

The Neolithization of Northern Black Sea area in the context of climate changes

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ABSTRACT – *The neolithisation of the Pontic steppe was a long process, with four stages which were associated with climate changes. It began c. 7500 calBC, with early animal husbandry in the western Azov Sea area. The beginning of the second stage was connected with an arid climate (7000–6900 calBC) and the origin of the Rakushechny Yar culture in the Lower Don region. The third stage (6500–6300 calBC) occurred during a humid period. Besides animal husbandry, the steppe population borrowed the first pottery from the Rakushechny Yar culture. The fourth phase (6300–6000 calBC) was connected with extreme aridity and the neolithisation of the modern forest-steppe and forest zones of Ukraine and Russia.*

IZVLEČEK – *Neolitizacija Pontoške stepe je bila dolgotrajen proces, ki ga sestavljajo štiri stopnje, povezane s klimatskimi spremembami. Začela se je z zgodnjo živinorejo na področju Azovskega morja okoli 7500 calBC. Začetek druge stopnje je bil povezan s sušnim podnebjem (7000-6900 calBC) in začetkom kulture Rakushechny Yar na področju spodnjega Dona. Tretja stopnja (6500-6300 calBC) se je pojavila v vlažnem obdobju. Stepsko prebivalstvo je poleg živinoreje od omenjene kulture prevzelo tudi lončenino. Četrta faza (6300-6000 calBC) je bila povezana s skrajno suhim podnebjem in neolitizacijo sodobne gozdne stepe in gozdnih predelov Ukrajine in Rusije.*

KEY WORDS – *Pontic steppe; climate changes; neolithisation; first pottery; early animal husbandry*

Basic concepts of the Early Neolithic in Ukraine

At the end of the 60s, V. N. Danilenko assumed that the beginning of the Neolithic in Ukraine was connected with an eastern cultural impulse (*Danilenko 1969*). He supposed that a progressive aridity in East Europe had resulted in a crisis of hunting economies, and in the VII millennium BC the ancient population of this region shifted to cattle breeding, and borrowed pottery. In search of new pasture, it began to move west, up to the Dnieper and the Southern Bug. Danilenko confirmed this migration with the similarity of the ceramics, with point bottom, drawn and pit ornamentation, which were found at Early Neolithic sites in the south of Eastern Europe. Apart from the first ceramics, the newcomers brought early animal husbandry to Ukraine. Under their influence, the local Mesolithic population shifted to the Neolithic, and the Azov, Surskaya and Bug-Dniestr

cultures appeared. Danilenko dated the first appearance of ceramics in Ukraine to the end of the VII millennium BC, based on its similarity to the pottery of the most ancient ceramic layer of Dzhebel in the Caspian Sea area. In turn, he synchronized this Dzhebel layer with the layers of Hacilar in Western Anatolia, which contained monochrome ceramics similar to the Dzhebel pottery (*Danilenko 1969.186*).

Danilenko supposed that cattle were domesticated in the Northern Caucasus and predominated in animal husbandry of Eastern Europe (*Danilenko 1969.180*). He connected the dissemination of agriculture in Ukraine with the influence of the Criş-Körös cultures, owing to which it appeared among the population of the Bug-Dniestr culture. The latter, in its turn, had played the main role in the neolithisation of the

forest-steppe and the forest zones of Ukraine. The Bug-Dniestr migration into the southeast woodlands and the Dnieper River basin caused the formation of the Dnieper-Donets culture. At the end of the VII millennium BC, the Mesolithic population of these areas borrowed the first ceramics and early agriculture from the newcomers.

Danilenko divided the sites of the Bug-Dniestr culture into seven phases (*Danilenko 1969*). The first phase (Pre-Ceramics) was dated to the second half of the 7th millennium BC. At the same time, according to his opinion, the Sursko-Dnieper culture also appeared. The second phase (Skibentsy) of the Bug-Dniestr culture was characterized by the appearance of ceramics, analogies for which he found in the Caspian Sea area and in the East Mediterranean. He synchronized the sites of this phase with a lower layer of Nea Nikomedeia, the fifth layer of Dzhebel, and the lower layers of Mersin. This phase, together with the Kizlevskaya phase of the Sursko-Dnieper culture, was dated to the end of the 7th – first half of the 6th millennium BC. Danilenko supposed that, at that time under the influence of the Bug-Dniestr culture, the earliest monuments of the Dnieper-Donets culture were also formed on the basis of the Mesolithic traditions of the forest-steppe Dnieper zone.

The third phase of the Bug-Dniestr culture (Sokoltsy), according to the researcher's opinion, kept the features of the relationship with the cattle breeding cultures of eastern regions. It was dated to the second half of the 6th, and the beginning of the 5th millennium BC. Danilenko assumed that the fourth phase (Pechera) was a result of the influence of the Criş-Körös cultures, with the distribution of painted pottery and ceramics with ornamentation in the form of finger prints, bowls on pallets as well as, burnished vessels. However, painted pots have been absent in all the Bug-Dniestr sites, whereas pottery with finger prints, pallets and burnished surface is known in the collections of the sites attributed by the researcher to the previous phases, where their appearance was explained by the Mediterranean-Bal-

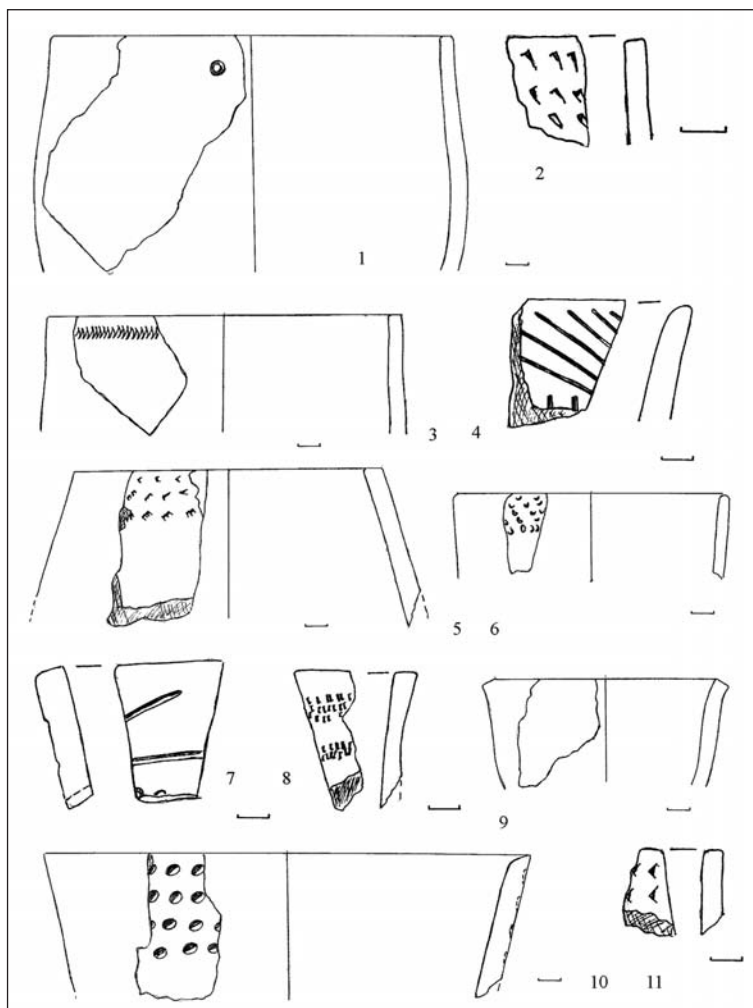


Fig. 1. Pottery of the Rakushechny Yar culture from the Rakushechny Yar site: 1–3 layer 23; 4, 5 layer 22; 6–11 layer 21.

kan interactions. Danilenko connected the completion of the fourth phase with the end of the spread of the Linear Pottery culture over the territory of Poland, Romania and Western Ukraine.

Danilenko considered the fifth (Samchinsty) phase to be short, and dated it to the last quarter of the 5th millennium BC. He connected the formation of its traditions with the influence of the population of the Dnieper-Donets culture. The sixth phase of the Bug-Dniestr culture (Savran) was characterized by the restoration of Pre-Samchinskaya traditions. The final phase of the Bug-Dniestr culture referred to the Pre-Tripolye period.

The problem of the appearance of the first domestic animals in Eastern Europe was considered by Tsalkin in detail (*Tsalkin 1970*). He admitted the fact of local domestication of horse, cattle and pig, supposing that further study of the most ancient Neolithic sites would clarify this problem.

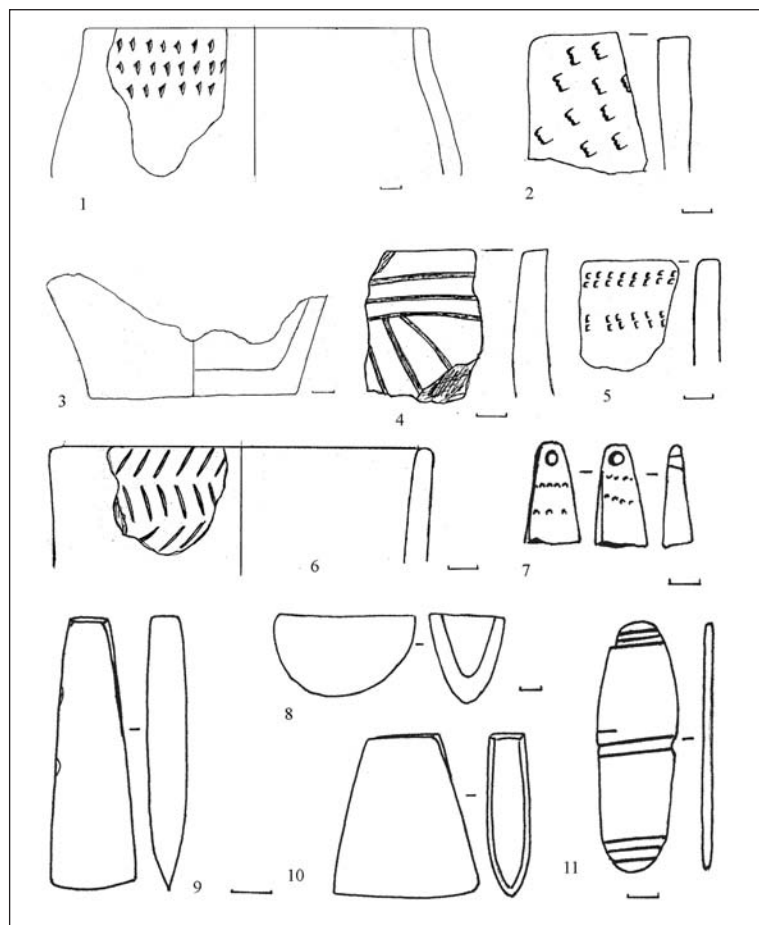


Fig. 2. Materials of the Rakushechny Yar culture from the Rakushechny Yar site: 1, 2 layer 19; 3 layer 20; 4, 5 layer 17; 6 layer 16; 7 layer 8; 8 layer 9; 10 layer 7; 11 layer 10; 7-10 stone; 11 bone.

Telegin suggested recently a renewed periodization of the Neolithic in Ukraine based on the ^{14}C dates (Telegin 1992; Telegin et al 2000). He dated the Neolithic period to 6500–5500 calBC, and connected it with the appearance of the Bug-Dniestr culture in the north-west Black Sea area, and the Surskaya culture – in the lower Dnieper River basin, the oldest Dnieper-Donets cemeteries (Vasilievsky 2 and Mariievsky) – in the northern steppe of the Dnieper River basin. In his opinion, these cultures developed on the local Mesolithic basis under the influence of other cultures. He considered the Criş-Starčevo cultures as having influenced the Bug-Dniestr culture; and the Surskaya culture as being influenced by the Neolithic of Asia Minor. The similarity of the Surskaya vessels to stone and burnished vessels from Asia Minor having an impurity of sand in the clay testifies to this. He also marked the similarity of ornamentation, consisting of smooth ‘walking’ prints and drawn lines in combination with pits.

Telegin considered the formation of agriculture and animal husbandry in Ukraine repeatedly (Telegin

1968; 1977; 1990; etc.). He assumed that domestic pig and bull had appeared in the South of the European part of the former USSR in the Mesolithic; domestic horse – in the Neolithic; and their appearance was the result of local domestication. Ovicaprids were disseminated in Ukraine together with the Linear Pottery culture. He connected the distribution of agriculture in Ukraine with the influence of this culture, as well as the Tripolye culture.

Shnirelman considered the development of the food-producing economy in the Neolithic, including Ukraine (Shnirelman 1980; 1986; 1989). In his opinion, only the horse could have been domesticated in the Northern Black Sea area (Shnirelman 1986.293). According to his assumption, the first domestic animals appeared among the population of Moldova and Ukraine as a result of borrowing: pig from the bearers of the Lepensky Vir culture, and cattle from the Criş population. Shnirelman supposed that the absence of ovicaprids at sites of the Dniestrovskiy variant of the Bug-Dniestr culture and the

fact of finding their bones on sites of the Bugskiy variant and at settlements of the Matveev Kurgan type in the Azov Sea area proves that domestic goat and sheep were borrowed from the East – from the population of the Northern Azov Sea area and the Northern Caucasus. In his opinion, the existence of early animal husbandry is hardly possible given the absence of agriculture (Shnirelman 1980.216) and, as a whole; the early food-producing economy had most favorable conditions for the complex development. In this connection, he considered that the existence of agriculture in the steppe Black Sea area is possible, as through this region *Triticum spelta* and *Panicum miliaceum* was distributed in the Dniestr River basin and further to the west (Shnirelman 1989.178).

Shnirelman writes that in the Early Neolithic cultures of the Northern Black Sea area and the Azov Sea area, the food-producing economy had little importance. In the course of time, its role grew gradually, and it penetrated to the North to the territory of the Dnieper-Donets culture, where domestic animals ap-

peared and barley cultivation began. The researcher marked the significant role of the Bug-Dniestr culture in the distribution of the food-producing economy in Ukraine, stressing that its microcenter had developed in the area between the Dniester and the Southern Bug rivers. It was a unit of the secondary Balkan centre of a food-producing economy. In spite of the fact that the Bug-Dniestr culture and its agriculture was similar to the Balkan cultures, this microcenter differed in its originality, which was the result of the penetration of hexaploid wheat, millet and ovicaprids through the steppe corridor (Shnirelman 1989:384).

Krizhevskaya raised questions connected with the formation of animal husbandry in the Azov Sea area regarding materials of the Matveev Kurgan type, where the bones of domestic pig, cattle, ovicaprids and, probably, horses have been found in Early Neolithic layers (Krizhevskaya 1992:105). In her opinion, the local domestication of bulls and pigs was possible, owing to the specialized hunting of wild boar, while ovicaprids were borrowed from inhabitants of the Caspian Sea area. She considered the steppe areas to the East from the Dniester as a place of horse domestication.

The neolithisation in Ukraine is discussed by Zaliznyak (1998; 2006). He connects the dissemination of the food-producing economy in the Balkan-Carpathian region and in Ukraine with migration from Greece. Zaliznyak assumes that the neolithisation of the steppe Ukraine began with the migration of the Grebeniki population about 7600 uncalBP. The flint tools of this culture do not connect with local Paleolithic and Mesolithic sites and are very similar to the Pre-Pottery complexes of the Balkan region (Zaliznyak 2006:8–9). The late migration of the Criş population in the 6 millennium BC resulted in the formation of the Bug-Dniestr culture and its economy, with cattle, ovicaprids and pig. Wechler has the same opinion, according to which the spread of cattle-breeding and agriculture in southern Ukraine was connected with the influence of Criş culture (Wechler 2001).

Following Danilenko, Zaliznyak considers that in the middle of the 5th millennium BC, the migration of the Bug-Dniestr population north up to the wood-



Fig. 3. The map of the sites of the 6500–6300 BC. 1 Rakushechny Yar; 2 Matveev Kurgan 1 and 2; 3 Gruntovsky 1 and 2; 4 Kamennja Mogila 3; 5 Zankovtsy; 6 Soroki 2; 7 Girzhevo; 8 Vasilievsky 2 and Marievsky cemeteries.

lands resulted in the formation of the Dniester-Donets culture. In the steppe areas of Ukraine, a cattle breeding was disseminated as a result of aridity in the 4 millennium BC only among the population of the Sredny Stog culture.

Environment and climate in the Northern Black Sea area

The Northern Black Sea region is a vast steppe area extending from the Danube in the west to the Northern Caucasus in the east, from the Black Sea and the Sea of Azov in the south, to the forest-steppe zone in the north. It includes four big rivers and the basins of some smaller rivers.

The Ukrainian steppe is characterized by constantly low humidity. The dryness in the southern areas of the steppe is six times greater than that in northern areas. The vegetative cover, being determined by climatic conditions, is also varied. The stock of phytomass increases from the northern limits of the steppe to the centre from 28 tons up to 48 tons per hectare, falling to 9 tons at its southern limits. The centre of the steppe zone is optimal, with a combination of heat and sufficient amount of precipitation (Mordkovich 1982).

Summer drought connected with a fall in the basic amount of precipitation in spring and autumn is a feature of the steppes from the Dniestr to the Don. Here, in comparison with more eastern areas, there are many mesophytes, but fewer xerophytes having a large underground phytomass. This makes the Northern Black Sea steppe more vulnerable and susceptible to climatic change. The small amount of xerophytes with advanced root systems cannot prevent

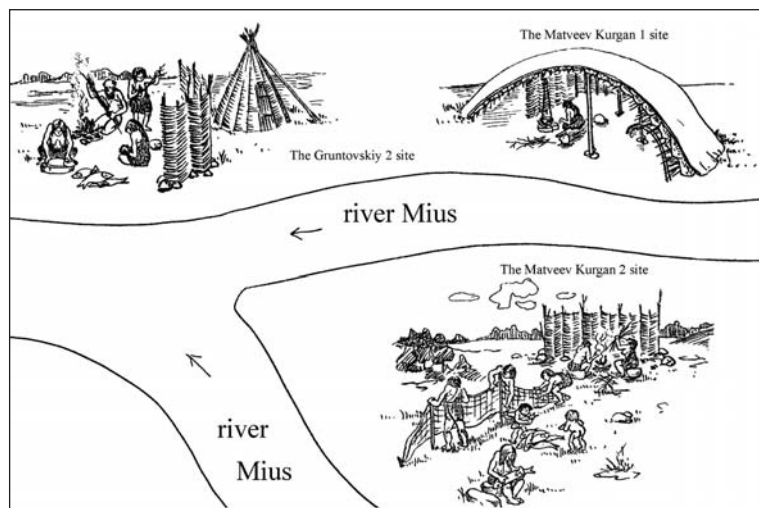


Fig. 4. The reconstruction of sites the Matveev Kurgan group (after Krizhevskaja 1992).

the rooting of woody vegetation. With increasing of humidity, this promotes easy access for trees to the steppe territories and to the southward expansion of the forest-steppe zone (Mordkovich 1982:56).

The steppes from the Don to the Urals are characterized by greater dryness in comparison with the Ukrainian steppe. During periods of aridity, the landscapes of their southern areas become similar to deserts. There are numerous xerophytes in this eastern steppe. During periods of humidity, they stop the southward expansion of the forest-steppe zone. The drier character of the eastern steppe region as compared to the Black Sea area is very important for understanding cultural processes in the prehistory of Eurasia.

The ancient climate and landscapes of the Pontic steppe have been reconstructed on the basis of the palynological analyses of samples from bogs and Neolithic settlements: Matveev Kurgan, Chapaevka, Kamennaja Mogila 1, and Razdolnoe (Levkovskaja 1992; Bezus'ko et al. 2000). These materials have added to the detailed scheme of the climate and landscape changes for the Holocene of Eastern Eu-

rope developed by E. A. Spiridonova (Spiridonova and Lavrushin 1997).

According to this scheme, the Atlantic period included several sub-periods of climatic fluctuation. During the wet sub-periods, the forests spread into the river valleys in the southern area of the steppe, and the amount of motley grass in the structure of the grassy vegetation increased. During the dry sub-periods, the forests in the South of the steppe zone disappeared, the role of motley grass decreased, and the quantity of wormwood in the structure of the grassy vegetation increased.

However, all the wet sub-periods during the Atlantic period were drier than the current climate, and the northern border of the steppe was on the territory of the modern forest-steppe zone. Such a situation continued until the beginning of the Sub-Boreal period, when the border became similar to the modern one.

Neolithisation in the Pontic steppe

The beginning of neolithisation in the Pontic steppe was probably connected with the Pre-pottery Neolithic layer of the multilayer settlement at Kamennaya Mogila 1 in the Azov Sea area (Danilenko 1986; Kotova 2003). Kamennaya Mogila is a natural stone accumulation with caves, near the village of Terpenie in Melitopol District, Zaporozhye Region. Near this stone hill, three multilayer settlements are located. All of them include Neolithic layers, but a Pre-Pottery Neolithic layer was discovered only at the first site. It is dated from 7500 to 6900 calBC and contains cattle, horse, sheep and goat bones. Unfortunately, the bones of the oldest domestic animals from Kamennaya Mogila 1 were studied by only one archaeozoologist, and more than 70 years ago (Pi-

Site and context	Material	Index	BP	calBC (2σ) *	Reference
Rakushechny Yar, layer 20 th	pots-snuff	Ki-6476	7930±140	7246-6472	Telegin et al. 2000
Rakushechny Yar, layer 20 th	pots-snuff	Ki-6477	7860±130	7062-6466	Telegin et al. 2000
Rakushechny Yar, layer 20 th	pots-snuff	Ki-6476a	7690±110	6901-6260	Telegin et al. 2000
Rakushechny Yar, layers 14-15 th	pots-snuff	Ki-6480	7040±100	6085-5720	Telegin et al. 2000
Rakushechny Yar, layers 14-15 th	pots-snuff	Ki-6478	6930±100	5999-5646	Telegin et al. 2000
Rakushechny Yar, layers 14-15 th	pots-snuff	Ki-6479	6825±100	5974-5558	Telegin et al. 2000

Tab. 1. Radiocarbon dates of the Rakushechny Yar culture (* calibrated by OxCal v.4., after Bronk Ramsey 2009).

doplichko 1956). Now we have no the opportunity to test these bone determinations, but we may offer two hypotheses about their origin.

The first hypothesis is that the animals were locally domesticated. It cannot be doubted that horse was domesticated in the Pontic steppe. The analysis of this problem by Kuzmina has been the most convincing up to now (Kuzmina 1997). She has proved that the origin of the domestic horse was connected with *Equus latipes Gromova*, which survived in the south of Russian steppe up to the 5th millennium BC. A study of East European Neolithic sites demonstrates the absence of domesticated horse and the presence of *Equus gmelini Antonius* and *Equus latipes Gromova* in the South of forest-steppe area of the Don basin in the 7–6 millennia BC (Kuzmina and Kasparov 1987). Horse, similar to *Equus uralensis Kuzmina*, was found at the Neolithic sites of Lower Volga basin (Kuzmina 1988. 178). Around 6200 calBC, domestic horses were known in the basin of the Southern Bug and in the Northern Azov Sea area (Kotova 2003). The most ancient finds of domestic horse are connected with the territory of the Western Azov Sea area, which was probably just the centre of its domestication, no later than at the beginning of 8th millennium BC.

The Pontic steppe was a habitat of the Auroch – an ancestor of cattle. Local domestication of this species was also possible (Tsalkin 1970.266). The ancestry of ovicaprids could lie in wild sheep, the Mouflon and a wild goat-pasan, which lived in the Northern Caucasus (Amirkhanov 1987.174).

However, the second hypothesis, regarding the borrowing of cattle, sheep and goat from the Ancient East, is also tenable. These domesticates are known from Pre-Pottery Neolithic sites in Eastern Turkey around 8000 calBC (Özdoğan 1999). It is possible to assume that they were borrowed by the population of the Pontic steppe around 7500 calBC. But without genetic analysis, this problem cannot be resolved.

The second phase of neolithisation (6900–6500 calBC) was connected with the Rakushechny Yar culture, whose sites are located in the Low Don region, and date from 6900 to 5600 calBC (Tab. 1). The most famous site of this culture is a multilayer settlement

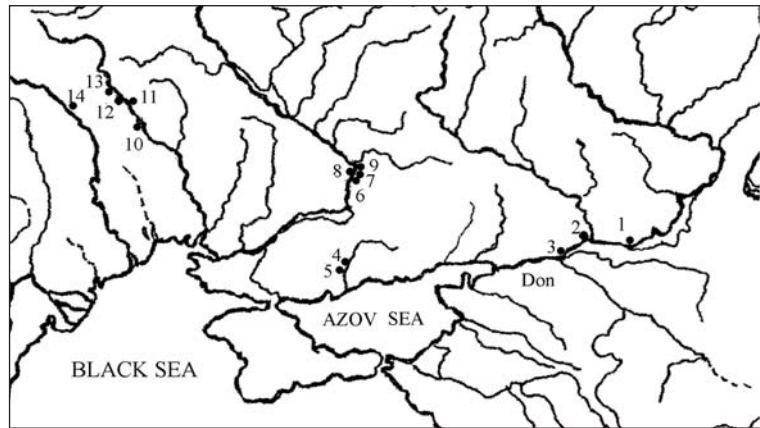


Fig. 5. The map of the monuments about 6300–6000 BC. 1 Tzimljanskoe; 2 Samsonovka; 3 Rakushechny Yar and Razdolnoe 1; 4 Kamennaja Mogila 1; 5 Semenovka 1; 6 Vinogradny; 7 Vasilievskiy and Marievskiy cemeteries; 8 Kodachok; 9 Surskoy Island 1 and 2; 10 Mitkov and Bazkov Islands; 11 Sokoltsy; 12 Glinskoe; 13 Pechera; 14 Soroki.

at Rakushechny Yar, which has 23 layers (Belanovskaya 1995). Seventeen of these are of the Rakushechny Yar culture (layers 23–7). This culture has the complete Neolithic package: pottery, polished stone tools, a productive economy. Rectangular houses were constructed with wooden posts, and clay coated floors and, possibly walls. Flat-bottomed pots, with an organic admixture in the clay, with linear, comb and impression ornamentation are typical of this culture (Figs. 1 and 2). The point-bottom pots appeared only c. 6700 calBC. Cattle, ovicaprids and pigs were known from 6900 calBC. At around 5900 calBC, the bones of hypothetical domestic horses appeared. The presence of querns suggests the existence of agriculture.

Some traits of Rakushechny Yar culture are similar to Neolithic sites in Eastern Anatolia: rectangular houses with daub, flat-bottomed pots, clay figurines, polished tools, animal husbandry with domestic cattle, ovicaprids and pigs, but no horses. This similarity, together with close radiocarbon dates, allows me to assume a borrowing of some attainments, or even a penetration of small groups of population from Eastern Anatolia to the Azov Sea area around 6900 calBC.

This migration could be the result of aridity, which has been fixed at c. 7000 calBC in the Azov Sea steppe (Bezus'ko et al. 2000.105). It was not a short arid period, nor a local event. The transition from the Pre-Pottery to the Ceramic Neolithic has been recorded for this period in southeastern Anatolia. It was accompanied by a collapse of the Pre-Pottery Neolithic cultures. Many sites were deserted. Turkish

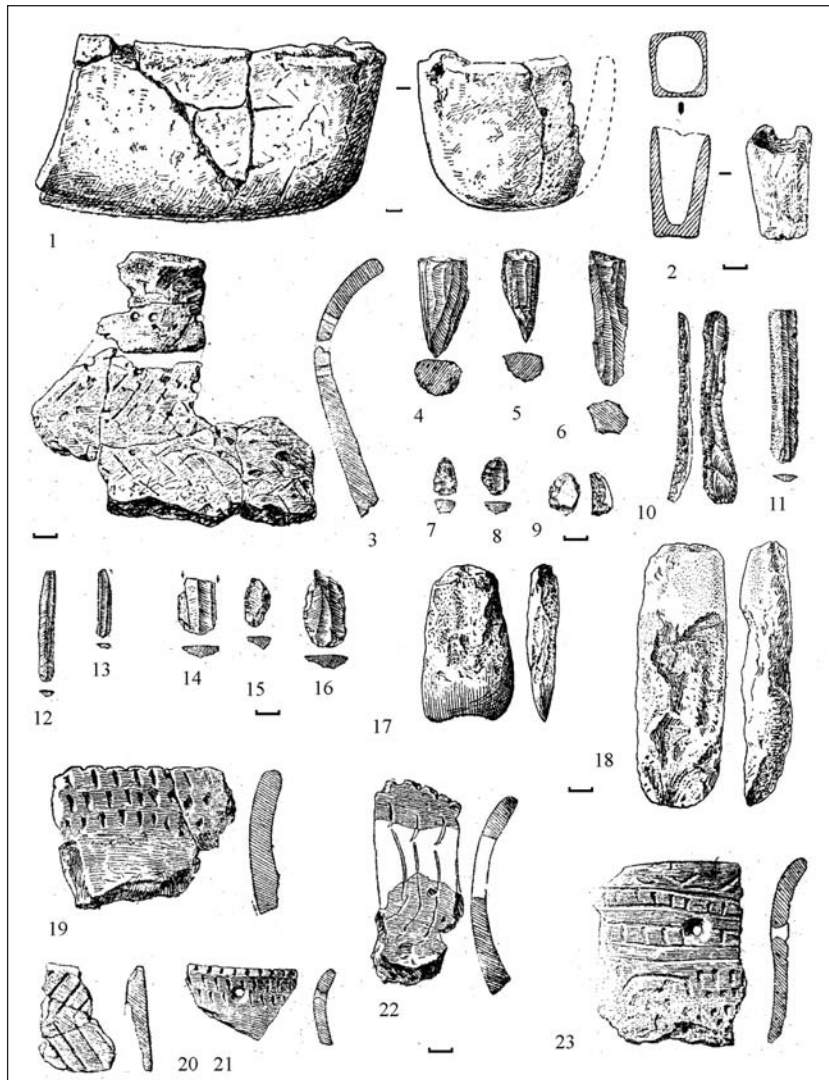


Fig. 6. Materials of the Surskaja culture from the site 1 (1-18) and 2 (19-23) on the Surskoy Island.

archaeologists have connected these events with climatic changes and overexploitation of the land (Özdoğan 1999.232). The migration from Northern Mesopotamia to the north and west and formation of the lowest layers at Yumuktepe were suggested as well (Caneva 1999.113).

The migration of some small groups of the Anatolian population along the eastern shore of the Black Sea

south of Eastern Europe: eastern (in the Northern Caucasus) and western (in the Low Don region). They mainly coincide with two variants of the Neolithic tradition as distinguished by Shnirelman, *i.e.*, western, to which - in my opinion - the Rakushechny Yar culture is close, and eastern, represented by Chokh (Shnirelman 1989.85). The influence of traditions of the eastern variant has been not traced in the steppes of Eastern Europe, probably because their

was also possible. The similarity of the pottery found at the Chokh site in the Northern Caucasus to pottery in Northern Mesopotamia, as recorded by Shnirelman (Shnirelman 1989.85), has confirmed this migration. *Triticum dicoccon*, *Triticum monococcum*, *Hordeum vulgare* and *Hordeum vulgare var. Coeleste*; the bones of cattle and ovicaprids were found at this site, which is dated to *c.* 6900 calBC (Amirkhanov 1987).

Penetrations of some groups of ancient populations from the South to Northern Caucasus during dry periods are well known for prehistory and ancient history. For example, the origin of the Maikop culture was connected with such migration after the most extreme drought *c.* 5200-5000 uncalBP (Korenevskiy 2001). We may assume that the origin of Rakushechny Yar culture was related to that Early Neolithic migration.

Site and context	Material	Index	BP	calBC (2σ) *	Reference
Matveev Kurgan 1	charcoal	GrN-7199	7505±210	6424-6381	Krizhevskaya 1992
Zankovtsy 2, lower layer	animal bone	Ki-6694	7540±65	6439-6404	Telegin et al. 2000
Soroki 2, third layer	charcoal	Bln-588	7515±120	6428-6392	Markevich 1974
Soroki 2, second layer	charcoal	Bln-587	7420±80	6363-6239	Markevich 1974
Girzhevo	animal bone	Ki-11240	7390±100	6343-6226	Man'ko 2006

Tab. 2. Radiocarbon dates of the Grebeniki type settlements (* calibrated by OxCal v.4., after Bronk Ramsey 2009).

bearers occupied mountain areas. The steppe population of the Northern Azov Sea area appeared to have been more interactive. It is probable that the Early Neolithic of eastern Europe was formed solely under its influence.

The third phase of the neolithisation of the east European steppe was connected with a period of damp climate from c. 6500–6300 calBC. The forest spread along the river valleys and there were favorable conditions for life in the steppe. The main areas of steppe were covered by meadows, typical now of the more northern part of the steppe zone (Levkovskaja 1992.176). Flood-land woods consisting of birch, elms, lindens, oaks, hornbeams, and maples expanded. Hazel, buckhorn, cornelian-cherry-tree, guelder rose, elder-grove were represented in undergrowth. It should be stressed that the majority of these plants form the bush component of the ravine woods of the steppe zone. Alder and willow grew in moist places; pines was widespread on sandy terraces.

This was the period of the sites of the Late Grebeniki type in the steppe between the Dniestr and Don

ivers. The center of this cultural group was the Grebeniki culture, located in the western part of this region (Stanko 1997.118), but a few sites have been

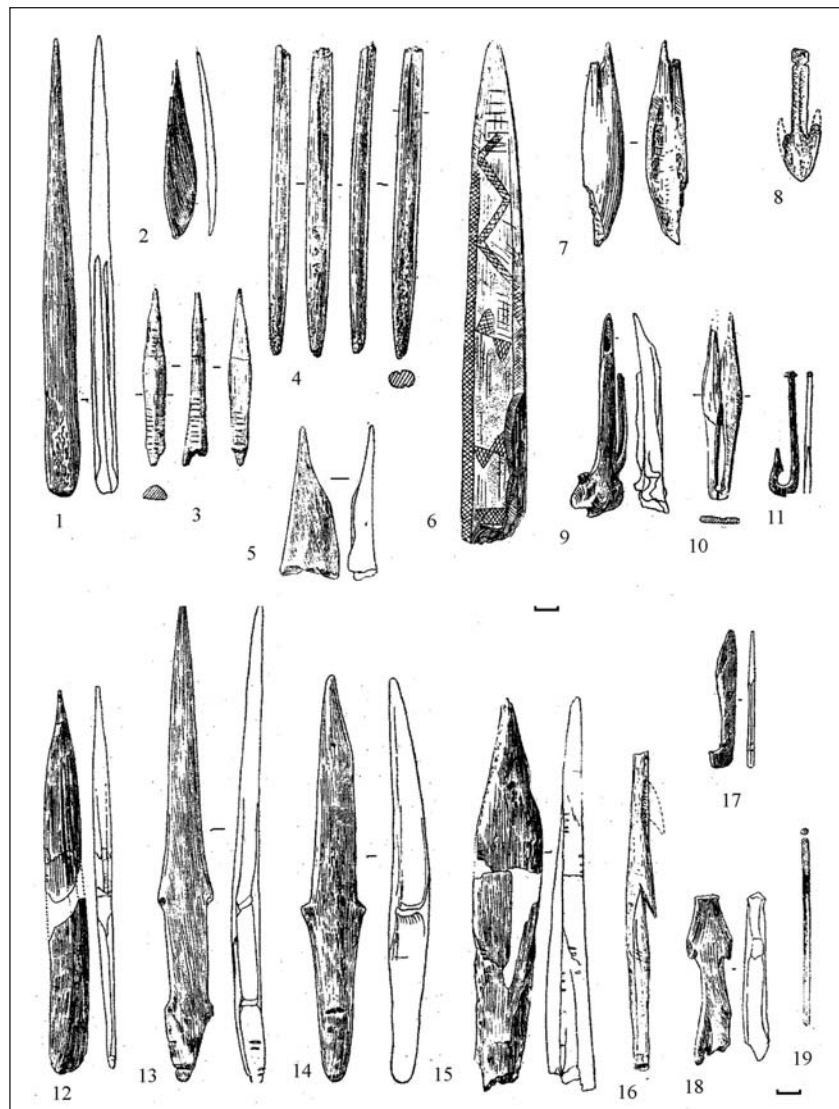


Fig. 7. Materials of the Surskaja culture from the site 1 (1–10) and 2 (11–19) on the Surskoy Island.

Site and context	Index	BP	calBC (2σ) *	Reference
Vasilievka 2 cemetery	OxA-3806	8020±90	7051–6838	Telegin et al. 2000
Vasilievka 2 cemetery	OxA-3804	7920±85	6824–6693	Telegin et al. 2000
Vasilievka 2 cemetery	OxA-3805	7620±80	6471–6443	Telegin et al. 2000
Marievka cemetery, grave 4	OxA-6199	7955±50	7029–6773	Telegin et al. 2000
Marievka cemetery, grave 4	Ki-6782	7680±90	6568–6468	Telegin et al. 2000
Marievka cemetery, grave 14	OxA-6269	7630±110	6477–6448	Telegin et al. 2000
Marievka cemetery, grave 14	Ki-7600	7650±100	6496–6460	Telegin et al. 2000
Marievka cemetery, grave 10	OxA-6200	7620±100	6471–6443	Telegin et al. 2000
Marievka cemetery, grave 10	Ki-6781	7585±80	6459–6432	Telegin et al. 2000
Marievka cemetery, grave 10	Ki-6779	7550±80	6443–6413	Telegin et al. 2000

Tab. 3. ¹⁴C dates obtained of human bone samples from Vasilievka 2 and Marievka cemeteries (* calibrated by OxCal v.4., after Bronk Ramsey 2009).

found in the Azov Sea region (Fig. 3). During the previous drought, only a few Kukrek culture inhabitants lived in the territory near the Sea of Azov. In the steppe near the Black Sea, a region more humid than the Azov Sea area, the population of the Grebeniki culture was preserved during the first half of the VII millennium BC. When the climate became more humid, the Grebeniki population started to penetrate to the steppe near the Azov Sea. The most interesting sites are known at the periphery of the Grebeniki group: the Matveev Kurgan and Kamennaya Mogila 3, near the Sea of Azov, and the Aceramic layers of Soroki in the forest-steppe zone of the Dniestr.

These settlements have given some evidence of a productive economy and ceramics. Domestic cattle and pig bones were found at the Soroki sites in the Middle Dniestr (Markovich 1982). The bones of cattle and a few shards without ornamentation were discovered at the Kamennaya Mogila

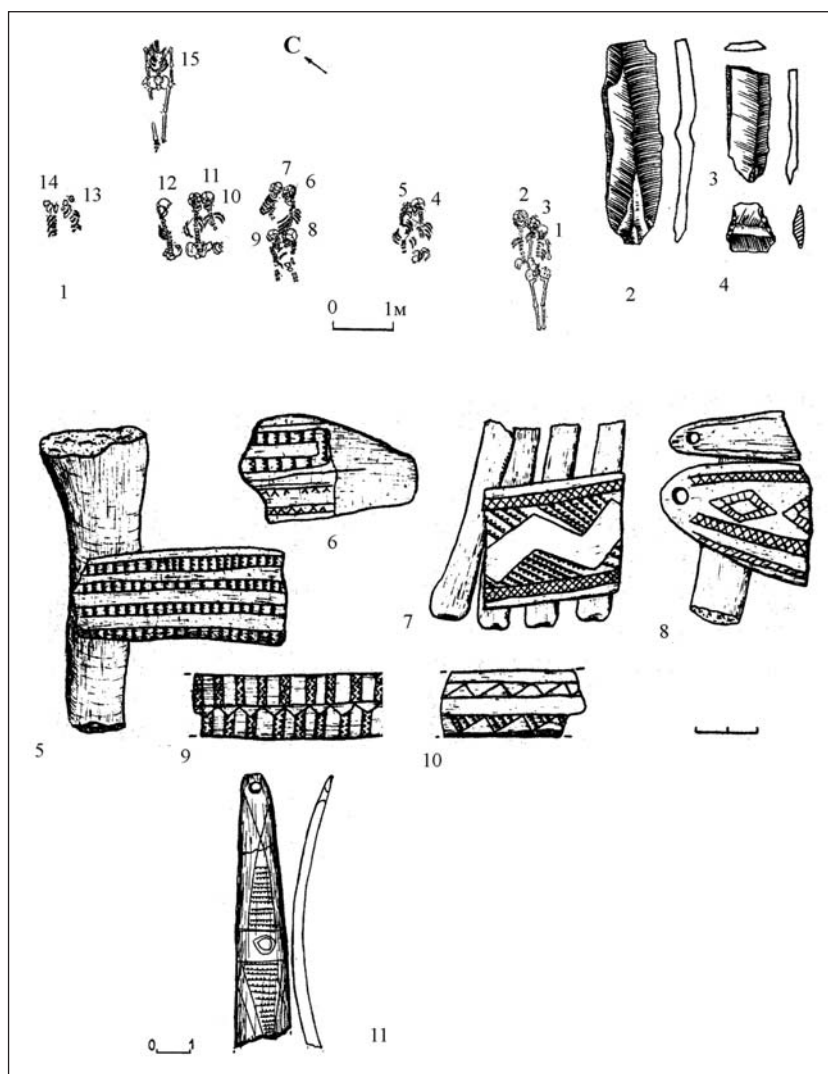


Fig. 8. Plan and grave goods of the Marievsky cemetery (1-4) (after Bodjansky 1956); grave goods of Vasilievsky 2 cemetery (5-10) (after Telegin 1991); the Kizlevy 5 site (11).

Site and context	Index	BP	calBC (2σ) *	Reference
The first period				
Surskoy Ostrov 2, lower layer	Ki-6691	7245±60	6227-6015	Kovaliukh and Tuboltsev 1998
Surskoy Ostrov 2, lower layer	Ki-6690	7195±55	6213-5988	Kovaliukh and Tuboltsev 1998
The second period				
Semenovka 1, lower layer	Ki-7679	7285±70	6351-6012	Kotova 2003
Semenovka 1, lower layer	Ki-6689	7125±60	6199-5847	Kovaliukh and Tuboltsev 1998
Semenovka 1, lower layer	Ki-6688	6980±65	5988-5737	Kovaliukh and Tuboltsev 1998
Semenovka 1, lower layer	Ki-7678	6850±70	5886-5630	Kotova 2003
Kamennaya Mogila 1, layer of the Surskaya culture	Ki-4022	7250±95	6362-5926	Telegin et al 2000
Kamennaya Mogila 1, layer of the Surskaya culture	Ki-4226	7170±70	6217-5911	Telegin et al 2000
Kamennaya Mogila 1, layer of the Surskaya culture	Ki-7667	7055±60	6049-5797	Kotova 2003

Tab. 4. ¹⁴C dates obtained from animal bone samples of the Early Surskaya culture (* calibrated by OxCal v.4., after Bronk Ramsey 2009).

3 site (*Tuboltsev 1995*). Domestic cattle, pig, horse, sheep and goat are known from the sites of the Matveev Kurgan group. The pollen of cereals and associated weeds were defined for the cultural layer of Matveev Kurgan 1 (*Krizhevskaya 1992*). Oval wattle-and-daub houses were also discovered there (Fig. 4). Hunting played an important role in the economy: wild boar, red deer, and roe deer inhabited the forests near rivers. Wild horses (Tarpan and Kulan), and wild donkey lived on the steppe between river valleys. All of them were hunted, supplementing the products of cattle husbandry.

The population of the Matveev Kurgan group were probably in contact with the bearers of the Rakushechny Yar culture. These contacts can explain the first ceramics and more advanced character of the economy of the Matveev Kurgan group in comparison with the economy of other synchronous sites. In that period, the East European type of animal husbandry was formed in the Azov Sea area. It was characterized by the complete absence - or insignificant numbers - of pigs, and a preponderance of horse, cattle, sheep and goat (*Kotova 2003*).

When the bearers of the Grebeniki culture occupied the south region of the steppe near the Azov Sea, there was a Mesolithic Kukrek population on the cen-

tral and northern part of the steppe along the Dnieper River. Perhaps the Vasilievka 2 and Marievka cemeteries belonged to that Late Mesolithic population. According to the radiocarbon dates, these cemeteries functioned *c.* 6900–6300 calBC. But it is possible that they are earlier, taking into account a reservoir effect.

The fourth phase of neolithisation is dated around 6300–6000 calBC. It was connected with the greatest aridity of the Atlantic period (*Spiridonova and Lavrushin 1997*), which was not a local phenomenon. It has been fixed in Anatolia and various parts of Europe, and connected with the dissemination of the farming and, with it, the onset of neolithisation in Europe (*Todorova 1998.68; Weninger et al. 2005; Budja 2007*).

Living conditions deteriorated in the steppe zone during the arid period: the forest in the river valleys disappeared, along with the forest animals. Steppe animals also suffered from the drought. As zoologists emphasize, extended aridity can reduce the food value, including vitamins, of forage. Poor nutrition reduces fertility in herbivores, sharply reducing herd sizes. In addition, mortality become considerably higher due to starvation and plague, and because of natural disasters and predators activity (*Ognev 1951.*

215). Therefore, long-term drought seriously reduces the available hunting resources of steppe regions and could be precisely the impulse that resulted in the wide distribution of domesticated animals and the adoption of pottery.

At the beginning of this arid period, the steppe population began to move to more humid regions: the basins of such big rivers as the Dnieper, Dniestr and Don, the northern part of steppe and to the forest-steppe zone. In these regions the Early Neolithic population retained old type of economy, with hunting playing a prominent role. But these migrations changed the cultural situation in the south of Eastern Europe.

At the beginning of this arid period, around 6300 calBC, two new Neolithic cultures appeared. The first was the Surskaya culture in the Middle Dnieper region (Fig. 5). The migration of the Grebeniki population from the Azov Sea steppe area to the Dnieper valley, where the big river

	Surskoy Ostrov 1	Surskoy Ostrov 2
<i>Bos taurus</i> L.	4–2*	114–23
<i>Capra</i> and <i>Ovis</i>	–	1–1
<i>Sus domestica</i> Gray	2–1	3–2
<i>Equus caballus</i> L.	–	30–7
<i>Canis familiaris</i> L.	1–1	6–5
In total domestic animals	7 – 4–12%	154 – 38–49%
<i>Cervus elaphus</i> L.	84–17	124–27
<i>Bos primigenius</i> Bojanus	79–11	1–1
<i>Capreolus capreolus</i> L.	–	2–1
<i>Sus scrofa</i> L.	15–4	1–1
<i>Canis lupus</i> L.	–	7–3
<i>Lepus europaeus</i> Pallas	20–10	4–3
<i>Vulpes vulpes</i> L.	20–8	5–3
<i>Meles meles</i> L.	2–1	–
<i>Spalax mycrophtalmus</i> Nordm	1–1	–
<i>Castor fiber</i> L.	–	2–1
In total wild animals	221 – 60–88%	146 – 40–51%
In total animals	228 – 64	300 – 78

Tab. 5. Faunal remains of the Surskaya culture (*The first figure is the number of the bones; the second figure – the minimum quantity of the species; the third figure – the percentage of the species from the total number of the animals listed here and in other tables).

mitigated the dry conditions, resulted in their coexistence with local Kukrek inhabitants and the formation a new culture on the bases of their respective traditions. It was probably at that time that pottery with line and pit ornamentation, polished tools and domestic pigs were borrowed from the Rakushechny Yar culture. The point-bottom pots and complicated band composition of ornamentation may be considered as the local innovations (Figs. 6.3, 19-23). Stone pots were also typical of the Surskaya culture (Figs. 6.1, 6.2).

The oldest site of the Surskaya culture is Surskoy Island 1 in the northern part of the steppe zone in the Dnieper valley (Figs. 6.1-18; 7.1-10). This site probably dates to the beginning of the drought, when forest with numerous wild animals (red deer, roe, wild boar and *Bos primigenius*) persisted in that region. This is why their bones are predominant in this collection, with the presence of only cattle and domestic pig -

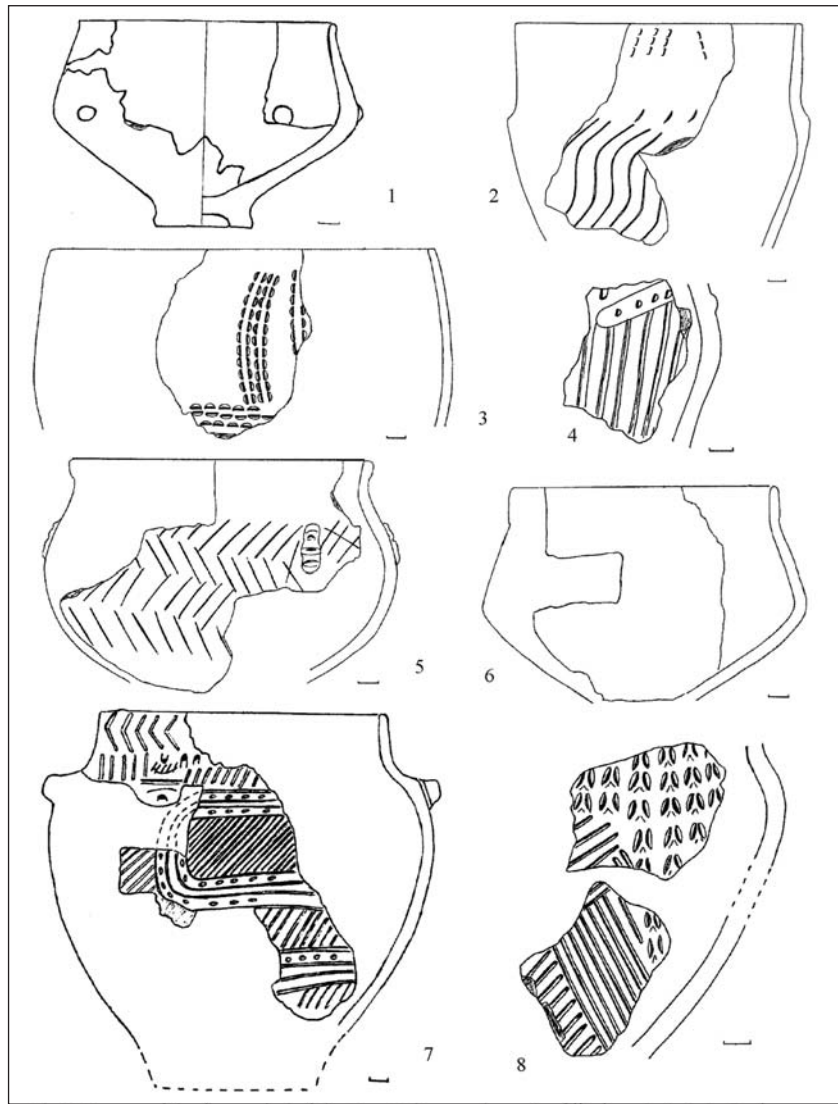


Fig. 9. Pottery of the first period of the Bug-Dniestr culture: 1 Glinskoe; 2, 4, 6, 8 Pechera; 3, 5 Sokoltsy 6; 7 Sokoltsy 1.

Site and context	Index	BP	calBC (2σ) *	Reference
Sokoltsy 2, lower layer	Ki-6697	7440±60	6439-6213	Telegin et al. 2000
Sokoltsy 2, lower layer	Ki-6698	7405±55	6416-6101	Telegin et al. 2000
Mitkov Ostrov, lower layer	Ki-6695	7375±60	6388-6090	Telegin et al. 2000
Bazkov Ostrov, lower layer	Ki-8166	7410±65	6426-6099	Kotova 2003
Bazkov Ostrov, lower layer	Ki-8167	7270±70	6336-6004	Kotova 2003
Bazkov Ostrov, lower layer	Ki-6651	7235±60	6225-6009	Telegin et al. 2000
Bazkov Ostrov, lower layer	Ki-6696	7215±55	6217-6002	Telegin et al. 2000
Bazkov Ostrov, lower layer	Ki-6652	7160±55	6208-5913	Telegin et al. 2000
Pechera, lower layer	Ki-6692	7260±65	6241-6008	Telegin et al. 2000
Pechera, lower layer	Ki-6693	7305±50	6329-6054	Telegin et al. 2000
Pechera, lower layer	Ki-8164	7205±70	6227-5929	Kotova 2003
Sokoltsy 1, lower layer	Ki-8165	7260±80	6351-5988	Kotova 2003
Dobrjanka 3	Ki-11105	7400±130	6356-6228	Man'ko 2006
Dobrjanka 3	Ki-11104	7320±130	6230-6095	Man'ko 2006

Tab. 6. ¹⁴C dates obtained from animal bone samples of the first period of the Bug-Dniestr culture (* calibrated by OxCal v.4., after Bronk Ramsey 2009).

the forest in the Dnieper valley was a favorable area for pasturing only these types of domestic animal.

It is possible that the Vasilievka 2 and Marievka cemeteries date to the first period of the Surskaya culture, too (Fig. 8.1–11). Their burial rites are very similar to other Surskaya cemeteries – Vilno, Vovnigi 1 (Kotova 2003). The common features are extended skeletons with the south-north orientation, and grave goods that include bone points, middle flint blades and, fish and red deer teeth. Tuboltzev has noted the common types of ornamented bone goods at Surskaya settlements and from the Vasilievsky 2 cemetery (Tuboltzev 2003.40) (Figs. 7.6; 8.5–11).

At around 6300 calBC, a new, Bug-Dniestr culture originated in the South of modern forest-steppe between the Bug and Dniestr. Its formation was very complicated and included local components (Grebeniki and Kukrek cultures) and two cultural impulses (from west and east). The flint tools were the heritage of local cultures. Most of the pottery was connected with a western cultural impulse (Fig. 9). It has an organic or sometimes invisible admixture. The pottery consisted of cups on pedestals and flat-bottomed pots with low necks and globular bodies. This pottery was ornamented with finger pinches, plastic bands, knobs on the ribs, and handles. All these features have analogies in the Early Neolithic of the Balkan region (Fig. 10).

The Bug-Dniestr ceramics are similar to the Monochrome pottery of the Balkan region, with the closest to the Ukrainian sites with Monochrome pottery being found in Bulgaria and Serbia (Stefanova 1996; Karmanski 1989; Bogdanović 2006). The oldest of these have been dated to c. 6500–6400 calBC (Weininger et al. 2005).

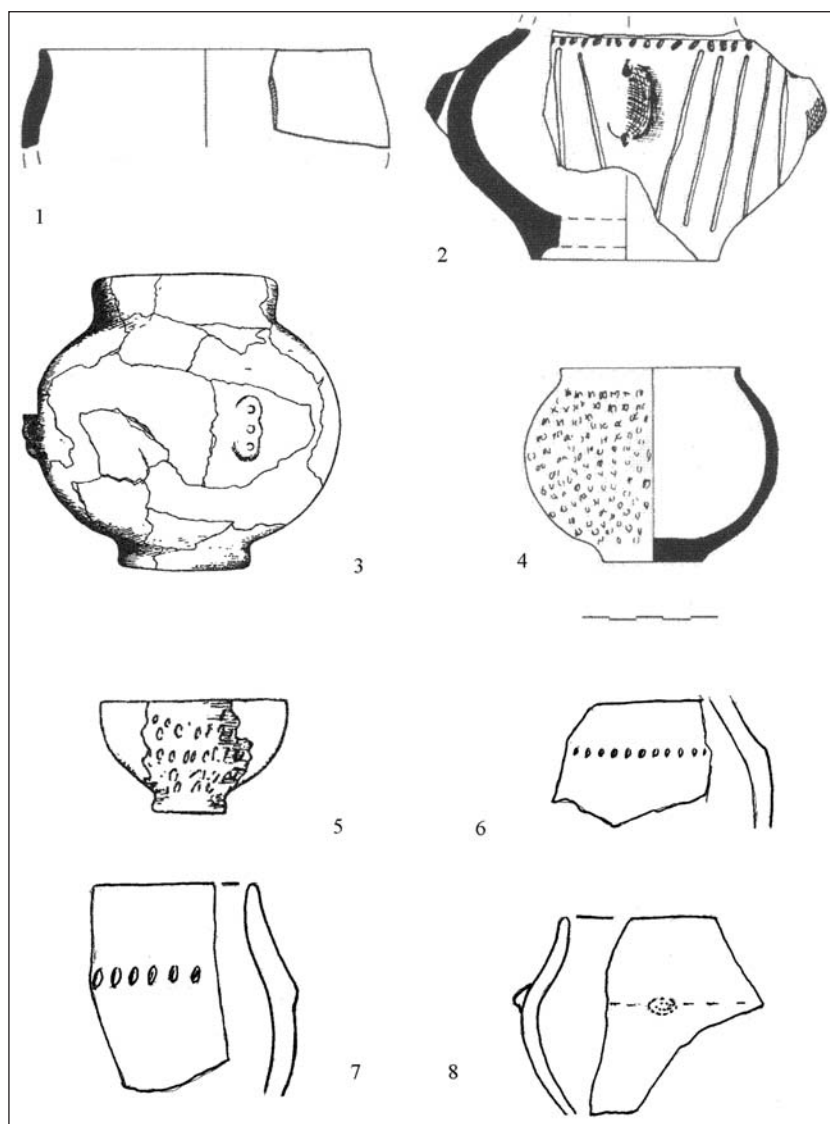


Fig. 10. Pottery of the Early Neolithic sites of the Balkan region: 1, 2 Koprivec; 3 Poljaniša (after Stefanova 1996); 4, 5 Donja Branjevina, layer 2–3 (after Titov 1996); 6–8 Grivac (after Bogdanović 2006).

The sites of the first period of the Bug-Dniestr culture probably constitute the most easterly group in Europe having the Monochrome pottery. Western elements in the Bug-Dniestr culture have two explanations. They can be a result of the separate migration of the Early Neolithic population from the Balkan region to the Middle Dniestr basin at c. 6300 calBC. However, I do not reject the idea that pottery and some elements of productive economy were borrowed from the western population.

It is interesting that similar sites have not been discovered in Romania, although it is understandable, because sites with Monochrome pottery are not numerous everywhere, and may perhaps be found in Romania, as well.

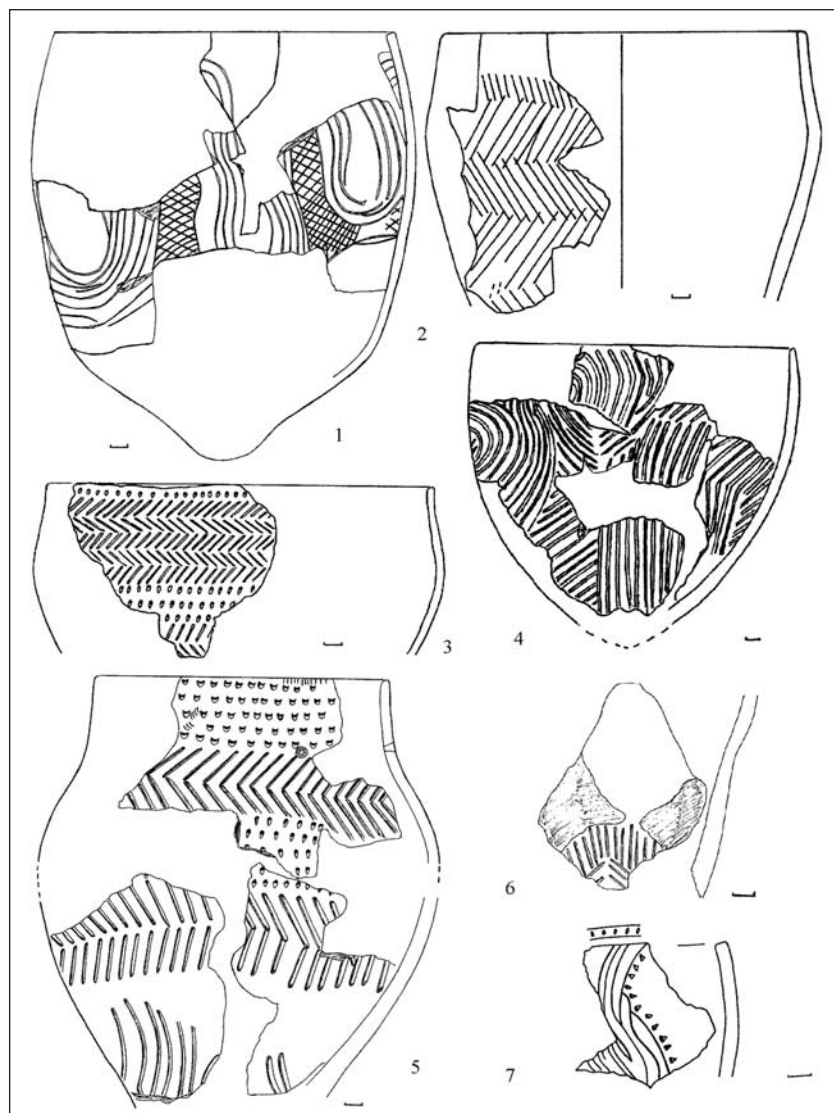


Fig. 11. Pottery of the first period of the Bug-Dniester culture: Bazkov island, lower layer (1, 2, 7); Sokoltsy 2 (3-6).

The eastern component of the Bug-Dniester culture consists of linear and impression ornamentation on a few pots with point bottoms (Fig. 11). These elements are similar to the steppe Neolithic pottery and could have been borrowed from the Neolithic populations of the Dnieper and Azov Sea area (Figs. 1.6, 10; 2.4-6). But another explanation is also possible. These types of ornamentation and point-bottom pots could have been innovations which appeared in the midst of Bug-Dniester population.

The animal husbandry of the Bug-Dniester culture consists of two herd compositions. Dniester herd structure was based on cattle and pig breeding. These domestic animals were known early in this region, at the Aceramic Grebeniki sites (Soroki 2). The structure did not change during the transition to the Pottery Neolithic.

Bug herd structure consists of cattle, pig, horse, sheep and goat (Kotova 2003). The composition testifies that the animals have been introduced from the eastern steppe region, where they were bred since 6900 calBC.

Numerous finds of hoes, grind stones and pestles at settlements allowed Danilenko (1969) to assume that the Bug-Dniester inhabitants were engaged in agriculture. As he emphasized, the territory of the Bug variant had included a zone of broad-leaved woods with occasional meadows. Only river banks and islands with fertile loess-silt soils accumulating during spring and autumn next to river ridges were suitable for agriculture. The topographical arrangement of fields caused the topography of sites to be located on banks, shores and islands.

Janushevich and Pashkevich investigated the imprints of cultivated plants on Bug-Dniester pottery (Markevich 1974. 152-153; Kotova 2003). Judging from the results of that

study, the Bug-Dniester population in the Dniester basin c. 6300-5900 calBC cultivated *Triticum monococcum* and *Triticum dicoccom*, as well as *Triticum spelta*. The people of the Bug variant cultivated *Hordeum vulgare*, *Panicum miliaceum*, and, probably, *Linum usitatissimum*. These data allow the assumption that the set of cultivated plants of the Bug variant was introduced together with conical-bottom pottery and cattle breeding from the steppe area. The agriculture was practiced by Matveev Kurgan group since 6500-6300 calBC. However, *Hordeum vulgare*, *Hordeum vulgare var. nudum* and *Panicum miliaceum* were cultivated in the Northern Caucasus at the Chokh site at about 6900 calBC.

The cultivated plants of the Dniester variant could have been borrowed from the Early Neolithic population of the Balkan region, together with pottery.

At about 6200 calBC, at peak aridity, the natural zones moved north. The steppe landscape occupied the forest-steppe zone (*Spiridonova and Lavrushin 1997*). The southern steppe became unfavorable to life. The central area could not provide sustenance for many people and some groups of the Rakushechny Yar, Surskaya and Bug-Dniestr populations moved north along the rivers and tried to find a habitable landscape and maintain the traditional economy. Due to this expansion, the neolithisation of the modern forest-steppe and forest zones of Ukraine and Russia began. For example, the big Dnieper-Donets culture was formed in Ukraine (*Kotova 2003*).

In this period, the valleys of the smaller rivers in the southern and central steppe probably became depopulated or were visited only occasionally. According to radiocarbon dates from Semenovka 1 and Kamenaya Mogila 1, some groups of Surskaya bearers dwelt in the basin of the Molochnaja River (Tab. 4). But the basic area of the Surskaya culture was the northern part of the modern steppe zone in the Dnieper valley.

During the drought, Surskoy Island 2 was inhabited in that region (Tab. 4; Figs. 6.19–23; 7.11–19). Cattle breeding and hunting (red deer, roe deer and wild boar) produced equal percentages of meat for the Surskaya inhabitants (Tab. 5). Cattle were the most numerous in herds, but some horses, pigs and a few ovicapries were also bred. Fishing played an important role.

A wet period replaced this long period of severe drought around 6000 calBC. At first, the maximum extent of the pine woods was in the western Asov Sea area, near the Molochnaja River (*Bezus'ko et al. 2000*). The Neolithic population began to return to the southern steppe. This was the beginning of the Middle Neolithic in the Pontic steppe, a period connected with a modification of the old Neolithic cultures and the formation of new ones.

Thus the expansion of the Neolithic package in the Northern Black Sea steppe was a long process, with four stages. Modifications in culture and economy were associated with climate change. The peculiarity of the Pontic steppe is ease of response to climate changes. During arid conditions, life in the region deteriorated and most of the population migrated to northern areas and maintained the traditional economy, in which hunting played a significant role. Fewer people changed economic strategies and adapted to the new climate and vegetation. One variant

of adaptation was to borrow early animal husbandry, agriculture and pottery. During the wet period, people returned in the south. All these migrations and, as a result, contacts with different cultures, modified the culture of the steppe population.

It is possible that neolithisation on the Northern Black Sea steppe began around 7500 calBC with early animal husbandry in the Western Azov Sea area. According to provisional data, the local population bred cattle, horse, sheep and goat. The second stage of neolithisation (6900–6500 calBC) was connected with the origins of the Rakushechny Yar culture in the Lower Don region. This population used pottery and bred cattle, pig, sheep and goat. The beginning of this stage coincides with an arid period around 7000–6900 calBC. The third stage of neolithisation (6500–6300 calBC) took place during a wet period, when the Grebeniki population migrated east and occupied the steppe zone from the Dniestr to the Don. In addition to early animal husbandry, the steppe population borrowed the first pottery from the Rakushechny Yar culture.

The period of aridity around 6300–6000 calBC played a key role in the neolithisation of Eastern Europe, with the Surskaya and Bug-Dniestr cultures appearing when it began. When the drought was at its most severe and the steppe landscape spread to the modern forest-steppe and forest zones, northward population movement increased, and neolithisation began in those areas.

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