

Ta-2642 8320±50 bp cal. 7473(7418, 7343, 7325)7294 BC, Ta-2643 8800±100 bp cal. 7966(7908, 7750)7695 BC. Durpių bandinys iš kultūrinio sluoksnio A viršutinės dalies datuotas: Ta-2610 7060±150 bp cal. 6009(5943, 5908, 5885)5724 BC. Atlikus žiedadulkių analizę, šis kultūrinis sluoksnis buvo datuotas Atlančio 1 periodu. Taigi viršutinis kultūrinis sluoksnis A susiformavo Borealio laikotarpio pabaigoje – Atlančio 1 laikotarpio pirmojoje pusėje. Radiniai iš šio kultūrinio sluoksnio greičiausiai sietini su keliomis vėlyvojo mezolito Janislavicių kultūros stovyklavietėmis.

Kabelių 2-osios gyvenvietės tyrimai parodė, kad ankstyvajame mezolite ir vidurinio mezolito pradžioje, Preborealio laikotarpio 2-oje pusėje – Borealio laikotarpio 1-oje pusėje, Pietų Lietuvoje gyveno 2 kultūrų, Kundos ir Kudlajevkos, žmonių bendruomenės. Vėlyvajame mezolite (Borealio pabaiga – Atlančio laikotarpio 1 periodas), šioje teritorijoje gyveno Janislavicių kultūros žmonių grupės.

*Tomas Ostrauskas  
Department of Archaeology  
Lithuanian Institute of History  
Kražių str. 5 LT-2001 Vilnius  
Lithuania  
tomasos@takas.lt*

## Lynby Points in Eastern Europe

**GALINA SINITSYNA**

The principal aim of this study is the analysis of tanged points of East European assemblages of Lynby cultural affiliation. Traditionally, tanged points are used in archaeology of Paleolithic – Mesolithic epochs as a “fossil directors” for diagnostics of industrial complexes, as a background for distinguishing a relative chronology, for defining local cultural varieties and as principal means for constructing the interpretation models of human migrations, movements, mutual influences and contacts of ancient populations.

A methodological basis for the current study is the analysis of the projectile points in the Magdalenian-Mesolithic complexes of Subbalticum area, made by R. Rimantienė (Римантене 1978). Augmentation of new materials during the last two decades gives a possibility both for making the most detailed classification of tanged points and for developing the methodological principles of analysis according to R. Rimantienė approach.

Two kinds of typological analysis may be distinguished in relation to the function of the supposed results. The first “self-valuable”, independent from the nature of problems for decision of which results of the analysis may be used. The maximum deliberated descriptive analysis with correlation of a number of attributes are principal methodological background for it. The basis of the second kind is the range of problems, the orientation on deciding of which limits a number of attributes estimated as significant for the concrete task. It is supposed in this case, that one set of morphological attributes of the typological group and one kind of its classification will be useful for deciding one set of problems, and another set of attributes and another kind of classification will be useful for other purposes. It appears to be possible that morphological attributes important for the problem of chronological seriation of materials would be irrelevant to the problem of distinguishing local cultural varieties.

The classification of R. Rimantienė belongs to the second group, based on orientation to resolution of concrete problems, in particular, the problems of cultural differentiation of archaeological records of the northwest of Eastern Europe in Final Palaeolithic – Mesolithic epoch.

Our classification is directed to the resolution of the same problem, it has the same methodical background of the analysis, and it seems to be appreciated as development of the approach of R. Rimantienė. The matter of our study is limited by analysis of projectile points from the assemblages of Lynby cultural affiliation of the northern part of Eastern Europe in connection to new materials of tardiglacial epoch discovered at Valdai Upland.

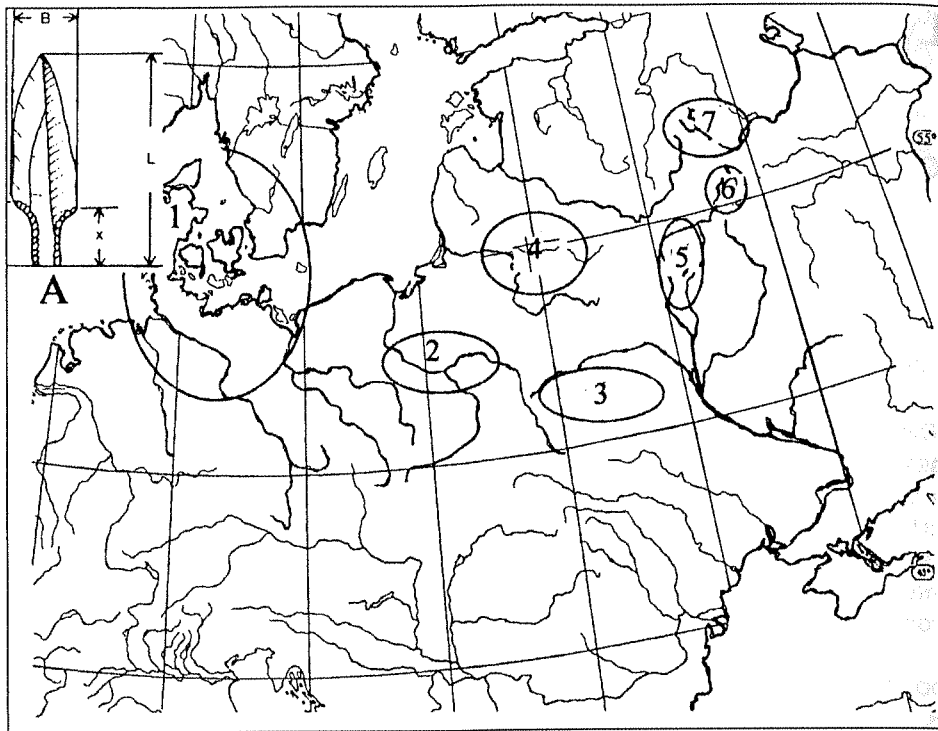


Fig. 1. Distribution of Bromme-Lyngby technocomplexes: 1 – Bromme group; 2 – Vistulian group; 3 – North Ukrainian group; 4 – Baltic Magdalenian group; 5 – Grenskaia group; 6 – Vyshegorskaia group; 7 – Podolskaia group. A – parametric indexes of tanged points according to A. Fischer (Fisher 1985).

This period in northern Europe is characterised by spread of the number of tanged points of archaeological cultures, with the strategy based on the season of reindeer hunting. Initial Bromme-Lyngby culture has a special meaning, as the oldest in the context of tanged points complexes. It is a matter of common knowledge to consider it as a base point for formation of more recent cultural entities, such as ahrensburgian (Rust 1958; Taute 1968) and swiderian (Schild 1975).

A number of archaeological cultures of Lyngby tradition were distinguished in Eastern Europe. These are: Magdalenian-Subbaltic set of assemblages (Rimantienė 1971), Grenskaia culture of Byelorussia (Ksenzov 1988; 1994; 1999), Krasnoselskaia culture of the Ukraine (Zaliznyak 1998; 1999), Podolskaia on Valdai Upland (Fig. 1).

The phenomenon of this wide spread and so long existing cultural tradition, uniform in the basis, as a rule is related to intensive migrations of the hunters on reindeer.

All East European cultural entities with tanged points were distinguished on the basis of typological structure of stone assemblages, on the basis of spatial variability of industrial complexes. Their chronological sequences and relations remain under discussion up to the present times. The first acceptable radiocarbon from this epoch was obtained in swiderian assemblage of Kabeliai site (Ostrauskas 1999).

There are no sufficiently acceptable radiocarbon evidences, corresponding to Alleröd or/and Younger Drias period, in sites of Lyngby affiliation. Evidences of

natural-scientific analysis related to chronological problems, at first palynological data, have a principal meaning in this situation as a direct evidence of the real age of archaeological sites.

The age of three sites of tanged point tradition were identified in the Upper Volga region as related to Alleröd and Dryas-III period on the basis of pollen analysis. These are: Podol III/1, Podol III/2 (Синицына 1996), and Ust-Tudovka I (Жилин Кравцов 1991). Materials of the Baranova Gora site (Синицына 1996), Troitskoye 3 (Ланцев, Мирецкий 1996), Lanino I (Синицына 1997) and Tioply Ruchej 2 (Кольцов 1994; Mireckij's excavations, which materials are not published) are typologically similar to them.

The fossil director for cultural identification of lithic assemblages for tardi-, postglacial epochs is the projectile points. Although general complex-statistical characteristic of techno-typological parameters of industries have an important meaning, the typology of projectile point remains the most important for cultural diagnostics of archaeological materials.

Some techno-typological features are common for all varieties of Lyngby cultural entity. First of all, use of hard hammer as a technological method for production the large and relatively rough blades and flake-blades with well-pronounced bulb. A tool-kit comprises large tanged points of Lyngby type, dihedral and retouched burins, simple end-scrapers with the working edge of 60°. Nevertheless, the basic criteria for the definition of cultural attribution of the industries remains to be a particular kind of tanged point, which is used both for distinguishing local variants and for distinguishing chronological sequences in cultural evolution.

As a particular type of projectiles, Lyngby tanged point was described in 1936 by G. Clark (Clark 1936: 215) as a the large point on rough blade with pointed or semi-rectangular basal tang made by means of abrupt retouch, and a point without ventral modifications.

B. Taute (Taute 1968) identified this type of projectiles in materials of Vilnius site – the most eastern for that time point of distribution of Lyngby cultural tradition. B. Taute distinguished the following varieties according to the size of items: 1) large (5.5 cm in length and 1.7 cm in width) as a basic type; 2) narrow and long; 3) short, with the length less than 5.5 cm. According to B. Taute, narrow and short varieties are transitive to Ahrensburgian type of tanged point.

R. Rimantienė (Римантене 1971; 1978) made classification of tanged projectiles of the so-called Magdalenian Subbaltic group of sites. Cultural complexes origin of which was related to derivatives of Late Magdalenian of Western Europe were incorporated in this entity. Assemblages referred to this culture, are distinguished on the background of large points on blade or flake-blade, the length of which exceeds the width no less than at 3 times. R. Rimantienė (Римантене 1978) distinguished 5 groups of tanged projectiles, the second among which was the "breadth-leaf", or Subbaltic Magdalenian set of types. Inside this group five types were identified:

– type 1: symmetric points. The tip sometimes may be displaced at one side. Tang of tools of this group is wide, a bit narrower than point; the bulb is well-distinguished. Initial Bromme-Lyngby complexes share the most close analogies to them. R. Rimantienė supposed there to be two lines of evolutions in the development of this group: basic and hybrid. The basic group has all attributes considered above, but point may be both retouched and without retouch; a distinctive attribute of points of a hybrid line is the ventral retouch on the tang, that was the evidence of swiderian influence;

– type 2: projectiles of the same morphological feature but with pointed tang. The most important feature of this type is the sharp contact of the tang and the point. In most cases the retouch is dorsal, seldom – ventral. The bulb frequently is destroyed by formation of the tang. Two lines of evolution (also basic and hybrid) are distinguished for this type. Projectiles of the basic have a tang made by dorsal, bifacial and ventral retouch. The tip of point often also has a retouch. Tanged points of a hybrid line (Chvalibogowicky type according to L. Sawicky) have a wide spread in archaeological materials of the Baltic area. The principal diagnostic feature of them is the ventral retouch of swiderian type on the tang. The tip is also usually retouched, sometimes on one side only, that makes the point asymmetrical;

– type 3: points with a large tang made by a side notch at the base. According to R. Rimantiene this type sporadically appeared after the extinction of Hamburgian culture. Two lines of evolution are characteristic of this type;

– type 4: epimagdalenian points. They are usually small, with a tang made by irregular retouches. They occur only in late mesolithic and neolithic assemblages;

– type 5: lanceolate points.

Typological classification of Lyngby points for Pomerania was made by Z. Bagniewski (Bagniewski 1999: 139). Seven types of projectiles were distinguished on the basis of size, degree of symmetry of the blank, form of the tang, and a type of the secondary modification.

A. Fischer (Fischer 1985) indicates the following diagnostic features of Bromme tanged points:

1) retouch on both edges of the tang and any retouch of the point should be carried out from the bulb-side of the flake;

2) the shortest tang retouch should be longer than the longest tang retouch divided by 1.5 ( $X > Y/1.5$ );

3) the length should be equal to or larger than double shortest tang retouch, and equal to or smaller than four times shortest tang retouch ( $2x \leq L \leq 4x$ );

4) the flake used for marking the tanged point should not have been struck off with a “soft” percussion implement;

5) if it cannot be shown that the flake was removed by using a “hard” hammer the length should be at least 8.0 cm, or the width should be at least 2.2 cm, or the weight should be at least 6.5 grammes. If the flake has definitely been struck off with a “hard” hammer then the length need only be at least 6.0 cm ( $L = 6.0$  cm).

The matter of the current study is the typological analysis of Lyngby tanged points from the Final Palaeolithic sites of Upper Volga area, the age of which was distinguished by the evidences of palynological analysis. These are: Podol III/1 (excavated area 1), Podol III/2 (excavated area 2), Ust' Tudovka I, and points of the same typological attribution from the neighboring areas (Table 1).

According to E. A. Spiridonova (Спиридонова, Алешинская 1996; Синицына и др. 1997) the chronological framework of the fossil soil with cultural layer of Lyngby affiliation at Podol III is distinguished by Alleröd period, namely by its terminal stage. The excavations provided the following number of Lyngby tanged points:

– Podol III/1: 5 intacts, 3 fragments (Fig. 2: 1, 2, 6, 7, 11);

– Podol III/2: 4 intacts, 11 fragments (Fig. 2: 4, 10, 13, 15) (one of them has a sloped edge).

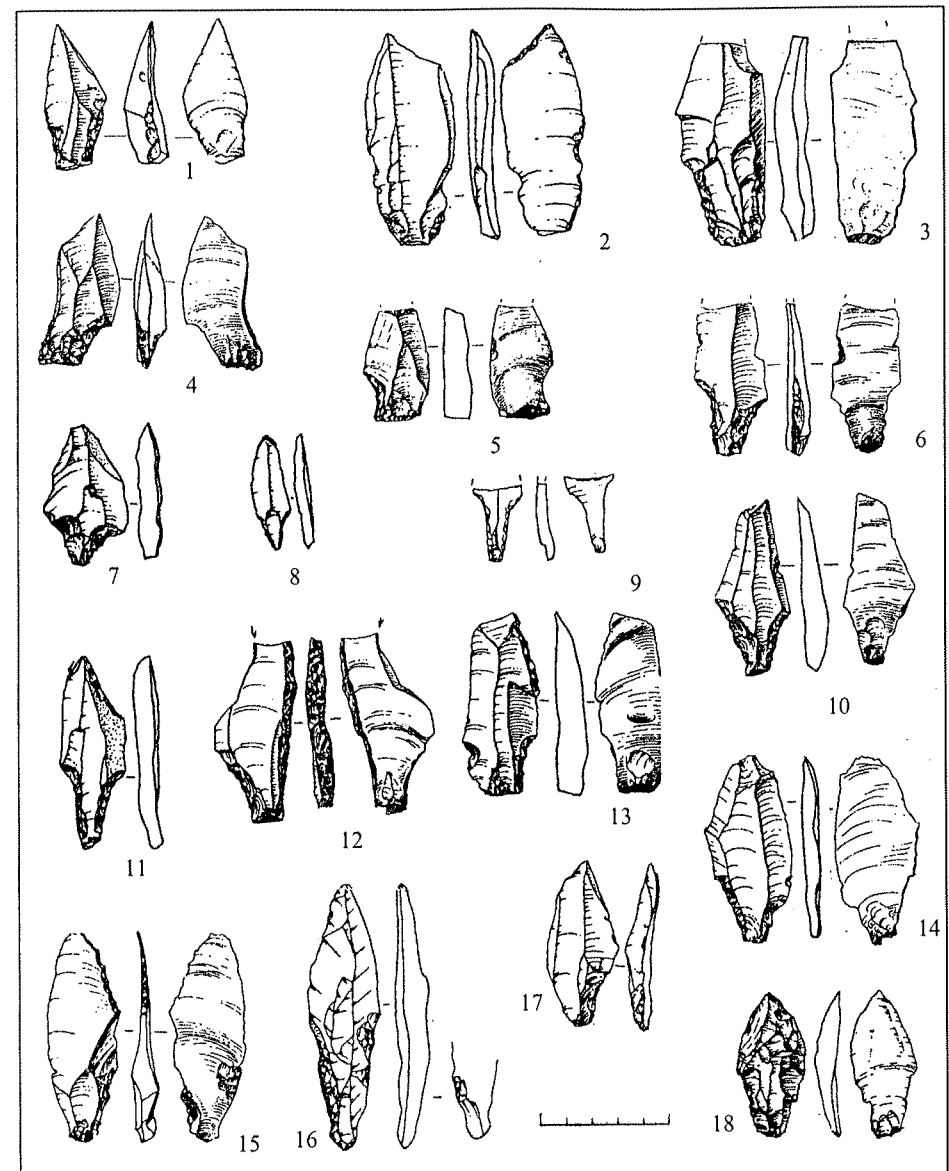


Fig. 2. Tanged points. 1–15 – Podol III/1–2; 16 – Troitskoe 3; 17–18 – Vyshegora 1.

According to quantitative meanings, the most diagnostic attribute for types definition appears to be the size of the blank.

All tanged points of Podol III/1 and Podol III/2 are made on rough blades, removed by means of hard hammer. Length of points varies within the framework of 6–8 cm. Retouch does not change the size of the blank. According to these parametric criteria tanged points of these two sites are identical to points of classic Bromme assemblages.

Typological configurations of both sites also share a close similarity.

Sites	Parameters	L	B	C	L:B	X	Y	L:X	Y:X
Denmark (according to Taute 1968, Tafel 92, 94, 95).									
Bromme [Tafel. 94-2]		10.6	2.5	1.0	4.2	4.0	5.3	2.7	1.3
Bromme [Tafel. 94-5]		7.4	2.0	0.5	3.7	3.2	3.5	2.3	1.1
Bromme [Tafel. 94-6]		8.3	2.8	0.5	2.9	3.2	3.6	2.6	1.1
Bromme [Tafel. 94-7]		8.5	3.3	1.0	2.6	2.8	2.9	3.0	1.1
Bromme [Tafel. 95-8]		6.0	2.6	1.0	2.3	2.0	2.2	3.0	1.1
Bromme [Tafel. 95-12]		3.5	1.0	0.4	3.5	1.5	1.9	3.5	1.3
Lyngby [Tafel. 92-1]		6.5	3.0	0.9	2.2	2.2	2.5	3.0	1.2
Lyngby [Tafel. 92-2]		7.7	2.2	0.6	3.5	3.0	3.4	2.6	1.2
Lyngby [Tafel. 92-3]		14.3	4.9	1.2	2.9	5.3	5.5	2.7	1.3
Lyngby [Tafel. 92-4]		9.0	3.0	0.8	3.0	2.5	2.9	3.6	1.2
Denmark (Ahrensburgian) (according to Petersen, Johansen, 1991: 23; Fig. 4-d, i, k, p).									
Sølbjerg [Fig. 4-d]		3.2	0.8	0.2	4.0	1.2	1.3	2.7	1.1
Sølbjerg [Fig. 4-i]		3.6	1.4	0.2	2.6	1.0	1.2	3.6	1.2
Sølbjerg [Fig. 4-k]		4.0	1.7	0.2	2.4	1.2	1.6	3.3	1.3
Sølbjerg [Fig. 4-p]		3.7	1.6	0.3	2.3	0.8	1.2	4.6	1.5
Upper Volga (Ust' Tudovka 1 according to Zhilin, Kravtsov, 1991 Fig.6: 1-2; Troitskoe 3 according to Lantsev, Miretski 1996: Fig. 2: 9).									
Podol III/1 (Fig. 2: 1)		5.9	2.5	1.3	2.4	1.7	2.7	3.5	1.6
Podol III/1 (Fig. 2: 2)		8.3	3.3	1.0	2.5	2.0	3.0	4.2	1.5
Podol III/2 (Fig. 2: 3)		9.0	3.0	1.2	~3	2.4	3.4	3.8	1.4
Podol III/2 (Fig. 2: 4)		6.2	2.5	1.3	2.5	1.5	2.0	4.1	1.3
Podol III/2 (Fig. 2: 5)		5.8	2.4	1.0	2.4	1.0	1.9	5.8	1.9
Podol III/2 (Fig. 2: 6)		7.5	2.7	1.0	2.8	2.0	3.0	3.8	1.5
Podol III/1 (Fig. 2: 7)		5.9	3.4	1.0	1.7	1.5	2.2	3.9	1.5
Podol III/1 (Fig. 2: 8)		4.6	1.4	0.2	3.2	1.4	1.5	3.3	1.1
Podol III/2 (Fig. 2: 9)		?	1.9	0.5	?	2.8	3.0	?	1.1
Podol III/2 (Fig. 2: 10)		6.8	2.8	1.0	2.4	2.3	3.2	3.0	1.4
Podol III/1 (Fig. 2: 11)		7.7	2.6	0.9	2.9	2.8	3.5	2.8	1.3
Podol III/2 (Fig. 2: 12)		9.0	3.0	0.8	3	3.0	?	3.0	?
Podol III/2 (Fig. 2: 13)		7.2	2.8	1.1	2.6	1.8	2.5	4.0	1.4
Podol III/2 (Fig. 2: 15)		7.6	3.0	0.7	2.5	1.8	2.9	4.2	1.6
Ust' Tudovka 1 [Fig. 6: 1]		7.1	2.2	0.6	3.2	2.5	2.5	2.8	1.0
Ust' Tudovka 1 [Fig. 6: 2]		6.0	2.4	0.9	2.5	1.7	2.6	3.5	1.4
Troitskoe 3 (Fig. 2: 16)		10.4	2.8	1.2	3.7	4.3	5.2	2.4	1.2
Ukraine (according to Zaliznyak 1998: Fig. 46).									
Krasnoselye [Fig. 46: 1]		5.2	2.0	?	2.6	1.5	2.4	3.5	1.6
Pribor 4 [Fig. 46: 2]		6.5	3.6	1.0	1.8	2.7	3.0	2.4	1.1
Rudnya [Fig. 46: 3]		5.6	2.5	?	2.3	2.2	2.4	2.5	1.1
Horymovka [Fig. 46: 4]		5.0	2.5	0.8	2.0	2.0	2.0	2.5	1.3
Rudnya [Fig. 46: 5]		6.0	1.8	0.8	3.3	2.0	2.0	3.0	1.0
Rudnya [Fig. 46: 6]		5.5	2.0	?	2.8	2.2	2.3	2.5	1.0
Never [Fig. 46: 8]		6.7	2.9	-	2.3	1.2	2.2	5.6	1.8
Lyutka [Fig. 46: 9]		7.5	2.0	-	3.8	1.7	1.8	4.4	1.1
Lyutka [Fig. 46: 10]		8.0	3.3	1.0	2.4	2.5	2.8	3.2	1.1
Lyutka [Fig. 46: 11]		7.3	3.5	0.8	2.1	2.5	3.0	2.9	1.2
Lyutka [Fig. 46: 12]		6.5	2.5	1.0	2.6	2.5	2.6	2.6	1.1

Sites	Parameters	L	B	C	L:B	X	Y	L:X	Y:X
Byelorussia (according to Cherniavski, Kudriashov, Lipnitskaia 1996: Fig. 35)									
Krasnoe Selo 5 [Fig. 35-1]		5.6	1.9	0.7	2.9	2.2	2.2	2.5	1.0
Krasnoe Selo 5 [Fig. 35-2]		5.7	2.1	0.6	2.7	1.4	1.9	4.1	1.4
Krasnoe Selo 5 [Fig. 35-3]		5.3	2.8	0.5	1.9	2.9	3.2	1.8	1.1
Krasnoe Selo 5 [Fig. 35-4]		6.7	2.6	0.6	2.6	2.8	3.4	2.4	1.4
Krasnoe Selo 5 [Fig. 35-5]		7.1	1.7	0.8	4.2	3.2	3.5	2.2	1.1
Krasnoe Selo 5 [Fig. 35-6]		6.1	1.7	0.6	3.6	2.1	2.3	2.9	1.1
Krasnoe Selo 5 [Fig. 35-7]		5.5	1.8	1.7	3.0	2.5	2.5	2.2	1.0
Krasnoe Selo 5 [Fig. 35-8]		5.0	2.1	0.7	2.4	2.0	2.5	2.5	1.3
Lithuania (according to Butrimas, Ostrauskas 1999: Fig. 2).									
Glinas [Fig. 2-8]		4.4	1.0	0.4	4.4	2.0	2.2	2.2	1.1
Merkys and Ula [Fig. 2-12]		5.6	2.2	0.7	2.5	2.0	2.0	2.8	1.0
Merkys and Ula [Fig. 2-13]		7.0	2.0	-	3.5	2.2	2.6	3.2	1.2
Lieporiai [Fig. 2-14]		7.0	1.8	-	3.9	2.0	2.4	3.5	1.2
Merkys and Ula [Fig. 2-15]		6.4	1.3	-	4.9	2.2	2.4	2.9	1.1

**Table 1.** Parametric indices of Bromme-Lingby tanged points: L – length, B – width, C – thickness, X – length of short side of the tang, Y – length of long side of the tang. (Fig. 1A)

The following varieties of tanged points of Lingby morphology are distinguished in assemblages of Podolskaia culture:

– type 1. Points with the asymmetric tip. The contact of large tang and leaf is sharp. The sides of the blank, as a rule, are not modified. Classical Bromme-Lyngby projectiles are direct analogies of this type (Fig. 2: 1). 7 points represent this group: one non-finished, two fragments from Podol III/2 (Fig. 2: 3, 4, 5); fragments of two tangs from the dwelling from Podol III/1 and from a hole from Podol III/2. A point from dwelling, with the distal edge truncated by ventral retouch can be considered a variant of this type (Fig. 2: 2). One point from Troitskoe 3 may be put in relation to this type as a variety or as an atypical form (Fig. 2:16);

– type 2. is represented by two intact symmetric projectiles with the pointed tang (Fig. 2:7) from the site Podol III/1, and, also, by one intact point and two fragments of tang from Podol III/2. One of them is a bit smaller than others (the Fig. 2:8), it is usually related to a high degree of utilization of raw material. According to B. Madsen (Madsen 1996: 67), the extraction of massive blades is necessarily accompanied by turn out of a number of fine “wast bladelets” and some microblades, which seldom are used in the manufacture of tools. The point from Podol III/1 is made on a similar blank. Two tang fragments of the points of this type provided the site Podol III/2 (Fig. 2: 6, 9); the intact point from this site has restricted bulb, destroyed by removals, directed from the striking platform (Fig. 2: 10);

– type 3. Is represented by one point (Fig. 2: 11) with the sloped tip. According to the size, proportion and the character of a break it has a direct analogy in a toolkit of the classical Bromme site Ullerslev (Petersen, Johansen 1996: 86, Fig. 12-e) in southern Denmark. The point from Podol III/1 is 5 mm shorter than the last;

– type 4. Is represented by the broken asymmetric point with the right lateral back made by abrupt opposite retouch. The analogies for this type are well known

from Neinhagen site in northern Germany (Terberger 1996: 117). B. Taute (Taute 1968) had separated classical Bromme group (Denmark, southern Sweden, Schleswig-Holstein) and southern group (northern Germany). For the former, the coexistence of two cultural traditions – Bromme and Federmesser – was established. On the background of this, southern direction of distribution (migration) of the population of Bromme culture in Alleröd time was reconstructed. It seems to be quite possible, that such important morphological element as continuous back, formatted by abrupt opposite retouche, is reflection of contacts or overlapping of these two cultural traditions. The point from Podol III/2 was renewed by means of burin spall (Fig. 2: 12). Similar morphological features have a point (Fig. 2: 13) provided from a hole at the same site Podol III/2;

– type 5. Points, according to their morphological features (Fig. 2: 14, 15), similar with leaf projectiles (type 7 – Hintersee, according to Z. Bagniewski (Bagniewski 1999).

So, five typological varieties of Lyngby points of the most eastern local group of this cultural tradition have direct analogies, first of all, to materials of classical Bromme group. Nevertheless, it is necessary to note a number of particular features of the Valdai materials. All varieties of Bromme types of tanged points were made on the basis of hard hammer technological method. Although tang of all types was formed by retouch located on both sides, there are some atypical forms. The best examples are points from Vyshegora I site (Fig. 2: 17, 18) at the Upper Dnepr. According to the second Fischer's criterium, tanged points of Valdai Upland does not correspond to classical Bromme. Moreover, the ratio of length of a point to length of a tang appears to be a diagnostic chronological marker. The tang of projectiles of mesolithic epoch became to be shorter than the tang of final Palaeolithic points as it is illustrated by lithic assemblages of Nizhnie Kotitsy 5 and Baranova gora sites.

Comparative study of tanged points, according to their parametric criteria, appears to be a one of the arguments in favor of Bromme cultural affiliation of Valdai final palaeolithic assemblages. The sites Podol III/1 and Podol III/2 were distinguished as the most eastern manifestation of the Bromme-Lyngby tradition (Синицына 1996). M. Zhilin (Zhilin 1996) considered them as Ahrensburgian. Our study seems to be a good illustration for the most close typological similarity of Valdai materials to classical Bromme, and may be put in opposition to Ahrensburgian ones according both to types of blanks, general morphology, and to secondary modifications.

Tanged points of each cultural group, distinguished for East Europe, have their own particular features: in general, points of Krasnoselskaia group were made on a more narrow, but Ukrainian ones – on a more wide blade blanks.

## Conclusions

1. Tanged points of Valdai sites Podol III/1, Podol III/2 are comparable and most similar to the projectiles of developed stage of classical Bromme of Scandinavia. Sites of Podol's group are the most eastern manifestations of this cultural tradition.

2. According to the morphological attributes tanged points of Valdai area shared more close similarity with the tanged points of Ukrainian (Rudnia, Liutnia, Goiramovka, etc.) and Byelorussian (sites of Krasnoselskaia area) groups. Another unity is represented by tanged points of Lithuania sites, assemblages of the Nemunas basin, and area of the Dnieper source.

3. The typological variability of Valdai tanged points is related to their chronological evolution: points of the type 1 are dated Alleröd period; type 2 – Dryas III; type 3 – the the end of Younger Dryas – beginning of Preboreal.

4. The most probable that Bromme points were transformed into tanged points of Ienevo culture of Preboreal times (type 5 of our classification).

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## Liungbiu tipo strėlių antgaliai Rytų Europoje

### GALINA SINITSYNA

#### Santrauka

Šios studijos pagrindinis tikslas – išanalizuoti įkotingius antgalius iš radinių kompleksų Rytų Europoje, siejamus su Liungbiu kultūrine tradicija. Darbo metodologija pagrįsta R. Rimantienės (1978) atliktos Baltijos regiono Madleninių – mezolitinių kompleksų strėlių antgalių analizės principais.

Rytų Europoje yra kelios Liungbiu tradicijai priskiriamos archeologinės kultūros: Pabaltijo Madleninė (Rimantienė 1971, 1978), Grensko Baltarusijoje (Ksenzov 1988, 1994, 1999), Krasnoseljės Ukrainoje (Zaliznyak 1998, 1999), Podolo Valdajaus aukštumose (1 pav.). Šis kultūrinis reiškiny yra siejamas su plačiomis šiaurės elnių medžiotojų migracijomis. Keli techno-tipologiniai bruožai aptinkami visose šiose Liungbiu kultūrinės tradicijos grupėse. Visų pirma, tai tiesioginio „kieto“ skėlimo technika, naudojama didelėms netaisyklingoms (grubioms) skeltėms ir nuoskaloms išgauti. Specifinio tipo įkotingiai antgaliai iki šiol išlieka pagrindiniu kriterijumi išskiriant lokalius variantus ir chronologines sekas kultūrų raidoje išskirti.

[vairias Liungbiu tipo antgalių tipologines schemas pasiūlė G. Klarkas (Clark 1936: 215), V. Tautė (Taute 1968), R. Rimantienė (Rimantienė 1971, 1978), Z. Bagniewskis (Bagniewski 1999: 139), A. Fišeris (Fischer 1985).

Atsižvelgiant į antgalių įvairių matmenų kiekybines reikšmes (1 lent.), reikšmingiausias požymis – tai antgalio ruošinio dydis. Visi Podolo III/1 ir Podolo III/2 kompleksų įkotingiai antgaliai yra padaryti iš grubių skelčių, nuskeltų kietu muštuku. Jų ilgis svyruoja nuo 6 iki 8 cm. Retušas nepakeičia ruošinio dydžio. Pagal šiuos matmenis minėtų stovyklaviečių antgaliai yra identiški būdingiausių Bromės (Liungbiu) stovyklaviečių antgaliams. Podolo kultūros kompleksuose galima išskirti 5 tipų įkotingius antgalius.

1-as tipas. Antgaliai su asimetrišku smaigaliu (2: 1–5 pav.). Masyvios įkotelės ir plunksnos kontaktas yra išryškintas.

2-as tipas. Antgaliai su smailėjančia įkote (2: 6–9 pav.).

3-as tipas. Antgalis su įstrižai retušuotu smaigaliu (2: 11 pav.).

4-as tipas. Asimetriški antgaliai su dvipusiu statmenu retušu ištaisai retušuotu dešiniuoju šonu (2: 11–13 pav.).

5-as tipas. Antgaliai pagal savo morfologinius bruožus panašūs į lapo formos antgalius (2: 14–15 pav.).

Nors visi Liungbiu tipo antgaliai iš Valdajaus aukštumų gyvenviečių turi tiesiogines analogijas Bromės kultūroje, tačiau pagal A. Fišerio nustatytą 2-ąjį kriterijų jie nepriskirtini klasikinei Bromės kultūrai.

Lyginamoji įkotingių antgalių analizė parodė, kad pagal savo parametrus Podolo III/1 ir III/2 gyvenviečių antgaliai yra labai panašūs į Bromės kultūros išvystytos stadijos gyvenviečių antgalius. Tai dar vienas argumentas įrodantis Valdajaus aukštumų vėlyvojo paleolito gyvenviečių ir Bromės–Liungbiu kultūros artumą. Šį argumentą galima priešpriešinti kai kurių tyrinėtojų nuomonei, kad šios gyvenvietės priskirtinos Arensburgo kultūrai (Zhilin 1996). Pagal morfologinius požymius įkotingiai antgaliai iš Valdajaus aukštumų labiausiai panašūs į Ukrainos (Rudnia, Liutna, Goiramovka ir kt.) ir Baltarusijos (Krasnoseljės apylinkių stovyklavietės) grupių antgalius. Kitas išsiskyres junginys apima Lietuvos, Nemuno baseino ir Dnepro aukštupio gyvenviečių antgalius.

Valdajaus aukštumos antgalių tipologiniuose skirtumuose greičiausiai atsispindi jų evoliucija chronologine prasme. 1 tipo antgaliai datuoti Aleriodu, 2-ojo – Vėlyvučiu Driasu, o 3-ojo – Vėlyvojo Driaso pabaiga – Preborealo pradžia. Greičiausiai Bromės tipo antgaliai Valdajaus aukštumų srityje Preborealyje transformavosi į Jenevo kultūros antgalius (klasifikacijos 5-asis tipas).

*Galina Sinytsina*  
*The Institute of Material Culture*  
*Russian Academy of Sciences*  
*Dvortsovaya nab. 18*  
*191186 St.-Petersburg*  
*Russia*