Introduction to the absolute chronology of Neolithic cultures in Eastern Europe

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ABSTRACT – *This paper is an introduction to the discussion of radiocarbon chronology of Neolithic cultures in Eastern Europe. It relates to a number of papers published in this volume.*

KEY WORDS – *Neolithic cultures; radiocarbon chronology; Eastern Europe*

Uvod k absolutni kronologiji neolitskih kultur na območju Vzhodne Evrope

IZVLEČEK – *Članek je uvod v diskusijo o radiokarbonski kronologiji neolitskih kultur v vzhodni Evropi. Nanaša se na tekste, objavljene v tej publikaciji.*

KLJUČNE BESEDE – *neolitske kulture; radiokarbonska kronologija; vzhodna Evropa*

Discussions about radiocarbon dates and the origin of dated materials have led to a revision of the absolute chronology of Neolithic cultures in Eastern Europe (*Mazurkevich* et al. *2016*). On the other hand, it has been suggested that a series of radiocarbon dates should be rejected due to the questionable nature of the dated material, *i.e.* organic material from pottery, food crust *etc*. (*cf. van der Plicht* et al. *2016*). Source criticism as a 'form of cognition' deepens our understanding of facts. However, we appear to be too critical, often forgetting about archaeological/historical possibilities for verifying dates and interpretation of a surprisingly old/young 'absolute' radiocarbon date.

Radiocarbon dates are not just dry figures; they conceal complex physical processes which reflect the natural history of the Earth. The accuracy and validity of radiocarbon dates have become two of the most important subjects recently. The results obtained while dating different materials from archaeological sites are regarded in light of the development of radiocarbon dating methods, the validity of the result obtained (taking into account, for example, the reservoir effect) and the possibility of its use in further reconstructions of historical background.

Discussions about the reservoir effect have a particular importance for the radiocarbon chronology of Eastern Europe, given the complex foraging economy of the ancient inhabitants of this region, where fishing often played a major role. Research of the reservoir effect in Denmark and Northern Germany has shown different values for the reservoir effect for different epochs and regions (*Philippsen, Heinemeier 2013; Philippsen 2013*). The dating of modern samples indicates that the freshwater reservoir effect is great and also variable even on short time scales. It has been suggested that it is impossible to find a single freshwater reservoir age for a given river system (*Philippsen 2013*). Recent research testifies to the difficulties in determining the reservoir effect, which might influence dates, as well as offset values. The detection of aquatic (fish) processing in charred food residue even by the use of the stable isotopes ^{13}C and ^{15}N (*Boudin* et al. *2010*) may be complicated, or an unlikely prospect.

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Investigations into the reservoir effect and arrays of radiocarbon dates related to Neolithic materials from Eastern Europe illustrate different possible scenarios (see, for example, articles by *Piezonka* et al. and *Dolbunova* et al. *in this volume*). Studies of sites in the Dnepr-Dvina region indicate differences in offset values even for different micro-regions and for different epochs. The comparative ^{14}C dating of wooden piles, food-crusts, fish and animal bones at the Serteya II site show that the FRE in Late Neolithic pottery food-crusts is generally negligible for this area (*Kulkova* et al. *2015; 2016*). The reservoir effect may also be absent in some of the regions (*cf. Marchenko* et al. *2015*).

Another problem is related to the calibration of dates and the existence of plateaus. The appearance of the most ancient pottery in Eastern Europe is dated to the first half of the 7th millennium BC, a period with one such plateau, which does not allow a more accurate chronology of this process (*Mazurkevich* et al. *2016*).

The choice of dating material is another important problem. It relates to the reliability of the archaeological context and, hence, the contemporaneity of different events represented by different materials. Events might have overlapped at an archaeological site which was occupied repeatedly. In cases when all artefacts, faunal remains and other objects were not recorded in a 3-D coordinate system, it might be difficult to divide these events, and their contemporaneity may appear to be doubtful. On the other hand, the choice of material for dating sites in Eastern Europe is determined mainly by the absence of a wide range of organic materials (wood, food crust, charcoal), which led to the use of pottery as a popular material for radiocarbon dating. The reliability of this material has been much discussed, although the first attempts to date organic material from pottery were made already at the end of the 1950s (*de Atley 1980.988*). The main problem is that carbon from non-cultural sources may also be present in ceramic materials, and this may effectively dilute the age or otherwise contaminate the cultural sample and, thus, different sources of carbon are possible (*de Atley 1980; Bonsall* et al. *2002; Zaitseva* et al. *2009*).

At first, many dates of pottery for the territory of Eastern Europe were primarily made in the Kyiv radiocarbon laboratory, which allowed a proposed scheme of absolute chronology for regions from where almost no radiocarbon dates had been obtained before (*Vybornov 2008*). These dates and the method itself were highly criticised (*cf. van der Plicht* et al. *2016*). The number of dates for organic material on pottery from different laboratories as well as cross-dating of other materials has now increased dramatically (see article of *Vybornov* et al. *in this volume; Mazurkevich* et al. *2016*). The coincidence of the series of dates obtained in different laboratories by different methods (AMS and conventional dates) and on different materials requires a specific discussion by specialists in this domain. A comparison and coincidence of different dates does not allow us to avoid this discussion or to neglect dates of organic material on pottery (see article of *Vybornov* et al. *in this volume*).

The radiocarbon chronology of Eastern Europe is based mainly on conventional dates, which extend the periods of the earliest ceramic cultures attributed to Neolithic era according to Russian scientific tradition. The correlation of processes dated by conventional dates and more precise AMS dates will allow us to narrow the period covering the appearance and longevity of these traditions.

During the last two decades, radiocarbon dates became the main resource for constructing different chronological and historical-cultural models. These important issues side-lined archaeological proxies, which led to the creation of various mathematical models, with very little consideration of archaeological context (*cf. Davison* et al. *2009; Silva* et al. *2014; Jordan* et al. *2016*). All these models were based on the values of radiocarbon dates and were not corrected with data about archaeological context, the typology of materials, cultural entities or cultural networks identified on the basis of archaeological materials. Thus a reverse trend can be noticed: all 'historical/cultural' connections and processes are adjusted to a certain mathematical (chronological) model.

The reliability of ^{14}C dates can be also verified by correlating these dates with typologies which were constructed on the basis of other independent proxies/principles or methods. This is well illustrated by the various discussions about the chronology of Rakushechny Yar, one of the oldest Neolithic sites in Eastern Europe, dated to the 7th–6th millennium cal BC. New investigations, including analysis of the context of dated materials, archive research and archaeological excavations allowed the chronology of this site to be refined and a revision of the notion that the existing chronology of southern Russia is unreliable (see *Tsybrij* et al. *in this volume*).

The radiocarbon dates collected for different periods of the Neolithic challenged our habitual linear scheme, the perception of continuity within the development of the Neolithic period. We can trace the asynchrony of various cultural events in different regions, as opposed to gradual changes in cultures (see *Mazurkevich* et al. *in this volume*). Radiocarbon dates challenge our notions about chronological boundaries between different cultures, as well as epochs. They require us to think more about the possibility that societies with different cultural attributions in different epochs coexisted. It is especially clearly seen on maps showing site distribution according to their chronology (Maps 1–5). Could such a 'striped pattern' have existed in the past? Our interpretation is also greatly influenced by stereotypes about primitive societies, which intentionally opted for such a way of life and preserved society in such a state (*Artemova 2009*). Interpretation is also influenced by our perception of time, when several hundreds of years or one millennium are regarded as a short period, and not as the lifetime of at least forty generations.

New radiocarbon dates will allow us to refine the chronology of different processes and influence much of our interpretation of social changes in the Neolithic era. It is important also to regard arrays of data grouped according to the main river basins of Eastern Europe, which served as waterways in the past, along which major migrations could have occurred.

The tradition of compiling radiocarbon dates has a long history. In Russian historiography, such compilations have been made since the 1970s; Pavel M. Dolukhanov, Vladimir I. Timofeev and Aleksandr M. Miklyaev laid the basis for this tradition (*cf. Dolukhanov* et al. *1969; 1972; 1978; Timofeev* et al. *1978; 2004; Mazurkevich* et al. *2014*). Such data compilation will continue to be published when a 'critical amount' of dates become available, giving rise to new discussions. The articles represented are devoted to different aspects of radiocarbon dating and chronology of Neolithic materials in Eastern Europe from the 7th to the 3rd millennium BC. The territory of research presented in this volume encompasses almost the whole of Eastern Europe, from the Lower Don River and Eastern Ukraine to Finland, from the Dnepr River basin to the Urals. The data and maps presented in the monographs reveals one more problem, about the definition of the Neolithic, the Neolithic revolution, and the Early, Middle and Late Neolithic, their chronological boundaries, which appear to be transparent in many cases, and how they can be distinguished one from another on the basis of archaeological features. The articles devoted to Eastern European chronology presented in this volume do not encompass all known radiocarbon dates for this area, but suggest another, new, point of view of the Neolithic in Eastern Europe.

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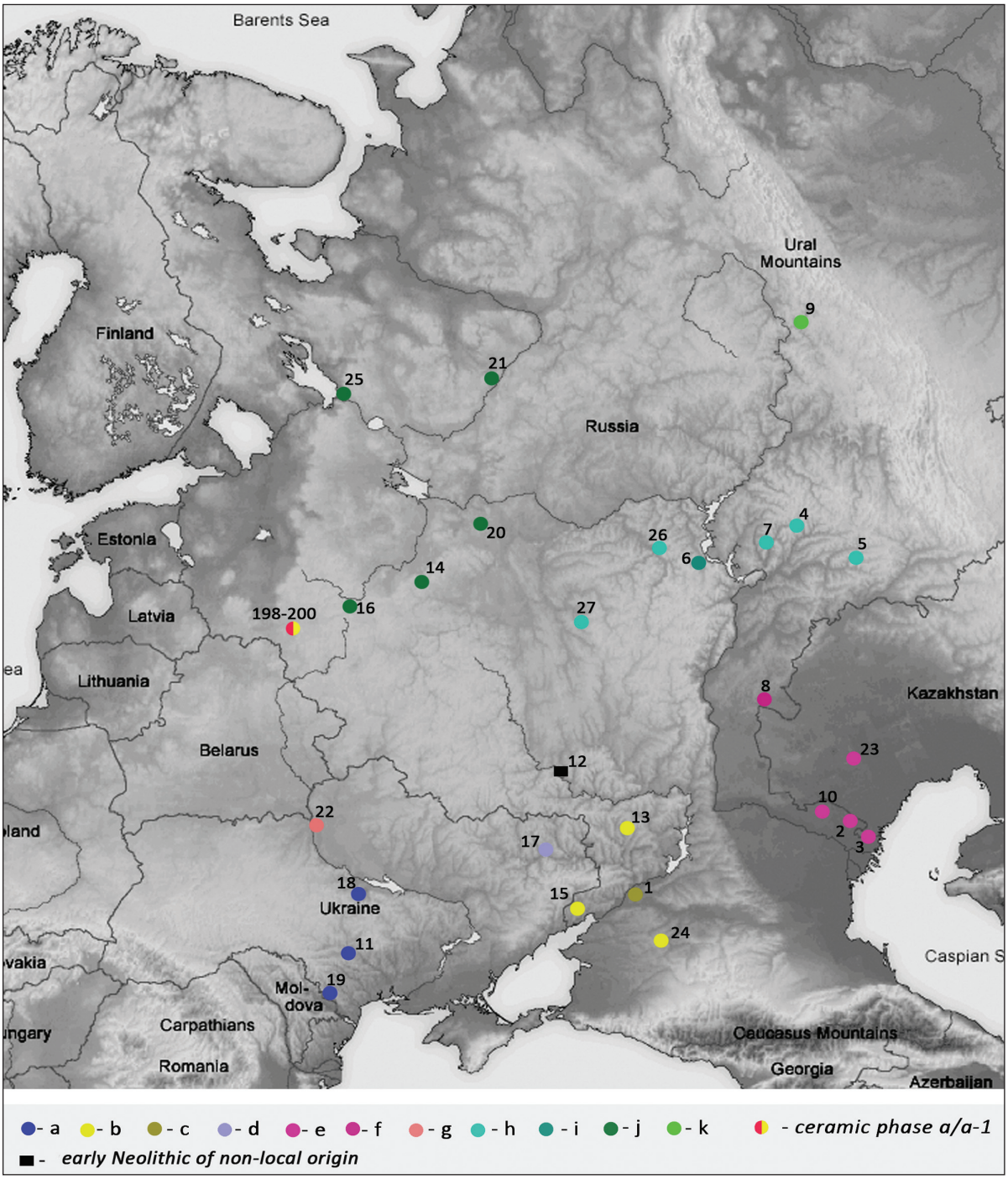
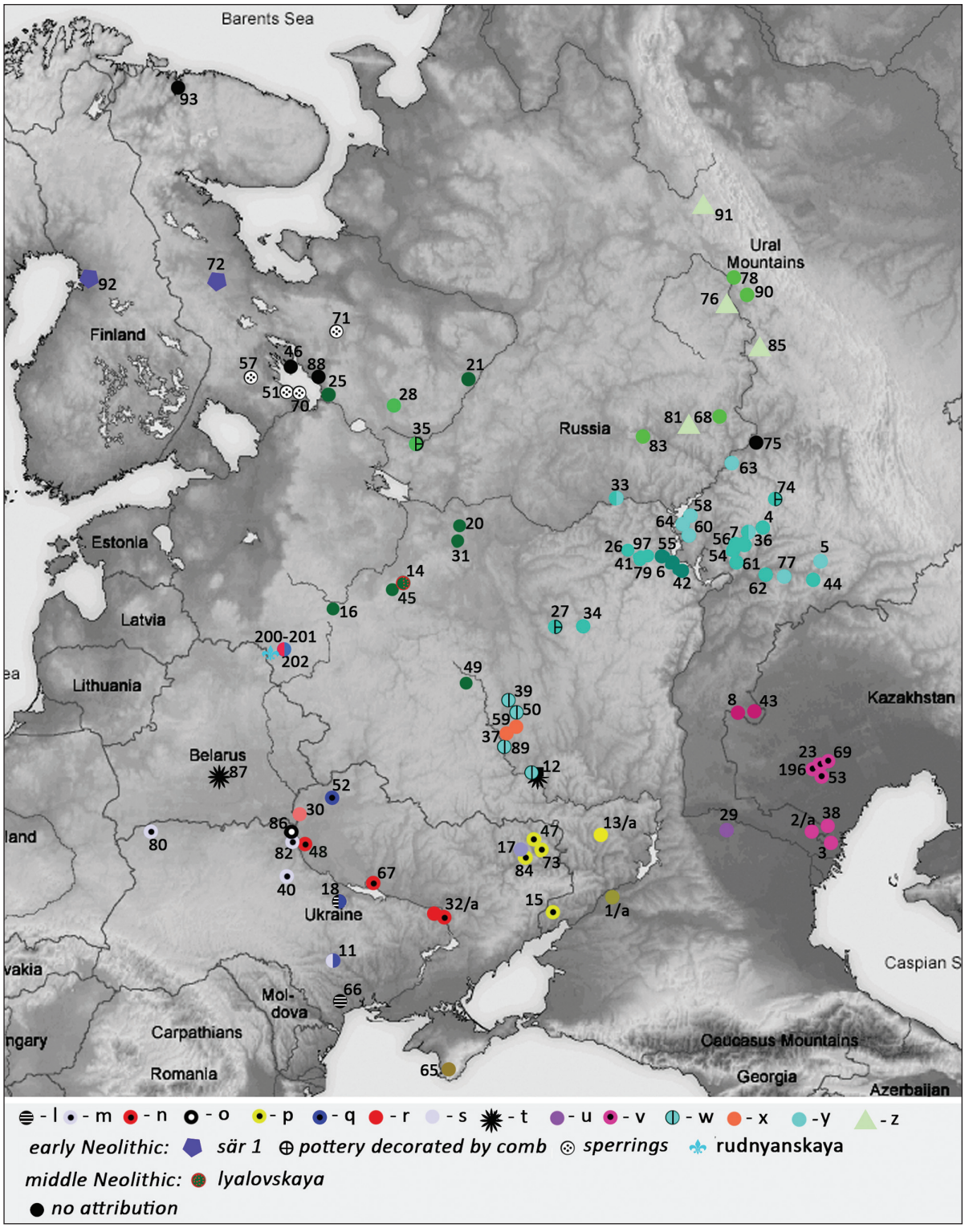
List of sites shown on Maps 1–5

1	Rakushechny Yar
1a	Razdorskaya II, site Samsonovskoe
2	Kairshak III
2a	Kairshak I, IV
3	Baibek
4	Chekalino IV
5	Ivanovka
6	Ust'-Tashelka
7	Bolshaya Rakovka II
8	Varfolomeevskaya
9	Levshino
10	Kugat IV, Kulagaisi
11	Gard VII
12	Cherkasskaya, Cherkasskaya 3, 5
13	Kremennaya II
13?	Kremennaya III
14	Zamostie 2
15	Matveev Kurgan I
16	Ozerki 5, 17
17	Kleshnya 3; Zelena Gornica 1, 6
18	Dobryanka 1, 2, 3
19	Girzhevo
20	Stanovoe 4
21	Berezovaya Slobodka II-III
22	Shmaevka
23	Tenteksor, Tenteksor III
24	Rassypnaya VI
25	Tudozero V
26	V'yunovo ozero I
27	Imerka VII
28	Karavaikha 4
29	Dzhangar
30	Pustynka 5
31	Sakhtysh 2a
32	Igren' 8
32a	Popov mys, Stril'cha Skelya
33	Dubovskoe III, Otarskoe VI
34	Ozimenki II
35	Veksa III
36	Il'inka
37	Ivnitsa
38	Burovaya 42
39	Dobroe 1
40	Lazarevka
41	Utyuzh I
42	Elshanka XI
43	Algay
44	Staraya Elshanka II
45	Okaemovo 5
46	Vozhmarikha 1, 26
47	Starobelsk, Novoselovka
48	Khodosovka, Romankiv
49	Berezovka 4?
50	Yarlukovskaya protoka (site 222)
51	Uya III
52	Studenok
53	Kachkarstau
54	Krasny Gorodok
55	Lugovoe III
56	Lebyazhinka IV, Kalmykovka I
57	Sulgu II
58	II Scherbetskaya
59	Karamyshevo 5
60	Lesnoe Nikolskoe III
61	Krasny Yar VII
62	Maksimovka I
63	II Dubogrivskaya
64	IV Tetushckaya
65	Fat'ma-Koba
66	Mainova balka
67	Buz'ki
68	Kyilud II
69	Kyzylchak
70	Sheltozero X
71	Shettima I
72	Kalmozero II
73	Tuba 1, 2
74	Mullino
75	Ziarat
76	Ust'-Zalaznushka II
77	Vilovatoe
78	Chashkinskoe ozero VI, VIII
79	Molebnoe ozero I
80	Lyadina Mys, Nobel' 1
81	Tarchan I
82	Krushniki
83	Koshkinskaya
84	Velika Pererva 1
85	Mokino
86	Plutovische
87	Kuzmichi 1
88	Chernaya Rechka 1
89	Universitetskaya 3
90	Chashkinskoe ozero IV
91	Chirvinskaya II
92	Oulu Vepsänkangas
93	Keret' XXII
94	Ust'-Shizhma
95	Podlesnoye III, IV
96	Podgorovka
97	Chernen'koe ozero III
98	Kovylyai I
99	Lebyazhinka I
100	Vasilievsky Kordon 7
101	Oulu Latokangas
102	Ksizovo 6
103	Erpin Pudas I
104	Dubovskoe XII, VII
105	Zabornoe Ozero
106	Srednee Shadbegovo
107	Chernushka
108	Sheltozero XI
109	Lyadina 14
110	Dubovskoe VII
111	Borovoe ozero I
112	Lukomie
113	Sauz II
114	Khutorskaya
115	Vantaa Palmu
116	Imerka Ia
117	Ivanovskoe 7
118	Vasilyevsky kordon 3, 5
119	Imerka III, IV
120	Gronov 3
121	Balakhchinskaya VIa
122	Berezovaya Slobodka VI
123	Orovnavolok V
124	Kladovets Va
125	Veksa I
126	Chernashka
127	Plautino 1
128	Kyilud III
129	Panozero I
130	Karamyshevo 9
131	Serebryanskoe
132	Simo Tainiaro
133	Staro-Mazikovskaya III
134	Chernikovo ozero
135	Pischiki
136	Chumoitlo I
137	Nizhnyaya Orlianka II
138	Poser
139	Chashkinskoe ozero I
140	Kaen-Tubinskaya
141	Pielavesi Kivimäki
142	II Lebedinskaya
143	Imerka III
144	Dronikha
145	Shan-Koba
146	Kryazhskaya
147	Kaluga 1, 2
148	Bukol'nikov 1
149	Karavaikha 1
150	Podolie 1
151	Vozhmarikha 4
152	Russko-Azibeyskaya
153	Nizhnyaya Strelka V, Galankina Gora II
154	Gulyukovskaya
155	Vantaa Storskogen
156	Matveev Kurgan II
157	Bol'shie Bortniki 1
158	Kladovets IX
159	II Tatarsko-Azibeyskaya
160	Vasukovo II
161	Fofanovo XIII
162	Kurino 1
163	Suna XII
164	Zolotec VI, Zalavruga I, IV
165	Outokumpu Sätös
166	Pegrema I, II
167	Rääkkylä Vihi 1
168	Orovnavolok XVI
169	Yamnoe
170	Chernaya Guba III, IX, IV
171	Vigainavolok
172	Vantaa Sandliden
173	Asavets 2
174	Sosnovaya gora 1
175	Sukhaua Vodla I
176	Inari Vuopaja
177	Komarin 5
178	Voinavolok XXVII
179	Berezovo XVII
180	Kladovets (burial)

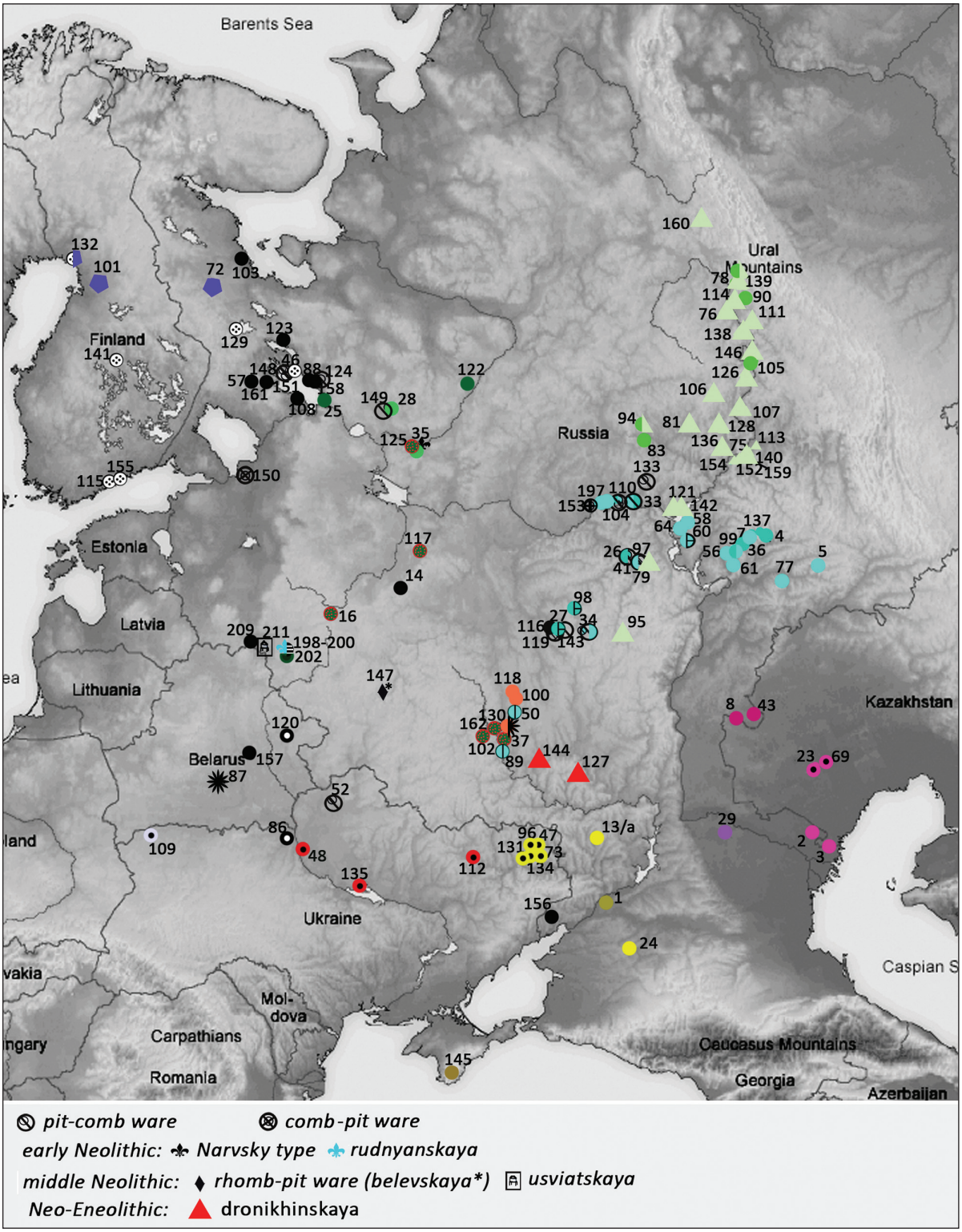
181	Prorva 2	191	Chernaya Rechka XII	202	Serteya XXIV
182	Pin'guba II	192	Lakshezero II, Kudoma X	203	Serteya XXIV
183	Tunguda III, XIV, XVII	193	Kostomuksha II	204	Serteya VIII
184	Meieri II	194	Vigainavolok II	205	Serteya XXXVI
185	Povenchanka XV, Voinavolok XXIV, Kochnavolok II	195	Palaiguba II	206	Serteya I, II
		196	Zhekolgan	207	Serteya XI
186	Nizhnyaya Olba 1	197	Sutyrskaya V	208	koorgan near village Serteya
187	Orovnavolok XI	198	Serteya XIV	209	Dubokray V
188	Kudomguba VII	199	Rudnya Serteyskaya	210	Dubokray IX, I
189	Zolotec IX, X, XX	200	Serteya X	211	Usviaty IV
190	Chelmuzhskaya kosa XXI	201	Serteya XXVII, XXII	212	Naumovo



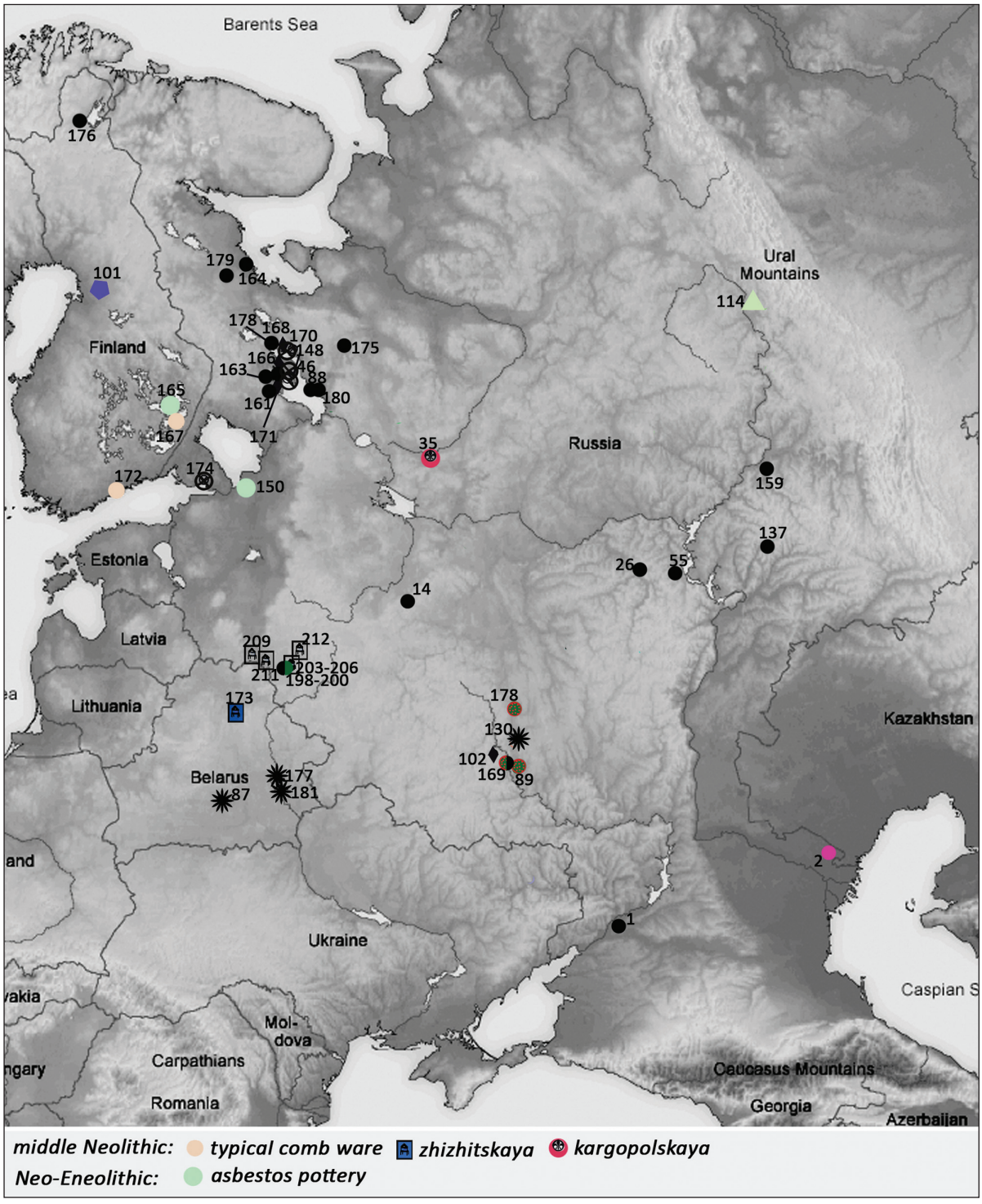
Map 1. Sites of the 7th millennium BC based on radiocarbon dating (modified from* Mazurkevich *et al.* 2016*).



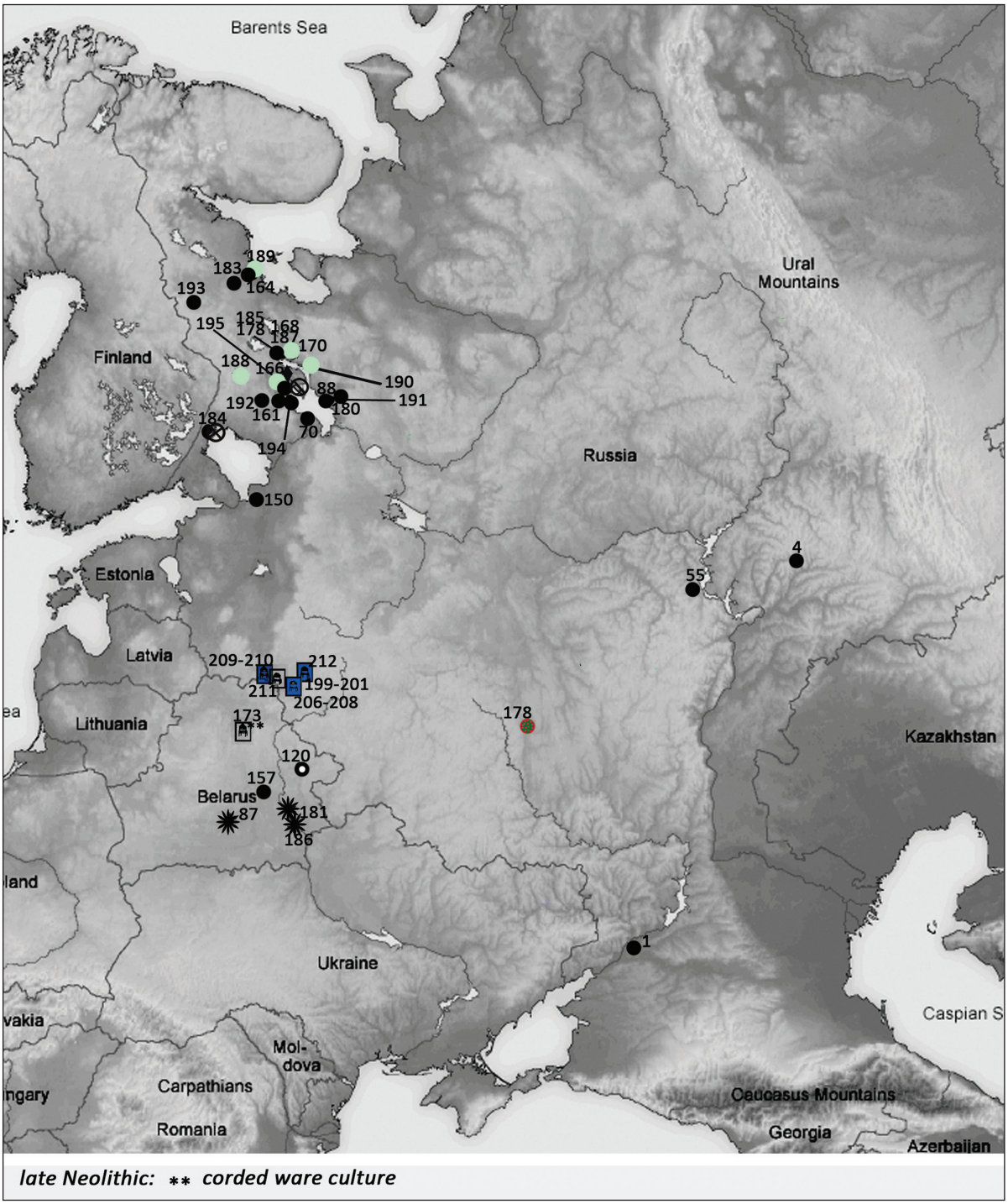
Map 2. Sites in the turn of the 7th to 6th millennium BC.



Map 3. Sites in the turn of the 6th to 5th millennium BC.



Map 4. Sites in the turn of the 5th to 4th millennium BC.



Map 5. Sites in the turn of the 4th to 3rd–2nd millennium BC.