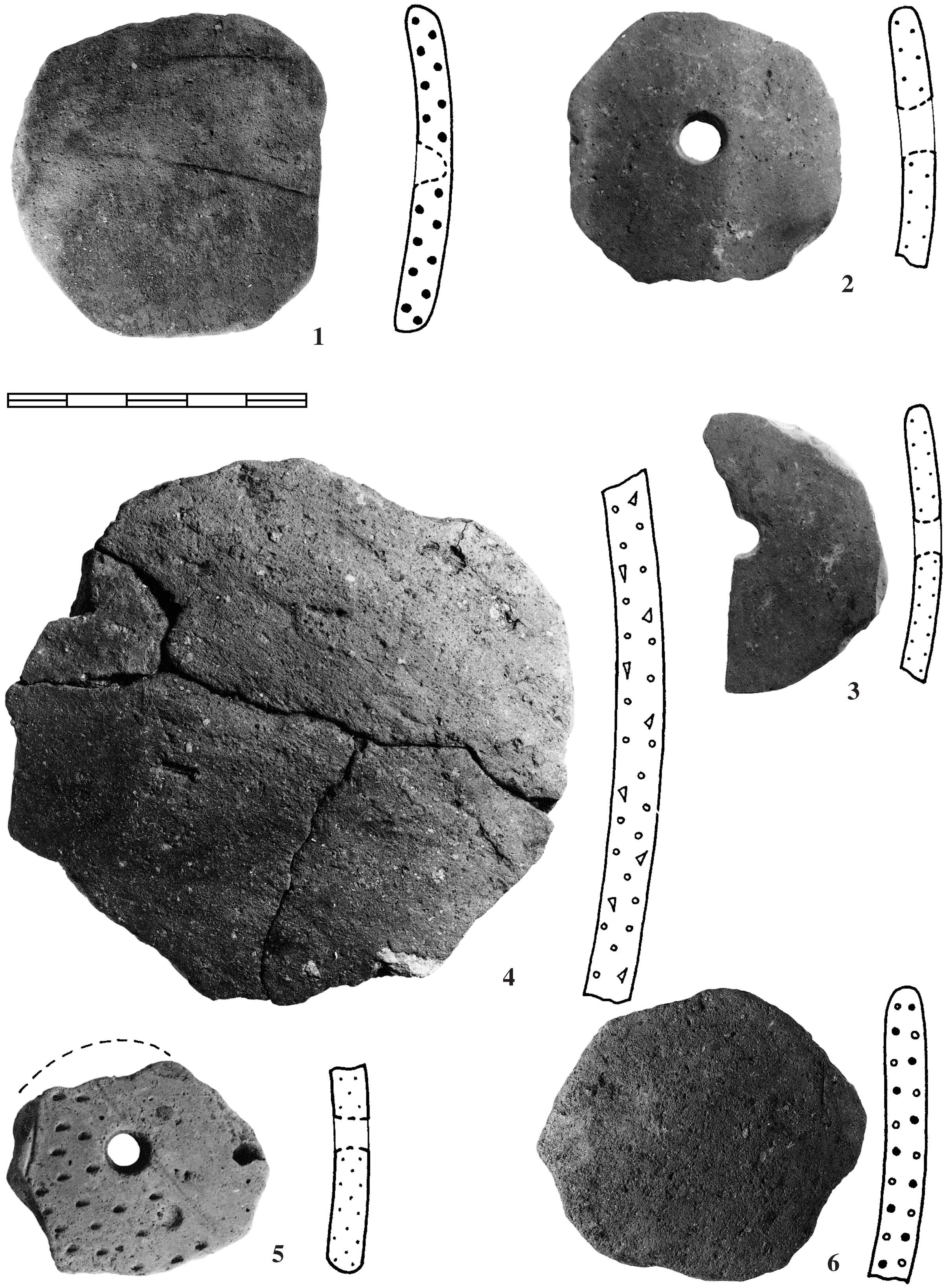
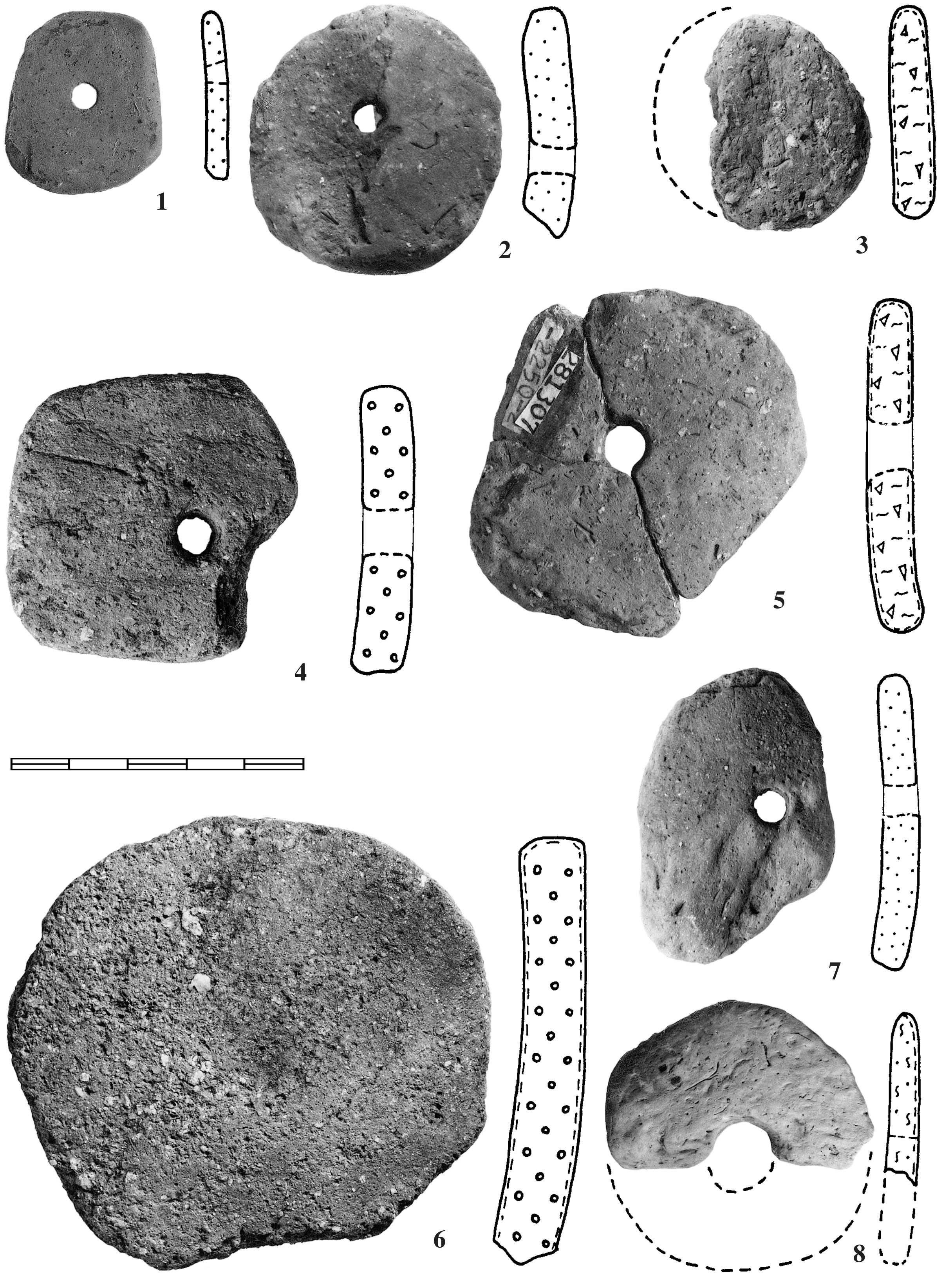
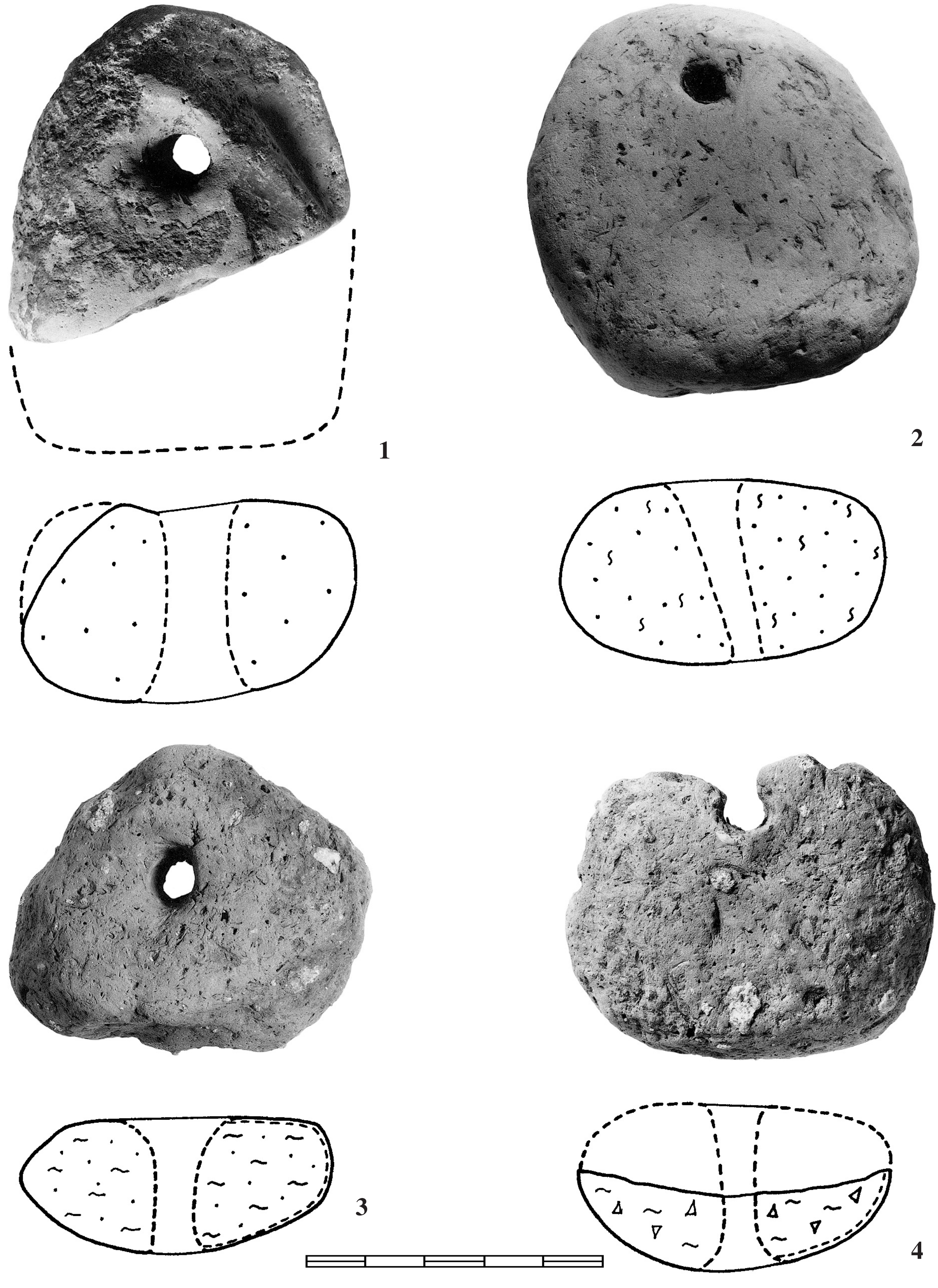
Pl. 3. Spoons. – Lžíce. (1-2182: 279254, 2-2115: 276235, 3-2115: 276233)



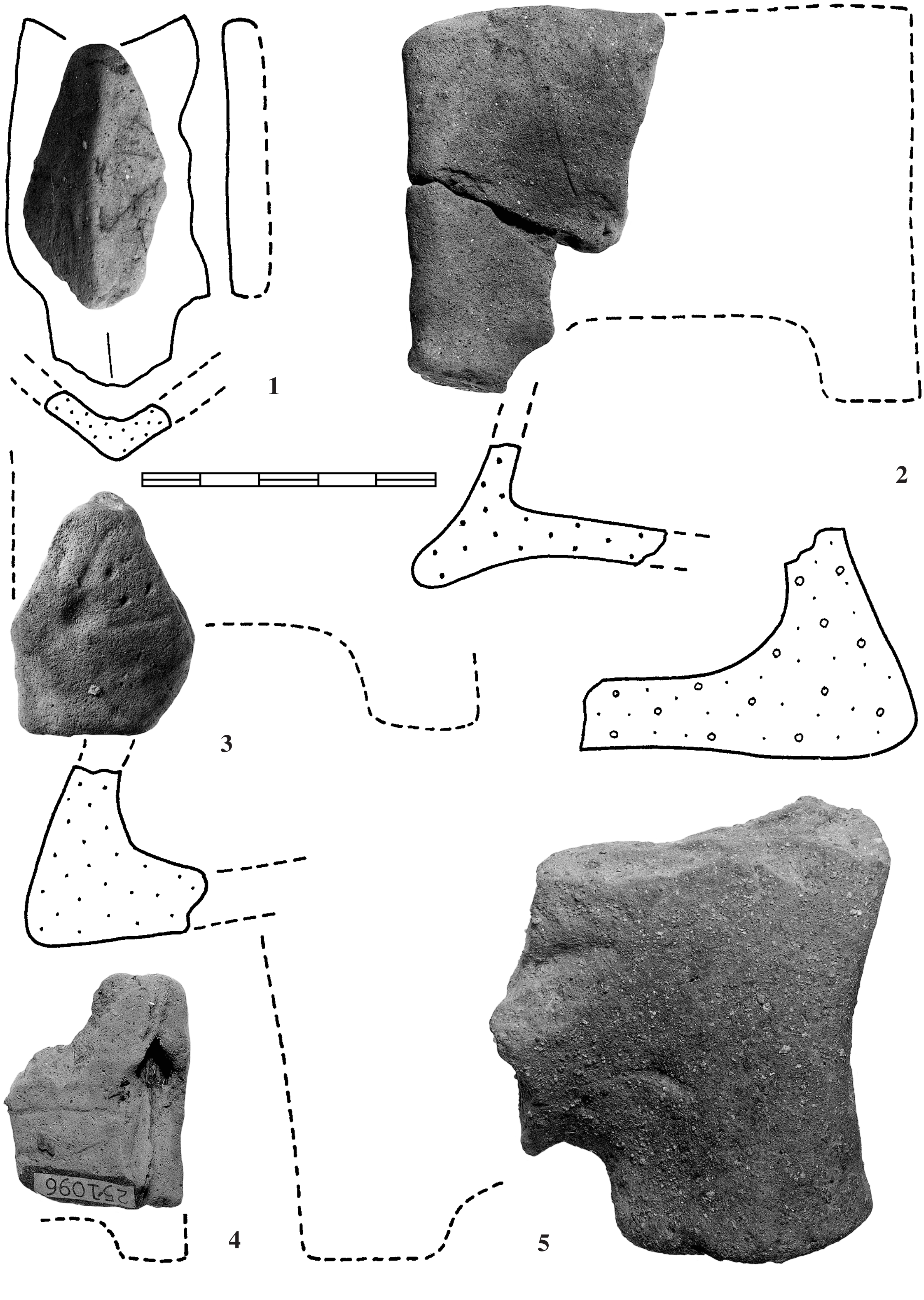
 Pl. 4. Wheels. – Kolečka. (1-66: 202159, 3-377: 225484, 3-377: 225484, 4-143: 209206, 5-780:262569, 6-592:284670)



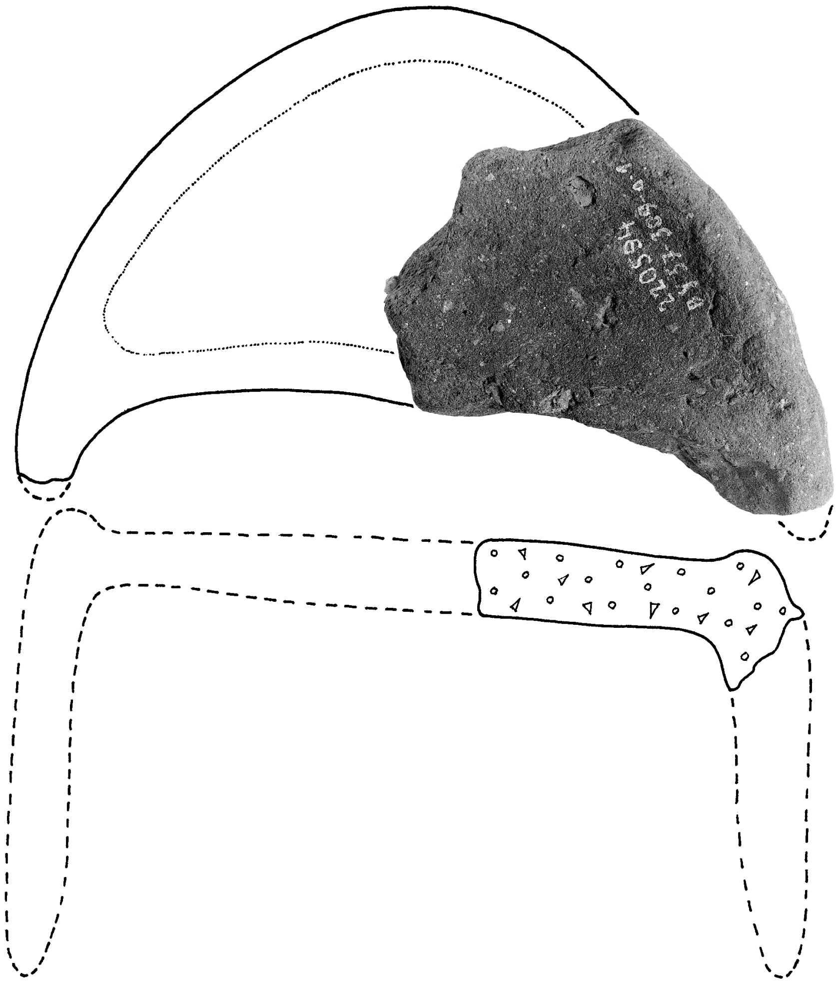
Pl. 5. Wheels. – Kolečka. (1-805: 252673, 2-833: 265141, 3-2151: 277664, 4-1138: 269868, 5-2250: 281307, 6-1230: 259204, 7/2243: 281149, 8-2284: 282044)



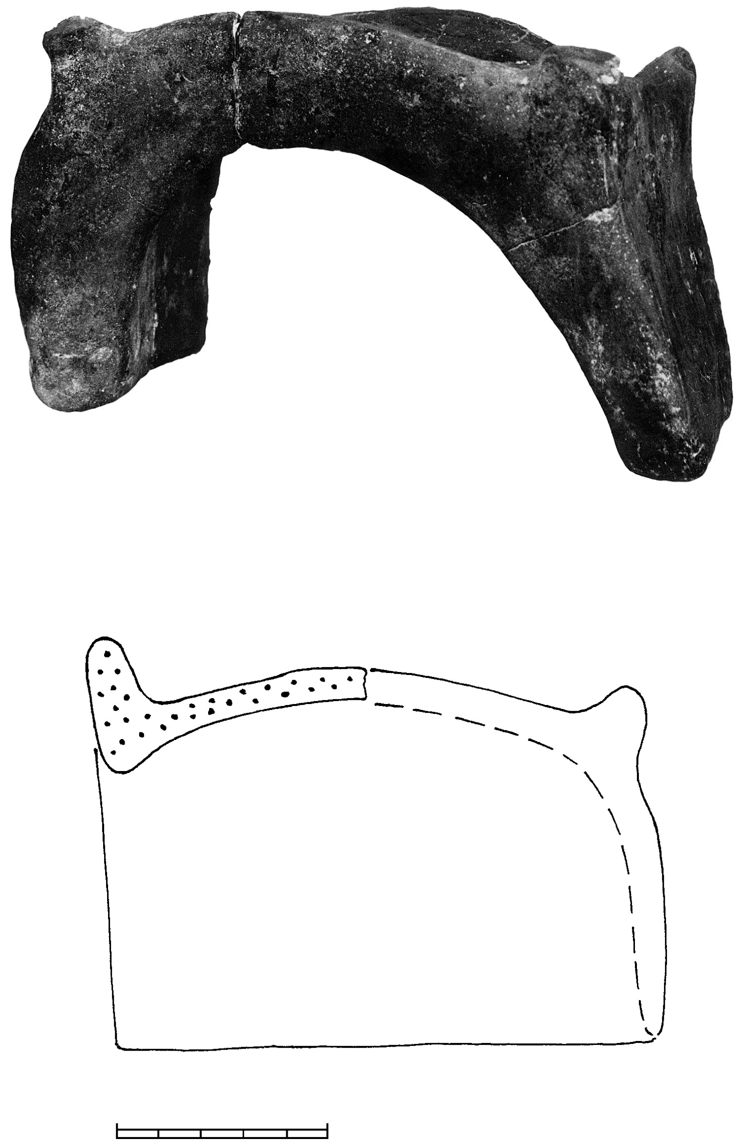
 Pl. 6. Weights. – Závaží. (1-138: 209039, 2-833: 265142, 3-2163: 278383, 4-2303: 282136/8)



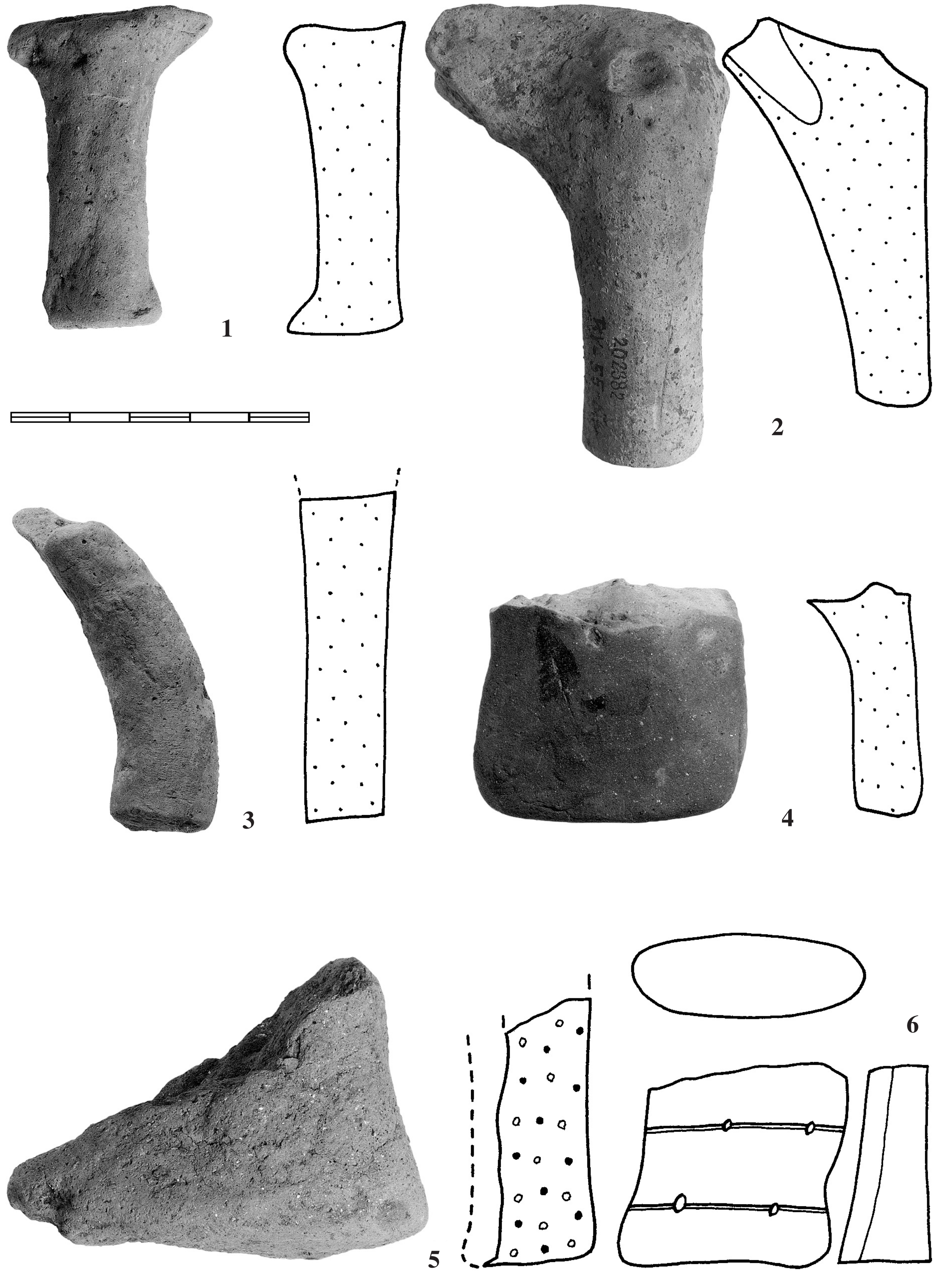
Pl. 7. Tables. – Stolečky. (1-129: 208223, 2-700: 239385, 3-44: 240310, 4-950: 251096, 5-564f: 240275)



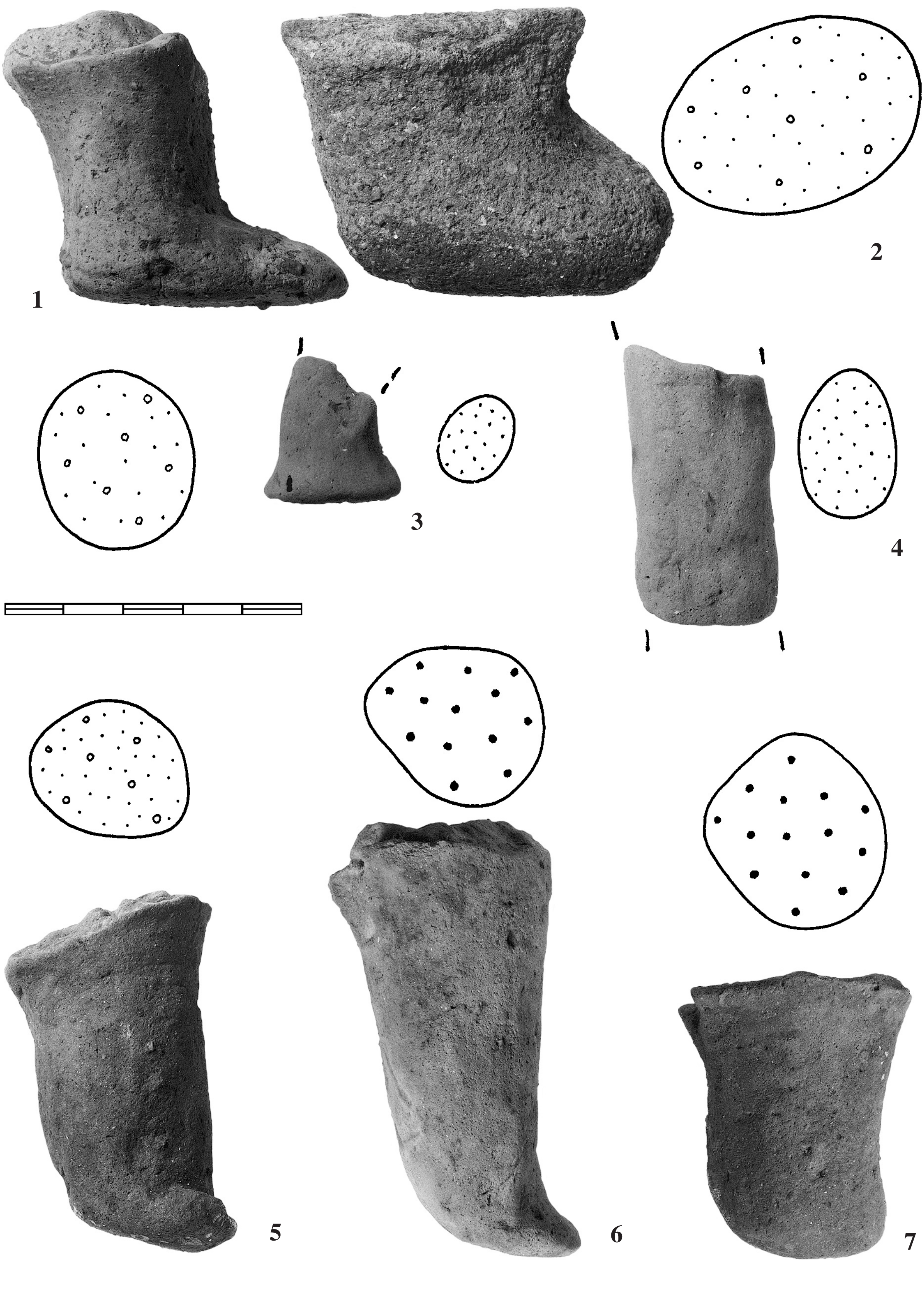
Pl. 8. Oven/house model. – Model pece nebo domu. (309: 220594)



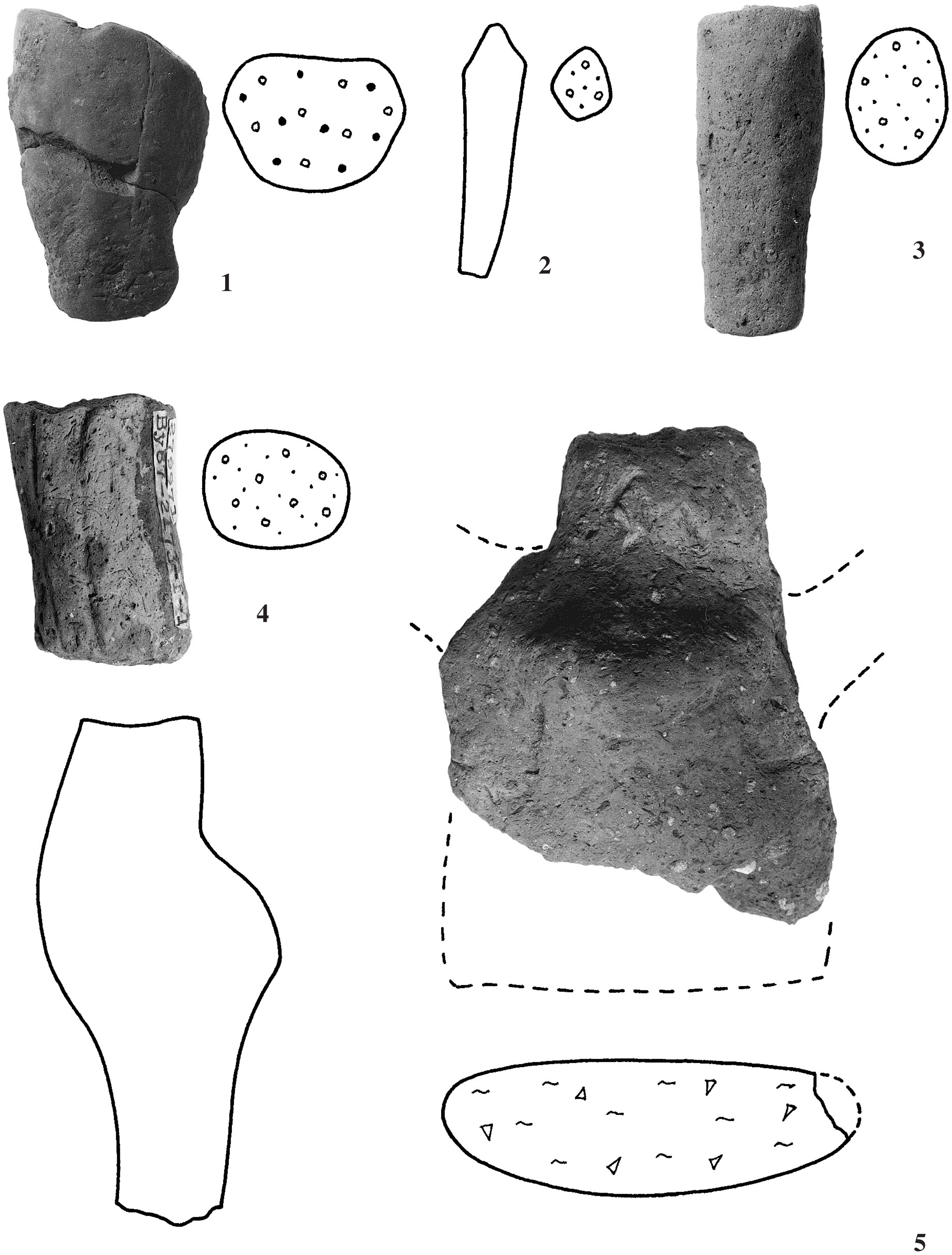
Pl. 9. Oven/house model. – Model pece nebo domu. (198: 212017)



Pl. 10. Feet of supports. – Nožky podstavců. (1-129: 208167, 2-64: 202382, 3-691: 243258/2, 4-2101: 256971, 5-708: 243862, 6-564: 236239)



Pl. 11. Feet of figurines. – Nožky figurálních plastik. (1-84: 203118, 2-290: 215218, 3-436: 219006, 4-470: 230561, 5-691: 240272, 6-691: 240273, 7-691: 240274)



Pl. 12. Feet of figurines. – Nožky figurálních plastik. (1-592: 242649, 2-626: 274356, 3-894: 245963, 4-2173: 279971, 5-2168: 278437)

1

2

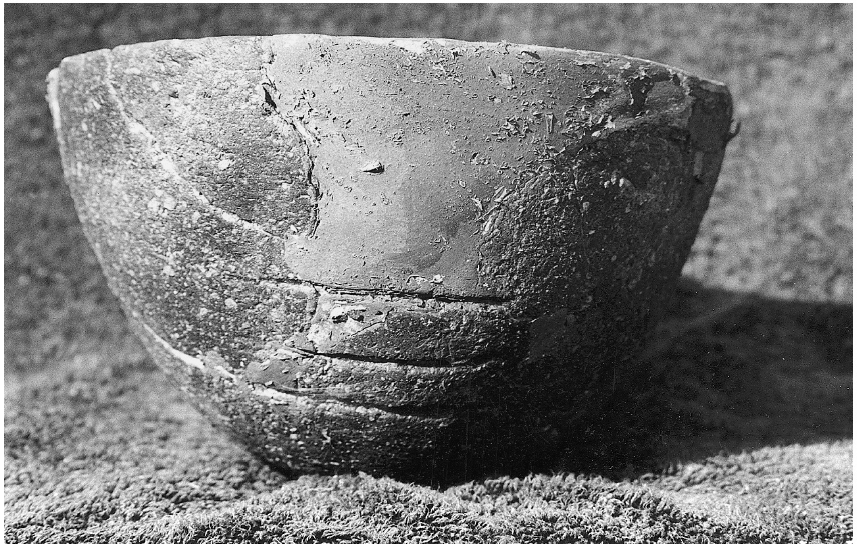
3

4

Pl. 13. Pots. – Nádoby. (1-2121: 276565 [95 mm] , 2-2168: 278436 [225 mm], 3-2216: 259250 [135 mm], 4-1701: 280584 [145 mm])

1

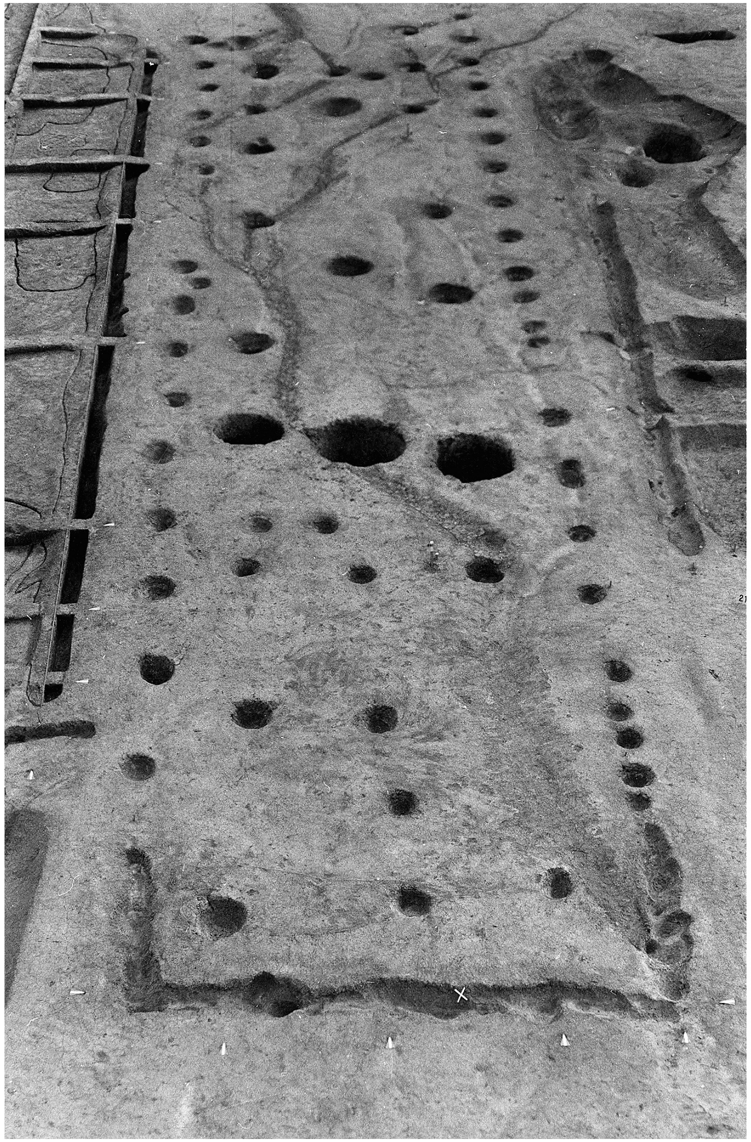
3



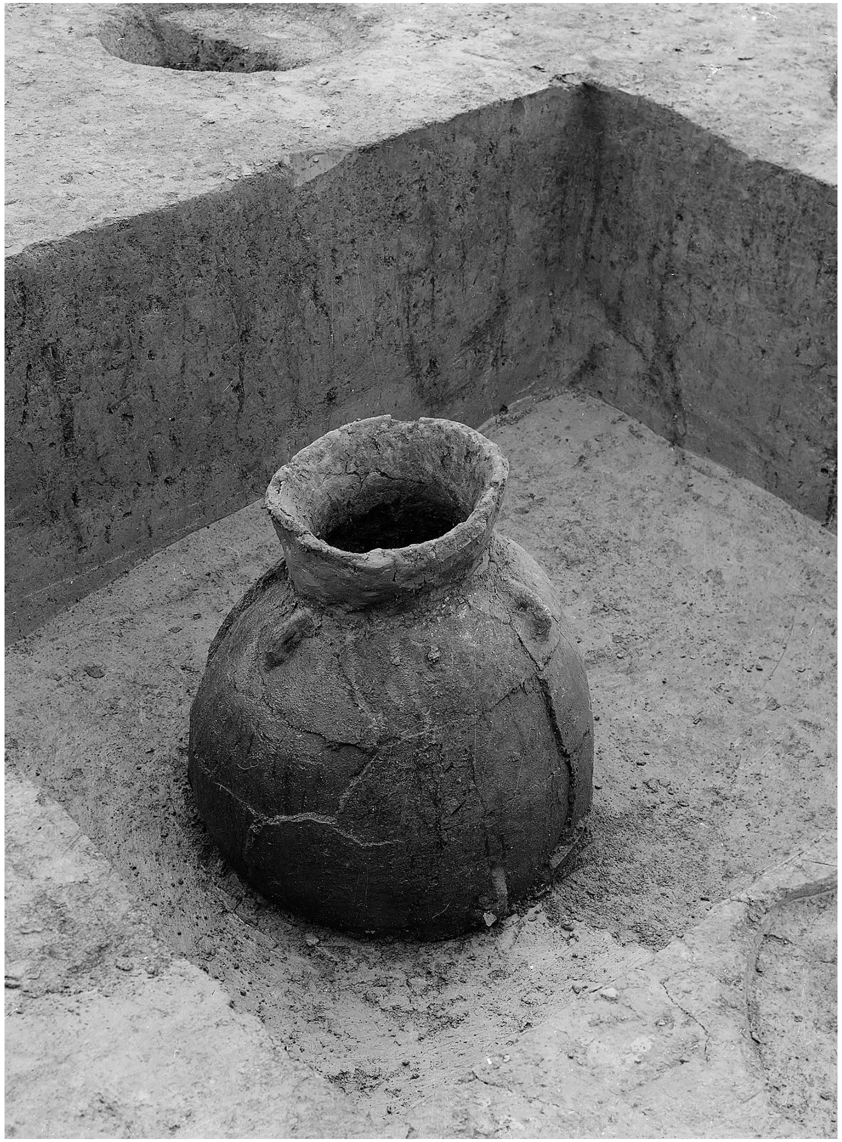
2

4

Pl. 14. Pots. – Nádoby. (1-2233: 280916/1 [105 mm], 2-2216: 259265 [115 mm], 3-2191: 279378 [104 mm], 4-2173: 280584 [108 mm])



1



2

Pl. 15. Excavations. – Výzkum. (1-house 2197, 2-storage pot 125. – 1-dům 2197, 2-zásobnice 125)

1

2

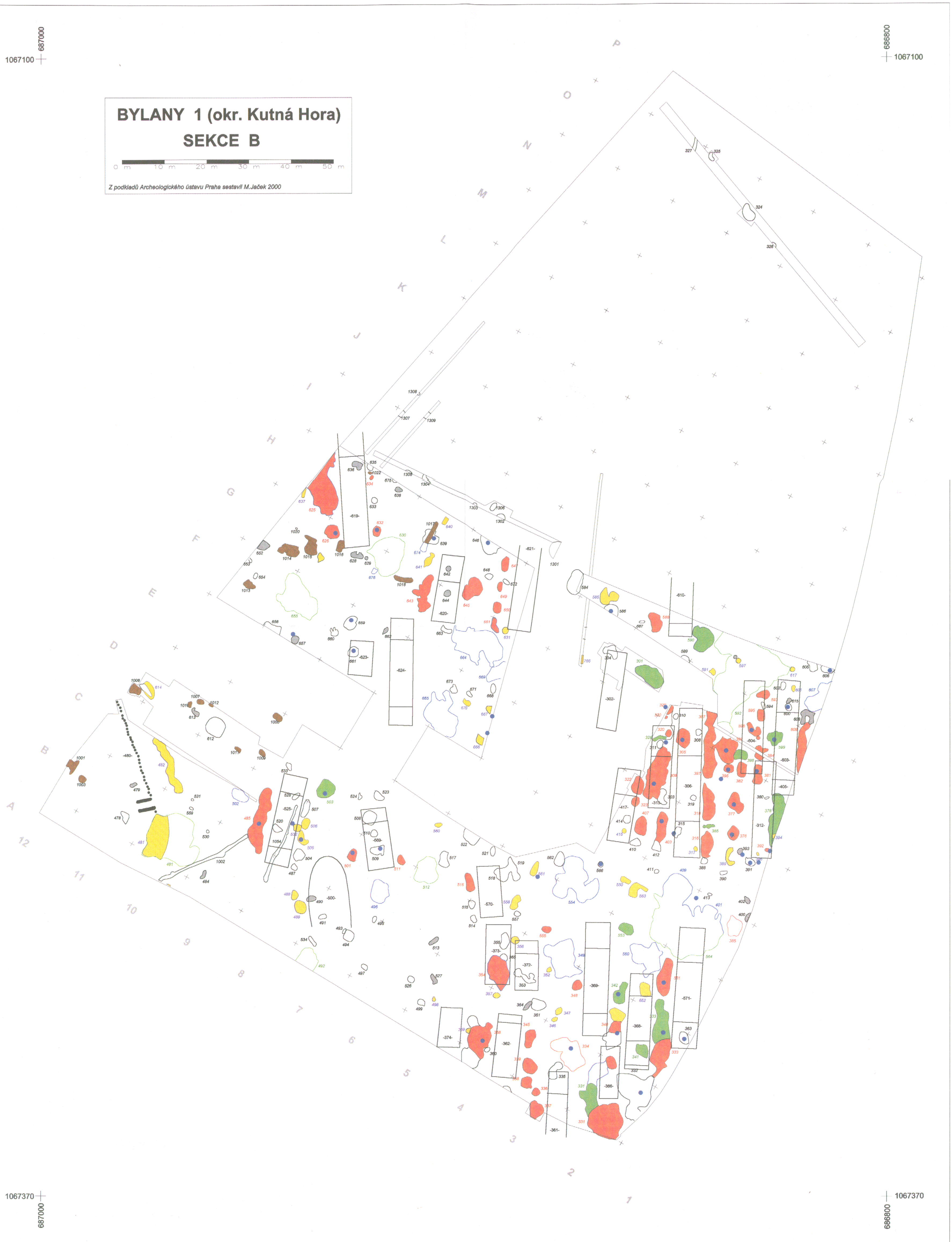
Pl. 16. Excavations. – Výzkum. (1-house 306, 2-house 41. – 1-dům 306, 2-dům 41)

1

2

 Pl. 17. Excavations. – Výzkum. (1-house 96, 2-house 912. – 1-dům 96, 2-dům 912)


BYLANY 1 (okr. Kutná Hora)
SEKCE A
0 m 10 m 20 m 30 m 40 m 50 m
Z podkladů Archeologického ústavu Praha sestavil M.Jaček 2000
Explanations - Vysvětlivky
Bylany, map of datable features. - Plán datovatelných objektů.
Neolithic: decorated pottery is absent, datable only according to the filling-in features. - Neolit: bez zdobené keramiky, popř. bez nálezů, datovatelné jen podle výplně.
Linear pottery culture: long pits datable due to an inclusion to the house complex. - Kultura s lineární keramikou: dlouhé stavební jámy datovatelné prostřednictvím jejich příslušnosti k určitému domu, EE I.
Linear pottery culture: isolated above-treshold find complexes datable into the chronological sequence of houses. - Kultura s lineární keramikou: izolované nadprahové celky datovatelné do chronologického pořadí domů.
Linear pottery culture: other pits datable after analysis due to the possible inclusion to the house complexes. - Kultura s lineární keramikou: ostatní jámy datovatelné po analýze prostřednictvím stavebního komplexu, EE III.
Linear pottery culture: large loam-pits most of them temporarily undatable. - - Kultura s lineární keramikou: velké hliníky zatím většinou nedatované.
Post constructions and their schemes. - Kůlové konstrukce a jejich schéma.
Stroked pottery culture: find complexes and intrusions. - Kultura s vypíchanou keramikou: soubory a intruze.
Postneolithic features: mostly early mediaeval and recent features. - - Postneolitické objekty: vesměs raný středověk nebo recent.
Natural features (trees, brooks). - Přírodní zahloubení (vývraty, potoky).

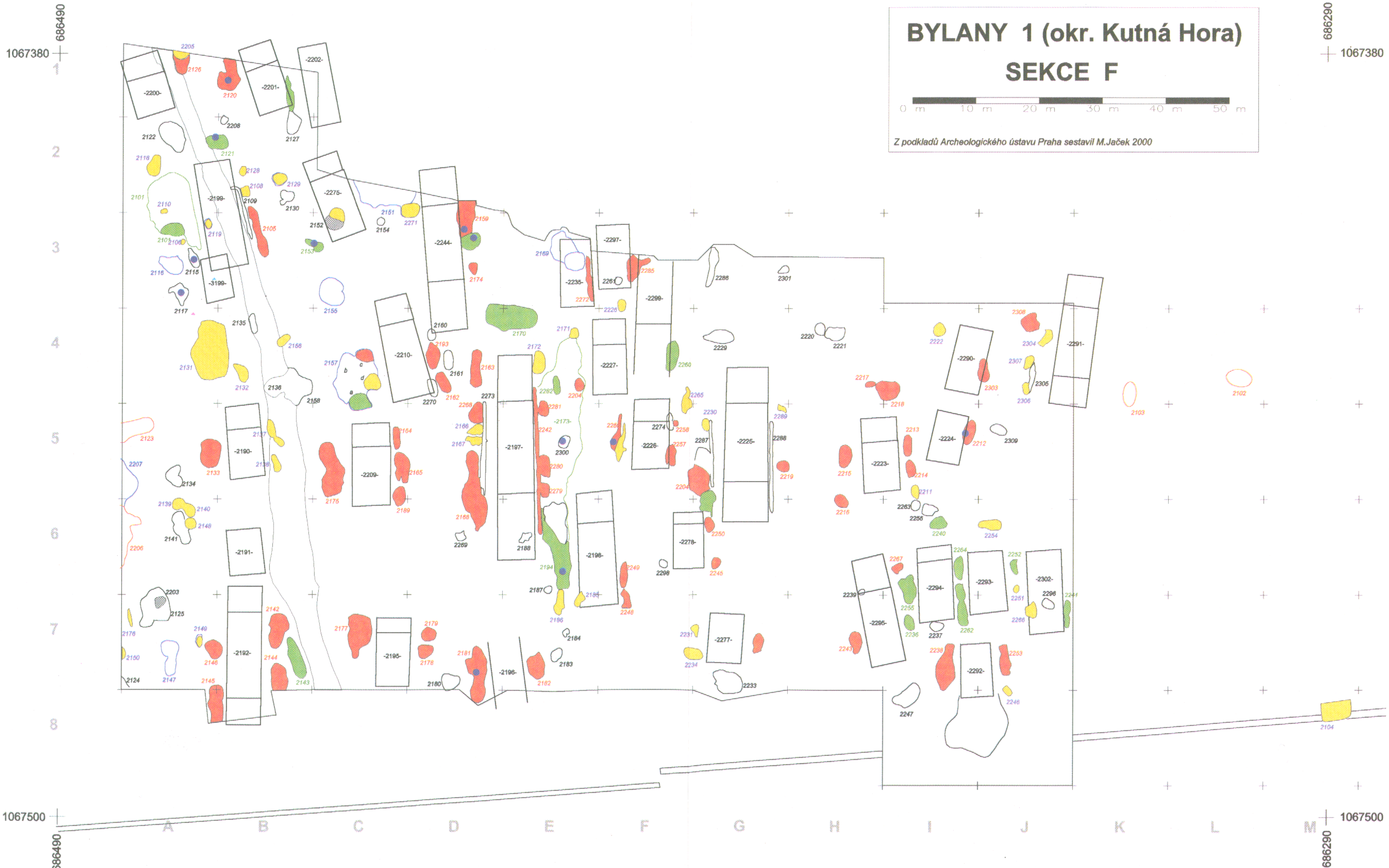

BYLANY 1 (okr. Kutná Hora)
SEKCE B
0 m 10 m 20 m 30 m 40 m 50 m
Z podkladů Archeologického ústavu Praha sestavil M.Jaček 2000
1067100
687000
686800
1067370

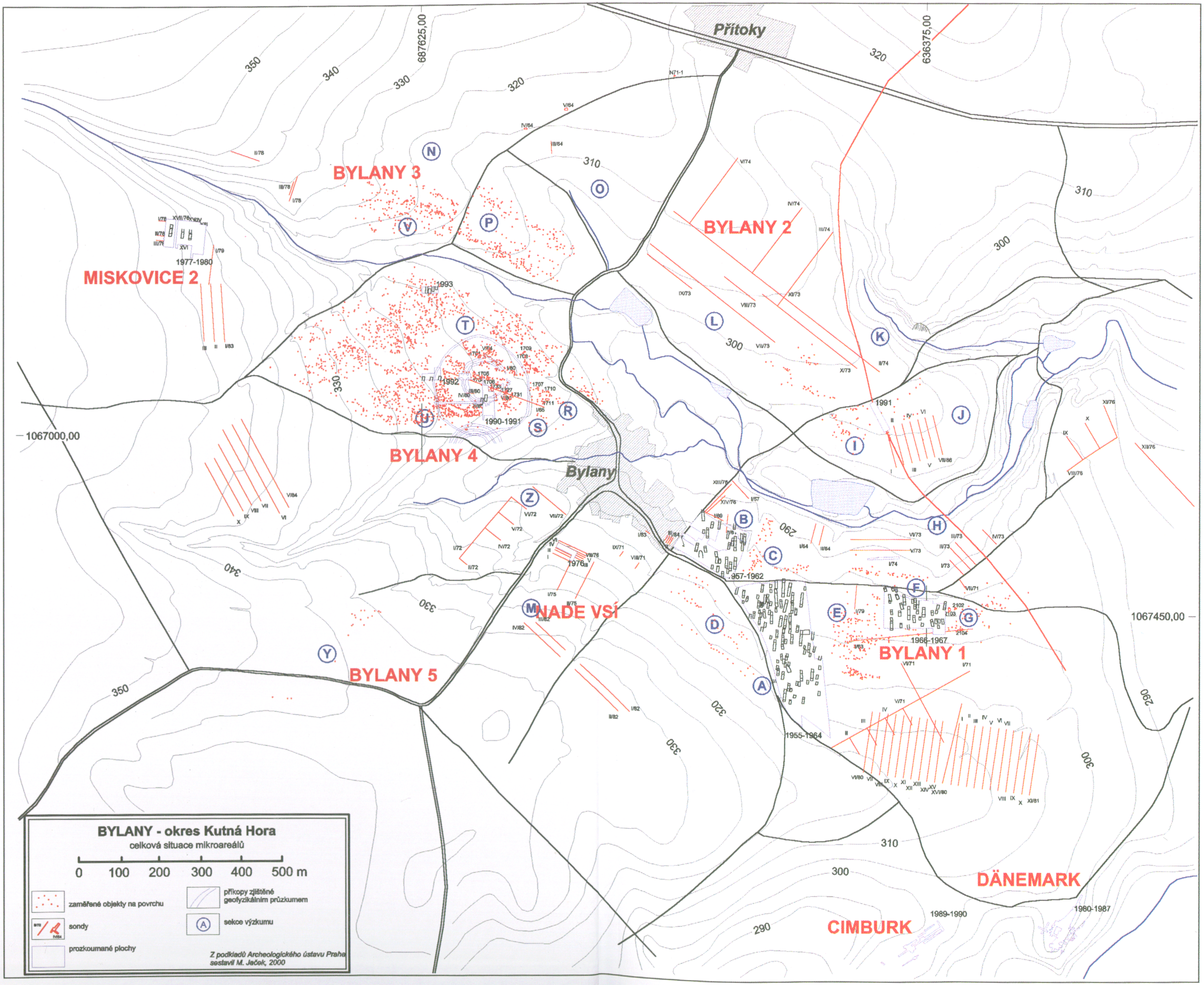
BYLANY 1 (okr. Kutná Hora)

SEKCE F

0 m 10 m 20 m 30 m 40 m 50 m

Z podkladů Archeologického ústavu Praha sestavil M.Jaček 2000




BYLANY - okres Kutná Hora
celková situace mikroareálů
0 100 200 300 400 500 m
zaměřené objekty na povrchu
sondy
prozkoumané plochy
příkopy zjištěné geofyzikálním průzkumem
sekce výzkumu
Z podkladů Archeologického ústavu Praha
sestavil M. Jaček, 2000
Přítoky
Bylany
BYLANY 1
BYLANY 2
BYLANY 3
BYLANY 4
BYLANY 5
MISKOVICE 2
NADE VSÍ
DÄNEMARK
CIMBURK
687625,00
636375,00
1067000,00
1067450,00
1977-1980
1993
1992
1990-1991
1991
1976
1957-1962
1966-1967
1955-1964
1989-1990
1980-1987
350
340
330
320
310
300
290