

**THE FOUNDATIONS OF RADIOCARBON
CHRONOLOGY OF CULTURES BETWEEN
THE VISTULA AND DNEIPER:
4000-1000 BC**

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Editor's Foreword

This volume of the *Baltic-Pontic Studies* is a record of investigations carried out under the research project begun earlier in vol. 7 ("The Foundations of radio-carbon chronology of cultures between the Vistula and Dnieper: 3150-1850 BC", Poznań 1999). Here, the approach is broader in terms of chronology and culture. Our purpose has been to fill taxonomic gaps hitherto present in the discussion (supplementing the dating of cultures, groups or phases) or reanalyze the grounds for findings considered particularly controversial. In the latter case, a very enlightening debate was provoked by the comparative chronology of the Yamnaya and Catacomb cultures presented by A.N. Nikolova. We hope that a large series of ^{14}C dates and a revision of the foundations of "archaeological knowledge" (stratigraphy, typochronology and groups of co-occurrence of traits), brought together in the paper by D.Y. Telegin, S.Z. Pustovalov, N. Kovalyukh, lay the ground for a stabilization of views on this important dividing line in the chronology of the Bronze Age in the Pontic zone.

A vast majority of the new ^{14}C dates have been obtained under an international research project financed by the Polish Committee for Scientific Research.

Editorial comment

1. All dates in the B-PS are calibrated [BC; see: Radiocarbon vol.28, 1986, and the next volumes]. Deviations from this rule will be point out in notes [bc].
2. The names of the archaeological cultures and sites are standarized to the English literature on the subject (e.g. M. Gimbutas, J. P. Mallory). In the case of a new term, the author's original name has been retained.
3. The spelling of names of localities having the rank of administrative centres follows official, state, English language cartographic publications (e.g. *Ukraine, scale 1 : 2 000 000*, Kiev: Mapa LTD, edition of 1996; *Rèspublika BELARUS', REVIEW-TOPOGRAPHIC MAP*, scale 1:1 000 000, Minsk: BYELORUSSIAN CARTOGRAPHIC AN GEODETIC ENTERPISE, edition 1993).

Dmitriy Y. Telegin, Sergey Z. Pustovalov, Nikolay N. Kovalyukh

**RELATIVE AND ABSOLUTE CHRONOLOGY OF
YAMNAYA AND CATACOMB MONUMENTS THE ISSUE OF
CO-EXISTENCE**

INTRODUCTION

The creation of periodisations is the primary task of history studies in the course of systematization of any archaeological material. Periodisation completes a typological study of individual categories of newly discovered materials and, after all, serves as the basis for further historical reconstructions. The arrangement of some objects in time allows the creation of structural-genetic schemes and interpretations based on particular archaeological material. Building a periodisation is a rather difficult work. Newly received archaeological materials demand constant correlation with the existing periodisation and, if necessary, its correction. Periodisation of the steppe bronze epoch of Eastern Europe is not an exception.

This article summarizes more than a century of efforts aiming at this and a chronological division between barrow burial sites of the early and middle bronze epoch. The emergence of a substantial number of radiocarbon identifications for graves of the Yamnaya and Catacomb communities allows a more confident interpretation of data of burial rites and inventories, a more critical perspective on the relative chronology of Yamnaya and Catacomb graves and, finally, the creation of a non-contradictory chronological scheme of development of these two major ethno-cultural formations.

Each of the authors was responsible for a specific chapter of the article. D.Y. Telegin wrote a chapter on analysis of the Yamnaya materials; S.Z. Pustovalov wrote a chapter on the analysis of Catacomb materials and their relation with Yamnaya monuments, and N.N. Kovalyukh contributed a chapter on the methodology of radiocarbon analysis as well as supervising the research on bone and wood samples.

1. RADIOCARBON DATING OF SAMPLES OF WOOD AND FOSSIL BONES

Radiocarbon dating is a multi-stage complex process.

The purpose of the initial chemical processing of samples to be dated is, first, to remove accidental inclusions of particles that contain carbon and may distort the true age of a sample. Practically all of the samples are unique in terms of their condition in their natural environments, and the most suitable way of processing them is required in every individual case. The generally accepted standard acid-alkali processing of carbon-containing substrates of vegetable origin very often leads to unjustifiable losses of matter containing the fraction of carbon that is used for dating. This is caused by dissolution of semi-ruined cellulose in the process of the removal of humic acids with alkali. The technique of selective removal of outside organics, developed at the laboratory of the National Environment and Radio-geochemistry Research Centre of the National Academy of Science of Ukraine, makes this stage far more secure and simple. The essence of the method is the processing of samples of vegetable origin with a 1%-3% solution of hydrofluoric acid. In that process, the first element to be dissolved is the silicate layer that coats organic fibres. That layer is formed due to the presence of excessive amounts of silicic acid in the soil which has immense absorption capacity. By dissolving that layer we automatically transform all humic acid and fulvo-acids that it absorbed into a mobile gel-like condition.

The development of a new method of obtaining lithium carbide — the so-called “vacuum pyrolysis” allowed substantial simplification and acceleration of two such important uses of the radiocarbon method as dating of wood and bones [Skripkin, Kovalyukh 1998].

Samples of wood are initially ground to the size of 3-10 mm and, after the removal of roots of contemporary plants, are processed in diluted hydrofluoric acid (1%-3%). An important advantage of this process is the maximum safety of the organic matter even of severely damaged wood. After rinsing and drying, the wood sample is placed in a reactor in a special container over melted lithium at 800°C in vacuum. Intensive thermal destruction of the wood occurs whereby the products of pyrolysis are fully absorbed by lithium.

After complete destruction of the organic substance, the hard residue (charcoal) is also added to the lithium alloy. Therefore, the whole carbon of the wood sample goes to the lithium carbide with minimum losses. The synthesis takes one stage and lasts for only 20 to 30 minutes instead of 3-5 hours required by the traditional technique.

The method of vacuum pyrolysis offers even more advantages for dating bone samples. The technique we developed allows us to obtain lithium carbide from collagen or bone coal without initially extracting them to a pure condition [Skripkin, Kovalyukh 1999]. For that purpose, bones are ground and, after being rinsed in a

solution of tri-sodium-phosphate, processed with 1-3% hydrofluoric acid. That acid transforms carbonate and partially calcium phosphate into fluoride. A substantial advantage of hydrofluoric acid is its capacity to dissolve silicates and humic acids and products of life activity of bacteria absorbed in them. That factor allows the removal of alien organics and carbonate carbon, as well as an easy and thorough washing and drying of processed samples. At further stages the sample is ground and mixed with manganese bi-oxide for obtaining lithium carbide through the “vacuum pyrolysis” technique.

The technique in question is based on a combination of two processes: thermal destruction of an organic sample and chemical absorption of gas-like products with lithium. The synthesis is done in a stainless steel reactor; metal lithium is placed inside the reactor and the sample is placed in a titanium cup. Such a location of lithium and the processed sample allows regulation of temperature in the thermal destruction zone (and, therefore, the speed of extraction of gas) without changing the temperature in the melted lithium zone. The reactor is placed in an electric furnace at the optimum depth and fixed in that position. The pressure in the reactor is set at the level of 0.1-0.2 atmospheres. That contributes to intensifying the extraction of volatile products of thermal destruction and prevents condensation of those products of the walls of the reactor. As a result of the processes, collagen is transformed into volatile organic compounds and bone coal. When heated to more than 550°C, manganese bi-oxide splits up with educing active oxygen from the whole volume of the mixture. The educing of oxygen occurs smoothly in a broad range of temperatures (550-940°C). In that process fine-dispersed bone coal oxidizes to carbon oxide and carbon bi-oxide and is absorbed by melted metallic lithium in that condition. A very important property of manganese oxides is their ability to link phosphorus and sulphur into thermo-stable compounds. That allows obtaining high-quality lithium carbide of practically all carbon of bone organics. The formation of lithium carbide occurs without complications with high return.

A chemical system for obtaining, purification and polymerization of acetylene is made of materials that do not absorb acetylene at all. The inner capacity of the vacuum line was reduced to a minimum due to the optimum composition of elements of the system and the use of a cryogenic pressure stabilizer. Due to these measures the “memory effect” is excluded completely from the process of the synthesis of benzol.

To ensure full standardization of quantitative features of obtained benzols, our laboratory has introduced additional chemical processing. For that purpose, a calculated amount of sulphur acid is added to freshly obtained benzol; after 24 hours the sulphur acid is removed with a micro-pipette. Benzol is separated through a low-temperature sublimation method with simultaneous removal of admixtures of radon. Such distillation excludes the drop-based transfer of harmful admixtures and even the slightest losses of benzol.

Following the addition of a scintillator, the benzols are placed in high-efficacy teflon optimum-sized vials. The optimization of working capacity of the vials allows minimization of space radiation on fidelity and stability of determination of b-activity. The measurements are performed in a low-phone spectrometer “Quantulus 1220 T”. To take into account the influence of isotope fractioning, correction by correlation of stable isotopes of carbon is performed. A micro-sample of benzol (1-5 mg) is oxidized to carbon bi-oxide and tested with the help of a mass-spectrometer MI-2001.

2. ABSOLUTE AGE AND PERIODISATION OF MONUMENTS OF THE YAMNAYA CULTURE BY RADIOCARBON DATA

2.1. HISTORY OF THE CREATION OF YAMNAYA CULTURE PERIODISATION

Among the increasingly important issues in the study of the Yamnaya culture of the early Copper — Bronze Age of Eastern Europe, discovered more than a century ago, are those of its chronology and periodisation. These issues are equally of interest to historians, archaeologists, anthropologists, linguists and other specialists. As we know, the author of the identification of the Yamnaya culture, V.A. Gorodtsov, referred it back to 3000 bc. Other opinions, however, were expressed on that issue at the same time, either moving its age strongly back to 6000 bc [Rykov 1923] or, on the contrary, making it much “younger”, up to 2000 bc [Sinitsyn 1948]. The issue of the absolute age of the Yamnaya culture was approached from a somewhat different perspective by N.Y. Merpert [1968], who identified its individual groups that were dated differently within the time range of 3000-1700 bc. V.A. Fisenko [1970] dated that culture of Kalmykia within the time range of 3000-1900/1980 BC. According to O.G. Shaposhnikova [1971], the Yamnaya culture could be referred to the beginning of the second half of 3000 bc.

The above data about defining the absolute age of the Yamnaya culture were based mainly on stratigraphical observations of graves in barrows as well as on the study of materials in complexes and on comparing them with finds of other cultures. A new stage in addressing that issue began from the 1970s, when authors started to apply radiocarbon dating for that purpose. One of the first works on this issue was an article by D.Y. Telegin [1977] that included references to about 40 first identifications done with the use of the ^{14}C method. The analyses were performed in Kiev as well as in Leningrad and Novosibirsk laboratories based on wood and charcoal relics in late Yamnaya graves of Ukraine. Most of these were graves made

in ordinary rectangular pits with or without a shelf. The predominant majority of the buried were placed on their backs with their legs bent up in the knees, while some of the buried were placed in a curved position on the side. In some cases there were ceramic vessels of the late “Gorodtsov” type placed near the buried bodies. The date count showed that most of the graves belonged to the period between 2500 and 1900/1870 bc by non-calibrated identifications. Only some of the graves dropped out of that chronological segment, one being later and two earlier than the rest. Basing on this data it was concluded that the Yamnaya culture could be referred to the period from the second half of 3000 to early 2000 bc. Moreover, that case involved monuments of the late stage of that culture, for early Yamnaya monuments were not subject to dating with the help of the ^{14}C method at that time [Telegin 1977].

Later on, other researchers followed approximately the same chronological framework for the Yamnaya culture of Ukraine. For instance, according to Z.P. Marina [1982], the Yamnaya culture developed within the time period from late 4000 to early 2000 bc. A.V. Nikolova [1992] referred it to 2400-1900 bc, and D.L. Teslenko [1999] referred it to 2400-1900 bc.

Some time ago, A.V. Nikolova [1999b; 2001] published a summary of her report on the chronology of the Yamnaya and the Catacomb cultures of the Middle Dnieper Region suggesting that graves of that culture with the buried bodies placed on their backs in a curved position should be referred to the period within 2800-2300 BC, and the graves with the remains curved on the side should be referred to 2580-2130 BC. A similar opinion is shared by authors of a report on the chronology of the Yamnaya culture of the North-Western Caspian Region — N.I. Shishlina [2001], referring it to 2700-2100 BC.

Unlike the dates for the Yamnaya culture of the Caspian Region, the age of Yamnaya graves of the Samara-Volga Region, based on the radiocarbon method, has been defined by experts as belonging to the period between the last quarter of 4000 — the first quarter of 3000 BC [Turetskiy 2001]. The graves of the so-called Novotitorovskaya culture, a relative of the Yamnaya culture, are referred to the second half of 3000 BC, based on the radiocarbon method [Gei 2000].

To complete the discussion of the issue on dates of the Yamnaya culture, let us consider interpretation of this issue by V.Y. Trifonov [2001], who quotes relevant data for individual regions of Eastern Europe from pre-Carpathians to the Steppe Volga. According to that author, there are six individual territorial groups of the Yamnaya monuments on that territory that differ in terms of period of their existence: from 3-6 centuries (the pre-Kuban Region, Kalmykia, the Lower Don) to 9-13 centuries (the Prut-Dniester, the Middle Don, the Lower Volga).

As we may see below, that dating of the Yamnaya culture needs to be clarified.

The issue of defining the absolute age of the Yamnaya culture is closely connected to the issue of its periodisation that is addressed by various authors in different

ways. For instance, according to E.F. Lagodovska, O.G. Shaposhnikova, M.L. Makarevich [1962], there were two main stages in the development of that culture — the early and the late ones. The first included monuments of the kind represented by the second layer of the Mikhailivka settlement, the Repin Khutor, etc. The late stage is represented by materials of the third layer of the Mikhailivka settlement. N.Y. Merpert [1974] suggested that the Yamnaya culture should consist of three stages. The first of the stages, in his view, included early graves with ovoid vessels like the Bykovo II,2/3, and of the Berezhnovka 5/22 type. For the second stage there were two kinds of typical vessels: (a) primitive neck-less vessels with a semi-round bottom; (b) vessels of a generally similar shape with a small rim. Z.P. Marina [1982] and I.F. Kovaleva [1984] see four stages in the development of the Yamnaya culture based on materials of the area between the Orel and the Samara rivers. They relate the early stage to the period of proliferation of pots of the Bykovo and Berezhnovka types, second layer of the Mikhailivka settlement and the Repin Khutor, etc. The second stage, in their opinion, corresponds with materials of the lower horizon of the Mikhailivka-3, while attributing the third and the fourth stages in development of that culture to the upper horizon of the third layer of that settlement.

A.V. Nikolova [1992] also identifies four periods in the development of the Yamnaya culture. Opinions of the above authors are shared by D.L. Teslenko [1999], who introduced a far more complex system of proof. In his view, monuments of the Yamnaya culture can be initially divided into three territorial groups. Within each of them, after having identified the “chronological weight” of each of the monuments, he identified 8-9 “interval groups” which he then unites into four chronological periods. The whole approach is based on statistical evaluation of the “weight” of individual features of the burial rites. In fact, the author deals with materials only at a later stage. Apparently, it is difficult to build historical assumptions on such a periodisation. Finally, some words need to be said about the periodisation suggested about 30 years ago by V.N. Danilenko [1974] that has been ignored by all researchers — and, perhaps, there is a reason. The point is that according to Danilenko, the Yamnaya culture should include not only Yamnaya monuments but also materials of other cultures of the Copper Age — for instance, the Sredniy Stog culture that was, in his opinion, “artificially removed from the Yamnaya culture”. After such a “revision” of the Yamnaya culture, the author raises the issue of identifying within it about ten different periods and phases, the identification of which is basically not supported with any justification — that is why they remain unaccepted among archeologists.

It should be emphasized that there are different degrees of justification for the separation of individual periods in the development of the Yamnaya culture. For instance, while the first and second periods are rather substantially identified both stratigraphically and typologically, the third, fourth and other periods are marked,

at best, by statistical processing of data in burial rites and are poorly correlated with analysis of factual materials.

Given the above, we believe — based on stratigraphical observations and data of radiocarbon analysis — that there were two periods in the development of the Yamnaya culture — the early and late ones. In general, this perspective is in agreement with the stratigraphy of the Mikhailivka settlement and other monuments. The early period of the Yamnaya culture corresponds with early Yamnaya graves and the second level of Mikhailivka, while the late period corresponds with the upper level of Mikhailivka and late Yamnaya graves. The issue of identification of the third and fourth periods in the Yamnaya culture demands, in our opinion, further research.

2.2. STAGES IN THE DEVELOPMENT OF THE YAMNAYA CULTURE — BASED ON DATA OF TYPOLOGICAL ANALYSIS OF MATERIALS AND STRATIGRAPHY

As set out below, let us briefly focus on the characteristics of the two identified periods of the Yamnaya culture and their absolute age. The periods differ primarily in terms of their types of ceramics and, as mentioned above, stratigraphy in settlements and, in some cases, in barrows as well.

The monuments of the first (early) period of the Yamnaya culture are relatively well represented in almost the entire territory of the proliferation of that culture from the Dnieper to the territory beyond the Volga. They have been known for a long time in settlements and barrows. The buried remains in those graves were usually placed curved on their backs and sprinkled with red ochre. In some cases the skeletons are accompanied with broken vessels of the Repin or Mikhailivka-2 types that belong to the early Yamnaya time. Those include graves of the Verkhna Maevka, Sokolove in the Dnieper Region [Shaposhnikova 1985; Kovaleva 1984; Marina 1982], Kremnivka, Volonterivka in the Azov Region [Constantinescu 1984], Repin Khutor on the Don, Bykovo-II 2/3, Berezhnovka 5/22, Kumyska on the Volga and others [Merpert 1974; Dremov, Yudin 1992] (Fig. 1:3-9).

A common feature of the early Yamnaya vessels of the territory between the rivers Dnieper and Volga is their rounded shape, fine or rounded bottoms, and the admixture of ground shells in the dough. Elements of the ornament include impressions of a comb or cord cuts; rather often there are rows of holes — “pearls”; the ornaments consist of horizontal rows and zigzags. The ornament usually covers only the upper part of a vessel, but sometimes goes down to the very bottom.

The early Yamnaya age of those vessels is proven by stratigraphy at the Mikhailivka settlement, in a number of barrows (Sokolove 9/19).

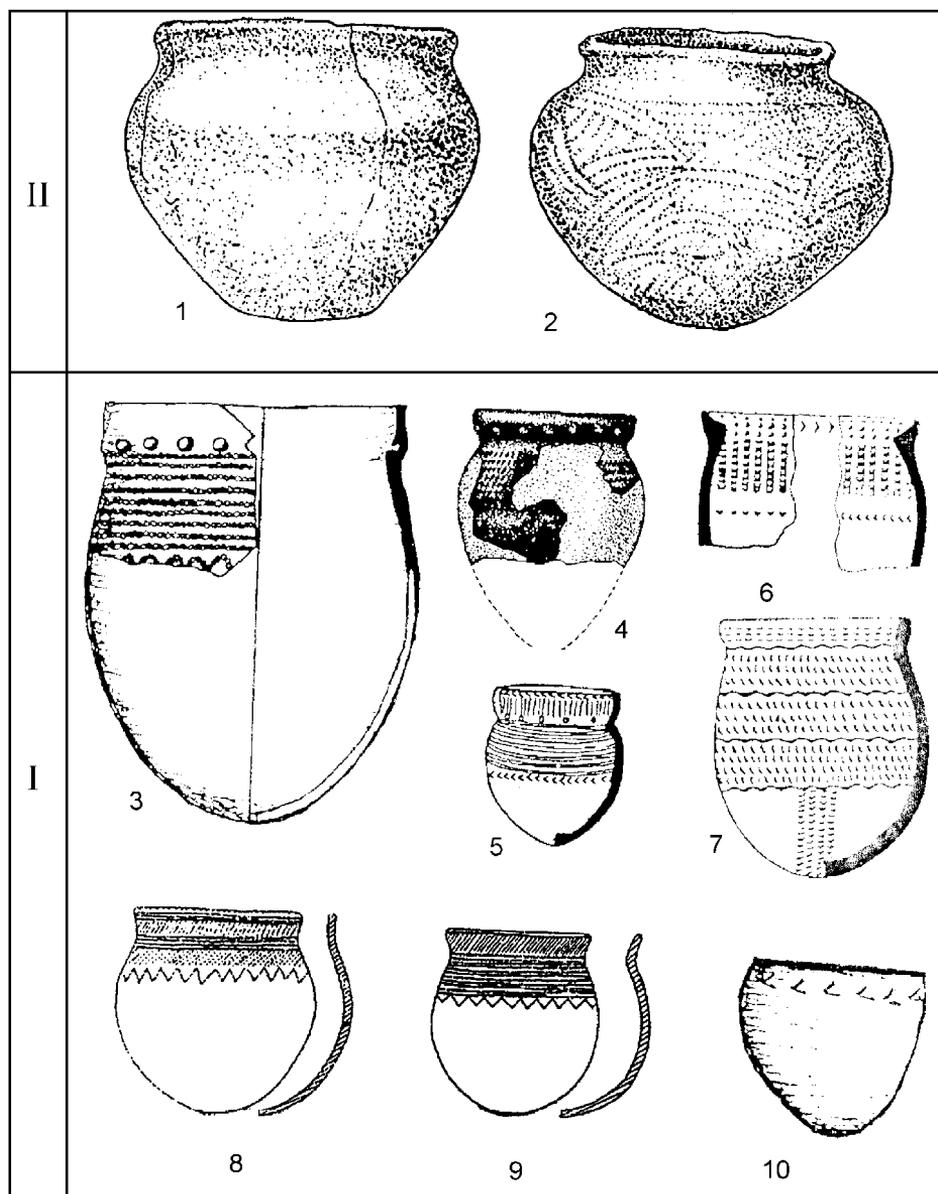


Fig. 1. Ceramics of the Yamnaya culture — early (3-10) and late (1-2) stages. 1. Mogilev, Brilyuvata Mohyla; 2. Otradnoe 36; 3. Repin Khutor; 4. Mikhailivka 2; 5. Bykovo II 2/3; 6. Rivne; 7. Berezhnovka I 5/22; 8-9. Kremnivka 6; 10. Berezhnovka I 22/4

While discussing the vessels in general, it is impossible to ignore noticeable differences among them, primarily in details of shapes, decoration of the rims and bottoms, — which allows identifying three types: ovoid vessels (type A), globular vessels (type B) and semi-ovoid vessels (type C).

Ovoid vessels (type A) differ from others by the elongated shape, sharp bottom, more often high, usually slightly grooved rim (in rare cases, the rim is short but carefully modelled). By this feature the ovoid vessels are classed into two versions: subtype A1 (Repin Khutor, Mikhailivka-2, Bykovo II 2/1 etc.; Fig. 1:3-5) and subtype A2 (Berezhnovka 1, 32/2, Kumyska etc.; Fig. 1:6-7), that also differ by the location of the ornament. In vessels of sub-type A1 it usually covers the upper part only, while in vessels of subtype A2 it covers the entire surface. These two types of ovoid vessels have different genetic sources.

Vessels of globular shape (type B) have a well-pronounced globular shape, round bottom and slightly-pronounced outward-bent short rim (Fig. 1:8-9).

Semi-ovoid vessels (type C) differ substantially from all other types by the general primitivism of their form and ornament. They are sub-conical, broadly opened without a pronounced rim, with a sharp bottom. They are decorated very poorly with cuts or do not have any ornament at all (Fig. 1:10).

Vessels of the three described types and sub-types occur in the whole territory of the Steppe between the rivers Dnieper and Volga, though not in the same numbers. For instance, ovoid vessels of subtype A1 are well represented in the Dnieper Region (Mikhailivka-2, Sokolove, Ignatevka etc.) and the Don Region (Repin Khutor, Universitetskaya Stoyanka etc.), while only a few of them occurred in the Volga Region (Bykovo II 2/1). On the contrary, vessels of subtype A2 are more common in the Volga Region (Berezhnovka 1, 32/2, Kumyska etc.). As for the globular vessels of type B and semi-ovoid vessels of type C, the former were found in the Left-bank Dnieper (Maevka, Kremnivka, Volonterivka), while the latter dominate among the Yamnaya funds in the Volga area. They were also found there at a later period [Merpert 1958].

Tools of the early Yamnaya culture period were made mainly of flint, stone and bone. Metal tools (awls) are poorly represented.

The monuments of the second period of the Yamnaya culture differ substantially from earlier ones by a number of features, primarily their ceramics. Vessels of the second period practically do not have admixtures of ground shells in their dough but have thicker walls and admixtures of sand in the clay. Their surface is usually covered with comb-like scratches. Among the shapes of ceramics, vessels of ovoid shape with short rims, flat or sharp bottoms dominate. However, some of the vessels have a different shape — and have handles or “ears”. Alongside with them, in the Volga Region in particular, semi-ovoid vessels continue to occur for a long time, but they are rare in the Don Region and further to the west. The main elements of ornament in those vessels are imprints of a cord, a comb, or cuts.

The ornament usually covers the upper part of a vessel, but sometimes goes down to the very bottom (Fig. 1:1-2). Other shapes include bowls, including bowls on “legs”.

Graves of the late period of the Yamnaya culture are divided by researchers into two or three “burial rite” groups. Vessels of that time include different shapes that are similar to those of the Catacomb culture. In addition to graves that contained skeletons placed curved on their backs, there were graves containing skeletons curved on the side, with their hands placed near the knees (the so-called “Catacomb” position).

Tools of the second period of the Yamnaya culture were made, as before, from flint, stone, bone and horns. The wide-spread tools include battle stone hammers, double-sided finished arrow-heads etc. At the same time, bronze tools become widespread.

The division of materials of the Yamnaya culture by periods casts light on a number of sides of its genesis. For instance, the presence of a substantial number of ceramic forms, particularly in the early period, points to the process of its formation in which earlier cultures took part, including the Sredniy Stog and the Khvalynsk cultures, as some researchers wrote before [Vasilev, Sinyuk 1985; Telegin 2000].

2.3. NEW MATERIALS IN RADIOCARBON DATING OF THE YAMNAYA CULTURE

As discussed above, the powerful Yamnaya culture that occupied huge territories of Europe and Asia, according to many authors, dates back to the period between middle 3000 and early 2000 BC. Nowadays, however, due to the availability of a number of new data, those dates need to be set more accurately. Within the past two or three decades, the number of radiocarbon identifications of the age of monuments of the Yamnaya culture has increased more than five-fold, particularly in Ukraine (Table 1). The methodology of treatment of samples with the ^{14}C method has also improved substantially. New schemes of radiocarbon dating with the use of calibration have been developed — for instance, the B. Weninger [1993] method of determining the age of a monument in a point-based mode.

The use of a major number of radioactive analyses of materials of the cemeteries of the Yamnaya culture for addressing the issues of chronology raises a number of separate tasks that need to be addressed. It should be noted that different dates may be obtained in the process of the definition of the age of a monument depending on the kind of material being analyzed (wood, bone, shells etc.).

Because the process of accumulation of radiocarbon definitions of the Yamnaya culture has occurred for several decades, and has been processed in different

Radiocarbon Chronology of the Yamnaya Culture*

No.	Locality (site, barrow/grave)	Material**	Author of research/publications	Lab. No.	Date 14C	
					BP	BC
1	2	3	4	5	6	7
Northern Pontic Area						
1.	Zaporizhzhia Reg., v. Avgustynivka 5/2	W	Otroshchenko	Ki-7110	4130±55	2712±115
2.	— << >> — 4/2	W		Ki-7111	4190±60	2773±94
3.	— << >> — 4/1	W		Ki-1446	4100±80	2618±137
4.	— << >> — 4/1	W		Ki-7116	4120±60	2702±121
5.	— << >> — 1/2	W		Ki-2118	4800±55	3579±66
6.	Odesa Reg., v. Zatoka, Akkembek barrow 1/33	W	Chernyakov	Ki-6816	3865±50	2309±89
7.	— << >> — 1/14	W		Ki-6817	3920±95	2345±136
8.	— << >> — 1/17	W		Ki-6816	3920±95	2345±136
9.	— << >> — 1/17	B		Ki-6819	3865±60	2314±97
10.	— << >> — 1/21	W		Ki-6820	3760±45	2126±79
11.	— << >> — 1/22			Ki-6820	3775±60	2160±105
12.	— << >> — 1/22	B		Ki-6822	3810±50	2224±88
13.	Mykolaiv Reg., v. Antonovka 1/30	W	Shaposhnikova	Ki-7117	3990±65	2483±99
14.	Luhansk Reg., v. Astakhovo 22/3	W	Evdokimov	Ki-2809	4880±90	3651±108
15.	— << >> — 3/15	W		Ki-7075	3950±65	2428±103
16.	Zaporizhzhia Reg., v. Balki 1/40	W	Otroshchenko	Le-1168	4080±90	2609±142
17.	— << >> — 1/57	W		Ki-606	4370±120	2979±34
18.	Cherkasy Reg., v. Bashtechki 4/2	W	Artemenko	Ki-1720	4405±70	3006±113
19.	Odesa Reg., v. Borisovka	W	Subbotin	Le-856	3920±50	2386±72
20.	Kherson Reg., v. Brilevka 16/29	W	Evdokimov	Ki-2762	4415±70	3025±129
21.	Mykolaiv Reg., Bugskiy 1/15	W	Pustovalov	Ki-9404	3900±70	2367±98
22.	Dnipropetrovsk Reg., v. Verkhnetarasovka 70/13	W	Cherednichenko	Ki-957	4090±95	2615±148
23.	— << >> — 9/18	W		Ki-602	4070±120	2555±58
24.	— << >> — 9/18	W		Le-1180	3980±70	2457±107
25.	— << >> — 17/3	W		Ki-581	3820±190	2242±38
26.	— << >> — 21/11	W		Ki-582	3740±150	2123±64
27.	— << >> — 21/11	W		Ki-7074	3860±70	2313±106
28.	Zaporizhzhia Reg., v. Vinogradne 2/18	W	Otroshchenko	Ki-9388	4245±70	2801±102
29.	— << >> — 2/11	W		Ki-987	3950±80	2432±119
30.	— << >> — 20/18	W		Ki-9395	4140±80	2725±123

1	2	3	4	5	6	7
31.	— << >> — 3/25	W		Ki-9399	3765±70	2152±114
32.	— << >> — 24/37	W		Ki-9402	3930±70	2380±101
33.	— << >> — 3/25	W		Ki-9413	3970±70	2451±107
34.	— << >> — 3/25	B		Ki-9395	3970±70	2451±107
35.	— << >> — 3/10	B		Ki-9414	4340±70	2965±82
36.	Odesa Reg., v. Vishnevoe 17/4	W	Subbotin	Ki-1270	3950±90	2434±132
37.	— << >> — 17/38	W		Ki-1711	4250±65	2808±98
38.	— << >> — 17/36	W		Ki-9927	3920±70	2373±99
39.	— << >> — 17/38	W		Ki-1726	4105±65	2697±129
40.	— << >> — 17/37	W		Ki-9926	3880±70	2342±102
41.	— << >> — 17/38	W		Ki-7078	4180±70	2762±104
42.	— << >> — 17/38	W		Ki-7079	4105±65	2697±129
43.	Luhansk Reg., v. Voykovo 4/8	W	Bratchenko	Ki-1718	4000±60	2501±86
44.	Zaporizhzhia Reg., v. Volchansk 1/18	W	Dorofeev	Ki-2119	3860±50	2303±89
45.	Donetsk Reg., v. Volonterivka 1/3	W	Bratchenko	Ki-9917	4570±80	3236±137
46.	— << >> — 1/4	W		Ki-9918	4535±80	3221±125
47.	— << >> — 1/5	W		Ki-9919	4490±80	3191±132
48.	— << >> — 1/6	W		Ki-9920	4305±70	2950±103
49.	— << >> — 1/9	W		Ki-9921	4320±70	2954±87
50.	— << >> — 1/1	W		Ki-9922	4380±80	2995±109
51.	Rostov Reg., Gireeva Mohyla	W		Le-136	3870±130	2318±50
52.	Kirovograd Reg., v. Golovkovka 3/1	B	Nikolova	Ki-6718	3020±60	1256±101
53.	— << >> — 5/3	B		Ki-6730	3960±60	2446±97
54.	— << >> — 5/5	B		Ki-6730	4005±55	2516±72
55.	— << >> — 6/8	B		Ki-6719	3970±55	2472±90
56.	— << >> — 6/9	B		Ki-6720	3880±55	2356±89
57.	— << >> — 6/11	B		Ki-6721	3850±55	2296±94
58.	— << >> — 7/4	B		Ki-6722	3980±60	2480±93
59.	— << >> — 11/5	B		Ki-6723	4030±60	2539±81
60.	— << >> — 12/3	B		Ki-6724	3950±50	2403±81
61.	— << >> — 14/2	B		Ki-6727	3910±15	2385±69
62.	— << >> — 14/3	B		Ki-6725	3895±55	2371±83
63.	— << >> — 14/4	B		Ki-2726	3840±50	2285±90
64.	— << >> — 14/7	B		Ki-6728	3905±55	2374±80
65.	— << >> — 14/9	B		Ki-6729	3920±50	2386±72
66.	Dnipropetrovsk Reg., v. Dmitrovka 1/5	W	Shilov	Le-822	3850±60	2302±99
67.	— << >> — 1/16	W		Le-823	3680±60	2037±90

1	2	3	4	5	6	7
68.	— << >> — 10/12	W		Le-824	3920±50	2386±72
69.	Cherkasy Reg., v. Dobrovody 1/2	W	Artemenko	Ki-2124	4200±70	2779±100
70.	— << >> — 1/6	W		Ki-7090	3960±60	2446±97
71.	— << >> — 2/4	W		Ki-2129	4160±55	2750±102
72.	— << >> — 2/6	W		Ki-2107	3980±45	2496±71
73.	— << >> — 2/10	W		Ki-7091	3920±60	2379±85
74.	Odesa Reg., v. Zheltiy Yar 1/11	W	Chernyakov	Le-2323	4020±40	2518±48
75.	Zaporizhzhia Reg., v. Zarechnoe 1/9	W	Mikhaylov	Ki-4193	4060±90	2594±143
76.	— << >> — 1/9	W		Ki-4616	4135±45	2731±108
77.	Dnipropetrovsk Reg., v. Kamenka-Dniprovska 1/9	W	Otroshchenko	Ki-3368	3960±50	2405±89
78.	— << >> — 1/9	W		Ki-3592	4370±50	2974±62
79.	— << >> — 6/4	W		??-3135	4062±19	2547±59
80.	Luhansk Reg., Kleshniya 3	B	Manko	Ki-7847	4120±60	2702±121
81.	— << >> — 2	B		Ki-7848	4170±60	2759±101
82.	Donetsk Reg., v. Kremnivka 6/4	W	Bratchenko	Ki-1708	4260±50	2830±83
83.	— << >> — 6/6	W		Ki-7076	4330±70	2958±83
84.	— << >> — 6/7	W		Ki-7077	4170±60	2759±101
85.	— << >> — 6/9	W		Ki-7260	4465±60	3170±129
86.	— << >> — 6/8	W		Ki 9898	4410±70	3013±121
87.	Mykolaiv Reg., v. Kovalivka 6/13	W	Kovpanenko	Ki-9392	3745±70	2118±109
88.	Odesa Reg., v. Liman 2/2	W	Subbotin	Ki-2394	4490±90	3185±140
89.	Kherson Reg., v. Mayachka 2/27	W	Telegin	Le-1501	3840±60	2296±101
90.	Dnipropetrovsk Reg., v. Minovka 2/5	W	Telegin	Ki-8296	4030±70	2551±103
91.	— << >> — 1/3	W		Ki-421	3970±80	2445±120
92.	Odesa Reg., v. Mikhailovka 3/10	W	Chernyakov	Le-2327	4010±40	2519±47
93.	Dnipropetrovsk Reg., v. Mogilev 1/6	W	Telegin	Ki-497	4270±120	2886±17
94.	— << >> — 1/5	W		Ki-8295	4105±70	2695±132
95.	— << >> —, Brilyuvata Mohyla 5	W		Ki-493	4220±80	2783±109
96.	— << >> — 6	W		Le-1167	4000±100	2534±26
97.	— << >> — 12	W		Ki-494	4080±100	2557±61
98.	Kherson Reg., v. Obloy 1/8	W	Evdokimov	Le-1507	3860±60	2309±97
99.	— << >> — 1/7	W		Le-1508	4630±40	3427±68

1	2	3	4	5	6	7
100.	Odesa Reg., v. Ogorodnoe 1/11	W	Subbotin	Le-2323	4020±40	2518±48
101.	— << >> —, v. Novoseltsy 19/7	W		Ki-1219	4520±70	3217±114
102.	— << >> — 19/11	W		Ki-1220	3800±60	2222±105
103.	— << >> — 19/15	W		Ki-1712	4350±70	2967±83
104.	— << >> — 19/19	W		Ki-7127	4055±65	2566±99
105.	— << >> — 20/8	W		Ki-7128	4005±50	2515±62
106.	— << >> — 20/9	W		Ki-8294	4190±80	2771±110
107.	Cherkasy Reg., v. Nagornoe 15/10	W	Artemenko	Le-2322	3940±40	2402±61
108.	— << >> — 49/3	W		Ki-2119	4620±50	3418±87
109.	Luhansk Reg., v. Nikolaevka 5/12	W	Bratchenko	Ki-873	4280±100	2890±16
110.	Kherson Reg., v. Novokievka 9/1	W	Evdokimov	Le-1713	3820±40	2250±72
111.	— << >> — 1/5	W		Le-1716	4010±60	2522±83
112.	— << >> — 1/8	W		Le-1714	4180±60	2775±97
113.	Dnipropetrovsk reg, Ordzhonikidze 11/90	W	Nikolova	Ki-6570a	4035±50	2532±66
114.	— << >> — 11/11	W		Ki-6572a	4005±55	2516±72
115.	Mykolaiv Reg., v. Otradnoe 26/9	W	Shaposhnikova	Ki-478	3990±100	2533±28
116.	— << >> — 1/17	W		Ki-431	3890±105	2355±49
117.	— << >> — 1/21	W		Ki-452	3830±120	2243±39
118.	— << >> — 1/22	W		Ki-454	3925±110	2402±42
119.	— << >> — 24/1	W		Ki-470	3860±105	2285±52
120.	— << >> — 36/4	W		Ki-483	3660±120	2006±29
121.	Cherkasy Reg., v. Palmira 3/2	W	Sivolap	Ki-4044	4060±60	2562±94
122.	— << >> — 3/2	B		Ki-7101	3990±55	2495±80
123.	Dnipropetrovsk Reg., v. Pereshchepyno 4/13	W	Telegin	Ki-9980	4150±70	2745±113
124.	— << >> — 1/6	W		Ki-9981	4080±70	2589±119
125.	— << >> — 1/7	W		Ki-9982	4105±70	2695±132
126.	— << >> — 1/7	W		Vs-?	4215±65	2790±94
127.	Kherson Reg., v. Pervomaevka 1/19	W	Evdokimov	Le-1712	4480±40	3209±106
128.	— << >> —, v. Pidkalynivka 5/5	W		Le-1377	4050±80	2573±125
129.	— << >> — 6/12	W		Ki-1715	4200±60	2781±92
130.	— << >> — 6/10	W		Le-1439	4220±50	2796±83
131.	Cherkasy Reg., v. Podolskoe 4/1	W	Sivolap	Bln-4602	4128±46	2777±87
132.	— << >> —, v. Pridneprovskoe 3/1	W		Ki-3139a	3970±80	2445±120

1	2	3	4	5	6	7
133.	— << >> — 4/1	W		Ki-3253	3600±90	1901±130
134.	Luhansk Reg., v. Pryvilya 8/1	W	Bratchenko	Ki-1214	3800±100	2241±33
135.	— << >> — 1/9	W		Ki-1707	4550±100	3166±68
136.	— << >> — 11/15	W		Ki-1437	4390±70	2995±97
137.	Kirovograd Reg., v. Protopopovka 1/2	W	Nikolova	Ki-6733	3945±50	2398±78
138.	— << >> — 1/3	W		Ki-6734	3925±55	2388±78
139.	— << >> — 1/4	W		Ki-6732	3890±55	2364±85
140.	Kiev Reg., v. Rosava 1/8	W	Klochko	Ki-3036	4570±90	3230±152
141.	Odesa Reg., v. Semenovka 11/6	W	Subbotin	Ki-1758	4400±50	2994±76
142.	— << >> — 14/52	W		Ki-2126	4600±90	3320±169
143.	Luhansk Reg., Svatove 1/1	W	Bratchenko	Ki-585	4000±190	2529±34
144.	— << >> — 1/1	W		COAH-1043	4150±30	2750±93
145.	— << >> — 2/1	W		Ki-7103	4060±55	2556±87
146.	— << >> — 2/1	W		Ki-586	4010±180	2565±263
147.	— << >> — 2/1			COAH-044	4070±50	2564±88
148.	Kherson Reg., Skadovsk 1/14	W	Evdokimov	Ki-2439	4100±90	2702±144
149.	— << >> —, v. Stryukovka 105/20	W		Ki-897	4035±60	2544±82
150.	Zaporizhzhia, v. Starobogdanovka 1/6	W	Otroshchenko	Ki-2120	4760±55	3570±82
151.	Cherkasy Reg., v. Talyanki 2/3	W	Kruts	Ki-2612	3760±70	2144±113
152.	— << >> — 1/1	B		Ki-6714	3990±50	2502±71
153.	— << >> — 1/2	B		Ki-6715	3945±50	2398±78
154.	— << >> — 1/3	B		Ki-6716	3950±50	2403±81
155.	— << >> — 1/4	B		Ki-6717	3865±50	2309±89
156.	Rostov Reg., v. Usman 1/13	W		UBLA-1271	4550±80	3225±128
157.	Kirovograd Reg., v. Uspenka 1/3	W	Nikolova	Kin-4599	4167±44	2770±92
158.	— << >> — 1/14	W		Bin-4600	4125±40	2671±108
159.	— << >> — 1/7	W		Bin-4601	4140±48	2733±107
160.	Odesa Reg., v. Utkonosovka 1/3	W	Shmagliy	Ki-660	4770±120	3556±31
161.	Mykolaiv Reg., v. Khristoforivka 1/1	W	Shaposhnikova	Ki-578	4160±170	2758±81
162.	— << >> — 1/11	W		Ki-549a	4200±70	2779±100
163.	Volgograd Reg., v. Tsatsa 6/3			UBLA-1270	4210±80	2778±108

1	2	3	4	5	6	7
164.	Kherson Reg., v. Chervoniy Yar 1/10	W	Evdokimov	Ki-1436	4100±130	2619±65
165.	— << >> — 1/10			Le-1504	3640±40	1972±60
166.	Dnipropetrovsk Reg., v. Chkalovo 11/9	B	Nikolova	Ki-6570	3985±45	2507±66
167.	— << >> — 11/11	B		Ki-6829	3900±55	2373±81
168.	— << >> — 11/11	B		Ki-6829a	3990±50	2502±71
169.	— << >> — 11/11	B		Ki-6572a	4005±55	2516±72
170.	— << >> — 11/11	B		Ki-6572	4060±50	2554±80
171.	— << >> — 11/8	B		Ki-6827	3910±45	2385±69
172.	— << >> — 11/9	B		Ki-6828a	4010±50	2521±60
173.	— << >> — 11/9	B		Ki-6828	3960±50	2450±89
174.	— << >> — 11/9	B		Ki-6571a	4035±50	2532±66
175.	Dnipropetrovsk Reg., v. Chernyavshchina 3/2	W	Telegin	Ki-803	4180±120	2784±73
176.	— << >> — 3/2	W		Vs-?	3790±105	2182±160
177.	Dnipropetrovsk Reg., v. Shakhty 2/6	B	Nikolova	Ki-6833	3900±55	2373±81
178.	— << >> — 2/9	B		Ki-6834	3970±50	2478±84
179.	— << >> — 2/9	B		Ki-6834a	3930±50	2392±72
180.	Kherson Reg., v. Shyroka Balka 4/10	W	Evdokimov	Ki-1716a	4800±120	3552±40
181.	— << >> — 3/6	W		Ki-8293	4055±70	2570±107
182.	— << >> — 4/7	W		Le-1506	4250±60	2811±93
183.	— << >> — 3/6	W		Le-1778	3940±60	2389±90
184.	— << >> — 1/10	W		Le-1379	4010±60	2522±83
185.	Luhansk Reg., v. Pidgorivka, feature 3a		Gurin	Ki-7843	4560±50	3234±106
186.	— << >> —, feature 2			Ki-4841	4370±55	2972±67
187.	— << >> —			Ki-4842	4330±50	2948±58
188.	— << >> —			Ki-7839	4130±70	2713±121
189.	— << >> —			Ki-7840	4205±70	2779±99
Northern Caspian Area						
190.	Zunda Tolga 3/3	W	Shishlina	IGAN-16334	3955±40	2407±72
191.	Mandzhyky 1 3/2	W		IGAN-1981	3955±50	2406±86
192.	— << >> — 3/2	W		IGAN-1891	3950±50	2403±81
193.	— << >> — 2, 11/2	W		IGAN-2042	3920±20	2401±47
194.	— << >> — 2, 11/2	W		IGAN-2058	4070±40	2556±78
195.	— << >> — 2, ?1/3	W		GrA-12690	4060±50	2554±80
196.	— << >> — 2, 11/3	W		IGAN-2056	4050±51	2546±75

1	2	3	4	5	6	7
197.	— << >> — 2, 11/4	W		IGAH-2057	3760±40	2124±74
198.	Shupta 1, 1/2	W		IGAH-1890	3860±90	2322±127
199.	Mu-Sharet 4, 1/4	W		IGAH-1851	4770±120	3511±134
200.	Ostrov 3/33	W		IGAH-2106	3620±260	1965±342
201.	KVCh-56 8/7	W		IGAH-1005	3610±90	1910±134
202.	— << >> — 13/9	W		IGAH-1004	3500±150	1809±194
203.	— << >> — 17/3	W		IGAH-1006	3850±40	2277±79
204.	Tsatsa 6/4	W		Le-0002	3980±50	2488±78
Samara-Volga Area						
205.	Kutuluk 1, 4/1		Turetskiy	OxA-?	4400±70	3001±106
206.	— << >> —			AA-?	4370±75	2986±95
207.	Nizhnyaya Oriyanka 1, 1/5			?	4510±75	3218±120
208.	— << >> —, 4/1			?	4520±75	3217±119
209.	Nizhnepavlovsk 5, 2/3			?	4001±75	2496±118
210.	Pershin 1/4			?	4200±75	2775±104

* See also ¹⁴C dates for Myronivka barrows [Klochko 1999] - Ed.

** W – wood; B – bone

laboratories, a number of contradictions have emerged in some individual cases. About ten samples in these cases received two or three (or even four) definitions each, stretched within several centuries. Obtaining a large number of ¹⁴C definitions requires checks and mutual comparison of different monuments. This is even more relevant and necessary given the fact that the dates were often obtained through different methods, including typological-statistic or radiocarbon methods. In our case, for instance, the above related to the issue of the chronological co-ordination of early Yamnaya monuments like Kremnivka-Volonterivka and the same dates that were obtained for the monuments that were typologically defined as late Yamnaya.

Below we provide a list of the majority (about 200) radiocarbon definitions of the age of monuments from Ukraine and adjacent territories that were obtained in different laboratories (mainly in the Kiev Laboratory). The list is followed with a chart of the distribution of those definitions (Fig. 2). The list contains references to locations of these monuments, kinds of materials analyzed, index of the laboratory that performed the analysis and results of the identification of the age of the samples: a) before contemporary time (BP); and b) BC in the point-based expression. The definition results are grouped on the chart by monument (barrow) and placed

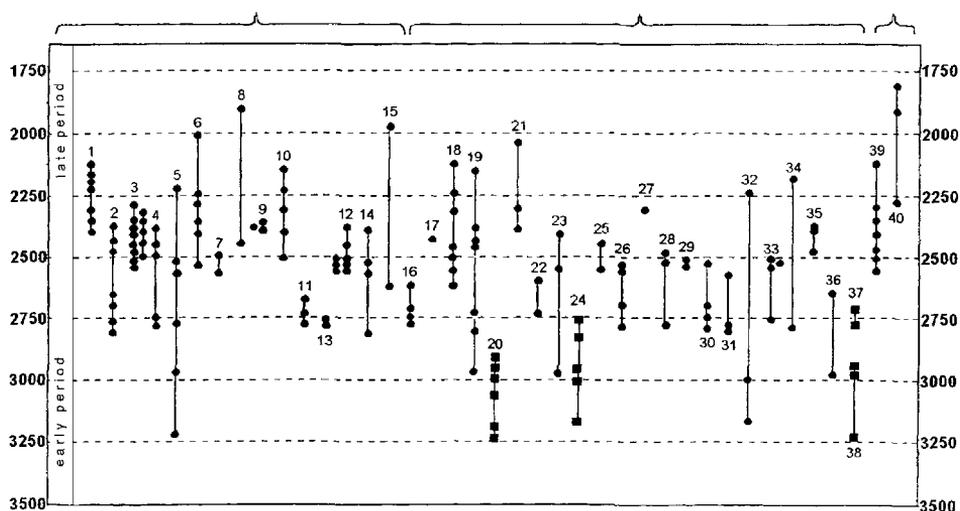


Fig. 2. Chronology and periodisation of the Yamnaya culture – early and late periods – based on radiocarbon data. 1. Zatoka (6-12); 2. Vishnevoe (36-42); 3. Golovkova (53-64); 4. Dobrovody (69-73); 5. Novoseltsy (101-106); 6. Otradnoe (115-120); 7. Palmira (121-122); 8. Pridneprovskoe (132-133); 9. Protopopovka (137-139); 10. Talyanki (151-155); 11. Uspenka (157-159); 12. Chkalovo (166-174); 13. Khristoforivka (161-162); 14. Shyroka Balka (181-184); 15. Chervoniy Yar (164-165); 16. Avgustynivka (1, 4); 17. Astakhovo (15); 18. Verkhnetarasovka (22-27); 19. Vinogradne (28-35); 20. Volonterivka (45-50); 21. Dmitrovka (66-68); 22. Zarichnoe (75-76); 23. Kamenka-Dniprovskya (77-79); 24. Kremnivka (82-86); 25. Minovka (90-91); 26. Brylyuvata Mohyla (94-97); 27. Obloy (98); 28. Novokievka (110-112); 29. Ordzhonikidze (113-114); 30. Pereshchepyno (123-126); 31. Pidkalynivka (128-130); 32. Pryvilya (134-136); 33. Svatove (142-143); 34. Chernyavshchina (175-176); 35. Shakhty (177-179); 36. Balky (16-17); 37. Kleshniya (80-81); 38. Pidgorivka (185-187); 39. Mandzhyky (191-197); 40. KVCh (201-203)

within a chronological scale within the period from 3300 to 1900 BC. Each symbol on the chart identifies one definition; the number next to it refers to the title of the sample in the general list of the monuments. In general, the chart reads from west to east and includes all major territorial groups of the Yamnaya culture from the Northern Pontic Region, the Right-bank Dnieper area, the Dnieper, the Left-bank Dnieper to the Azov Region, the Don, the Northern Caspian and the Samara-Volga area.

The chart contains a whole series of definitions (up to 8-10 per barrow) that form either a rather dense group or stretch from century to century in a peculiar “chain” with breaks of two, three or more centuries between individual symbols. As for the degree of fidelity of every individual definition, there is more confidence about groups of dates in that sense. Individual dates or definitions with major chronological gaps between them are seen as less reliable and were not included in the chart.

In general, the definitions presented in the chart and the table cover the period of time from the second half of 4000 to the end of 3000 BC. At the turn of 3000

and 2000 the Yamnaya culture ceased to exist almost along the entire territory of Eastern Europe.

However, the life time of the Yamnaya culture differed substantially in different Regions. For instance, judging from radiocarbon definitions for the North-Western Pontic Region, the oldest graves there were made in 3300-3100 BC. They occurred somewhat later in the Dnieper and the Azov Regions. The old Yamnaya graves in the Volga Region also belong to that time [Turetskiy 2001]. In the North-Western Caspian, however, they occur only in the second half of 3000 BC [Shishlina *et al.* 2001]. Late Yamnaya graves (Geshanovo, Plachidol) in Bulgaria also refer to a rather early period (2900-2500 BC) [Kaiser 2001:100].

One of the important results of the study of the issue of radiocarbon dating of Yamnaya culture monuments should be the recently obtained age definitions for graves of its early stage. We have in mind the dates for five samples of wood from barrow 6 near the village of Kremnivka of the Volodarske district, the Donetsk Region, six samples from barrow 1 near the village of Volonterivka near Mariupol, at the village of Pidgorivka in the Luhansk Region etc. These dates are located rather closely on the chart — within the period of 3200-2700 BC. With this stage the Kremnivka and Volonterivka monuments correspond with a number of other monuments of the early period of the Yamnaya culture, including the Repin, Mikhailivka-2 types etc. [Constantinescu 1984].

2.4. CONCLUSIONS

1. Therefore, based on the above, we may conclude that the Yamnaya culture in the steppe and forest-steppe zones of Eastern Europe was developed within the period of fifteen centuries, approximately from 3300-3200 to 2100-2000 BC.

2. In its genesis there were two distinct periods — the early one and the late one, divided with a conventional edge mark at the beginning of 3000 BC (3000-2700 BC), when the monuments of the first and the second periods developed practically in parallel (?!).

3. In conclusion, let us note that the analysis of the definitions of the isotope age of the Yamnaya culture, discussed above, needs further, deeper investigation — both in terms of selection of samples for analysis and the methodologies of their study through typo-statistic and radiocarbon methods. The solution of these issues, probably, requires their separate theoretical discussion.

3. THE ISSUE OF THE CO-EXISTENCE OF THE YAMNAYA AND CATACOMB MONUMENTS

3.1. THE ISSUE OF CO-EXISTENCE AS PRESENTED IN THE LITERATURE

The first efforts to divide materials of the bronze epoch, undertaken by D.Y. Samokvasov [1892; 1908], A.A. Bobrinskiy [1901], A.A. Spitsyn [1899], N.E. Brandenburg [1899; 1908], failed because the researchers took individual, occasional features (for instance, colouring with ochre) as the unit of systematization.

V.A. Gorodtsov was the first to bring a scientific foundation to the study of periodisation based on Steppe Bronze materials [Gorodtsov 1905; 1907]. In addition to the stratigraphic method, V.A. Gorodtsov used the typology of forms of burial rites and inventories [Gorodtsov 1916]. Mutual correlation of their results produced a scheme that remained almost without changes for several decades.

The long life of Gorodtsov's periodisation of the Bronze epoch was caused, first of all, by the fact that all of its three components (stratigraphy, burial rite and inventory) did not contradict each other. However, some contradictions emerged at a later stage. Let us consider the process in detail.

The first serious corrections in Gorodtsov's scheme had to be introduced after the excavation of Eneolithic-Bronze settlements in the ravines area of the Dnieper and particularly the excavation of the widest-known Mikhailivka settlement [Lagodovska, Shaposhnikova, Makarevich 1962]. The presence in the same layer of late Yamnaya, Inhul (separated in an individual culture much later by O.G. Shaposhnikova) and classical Catacomb relics, the occurrence of mixed Yamnaya-Catacomb graves formed the basis for a hypothesis about the long-time co-existence of the Yamnaya and the Catacomb cultures in the Lower Dnieper Region.

The hypothesis about long-time co-existence of the Yamnaya and the Catacomb monuments was supported by such prominent researchers as S.S. Berezanskaya and O.G. Shaposhnikova [1957] and some others.

O.G. Shaposhnikova, when studying materials of the Lower Dnieper cemeteries, concluded that Yamnaya tribes had lived in the Lower Dnieper Region for a very long period of time, when bearers of the Catacomb culture had also lived there. As O.G. Shaposhnikova wrote, "analysis of materials from settlements and graves leads us to conclusion that a specific culture of a mixed type with rather strong traditions of the Yamnaya culture was formed in the Lower Dnieper. However, the culture of those tribes that continued to live there for a substantial period of time, the influence of the Catacomb culture was also obvious" [Shaposhnikova 1969:98].

V.A. Fisenko, describing the Catacomb monuments of the Region between the Volga and the Don rivers, identified a group of Yamnaya-Catacomb graves in which

the catacomb-like burial construction was combined with the typically Yamnaya position of the buried and the Yamnaya inventory, or vice versa — the pit-like burial construction was combined with catacomb inventory, primarily ceramics. Summing up his analysis, he wrote: “At the end of 3000 and the beginning of 2000 bc the territory of the Kalmykia ASSR was populated by two groups of tribes that had different material and spiritual cultures. These groups correspond with two archaeological cultures — the Yamnaya and the Catacomb. Their chronological and territorial contacts resulted in the creation of graves of the Yamnaya-Catacomb type” [Fisenko 1970:65].

Addressing the issue of the co-existence of the Yamnaya and the Catacomb populations in the Lower Dnieper Region, V.N. Danilenko wrote in early 1970s: “The population that continued the old Yamnaya tradition of ethno-cultural development, even in the period of domination of the Catacomb culture in the Eastern European steppes, did not leave its main territory — the Dnieper basin” [Danilenko 1974:138]. Interestingly, V.N. Danilenko began developing these ideas in the 1940s in his university course of lectures (the author is deeply grateful to O.G. Shaposhnikova for her kind permission to use materials from her personal archive).

Within the second half of the 1970s and in 1980s, due to vast excavations of barrows in the areas designated for new housing construction, new works emerged, based on stratigraphical columns of barrows. The investigations focused on chronological and cultural definitions of the Catacomb graves of the steppe area of Eastern Europe.

At the beginning, the field research seemed to confirm the accuracy of Gorodtsov’s scheme and allowed dividing in time the materials that were mixed in the same cultural layer. That is how the periodisations made by A.A. Shchepinskiy and E.N. Cherepanova [1969], V.A. Safronov [1974], S.N. Bratchenko [1976], G.L. Evdokimov [1979; 1980; 1987], S.Z. Pustovalov [1980; 1982], I.F. Kovaleva [1982; 1984], Z.P. Marina [1982b], S.N. Bratchenko and O.G. Shaposhnikova [1985] and some other researchers were done. According to works of that period, the late Yamnaya monuments co-existed with so-called early Catacomb graves. For the territory of Ukraine the second (and sometimes the third) stage was formed by the Inhul catacombs, while for the eastern territories those were the monuments of the Baturyn [Trifonov 1991], Donetsk and Bakhmut groups [Bratchenko 1976].

As a result of those studies a number of authors shared the opinion about the existence of two stages of development of the Catacomb entity [Bratchenko 1976; Otroshchenko 1990; Shaposhnikova, Bochkarev, Sharafutdinova 1977]. Works of other archaeologists proposed division into shorter units (three stages) [Shchepinskiy, Cherepanova 1969; Evdokimov 1979; Pustovalov 1980; 1982; Kovaleva 1982; 1983b]. The latter view was reflected in the “Archaeology of the Ukrainian SSR” [Bratchenko, Shaposhnikova 1985].

The three-stage periodisation included a separate early Catacomb layer of graves. This was described by the earliest (of all Catacomb monuments) stratigraphic position in the barrows. Its distinguishing features included: a catacomb with clearly visible corners, the position of the buried body (curved on the back or on the side) and the Yamnaya traditions in the inventory. The second stage was characterized by oval burial constructions, the position of the buried body (curved on the side) and predominantly the inventory that was typical for the Donets culture. The third stage corresponded with graves of the Inhul culture identified by O.G. Shaposhnikova [Shaposhnikova 1978].

Describing the first ritual-chronological group, I.F. Kovaleva wrote: “Comparing the first ritual-chronological group with early catacomb graves, we find a convincing match of a number of features that prove the long preservation of local, late Yamnaya traditions in the catacomb time” [Kovaleva 1982:39]. At the same time, Z.P. Marina identified a group of Yamnaya-Catacomb graves based on the materials of area between the Orel and the Samara rivers. Some of those graves were made in catacombs, while others were made in pits [Marina 1982a:46-50]. The author stressed the long duration of the co-existence of the late Yamnaya (III-IV stage, according to Z.P. Marina) and the early Catacomb [Marina 1990:46] cultures (Fig. 3:1-2). The noteworthy fact is that the first ritual-chronological group of Catacomb monuments of the area between the Orel and the Samara rivers already contains elements of the Inhul culture: rounded catacomb shafts and the presence of Inhul ceramics, including those made of osteoceramic mass [Kovaleva 1982:Fig. 4-36, 27] (Fig. 3:11-12).

Later on, the conclusions made by I.F. Kovaleva and Z.P. Marina were developed in the work by E.L. Feshchenko [1993], who believed that the bearers of the Inhul burial tradition entered the Pryporizhie* at the second stage of development of the Catacomb monuments [Feshchenko 1993:16-17]. He also notes that the Yamnaya position (curved on the back) had existed in that region until the end of the Catacomb time [Feshchenko 1993:19]. That factor points out to the long co-existence of the Yamnaya and the Inhul populations.

Describing the second stage of the Yamnaya culture, G.T. Kovpanenko and V.N. Fomenko, wrote that there were “... certain reasons for synchronizing the second stage with monuments of the Donets catacomb culture” [Kovpanenko, Fomenko 1986:20]. The evidence they referred to, ceramics (Fig. 3:3-4), had analogues among the Inhul amphorae.

According to S.N. Bratchenko, the Catacomb entity is dated in the following way: the oldest stage — 2200-2000 bc, the stage of the Donets culture and cultures synchronous with it, including the Inhul — 2000-1800 bc, the late stage, including the end of the Inhul — 1800-1700 bc [Bratchenko 1989]. In our view, due to the general deepening of dates, the lower date should be moved even further.

* A section of the lower Dnieper where steps from waterfalls – Ed.

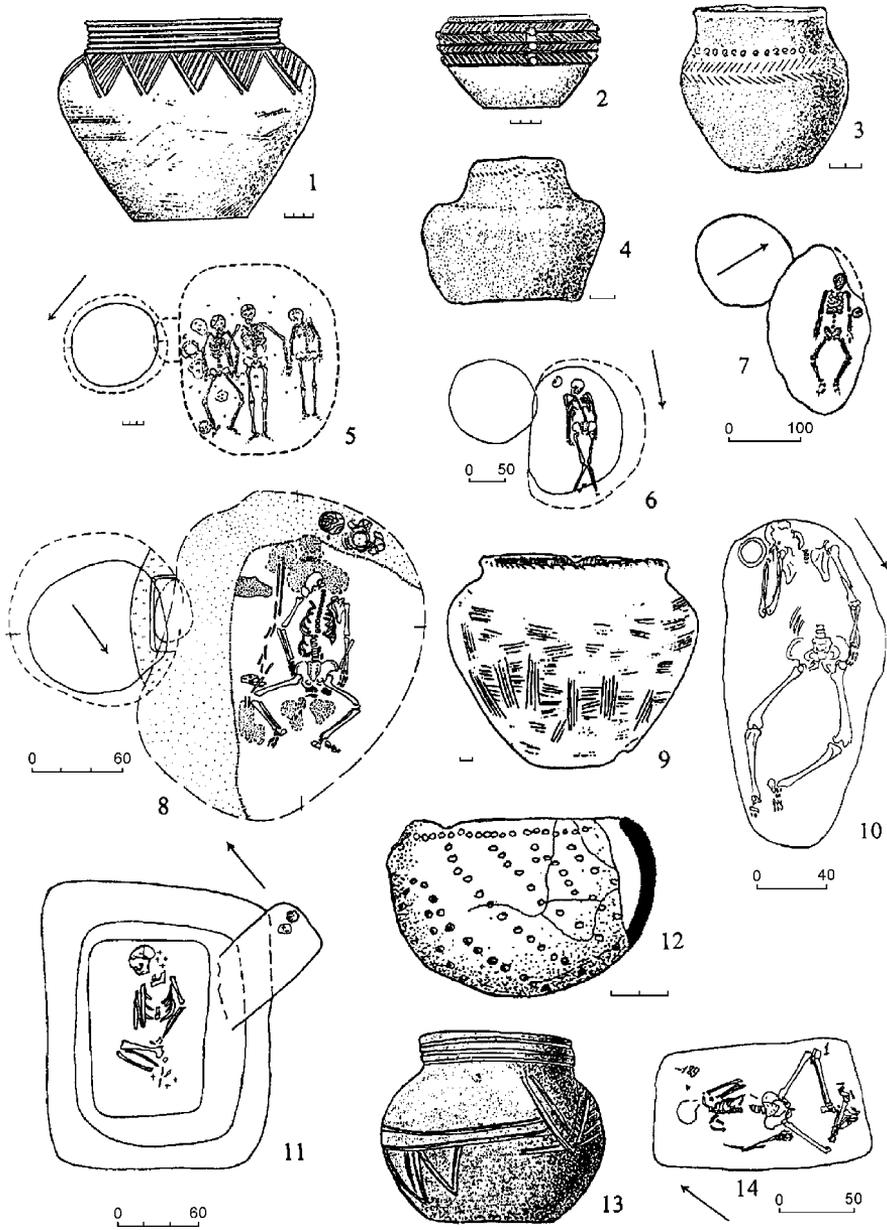


Fig. 3. Materials of the burial rite and inventory referring to the co-existence of the Yamnaya and Catacomb populations: 1. Verklina Maevka IV 2/5; 2. Pidgorodne V 7/2; 3. Kovalivka VII 4/22; 4. Kovalivka IV 1/9; 5. Bashmachka 3/4; 6. «Bobushka» 3/35; 7. Vilno-Grushivka 2/4; 8. Zamozhne 5/2; 9. «Bobushka» 3/34; 10. Velika Bilozerka 21/33; 11-12. Krasnoyarskoe 11/29; 13-14. Lymany 3/7

According to O.G. Shaposhnikova and other researchers, the upper date of the Yamnaya monuments appears to be 1900 bc [Shaposhnikova *et al.* 1986], while V.M. Fomenko refers to an even higher date — 1700 bc. In other words, according to the absolute chronology after S.N. Bratchenko, there was partial co-existence of the Yamnaya and Catacomb monuments, including the Inhul monuments, but according to the lower date of the Inhul monuments proposed by M.A. Chmykhov, the co-existence was practically complete. In any case, that co-existence was deemed a fact.

Co-existence of the Yamnaya and Catacomb monuments in the Steppe Volga Region was noted by I.I. Dremov [1997:61-69]. He wrote that the lack of the reliability of barrow stratigraphy illustrated the relative contemporaneousness of graves of the Yamnaya and Catacomb types.

One of the authors of this paper noted in 1987 and later [Pustovalov 1987; 1992b] that the Inhul monuments emerged very early and co-existed for a long period of time with the “early Catacomb” and late Yamnaya populations [Pustovalov 1990b; 1991a; 1995b; 1996c; 1997a; 1999d; 1999e; 2000d].

The long period of co-existence of the Yamnaya and Catacomb populations was mentioned by N.A. Chmykhov and I.T. Chernyakov [1988]. Of the four periods of the Yamnaya culture the two latter, in their opinion, co-existed with the Catacomb entity [Chmykhov, Chernyakov 1988:77]. They believed that the Yamnaya monuments had survived till the end of the Catacomb epoch and participated in the formation of the Srubnaya entity [Chmykhov, Chernyakov 1988:79]. However, the authors noted that among the Inhul pottery they identified, the objects were dated — according to the ornamentation system — to the early stage of the late Yamnaya period [Chmykhov, Chernyakov 1988:92].

Therefore, on the basis of the comparison of the periodisation schemes of the Yamnaya entity [Marina 1982; Shaposhnikova, Fomenko, Dovzhenko 1986; Kopyanenko, Fomenko 1986; Nikolova 1992] and the Catacomb entity [Bratchenko 1976; Bratchenko, Shaposhnikova 1985; Kovaleva 1982; 1983b; Bratchenko 1989; Chmykhov, Chernyakov 1988], developed on the basis of materials collected in the Ukrainian territory, it becomes obvious that the Yamnaya and Catacomb entities co-existed for a substantial, several centuries-long period of time.

It might appear that the issue of co-existence is clear enough. However, in the 1990s, some archaeologists took an opposite view. Their arguments were based on stratigraphical columns of barrows and cases of direct stratigraphy. They ignored the similarity of burial rites, including the similarity of ethnic features, of ceramics and other inventory [Nikolova, Chernykh 1997; Otroshchenko 2001]. They based their arguments on the presence of so-called “early Catacomb” graves between the Inhul and Yamnaya graves in stratigraphical columns of the barrows. Therefore, in their opinion, there could be no co-existence of the Yamnaya and Inhul monuments. They accept only short contacts between the Yamnaya and “early Catacomb” populations

[Nikolova 1992:20]. However, even the works of the above archeologists give data about such co-existence.

Analyzing the periodisation of the Yamnaya culture done by A.V. Nikolova, one may note that in the development of the Yamnaya culture, alongside with gradual changes in the burial rite and inventory, there was an obvious abrupt jump between the II and the III development stages. Of four sub-systems that were used for the analysis by A.V. Nikolova (shape of the burial construction, position of the buried body, orientation and ceramics) three undergo radical transformation from the beginning of stage III onwards. In the orientation subsystem, it is the circular orientation that substitutes the west-east orientation, but not the “unsteady”, as A.V. Nikolova wrote [1992:16]. This change cannot be explained by internal processes in the Yamnaya culture alone. S.N. Bratchenko [1976] and, more specifically, S.Z. Pustovalov [1991d] demonstrated that the graves arranged in barrows in circular “bows” were the Catacomb graves.

At stage III, the position “curved on the side” emerges and gradually substitutes all other positions. The long co-existence of curved on the back and curved on the side positions of the buried bodies in the Yamnaya culture of the pre-Danube Region was recorded by S.V. Ivanova [1999]. The position of the buried body in the burial rite in the Yamnaya entity is one of the most important ethnic indicators [Rychkov 1990]. Its change is impossible without important reasons of an outside nature, for an ethnic group always seeks to support its own stability. The position “curved on the side” is the most typical feature of the eastern catacomb population (archaeo-ethnic types I, II, III) [Pustovalov 1992b:72-75].

Finally, from the beginning of the III period, flat-bottomed pots emerge among the ceramics. The fact itself could be caused by a variety of factors. However, some shapes of those pots are identical to the Catacomb forms [Kovpanenko, Fomenko 1986:Fig. 3:1, 2; 77, section II, group B, types 5-6; Teslenko 1999b:15; 1999a:90, table 3].

Therefore, following the classification done by A.V. Nikolova, in the process of development of the Yamnaya culture only the form of burial construction remains unchanged, i.e., a pit. All other sub-systems of the burial rite gradually change and become identical to catacomb sub-systems. Similarly, few differences occur in inventories of the Yamnaya and Catacomb entities. That is why this periodisation shows that two stages out of four were the stages of co-existence of the cultures.

The approach to creating periodisation, identical to that pursued by A.V. Nikolova, can be found in the work done by A.N. Gei [2000].

The uniqueness of pre-Kuban barrow graves of the early and middle Bronze epochs was noted long ago by many researchers. The monograph by A.N. Gei [2000] in a sense summarizes the study of that interesting phenomenon. The author consistently argues in favour of the existence of an independent Novotitarovskaya culture as distinct from the Yamnaya, the Northern Caucasus and the Catacomb cultures.

The Novotitorovskaya culture (NTC), in his opinion, was a predecessor of the Catacomb entity. A.N. Gei traces connections between the NTC and the Yamnaya monuments in the Lower Dnieper Region, the Budzhak culture, and the so-called level of the pre-Donets monuments. The foundation of the NTC was the stratigraphy of barrows. The work contains a large number of interesting observations and productive ideas, however, its main argument which, according to A.N. Gei, is that the NTC phenomenon is an archaeological culture that precedes the catacomb entity, is erroneous [Pustovalov 2000d].

Let us turn to the facts. In terms of the shape of a burial construction, most of the NTC graves are not different at all from Yamnaya graves. The so-called proto-catacombs are singular cases and serve as yet another proof of the co-existence of the NTC with the Catacomb entity (CE) [Pustovalov 1998; 2000c].

Some differences may be observed in the positions of the buried bodies in NTC graves. There are almost no early Yamnaya positions (curved on the back with legs bent in the knees). The predominant position is “curved on the side”, typical for the second half of the Yamnaya entity, when features of its co-existence with the CE are found en masse. The same is proven by a substantial number of dismembered skeletons and partial burning of the dead bodies. All those are pieces of evidence of the influence of the Catacomb entity. The increasing number of buried bodies in the position “stretched on the back” by the late stage of the NTC may suggest not only the close ethnic contacts with the population of the northern Caucasian culture but also with the Inhul population. That is quite obvious, for NTC ceramics display not only influences of the Budzhak but (which was not noticed by A.N. Gei) the Inhul pottery (groups 1 and 6) [Gei 2000]. NTC amphorae and cups bear unquestionable resemblance to the Inhul analogues.

In general, the NTC material culture has both Yamnaya-Catacomb and Northern Caucasian nature. Ceramics, axes and knives demonstrate the long co-existence of the NTC with the Catacomb world. This point is confirmed by the radiocarbon dates quoted by A.N. Gei — which he, probably trapped by the barrow stratigraphy, dismisses as erroneous. According to the calibrated dates, the end of the NTC occurred in the first quarter of 2000 BC. This does not contradict the quoted parallels with the Inhul and Budzhak cultures.

It should be noted that the blind belief in the absolute priority of stratigraphy let A.V. Nikolova and A.N. Gei down. A.V. Nikolova failed to notice that three quarters of the features of the burial rite of the Yamnaya culture of Ukraine were substituted with Catacomb features. The Yamnaya ceramics, as A.V. Nikolova noted [1997:110], included some Bakhmut forms. However, those were already late Catacomb ceramics!

Mistakes of that kind were possible only because those authors broke the systemic approach to building periodisations that was presented in the works of V.A. Gorodtsov. In addition to stratigraphical observations, the analysis of burial rites

and inventory, the development of archaeology added data of exact sciences — archeo-magnetic and radiocarbon dating, that has developed to a great success. It is expected that these methods will provide new arguments in support of specific concepts.

3.2. RADIOCARBON DATING OF CATACOMB MONUMENTS AND THE ISSUE OF CO-EXISTENCE

Until recently, radiocarbon dating of Catacomb graves was practically never performed. Except for several published dates [Telegin 1992a; Telegin, Mallory 1994], Catacomb monuments, particularly those of the Inhul culture, were not studied with the use of that method. Meanwhile, such data became necessary for addressing the issue of the co-existence of the Yamnaya and Catacomb monuments (Inhul monuments in particular). The author of this paper already provided evidence of the co-existence of the Yamnaya and the Inhul populations, based on analysis of the burial rite [Pustovalov 1998; 2000d]. A new publication, in *BPS* 7, of a large series of materials on radiocarbon dating of the Yamnaya and Catacomb cultures prompts us to address this issue again.

Some of the articles of the above collection offer analysis of data that cannot be seen as satisfactory. Therefore, we will try to analyze the published data again.

The first series of radiocarbon dates for Yamnaya and Catacomb graves near Nikopol were published with major ‘trickery’ [Nikolova 1999a; 1999b]. In two articles, A.V. Nikolova published report data of excavations and data of radiocarbon analysis (53 definitions) of samples of bones from Yamnaya and Catacomb graves.

Such a significant series of dates should have assisted their deep and thoroughly weighted analysis. However, A.V. Nikolova did not use all of her advantages and omitted the most interesting instances.

Her final conclusion was radical: “The radiocarbon data obtained, supported by the published archaeological facts, absolutely contradict the theory of the synchronism of the Late YC and the Late CC monuments on the territory of Ukraine” [Nikolova 1999a:128]. Careful study of the published materials does not allow us to agree with that conclusion. A.V. Nikolova’s interpretation of the results of radiocarbon study of the samples from the Yamnaya and Catacomb graves does not fully comply with the data she provided. A very different interpretation of the performed definitions demands consideration. Let us review the obtained materials.

It should be noted that the region of the Lower Dnieper was populated, as O.G. Shaposhnikova believes, by Catacomb tribes at a rather late stage [Shaposhnikova 1968], i.e., it was the periphery of the Inhul and other monuments of the Catacomb cultural and historic entity.

The modern methodology of radiocarbon dating provides an archaeologist with several scales for chronological analysis, including a scale on which the time is counted from the present day, calibrated dates from the edge of this era, two versions of calibrated dates with binary or singular mean-square deviation (1 sigma or 2 sigma). All of them offer relative dating.

As may be seen from the calibration tables [Nikolova 1999b:Fig. 9, 10], there were 29 dates for the Yamnaya graves and 24 dates for the Catacomb graves. By the way, it was not easy to find out the number of analyses performed. The number of dates in the calibration tables [Nikolova 1999b:Fig. 9, 10] does not match the number of dates in Fig.11 (53 and 49, respectively). Apparently, some of the dates were withdrawn by the author. The numeration of dates in Fig.11 is provided at random, and it is impossible to identify precisely the dates in the chart with the data in the table.

Now, let us perform our own analysis of the data presented in the article by A.V. Nikolova. First of all, the analysis should mention that the Yamnaya graves with the position of the buried body on the side have both earlier and later dates. Similarly, graves with skeletons curved on the back are present both in the earlier group and the later complexes.

It should be noted that in this case the testing was performed mainly on the Yamnaya graves that occupied earlier stratigraphical levels in the barrows. Hence, in barrow 11 at v. Chkalovo there were no definitions for the latest Yamnaya grave 13. In barrow 6 at v. Golovkovka the latest Yamnaya grave 13 did not have a definition of age, while the previous in age (grave 11) gives the date of 2296 ± 94 BC. The same picture can be observed for other barrows used in the analysis. This allows an assumption that the Yamnaya graves from the published cemeteries were made later than the latest of the obtained dates. Radiocarbon dates confirm the point that notwithstanding a certain trend towards the increase of the number of skeletons in the “curved in the side” position with the time, the skeletons curved on the back also occur at the latest stage of existence of the Yamnaya entity [Pustovalov 1999b].

Now, let us see how the issue of the co-existence of the Yamnaya and Catacomb monuments is addressed. For that purpose it is necessary to identify the upper limit of the Yamnaya graves and the lower limit of the Catacomb graves. The fact that some of the Yamnaya and Catacomb graves were made during the same chronological period can be seen from the chart in Fig.11 [Nikolova 1999b:1-27] (dates Nos. 5, 6, 33, 45, 46, 48). Because the samples in the chart were numbered by Nikolova at random and the numeration is in no way related to specific definitions, let us put those data in good order. Having included the resulting chart in a joint chart where, in addition to data and articles by A.V. Nikolova we will introduce definitions from the late Yamnaya graves from barrows near the town of Myronivka [Klochko 1999], definitions from late Yamnaya (Budzhak) graves and graves of the Mnogovalikovoy

Yamnaya and Catacomb cultures

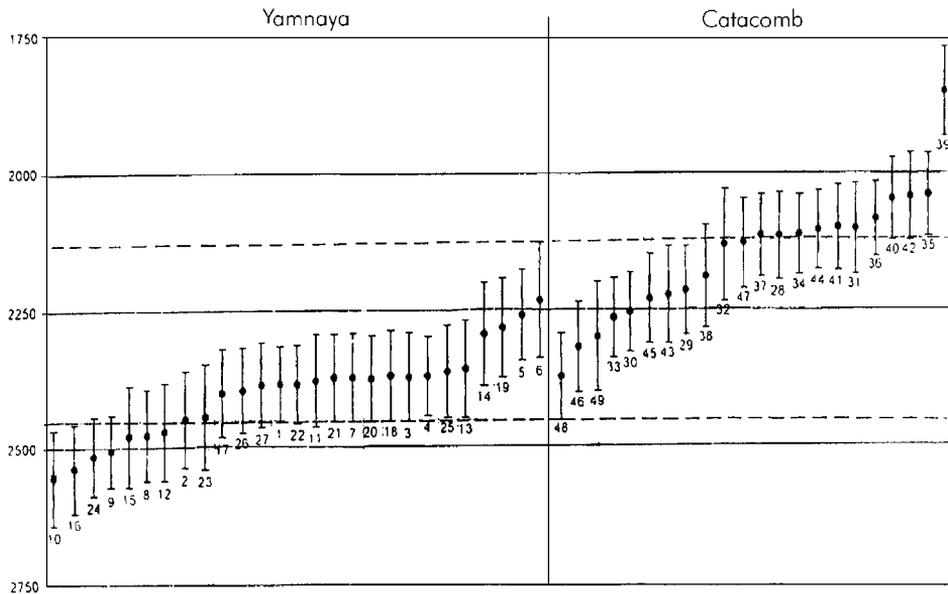


Fig. 4. The chart of distribution of dates of ^{14}C samples from graves of the Yamnaya and Catacomb cultures, based on the data presented by A. Nikolova

Pottery culture from the Akkembetskiy barrow of the Belgorod-Dnistrovski district [Szmyt, Chernyakov 1999] (Fig. 5). Let us analyze the resulting joint chart.

Two dates from the Yamnaya graves practically reach 2200 BC (Golovkovka, 6/11; Golovkovka 14/4). By the means of calibration, their age is 2296 ± 94 and 2285 ± 90 BC, respectively. The Inhul grave near v. Chkalovo, 11/12, has the age of 2320 ± 83 BC. Taking into account the standard deviation, the Inhul grave reaches near 2400 BC.

The resulting corridor of 200 years (2400-2200 BC) may contain almost half of the dates from the Yamnaya graves and a substantial number of dates from the catacomb graves. It should be noted that the so-called “early Catacomb” graves were not the oldest ones according to the radiocarbon calibration scale. Of the oldest graves, middle dates for which reach 2300 BC, only two are “early Catacomb” (the Chorna Mohyla cemetery, barrow 3, grave 28 and the Kruhla Mohyla cemetery, barrow 11, grave 12; Fig.6). The other graves are the so-called “late Catacomb” or Inhul. This fact is admitted by E. Kaiser [1999:135-137]. The early date of the Inhul graves — even in such a limited territory — confirms earlier conclusions made by S.Z. Pustovalov [Pustovalov 1998; 1999d; 2000d] and indirectly suggests the caste nature of the Catacomb society of the Northern Pontic Region. The absolute dates

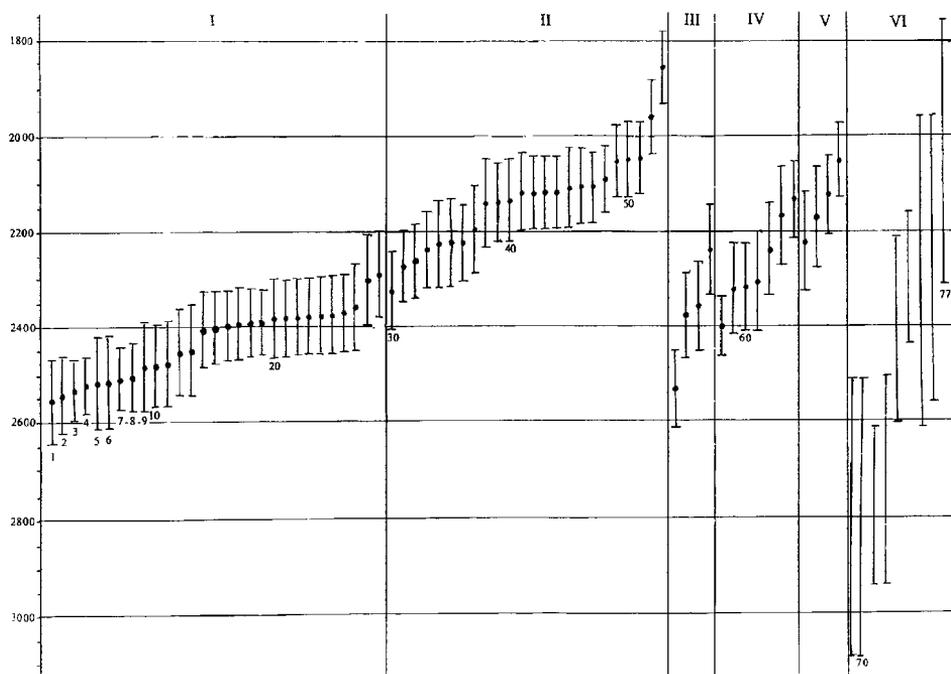


Fig. 5. Distribution of definitions of ^{14}C samples from Yamnaya and Catacomb graves of the Northern Pontic Region: I. Samples from Yamnaya graves near Ordzhonikidze and upper areas of the Inhulets river; II. Samples of Catacomb graves near Ordzhonikidze; III. Yamnaya graves near Myronivka; IV. Yamnaya graves from Budzhak; V. Graves of the Mnogovalikovoy Pottery culture from Budzhak; VI. Catacomb graves of Eastern Ukraine

of “early Catacomb” graves reach rather high, far younger than the co-existence corridor (e.g., Kruhla Mohyla cemetery, barrow 8, grave 13 — 2101 ± 78 BC). Practically that is 177 years later than the co-existence corridor. Meanwhile, these graves contain, as a rule, the inventory of the Yamnaya types, including ceramics. It is estimated that up to 86% of ceramics from those graves are of the Yamnaya type [Pustovalov 1982]. The issue is how the Yamnaya ceramics found their way to the graves that go beyond the co-existence corridor. The conclusion that suggests itself it that the co-existence period was longer than presented in the chart (Fig. 5). True, dates of the Yamnaya graves from the Akkembetskiy barrow fall within 2380-2130 BC [Szmyt, Chernyakov 1999:199]. The same is suggested by the dates from the Yamnaya graves near Myronivka (Ki-5826 — barrow 2/3) [Klochko 1999:174].

Therefore, the time of co-existence of the Yamnaya and Catacomb entities is increased by almost 100 years.

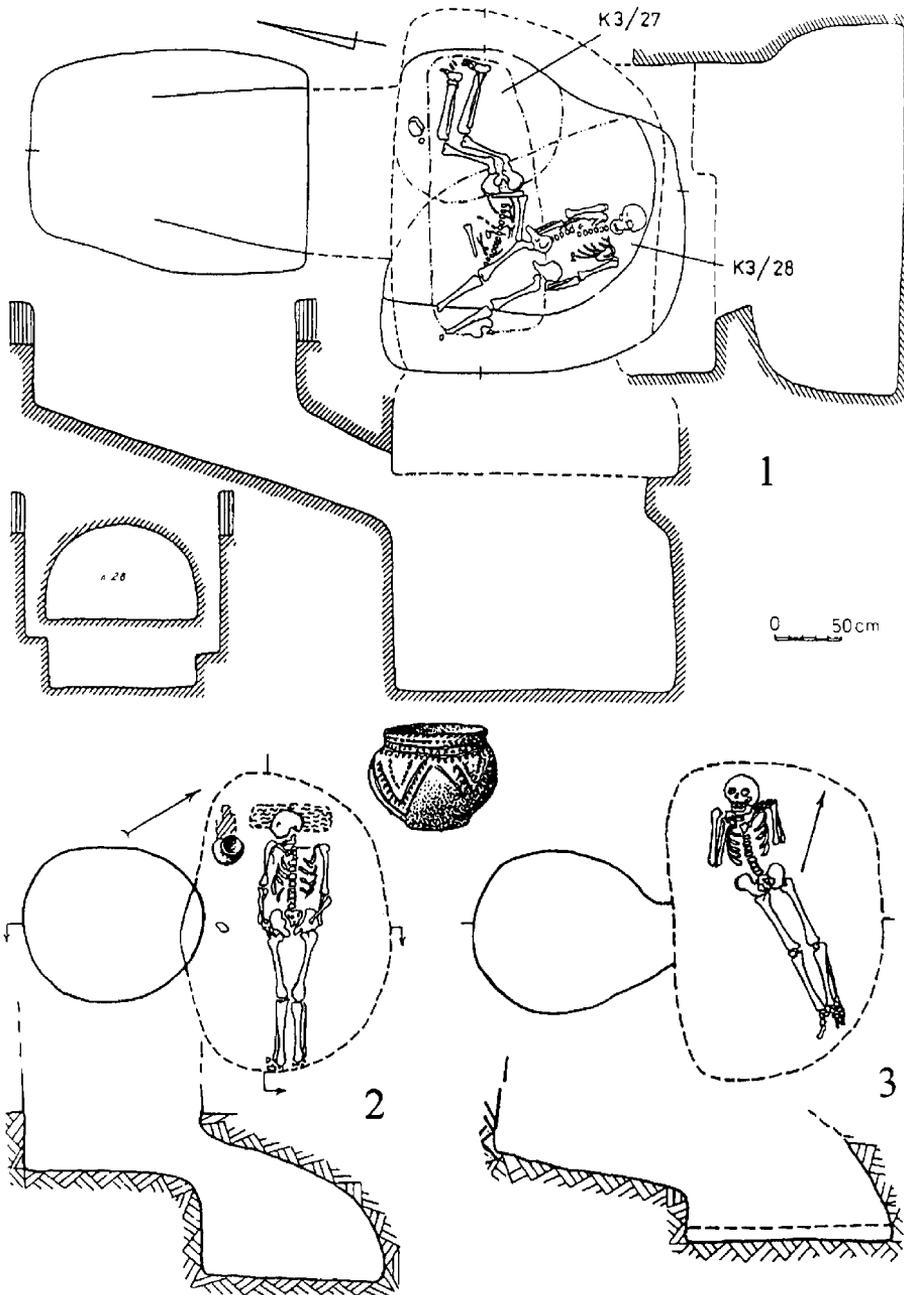


Fig. 6. Plans of catacombs near the village of Chkalovo at Ordzhonikidze (after Nikolova 1999 a,b; Kaiser 1999): 1. Chorna Mohyla 3/27,28; 2. Chkalovo 11/12; 3. Chkalovo 11/6

Now, let us see if the lower limit of co-existence grows older due to the published data from the Akkembetskiy barrow (the Odesa Region). In all the chronological schemes, the Mnogovalikovoy Pottery culture follows the Catacomb entity. The dates for Mnogovalikovoy graves from the Akkembetskiy barrow practically coincide with dates of the Catacomb graves from near the town of Ordzhonikidze (2220-2000 BC) [Szmyt, Chernyakov 1999:199]. There are no Catacomb graves in the Akkembetskiy barrow. However, given the dates of the Mnogovalikovoy graves of that barrow, the Catacomb graves on that territory should have earlier dates. It is difficult to say now for how many years the “aging” will be, but it is more than probable that such dates will be obtained.

Let us turn to the Eastern Catacomb monuments. Calibrated dates for Catacomb graves at Svatove, quoted by E. Kaiser [1999], refer to the beginning of the second quarter of 3000 BC (Fig. 5). Notwithstanding the broad chronological framework of some definitions, the radiocarbon dates are rather explicit. Therefore, the co-existence of Yamnaya and Catacomb tribes on the territory of Ukraine is a fact confirmed by radiocarbon dating. The lower line of the Catacomb monuments is on the edge of the first and second quarters of 3000 BC by the calibrated scale.

Based on the age difference between the Catacomb graves in the territories of Eastern Ukraine and the Dnieper Region, E. Kaiser believes that the centre of the Catacomb culture was located in the Done and Donets area [Kaiser 1999:147]. To this one can agree only for Eastern Catacomb monuments but not the Inhul monuments that had an absolutely different origin. The presence of two major ethno-social centres (the Eastern Catacomb and the Western Catacomb or the Inhul) was already described by the author [Pustovalov 1994; 1999e]. Therefore, rather early dates could be expected for the Inhul graves too. Such data have been obtained recently (Table 2).

Based on materials of definitions of samples of bones from the Yamnaya and Catacomb graves, excavated at the Molochna river, it is possible to argue confidently that the Inhul culture is synchronous — at least in that region — with the late Yamnaya culture. Both of the cultures cease to exist practically at the same time (Table 1, 2; Fig. 15, 16). The latest date for the late Yamnaya grave is 3765 ± 70 BP; for the Inhul grave it is 3605 ± 70 BP. Interestingly, one of the samples (Ki-9546) that produced the oldest date for graves of the Inhul culture was taken from a grave in the open steppe.

A.V. Nikolova does not publish radiocarbon dates from the Inhul Catacomb graves of the Golovkovka cemetery. However, such definitions were made. They are quoted by M. Szmyt [Szmyt 1999:279]. Judging from the numeration in the Kiev laboratory, where the analyses were performed, the definitions from the Inhul graves were performed together with definitions from the Yamnaya graves of the Golovkovka cemetery (Ki-6734 is from the Yamnaya grave; Ki-6735 and Ki-6736 are from the Inhul graves). Two definitions (from grave 10 of barrow 14 and from grave 1

List of Radiocarbon Dates for Samples from Graves of the Catacomb Entity

No.	Locality (site, barrow/grave)	Material*	Culture**	Author of research/publications	Lab. No.	Date 14C	
						BP	BC
1	2	3	4	5	6	7	8
Western Azov Reg.							
1.	Zaporizhzhia Reg., v. Vinogradne 24/19	B	ECC	Otroshchenko	Ki-9401	4280±70	2825±123
2.	— << >> — 2/20	B	ECC		Ki-9389	4145±70	2736±115
3.	— << >> — 2/6	B	ECC		Ki-9394	4230±70	2794±99
4.	— << >> — 2/6	B	ECC		Ki-9544	4060±70	2572±109
5.	— << >> — 15/5	W	ECC		Ki-7095	4200±60	2781±92
6.	— << >> — 15/5	W	ECC		Ki-7096	4055±60	2557±91
7.	Zaporizhzhia Reg., v. Zhovtnevoe 12/2	W	ECC	Lyashko	Ki-9409	4120±60	2702±121
8.	Zaporizhzhia Reg., v. Vinogradne 3/39.	B	ECC?	Pustovalov	Ki-9412	3720±70	2088±104
9.	Zaporizhzhia Reg., v. Beloretskoe 1/12	B	IC		Ki-9546	4420±60	3018±118
10.	— << >> — 1/12	B	IC		Ki-9398	4360±60	2965±70
12.	Zaporizhzhia Reg., v. Zamozhne 5/2.	B	IC	Otroshchenko, Pustovalov	Ki-9418	4370±60	2976±73
13.	Zaporizhzhia Reg., v. Vinogradne 3/36	B	IC	Pustovalov	Ki-9390	4020±70	2533±105
14.	— << >> — 3/30	B	IC	Pustovalov	Ki-9417	3980±70	2457±107
15.	— << >> — 8/1	B	IC		Ki-9543	3950±60	2402±97
16.	— << >> — 23/5	B	IC	Otroshchenko	Ki-9393	3920±70	2373±99
17.	Zaporizhzhia Reg., v. Zamozhne 6/2	B	IC	Otroshchenko, Pustovalov	Ki-9416	3920±60	2360±114
18.	Zaporizhzhia Reg., v. Vinogradne 33/4.	B	IC	Pustovalov	Ki-9408	3910±80	2358±112
19.	Zaporizhzhia Reg., v. Zhovtnevoe 3/3.	B	IC	Pustovalov	Ki-9405	3910±60	2377±85
20.	Zaporizhzhia Reg., v. Vinogradne 23/5	B	IC	Otroshchenko	Ki-9407	3860±70	2313±106
21.	— << >> — 8/1	B	IC	Pustovalov	Ki-9397	3780±70	2164±118
22.	Zaporizhzhia Reg., v. Zamozhne 8/1	B	IC		Ki-9403	3780±60	2166±107
23.	— << >> —	B	IC		Ki-9522	3780±70	2164±118
24.	Zaporizhzhia Reg., v. Vinogradne 33/3	B	IC		Ki-9400	3710±60	2088±91
25.	— << >> — 34/9	B	IC		Ki-9410	3640±60	1977±93
26.	Zaporizhzhia Reg., v. Zamozhnoe 15/4	B	IC		Ki-9391	3605±70	1923±106
Dnieper Left bank's Reg.							
27.	Kamenka-Dniprovskia 11/9	W	ECC	Chernykh	Ki-3368	3960±70	2445±107

1	2)	3	4	5	6	7	8
28.	— << >> —	W	ECC		Ki-7098	4015±60	2527±81
29.	Crimea, Bolotnoe 14/28	W	ECC	Korpusova, Lyashko	Ki-1200	4020±90	2536±147
Dnieper Law bank's Reg.							
30.	Dnipropetrovsk Reg., Ordzhonikidze Chorna Mohyla 3/28	B	ECC	Nikolova	Ki-6555	3825±45	2253±82
31.	— << >> — Kruhla Mohyla 11/12	B	ECC		Ki-6568	3810±50	2224±88
32.	— << >> — 8/13	B	ECC		Ki-6566a	3760±50	2127±85
33.	— << >> — 1/15	B	ECC		Ki-6562	3750±50	2117±75
34.	— << >> — 8/13	B	ECC		Ki-6566	3720±50	2101±78
35.	Zaporozhia 1/19	W	ECC	Mozolevski	Ki-521a	4080±70	2589±119
36.	Dnipropetrovsk Reg., Vyvodovo 93/10	B	IC	Cherednichenko	Ki-9415	3950±60	2433±108
37.	Kirovograd Reg., v. Golovkova 14/10	B	IC	Kaiser	Ki-6735	3905±55	2460-2300
38.	Dnipropetrovsk Reg., v. Chkalovo 11/12	B	IC	Nikolova	Ki-6609	3870±40	2320±83
39.	Kirovograd Reg., v. Golovkova 23/1	B	IC	Kaiser	Ki-6736	3845±40	2390-2220
40.	Dnipropetrovsk Reg., v. Chkalovo 7/8	B	IC	Nikolova	Ki-6558	3835±40	2266±72
41.	— << >> — 11/12	B	IC		Ki-6609a	3800±50	2217±87
42.	— << >> — Chorna Mohyla 3/27	B	IC		Ki 6554	3805±45	2217±80
43.	— << >> — Kruhla Mohyla 1/18	B	IC		Ki-6563	3775±50	2191±93
44.	— << >> — 11/6	B	IC		Ki-6608a	3770±50	2135±92
45.	— << >> — 11/7	B	IC		Ki-6610	3765±45	2131±82
46.	— << >> — Chorna Mohyla 3/17	B	IC		Ki-6553	3745±50	2118±79
47.	— << >> — 11/7	B	IC		Ki-6610a	3750±45	2117±75
48.	— << >> — 2 1/20	B	IC		Ki-6559	3740±45	2115±73
49.	— << >> — Gurska Mohyla 2/30	B	IC		Ki-6556	3720±55	2103±83
50.	— << >> — Kruhla Mohyla 11/17	B	IC		Ki-6569	3730±45	2106±72
51.	— << >> — 1/14	B	IC		Ki-6561	3710±40	2085±68
52.	— << >> — 8/12	B	IC		Ki-6565	3690±45	2048±75
53.	— << >> — 11/7	B	IC		Ki-6567	3680±50	2044±80
54.	— << >> — 1/7	B	IC		Ki-6560	3680±45	2041±76
55.	— << >> — 8/5	B	IC		Ki-6564a	3620±55	1953±80
56.	— << >> — 8/5	B	IC		Ki-6564	3560±55	1851±82
Inhul Region							
57.	Mykolaiv Reg., v. Privolnoe 2/27	B	IC?	Shaposhnikova	Ki-9411	3805±70	2224±122

1	2)	3	4	5	6	7	8
East-Ukrainian Reg.							
58.	Luhansk Reg., Svatove 12/4	W	ECC	Bratchenko	Ki-1564	4200±80	2773±109
59.	— << >> — 18/3	W	ECC		Ki-1584	4200±80	2773±109
60.	— << >> — 12/9	W	ECC		Ki-1560	4200±65	2779±96
61.	— << >> — 16/1	W	ECC		Ki-1562	4100±80	2618±137
62.	— << >> — 20/3	W	ECC		Ki-1567	3900±50	2374±77
63.	— << >> — 4/5	W	ECC		Ki-892	3820±35	2252±62
64.	— << >> — 12/2	W	ECC		Ki-1558	3800±90	2190±145
65.	— << >> — 5/1	W	ECC		Ki-906	3710±60	2088±91
66.	— << >> — 18/4	W	ECC		Ki-1564	3600±75	1917±112
67.	— << >> — 13/2	W	ECC		Ki-1561a	4070±80	2590±129
68.	— << >> — 18/1	W	ECC		Ki-1229	3990±80	2464±123
69.	Luhansk, 2/1	W	ECC		Ki-583a	3930±60	2384±86
70.	Luhansk, Nikolaevka 5/5	W	ECC	Cherednichenko	Ki-616	3910±70	2371±89
71.	— << >> — 5/10	W	ECC		Ki-618a	3950±70	2433±108
72.	Luhansk, Astakhovo 22/3	W	ECC	Evdokimov	Ki-2600	4100±80	2618±137
73.	Luhansk, Privolnoe 1/3	W	ECC	Bratchenko	Ki-1706a	4030±90	2546±146
74.	Luhansk, Voykovo 4/4	W	ECC		Ki-2093a	3960±70	2445±107

* W – wood; B – bone

** ECC – Eastern Catacomb culture; IC – Inhul culture

of barrow 23 at Golovkovka) give the date 3905±55 and 3845±60 BP, respectively (2460-2300 and 2410-2210 BC by the calibrated scale). Obviously, those are the two definitions of the four that were withdrawn by A.V. Nikolova. As we can see, the co-existence of the late Yamnaya and the Inhul population, even based on the data of the Golovkovka cemetery alone, lasted for more than 100 years. Therefore, A.V. Nikolova consciously concealed the fact of the co-existence of the Yamnaya and Catacomb populations.

It should be noted that notwithstanding the proven fact of co-existence there are very many other issues that need to be addressed. It is not clear how the co-existence really occurred: were there separate territories where the Yamnaya population continued to live until the end of the Catacomb era, or the Yamnaya enclaves did not exist and the Yamnaya and Catacomb populations lived in different segments of the same territory? In order to solve the issue of complex radiocarbon dating of monuments of the Yamnaya and Catacomb entities with a new, more precise radiocarbon method it is necessary to have not randomly captured individual materials but follow a consistent, specially designed programme. The materials, published in *BPS* 7, were taken from the periphery of the area occupied by the Inhul culture, where the Inhul culture emerged relatively late.

In order to identify the true period of the existence of the Inhul culture and the pace of its proliferation in different directions, first, it is necessary to obtain a series of dates from the graves in the area between the Southern Bug and Inhulets rivers where, according to O.G. Shaposhnikova, the oldest monuments of the Inhul culture lie. Then it is necessary to obtain a series of dates from burial monuments along the imaginary radial lines in that district. One of the radial lines should be aimed to the south-east, to the Steppe Crimea. Another one should run to the north-east, to the Left bank of the Dnieper, to the Molochna river and beyond, to Taganrog. The third radial line should aim northwards through the area between the Orel and Samara rivers, further to Cherkasy and to the southern districts of the Kiev Region. The fourth radial line should include monuments to the west from the centre of the Inhul culture — Budzhak, Southern Moldova and Eastern Romania. At each of the radial lines it is necessary not only to take samples from major barrows that contain Yamnaya, Eastern Catacomb and Inhul graves but also the barrows that do not have Catacomb graves but only have Yamnaya graves, as well as the barrows in which Inhul graves directly follow Yamnaya graves. It is very important to study samples from the barrows located in the valley and on the high bank of the same river. If performed in full, this programme will clarify completely the real picture of co-existence of the Yamnaya and Catacomb populations in its whole diversity.

Therefore, the analysis of published definitions of the age of graves through the radiocarbon dating method, strengthened with the analysis of stratigraphy of the graves that produced the samples as well as that of the graves from which the samples were not taken and by the analysis of archaeological materials from the graves, explicitly proves the presence of a long period of co-existence of the Yamnaya and Catacomb populations, the Inhul population included.

3.3. CO-EXISTENCE OF THE YAMNAYA AND CATACOMB POPULATIONS BASED ON DATA OF THE BURIAL RITE AND INVENTORY

The co-existence of the late Yamnaya and Inhul populations is also proven by the analysis of the burial rite and inventory [Pustovalov 2000d]. Let us consider some of the clearest pieces of evidence of that co-existence.

The Catacomb graves classed among the early ones occasionally contain skeletons that are stretched on their backs. Those include graves Novopilipivka 9/4-6 [Vyazmitina, Illinskaya 1960], Stryukovka 105/21 [Cherednichenko *et al.* 1975], Vysoka Mohyla 3/3, Kovalivka-VI 25/2, Krasne 5/8 [Krylova, Kubyshev, Yakovenko 1967]. The position of the skeletons alone allows suggestions about co-existence of the Inhul and the “early Catacomb” populations.

In turn, some of the Inhul graves contain skeletons places in the Yamnaya position (curved on the back). For the area between the Orel and Samara rivers such catacombs comprise 20% (91 graves) [Kovaleva 1987]. Such graves also occur at the Molochna river (Zamozhne 5/2, Akkermen-1 17/1) [Pustovalov 1999b; Vyazmitina, Illinskaya 1960] and the Left-bank Dnieper (Velika Bilozerka 21/33; Vilno-Grushivka 2/4; Zlatopol 7/28) [Bidzilya, Otroshchenko 1974; Telegin, Bratchenko, Smirnov 1977], and in the Mykolaiv Region (Otradnoe 28/8) [Shaposhnikova 1971b], and in the Crimea (Bolotnoe 15/15; Kropotkino 1/6) [Koltukhov, Toshchev 1998, Fig. 48] (Fig. 3:5-8, 10).

Another evidence of the co-existence of the so-called “early Catacomb” and the Inhul populations is the presence of multi-chamber catacombs in which the buried bodies had been placed in different chambers and in different positions: stretched on the back in one of them and curved on the back in the other. The chambers also differ accordingly (Minovka XVII 1/6-6a; Bogachovka 10/2, 8; Chkalovo 3/33-34) [Pustovalov 1999e]. In the latter case, the early date of the skeleton buried stretched on the back in an oval chamber is supported with a pot of the Yamnaya type (Fig. 3:9). A similar picture can be observed in some multi-chamber graves in the Samara Region (Bohdanovka 5/8) [Marina, Romashko, Severin 1995:40-41].

Late Yamnaya graves sometimes contain Inhul ceramics — for instance, a pot and a cup from the area between the Orel and Samara rivers [Marina 1982a:46-50]. One of the late Yamnaya graves in the Northern Crimea contained a cup that — judging by its shape — belonged to the Inhul type [Koltukhov, Toshchev 1998, Fig. 84] (Fig. 3:11-12). A late Yamnaya grave, Vysshetarasovka (Verkhnetarasovka) 78/5, contained a fragment of a cup with a typical Inhul handle with vertical holes in it [Cherednichenko, Evdokimov 1975] (Fig. 7:1-2). A Yamnaya grave, Lymany 3/7 in the Mykolaiv Region, contained a vessels of the Inhul type (amphora-like) with fine-drawn ornament [Elagina, Petrenko 1969] (Fig. 3:13, 14). The materials of Yamnaya graves at the Molochna river included a vessel of the Catacomb type, decorated with an ornament in the form of a thin rolled cord (Vinogradne 15/10) [Otroshchenko, Rassamakin 1983]. This ornament was typical for late Catacomb monuments of the Bakhmut type (Fig. 7:3-4). The materials gathered from the excavations conducted by A.A. Melnik included a number of graves of the late Yamnaya time that contained pots of the Catacomb type (Krivi Rih, Shevchenko 4/29 group — Fig. 7:6-7, 9), Lukyanovka 19 (Fig. 7:8, 10) [Melnik 1984; 1986].

Samples of the Yamnaya, Budzhak and Catacomb ceramics were found in the grave Vladimirovka 13/10 in the Dnipropetrovsk Region [Cherednichenko, Evdokimov 1975]. There the burial construction displayed typical features of the Inhul culture: a rounded shaft and an oval chamber. Three buried bodies were placed curved on the side. There were six vessels in the chamber: one typically Lower Dnieper, the second one late Yamnaya, the third one was a shallow cup, and three others had strong resemblance with the Budzhak ceramics (Fig. 8:1-8).

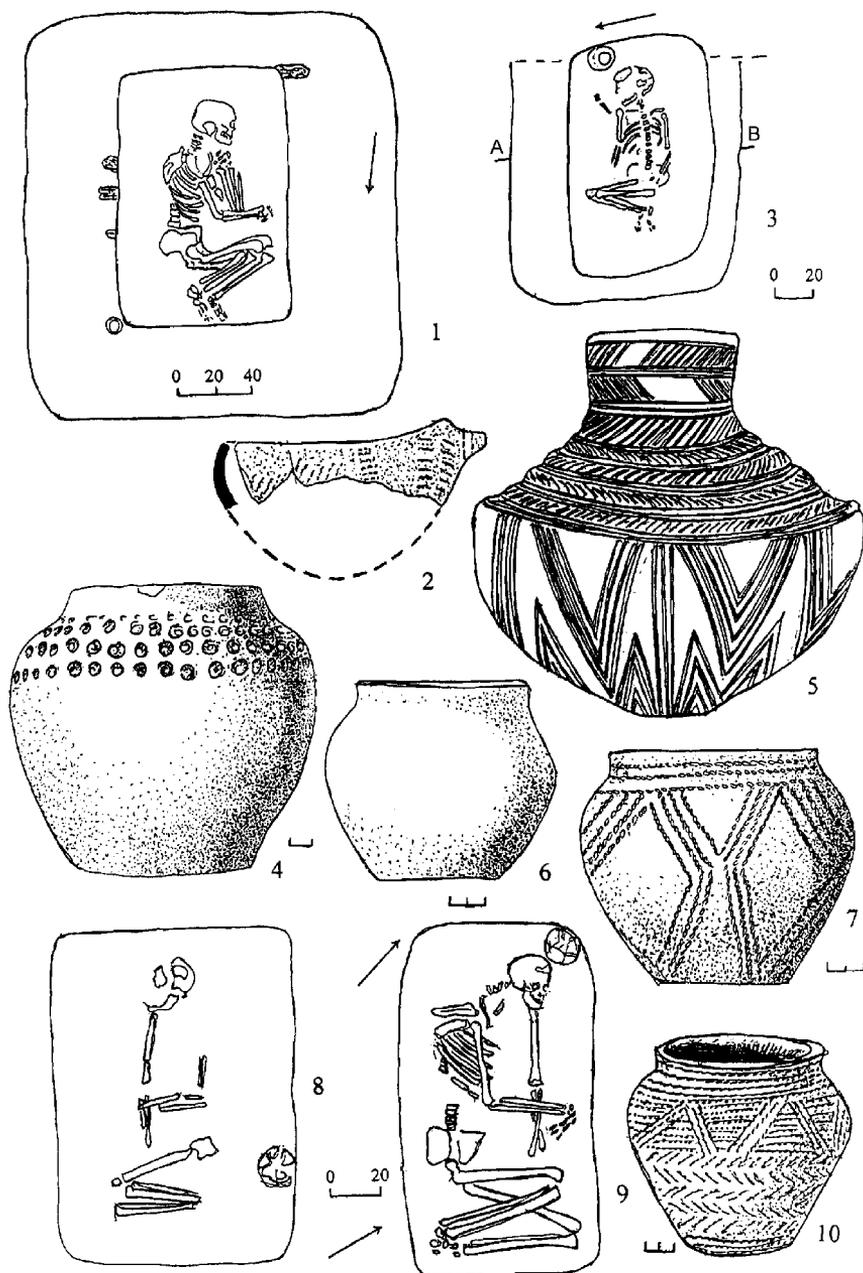


Fig. 7. Materials of the burial rite and inventory indicating the co-existence of Yamnaya and Catacomb populations: 1-2. Vyshhetarasovka 78/5; 3-4. Vinogradne 15/10; 5. Sokolovka 2/6; 6,7,9. Shevchenko 4/29; 8,10. "Lukyanovka" barrow 19

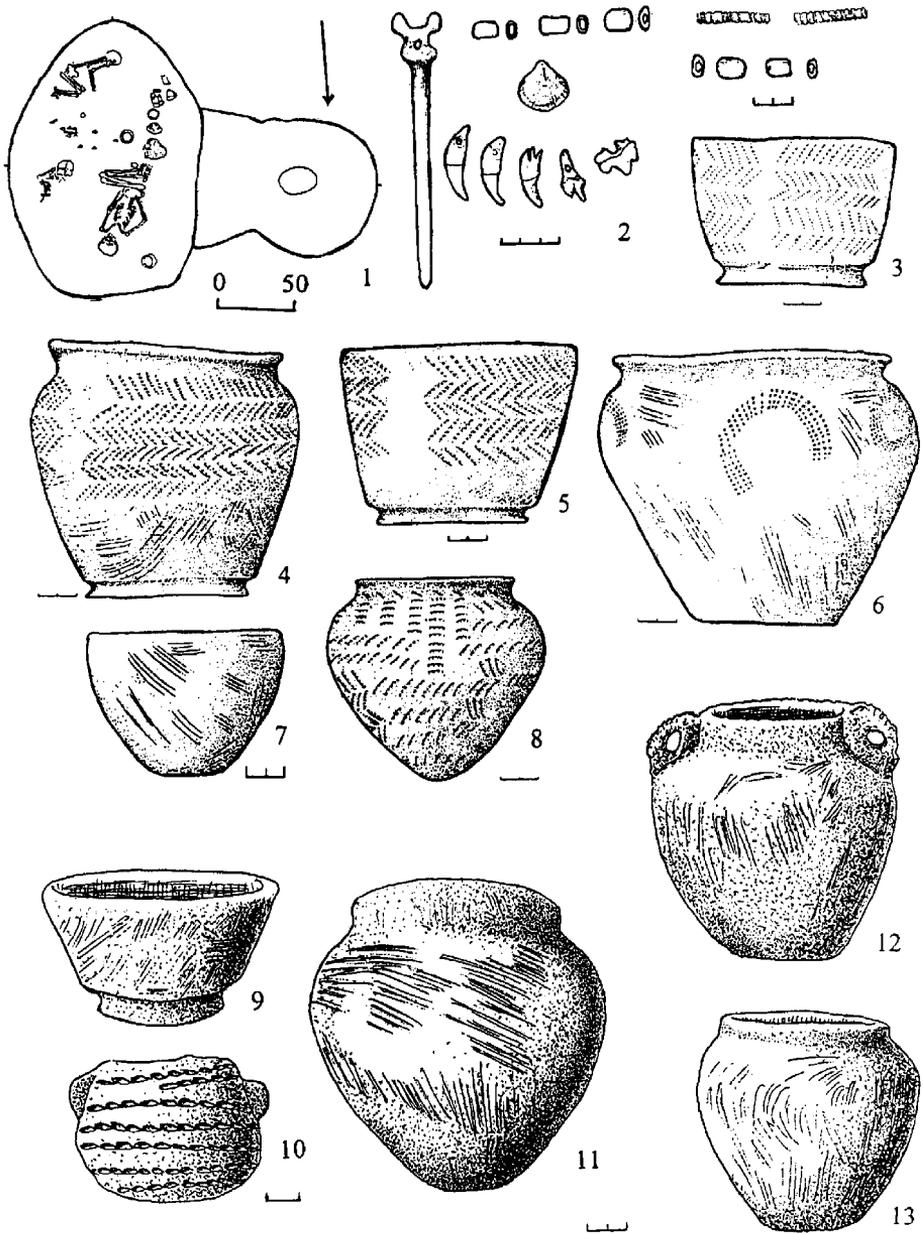


Fig. 8. Materials of the burial rite and inventory indicating the co-existence of Yamnaya and Catacomb populations: 1-8 - Volodymyrivka 13/10; 9-13 - Vinogradne 24/14

This co-existence can be traced in another round of analogues as well. Both, the late Yamnaya, the Inhul and the so-called “early Catacomb” graves contained analogues to ceramics of the Globular Amphora culture. Those include grave Lymany 9/1. There, in a bean-shaped chamber with two buried bodies placed on the side there was an amphora with typical ornament (Fig. 9:2). Volchansk 1/7 contained a similar amphora (Fig. 9:3) but in the late Yamnaya grave. The face of the buried body had been modelled [Pustovalov 1999b:222-255]. An amphora with a globular body was found in grave Antonovka 7/8 (Fig. 9:1). The ornament on it was made in a fine drawn technique with elements typical for the Inhul culture. A globular amphora was found in grave Akkermen-I 8/6 (Fig. 9:4). In the latter case the ornament on the amphora was made both by the cord and by drawn lines, i.e., in a typically Inhul techniques. The radiocarbon analysis data allow M. Szmyt to conclude that the Globular Amphorae population had survived until the Catacomb era [Szmyt 1999:117]. However, judging by their shape, the amphorae found in the Northern Pontic steppes do not appear to be the latest ones (Fig. 9:5-10).

The monograph by S.N. Bratchenko on the early stage of the Donets culture [Bratchenko 2001] proposes there are more than enough data pointing to the co-existence of the Inhul and “early Catacomb” populations. These include a cup from Astakhovo 3/2 [Bratchenko 2001:77, Fig. 3:3] (Fig. 10:5-6), a cup from grave Nikolaevka 1/10 and a cup-like vessel from grave Nikolaevka 1/5 [Bratchenko 2001: Fig. 12:2, 5] (Fig. 10:9).

Trying to prove an earlier age of the early stage of the Donets culture as compared to the Inhul culture, S.N. Bratchenko undertakes a deliberate distortion of the pictures of objects from the graves. The issue concerns the grave in the Rybasovo-II ravine (Kriviy Rih 4/10). The hammer-flattening of the tip of the blade of the knife-dagger from that grave is presented by S.N. Bratchenko as very emergent [Bratchenko 2001:167, Fig. 94:3-5] (Fig. 10:10), while in fact the tip of the knife-dagger was far more strongly hammered (Fig. 10:11). The author performs the same operation on grave Golubovsky 1/1, announcing that the bicameral catacomb [Samoylenko 1991] is a case of direct stratigraphy [Bratchenko 2001:11] (Fig. 11:1). S.N. Bratchenko also imprecisely reproduced a dagger from grave Oknitsa 3/5 [Bratchenko 2001: Fig. 94:3-5] (Fig. 10:3-4, 7). An evidence of the upper limit of survival of the Yamnaya population is a knife hammer-flattened point end found in the Yamnaya grave in the Orel Region [Marina 1990] (Fig. 10:1-2).

There are therefore, clear pieces of evidence of the co-existence of the Yamnaya and the Inhul populations in different areas of Ukraine.

Data from stratigraphy, though, are not so unquestionable. The relative chronology of barrow 3 at the village of Vinogradne (Molochna sanctuary) [Pustovalov 1999d] shows that one mound of the central barrow contained both late Yamnaya and “early Catacomb” graves (mound 8). In turn, that mound superseded the mound of barrow “D” made over the Inhul grave 18. However, the mound over the

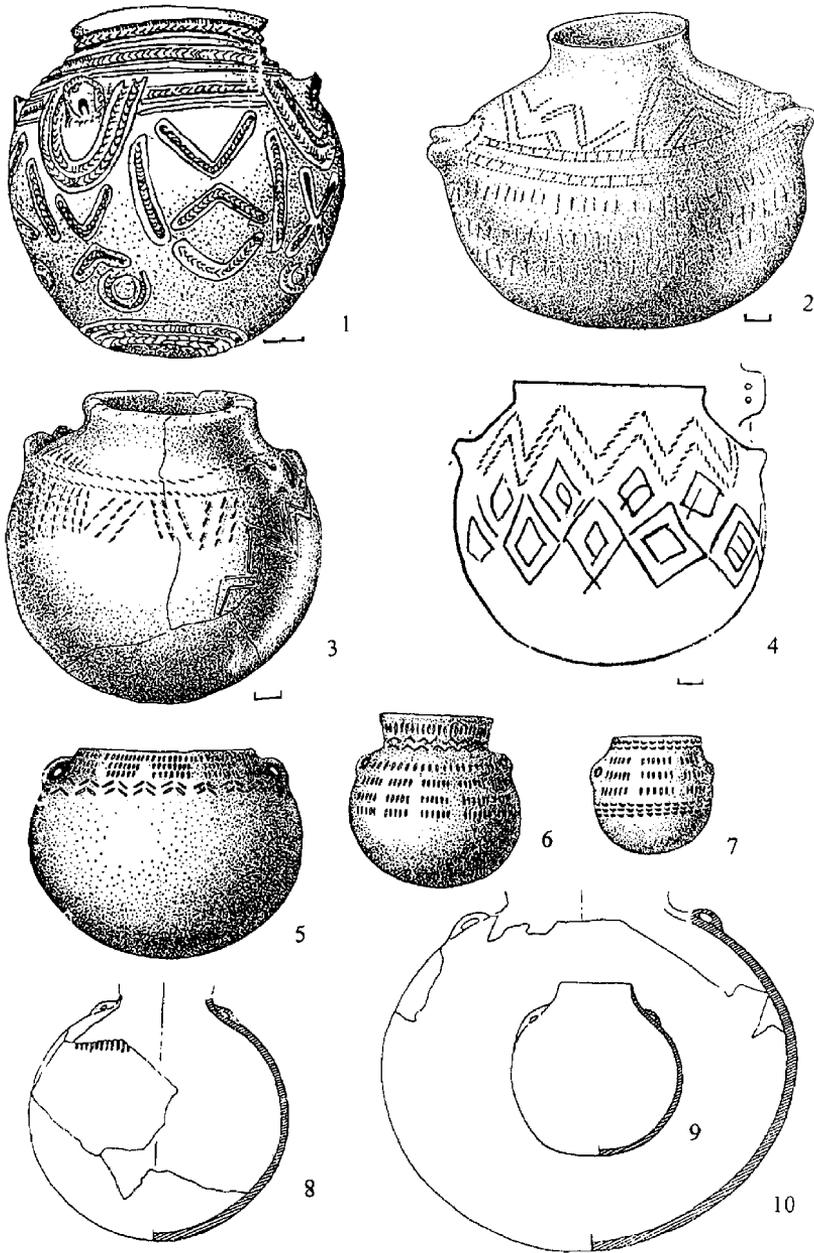


Fig. 9. Ceramics from graves of the Yamnaya and Eastern Catacomb cultures (1-4) and their analogues in the Globular Amphora culture (5-10): 1. Antonovka 7/8; 2. Lymany 1/9; 3. Volchansk II 1/7; 4. Akkermen I 8/6; 5-7. Kikova 1; 8-10. Świerszczów 27

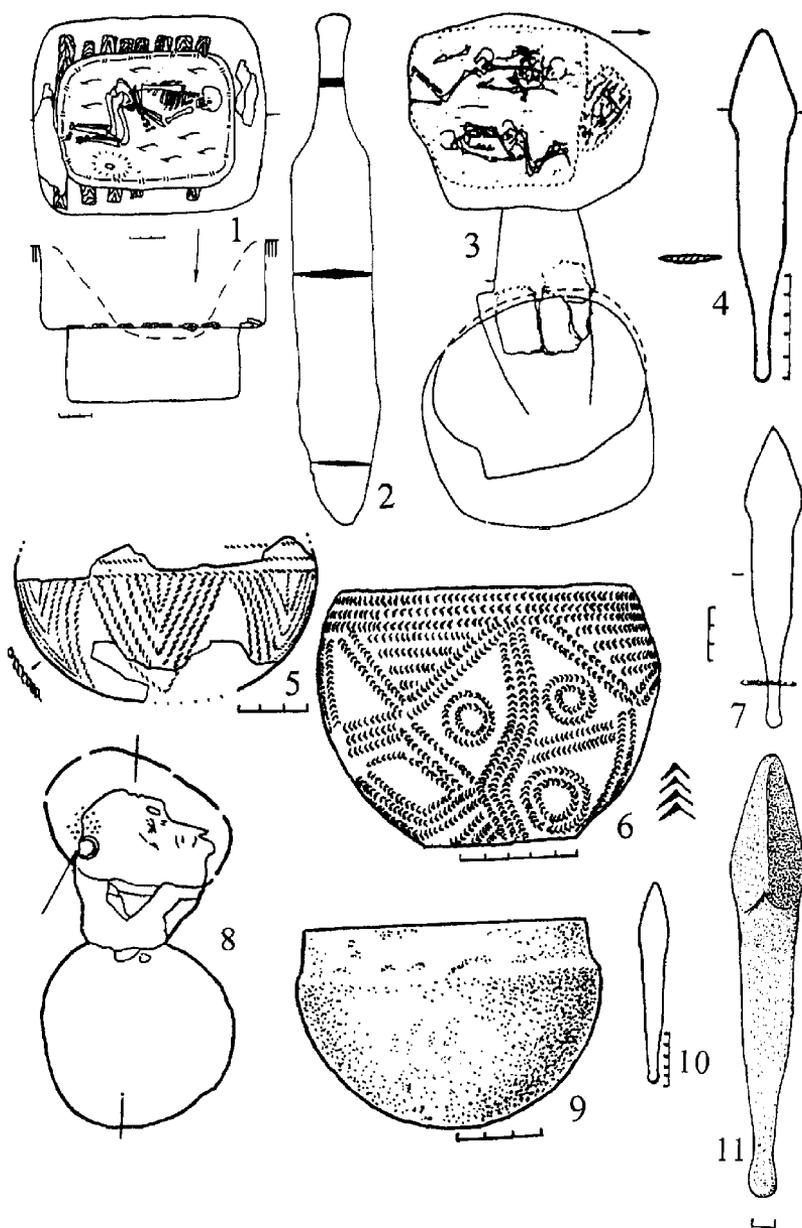


Fig. 10. Materials of the burial rite and inventory indicating the co-existence of Yamnaya and Catacomb populations: 1-2. Verbky 4/3; 3. Oknitsa 3/5 (Toshchev 1998); 4. Oknitsa 3/5 (Bratchenko 2001); 5. Astakhovo I 3/2; 6. Nikolaevka I 2/10; 7. Oknitsa 3/5 (Toshchev 1998); 8. Nikolaevka I 2/10; 9. Nikolaevka I 1/5; 10. Rybasovo II 4/10 (Bratchenko 2001); 11. Rybasovo II 4/10

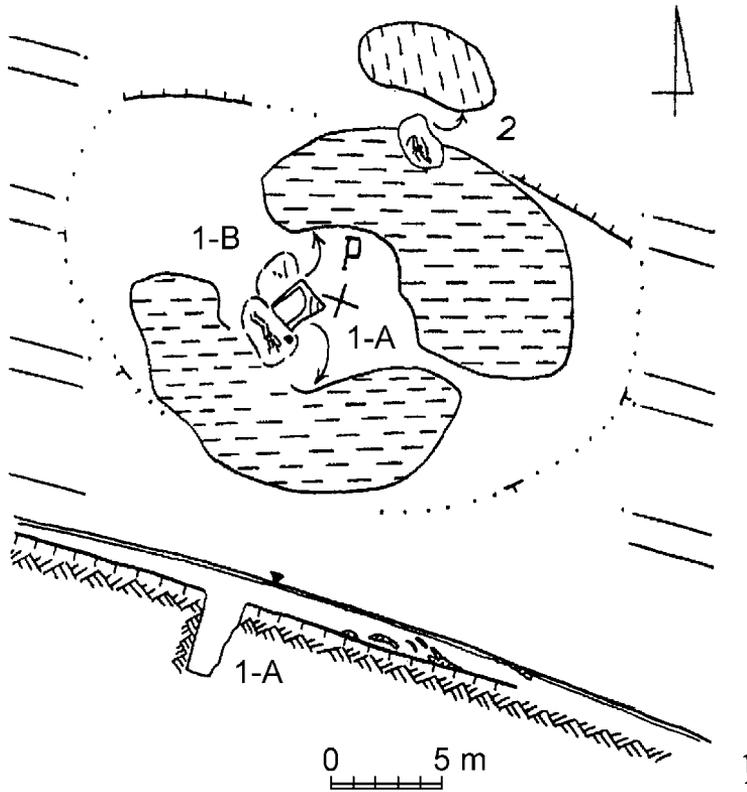


Fig. 11. Materials of the burial rite and inventory indicating the co-existence of Yamnaya and Catacomb populations: Golubovsky 1/1

Yamnaya grave 22 of the central barrow superseded or was synchronous to the later Catacomb layers added to barrow "D". This phenomenon is confirmed by the fact that the mound of barrow "A", in which the Inhul grave 30 was dropped, began to be destroyed by mound 7, made over the Yamnaya grave 25 [Pustovalov 1999d].

Therefore, for the Crimea, the Lower Dnieper, the Azov area, the region between the Orel and Samara rivers, the Inhulets and the Southern Bug, there are clear data about co-existence of the late Yamnaya, "early Catacomb" and the Inhul populations for a certain period of time.

Now let us consider the time limits of co-existence. The lower limit of the so-called "early Catacomb" graves belongs to the middle of the period of existence

of the Yamnaya culture [Pustovalov 2000d]. The upper limit is a matter of discussion. Let us turn to the analysis of facts. Hence, A.A. Melnik excavated grave 4/10 in the Rybasovo-II ravine in Kriviy Rih [Melnik 1986] (Fig. 12:5-7). The grave had a trapeze-shaped shaft, the steps, a long dromos and an oval chamber. The skeleton was placed curved on the side. The inventory included a bronze dagger with a triangular widened tip of the blade (Fig. 12:6-7). Such daggers were typical for the Middle Don culture [Pryakhin *et al.* 1991] and were referred by A.T. Sinyuk to 1600 — 1500 BC [Sinyuk 1996:168]. Possibly, the Ordzhonikidze 3/3 grave also did not belong to the Bakhmut culture, as A.V. Nikolova and E.P. Bunyatyan argue [Nikolova, Bunyatyan 1991:134-135], but continued a local tradition of Yamnaya-Catacomb graves. The quoted data allow stating that “early Catacomb” monuments survived until the end of the Catacomb entity, at least in the Dnieper Region.

Now, let us turn to the definition of the lower line of the Inhul culture that had been in full force at the late catacomb time.

Among ceramic materials of the Inhul culture, there was one specific item — an amphora from the Inhul grave Sokolovka 2/6 [Sharafutdinova 1972] (Fig. 7:5). Its analogues can be found among ceramics of the edge of 3000 — the fourth quarter of 3000 BC [Sharafutdinova 1972; Zervos 1957:33]. N.A. Chmykhov, studying ornaments of the Inhul ceramics, noted that they included samples dates, according to his system, to no later than the beginning of the last quarter of 3000 BC [Chmykhov, Chernyakov 1988:79].

The early date of the emergence of the Inhul culture (IC) is suggested by the finds of Inhul cups in early Donets Catacombs [Bratchenko 2001:70, Fig. 67:9; 68:7; 69]. Their shapes and ornaments leave no doubt about their relation to the Inhul culture (Fig. 10:5, 6, 9).

Finally, a number of battle celebration axes of the Inhul culture, decorated with relief ornament, had analogues in Anatolia, in Troy-II, and in the Dorak cemetery (mid-3000 BC) [Klochko, Pustovalov 1992].

Let us consider the upper limits of the Inhul and Eastern Catacomb ritual. In that sense, the following ceramics from graves are rather demonstrative; Rodionovka 7/6 [Melnik 1984, Fig. 136] and Vladimirovka 110/5 [Cherednichenko, Evdokimov 1975]. The first of the above graves was the Inhul grave, the other belonged to the Eastern rite. Both of the catacombs contained pots, proportions and details of which were already close to shapes of the Srubnaya culture (Fig. 12:1-4, 10-11). Therefore, the conclusion of V.I. Otroshchenko about the absence of contacts between the Srubnaya and Catacomb populations is not universal for the steppe zone [Otroshchenko 1990:76-78].

Hence, the lower limit of the emergence of the Inhul monuments goes down, even in traditional chronology, to the middle stage of the Yamnaya culture, and late Yamnaya and “early Catacomb” monuments survive until the end of the Catacomb entity. That conclusion involves zone-by-zone existence of all three ethnic groups

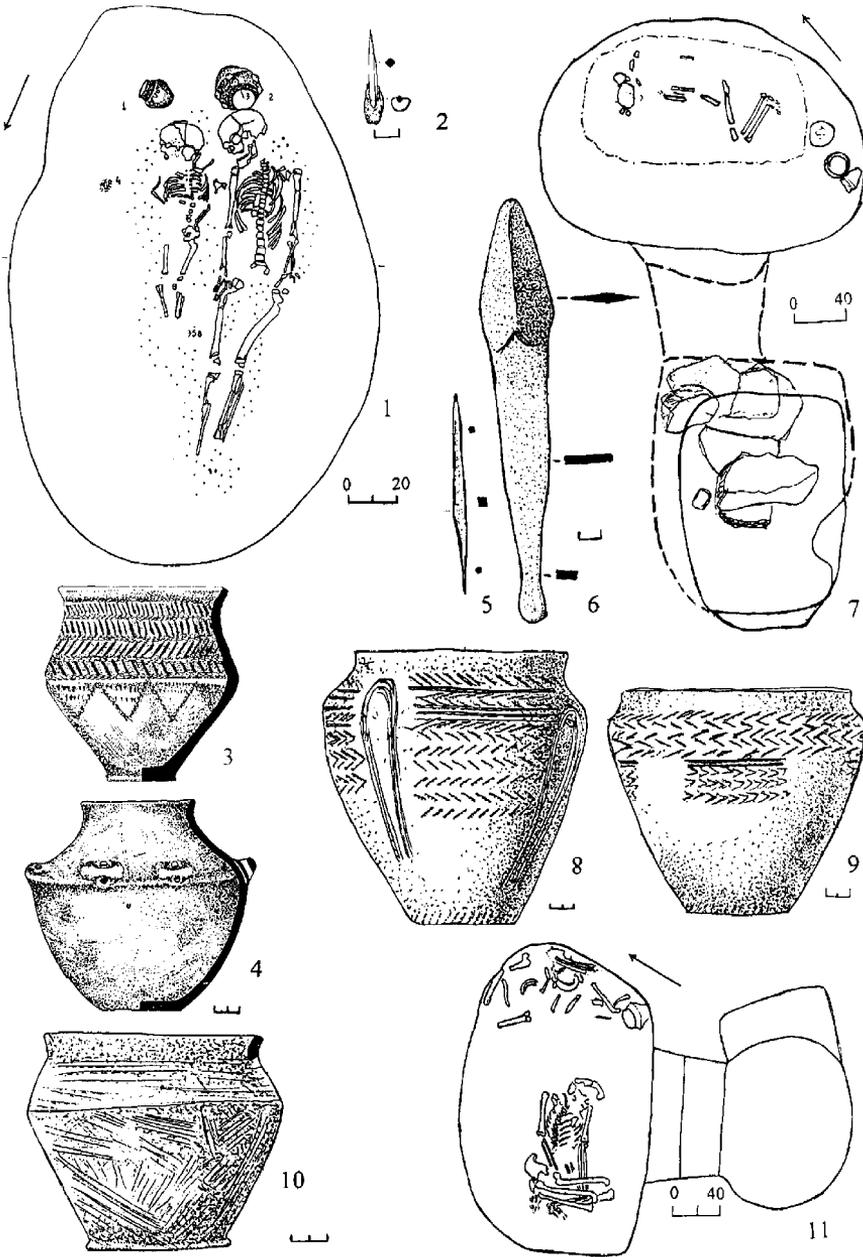


Fig. 12. Materials of the burial rite and inventory indicating the co-existence of Yamnaya and Catacomb populations: 1-4. Rodionovka 7/6; 5-9. Rybasovo 4/10; 10-11. Vladimirovka 110/5

of population. The zone-by-zone co-existence of the above groups is proved by the fact that the Budzhak ceramics occur not only in Yamnaya and Catacomb graves of the Right-bank Ukraine, but also in the pre-Azov Region. For instance, one of the five vessels found in the Yamnaya grave Vinogradne 24/14 was a cup on a saucer of the Budzhak type (Fig. 8:2). In the light of the above, it is interesting to note that in 3% of barrows of the Lower Dnieper Region the stratigraphical columns end with the Yamnaya graves.

The modelling rite that occurs in some graves of the Yamnaya entity also point out to the co-existence of those groups of the population [Pustovalov 1999b].

A clear evidence of the co-existence of the Yamnaya and Catacomb (including the Inhul) populations is presented by arrowheads that were the causes of death of the people buried in the Yamnaya graves. To date, over 60 of them have been found [Pustovalov 2000b; Teslenko 2000a].

Such graves are rather widely known. As an example, one may consider a fragment of an arrow-head from the Nova Odesa IV 2/6 cemetery; a fragment of the arrowhead found in pelvic bones of the skeleton from the Novo-Petrovka-II 1/7 cemetery; a fragment of an arrow-head from Kamenka 16/26 [Shaposhnikova *et al.* 1986]; from the Dniester — Danube Region, one may refer to a flint arrow-head from Semenovka 14/24 [Subbotin 1985]; an arrow-head from Nikolskoe 13/1 [Agulnikov 1999]; the Crimean monuments include Krasnoyarskoe 11/30 [Koltukhov, Toshchev 1998]; the Right-bank Dnieper Region includes Marevka 8/3; Shyrochany 9/4; Novoivanovka 3/2 [Samoylenko 1988]; “Bobushka” 3/23 [Pustovalov 1999]; from the western Azov Region one may refer to Vinogradne 15/8; 24/31 and Barvinovka 7/14 (the excavations performed by the Zaporizhzhia expedition in early 1980s); from the area between the rivers of Orel and Samara one may refer to Vasilevka-1 2/3 [Kovaleva *et al.* 1995]; Chkalovka-II 1/2 and 2/7 [Kovaleva, Shalobudov 1992]. There the arrowheads were found among the bones of the skeletons and in the bone. Some graves containing arrowheads have been found near Melitopol: Konstantinovka 2/10; 2/4 [Boltrik *et al.* 1991]. In the North-Western Pontic Region, arrowheads were found in the bones of the buried (i.e., had been the cause of death) in 17 cases. Six more cases, where exact location of the arrowheads was unclear, should probably be added to them [Ivanova 1999:6; Subbotin 1990:52]. The list of such graves may be continued (Fig. 13).

A noteworthy fact is that the types of axes found in the Yamnaya graves in a number of cases are identical with Catacomb axes. For instance, in Semenovka 8/16 the stone axe with a typical rib in the middle part [Subbotin 1985, Fig. 8] had analogues in Catacomb graves (Vinogradne 24/22) [Klochko, Pustovalov 1992, Fig. 4] (Fig. 14). Axes with several cannelures in the middle part from the Yamnaya graves of that region were also found in the Catacomb graves [Sanzharov 1999:Fig. 9]. Interestingly, in that case the Catacomb grave belonged to the Inhul type and was dated to the late Catacomb period [Sanzharov 1999; Andro-

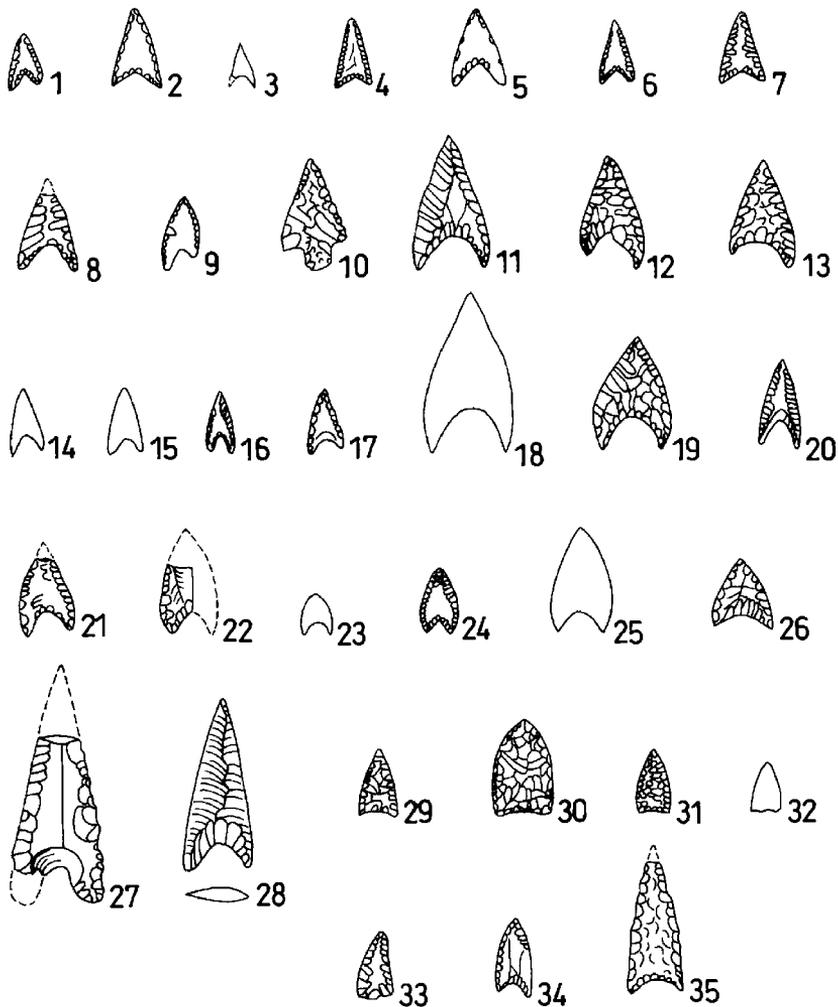


Fig. 13. Arrowheads of the Yamnaya and Catacomb cultures: 1. Konstantinovka 2/10 (Yamnaya); 2. Novoivanovka 3/2 (Yamnaya); 3. Barvinovka 7/14 (Yamnaya); 4. Kremenchuk (Mnogovalikovoy Pottery culture); 5. Golovkovka (Yamnaya); 6. Rysove (Catacomb); 7. Catacomb culture (after Dergachev 1999); 8. Shyrochany 9/4 (Yamnaya); 9. Semenovka 2/7 (Yamnaya); 10. Marevka 8/3 (Yamnaya); 11. Golovkovka 7/5 (Catacomb); 12. Veliky Tokmak 1/9 (Catacomb); 13. Vinogradne 19/8 (Catacomb); 14. Chkalovka II 1/2 (Yamnaya); 15. Chkalovka II 2/7 (Yamnaya); 16. Vasilevka I 2/3 (Yamnaya); 17. Semenovka 14/24 (Yamnaya); 18. Vinogradne 15/8 (Yamnaya); 19. Golovkovka 7/5 (Catacomb); 20. Slavne 1/2 (Catacomb); 21. Chkalovo 3/23 (Yamnaya); 22. Novopetrivka II 1/7 (Yamnaya); 23. Vinogradne 24/31 (Yamnaya); 24. Staroe 14/24 (Yamnaya); 25. Vinogradne 19/8 (Catacomb); 26. Golovkovka 24/2 (Catacomb); 27. Kamenka 16/26 (Yamnaya); 28. Boeva Mohyla (Mnogovalikovoy Pottery culture); 29. Talmaz 13/30 (Catacomb); 30. Krasnoyarskoe 11/30 (Yamnaya); 31. Tankove 9/24 (Yamnaya); 32. Novonikolske 1/5 (Catacomb); 33. Golovkovka 24/2 (Catacomb); 34. Babenkove 1/21 (Yamnaya); 35. Talmaz 3/15 (Catacomb)

sov *et al.* 1990:Fig. 5]. According to L.V. Subbotin, types of axes and other objects from the Yamnaya graves of that region were the most common for the Catacomb monuments. The cases of reverse stratigraphy (Cholmskoye 2/17, 24) allow to refer the end of co-existence of the Yamnaya and Catacomb populations to 1800-1700 BC [Subbotin 1990:51-52]. In other words, the comparison of the inventory of the Yamnaya graves of the North-Western Pontic Region and the Catacomb monuments displayed their co-existence for a rather long period of time.

E.V. Yarovoy referred the last post-Yamnaya group to the period from the edge of 3000-2000 BC to the first quarter of 2000 BC [Yarovoy 2000:26]. That is also suggested by finds of ceramics. Hence, pots on saucers that are typical for the Budzhak monuments or without a saucer (the post-Yamnaya group) were found both in Yamnaya (the Inhul region, Kovalivka VII 3/11), and Catacomb graves of the Inhul type (Volodymyrivka 13/10) [Cherednichenko *et al.* 1975].

As may be seen from the list, such graves occur over the entire territory of the steppe zone of Ukraine. The graves of the Yamnaya culture containing weapons comprise only 1%-2%, and the majority of weapons in them are the causes of wounds and therefore, could be regarded as objects that were included in the graves accidentally. The occurrence of arrow wounds in the Yamnaya culture is comparable only with the occurrence of wounds in Catacomb graves, which in itself is an indication of the kind of relations between those major ethnic groups. The types of arrows found in the Yamnaya graves offer a picture of relations with the Middle Dnieper Region (the Middle Dnieper culture) (Marevka 8/3), and different groups of the Catacomb population.

The most common kind of arrowhead that was the cause of possible death had the shape of an isosceles triangle with turn-off thorns that were brought slightly closer to each other (Fig. 13:14-20). That type of arrowhead also occurs in the Catacomb, including the Inhul graves (e.g., Vinogradne 19/8) [Klochko, Pustovalov 1992:Fig. 1:4].

The arrowhead from Semenovka 2/7 near Melitopol was interpreted by the author of the publication, B.D. Mikhaylov, as close to the arrowheads of the Maykop culture, the special feature of which was the presence of asymmetrical thorns [Mikhaylov 1990:115]. However, such types of arrowheads were also found in Catacomb graves [Klochko, Pustovalov 1992:120, 123]. Practically all of the finds of arrowheads listed above have analogues in the Catacomb graves, including the Inhul graves, though those types are not the only types of the diversity of Catacomb arrowheads.

In the context of the co-existence of the Yamnaya and Catacomb groups of population and the time till which the Yamnaya population survives, an interesting fragment of an arrowhead was found in a Yamnaya grave Kamenka 16.26 (Fig. 13:27). Such massive arrowheads existed already in the Mnogovalikovoy time [e.g.,

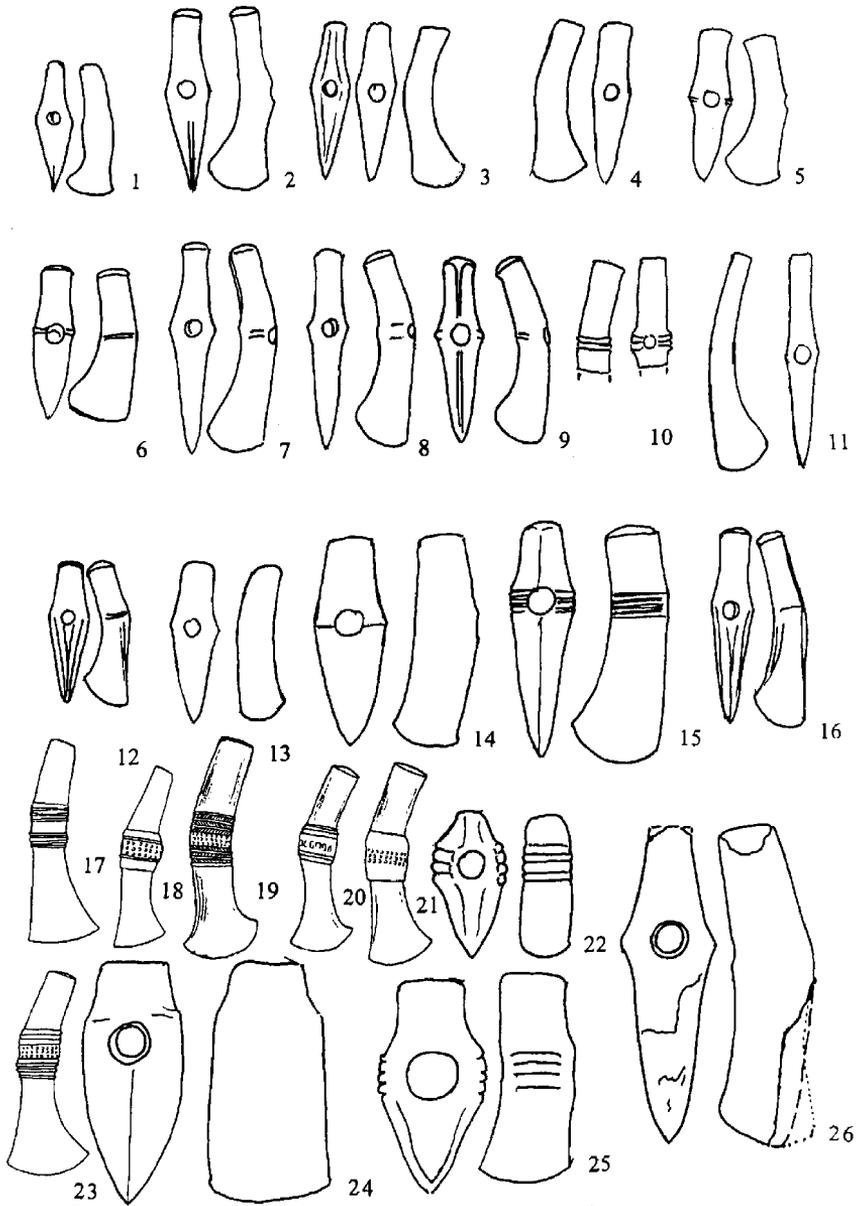


Fig. 14. Axes of the Yamnaya, Catacomb and Mnogovalikovoy Pottery cultures: 1. Luhansk 3; 2. Akkermen 8/7; 3. Krasnopartyzanske 7; 4. Starovelychkovska; 5. Baturyn I 2/9; 6. Shalushinske; 7. Anuchin collection, Northern Caucasus; 8. Mikhailivske; 9. Borodino; 10. Pervomayske 2/2; 11. Lebedi I 3/10; 12. Borodino; 13. Vinogradne 24/22; 14. Semenovka 8/16; 15. Baranivka 1/10; 16. Borodino; 17-18, 23. Dorak; 19-21. Troy II; 22. Golovkovka 24/2; 24. Oleksandrivka 3/4; 25. Burlatske 3/4; 26. Chkalovka 6/12

Polidovich 1993, Fig. 52:1] (Fig. 13:28). Of course, it should be noted that the Kamenka arrow was finished more primitively, but general proportions and sizes coincide. It is noteworthy that the arrowheads that are most frequently represented in Yamnaya graves also occur in graves of the Mnogovalikovoy Pottery culture [Litvinenko 1998:48, Fig. 1:6].

As we can see, the co-existence or even parallel existence of two major ethno-cultural entities of the Bronze Age in the Northern Pontic Region is now proven not only by the analysis of burial rites and inventory [Pustovalov 1998; 1999d; 2000d], but also radiocarbon dates. It appears that barrow stratification alone contradicts the co-existence argument. However, that issue is not completely clear either. There are cases of reverse stratigraphy [Pustovalov 1999d]. As noted above, in a number of cases the reverse stratigraphy was mistakenly presented as unreliable. The researchers who performed the excavations were taken hostage by traditional paradigms and were unable to assess the unusual phenomenon in an unbiased manner.

The massive excavation of barrows caused disagreement between stratigraphy data on the one hand, and the burial rite and inventory, on the other. Representatives of the “stratigraphical direction” basing their assumptions derived from relative barrow stratigraphy, had to conceal cases of reverse stratigraphy and burial rite and inventory data that contradicted their views — or explicitly dismiss them as wrong. Yet, such data in no case must be concealed. In a sample of 1000 units of observation, even three cases are statistically true and demand historical explanation. Such graves number about 200, or about 4% of all excavated Catacomb graves. Appealing to V.A. Gorodtsov in their assumptions, those authors forget that the main principle in Gorodtsov’s scheme was not the strict sequence of the three archaeological cultures of the Bronze Age, but the systemic method itself, due to which the composition was performed [Pustovalov 2001b].

Unlike the representatives of the stratigraphical approach, the systemic approach of Gorodtsov is shared by a number of researchers who believe that there had been some period of co-existence of the Yamnaya and many groups of Catacomb populations. The contradictions that exist in that case as well between the predominant majority of cases of stratigraphy and the data of burial rites, inventories and even radiocarbon analysis should be resolved through historical interpretation, explanations of the fact in question but not through its rejection.

The class-caste system that dominated the early stages of the development of statehood in societies that emerged as a result of contacts between civilization centres within the periphery gives a key to understanding of ethnic, social, religious and economic processes in the Yamnaya-Catacomb epoch [Pustovalov 1990b; 1991a; 1992a; 1994a; 1995b; 1997a; 1999e; 2000c; 2000d]. Among other things, it allows the explanation of the strict sequence of graves in the barrows. If the barrow contains graves of representatives of one kin or a family, the person born in one ethno-social group could be buried either in accordance with the burial rite

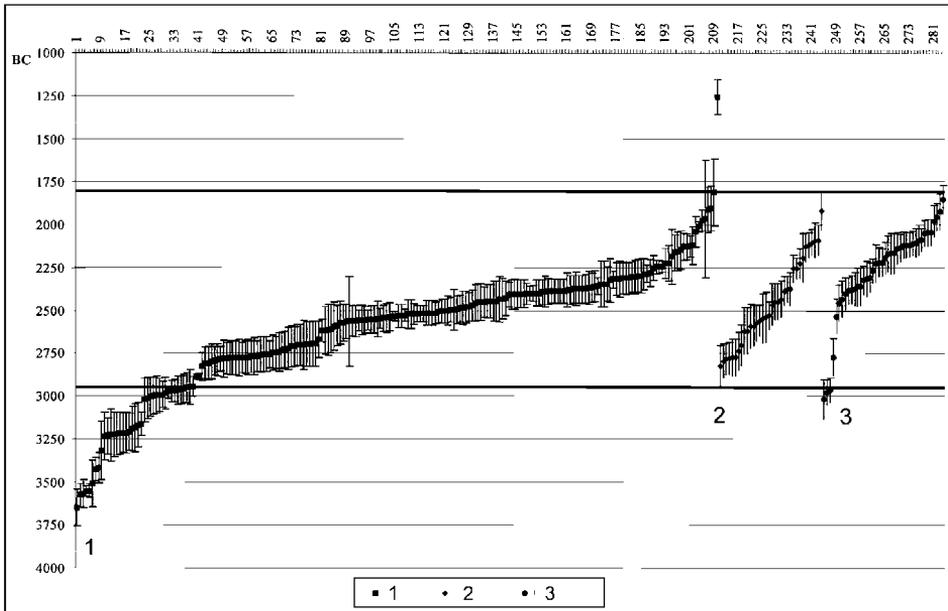


Fig. 15. Radiocarbon definitions of the Yamnaya, Eastern Catacomb and Inhul cultures: chart. 1 - Yamnaya culture; 2 - Eastern Catacomb culture; 3 - Inhul culture

of his or her ancestors or in accordance with the rite of the ethno-social group to which he/she had been included after an increase in his/her social status. For men that increase was possible through significant war achievements, for women through marriage [Pustovalov 1995b; 1999e]. Unequal relationships were severely punished in caste societies. Therefore, there were almost no cases of reverse stratigraphy [Pustovalov 2000d]. Hence, the strict and consistent sequence of graves of different ethno-cultural groups in the barrows could be a result of the caste system that existed in the Yamnaya-Catacomb society of the Northern Pontic Region.

V.A. Gorodtsov was right when he reflected in his scheme the sequence of peaks of development of the three ethnic population groups that co-existed on the territory of Ukraine and in the Northern Pontic Region in general, in the Yamnaya-Catacomb period. The solution of contemporary contradictions in the construction of periodisation of early and middle Bronze age in the steppe part of Ukraine is achieved through the use of a class-caste model. The idea of the class-caste model may be also productive for eastern regions of the Catacomb entity. Something similar was reconstructed by A.T. Sinyuk for the Middle Don [Sinyuk 1996]. Elements of the caste system may be traced in relations between the Yamnaya population with the Kemi-Oba population, in the Chernyakhov culture and in

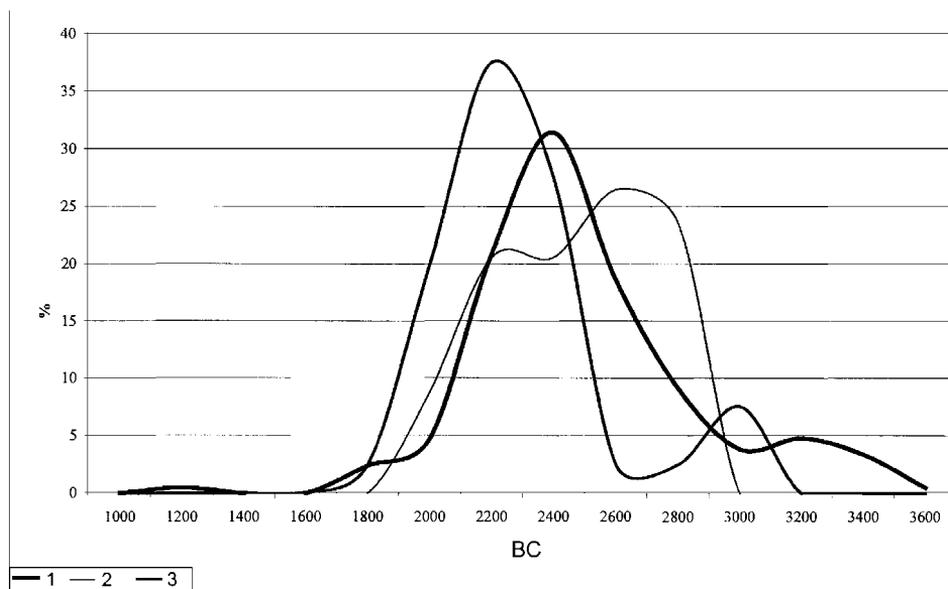


Fig. 16. Radiocarbon definitions of the Yamnaya (1), Eastern Catacomb (2) and Inhul cultures (3): chart (in %).

the Khazar society [Pustovalov 2000b]. The disagreement between the stratigraphy data and results of the analysis of the burial rite, the inventory and the radiocarbon analysis may serve as an indicator of the presence of a caste system in a particular society. This idea will be also productive for the analysis of the Yamnaya-Catacomb (Novotitarovka) monuments of the Northern Caucasus and for reconstruction of ethno-social relations at an early stage of the Late Bronze Age of Eastern Europe.

3.4. CONCLUSIONS

Analysis of the data of the burial rite, the inventory and the radiocarbon dating, indicate a long period of the co-existence of the Yamnaya and Catacomb, including the Inhul, populations. The existence of the Yamnaya population can be divided into two stages. The second stage is synchronous with the Catacomb entity. Practically speaking, the Yamnaya population on the territory of the Northern Pontic Region survives until the late Catacomb period. The time of co-existence is estimated for all the three groups of the population (Yamnaya, Eastern Catacomb and Inhul) as

800 years, while the co-existence of the Yamnaya and the Inhul is estimated to have lasted for 1,200 years (Fig. 15). Quite possibly, with the increase in the number of samples, the duration of co-existence with the Eastern Catacomb culture will also increase. It should be noted that all the three groups cease to exist practically at the same time. Interestingly, in case of the distribution of frequency of the same dates on the time scale peaks of charts for the Yamnaya and Inhul, the groups do not overlap. The two-peak distribution of the Eastern Catacomb graves may be a result of either insufficient number of definitions or a reflection of dependence of the Eastern Catacomb population on the other two groups (Fig. 16). The predominant majority of cases of barrow stratigraphy contradict that. However, that is explained by the class-caste nature of the Yamnaya-Catacomb society.

Translated by Inna Pidluska

ABBREVIATIONS

AAC	– Acta Archaeologica Carpathica, Kraków
Annales UMCS	– Annales Universitatis Mariae Skłodowska-Curie, Lublin
AP	– Archeologia Polski, Warszawa
APŚ	– Archeologia Polski Środkowoschodniej, Lublin
BerRGK	– Bericht der Römisch-Germanischen Kommission, Mainz
BPS	– Baltic-Pontic Studies, Poznań
BSA	– Annales of the British School of Archaeology at Athens
JIES	– The Journal of the Indo-European Studies, Washington D.C.
KSIA	– Kratkiye soobshcheniya Instituta Archeologii, Moskva
MANH	– Materiały Archeologiczne Nowej Huty, Kraków
NA IA NAN	– Nauchnyy Arkhiv Instituta Arkheologii Natsionalnoy Akademii Nauk Ukrainy, Kiev
PA	– Przegląd Archeologiczny, Wrocław
PBF	– Prähistorische Bronzefunde, München
PZP	– Prahistoria ziem polskich, Wrocław-Warszawa-Kraków-Gdańsk
RA	– Rossiyskaya Arkheologiya, Moskwa
SA	– Sovetskaya Arkheologiya, Moskwa
SIA	– Slovenska Archeologia, Bratislava
SPA	– Sprawozdania Archeologiczne, Kraków
WA	– Wiadomości Archeologiczne, Warszawa

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