NOMADISM AND PASTORALISM IN THE CIRCLE OF BALTIC-PONTIC EARLY AGRARIAN CULTURES: 5000-1650 BC

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DEDICATED TO THE MEMORY OF THE LATE MARIJA GIMBUTAS (23.01.1921 – 2.02.1994)

Editor's Foreword

This volume takes up the controversial problems of the early agrarian stage of "pastoral cultures". It contains the contribution of authors who are united in their conviction of the need to analyze the "classical" interpretation, which is of a monolinear, very dynamic development of the East European pastoralism and its Central European (or — to use a wider term — West European) manifestations. All articles were created under the Editor's authorization and they concern a special register of questions. The questions addressed are: genesis and changes of the given phenomena, functional requalification of economic and social systems, traditionally considered to be "pastoral" ones; as well as the reconstruction of fields of culture, considered to be particularly useful in analyzing the development of the civilizational trend (metallurgy, weapons), in which we are interested. The volume does not exhaust all the necessary aspects of the discussion. I hope that we will be able, in the near future, to present its continuation within the *Baltic-Pontic Studies*. Editorial comment

1. All dates in the *B-PS* are calibrated [see: *Radiocarbon* vol.28, 1986, and the next volumes]. Deviations from this rule will be point out in notes.

2. The names of the archaeological cultures (especially from the territory of the Ukraine) are standarized according to the English literature on the subject [e.g. Mallory 1989]. In the case of a new term, the author's original name has been retained.

3. The place names located in the Ukraine have been transliterat from the versions suggested by the author (i.e. from the Ukrainian, Polish or Russian originals).

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Aleksander Kośko, Viktor I. Klochko

NOMADISM AND PASTORALISM — AN OUTLINE PROGRAMME FOR A DISCUSSION

An inspiration for exposing the problems of concept meaning, mentioned in the title, and furthermore, the norms of their identification in the practice of archaeological studies, came from observation of the range of misunderstandings, a differentiation of perspectives, which we encounter in the most recent literature. These subjects, when considered in a time span of about 5000–1650 BC, are inseparably connected to the major research problems of European prehistory: the beginnings of pastoralism (time and location of origin) and the participation of shepherds in the cultural-ethnic transformation of the continent [cf. Gimbutas 1956, 1977, 1980, 1989, 1991].

In this volume, we compile several opinions which are particularly representative of the most recent thought, considerations which correct the previous interpretation standards. The texts presented here concern a borderland of the East and West of Europe, in general, the region between the Vistula and Dnieper. The selection of authors and subjects has been made with the intention of giving inspiration for further discussion.

1. Nomadism and pastoralism in terminological traditions of European archaeology are not definitively understood. We can encounter examples of their terminological identification. It becomes necessary to initially define the concepts of our field of research [cf. Dyson-Hudson, Dyson-Hudson 1980].

Nomadism is a wide concept which defines a certain life-style based on a stagecontinuous change of settlement (Greek *nomas* means a man who conducts a wandering lifestyle). In classifying nomadism, the basic categories are: generators, i.e. genetic-functional inspirations (hunting-gathering, early agrarian or pastoral), and the mechanics of land use. In the latter case, two kinds of space should be distinguished: the natural and the cultural. The nomads moved in set patterns: a continuous one (with routes of migration following routes of a definite species of animal), meridional (e.g. winter — south, summer — north), annular (e.g. around a network of water reservoirs) or vertical (mountain). Patterns also differed according to relations to settled communities or to those that were less mobile than themselves.

In this context, pastoralism would mean pastoral nomadism (Latin *pastoralis* = shepherding). In the classification of this type of nomadism, an important role is also played by the evaluation of the structure of the herd, or more comprehensively, breeding technology. From among its many regional ("continental") forms [Shnirelman 1980], our attention is focused around the Euro-Asiatic trend.

The origin of Euro-Asiatic pastoralism is connected mainly with the local process of "taming the steppe" between the Ural and the Dnieper. The base of knowledge on the basic trends of this process we owe to Russian researchers [f.e. Gorodtsov 1905; 1907; Merpert 1974] and to Ukrainians [f.e. Makarenko 1933; Lagodovska, Shaposhnikova, Makarevich 1962; Telegin 1973; Danilenko 1974]. An important role in a wider exposition of this contribution was played by some Anglo-Saxon researchers [f.e. Childe 1926; Gimbutas 1956, 1977, 1980, 1989, 1991; Mallory 1976, 1977; 1989; Anthony 1986] and, to a lesser extent, by representatives of continental, Central European archaeology [e.g. Ecsedy 1979; Haüsler 1981; Kośko 1985]. The basic features of the observed picture of the beginnings of Euro-Asiatic pastoralism were outlined as if marginal to a discussion of the "turning point" in the history of the continent, its Indo-Europeanization.

2. The essential features of the "model" interpretation of the problems in which we are interested may be characterized as follows:

- the point initiating the history of the "taming of the steppe" was the use of horses for horseback riding, which may be dated, on the basis of what has been established at Dereivka, to ca. 4000 BC [Telegin 1986; Anthony, Telegin, Brown 1991];
- another turning point in the development of pastoralism was the occurrence of "the developmentally critical triad" [Anthony 1989]: breeding of sheep in herds, the use of horses for long-distance riding and of carts, which meant the formation of a "typical" pastoral community and which was supposed to occur, at the latest, in 3150/3000 BC.

In this interpretation, there is no distinct delimitation of the pastoral economy, no unequivocal definition of the above mentioned "early pastoralism". It concerns, in particular, norms of its "exclusion" from the framework of a widely understood agrarian economy [cf. inspiring observations from Mikhailovka: Lagodovska, Shaposhnikova, Makarevich 1962]. The boundary between the breeding segment of the agrarian community and the pastoral community may, therefore, evoke a number of discussions. "The proof of a pastoral character" is usually provided by the data on settlement and to a smaller degree by other premises: subject (cultural equipment) or archaeo-zoological. In the case of the former, additional difficulties are

created by the lack of a more thorough knowledge of the steppe and forest-steppe palaeoecology [Shilov 1975a].

The Eneolithic communities of Early Bronze Age shepherds, outlined in such a manner, would be characterized by a significant aptitude for cultural and even ethnic transformation (cf. Indo-Europeanization hypothesis) in a particular circle of communities: the Northern Pontic (Black Sea) area or the Balkans. However, the immediate regions of their settlement expansion are connected closely with the steppe band, which cut towards the West, onto the areas of the Carpathian Basin along the Danube and the Tisza [Alexeyeva 1976, 1978; Dergachev 1986; Yarovoy 1985; Ecsedy 1979]. Apart from the above mentioned area, the majority of the Black Sea pastoral communities in the West European cultural environments are found in the form of formally differentiated "influences". This also directly concerns the area of the catchment of the Baltic (more broadly: Central Europe) in which we are interested [Kośko 1991].

The key issue in studies of this territory is the relation of the so-called "influence" to the process of late-Neolithic nomadization. "Late-Neolithic nomadization", most often identified with the formation of the Corded Ware culture circle [Merpert 1976; Buchvaldek 1986], is documented mainly in sphere of settlement observations — the disappearance of relatively stable settlements for the sake of development of "episodic" settlement forms: camps and, in particular, camping-places. One of the spectacular manifestations of this process is the development of "burial ground cultures" ("grave" cultures) — proven exclusively (or almost exclusively) through means of sepulchral sources. In the interpretations of this phenomenon, a motif of the "crisis of agriculture" dominates [cf. a different interpretation: Neustupny 1969]. Particular authors differ in their estimates of the depth of the above mentioned process and in the participatory scope of the exogenous generators — to be more precise, the Pontic pastoral cultures [Machnik 1966; Merpert 1974; Buchvaldek 1986; Milisauskas, Kruk 1989].

3. The above outlined picture of the "model" interpretation requires important corrections. Its indispensability results, first of all, from the modification of interpretations of the origin of development of the "lair" of pastoral cultures, noticeable in the 80's and 90's. This also concerns Russian studies of the centers situated between the Don and the Ural [Matyushin 1982; Vasilyev 1981; Vasilyev, Sinyuk 1985], as well as the Ukrainian ones connected with the region between the Don and the Dnieper [Telegin, Potekhina 1987; Rassamakin 1993]. In this publication our attention is focused on the latter.

Changes in the character of the oldest pastoral culture (the "pre-Yamnaya" and "Yamnaya" stages) concern: the increase in complexity of taxonomic recording of their development and extension of critical reflection on the myth of the Eneolithic — Early-Bronze macrospatial pastoral cultures, reconstructed in this version according to the norms of "standard systems" that have been historically recognized. The first modification suggests a conclusion that there was a great polylinearism in the process of "taming of the steppe". Its derivative is an observation that there is a need to develop many anthropological models of clarification of the indicated phenomena, and further the requirement for revision of the said myth. The place of "Scythian-like" or even "Mongol-like" Eneolithic — Early-Bronze shepherds is taken by a cultural mosaic of the region and communities having different experiences in the economic field of specialized breeding. This brings about the question of the principles of delimitation of the caesura of the "pastoralism proper". Within this reflection a tendency towards restriction in their location becomes prominent-maximally as long as the beginnings of the Iron Age.

Therefore, could these oldest communities — let us call them *quasipastoral* — have at their disposal the ability that was hitherto utilized to destroy the Balkan-Central European cultural area, among others, in the Baltic catchment area? It becomes particularly important when considered together with the extension of the documentation of the presence of the Pontic component in the development of the Vistulian Corded Ware culture [Kośko 1992].

The doubts that have been outlined here are justification of the need for a prompt reconstruction of the co-ordinated research programs on:

- reconstructing early forms of breeding nomadism;
- revealing in their development of the position of pastoralism (including the definition of criteria of separation of "pastoralism proper");
- showing the stages of spatial progression of this form of culture.

The territory of the borderland between Eastern and Western Europe should have a special place in such a program, and is justified by the position of this area in the previous conceptions of the "pastoral turn" — "a crucial moment" in the history of the continent. The collection of works presented in this volume should be conducive to the reanalysis of a number of views and open a wider forum for discussion.

Translated by Andrzej Pietrzak and Karen Laun

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Mihailo Y. Videiko

TRIPOLYE — "PASTORAL" CONTACTS. FACTS AND CHARACTER OF THE INTERACTIONS: 4800–3200 BC

Many archaeologists were interested in questions of interaction between the population of the Tripolye culture and their Eastern ("steppe") neighbors [Gimbutas 1974; Movsha 1961, 1984, 1988, 1993; Danilenko 1974; Dergachev 1980, 1986; Tzvek 1989; Kośko 1991; Mallory 1977 and many others]. It is generally accepted that Pontic pastoralists played an important role in the history of Europe in the Copper Age. But when and how did they appear? When did nomadism and pastoralism appear as branches of stock-breeding? The critical study of archaeological sources from the territory of the Ukraine show us the possibility that it was later than the Copper Age [Shnirelman 1980: 89-90, 240-243]. We consider the question about Pontic migrations into Danube basin and other European areas in Chalcolithic period to still be open. It is a large field of research.

Tripolye culture was on the borders of European civilization with the "steppe" world for a long period of time — close to 1600 years (Fig. 1-3). We shall write here about only two main problems:

- Tripolye and the spread of the food-producing economy in the Northern Pontic zone;
- Tripolye protocities and the "steppe tribes".

1. ABSOLUTE CHRONOLOGY AND CULTURES IN THE NORTHERN PONTIC AREA IN THE COPPER AGE

All chronology of this period is connected with periodization and chronology of Tripolye-Cucuteni. We have many types of such periodization and chronology [Passek 1949; Chernysh 1982: 171-175, Tab. 8-10; Telegin 1985c, 1991; Patokova et



Fig. 1. Copper Age cultures: I — Tripolye A, II — Gumelnița (Bolgrad-Aldeni type). After Arkheologiya 1985: Map 5.



Fig. 2. Copper Age cultures: I — Polgar, II — Baden, III — Tripolye, IV-V — Sredny Stog Unity; VI — Nizhnemikhailovka culture; VII — Copper Age of Crimea. After Arkheologiya 1985: Map 6.



Fig. 3. Copper Age cultures: I — Funnel Beaker culture; II — early Yamnaya culture; III — Tripolye C-I and C-II; IV — Pit- and Comb-Pottery culture. After Arkheologiya 1985: Map 7, changed by Author. Tripolye C-I and C-II: 1-5 Koshylovcy-type (end C-I); 6-17 — Zhvanec (Brynzeny) type (C-II); 18-35 — Tomashivka type(C-I): 18 — Teplik, 19 — Popudnia, 20 — Mankivka, 21 — Dmitrushki, 22 — Uman (Pankivka), 23 — Tomashivka*, 24 — Stary Babany, 25 — Sushkivka *, 26 — Dobrovody *, 27 — Talyanki *, 28 — Talne-1, 29 — Maydanetskoye *, 30 — Kolodiste *, 31 — Rozsokhuvatka *, 32 — Chichirkozivka *, 33 — Stara Buda, 34 — Vasilkove *, 35 — Kaytanivka; 36-39 — Kanev type (C-I); 40-51 — Kolomiyshchyna type (C-I); 52-57 — Lukashi type (end C-I); 58-71 — Sofievka type; 72-76 — Troyanov type; 77-92 — Gorodsk type; 93-112 — Usatovo type; 113-120 — Tripolye materials in mound burials (C-II): 113 — Yermolayevka, 114 — Olshanka, 115 — Serezlievka, 116 — Zhivotilivka, 117 — Bilozirka, 118 — Libimivka, 119 — Krivyi Rig, 120 — Sokolivka

* - Tripolye protocities

al. 1989]. In this paper we use periodization, as created by T. Passek, with verifications of N. Vinogradova [1983], and with its connections with Cucuteni periodization [Chernysh 1982: 175, tab.10].

Absolute chronology of Tripolye-Cucuteni:

Tripolye A — Precucuteni I,II,III:	4800–4500 BC
Tripolye B-I — Cucuteni A (1-4):	4500–4200 BC
Tripolye B-I/II — Cucuteni A-B (1-2):	4200–4000 BC
Tripolye B-II and C-I — Cucuteni B(1-3):	4000–3500 BC
Tripolye C-II:	3500-3200 BC
The Gumelnita (Bolgrad-Aldeni type) was contemporary	with Tripolve A and partly



Fig. 4. Synchronization of Tripolye and "steppe" chalcolithic cultures.

with B-I [Subbotin 1983: 130, tab.11]. The "steppe pastoralists" were represented by (Fig. 4):

1. The Sredny Stog Unity — former Sredny Stog culture, which is now divided into: Skelanska culture — in the steppe and forest-steppe, in the river valleys of Dnieper and Don (contemporary with the end of Tripolye A — Tripolye B-I); Kvitanska culture — in steppe and partly — forest-steppe areas near the Dnieper; Stog group — in the steppe part of the Dnieper area (contemporary with Tripolye B-I/II — B-II); Dereivka culture — in the forest-steppe part of the Dnieper basin, on Northern Donets and Oskol rivers; Molukhiv Bugor type — in the forest-steppe, on the right bank of the Dnieper, near the borders of the Tripolye Kosenivka-type, including the former Pivikha type (contemporary with Tripolye C-I (?) and C-II). All types and cultures are connected with one another by their origin [Rassamakin 1993]. 2. Nizhnemikhailovka culture, on the Dnieper and in the Azov region (contemporary with Tripolye B-I(?) — C-II) [Shaposhnikova 1987; Rassamakin 1993].

There were other "steppe" cultures at different times on the Don and in the East Azov region: Azov-Dnieper, Donets, Khvalynsk, Kuban, Konstantinovka, and Repin cultures, which were more connected with the Caucasus than with the Western areas.

2. TRIPOLYE AND SPREAD OF THE FOOD PRODUCING ECONOMY IN THE NORTHERN PONTIC AREA

The first elements of husbandry appeared there a long time before the Tripolye culture, at the end of the Late Palaeolithic period or Mesolithic period. Among thousands of flint implements at the site of the Late Mesolithic settlement Mirnoye (Odessa region), G.F. Korobkova singled out 16 tools for harvesting [Korobkova 1989: 63-76].

The first Neolithic agricultural population was connected with the cultures of Kriş and Linear Pottery, which spread between 6000–5000 BC in the Moldova and Ukraine territories. Under the influence of this European Neolithic culture, some features of husbandry appeared in the economic systems of Bug-Dniester and Dnieper-Donets culture populations, but the foundation of this system was based on hunting, fishing and gathering [Pashkevich 1991; Korobkova 1987: 151-169, 1989: 70-73].

When the first Tripolye population appeared to the East of the Romanian Carpathians (around 4800–4700 BC), limited tribes of the Bug-Dniester culture lived on the Southern Bug (phase Savran), in settlements where Tripolye imported pottery was discovered [Shaposhnikova, Tovkailo 1987; Burdo 1993b]. It is interesting to note that these settlements are in the river valley, but also in the steppe region (Fig. 1).

The emergence of Tripolye A (Precucuteni I-III) was connected with the Neolithic Boian culture (phase Boian-Giuleşti) and influenced by Kriş, Linear Pottery and other cultures [Zbenovich 1989: 171-186]. The food producing economy of the Boian culture was based on developed agriculture (Triticum mon., Triticum dic., Hordeum vulg., Vicia, stone or antler mattock) and cattle-breeding (cattle up to 80% of herd) [Comşa 1974: 53-58]. The emergence and spread of Tripolye-Precucuteni took place during the dry Holocene subperiod [Petrenko 1992: Fig.1], when the ecological situation in the foothills was unfavorable. When the Tripolye A culture appeared on the Southern Bug, its area increased. This was the territory of the forest-steppe zone with grasslands, cereal-partigrass steppes on watersheds, and



Fig. 5. Skelanska culture pottery from: 1-4 — Soloncheny-II, 5-6 — Kadievcy, 7 — Floreşti (Zagotzerno). After T. Movsha.

groves of trees (lime-tree, oak, hazel, hornbeam, birch) [Kremenetski 1991: 80, 111-112].

Tripolye A agriculture was similar to the Boian system. Only one new type of tool appeared, for example the antler "ploughs" — one was discovered in Khrebenikiv Yar, to the East of the Southern Bug (excavations of N.B. Burdo), and more in Moldova, which they dated to the end of Tripolye A or Tripolye BI/II — Cucuteni A-B [Burdo 1993b; Sorokin 1991: 108-111, 145]. The position of hunting in meat production increased — from 34.1% in Traian — Dealul Viei (Precucuteni I) to 59.2% at Bernashivka (Precucuteni II) — on the Dniester and 48.8% at Sabatinivka II on the Bug [Zbenovich 1989: 152]. Environmental conditions in the new areas were so favorable for the foraging economy that Tripolye, with its old food producing economy traditions, had some features similar to the Bug-Dniester or Dnieper-Donets cultures' economic systems.

The next period, i.e. Tripolye B — Cucuteni A and A-B, was more favorable for the producing economy because it coincided with the humid phase of Holocen [Petrenko 1992]. The Tripolye culture population appeared on the Middle Dnieper and formed a local group between the Southern Bug and Dnieper, which is now known as the East Tripolye culture [Tzvek 1985, 1989]. Other local groups, Soloncheny and Zaleshchyky, were in the Western areas between the Southern Bug and Prut rivers (Fig. 2) [Vinogradova 1983]. All the forest-steppe areas to the West of the Dnieper were divided between Tripolye chiefdoms and tribes, which corresponded with this local group type [Chernysh 1982: 236-238].

The first evidence of interactions between the Tripolye and the "steppe" Chalcolithic communities appears at the end of Tripolye A (Precucuteni III). It is a fragment of pot from Luka Vriblivecka, similar to the pottery of the Skelanska culture (or the period Ib of Sredny Stog) — it is an import or a sign of influence of the previous culture (Fig. 4) and two fragments with broken shell in clay [Burdo 1993a: 28, Fig. 3:7]. During the period of Tripolye B-I/ Cucuteni A3-A4, their quantity increased. At first, there were lower parts of the Skelanska culture pottery and some other fragments from the Tripolye-culture settlements Soloncheny, Floresti--Zagotzerno, Kadievtsy, Vasilivka, Drăgușeni, Novye Ruseshty-1 and other (Fig. 5) [Movsha 1961, Fig.2:5; Zbenovich, Shumova 1989: Fig. 2:15,16,17; Crişmaru 1977: Fig. 42:1,2]. All these settlements are from the West Tripolye areas. There are some imports in the East-Tripolye culture in the Tripolye B-I period: in Berezivka, Krasnostavka, Chizsovka, Sabatinivka-I, Pechera, Cherniavka, Onoprievka, also connected with the Skelanska culture (Fig. 6) [Danilenko 1974: Fig. 68:3,10,11; Tzvek 1989: 111-112, Fig. 4:4]. We must note that such "steppe" features as the broken shell in clay pottery were also present in the Neolithic cultures of Boian and Sredny Stog [Danilenko 1969; Comşa 1974]; a long time before the Sredny Stog cultural unity appeared, so the shell is not only a "steppe" tradition.



Fig. 6. Skelanska culture pottery from Tripolye settlements: 1 — Krasnostavka; 2-4 — Sabatinivka-I. After O.Tzvek and V.Danilenko.

We have real imports from the Skelanska culture in only a short period — from the end of Tripolye A-Precucuteni III to the beginning of Tripolye B-I/II — Cucuteni A-B1 (around 4600–4300 BC). Only some features of this pottery became part of the Tripolye pottery-making tradition from the period of Tripolye B-I/II (Fig. 7). The clay with the broken shell admixture was used for production of the Tripolye pottery forms: pear-like vessels, hat-like lids and other types. According to V.N. Danilenko, the spread of the "steppe" pottery in Tripolye was connected with the spread of milk-husbandry under a nomadic influence [Danilenko 1974: 104]. It is interesting to note that ceramic types connected with milk-husbandry, such as different strainers and jars, are also known in Tripolye A — Precucuteni I-III [Zbenovich 1989: Fig. 47, 45:16, 69:3]. So the question about the direction of influence is open.

The next problem is one of horse domestication. The great quantity of horse bones at the "steppe" settlements, the stone horse-head sceptres, and bone cheekpieces created the theory that this process was connected only with the "steppe"



Fig. 7. "Steppe" imports from: 1-2 — Cucuteni A-B settlement Draguseni; 3 — from Gumelniţa (Bolgrad-Aldeni type) settlement Taraklia; Tripolye BI/II pottery with some "steppe" features: 4-7 — Klisciv. After A.Crişmaru, S.Ryzhov and I.Zayets, I.Manzura and V.Sorokin.

communities (Danilenko 1974; Telegin 1973; Anthony, Telegin, Brown 1991 and others).

The beginning of this process is dated by the stone sceptres from the Chalcolithic burial mounds of the Northern Pontic zone (Alexeyeva 1992: Fig. 3:1,4). Similar sceptres were discovered at the Tripolye-Cucuteni settlements of Berezivka, Verhna Zsora, Obrisheni, Fedelesheni [Danilenko, Shmaglij 1972: 7, Fig. 2:4; Dergachev 1986: 73], which are dated to the periods of Cucuteni A3 — Cucuteni A4 (around 4500–4300 BC). In the region of interaction between the Tripolye and Sredny Stog Unity, most of the sceptres were discovered at the Tripolye — Cucuteni settlements. Only two were in the "steppe" burials: Suvorovo and Kasimcha, which are near the territory of the agricultural communities [Dergachev 1986: 59]. The tradition and technology of production of the polished stone articles was unknown to the population of the Skelanska culture, but well known to the Copper Age population of the Balkan-Carpathian region. According to investigations carried out by V.F.Petrun, the sceptres from Beresivka (on the Southern Bug) were produced from the local raw material. The highest percentage of horse bones was in Dereivka -55% [Telegin 1973: 133, tab. VII], which is dated now to the period of Tripolye C-II [Movsha 1993: 47] — around 3500 BC. In the earliest settlement — Sredny Stog II, which was contemporary with the Tripolye B-I/II: 4300-4100 BC (after the end of the epoch of sceptres) this percentage was no more than 15% [Telegin 1973: tab. VII]. Before this time, the horse was common in the Tripolye and Gumelnita population herds of the Northern Pontic region: Tripolye A — from 2.5% to 8%, Gumelnita (the Bolgrad-Aldeni type) — from 3.2% to 16.8% [Subbotin 1983: 95, tabl.8].

The most interesting situation was in the region of the lower Danube and Dniester, which was occupied by the Bolgrad-Aldeni population (Fig. 2). The ecological situation here, at around 4600–4300 BC, was favorable for stock-breeding and agriculture [Kremenetski 1991:137] and close to 27 settlements appeared to the east of the Lower Danube — on the banks of the liman lakes and small rivers in the steppe zone [Subbotin 1983: 6-8, Fig.2]. The economic system of the Bolgrad-type population was based on developed agriculture and stock-breeding. The most important animals in the herd were cattle (26-58%) — up to 81.5% of the meat production, the percentage of sheep was sometimes up to 45.7%, but it was not more than 7--10% of the total meat produced. The horse was well-known: at the early settlement of Kokora 1 — 16.8%, at the late period settlement Bolgrad I — 15.4% [Subbotin 1983: 94-97]. The Bolgrad-Aldeni type gave the earliest and the first real example of the food-producing economy in the steppe zone of the Northern Pontic region during the Copper Age. This population had different contacts with the "steppe" population.

At the settlement of Taraklia (Moldova) a pot was found, it may be a "steppe" import (Fig. 7:3), in Bolgrad I — shell beads [Manzura, Sorokin 1990: Fig.1:9;



Fig. 8. Settlements and mound burials with Tripolye B-II and C-I pottery. I — settlements: 1 — Konecpol, 2 — Grushivka-Ostriv, 3 — Bogdanivka, 4-5 — Gard 1,3, 6-7 — Gard 4, 8 — L.Gard, 9-10 — Pugach, 11 — Novorozanivka; II — mound burials: 1 — Konstantinivka 2,m.1,b.23, 2 — Kovalivka, m.4, b.32, 3 — Serezlievka, m.4.

Subbotin 1983: 131]. Copper and gold articles from the Balkanian centers were discovered in burials of the Skelanska culture [Rassamakin 1993]. Some burials of this culture were near the of the Bolgrad-Aldeni type, among them the burial with the stone scepter from Suvorovo.

The early Tripolye may have been the second center of horse domestication in the first half of the 5th millennium BC. In Tripolye we have horse bones: from period A — Precucuteni I-III (before the "steppe" horseback-riders of the Sredny Stog Unity appeared), clay and stone sculpture, and painting with horse images. The process of domestication may have taken place in the forest zone of Europe, beginning with the aboriginal, large forest horse. We can see, in this process, the development of the domestication experience in societies with stable and old traditions of the stock-breeding [Bibikov 1953: 244-247]. The first evidence of horseback-riding was found in Dereivka (the Dereivka culture, or Sredny Stog-IIa) which dates 600–700 years later than Tripolye A and the Bolgrad-Aldeni type.



Fig. 9. Tripolye B-II period pottery from Novorozanivka settlement on Ingul-river.

The next period was more favorable for the spread of the Tripolye-culture population in the steppe zone, at first in the valley of the Southern Bug (Fig. 8). More than ten settlements with painted pottery of the Tripolye BII-CI periods were found there: Gard, Gard-3, Gard-4, Vinogradny Sad, Tashlyk-4, Novorozanivka (on



Fig. 10. Tripolye B-II and C-I periods pottery from "steppe" burials: 1 — Koshary (Odessa reg.) b.20, 2 — Khadzhider (Odessa reg.), m.6,b.4, 3 — Igren-8 (Dnepropetrovsk reg.), 4 — Rotmistrivka (Cherkassy reg.), 5 — Novo-Kotovsk (Odessa reg.), m.1, b.8, 6 — Igren-8. After S.Agulnikov, V.Petrenko, T.Movsha.

the Ingul river), and others [Movsha 1993: 41, Zbenovich 1974: 64]. In the cultural layer of these settlements pottery of the Sredny Stog Unity and painted pottery of Tripolye culture, and local groups Nebelivka and Tomashovka, were found (Fig. 9). According to O.G. Shaposhnikova, they were a new type of Tripolye settlement, connected with the mobile stock-breeding in the steppe zone [Shaposhnikova 1989: 7]. V. Kruts wrote about them as places of exchange, winter settlements of the herd-smen who belonged to the "steppe" population [Kruts 1989: 131-132]. According to T.G. Movsha, they were connected with the settling of the Tripolye population, which produced corn and cattle for exchange with the "steppe" communities and they were attempts of territorial expansion of the Tripolye in the steppe region [Movsha 1993: 40-41]. But this "expansion" was connected only with the river valleys and the character of the settlements is different than in the forest-steppe. Whether or not these settlements were Tripolyan is the problem which must be investigated.

Painted Tripolye pottery of the C-I period was found in the burial mounds in the Southern Bug region: Serezlievka (mound 4), Bogdanivka (mound 1), Konstantinovka and Pribugske. These burials belong to the Niznemihailovka culture [Movsha 1993; Rassamakin 1993]. It was the beginning of a tradition of putting the prestigious Tripolye pottery into the "steppe" graves, a tradition which flourished after 3500 BC (Fig. 10).

The river valleys were, at first, places for hunting, fishing and gathering of stone and raw flint for all populations — Tripolye and "steppe". All settlements were situated near fords and crossing-places [Movsha 1993: 42]. The period between 4000–3500 BC was the time when we had some "steppe" imports in the Tripolye settlements of the forest-steppe zone. It may have been a period of spread of the Tripolye influence to its neighbors. When V. Danilenko wrote about the antagonistic relations between the "steppe, stock-breeding" and the Tripolyan agricultural population, he considered it to be based on a division of labour between the populations which lived in different ecological conditions (steppe and forest-steppe). But he wrote in his book only about sceptres and pottery — archaeological evidence of interactions [Danilenko 1974: 92, 94-106]. N. Merpert had another view. In his opinion there was a long period of influence of societies with a producing economy in the Northern Pontic area on the cultures of hunters-fishers, especially in the forest-steppe(!) zone [Merpert 1982: 322-323].

The majority of the Sredny Stog Unity settlements were situated in the forest-steppe [Telegin 1973: 131]. Settlements of the Nizhnemihailovka culture and Pivikha (or Molukhiv Bugor) type were in similar locations. We have little data about the agriculture of these communities. At the Molukhiv Bugor settlement (Cherkassy region) some imprints on pottery were found: Triticum monococcum, Hordeum vulgare and Panicum miliaceum; at Lysa Gora (Poltava region) — Triticum dicoccum, Panicum miliaceum, Vicia ervilia; at Prisya (Poltava region) — Panicum miliaceum; at Mihailovka (Kherson region), in the lower layer — imprints of Triticum dicoccum, Hordeum vulgare, Panicum miliaceum [Pashkevich 1991: 14--16]. Triticum monococcum and dicoccum, Hordeum vulgare were the main cereals in Tripolye culture from the earliest periods and unknown for the population of the neolithic cultures on the Dnieper before the spread of the Tripolye to the East [Pashkevich 1991: 26-27].

The tools connected with agriculture are also not numerous. Antler hoes were found in Dereivka and Molukhiv Bugor [Telegin 1973: 74-75]. Flint sickles were produced in large blades [Telegin 1973: 69, Fig. 36:2]. The antler hoes are similar to Tripolye culture tools which were found in settlements in areas between the Southern Bug and Dnieper, for example — at the Vladimirovka settlement of the Tripolye B-II period [Passek 1949: Fig. 47] (Fig. 11). The sickles on large blades are also typical of the Tripolye culture B-II period [Korobkova 1987: Fig.47; Passek 1949: Fig. 58:2,6]. There are some flint sickles of the Karanovo-type, which were typical of the Tripolye culture of previous periods among the materials of the "steppe" settlements. So we can say that agricultural spread in the forest-steppe zone (in Sredny Stog Unity and other cultural types) was connected with the Tri-



Fig. 11. Agriculture tools from Tripolye and Dereivka cultures (Tripolye — from Vladimirovka and Polivaniv Yar; Dereivka — from Dereivka). After T.Passek and D.Telegin.

polye influence or population. It took place in a period not before Tripolye B-II — after 4000 BC.

More complex is the question about the spread of stock-breeding. Some authors considered it to be before the spread of agriculture [Danilenko 1969, 1974: 25--29; Telegin 1971b: 21], others — to be connected with Western cultural influences [Shnirelman 1980: 89-91]. The earliest cultures of the Sredny Stog Unity dated near 4500-4300 BC (on the evidence of Tripolye A or B-I periods pottery imports), were closely connected with Tripolye-Cucuteni and Bolgrad-Aldeni (Gumelnita) cultures. So the Western influence was connected, at first, with these cultures (except the region of the Don, where the influence of the Caucasus was predominant). The herds of the Sredny Stog Unity (except for the high percentage of horses) is similar to Tripolye data [Telegin 1973: 133; Zbenovich 1989: 152]. The Dereivka settlement represented the end of the creation of stock-breeding husbandry in the forest-steppe zone [Telegin 1986]. Dereivka was contemporary not with Tripolye C-I, but with C--II [Movsha 1993: 47], so it was the period after 3500 BC. The Dereivka culture was formed (according to N. Kotova) on the base of the Stog group, Kvitanska culture, Dnieper-Donets culture, late Tripolye and Funnel Beaker cultures only in the forest-steppe, because the steppe zone at this period was occupied by the Repin culture (connected with the origin of Yamnaya culture), which was under Caucasian influence. The forest-steppe cultures marked only the beginning of the history of real steppe unities, which were probably connected with mobile forms of stock--breeding [Merpert 1982: 325]. So the beginning of pastoralism and nomadism in the Pontic steppes can be dated after 3200-3000 BC and was connected with the global aridisation of climate at the end of the Atlantic/beginning of Subboreal. In the Copper Age, other pre-conditions of this process appeared: horse domestication, wheeled transport, and developed stock-breeding. The first semi-nomadic traditions were closely connected with the centers of the high civilizations, Sumer at Near East and Vinča in Europe [Nikolayeva 1991:85]. But the neighbors of the pastoralists' ancestors were Tripolye and Bolgrad-Aldeni, not Vinča, as we show in this article.

3. THE TRIPOLYE PROTOCITIES AND THE "STEPPE" TRIBES

In the second half of the 5th millennium BC, on the territories between the Southern Bug and Dnieper, large settlements of Tripolye culture appeared. At first, they had near 20-60 square hectares, as in Tsciszovka or Onoprievka (Tripolye B-I), then they increased to 150-200 ha, as in Vesoly Kut or Miropolye (Tripolye B-I/II)



Fig. 12. Plans of Tripolye proto-cities (after V.Dudkin): 1 — Maydanetskoye, 2 — Talyanki.

[Tzvek 1980: 175-180]. Around 4200–4000 BC, such settlements appeared in other Tripolye areas — in Moldova and Podolye [Markevich 1973; Videiko 1993]. The period between 4200–3500 BC was the time of the largest Tripolye protocities, such as Talyanki (450 ha, up to 2800 buildings, population near 14,000), Maydanetskoye (200 ha, up to 2000 buildings, population near 10,000; Fig. 12) in the areas between the Dnieper and Southern Bug [Kruts 1989; Shmaglij, Videiko 1993]. They had powerful fortifications of two-story buildings (Fig. 12,13) and large public buildings. Near the large settlements, within 4-7 km, were small villages (2-9 square ha) from 10 to 120 buildings (Fig.14) [Shmaglij, Videiko 1993].

Part of these large settlements were situated near the steppe border (Fig. 8). The economy of the large settlements was based on extensive agriculture and stockbreeding, some craft specialization appeared. They were the entire economic, public, political, military and cult centers which formed the complex structures of Ancient-East *nomus* type in order to control the surrounding territories [Videiko 1992:11-19; Shmaglij, Videiko 1993: 63].

V. Kruts regards such settlements as unreasonable from an economic point of view, and says their existence was connected with the political situation on the steppe [Kruts 1989: 121]. Some years earlier, E. Chernysh voiced a supposition that the large settlements appeared in connection with the opposition against the "steppe" [Chernysh 1977: 18-21]. The threat of war came from the type of steppe tribe economy, because they were forced to enter the forest-steppe areas for stock-breeding and, at the same time, plundered the Tripolye settlements. According to V. Kruts, the steppe population was connected with cultures of the Sredny Stog, Niznemikhailovka and eneolithic inhumations in the supine position [Kruts 1989: 121,127,129-130, Fig. 5]. All this is similar to the hypothesis, which was critiqued by V. Titov [Titov 1982: 90-91,137-138], about the rural people of the Pontic steppes, who destroyed the civilizations of the Copper and Bronze Age in Europe and built their burial mounds on the territory of the agricultural settlements [Bona 1961; Gimbutas 1974: 129,131].

The large Tripolye settlements appeared in the B-I/II period, when their "steppe" neighbors were tribes of the Sredny Stog Unity, who lived in the forest-steppe zone on the Dnieper and the steppe zone on the Dnieper, Don, Donets and smaller rivers (Fig. 3). Their economy (in the opinion of D.Y. Telegin) was based on developed stock-breeding. Agriculture, hunting, and fishing were secondary [Telegin 1973: 162]. According to our calculations, the meat from horses and cattle comprised up to 91% of the total, as in the Bolgrad-Aldeni culture. If the horse was the object of hunting, the herd may been, in reality, to be similar to the Tripolye, with the cattle as the primary meat source. Nomadism is not possible with such a number of cattle. The Sredny Stog population was settled [Shnirelman 1980: 241-242]. The image of the warlike Sredny Stog horseback riders was also based on the facts



Fig. 13. Tripolye C-I period protocity Maydanetskoye: reconstructions of buildings and fortifications: 1 — part, excavated in 1987–1991; 2 — reconstruction of this part; 3-4 — reconstructions of buildings (Pictures by Y.Bakhmach and P.Kornienko).



Fig. 14. Region of Talyanki and Maydanetskoye protocities: I — settlements; II — relief; III — mounds. 1 — Talyanki, 2 — Maydanetskoye, 3 — Talne-1, 4 — Talne-2, 5 — Talne-3.

of the archaeological finds: so called bone cheekpieces and traces on horse teeth [Anthony, Telegin, Brown 1991: 96-97]. But whether the investigated horse bones belonged to the Copper Age is a problem, because in Dereivka, layers of the Middle Bronze (with circular bone cheekpieces) and the Iron Age were also discovered. If this horse really belonged to the Chalcolithic layer, the possibility of horseback riding is not the same as the possibility of their use in war [Shnirelman 1980: 231--232]. The existence of the Sredny Stog cavalry, armed with bone hammer-axes, spears with flint heads, and bows and arrows [Telegin 1973: 143] is problematical. Tripolye armament was more perfect: stone and copper hammer-axes, flint and copper daggers and knives were unknown to the "steppe" population at this time [Zbenovich 1975]. The large settlements had strong fortification systems [Shmaglij, Videiko 1993: 54-55; Fig. 1:3]. The Tripolye population of only one local unity, the Tomashovka group, was near 25,000-34,000 in some periods [Videiko 1992; 11]. The population of the entire Tripolve was near 410,000 during the middle period (near 4200-3900 BC), and at the beginning of the late Tripolye (3900-3500 BC) -100,000 to 120,000 people [Kruts 1993: 33]. The number of the Steppe population in the Early Bronze Age in the entire (!) Northern Pontic area — from the Don to the Danube — was near 50,000 in the period of the Catacomb Unity [see the article by S.Z. Pustovalov in this volume of B-PS]. The Sredny Stog Unity was only a cultural unity, but not a military organization like the Catacomb Unity under the rule of Ingul leaders.

There is some data about the war conflicts between "steppe" tribes and Tripolye. The spreading of mounds on the territory of Tripolye protocities is connected with the Early Bronze Age period. In mound 1, on the territory of Maydanetskoye (Cherkassy region), were 6 burials, 5 of which belonged to the Yamnaya culture [Shmaglij, Videiko 1988]. The main burial was excavated from a level of black soil (up to 20 cm), which covered the Tripolye fortifications. Pottery from other burials (3 and 6) is similar to the pottery of the upper layer of the Mikhailovka settlement on the Dnieper (Tripolye pottery of C-II period was found in the middle layer, Maydanetskoye was dated to period C-I). So this mound, like many others, appeared a long time after the Tripolye culture disappeared [Shmaglij, Videiko 1991]. At the beginning of the C-II period in this region, the Tripolye population of the Kosenivka-type built protocities and had contact with the population of the Molukhiv Bugor type, whose pottery was found during our 1993 excavations of a large settlement (180 ha), Olkhovets (Cherkassy region), not far from the Sredny Stog Unity (Fig. 15).

These materials help to establish the dates of the Molukhiv Bugor-type close to 3500 BC. The Kosenivka-type (the largest settlements) are contemporary with the Sofievka-type cemeteries in the Kiev region. According to V. Kruts, the territory of the Kolomiyshchyna-type (Tripolye C-I) on the Middle Dnieper was partly covered by materials of the "steppe" Molukhiv Bugor-type. This process led to a migration of the Tripolye population to the North and the appearance of Chapayevka and later local groups on the Dnieper, with "steppe" features in their pottery [Kruts 1977: 149-156]. It is based on a synchronization of Molukhiv Bugor (by V. Dani-



Fig. 15. Tripolye C-II period settlement Olkhovets: pottery with Molukhiv-Bugor type features.

lenko) with Tripolye C-I. In reality, this type was dated as later and its connection with the Tripolye migrations is disputable. All the "steppe" features, in reality Tripo-
lyan features in Molukhiv Bugor pottery, appeared under the influence of Tripolye traditions. The economy of Molukhiv Bugor was based more on hunting than on stock-breeding [Telegin 1973: 131].

There were some economic, military and political pre-conditions of the "steppe aggression" against the "peaceful" Tripolye population of the forest-steppe zone in times when the protocities existed. Protocities disappeared long before forces more powerful than Tripolye chiefdoms appeared in the steppe. Tripolye protocities appeared as a reaction to the economic and political situation in the Tripolye-Cucuteni Unity (population growth, military conflicts between tribes, migrations). Through the example of large Tripolye settlements, we can see the beginning of the urbanization process, which was similar to the prehistory of Sumer cities in Mesopotamia between 4000–3000 BC [Videiko 1992: 15-19].

CONCLUSIONS

Elements of the producing economy in the steppe zone appeared very early — in the Late Mesolithic and Neolithic periods. But the husbandry of the steppe population, which was limited for a long time, was based primarily on hunting and fishing. Cultures of these periods were connected with the valleys of large rivers, not with the open steppe. We can see the same picture in the forest-steppe, except for some regions where the population of the Kriş and Linear Pottery cultures lived.

The wide spread of the producing economy between the Lower Danube and Dnieper was connected with the Tripolye-Cucuteni and Gumelniţa cultures (Bolgrad-Aldeni type). Bolgrad-Aldeni was the first culture with developed stock-breeding in the steppe zone of the Northern Pontic area. Horse domestication may also be connected with the Tripolye and Bolgrad-Aldeni, where the horse appeared before it spread to the Sredny Stog Unity. The complex producing economy, similar to Tripolye and Bolgrad-Aldeni husbandry systems, was first established among the Sredny Stog Unity population in forest-steppe zone, near the Tripolye borders. The end of this process is dated between 3500–3200 BC. It was the foundation of real mobile forms of stock-breeding in the steppe zone. The spread of these forms, after 3000 BC, was connected to the end of the Atlantic and the beginning of the Subboreal periods. At the same time, it was the end of the Tripolye-type complex economy and the end of Tripolye culture.

The wide spread of the "steppe" influences around 4500 BC (pottery, sceptres(?), beads) was connected not with the migration of the Sredny Stog Unity population to the West, but with the copper trade with the Balkans. After the disintegration of the Gumelnita metalwork center, all "steppe" influences disappeared. Instead, Carpathian features appeared in "steppe" materials - after the change of copper trade directions in about 4200 BC. This was also the time when the Tripolye husbandry model interested the forest-steppe population of the Sredny Stog Unity. This process was connected with the spread of prestigious metal articles (gold and copper) among the leaders of this population — previous husbandry systems were not enough for their new requirements. At the same time, the steppe zone became the object of Tripolye expansion, when settlements with Tripoyle materials appeared on the Southern Bug (periods B-II and C-I). Tripolve proto-cities appeared near 4000 BC in different territories (not only on the borders with the steppe). They were the centers of numerous Tripolye chiefdoms which were in a state of permanent internecine war. The cause lay in the expansive character of agriculture - after 40-70 years, settlements were built near the new fields, but the territory of the forest-steppe was limited. There were some economic, political and military pre-conditions to "steppe" aggression against Tripolye proto-cities and there is some archaeological evidence of such conflicts. Disintegration of the Tripolye husbandry and cultural type was connected with the change in the environment after 3500 BC. These changes led to the spread of a producing economy in the steppe zone. Interactions between Tripolye and Sredny Stog Unity created the pre-conditions for this process. After 3500 BC, some groups of Tripolye population took part in the creation of new cultural types in the steppes — like the Usatovo culture and others. Only after these events did the steppe pastoralists appear. There were some pastoralists between 4800-3200 BC in the Northern Pontic area. The billiard ball model [Kośko 1990: 310-312] must take into consideration the internal causes of Tripolye culture migrations, change of environment, which were more powerful forces than the minor tribes of the Sredny Stog Unity. They only began agriculture and stock-breeding for themselves with the help of the Tripolve culture and Bolgrad-Aldeni type. Tripolye and Bolgrad-Aldeni played the part of higher civilizations in the creation of the European semi-nomadic tradition.

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THE MAIN DIRECTIONS OF THE DEVELOPMENT OF EARLY PASTORAL SOCIETIES OF NORTHERN PONTIC ZONE: 4500–2450 BC (PRE-YAMNAYA CULTURES AND YAMNAYA CULTURE)

When working researchers are touching upon such topics as the economy of one or the another primitive tribe and settling down only on the given facts of archaeological excavations, then, when referring to the Black Sea steppe zones, in particular, the question is one of shepherds or nomads. Such a position acquired an almost axiomatic character due to written works and ethnological facts about the steppe tribes of the Middle Ages and the people of the 18-19th century. Also coming from elementary logical thought is the idea that development of different forms of cattle breeding had no advantageous alternative on steppe expanses. And we have to agree with the fairness of a very simplified approach — that of a growing farm production — despite the fact that the present steppe expanses, especially in the Ukraine, have been used for a long time. However, this is the result of brutal and uneducated interference from human beings, especially in the Soviet era. It wasn't excused either economically or ecologically. Even in the last decade of the 19th century, after the severe drought of 1891–1892, the famous Russian scientists, V.V. Docuchayev, A.A. Izmailski, and others, were giving warnings about the downfall of the steppes due to thoughtless economic activities. The problem of survival of the steppes is presently becoming even worse. It is now getting very difficult to find areas of natural virgin steppe. Even the reserve areas can not fill this loss completely. Therefore, we can not have the "visual aids" that would enable us to see those ecological conditions in which not only the Middle Ages, but primarily, the primitive societies of the first cattle breeders formed and existed.

In the history of developed specialized cattle breeding and its different forms, the first stages of this process have a special place, which, on the territory of the steppe zone from the Volga to the Dnieper, may be dated as a period starting from the end of the Neolithic, Eneolithic, and Bronze Age (corresponding with ca 4500–2500 BC). Most important is the end of the Neolithic and the Eneolithic in particular. This exact time is referred to the period when the first groups of mobile

people appeared; for whom the economy base became specialized cattle raising. In the Ukraine, such early cattle breeders are considered to be the tribes of a particular culture, well-known as the Sredny Stog, according to terminology by D.J. Telegin [1971, 1973]. The period of the Early Bronze Age, which coincides with the spread of people of the so-called "classical Yamnaya" culture, is already regarded by many researchers as a time of nomads or semi-nomads. This was written, for example, by researchers of Mikhailovka [Lagodovskaya, Shaposhnikoya, Makarevich 1962: 173] and by N.J. Merpert, who considered such forms of cattle breeding to be an early trend in the development of an economic state between primitive Yamnava tribes [Merpert 1974: 115]. However there are hypotheses about the presence of another trend: the existence of a settled way of life among those cattle breeders in conjunction with the semi-nomads [Merpert 1974: 115], or the existence of groups of people with a fully settled way of life, who pursued cattle breeding along with other kinds of economic activities [Lagodovskaya, Shaposhnikova, Makarevich 1962: 176--178]. The findings of several research projects initiated a more differential approach to solving the problem of developed forms of cattle breeding among the people of steppe cultures. This approach is best accomplished in the works of V.P. Shilov [1975a, 1975b], who highlighted three types of cattle breeding: 1 — settled horse breeders in the northern part of the steppes and forest-steppe; 2 - settled cattle breeders in the flood plains of river territories (Dnieper, Don), raising large horned livestock; 3 — sheep breeders — nomads in the open areas of southern zones. Shilov proposed to look at the Volga-Ural model as the first stage of nomadic cattle breeding, based on the raising of small horned livestock, i.e. on sheep breeding. In the opinion of V.P. Shilov, the Northern Caucasian model, on the other hand, is not considered to have a nomadic style of life and is characterized as a settled model, based on containment of large horned livestock and breeding of pigs. However, the researcher does not reject the idea of seasonal driving on the summer pastures.

On the whole, the works of V.P. Shilov still remain the fullest and most fundamental studies of problems of development and forms of cattle breeding in the steppe tribes. We can use them as a foundation for further research; modernizing and making them more precise on the basis of new osteological, palaeoecological, palaeoclimatical and other facts. The works of this researcher have some disadvantages, however, relative to the territory of the Ukraine, which may concern chronological disparity types of cattle breeding in the Black Sea model. The settled horse breeders of the northern zone (for example, the residents of Dereivka) are older than the so-called Yamnaya culture inhabitants of the Dnieper banks and southern zone of the steppe. But, in this case, it is not Shilov's fault, since the cultural differences, in the steppe territory and to the south of the combined forest and steppe zones of the Ukraine during the Eneolithic period, are a very difficult problem and have not yet been solved. There are two problems in addition to this one: the presence of qualitative osteological facts for the given periods and the use of facts for reconstruction of palaeoecology of the Eneolithic and Early Bronze Age in the steppes of the Black Sea shores and the shores of Azov. We may consider these three problems to be a basis for study of the character of the steppe inhabitants' cattle breeding economy. They are interrelated and can be expanded upon with the facts of osteological research, which look for instruments of labour, planigraphical and topographical features of settlements, burial places, etc.

Therefore, we first set a task of critical analysis of resolved issues pointed out earlier in order to construct an image about excising abilities of objecting reconstruction in the character of cattle breeding during the Eneolithic and Early Bronze Age. The models of type and form of cattle breeding, and also the way of life among the first cattle breeders, are in many cases similarly modified by the achievements of ethnology.

1. CULTURAL AND CHRONOLOGICAL DEVELOPMENT OF EARLY CATTLE BREEDERS

For the majority of specialists, who have never studied the materials of the Eneolithic and Early Bronze Ages and are not familiar with the steppe Ukraine discoveries of the last decades — unpublished or insufficiently presented in published works (thesis, short incomplete publication, etc.) — it is becoming very difficult to familiarize oneself with general interpretations. This is especially true for the Eneolithic, which differs from the others with its abundance of archaeological facts and tangled system of terminology. The most famous cultures are the Sredny Stog and Yamnaya, which have been representative of one era of the Eneolithic for a long time. At the present time, they are used more out of habit and without clarification of these meanings. Right now, the Eneolithic era of the steppe and southern zones of the forest-steppe is represented by many monuments due to archaeological research in the land reclamation zones. These are mainly the burial mounds, which are divided into different cultures, cultural groups, types and variants, Along with the famous Sredny Stog and Yamnaya cultures studied at the beginning of 70's, and the monuments of the Nizhnemikhailovka type, there are distinguished the monuments of the Novodanilovka type, post-Mariupol culture, Suvorovo, Utkonosovka, Khadgider groups, etc., which were studied at the end of the 60's. Some of the terms are simply repeated and do not clarify the situation. Even Yamnaya culture is now open to some doubts in connection with the highlighting of Repin culture on the Don, Yamnaya-Berezhnovsky burials in the steppe area of the Volga (which created some

difficulties in the understanding of an early period) and also a row of independent cultures (Novotitarevskaya, Kuban, Budghak in the northwestern Black Sea area). Yamnaya culture has ceased to be an occurrence of the Eneolithic and the basic period of its existence now characterizes the Early Bronze Age.

Grasping the full picture of cultural development is getting more difficult, especially if we add all that has been said to those groups and types of burial monuments which never received a concrete name and have only numeral indication. They are known in the Dnieper area, near the Azov, Kuban, and Don. We should agree, that the full picture of development in the culture of early cattle breeders does not exist between habitually used old meanings and numerous new terms. For example, very few people can explain the differences between the Novodanilovka type of burial monuments and well-known Sredny Stog culture burials. Because of the relatively rich inventory, which included prestigious objects, we can not estimate the independence of a culture. Nor can we single out the post-Mariupol culture with its so-called "outstretched" burial mounds and not touch the basis of allocation in Sredny Stog culture? The fact is, that for the first culture the ceramics of the Kvitanska type are significant (according to D.J. Telegin, the ceramics of the Sredny Stog culture). The question of correlation between burial mounds of Eneolithic burials and synchronic settlements of Dnieper and Azov areas is not well-developed. The term "Yamnaya" is a contradiction in itself, because only the "Yamnaya" culture can be referred to on the territory of the Ukraine with the so-called "late Yamnaya" monuments. It was preceded by Eneolithic cultures completely different in time and appearance.

This way, the most important task is to order all existing materials and to create a full picture of development in different cultures. They are presented as a community of original cattle breeder tribes after the disintegration of the Mariupol cultural and historical unity (in our understanding still Neolithic). This will give the opportunity, depending on the representation and quality of the sources, to get a better idea about the dynamics of development of cattle breeding among different groups of inhabitants.

First of all, we should refuse a common meaning for the "Sredny Stog culture". This is dictated by three objective factors.

1. The settlements, Sredny Stog II (which gave its name to the culture) and Dereivka (which has become an example of this culture) are valuable because of the different monuments on their territories (steppe and border of steppe and foreststeppe zones), because of the time of existence (Sredny Stog II is a bit older than others) and because of the appearance of a material culture (ceramics, flint, etc.). Therefore, when researchers use the term "Sredny Stog" culture, it is unclear and difficult to understand what it is all about.

2. The second factor is the appearance, in the Dnieper area, of a special group of burial monuments, which is accompanied by ceramics of the "Kvitanska"-type in the funerals. The question is one of the so-called "outstretched" burial mounds, placed by J.F. Kovaleva into a separate post-Mariupol culture [Kovaleva 1984]. But since, until the most recent time, the ceramics of the Kvitanska-type were considered to be the oldest pottery of the Sredny Stog culture [Telegin 1973: 8, 122-123; Shaposhnikova 1987; 6], the arisen contradiction can not be overcome by artificial separation of the tight group of "outstretched" burial mounds. We can not put them into different, but still traditional cultures (Sredny Stog, Nizhnemikhailovka, Yamnava) [Telegin 1987: 26; Shaposhnikova 1987: 6]. The only solution is to look again at the basis, which highlighted these cultures, and first of all, at Sredny Stog. Actually, the ceramics of the Sredny Stog II type are not found near the burials, and in the settlement itself the Kvitanska-type pottery is absent. We can say a few words about Dereivka, where some pieces of Kvitanska-type pottery were found. They can be seen, in a complete picture, either as a distinctive import or as a remainders of another layer. It is necessary to note the absence of settlements of the "Dereivka" type in the steppe zone, and, vice versa, the absence of "Sredny Stog" type settlements in the forest--steppe zone. For example, in the settlement of Alexandria near the Oskol river, the ceramics of the Sredny Stog culture are of insignificant quantity and have the appearance of an import when placed against the background of other materials. The difference between the Sredny Stog, Dereivka and Kvitanska cultures is that Kvitanska is present both in the steppe zone and to the south of the forest-steppe zone. As an aside, there is proof to date them as later cultures, but not early cultures as was previously believed. All objects which accompanied the "outstretched" burials (polished stone hammers, statuettes of the Serezlievka type, figured bone piercing etc.) are dated according to the Tripolye scale as the period of C-II, because they correspond to the materials of Sofievka, Usatovo and Southern Bug variations of the late Tripolye.

3. The last factor is the allocation of monuments of the "Novodanilovka" or "Kasimcha-Petro-Svistunovo" types [Zbenovich 1973; Telegin 1985d] into an independent culture. This is generally unclear if we consider the two previous factors. In the end a legitimate question arises — what is "Sredny Stog culture"? Is it myth or reality?

N.S. Kotova, together with the author, made an analysis of available burial monuments and settlements. We came to a conclusion about the possibility of allocation in the Ukraine territory, instead of one united Sredny Stog culture, four groups of monuments. These four groups have even more specific groups of ancient cattle breeders and we would be able to classify them as independent archaeological cultures. But to give tribute to tradition and to consider the expansion of the term "Sredny Stog" culture, we decided that it is possible to unite the four given cultures within the framework of the Sredny Stog region.

The Skelanska culture (Fig. 1) is so named because of distinctive features in the complex of ceramics found near the settlement of Strilcha Skela, which is located



Fig. 1. Grave and the basic finds of the Skelanska culture: 1-2, 12, 22, 27 — Krivoy Rog (after Budnikov, Rassamakin); 3, 6 — Novodanilovka; 4, 9-11, 17, 19, 21 — Alexandrovsk (after Bratchenko, Konstantinescu); 5, 13 — Chapli (after Dobrovolskiy); 7, 20 — Popow Khutor, barrow 31/7, grave 4 (after Stolyar); 8, 14, 23, 24, 26 — Petro-Svistunovo (after Bodyanskiy); 15, 18 — Mariupol, grave 24 (after Makarenko); 16 — Suvorovo II, barrow 1, grave 7 (after Danilenko, Shmagliy); 25 — Voroshylovgrad. 2 — gold; 3, 7 — pottery; 4, 18-20, 23, 26 — bone; 5, 6, 8-13, 22 — copper; 14, 21, 24 — flint; 15, 16, 25 — stone; 17, 27 — shell.

near the large rapids on the Dnieper. It has some parallels on the Don and Azov: the 4th layer of Razdorsk settlement [Kiyashko 1987: 75], pieces of the 5th layer of the Samsonov settlement [Gey 1983: 16, Fig. 12:2], and separate pieces of Razdolny [Shaposhnikova 1970] on the Kalmius and Semenovka near the Molochnaya river. The area near Kamenaya Mogila is also possible. In the same cultural circle are burials of the Novodanilovka type: Chapli, Petro-Svistunovo, Novodanilovka, Mariupol, Alexandrovsk and others [Kotova, Rassamakin 1995]. To the above we can add the oldest burials of the Dnieper basin which are without an inventory of burial mounds. For example, Igren — 8 and the island of Vinogradny and a series of burials in the Don basin: Mokry Chaltir, (m.2, b.6), Popova (m.31/7, b.7) and others. We connect the appearance of burial monuments in the Dniester-Danube region with this culture. This group is known by the name of "Suvorovo" [Alexeyeva 1976; Dergachev 1986; Petrenko 1989; Manzura 1993]. They are also found in the Kuban area [Korenevsky, Nagler 1987; Trifonov 1991].

We may consider the most distinctive feature of ceramics to be the presence of round-bottomed wares with straight, relatively low necks and bellies, the maximum diameter of which is usually in the middle of its height. A plentiful mixture of shell in clay is usual, too. A particular ornamentation covers the top half of the vessel down to the shoulders and is executed in simple, drawn lines. It consists of different vertical and horizontal patterns, and zigzags. Attached figures were often added to the decoration. The ornamentation was also present at the top of the neck. Among flint artifacts, a common characteristic is double-ended arrow-heads and javelins with a straight and slightly bulging base, and long knife-like metal plates. For burial ceremonies, ground burials consisted of individual burial places with characteristic burial constructions. The buried are placed in oval pits, sometimes in boxes, in a curled position on the back. The head is slightly raised, the arms are slightly bent at the elbows and placed on the pelvis area or on the stomach. The bent legs usually keep their original position. The abundance of ocher, which covers the buried in a thick layer, is noticeable. Orientation towards the east is predominant but western orientation exists as well. Many tools, decorations and the details of the ceremonies unite the monuments of this culture with the preceding Mariupol culture.

The Skelanska culture is the oldest Eneolithic culture. The time of its existence is determined by items which allow one to make a synchronization with well-dated cultures of the Balkan-Carpathians region. And we can add Tripolye culture, from one side and from the other, the Eneolithic cultures of the Caucasus, North Caucasus and Volga area. We can discuss such findings as zoomorphic scepters, bone fasteners, boar's fang and shell decorations, import ceramic, copper and gold goods, and flint javelin and arrowheads. This question is well developed in literature, especially on the local level. We simply certify the generally accepted opinions within the framework of the suggested conception. The presented facts synchronize Skelanska culture with cultures of Gumelniţa A2-B1, Varna, Cucuteni A and Tripolye B-I on the western and northwestern borders, with pre-Maykop culture (settlements Svobodnoye, Meskhoko, Miskhaka) on the North Caucasus [Nechayev 1990] and with Khvalynsk culture in the Volga area. Based on radiocarbon dating for monuments of the above-mentioned farming cultures, in particular Gumelniţa and Tripolye [Movsha 1984; Telegin 1985c; Subbotin 1983: 130], this time is determined to be in the range of 4500–4100 BC [Movsha 1984]. This does not coordinate with the published dates of the "Khvalynsk" burial mound [Agapov, Vasiliev, Pestrikova 1990: 85-87], which gave a much older age. But it corresponds with the dates of Yamnaya-Berezhnovsky burial mounds of the steppe Volga [Dremov, Yudin 1992: 29-30]; which reflects a process of Yamnaya culture formation in this region.

Stogovska culture (Fig. 2) can be considered to be a continuation or a second stage in the development of Skelanska near the Dnieper area. It is distinguished from the previous one, first of all, by a complex of ceramics, well represented in the settlement Sredny Stog II. Distinguishing features are becoming more common, such as sharp and round-bottomed shapes with maximum diameter in the top part of the belly, and an extended neck. They often appear with purposely bent inside rims. All vessels are decorated on the upper part, down to the shoulders. The ornamentation is fairly regular in composition and a technique of imprinting tooth-like stamps and so-called caterpillars made from woven cord is used. The predominant style is a number of rows and zigzags, imprinted with the same technique, just below the neck and also on the inside of the neck. A similarity is seen in the ornamental composition of Skelanska culture ceramics. The arrowheads from Sredny Stog II are analogical with the Skelanska culture, but the long plate-knives disappear.

The most famous and outstanding settlements of the Stogovska culture are found in the Dnieper basin: the top part of the Eneolithic layer of Strilcha Skela, Sredny Stog II, Kodachek, Zolotaya Balka, etc. From burial mounds we can distinguish Igren — 8, Vinogradny island, despite the fact that those burials already existed in the time of Skelanska culture. Basic ritual features are preserved, but they are not so unvarying. This is evident in a number of variations in placement of arms and legs, the skull, and in the use of ocher. The rich, inventory-full (especially metallic) burials, which we know from the Skelanska culture, are completely absent.

The time of Stogovska culture existence is not determined reliably enough. The border with the Skelanska culture can not be determined. And a slightly later time is fixed only by the finding of Tripolye pottery in the burial mound of Igren — 8 [Telegin, Filenko 1982]. Vessels typical of Stogovska culture settlements were also found there, but not in the same complex. Tripolye wares belong to stages B-II/C-I and C-I. It is obvious that fragments of Tripolye ceramics from the settlement of Sredny Stog II are much older, but they are unavailable for present researchers,



Fig. 2. Grave and the basic finds of the Stogovska culture: 1-3, 5, 8 — Igren 8, graves 13,15,10 (after Telegin, Filenko); 4 — Khortitsa; 6, 7 — Sredny Stog II. 2-4 — pottery; 6, 7 — flint; 8 — bone.

and the publication of this does not give a reason for exact dating [Dobrovolsky 1929: 2, 91n., Fig. XI]. Consequently, Stogovska culture can presumably be dated as one of 4100–3600 BC. This corresponds to the dates accepted for stages of Tripolye culture [Movsha 1984: 61-63; Chernysh 1982: 175].



Fig. 3. Graves and the basic finds of the Kvitanska culture: 1 — Sadovoye, barrow 101, grave 12 (after Nikolova, Rassamakin); 2 — Lubimovka I, barrow 3, grave 2 (after Rassamakin); 3, 4, 19 — Bogdanovka III, barrow 1, grave 2,3,7, barrow 6, grave 3; 5, 8, 9 — Verkhnaya Mayevka XIV, barrow 1, grave 6; 6 — Terny I, barrow 9, grave 2; 7 — Orekhov, "Tarasova Mogila", grave 6 (after Samar); 10, 11, 18 — Vinogradnoye, barrow 2, grave 3 (after Rassamakin); 12 — Novoaleksandrovka, barrow 1, grave 16; 13 — Bulakhovka III, barrow 3, grave 9 (after Kovaleva); 14 — Ordzhonikidze, "Chkalovi Mogily", barrow 3, grave 10; 15 — Buzovka XXIV, barrow 1, grave 3 (after Kovaleva); 16 — Nizhnaya Khortitsa, barrow 2; 17 — Orlik, barrow 2, grave 2 (after Lugova, Rassamakin); 220 — Verbki V, barrow 1, grave 7 (after Kovaleva); 21 — Ordzhonikidze, "Dovga Mogila", grave 12 (after Nikolova, Rassamakin); 22 — Kamenka Dneprovskaya, barrow 14, grave 2 (after Rassamakin). 2-9, 13 — copper; 10, 11, 14, 18 — bone; 12, 15-17 — pottery; 19, 20 — flint; 22 — stone.

Kvitanska culture (Fig. 3) — this term is offered instead of post-Mariupol culture [Kovaleva 1984] because the previous term is not correct. All cultures of the Eneolithic period are post-Mariupol, in particular, the Skelanska culture. On the other hand, our term has a recognized name which more precisely reflects the character of the culture. First of all, it is seen in the famous ceramic complex from the Kvitanov burial near the village of Fedorovka [Bodyanski 1954]. Well-studied settlements are absent, but numerous findings of Kvitanska culture ceramics in the multiple layers of settlements and also in its independent layer places are known (Leontevka, Solovinaya Roscha in the Dnieper basin, Voznesenovka in the Sivasch region etc.). In a number of settlements, with non-separated layers of different periods from Neolithic to the Late Bronze Age (Vinogradny island, Pochilom, etc.), Kvitanska pottery are predominant. The most promising forms are present in the burial complexes. The ceramics are characterized by regular and very monotonous types of vessels of different sizes: from miniature to very large. Ornamentation decorates the top part of the vessels. Predominant are imprints of "walking" comb, and the main elements of design are a number of parallel rows with slightly bent imprints under the neck and from neck to belly. In a number of compositional features, Kvitanska culture pottery is similar to the Stogovska culture's.

For the Kvitanska culture, a raised form of burial mounds with ceremonies is characteristic. Also, a recurrence of archaic traditions with several burials under one burial embankment is seen (sometimes up to 7-9 separated burials). Archaism is preserved in the ceremony itself, demonstrated in the stretched position of the dead. They are lying in narrow oval and rectangular dimples, sometimes with signs of sustenance and tied extremities. A great importance of fire in the ritual is noted. There was an uneven use of ocher. An orientation towards the east is predominant, but towards the west is also possible.

Due to discoveries in the burial places, we can add multiple copper decorations to the characteristics of the material complex of the Kvitanska culture. They have the appearance of a kind of tubular and spiral piercing. Small brackets and clips were decorations for the belts and a bone piercing tool was used for decorating the outfit in some kind of rows. The same function was determined for polished stone hammers [Kovaleva 1984]. Some tools made from animal ribs are characteristic, too. It is obvious that well-polished and hand-worked bone punctures can be recognized as specific tools of the given culture. Some of these things were used by neighboring tribes (Nizhnemikhailovka culture, some groups of late Tripolye) — copper decorations, bone tools of production, piercing, stone hammers.

The territory of extension of the Kvitanska culture, based on the placement of materials in settlements and on burial concentration, could possibly reach the northern steppe and forest-steppe spaces of the Dnieper basin, the right and left banks of the Dnieper river, and even the Northern Donets and Ingulets rivers. The arrangement of burial places testifies that, during a period of activity, the population of the Kvitanska culture probably reached the Don and Danube basins.

The chronology of the early stage of the Kvitanska culture does not yet have reliable benchmarks. From the logical point of view, its beginning should be in the epoch of disintegration of Azov-Dnieper culture in the Mariupol unity. But when and for how long the formation process of the new culture progressed is hard to say. Obviously, it went parallel to the development and formation of, first, Skelanska and, afterwards, Stogovska cultures. This is explainable by the presence of similar features to the previous culture. But, at the present time, we have to deal with an already formed culture which is reliably dated late enough, according to synchronization with later stages of local variants of Tripolye — in particular, Sofievka and Usatovo. This is the time when Kvitanska culture itself was going through the period of disintegration. The archaism of figured piercing has become an example after the same type of product was found in the Usatovo complex [Malyukevich, Petrenko 1993: 25-30, Fig. 5]. Stone hammers are not dated earlier than the Sofievka variant, according to the similarity of the burials and the latest Tripolye monuments on the Southern Bug and according to similarities in the burial mounds of Yermolayevka with painted Tripolye ceramics [Ribalova 1964: 79-80]. In this way, Kvitanska culture, according to synchronization with Tripolye C-II, can be reliably dated to a period of 3600–3000 BC. And probably to an even earlier time, synchronic to Tripolve C-I and B-II/C-I [Movsha 1984], in other words, 3700-3600 BC.

Dereivka culture (Fig. 4) is so-named so due to a distinctive complex of Dereivka settlements and characterizes the culture of a population in the south of the forest--steppe zone. The ceramics of the "Dereivka" type are well-known on the Northern Donets and Oskol (Minevsky Yar, Alexandria), the Dnieper basin, to the north of Dereivka. The circle of comparable things is limited because of the lack of study of the Eneolithic in the forest-steppe of the Ukraine.

From burial monuments, Dereivka culture can claim a second burial mound near Dereivka and possibly some of the burials from the first burial mound. It could be that two burials of Kamennye Potoki are attributed to this culture. But studying rituals of the Dereivka culture demands a search for new, reliable sources.

Dereivka-culture pottery are characterized by a predominance of specific sharpbottomed vessels with very high necks. Ornamentation decorates the top part of the vessels and is done by imprinted crests, brackets, different dents, notches, and the use of a string. Designs of vertical columns and also of horizontal rows are very characteristic. The form, technique, and composition in the ornamentation of the vessels differs fundamentally from the characteristics of cultures mentioned above. In conjunction with the bottom-sharpened ceramics are a large percentage of flat bottomed bowls and pots.



Fig. 4. Finds from Dereivka (after Telegin).

The time of existence of Dereivka culture was determined by a Tripolye bowl without painting from the second burial mound. It was dated as Tripolye B-II and B-II/C-I. The synchronization with Tripolye C-I is based on the discovery of a female figure, which is similar to the figures of Cernovoda I culture. And this is also known in such settlements as Cernovoda, Remnicheu, and Tirpeşti in Romania. On the other hand, one fragment of statue is close to the Serezlievka type, dated as Tripolye of C-II. T.G. Movsha raised a reasonable question about people living outside of the Dereivka settlement before Tripolye C-II [Movsha 1984: 77]. In this way, Dereivka

culture can be dated within the framework of 3700–3150 B.C. This dating needs to be stated more precisely, but it is impossible because of the limited sources.

A short characterization of our cultures has been given above. Until now, they comprised the unified Sredny Stog culture and we now include them into a region of the same name, which appears to be the western part of the "Sredny Stog — Khvalynsk" community [Vasiliev 1981: 34]. Their relative unity is fixed only in the period when Skelanska and Khvalynsk cultures existed, including the "Mino-Bere-zhnovsky" burials.

Besides the highlighted cultures, another one existed in the southern part of the Ukrainian steppes, for which we reserve the famous name of the Nizhnemikhailovka culture.

Nizhnemikhailovka culture (Fig. 5) received its name due to a specific complex of ceramics from the bottom layer in the settlement of Mikhailovka near the Dnieper, and its monuments are also known as monuments of the "Nizhnemikhailovka" type [Shaposhnikova 1971b, 1985, 1987; Telegin 1971a]. We have our own point of view on this matter, close to V.N. Danilenko's view, which distinguished a separate Azov-Black Sea line in the development of the steppe Eneolithic, actually differing from the Yamnaya.

Besides the bottom layer of Mikhailovka, and obviously, several vessels from the Novorozanovskove settlement on the Ingul river [Shaposhnikova, Neprina 1977; 60], the rest of the monuments are presented as burials in mounds, spread from the Danube to the Don. According to our statistics, one-type burials can be added to the Nizhnemikhailovka culture. They are characterized as having a stable set of signs; oval pits, tucked position of the dead one side with one bent arm and the other outstretched along the body. Occasionally, both arms are outstretched in the direction of the knees or bent at the elbows with the hands in front of the face. The eastward orientation is predominant. The use of ocher ranges from intensive color to barely noticable zonal marking. In the construction of burial mounds the distinguishing features are ditches. In the burials and funerals, the predominant feature is ceramics with a similarity to the ceramic complex of Mikhailovka'a bottom layer. Distinctive local features exist along with absolute unity in the burial practices. For example, in the Dniester-Danube region, the burials are separated into a cultural group known as "Utkonosovska" (according to I.L. Alexeveva), "Khadzhider" (according to V.G. Petrenko) and "proto-Usatovo" (according to I.V. Manzura). On the Don river this culture is visibly represented by the burials of the III group (according to V.Y. Kiyashko). Plentiful complexes on the Southern Bug, in the Dnieper basin, and on the Molochna also exist.

The most typical ceramics characterizing the culture are presented in the bottom level of the "eponym" settlement and in ditches of funerals in burial complexes. These are flat-bottomed vessels with rounded and spherical bellies and high or me-



Fig. 5. Grave and the basic finds of the Nizhnemikhailovka culture: 1 — Sofievka, barrow 40, grave 7; 2, 7 — Vasilevka, barrow 1, grave 22 (after Rassamakin); 3 — Kovalevka VII, barrow 4, grave 32 (after Kovpanenko, Fomenko); 4 — Trapovka, barrow 10, grave 14 (after Petrenko); 5 — Dolinskoye, barrow 1, grave 32 (after Rassamakin); 6 — Ordzhonikidze, "Chkalovskaya", barrow 3, grave 32 (after Nikolova, Rassamakin); 8, 9 — Obloy, barrow 2, grave 4 (after Evdokimov, Rassamakin); 10 — Aleksandrovka, barrow 1, grave 17 (after Rassamakin); 11 — Mikhailovka, barrow 1 (after Evarnitskiy); 12 — Novo-Kotovsk, barrow 1, grave 9 (after Agulnikov); 13, 14 — Khadzhider and Koshary (after Patokova, Petrenko, Burdo, Polishchuk). 2, 5, 6, 8, 10-14 — pottery; 3, 4 — silver; 7 — flint; 9 — copper.

dium-height necks with well-cut rims. The surface is smooth, although on many wares, in particular well-known amphora from the settlement #2 [Lagodovskaya, Shaposhnikova, Makarevich 1963: Fig. 10], some scratches are visible: vertical on the neck and slanting on the belly. But there are many polished vessels as well. Ornamentation is seldom found. Rows of imprints of string on the neck are typical. They also have notches, pearls, and caterpillars. Small-sized, round-bottomed wares with similar distinctive technical features are also found in the burials.

The time of existence of Nizhnemikhailovka culture is determined by the presence of Tripolye imports in the burials of the western type and the Dnieper basin, the stratigraphy of the burials and the bottom layer of Mikhailovka. These facts allow dating of the given culture, with its local displays, to the time of Tripolye B-II/C-I, C-I and C-II, in other words 3700–3000 BC [Movsha 1984]. But some findings in the burial mounds on the Prut river (Sarateni, m. 3 and m. 1), where sherds from the culture of Cernavoda I and Ib were found in funerals [Demchenko 1990: 63; Manzura 1993: 29], and also in the burial mounds of the Dnieper basin (Vasilievka, m. 1 b. II), where Stogovska culture ceramic was found in funerals of the Nizhnemikhailovka type [Rassamakin 1993: 10, Fig. 9:4], can move the dating to Tripolye B-II, in other words, to the first quarter of the 4th millennium BC. But early dating, like in the Kvitanska culture, needs a reliable source for additional grounds.

In this way, we highlighted five basic cultural occurrences, which characterize the Eneolithic of the steppe and south to the forest-steppe zone of the Ukraine. The first four represent the Sredny Stog region and, from the point of view of V.N. Danilenko, comprise all the stages in the development of Yamnaya culture. The fifth culture, as a rule, contrasts with the previous ones in the framework of a special, Azov-Black Sea line of development of steppe Eneolithic. As a result, we have the oldest Skelanska culture, which delimited Mariupol cultural and historical unity (in essence still a Neolithic one) and the beginning of the Eneolithic epoch. It has also served as a distinctive ignition for the succeeding cultural development. From them, synchronically and territorially adjacent cultures were formed. One is Stogovska culture, a little bit more ancient, the monuments of which are concentrated very deep in the steppe Dnieper basin, and the other is Kvitanska culture, which has a basic concentration of monuments found in the northern steppe and south of the forest-steppe zones on the right and left banks of the Dnieper with local displays near the Azov Sea, on the Donets and Ingul rivers. Synchronically with Kvitanska in the southern steppe zone, Nizhnemikhailovka culture was developing, the most plentiful monuments of which are found from the Molochna to the Danube. Only the forest-steppe zone from the left bank of the Dnieper to the Donets was occupied by the Dereivka culture, co-existing in that region with Kvitanska. The golden age of these cultures, obviously, was approximately simultaneous to Tripolye C-I, but a decline and loss of distinguishing features corresponded in time with the downfall of Tripolye culture of C-II with similar characteristics, local delimitations and the creation of varying local syncretical occurrences. For example, on the right bank of the Dnieper [Nikolova, Rassamakin 1985] or, more stably, on the Danube and Dniester (Usatovo variant, Cernavoda I), Don (Konstantinovka culture). That is why there it is not surprising that, during this time (the end of 4th millennium BC), in the steppe zone and south of the forest-steppe, new cultural phenomena occurred which gave a basis for migrational processes. One of them, preliminarily named the Zhivotilovka-Volchansk group, is characterized by strongly displayed features of the Gordineshty or Kasperovka variants of the latest Tripolye (especially in the area from the Dniester to the Molochna and Samara rivers) on one hand, and by features of the Maykop culture type of Novosvobodnaya in the area from the Dnieper to the Don on the other [Rassamakin 1988; 1993]. The ceremonies of this group are surprisingly stable, although they do not have a reliable local steppe and genetic base: rectangular, often ledged pits; extremely curled position of the dead on one side with an orientation towards the western direction, arms bent at the elbows and placed in front of the face. This group testifies to activity of separate groups of Tripolye population in its declining years, especially in the forest-steppe, and to contact with the population of Central European cultures [Movsha 1985]. Proof was reflected in the ceramics and representative amphora-like and goblet-like vessels, different ears and loop handles, and conical sticks on ledges [Rassamakin 1993: 10, Fig. 13]. At the same time, the highest level of activity and penetration into the steppes of Maykop traditions occurred, which in its most common form is reflected on the Lower Don.

At the end of the IV millennium BC, on the left bank of the Dnieper, Donets and near the Azov Sea, monuments (settlements, burials) with ceramics of the Repin culture appear (Fig. 6), singled out on the Middle Don [Sinyuk 1981; Sinyuk, Vasiliev 1985: 49-61]. On the given territory, Repin ceramics accompanied burials in the burial mounds with fixed ceremony: rectangular pits, curled position on the back with arms outstretched along the body, facing the eastern direction. If taking into account that, for the Middle Don, it is characteristic to have an outstretched, ceremony, lacking burial mounds [Sinyuk 1981: 18], it would be obvious that, in the formation of "local" Repin culture, a big role was played by tribes of the Stogovska culture.

In fact, the appearance of the Zhivotilovka-Volchansk group (Fig. 7) and the Repin culture in the steppe zone of the Ukraine (Fig. 8, 9, 10) makes this significant because this is considered to be a transitional period from Eneolithic into Early Bronze Age. After them, multiple burials of Yamnaya culture in the burial mounds are statigraphically fixed (Fig. 11). This culture appears with already clearly highlighted local distinctions and it is principally different from cultures of the Eneolithic epoch in the appearance of tools and burial ceremony. Nevertheless, with a



Fig. 6. Grave and the basic finds of the Repin culture: 1, 3 — Verkhnaya Mayevka XVIII, barrow 1, grave 9,7 (after Kovaleva); 2 — Ogorodnoye, barrow 3, grave 1 (after Posrednikov, Sarayskaya); 4, 6 — Kremehevka, barrow 6, grave 8 and Volonterivka, barrow 1, grave 5 (after Konstantinescu); 5, 7, 8 — Samozhne, barrow 3, grave 6 (after Bratchenko). 2-6, 7, 8 — bronze.

formal comparison, we can find common features which unify the cultures of the two epochs. A distinctive leap, still very difficult to describe on the empirical level, can be discussed which reminds us about the change of cultures on the border of the epoch in the Balkan-Carpathians region. After that leap, the whole appearance of the cultures is changed. Their material look and spiritual reflection in ceremony alters, but this does not mean a change of population by migration from the east, for example, as was pictured before. Analysis of the preceding epoch forces us to search for the root of change in one and the same territory.



Fig. 7. Graves and the basic finds of the Zhivotilovka-Volchansk group: 1, 3, 6, 19, 23 — Volchansk I, barrow 1, grave 21 (after Rassamakin); 2, 15 — Tarakliya, barrow 10, grave 2 (after Dergachev, Manzura); 4 — Sokolovo II, barrow 6, grave 4; 5, 17 — Boguslav, barrow 23, grave 12,7 (after Androsov, Marina, Zavgorodniy); 7 — Vinogradnoye, barrow 2, grave 14; 8, 21 — Koysug, "Radutka", grave 24 (after Maksimenko); 9 — Zhivotilovka; 10, 12 — Vinogradnoye, barrow 14, grave 1 (after Rassamakin); 11 — Bolgrad, barrow 6, grave 1 (after Shmagliy, Chernyakov); 13, 22 — Podgorodnoye X, barrow 3, grave 7 (after Kovaleva); 14 — Tiraspol, barrow 3, grave 27; 16 — Kazakliya, barrow 17, grave 22 (after Dergachev, Manzura); 18 — Pavligrad, barrow 7, grave 3 (after Kovaleva); 20 — Primorskoye II, barrow 4, grave 2 (after Rassamakin). 11-15 — bone; 16-19 — bronze; 21, 22 — stone; 23 — gagat.



Fig. 8. Map of major sites of the Skelanska (A), Stogovska (B) and Dereivka (C) cultures: (A) 1 — Aleksandria; 2 — Aleksandrovsk; 3 — Voroshilovgrad; 4 — Olkhovatka; 5 — Donetsk; 6 — Razdolnoye; 7 — Mariupol; 8 — Chapli; 9 — Strilcha Skela; 10 — Petro-Svistunovo; 11 — Novodanilovka; 12 — Kamennaya Mogila; 13 — Blagoveshchenka; 14 — Nizhniy Rogachik; 15 — Kut; 16 — Krivoy Rog; 17 — Lubimovka; 18 — Suvorovo; 19 — Kaynary; 20 — Dzhurdzhuleshti (B) 1 — Igren; 2 — Strilcha Skela; 3 — Kodachok; 4 — Durna Skela; 5 — Sredny Stog; 6 — Naumova Balka; 7 — Khortitsa; 8 — Zolotaya Balka. (C) 1 — Aleksandria; 2 — Minevskiy Yar; 3 — Zlivki; 4 — Dereivka; 5 — Kamenniye Potoki; 6 — Molyukhov Bugor.

2. THE SOURCES FOR RECONSTRUCTION OF ECONOMIC ACTIVITIES

Cultural and chronological assumptions, described in the preceding part, allow us to examine the sources more specifically. These are sources usually used by archaeologists for study of the economy of prehistoric populations. Such sources include osteological materials, separate categories of manufactured inventory (the material for production and traseological researches, functional belonging), and



Fig. 9. Map of major sites of the Kvitanska (1) and Nizhnemikhailovka (2) cultures.

information about the topography of settlements and burials. Consequently, we will try to state the present condition of those sources.

For the Skelanska culture we have very little information. Definitions of osteological materials from the settlement of Strelcha Skela are made for all cultural layers, from Neolithic to Bronze Age, and are published in this way by I.G. Pidoplichko [1956: 14-15]. Therefore, these facts can not be used for reconstruction of the herd's structure. The only thing that can be referred to is a minimal number of bones and pig specimens for these periods. It is impossible to distribute between cultures, ages of bones and specimens of cattle, goat, sheep, and horse. A similar picture, in our opinion, is in the case of Alexandria, considering disagreements in stratighaphical division of the monument by D.J. Telegin and B.N. Danilenko [Telegin 1973: 15-23; Danilenko 1974: 49-56]. Additionally, even the layer itself is divided by the excavator (Sredny Stog by D.J. Telegin), who is highlighting materials of only 14 specimens of osteological definition [Telegin 1973: 132-133]. It makes them even less expressive and less defined. Information from the Lower Don settlements is also absent.



Fig. 10. Map of major sites of the Zhivotilovka-Volchansk group (A) amd Repin culture (B). (A) 1 — Primorskoye; 2 — Vasilevka; 3 — Aleksandrovka; 4 — Boguslav; 5 — Pavlograd; 6 — Zhivotilovka; 7 — Podgorodnoye; 8 — Novomoskovsk; 9 — Sokolovo; 10 — Dneprelstan; 11 — Razumovka; 12 — Pologi; 13 — Vinogradnoye; 14 — Novo-Filipovka; 15 — Volchansk; 16 — Yuryevka; 17 — Davydovka; 18 — Novovorontsovka; 19 — Ust-Kamenka; 20 — Staroselye; 21 — Velikaya Aleksandrovka; 22 — Kovalevka; 23 — Tiraspol; 24 — Cura-Bykuluy; 25 — Roshkany; 26 — Tarakliya; 27 — Kazakliya; 28 — Bolgrad; 29 — Sarateny; 30 — Bursucheny; 31 — Novye Duruitory; 232 — Kosteshty. (B) 1 — Podgorovka; 2 — Aleksandria; 3 — Volonterovka; 4 — Zamozhnoye; 5 — Kremenevka; 6 — Ogorodnoye; 7 — Boguslav; 8 — Aleksandrovka; 9 — Verkhnaya Mayevka; 10 — Durna Skela; 11 — Zamozhnoye; 12 — Mikhailovka II.

The osteology from burial monuments is not at all impressive. In the filling material of four burials near Chapli (b. Ia-3a, 5a) the teeth of a sheep/goat were found in three cases and the pelvis bone of a bull in one (according to I.G. Pidoplichko). In the same material of burials I and II, in a recently researched burial mound near Krivoy Rog, some bones of animals were also recorded. They probably belonged to large horned livestock, but the conclusion of experts is lacking [Rassamakin, Budnikov 1993: 116-117]. An analogical situation occurred in the burial of Dzhurdzhuleshti [Haheu, Kurchatov 1993: 101, Fig.I,3;3]. That is why using only given materials to describe the organization and character of the Skelanska culture



Fig. 11. Chronological position of the graves and settlements.

herd, with its local displays, is very difficult. Even different categories of inventory do not add any information because trace identifications are absent. The majority of tools and decorations were made from the bones of wild animals, especially deer and wild boar. The handle of a copper awl from burial I of the burial mound in Krivoy Rog was made from the bone of a sheep/goat, but the tool itself is more likely to be an import [Rassamakin, Budnikov 1993: 116, Fig. I,5].

The same picture can be drawn of the Stogovska culture. Some osteological definitions for the Eneolithic layer exist for the Sredny Stog settlement [Pidoplichko 1938: 159], but they are based on a very insignificant number of materials. Domestic types of animals, including dog, are represented in only 15 specimens (225 bones), and wild in 6 specimens (25 bones). The indicators of types of domestic animals are really poor: only two specimens of bull and horse, one of goat and pig, and eight specimens of sheep or goat. Naturally, it is impossible to tell the character of cattle breeding among Stogovska tribes using just those facts. The settlement itself is just a part-time, obviously summer-time residence of a separate group of

the Stogovska culture population, adjacent not to the native shores of the Dnieper, but to Khortitsa island.

The inventory of burial monuments do not add anything to the general picture. Those burials that can be related to Stogovska culture on Vinogradny island, Igren — 8, do not usually have any inventory at all and no remains of funerals or sacrificial food are recorded. The only distinguishing feature of the burials that allows judgement of the settled population is the presence of their bones in probably long-existing ground burials.

Manufacturing inventory is also unplentiful. In settlements, very few tools are discovered. In Sredny Stog — 2, flint goods are found, the majority of which are pieces or manufacturing waste [339 out of 423 according to A. Dobrovolski 1929: 123]. But, out of 84 restored objects only 42 are undamaged. Scrapers, knives, and tips are also found, but their trace analysis was not done and their functional belonging is unclear.

The topography of the Skelanska and Stogovska culture settlements is close to that of the Dnieper basin (Fig. 8). The settlements were located either in places with easy approaches to the river banks or on mountain ledges with niches, which protected these part-time refuges from bad weather. There is a possibility of their using them during war conflicts, too. We have evidence that the epoch of Skelanska, and to a lesser degree the Stogovska cultures, was characterized by increased opposition of different groups among the population. Multiple flint arrow- and javelin-heads, were found both in the settlements and in the burial complexes as well.

Kvitanska culture, unfortunately, is not represented either with osteological facts or with manufacturing sets from settlements because neither were researched. In those cases where Kvitanska ceramics were a predominant factor in settlements, it is impossible to single out materials belonging to the given culture because of the thick layers. Therefore, basic sources are burial monuments, so-called "outstretched" burials under embankments of burial mounds. But even these sources are very limited. For example, from funeral remains of full Kvitanska culture burials in one region between the Orel and Samara rivers, I.F. Kovaleva mentions only two cases with buried sacrifical animals (the skull of a bull and a skulless skeleton of a young large horned livestock specimen) [Kovaleva 1984: 14]. But these facts have to be checked. Of bone goods, the puncture tools from horse bones are mentioned [Kovaleva 1984: 34]. Despite completely identical punctures from Ordzhonikidze and Vasilievka [Nikolova, Rassamakin 1985: 45, Fig. 10:2; Rassamakin 1993: Fig. 11:9], archaeozoologist O.N. Zhuravlev did not risk giving a final definition. A definition of domestic animal type, whose bones were used to make other things, is absent. Some findings of animal ribs are also mentioned, but this is the limit of the facts. A trace analysis of different categories of tools made from of flint, stone, and bone is also absent. From our excavations (Vinogradnoye, m.2 b. 2) [Rassamakin 1987: 33, Fig. I,8] one piece of an animal's rib cage, with multiple usage tracks, was defined by G.F. Korobkova as "kochedik", used for weaving.

The topography of settlements and burial mounds of the Kvitanska culture points to a complete and close connection of life with the river valleys (Fig. 9). This gave a basis for the thoughts of I.F. Kovaleva. She points out a connection with the population which left "outstretched" burials (or according to her terminology post-Mariupol culture) in the deep steppe regions, which lay outside of its sphere of influence [Kovaleva 1984: 10].

Dereivka culture differs favorably from all the above described cultures of the Sredny Stog region due to perennial permanent research in the Dereivka settlement. It is, in fact, the only one that provides materials for reconstruction of the entire culture's economy. We mentioned the Alexandria settlement before. The settlement of Molukhov Bugor, after insignificant excavations by V.N. Danilenko, was represented only by 8 species (80 bones): 3 — cattle, 3 — horse, and 2 — pig [Telegin 1973: 132, diagram VI]. Naturally, it can not serve as a full-fledged source. Moreover, the author of this research was highlighting two horizons of a settlement and the distribution of domestic animal bones, according to this, has remained unknown [Danilenko 1959].

A study, made by V.I. Bibikova, of osteologic materials from Dereivka revealed a tremendous predominance of horse bones and specimens over other types of domestic animals. According to her results, the horse comprised 55.7%, the cattle -20.6%, small horned livestock -14.4%, and the pig -9.3% [Bibikova 1975: 85]. V.I. Bibikova also records approximately 2255 horse bones with the minimal number of specimens at 44, but D.J. Telegin has evidence of 2412 horse bones 52 specimens [Bibikova 1969: 64; Telegin 1973: 132, diagram VI]. It is obvious that the last facts are the most complete, but all the works of V.I. Bibikova are based on the previous facts [Bibikova 1963: 134, addition 6]. It does not make a big difference in the general distribution of domestic animals and it does not influence the general characteristics given by V.I. Bibikova. Osteological study of horse bones (distribution of sex and age of specimens and detailed comparison — studying of the horse skull and lower jaw from the ceremony place, and also separate extremity bones), which was compared with existing facts about wild horses (tarpan and Przevalski horse) and known facts of horse domestication, led V.I. Bibikova to the conclusion that horse bones of Dereivka belonged to an early domesticated type [Bibikova 1967, 1970, 1975, 1969]. The same point of view is held by the majority of researchers, both archaeozoologists [Tsalkin 1970: 198-204; Bökönyi 1984: 10-11] and archaeologists [Danilenko, Shmagliy 1972; Danilenko 1974; Telegin 1973: 131-134]. In Bibikova's opinion, the horse was an addition to the meat ration of settlements' populations. According to these facts, which are automatically spread to the whole Sredny Stog culture (in the interpretation of D.J. Telegin), the people of the Dereivka settlement are seen as horse breeders and even as nomadic horse breeders.

A series of antler items were singled out from the settlement inventory for the support of a horse breeding economy of its inhabitants. They have become "psalii" (cheekpieces) in interpretation [Telegin 1973: 137-139] and used to describe Dereivka riders or Sredny Stog riders (who are one and the same). They represented fearsome combat forces, armed with spears, bows, combat hammers and maces made from antler [Telegin 1970: 19, 1971: 230]. By no means do all researchers support the idea of horsemen among the Dereivka population, dispute over the existence of antler cheekpieces arises. This issue was often discussed in the literature, having its supporters, who were trying to find reliable arguments [Anthony 1986; Anthony, Brown 1991], and its opponents [Haüsler 1994; Ditz 1992], who bring some arguments against it. At the present time, this discussion continues, but new sources, which would allow a breakthrough in this problem, are absent.

The inventory presented in Dereivka does not support a mobile or even any nomadic way of life for its inhabitants. The seasoned character of accumulation of the cultural layer, as was suggested by V.I. Bibikova, is based on the age of slaughtered animals — a year and a half and older with an absence of the very young, before half a year [Bibikova 1975: 85]. Numerous antler hoes testify to the great role of farming. Some pieces of these hoes can not be combat hammers. Despite the absence of traseological research, it is hard to believe that so many powerful combat weapons were scattered in the settlement. Even D.J. Telegin notes the difficulties in discerning the difference between combat hammers and hoes [Telegin 1973: 74]. Indirectly, the similarity of the Tripolye population and its influence, as well as the presence of imprints of cereals on Molukhov Bugor ceramics, point to the farming function of these goods [Pashkevich 1992: 185]. In the Dereivka settlement, some stone grinders and grain graters are mentioned [Telegin 1973: 71]. But, traseological analysis can not establish the function of these goods and weapons yet.

Ground burials and topography (Fig. 8), which point to an area comfortable for long residence, confirm that the settlements of the Dereivka culture were permanent.

In the character of sources, the Nizhnemikhailovka culture is reminiscent of Stogovska culture. On one hand, because the lower layer existed in the Mikhailovka settlement with osteological definitions, and on the other, because Kvitanska has few funerals with animal bones in underground burial monuments. But neither one nor the other provide enough materials for reconstruction of the character of the cattle breeding population of the whole culture. For example, the lower layer of Mikhailovka, according to the information from V.I. Bibikova and A.I. Shevchenko, is represented by only 1106 domestic animal bones, of which the minimal specimen number is 55 [Bibikova, Shevchenko 1962: 207, diagram I]. The largest number of

bones and specimens is among small horned livestock — 760 and 36 respectively, after that is cattle — 217 and 9, horse — 104 and 4, pig — 20 and 4, and dog — 5 and 2.

Burial monuments provide only minimal information. Bones from the funerals in two cases were defined — from complexes on the Molochna (Vinogradnoye, m. 24, b. 30) and Dnieper basin (Vasilevka, m. 1, b. 22). They belonged to a bull, a cow, a goat and a sheep (definitions of E.I. Sekerskaya and O.N. Zhuravlev). These facts supplement those found in settlements insignificantly. Besides, researchers point out the insignificant number of bones, which were given away for measurement and detailed characterization, except for a few parameters of some bones [Bibikova, Shevchenko 1962: 209, 227-228, 233], especially for cattle and horse.

The manufacturing inventory is represented by an insignificant number of flint and bone tools in the settlement (scrapers, arrow-heads, puncture tools), which were never given away for traseologic study. Quite poorly represented are the tools of production and burial complexes, where ceramics and decorations are predominant.

The topography of the Mikhailovka settlement, which is located on a high hill comfortable for long residence and with an approach to the river Pidpilna, is the most optimum for this region, for which a high shore line is characteristic. The burial mounds of the Nizhnemikhailovka culture are connected with the river basins and were located, as a rule, along high and low shores. They are not known in the open steppe. Due to observations on the right shore of the Molochna, Nizhnemikhailovka burial mounds and burial mounds of the Kvitanska culture were located closer to the end of the plateau and even continued towards an already descending hill (Fig. 9).

Thus, we briefly characterize the sources relating to the highlighted cultures, which were obtained as the result of archaeological research in the epoch of the Eneolithic. It is necessary to state the limited collection of facts, available to clarify the character of the cattle breeding economy among natives of the described cultures. We can speak about the organization of the herd, which was already stable in the Neolithic time, but not about the predominance of one or the other type of domestic animal and the character of their support. The information we have is insufficient. The same can be said about the related domestic production. To a certain degree, an exception could be the Dereivka culture, but even its characteristics are based on a single monument and still raise many challenging questions, for which the solution requires new qualitative sources.

The monuments of the changing period (Repin culture and Zhivotilovka-Volchansk group) provide practically no information. Repin culture is usually referred to by researchers as a horse breeding culture, based on the facts of osteology from the settlement of Repin. But we can not find the original information in which a amount of 80% of horse bones and specimens are mentioned. The facts about the Repin settlement are presented by V.P. Shilov [Shilov 1975a: 67], without referring to literature, but with reference to the definition of V.I. Tsalkin about the 1958 excavations of the settlement. According to these facts, such things as 150 horse bones from 5-6 specimens, 20 cattle bones from 2 species, and a number of bones from 1 specimen of small horned livestock and a pig were found. Furthermore, the researcher alludes to the statement of the excavator, I.V. Sinitsin, that the horses, according to the precise facts, comprised 80%. But such insignificant facts do not allow a reliable and thorough characterization of the economy of inhabitants of the Repin culture. Besides, detailed research of archaeozoologists are absent, for example, in Dereivka. Burial complexes with Repin ceramics do not reveal any facts yet.

The population of the Zhivotilovka-Volchansk group left only burial monuments, through which we may judge only the great mobility of this group (Fig. 10). The usual findings of bones in the burials testify to the presence of sheep, but the skull of a bull and a bison in one burial (Volchansk, b.1, p.16) were not described by specialists.

Yamnaya culture, which replaced the Eneolithic cultures in the Dnieper-Danube region (Fig. 11) and standardized them outside, is represented both in the settlements in the Dnieper basin and in the burials, the number of which is more than one thousand. They also supplied very limited facts for the reconstruction of the cattle breeding economy. The fundamental source with osteological definitions is the middle and upper layers of Mikhailovka settlement. Besides this, the definitions for two more settlements are published — Durna Skela and Perun [Bibikova, Shevchenko 1962; Pidoplichko 1956: 44,51]. The difficulties in using the facts about these settlements are illustrated in the definition from Mikhailovka which is given for two layers together, despite the fact that different times and even other culture materials are highlighted among them. For example, the lower horizon of the middle layer was singled out by O.G. Shaposhnikova due to a distinctive ceramic of the Rogachik type of monument. Also present are materials of the Repin culture. In the top horizons, the materials from the time of Catacomb culture are present. At the settlement of Durna Skela, the materials of Sredny Stog and Repin cultures exist, and perhaps the materials of the Middle Bronze [Yakubenko 1982]. The settlement of Perun also needs additional analysis and a new chronological definition. Nevertheless, these facts are used for definition of the herd organization and for the characteristics of cattle breeding among the tribes of the Yamnaya culture of the Dnieper basin. Therefore, we will bring in the basic facts about previously discussed settlements. In Mikhailovka, two upper layers yielded 51 541 bones, from which 3679 specimens of domestic animal were defined. Of these, the cattle was predominant — 1627 specimens, small horned livestock totaled 1202 specimens, horse -656 specimens, pig -82 and dog -112. Perun is represented by 1037 bones of domestic animals, which comprise 53 specimens: 22 of cattle, 24 — of sheep or goat, 2 - of horse, 1 - both of goat and pig, and 3 - of dog [Pidoplichko 1956: 51]. The settlement of Durna Skela produced 25 specimens of domestic animal: 10 — cattle, 6 — goat or sheep, 1 — sheep, 5 — horse and 3 — dog [Pidoplichko 1956: 44]. These are the facts from the settlements. The materials of Mikhailovka have an advantage, not only because the quantitative indicators were published, but necessary measurements of bones were made, as well. Also, a comparative analysis of results with archaeozoologistic and facts available in the 60's was made [Bibikova, Shevchenko 1962].

Some information exists about the presence of domestic animal bones in the burial complexes of the Yamnaya culture. They are found in filled burial mines, on the ledges of burial pits and near the buried. At the end of 60's, N.J. Merpert, in his doctoral thesis, was bringing together the facts then available, which fit into certain regions of Yamnaya cultural-historical unity. They were also used by V.P. Shilov in his work [Shilov 1975a: diagram 8]. According to the diagram, which was discussed in the work, the limit of the given source could be seen, because complexes with animal bones, especially those examined by specialists, are less common than those with researched pit burials. This tendency has its support even now, after the time when thousands of pit burials were excavated on the site of new buildings. The last has become the object of a whole series of regional research in the Dniester--Danube region, on the Southern Bug, on the right bank of the Dnieper, between the Orel and Samara rivers and on the Molochna river, at the north-eastern Azov coast [Yarovov 1985; Dergachev 1986; Kovaleva 1984; Sanzharov 1991 and others]. Usually very little information is brought up about the character of osteologic material, sometimes limited by the establishment of its presence or by a short list of domestic animals to which those materials belonged. Most often, cattle and sheep belong to such groups. The horse is rarely mentioned and pigs not at all. Dogs also exist. But it is difficult to produce any numerical indicators. For example, on the north-western Azov coast, out of 589 pit burials, only 32 (5.4%) have any animal remains at all. In addition, in not all cases were these bones examined by specialists [Rassamakin 1992: 12]. On the right bank of the Dnieper, from an excavated series of 197 burials, the bones of animals were found only in 10 [Samoylenko 1988: 77]. Goat/sheep, cattle and horses are mentioned. The first two specimens are mentioned for the Southern Bug variant of Yamnaya culture without any quantitative facts [Shaposhnikova, Fomenko, Dovzhenko 1986: 21]. On the whole, up to the present time, any total summary of osteologic materials from dimple burials is lacking. It is thought to reflect the present level of research on the whole culture. This is also concerns the simple quantitative indicators, and even more, the differences between animal types not only in general, but regionally as well.

The state of the osteological base for reconstruction of the cattle breeding economy of the Yamnaya culture in the Pontic and Azov areas must be and is desired to be improved. Traseological research revealed that, despite the abundance of different productive complexes, tools of production also were not available in a proper range. Separate research is available about grounddigging tools, which were made from animal bones and antler [Androsov 1987], about the study of metal treatment [Berezanskaya 1979] and other things, but complex purposeful research was never done. In recent years, the production complexes of Mikhailovka were exposed to traseological analysis within the framework of developing scientific topics in the Archaeologic Institute of the Academy of Sciences in Ukraine. But the results of work are not yet published. In the last decade, some discoveries appeared which some researchers treat as cheekpieces; maintaining with this definition the existence of bridled horses among Yamnaya tribes, usable for horseback riding [Shmagliy, Chernyakov 1983; Kovaleva 1993].

The topography of burial mounds with pit burials in Azov-Black Sea steppes is highly demonstrative. In all regional research, the link between burial mounds and river valleys is clearly outlined. On the watersheds, the burial mounds are placed along the shoreline, pressed to the brink of the plateau or moving slightly away from it. This picture, which was presented by V.P. Shilov for the Volga area, for example, does not exist. I.F. Kovaleva points out a number of pit burials in "high, in relation to the native shore or plateau, groups" with maximal distance of the burial mounds from the river valleys being 25-30 km [Kovaleva 1984: 68]. But this is an exception because the described territory of the northern zone has a highly developed hydrosystem.

The territory between the Dnieper and Molochna rivers is also very illustrative in this reference. For many years, research has been made there among burial mounds and in river bank areas, as well as in the open steppe, which is characterized by very brutal conditions since it is one of the lowest regions of the steppe zone. An account made according to observations from the excavations showed that pit burial mounds are located nearest to the shore of the Dnieper and Molochna zones or by the embankments. In the open steppe, they are practically non-existent [Otroshchenko, Boltrik 1982; Otroshchenko 1987]. Nearly the same picture of location of pit burial mounds can be seen practically everywhere, in all regions of the Azov-Black Sea line. To this point we can add the completion and size of pit burial mounds in the regions. They show a long period of usage of the same burial mounds for additional burials and underburials. This also testifies to the permanent presence of Yamnaya tribes near the burial mounds. The height of pit burials reaches 3-5m, but sometimes even higher and they have from 3-4 to 7-8 different additions. Even small burial mounds, without any signs of additions, usually present a so-called "mogilnik" in the burial mounds' embankments, with well-planned circular or center entrance burials. Such a picture testifies to the preference of the Yamnaya population to live in certain places, which are shown to be closely connected with the river basin areas and the river bank line of small and large rivers.

As a closing summary to this section, we are forced to note a weak base of sources for the solution of such a difficult problem of the Eneolithic period, as well as the Early Bronze. Such problems include the reconstruction of the type of cattle breeding economy among the populations of different cultures and their way of life. The herd organization is outlined well enough according to the bone remains, but for future research this is only half of what is needed. Things are going a little bit better with studies of Dereivka and Mikhailovka, but even here we have some problems, as will be discussed in the following paragraphs.

3. THE QUESTIONS OF PALAEOECOLOGY

The reconstruction of the ecological situation in the northern Pontic steppes and to the south of the forest-steppe zone, during the period of formation and early stages in development of the specialized cattle breeding economy, is one of the most important complications in reconstructing the way of life among early cattle breeders. Since the last two decades, great success was achieved in this field due to study of natural sediments, but also due to active research by specialists (palaeobotanists, palaeoclimatologists and palaeopedologists) in archaeological sites — settlements and burial mounds. Along with summarized research [Khotinski 1977; Veklich 1987] some work is sent out directly regarding the region that we are examining. From only the last decade, we can name a number of important research [Artyushenko et al. 1982; Artyushenko et al. 1984; Ivanov 1984, 1985; Alexandrovski 1983; Spiridonova 1990, 1991; Kremenetski 1991; Gerasimenko 1993 and others] which allow us to work out common views on the natural situation and climate of the steppe and forest-steppe of the Ukraine. We can do this despite disagreement about dates and natural-climatic characteristics of certain periods and subperiods. Naturally, we are interested in those works which were executed on the basis of studying the archaeological monuments, as they have a direct connection to our topic and to the cultures mentioned above. We will note the monograph of K.V. Kremenetski [1991], the conclusions of whom are based on a large amount of factual material from archaeological monuments of the Northern Pontic zone from the Don to the Prut river. To the west, these monuments are represented by Tripolye and Gumelnita culture settlements, synchronic with Skelanska and later cultures of the Eneolithic epoch. To the east, pollen analysis from multiple layers of settlements on the Don river were studied with clear eneolithic layers: Razdorskoye, Samsonovskoye, and also Konstantinovskoye. These facts were supplemented by the study of swamp sediments, from which it is important to single out Kardashinskoye in the lower reaches of the Dnieper, because it gives basic palinological facts for this part of the Northern Pontic zone. We are also interested in the conclusions of palaeopedologists, who researched the burial mounds of Eneolithic and Yamnaya times. V.P. Zolotin was conducting research in the burial mounds of the Northern Pontic in the late 60's [Zolotin 1970]. The researcher came across those burial mounds which were designed during Usatovo and Yamnaya culture times. New research was made by I.V. Ivanov in the burial mounds of the northern steppe zone of the Dnieper basin, between the Orel and Samara rivers, which were erected above the burials of Kvitanska and Yamnaya cultures [Ivanov 1983, 1985].

The facts for reconstruction of the natural situation and climate of the North Pontic area are supplemented by research which indicates changes in the level of the Black Sea [Fedorov 1973; Gozhyk, Karpov 1985]. The progression and regression of the sea is accordingly tied up with the warming or cooling of the climate, also influencing the natural situation of the Northern Pontic region. The facts about the rhythms of the Black Sea, the conclusions of palaeopedologists and palinological materials are used by archaeologists when studying a number of basic problems in the development of archaeological cultures: their formation and disappearance, economic aspects, migrations, etc. These trends have become very popular lately. Archaeologists started to pay special attention to the synchronization of cycles of natural-climatic changes with the alteration of the cultural-historical situation in the steppe zone of the Northern Pontic area. Lectures were delivered on this subject by, for example, C. Todorova, V.G. Petrenko, N.S. Kotova. The climactic change and the swamping of the preferred living sites (valleys) of the eneolithic tribes of the Varna and Kodzhadermen-Gumelnita-Karanovo VI cultures destroyed, according to Todorova's point of view, their ecological inheritance base and led to havoc in the stable situations of Thracia and the Lower Danube. All Bulgarian settlements of the late Eneolithic were deserted, the Balkan-Carpathians metallurgical field was soon abandoned and a temporary hiatus was created until the beginning of the Early Bronze age [Todorova 1989: 25-26, 1993: 79]. The researcher does not exclude the influence of the climate on the decline of Lengvel and Polgar cultures in Central Europe and on the creation of favorable conditions for invasion of the early steppe tribes to the Balkans.

N.S. Kotova tried to combine natural-climatic changes in the Don-Dnieper steppe zone with the appearance and development of a number of neolithic cultures in Mariupol cultural-historical region, in this way synchronizing certain cultures of their periods with the rhythms of climactic changes (aridization and moistening). The researcher states that either migrations of any culture's population into another region (as a rule, from south to north), or their peak, the increase of population, etc. were dependent on the above-mentioned conditions [Kotova 1993: 22-31]. The beginning of the Eneolithic epoch, connected with the appearance of Skelanska culture, coincides with a favorable natural-climatic situation of the moistening period [Kotova 1993: 29].

V.G. Petrenko worked out, in detail, the stages of Tripolye culture development and changes of the Black Sea level. He came to the conclusion that the Tripolye phenomenon "was moving towards the limit of its formation in the same rhythm as the climatic changes" [Patokova et al. 1989: 117], and that the end of the Eneolithic, to the north of Black Sea, and the end of the Atlantic period of the Holocene are synchronized. We consider the researcher's conclusion about worsening of naturalclimatic conditions during the late period of development of Tripolye culture to be very important. The development of Usatovo culture coincides with a cold snap, and to the time for the Khadzhibey regression of the Black Sea on the transition between the Atlantic and Subboreal periods. On the whole, it is possible that the existence of the late Tripolye culture could be spread over the transitional phase from humid to dry climate [Patokova et al. 1989: 117].

The conclusions of V.G. Petrenko coincide with the observations of palaeopedologist I.V. Ivanov, who studied ancient soils in the burial mounds of the Kvitanska culture, according to our terminology (the "outstretched" burials). He determined that the erection of burial mounds was taking place under the conditions of transition from Atlantic to Subboreal, and is characterized by a worsening of climate [Ivanov 1985: 30]. This conclusion coincides with the dating of "outstretched" burials according to found items in Usatovo, of later Tripolye affiliation.

Summarizing the existing facts and taking as a basis the works of K.V. Kremenetski and V.G. Petrenko, we may correlate the development of steppe cultures and the changes in natural-climatic conditions in the following way.

The beginning of the steppe Eneolithic and the appearance of Skelanska culture coincide with the beginning of the second half of the Atlantic period, which is characterized by favorable living conditions due to the oceanic climate. This time of so-called optimal climate is characterized by milder summers and winters than now, but the quantity of rainfall dropped to 120-130 mm. Broad-foliage areas are extended, the grass coverage of the steppe is also improved, and the vegetation becomes more diverse [Kremenetski 1991: 150-160, 174-175]. Considering the disagreements in dating, we took archaeological sites, where studies of soil and pollen analyses were made, as a basis. The early Eneolithic coincides with Tripolye B-I and, using the dates mentioned in the first part of this work, this time can be determined to be 4500–4150 BC.

The late Eneolithic of the steppe falls in the time of the beginning of aridization of the climate, the worsening of the natural-climatic situation, which foreshadows the beginning of the Subboreal period of the Holocene. Obviously, this process, as suggested by V.G. Petrenko, could extend not only to the final phase of Tripolye C--II, but to the whole late Tripolye period of development, especially in the southern steppe zone. In any case, Tripolye C-I is synchronized with spread of the same well--outlined burial mound cultures like Nizhnemikhailovka and Kvitanska, which are evidence themselves of change in the economic structure among culture bearers. For the Dereivka forest-steppe and Stogovska steppe cultures, such a process has not yet been observed. Judging from the dating of Tripolye monuments on the stage of C-I and consequently, Kvitanska and Nizhnemikhailovka cultures, the time of these changes falls in the period of 3700-3150/3000 BC. More drastic changes in cultures occurred during the period of 3600–3000 BC. During this precise time, common processes of decline are observed in the Tripolye environment, and in the steppe as well. Culture-migrants appear, a type of Repin and Zhivotilovka--Volchansk group.

The epoch of the Early Bronze Age is completely connected with the extension of Yamnaya culture. This process fully coincides with the beginning of the Subboreal period, which is characterized by the establishment of a drought-afflicted climate. Valley forests were decreased, the grass coverage was changed resulting in, according to I.V. Ivanov, less productive pastures (50-60% lower) in comparison to the preceding Atlantic period [Ivanov 1985: 30]. A decrease of water in river flood plains was also seen, the quality of water suddenly dropped. These changes could be ignored by the steppe population and influenced its economic activities in a variety of ways. In particular, specialized cattle breeding demanded a transition to a more mobile form, in comparison with Eneolithic times. This was reflected in the whole appearance of the steppe population's culture, which we record in a semi-detailed, uneven change of material culture and ceremony among the Yamnaya population. This is reminiscent of the process of transition from the Eneolithic to Early Bronze Age in Balkan-Carpathians region.

Considering the fact that monuments of the Yamnaya culture in the burial mounds of Northern Pontic area cover all previous burials of eneolithic cultures (Nizhnemikhailovka, Kvitanska, Usatovo), the time of Subboreal coincides with the period no earlier than 3000–2900 BC and continued for about 500 years.

The attempts to correlate the natural-climatic changes with the change or transformation of different cultures provides the foundation for connecting these changes with the changes in the economic activities of the ancient population of cattle breeders and farmers, either in the steppe or forest-steppe, as well. Naturally, the biggest influence, because of the change in ecological conditions, was in steppe zone in the are of the population. The only way to survive became improvement in
forms of breeding and maintenance of cattle. Therefore, reaction to the worsened natural-climatic situation was always cause and effect one.

Naturally, there is a large quantity of still existing problems in studying the influence of natural-climatic factors on the development of Eneolithic and Early Bronze Age cultures. It is first necessary to improve and more distinctly correlate the chronology, palaeoecological and archaeological, for the purpose of improving and combining both scales. Until the present time, some disagreements exist in dating, even within the framework of certain scientific disciplines.

The research done by specialists is necessary in the steppes of the Northern Pontic area, because archaeological monuments here, from the point of view of natural-climatic reconstructions, are poorly researched. On the Dnieper and near the Azov sea they were not adequately studied. The facts about the settlement near Kamenaya Mogila on the Molochna river are not published (the research of G.A. Pashkevich). Of special interest is the burial mounds with multiple additions during the Eneolithic and Early Bronze Age, on the surface of which a thin turf layer formed of dirt accumulation is usually found. The researches of such monuments would allow us to build a reliable time-ecology scale well connected to the archaeological cultures and their chronology. But so far, the steppes of the Northern Pontic and Azov areas are "surrounded" by facts about the farming type of Tripolye culture to the west and northwest. To the north there have been studies of soil in the burial mounds of Kvitanska and Yamnaya cultures and on the Northern Donets and Middle Don. But to the east there is only the materials from the settlements of the Lower Don. Therefore, the conclusion of K.V. Kremenetski about synchronization and homogeneous changes in the climate and vegetation of the steppe zone in the southern Russian Plain is very relevant and vital [Kremenetski 1991: 147-148].

4. THE PROBLEMS OF PALAEODEMOGRAPHY

Palaeodemographic development on the territories of the Northern Pontic and Azov areas during the period of Eneolithic and early Bronze culture development is practically non-existent. In the topic we examine, one thing from general regularities is very important and connected with demographic research: with a population increase, a rise in productivity is necessary because consumption also increases. Or there may be a transition to another economic system or a fundamental transformation of the old one within the possible ecological bounds. The importance of such research and, at the same time, their complexity and controversiality show researchers' achievements in the field of Tripolye culture study. The last provides extensive materials for palaeodemographic calculations except for from one source - cemeteries, which appear on the stage of development among separate local variants of culture and can not already be "native Tripolye". According to the facts from burial monuments, for the steppe zone, the only tendency is an increase of population from the Eneolithic to the Bronze Age. This is also proved by simple quantitative indicators of researched monuments and other calculations with the use of indicators showing age and sex, which contain their basis in the work of A.E.Kisliv [Kisliv 1989]. The calculations of S.Z. Pustovalov suffer from the large quantity of conventional assumptions and admissions. It is hard to perceive them objectively [Pustovalov, Stepanova 1994]. The limitation of sources, in the framework of burial monuments, is also seen in the research of remains in the burials. These studies usually do not take place and anthropologists are at fault. The settlements of the observed period are limited, essentially, to two monuments: Dereivka and Mikhailovka, where the remnants of dwellings and buildings were recorded. But even those unique monuments have not had a serious demographic analysis until the present time. Therefore, the conclusions about the increase of population in the Early Bronze Age are abstract and based, in many cases, on the nature of archaeological research of the last 25 years. Due to circumstances, were mass excavations of burial mounds. They have become the fundamental and predominant source of ceremony study among the population of the Yamnaya culture. As for the Eneolithic, along with the appearance of early burial mounds, we may obviously suppose the presence of a significant percentage of ground cemeteries, which are occasionally discovered by accident and researched by archaeologists. This is particularly visible in the examples of the Skelanska, Stogovska, and Dereivka cultures.

At the same time, for studying the distinctive economic features of one or the other population, it is more important, in our opinion, not so much to indicate the general increase of population, but to find out the density of population in different regions and at different times. The possibilities exist to single out certain fixed or limited territory groups of population using the following calculations of their productivity potential and level of consumption. Unfortunately, the absence of facts concerning settlements does not permit observation of all aspects of cattle breeding within the framework of certain economic complexes, as demonstrated by S.N. Bibikova using the example of Tripolye culture [Bibikova 1965]. Additionally, the solution to this problem is significantly difficult because of the weak development of social structure among the steppe communities of the Eneolithic, as well as in the Early Bronze Age. The presence of patriarchal relations and the appearance of a large patriarchal family as a basis of society [Lagodovska, Shaposhnikova, Makarevich 1962: 181-182; Merpert 1974: 129-134] can serve as a starting place for research in the framework of certain limited zones. For the Eneolithic and Early

Bronze Age these zones coincide with river valleys and adjacent coastal territories. Graphically, such principle are confirmed by the highlighted local variants of Yamnaya culture, which with more detailed dividing, territorially coincide with the basins of large rivers and their inflows.

5. THE PROBLEMS IN RECONSTRUCTING CATTLE BREEDING TYPES AND THE WAY OF LIFE AMONG THE STEPPE POPULATION DURING THE ENEOLITHIC-EARLY BRONZE AGE

Summarizing all that we said in the preceding parts, we have been introduced to a very problematic objective solution of the given problem, especially for the epoch of the Eneolithic. The question is not one of the herd's organization and which domestic animals formed these early cattle breeders' herds. It was formed among the population of the Mariupol cultural-historic unity, maybe even including the horse. The heart of the problem lies in the correlation of different types of animals in the herd and forms of its maintenance, about which simple calculations of bones and specimens do not provide single-digit information. We are not talking about burial monuments with their ritual specifications. The base of information consists of materials from settlements, the quality of which was mentioned above. It would be possible to name the ideal facts which would allow calculation, during a set period of time, of the quantity of a settlement's inhabitants who could use meat production from the domestic animals represented in that settlement. Not on the basis of the number of specimens, but according to the recalculation of living weight. The last one usually changes the relationship of the herd, especially in those cases where the bones of small horned livestock are predominant. With that, it would also be necessary to count the living weight of wild animals (deer, aurochs, wild boar, miniature horse "kulan" and others). Obviously, the count of possible dairy cattle is needed, and draft and pack cattle, too. The development of such a study, with reference to the steppe zone of the Ukraine, is absent. Therefore, it is impossible to objectively estimate the character of the cattle breeding economy of one or another population. As a result, all suggestions about the way of life among the Eneolithic and Early Bronze steppe tribes are based on indirect evidence. In a summarized form, the conclusion could sound like this: considering the tendency towards population increase from the Eneolithic to the Early Bronze Age, the worsening of the natural-climatic situation from the Atlantic to the Subboreal and in the beginning of the Subboreal, the steppe population transformed to a mobile method of cattle breeding, possibly including semi-nomadism, based initially on sheep breeding. But even with all of this, some settlements should be preserved in the river valleys, which offered winter housing and possibly even tribe centers with a dependance on their permanent establishment. In fact, the same conclusion was reached by researchers after the excavation of Mikhailovka, as we pointed out in the introduction. This opinion is also held by V.O. Shilov (if for the Early Bronze Age, a type of settled horse breeders of the forest-steppe would be removed, which the researcher placed at Dereivka, in other words, in the Eneolithic period of time).

But this is just a superficial section of the problem dealing with reconstruction of cattle breeding, which is aggravated by general methodological difficulties in classification and typology, fully outlined in anthropological literature. In the 80's, the discussion on the pages of "Sovetskava Etnographiva" did not bring significant change because researchers preferred to have their own opinions [Andrianov 1982; Markov 1981, 1982; Semenov 1982; Shamiladze 1982; Simakov 1982]. The areas of the largest disagreement remain. These are problems of identification and characteristics of different forms of mobile or unbranded cattle breeding. The critical analysis of this methodological dispute and a list of the latest researchers addressing this topic were made by E.P. Bunyatyan, who has principles of approach we agree with [Bunyatyan 1989, 1994]. The principles reflect the method of cattle maintenance and reproduction and were put into the basis of cattle breeding classification. This gives, in Bunyatyan's opinion, an idea of the essence of cattle breeding as a branch of activity. The methods of maintenance of cattle are observed within the bounds of their extreme manifestations: between stable — stalled, as a form of intensive cattle breeding and mobile — driven, as a form of the most extensive cattle breeding. Depending on a combination of different ways (driving, driving to pasture), four main types of cattle breeding are highlighted: stall-pastured, driven-stall-pastured or driven, driving of cattle and stalled [Bunyatyan 1994: 97-98]. These types of cattle breeding, as determined by other types of economy, primarily with the level of farm development and, in our opinion, the hunt for meat animals, can appear as a criterion for characteristics of the steppe population's way of life: from settled with stalled and stall-pastured, to nomad with driving type, including different intermediate or mixed variants [Bunyatyan 1995]. But this is just a theoretical development, based primarily on anthropological (ethnological) materials, the combination of which with archaeological facts is a necessity. This task for the observed epoch is a very difficult one and almost impossible to complete, unlike, for example, the Middle Ages or Scythian times, because it creates difficulties in finding a corresponding analogy. The facts about completely nomadic societies or those tranformed into a settled way of life are often not identical to the period of formation and development of the specialized cattle breeding economy in the Eneolithic — Early Bronze Age.

Drawing a conclusion from what has been stated in parts of our work and guided more by indirect facts, and to a considerable extent, by logic and intuition,

we can suggest the following model of development of separate groups among the population. If our conclusion about the residence of Skelanska culture tribes in favorable climate conditions is correct, then the only significant cause for migration could be a demographic one. We are talking about a possible surplus of population in the basins of large rivers (Don, Dnieper) and adjacent territories on the of the Neolithic — Eneolithic. Then, a part of the population could have been forced to resettle into other zones. The given cause is possible, though very improbable. First of all, for such resettlement there was no need to move to the Danube or even further. Neighboring territories with favorable conditions could have solved the arising problems. Secondly, we do not have the appropriate demographic research. Multiple burials of the Mariupol type in the Dnieper basin were erected over a long period of time, and some of them are ones of a different time. They testify to permanent and long-lasting settlement of a territory, but do not give any evidence of a demographic crisis. Another possibility exists concerning early Eneolithic migrations of Skelanska culture tribes and, in our opinion, is more realistic. The appearance of burials belonging to the Skelanska culture in the Carpathians-Danube region coincides with the development of the Balkan-Carpathians metallurgical province. The metal was a stimulus and a purpose for movement. This period in the life of the steppe population could have been called an epoch of prestigious exchange, the importance of which is well-known, according to demographic facts. Rich burial complexes appear, in which the dead were always accompanied by prestigious belongings: copper goods, golden decorations, high quality flint tools, belt sets made of shells, imported ceramics and sceptres or maces. Separate groups of Skelanska culture population were possibly engaged in prestigious exchange, being mediators between the steppe and farming worlds. Due to that, not only completed artifacts were found in the steppes, but independent metallurgical complexes were created in the Dnieper and Volga basins as well [Rvndina 1993]. A parallel can be made between the steppe "rich" burials and Varna's burial. The prestigious exchange. first of all, stimulated social shifts in the Skelanska culture society, which was reflected in the appearance of individual burials (maybe with burial marks on the top) and later, in burial mound construction.

In this way, the appearance of burial mounds was primordially conditioned by social reasons, which were later consolidated into a certain cult-ceremonial and mythological form. As for the economic aspect, we know that domestic cattle were undoubtedly included into a sphere of exchange. It was mainly a certain, atypical for farming, type of pedigreed animal. Consequently, we can talk about certain forms of cattle driving, stimulated by exchange, and simplified by favorable climate conditions. A separate part in this problem is taken by the horse, which could appear as the most "exotic" and prestigious animal. In any case, the appearance of scepters resembling horse heads confirms this suggestion. The horse became a socially prestigious symbol in the surroundings of steppe-mediators and maybe, among certain segments of farmers as well. This stimulated the taming and domestication of the horse.

But we can not say how far this process has gone among the Skelanska culture population, whether groups of mediators owned several specimens or if they supported a small herd. We think, the forest variant is more realistic. The psychology of people from this period could reflect not only and not so much the practicality of the action, but the irrationality which appears during those moments when the prestige of owning a certain object or good is significally predominant over practical and economic necessity. In the given case, this can be considered the "rich" segment of the Skelanska population and the farming segment as well. With this idea, the cult meaning of an animal increases, as is easily seen in findings in the Volga basin in the early monuments of the Samara culture (Syezhinsk cemetery, for example). There skulls and legs were recorded on the sacrificial square, and figures of horses made from wild boar fang [Vasilyev 1981: 67]. There are also synchronic monuments of the Khvalynsk culture (Khvalynsk cemetery), where horse bones were recorded in altars [Agapov, Vasilyev, Pestrikova 1990: 65, diagram 2].

In our opinion, for the lifetime of Skelanska culture in the Don-Dnieper steppes, the necessity of wide settlement concerned with settling and extension of pastures or development of mobile, semi-nomadic forms was absent. Especially with nomadic cattle breeding, local resources provided the needed level of lifestyle. This is confirmed by the following period, when the Balkan-Carpathians metallurgical province disappeared. At the same time, "rich" burial complexes disappeared, and the movements of the population's groups are not recorded archaeologically. In the the Dnieper basin, Stogovska culture is formed. The materials of this culture are still limited by steppe-adjacent Dnieper basin zones, and burials are represented by ground cemeteries and small in number "ordinary" inventories. The life of the Stogovska population was probably fully tied up with the Dnieper basin, and it is hard to calculate the importance and predominance of cattle breeding over other types of economy. Most probable is the presence of stall pastured support of domestic cattle during a settled life.

The Kvitanska and Nizhnemikhailovka cultures, with their clearly outlined burial mound ceremonies expanded during that period, when, in V.G. Petrenko's opinion, a moderately humid climate phase starts. In combination with the wide extension of monuments, this can already be evaluated as the development of mobile forms of cattle breeding under the conditions of a gradually worsening climate. In addition, the primary place belonged to the population of the Nizhnemikhailovka culture, which settled in the more southerly steppe zone and influenced the development of mobile forms of cattle breeding among the Kvitanska-culture population. The rigid connection of monuments of both cultures with river valleys does not permit explanation of any forms of long-lasting driven cattle breeding, especially among the Kvitanska population. We can not speak more concretely about the cattle breeding economy of Nizhnemikhailovka and Kvitanska cultures.

An uneven picture of economic activity is given by the materials of the forest--steppe Dereivka culture, represented by settlement of Dereivka. Basic facts were outlined above. How much of is this economy characterized by horse breeding? Doubts appear that horses presented only the domesticated type. With a very high importance of hunting, the suggestion about the origins of the majority of horse teeth from the settlement confirms this [Levine 1991: 738-739]. Consequently, D. Anthony and D. Brown do not bring in any evidence of horse domestication, except for the famous skull and lower jaw of a horse from a "cult place". These researchers were able to determine the use of bits from tracks in effaced teeth [Anthony, Brown 1991], but other objects did not give any further confirmation. Thus, the statistical confirmation is absent, not only of the presence of horseback riding on a bridled horse, but its domestication as well. The fact that horses are determined to be either domestic or wild in accordance with bone remnants from settlements confirms the absence of reliable criterion for both forms of division. Moreover, the observations of A. Haüsler are a confirmation that "cult places" are remnants of late destruction of Middle Ages times. We can add that a layer of the Late Bronze Age existed in Dereivka, and is connected to the Byelozerka culture [Sharafutdinova 1982: 15]. The finding of real bone cheekpieces of the Late Bronze Age near a fire-place deep in the shell layer, is notable. It lay on the same level as the fire-place. The "cult place" was placed outside of the shell layer, near the end of the late Perekop, and considering all this, the skull of the horse lay above the bones of dogs. Around the square of the "cult place", D. Telegin also noted down the mixture of layers above the shell horizon. It can be seen that an additional exacting analysis of materials from the settlement is necessary. There is no doubt that part of bones, and also some stone constructions could belong to the Byelozerka culture (Late Bronze Age).

If our thoughts are correct, then the economy of Dereivka's inhabitants can already be characterized not as horse breeding, but as complex, with a significant specific importance of farming and hunting. This situation is found in the farming settlements of Tripolye and Gumelnita, especially in the early stages, and is supplemented by a relatively high representation of cattle and even pigs. The picture of Dereivka as a farming-cattle breeding settlement is not as clear as in Tripolye settlements, but this is quite explainable by the absence of deep traditions and the perception of Tripolye influence on a local "barbarian" basis.

The population of the Yamnaya culture of the Early Bronze Age can possibly be named as the first semi-nomadic tribes. Their high level of mobility was determined by the arrival of a drought-afflicted climate, which initiated a transition to more extensive forms of cattle breeding. Wide distribution was obtained by wheeled transport. Nevertheless, the Yamnaya population kept certain, obviously assigned to tribe or family, cattle grazing places, adjacent to river basins, where settlements and burial mounds were located. The support of cattle was based, obviously, on a developed driving-away system, not excluding driving of cattle in places bounded by rivers. But with such characteristics, a different approach is necessary for revealing them as really semi-nomadic groups or as groups of "cow-grazers", according to the analogy of Nuers and others.

CONCLUSIONS

In conclusion, we will note that the given work is considered to be at an initial stage of a difficult and important theme. Its critical purpose should be considered to be an attempt to call researchers' attention to existing problems in the field of reconstructing the economy of the steppe population during the formative period and during initial stages in development of specialized forms of cattle breeding on the territory of the Northern Pontic zone.

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FROM NOMADISM TO THE SEDENTARY WAY OF LIFE. A CASE OF THE EVOLUTION OF THE LATE NEOLITHIC AND THE EARLY BRONZE AGE COMMUNITIES IN SOUTH-EASTERN POLAND: 2900–1650 BC¹

At the beginning of this article I would like to emphasize that the terminology used here, referring to various forms of breeding economy, is based on the suggestions of V.A. Shnilerman [1980]; K. Tunia [1986]; O. Bar-Yosef and A.Khazanov's [1992]. In the light of the theories mentioned there only the population of the earliest horizon of the Corded Ware culture may be defined as practicing pastoral nomadism in the form most approximate to model interpretations. Pole apart model represent the economy of the Mierzanowice culture, in which breeding of animals grazing on pastures around the permanent settlements was supplemented by land cultivation, at the same time being a rejection of any form of the nomadism. Breeding activities of the population of the late stages of the Funnel Beaker culture and the Cracow-Sandomierz group of the Corded Ware culture are the intermediate forms between the above mentioned, extreme types of this kind of economy.

1. STATE OF DISCUSSION

Slovakian researchers see a decisive role of influences from the East on the formation of the Early Bronze Age civilization in the area of Małopolska and Slovakia. So in reference to the Koštany group [Pastor 1965, 1969] as well as Nitra group [Točik 1963, 1979; Vladar 1973] and to the so-called Chłopice-Veselé type they stated unequivocally their eastern roots. This thesis was emphasized in the strongest way by Jozef Vladar, who wrote: "Nach dem bisherigen Forschungsstand ist die

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Entstehung des Chlopice-Vesele-Typus mit dem osteuropäischen Gebiet zu suchen, nicht in Kleinpolen" adding that: "Die Träger der Glockenbecherkultur drangen im jüngeren Abschnitt ihrer Existenz durch Marchtal und die Mährische Pforte nordwärts nach Kleinpolen. Erst in dieser Zeit, bzw. etwas später, konnte es zur Expansion des Chlopice-Vesele-Typus aus dem osteuropäischen Raum nach Kleinpolen" [Vladar 1973: 255]. The same researcher maintained that the development of the local metal working in Slovakia occurred in connection with migration of the new population from the East European areas (probably from Caucasus) what was indicated by the use of the so called arsenic copper in metallurgic production [Vladar 1973: 254]. Also in Andrzej Kempisty's conception the Chlopice-Veselé group had extensive, Euro-Asian links. Its connection with the considerable movements of people was undoubted [Kempisty 1978; 420]. The radical population change in the Early Bronze Age in Małopolska had already been indicated earlier by Leon Kozłowski. He associated this change with climatic changes. However, he did not pointed to the East as an area of the source of migration of the newly arrived population [Kozłowski 1928: 3-35].

On the other hand, the local origins of the Early Bronze Age cultures in Małopolska were pointed to by Jozef Kostrzewski [1939–1948: 204-206], Konrad Jażdżewski [1981: 310-311], Witold Hensel [1973: 131-132], Klaus Schäfer [1987] and Marek Gedl [1989]. According to Jan Machnik's interpretation [Machnik 1967, 1978, 1987, 1991] the process of formation of the Chłopice-Veselé group/culture was much more complicated. It was formed in the river basin of the upper Vistula as a result of an interaction of a part of Corded Ware and Bell Beaker culture. A little later this group spread by means of migration around the western part of the Carpathian Mountains. However, it differed much from the cultures which preceded and co-created it. The cultural change in Małopolska was to be a part of processes occurring on larger areas. According to Jan Machnik it may be connected with the population movements in the Anatolian-Aegean and Caucasian zone which caused further migrations occurring like a chain reaction [Machnik 1967: 184-190, 1973: 127-165, 1978: 9-29, 1987: 154-164, 1991: 173-185].

However, it is difficult to see in the attempts made so far anything more than analysis on the level of cultural units in which particular researchers explicitly [Kowalczyk 1959] or implicitly (all the other authors) suggested a relation of cultures and cultural groups with the specific tribes. Apart from pointing to changes in climate (Leon Kozłowski) those researchers who were in favor of the culture change at the beginning of a new epoch did not present concrete reasons of migration movements. Those who were in favor of continuation did not present causes of the state of affairs which they suggested either, particularly in face of the evident civilizational turning point in the areas of the Carpathian Basin and areas occupied by the Únětice culture. I think that further dwelling at the level of cultural taxonomy units as far as the question of the origin of the Carpathian Epicorded Cultural Circle longer gives any hope for progress in this field. Neither do I consider it proper to search only for one reason which caused a complex socio-cultural process. To answer to the question: what happened at the beginning of the bronze age in Małopolska, why just in this and not another moment and what mechanisms shaped the processes of evolution at this time we should involve the knowledge in the field of settlement forms, economy, social structures and ideology not only about the period we are interested in but also from the time which preceded it immediately. In the causal chain of events that form the picture of the Early Bronze Age civilization in Małopolska an important role was played by breeding economy in its many aspects: economic, social, organizational and ideological.

2. ENEOLITHIC

The beginning of socio-cultural transformations in the loess zone of Małopolska, the last link of which was the formation of the Mierzanowice culture, was an introduction of slash-and-burn system at the turn of the 5th and 4th millennium BC as a basic and regular agrotechnical treatment [Kruk 1993: 11-14]. It was accompanied by a considerable increase in size of settlement microregions. Hierarchically differentiated communities of the Funnel Beaker culture appeared [Milisauskas, Kruk 1984]. Significant changes were found in many other disciplines, among others in the technology of the flint processing.

Practicing an extensive system of agriculture caused the process of considerable ecological changes in the form of deforestation of great areas, particularly on the loess uplands. Open areas were made more permanent through grazing large herds of cattle and sheep. There was a fundamental contradiction in this system. Janusz Kruk wrote: "Its rise and economic efficiency was connected with the forest. In practice, it consisted in the destruction of these resources" [Kruk 1993: 11]. Populations using this method of cultivation were in a sense trapped. In the modified environment conditions were better for stock rearing than for a continuation of slash-and-burn agriculture. Thus there occurred the collapse of the Funnel Beaker culture and the permanent agricultural settlement system which had been dominant so far, and the prevalence of the Corded Ware culture which based its economy on the semi-migrating and migrating pastoralism [Kruk 1993: 14].

The sequence of events, which were reconstructed by Janusz Kruk, was an indispensable condition for the domination of breeding activities on the loess uplands of Małopolska at the end of Neolithic, However, it did not prejudge the shape of the socio-cultural structures at this time. A condition that was conducive to the strengthening of the trend of economic transformations described here was the appearance of a new model of economic behavior as well as social and cultural in the form of penetration of the Małopolska region by the representatives of the oldest horizon of the Corded Ware culture. Their appearance at any different moment in history would not have caused changes of a similar character and scale to those which occurred just at the end of the Neolithic. At this moment the question whether they came from the East (what is very probable) or not is not very important. It is important that they brought with them a new, fully-formed model of culture which legitimated the social system that was better adapted to the performance of tasks different than those of the economy of slash-and-burn agriculture. The groups of newcomers were not large. Their life style might have been most approximate to the model nomadic pastoralism [Bar-Yosef, Khazanov 1992: 2] in the prehistory of the area discussed here. An archaeologically visible trace of existence of these groups were the oldest sub-barrow graves of the Corded Ware culture. Acculturation processes of the part of population of the Funnel Beaker culture, which had already earlier been specialized in breeding activities, surely occurred quickly. Probably this population increased the number of the nomadic herdsmen of the Corded Ware culture, described as the Central European Corded Ware culture horizon.

Different situation prevailed among the populations which were still dealing with agricultural activities. In the "Baden-like" form (loesses of the western Małopolska) or not "Baden-like" (all the other areas) they continued traditions of the Funnel Beaker culture. However, the deforestation processes that have previously been mentioned were still deeper and deeper. Obviously this was conducive to the further development of the population of breeders and decreased the chances of the agricultural populations. A similar effect might be brought about by the asymmetry in the mutual relations of both populations. On the one hand, there were breeders-warriors who were well equipped with stone battle-axes and bows, and on the other, farmers who partly lived in the fortified settlements. Constant decrease in the number of farmers, accompanied by the simultaneous increase in the number of herdsmen led to another trap, this time of an economic character. Communities of breeders could not survive without access to agricultural products [Moszyński 1953: 46-48; Kruk 1980: 325; Shnilerman 1980: 230-243; Robertshaw, Collett 1983: 73]. At the moment when agricultural settlement disappeared in the middle of the 3rd millennium BC pastoral population of the Corded Ware culture faced a very serious crisis. The condition of its further existence was to undertake agricultural production. The drama was getting even more dramatic by the ideology that was prevailing among the breeders. It can be resolved to a statement that a person who became a herdsman once should no longer humble himself by taking up agricultural activities [e.g. Evans-Pritchard 1940: 80]. In a situation when existence was threatened whole populations of breeders or their part started to practice other activities, mainly agriculture. Taking up agricultural activities was not a barrier for breeders that could never be passed both in the technological and organizational sense [Mace 1993: 369-370]. Archaeological form of this state of evolution of the communities of the Corded Ware culture was the Cracow-Sandomierz group. On the other areas of Małopolska groups of breeders were still existing that adhered to the "old Corded Ware culture" traditions. Traces of their existence were found in the Carpathian Mountains, in the Sandomierz Basin, on the Grzęda Sokalska and in the basin of the upper Dniester [Machnik, Ścibior 1991]. Until recently this type of the communities of the Corded Ware culture was described as Lubaczow group [cf. new suggestions in this matter by Machnik 1992]. In the Volhynian Upland communities of the late stages of Globular Amphora culture were developing at that time (Fig. 1).

Cultural assemblages, burial rites and settlement systems of the older phase of the Corded Ware culture groups from the western Małopolska loess uplands and from the areas located outside the loess zone (e.g. the Sandomierz Basin) show great similarities. However, with respect to the obvious differences in the degree of anthropogenic transformations of both zones and of the cultural milieu in which the Corded Ware culture people lived one should doubt whether the degree of pastoralization and nomadization was the same in these two regions. More forests and the lack of agricultural settlement in the Sandomierz Basin for sure forced the Corded Ware culture population to develop some form of nomadic agropastoralism and one should seriously consider gathering activities as very probable in this case.

Changes occurring in the western Małopolska uplands whose result was the rise of the Cracow-Sandomierz group of the Corded Ware culture appeared to be firm. The rise of small cemeteries, apart from the stabilization of the settlement network, may indicate restriction of mobility of human groups and probably greater role of agricultural activities in the economic structure. A certain microregionalization and stabilization of the settlement network may also be the proof of the beginning of the transformations in the character of social ties from the kinship ties dominant among the nomads to the territorial ties [Penkala-Gawęcka 1987: 150]. Funeral rites of the Cracow-Sandomierz group contain features of the ritual replica of equality and completeness of rights of all the adult members of the community. The lack of barrow mounds over the selected graves, identical construction of graves and fundamental unity of their equipment point to egalitarianism of these communities [Kempisty 1978: 389-391]. The gender symmetry of persons buried on these cemeteries is in sharp contrast with the rules of the burial rite of the old Corded Ware culture where male burials prevailed.



Fig. 1. Distribution of sites of the proto-Mierzanowice phase, where circles — graves, triangles — settlement materials, quadrangles — single elements of the proto-Mierzanowice phase (vessels, flint axes) within grave complexes of the Corded Ware culture, black line — permanent boundary between zones of settlement of the Corded Ware culture (in the South) and Globular Amphorae culture (in the North); 1 — Hulin, 2 — Kietrz, 3 — Cracow-Nowa Huta, site Kopiec Wandy, 4 — Żerniki Górne, 5 — Mierzanowice, 6 — Starachowice-Wierzbnik, 7 — Chłopice, 8 — Lvov, 9 — Syrynia, 10 — Piaseczno Kolonia, 11 — Iwanowice, 12 — Swierszczów-Kolonia, 13 — Nikisiałka, 14 — Lubcze, 15 — Klimkowce, 16 — Okniany, 17 — Plaucza Wielka, 18 — Gwoździec Stary.

In spite of assimilation of certain new elements inspired from the East (niche graves), communities of the Cracow-Sandomierz group reproduced in principle only the type of material culture that was characteristic of the local old Corded Ware culture groups. The new type of economy, forced by the historical situation, stimulated transformation of the settlement network and principal features of the social structure. As it seems the reason of continuation of the older traditions was in the extreme attractiveness of the herdsmen's culture. Quite often it has been found that pastoral communities, forced by the conditions to practice agriculture, in symbols, customs, in religious sphere were still interested in breeding (e.g. Robertshaw, Col-

let 1983: 73]. Nuers "are always talking about their beasts. I used sometimes to despair that I never discussed anything with the young men but livestock and girls and even the subject of girls led inevitably to that of cattle" [Evans-Pritchard 1940: 18-19]. Such a state of affairs, or inadequacy of the ideological system, which was legitimized by a definite type of material culture, to the agriculture prevailing in the economy was not conducive to the stabilization of the social and cultural system of the Cracow-Sandomierz group.

3. MIERZANOWICE STAGE

From about 2300 BC isolated graves appeared in the area of Małopolska as well as traces of short penetrations and single finds of a new cultural entity — of the proto-Mierzanowice phase of the Mierzanowice culture [Kadrow 1994]. The character of these finds indicates the mobility of this population, probably connected with breeding economy. The disappearance of the barrow-graves, lack of cemeteries and permanent settlements was certainly connected with a rather extreme form of atomization of the social structure. "Military" elements of the burial rite (stone battle-axes, stone bracers and copper daggers) are to speak in favor of a significant role of males in this community. Not very numerous population of the proto-Mierzanowice phase existed in among communities of the late phases of the Corded Ware culture.

The appearance of the proto-Mierzanowice population was connected with the contacts with the population of the Bell Beaker culture (cf. Machnik 1991: 170-172]. Jan Machnik thinks that the point of junction of this culture with the Corded Ware culture in which certain features of the Bell Beaker culture might have been adopted by the population of the former, as a result of which the Mierzanowice culture was formed, was the catchment area of the upper Vistula and Odra rivers [Machnik 1991: 170]. The lack of the so called eastern elements in the assemblages of the proto-Mierzanowice phase, e.g. in the form of the so-called willow-leaf copper earrings decisively negates the eastern theory of the origin of the whole Epicorded, Carpathian cultural circle advocated by Slovak researchers.

Among the not very numerous human groups of the Corded Ware culture, penetrating the borders of the western Małopolska loess uplands, that maintained the traditional, "pan-European" type of social, cultural and economic behaviors there must have appeared a group which took over a part of external elements of the Bell Beaker culture (e.g. mug and jug). What is more important, it also took over a part of elements of its social structure, as a result of which the extreme forms of patriarchalism represented by the communities of the old Corded character were diminished. Patterns of culture offered by the Bell Beaker culture people were even more attractive because this population was characterized by the mobile life style, covering great distances in a short time. It is supposed that it occupied itself with hunting, breeding, robbery, mining and metallurgy or trade [Machnik 1978: 413].

It cannot be excluded that in the travels of the Bell Beaker culture people as well as those of the population of the proto-Mierzanowice phase (that were inspired by the former) mostly men took part. This gave a possibility of covering enormous distances "there and back" in a relatively short time. It is confirmed by the scarce, randomly distributed graves which contain typically male equipment, i.e., among other things, stone battle-axes, stone bracers, copper daggers and arrowheads.

Small groups of men wandering about extensive areas North of the Carpathian Mountains were bearers of traditional herdsmen ideology, organizing the world around a distinct opposition "male-female". In some parts of the penetrated areas (Małopolska loess uplands) they had contacts with the communities whose routine were agricultural activities. Obviously, what is meant here are the representatives of the late phases of the Cracow-Sandomierz group of the Corded Ware culture. Nothing points to the fact that they were able to create independently a new, coherent system of cultural behaviors that would be adequate to the new situation. The only achievement of these communities that was useful in new conditions was the transformation of the traditional organization of kinship groups with the dominant role of one of the men as the main principle. Its material correlate and legitimization was a widely practiced custom of constructing barrows over the graves of these men. The roles of kinship groups as a main factor of interpersonal tie was begun to be taken over by a local group, organized around one, permanent place where its members were buried, i.e. around the cemetery. This situation might have been a source of social tensions because the so far dominant role of men both in the economic and social sphere had not been determined sufficiently. An effective solution was the synthesis of the traditional values of the herdsmen's community, whose depositaries were the representatives of the proto-Mierzanowice phase, with the requirements of the newly formed community whose material basis was agropastoralism, strongly connected with the organization of communities in the form of local groups.

As a result of the mentioned synthesis was an unusually permanent and economically efficient socio-cultural system of the Mierzanowice culture. The basis of this system were (a) stable settlement network whose main elements were settlement microregions, (b) double-track economy of an agricultural-breeding character, (c) strict observance of the division of social and economic roles between men and women, sanctioned by the consistently observed and extremely formalized rules of the burial rite (placing men on the right side with the head turned westward and of women on the left side with the head turned eastward), (d) social egalitarianism.

Thanks to the stability of the settlement microregions, based on the main settlements with cemeteries accompanying them, the main form of social organization became local groups which consisted of two or three settlements inhabited by nuclear families. Economic requirements of the population were totally satisfied within them. Basing social organization on the axis of the natural opposition "male-female" did not require involving some additional cultural mechanisms which would legitimate. This structure, dividing economic tasks between men (breeding) and women (agriculture), resulted from the adopted economic model and at the same time was conducive to its stabilization. In this way it was possible to reconcile maintaining an attractive form of ideology of herdsmen with the historically determined necessity of land cultivation. The former of the elements mentioned found its justification in the custom of distinguishing the position of men in the fact that they always received after their death their place on the cemetery. Due to the cultivating of crops — which was the domain of women — the efficiency of the economy of the Mierzanowice culture increased considerably as compared with the end of the Neolithic. An indirect proof of this is a demographic explosion of population of this culture, measured by means of a violent increase in the number of various kinds of sites. It conditioned the possibility of undertaking expansion by the representatives of this culture in many directions, although it had not been its direct reason. The expansion mentioned here which began at the early phase of the Mierzanowice culture included, among others, the North-Eastern Moravia, the South-Western Slovakia, considerable area of Central, North-Eastern Poland and Volhynia.

In the formation of a new socio-cultural and economic system the whole population of the Małopolska and the Western Volhynian loess uplands was involved. It was possible due to the multidirectional character and relative economic universality of the Mierzanowice culture. There were created economic, social and "political" conditions for an undisturbed, long lasting and relatively isolated reproduction of the Mierzanowice culture.

What has been said above about the mechanisms of transformation of the communities of the Mierzanowice culture at the turn of the proto- and early phases refers to the areas previously settled by the population of the Cracow-Sandomierz group of the Corded Ware culture. A totally different situation was on the areas occupied by the conservative population that continued the "old" Corded Ware culture traditions. It advocated of a model of socio-cultural and economic organization that was appropriate to the so called Central European horizon of this culture [Machnik 1978: 347]. Penetration of these areas by the population of the proto-, early and probably the beginning of the classic phases of the Mierzanowice culture did not lead here to any important changes, either cultural, economic or social. Still

there were no permanent settlements. The late Neolithic traditions were continued in the field of pottery and flint processing as well as in the field of basic burial practices. The influence of the Mierzanowice culture was most often marked by the presence of its single vessels or flint lenticular axes within assemblages of the sub-barrow graves and graves dug into the mounds of the barrows of the Corded Ware culture. Some of the examples pointing to this type of presence of elements of the Mierzanowice culture within Corded Ware culture assemblages are inventories of graves, e.g. at Lubcza [Koman 1990: 13-19, Fig. 4], Okniany, Plaucza Wielka, Klimkowice and the like [Sulimirski 1968: 144, 152, 172, 173].

Due to the studies of the chronology of Globular Amphora culture in the eastern part of the Lublin region are at an insufficient stage as well as those in Volhynia and the catchment area of the upper Bug, it is difficult to say whether the rich settlement there of the Mierzanowice culture from its early phase and the beginnings of the classic phase were the result of colonization of this area or rather its acculturation. Certain peculiarities of the eastern parts of the Mierzanowice culture and the appearance of the Strzyżów culture or a Poczapy group later, which contained certain elements of the Globular Amphora culture, and what is most important, developing in the areas that were earlier occupied by the latter (Fig. 1) make it possible to think that in the process of formation of the Gródek-Zdołbica group the population of the Globular Amphora culture must have taken considerable part.

Probably this significant participation of the Globular Amphora culture population in the groups of the early phase of the Mierzanowice culture in Volhynia became the reason of a rather astonishing event which was the appearance in this area of the Strzyżów culture. We have to do with its well-developed form in the southern zone of its range as early as the middle of the classic phase of the Mierzanowice culture [cf. Kadrow 1995]. The premises of a settlement nature indicate that a bit earlier it might have appeared in the territory of the Volhynian-Polesie borderland and in Polesie. There is a rather numerous group of sites there, dated to the Early Bronze Age which have not got much in common with the Gródek-Zdołbica group (for a different opinion on the subject see Sveshnikov 1974: Fig.24, 28). What seems not very probable in the process of formation of the Strzyżów culture, on the other hand, is the influence of the Middle Dnieper culture and Yamnaya culture. Among other things, it results from analyses of forms of the burial ritual of the cultures mentioned here (cf. Häusler 1992: 294].

In the middle of the 20th century BC local groups of the late stage of the Mierzanowice culture appeared. On the cemeteries (e.g. Mierzanowice, Wojciechowice, Złota-Nad Wawrem, Szarbia, Iwanowice-Babia Góra, concentration of graves nr III) used at that time there are recorded — in the elements of the burial rite — changes in the hitherto existed social structure. They consisted in the appearance

of social stratification, inclusion of a small part of the women in participation in the group of the society of a higher status and giving women in general the right to be buried on the commonly used cemeteries. These changes were not accompanied by transformations in the fundamental social or economic structures which should find reflection in the co-occurring changes in the settlement network and spatial organization of settlements.

More or less at the same time in an immediate vicinity of the Mierzanowice culture appeared communities which were characterized by an advanced ranking and social stratification as well as beginning of territorial political units. What is meant here first of all is the population of the Unětice culture as well as that of Füzesabony, Mad'jarovce and Věteřov cultures [cf. Vladar 1973: 258-266; Coles, Harding 1979: 43; Bintliff 1984: 91-93, Fig. 1; Harding 1984: 138-141; Ostoja-Zagórski 1989: 194; Simon 1990: 298-319].

It should be emphasized that the source of ranking in the Mierzanowice culture had an external character. Inspiration can be seen surely in the horizon of the "prince's graves" of the northern zone of the range of the Únětice culture which may be dated to the beginning of the A2 stage according to Paul Reinecke. Their archaeologically visible trace is the presence of a certain number of the so-called willow-leaf earrings in the Únětican hoards which has so far been wrongly related to the A1 stage [Machnik 1978: 92, Fig. 35; Blajer 1990: 82]. Intensification of external, multidirectional influences in the period of the late phase of the Mierzanowice culture and their differentiation led at that time to the rise of a number of local groups of this culture (Giebułtów, Szarbia, Samborzec and Pleszów).

If the very essence of the briefly reconstructed sequence of events [more on the subject in: Kadrow 1995] is proper, this may mean that for the adaptation of the ranking what is necessary is only an example, a model to be imitated. A proper state of the socio-economic base is not a necessary condition for its adoption. However, this may also mean that at present we are not able to reveal and record — on the basis of archaeological data — the state of tensions in the seemingly well stabilized and conservative local groups.

4. TRZCINIEC STAGE (AN OUTLINE)

Not very numerous radiocarbon dating [Miśkiewicz 1978: 190; Wróbel 1991], certain premises resulting from pottery analyses [eg Kadrow 1988], single metal artifacts [Kłosińska 1994: Fig. 3:3] and the logic of the development of the Trzciniec

culture indicate that most probably this culture initially developed at the same time as the part of the late phase of the Mierzanowice culture and the decline of the Strzyżów culture. However, a fact should be stressed that the period of coexistence — on the scale of the whole Małopolska — was distinctly longer in the northerneastern zone of the range of cultures in which we are interested than in the western and southern zone. This conclusion, is supported by the views on the "northern" roots of the Trzciniec culture [Kempisty 1978: 413; Kośko 1979; cf. a different view of Dąbrowski 1987: 8].

In spite of the visible progress in the studies of the chronology of the Trzciniec culture [Górski 1991, 1994; Wróbel 1994] it is still impossible to undertake a more extensive reconstruction of processes of the culture change at the turn of the Early and Older Bronze Ages. It seems, however, that there is no doubt that at this time the Mierzanowice settlement assumed the forms of the concentrated "islands in the sea" of the Trzciniec settlement network. On the archaeological time scale replacement of the Mierzanowice culture by the Trzciniec culture in the area of the whole Małopolska occurred more or less at the same time and was relatively sudden. However, there is no proof to account for this phenomenon in terms of the victorious, armed invasion of the "Mierzanowice culture tribes" by the "Trzciniec culture tribes" or the extinction of the former. It seems that after a period of co-existence during which populations of both cultures, while occupying different ecological niches (higher versus lower landscape zones of the loess uplands) and practically not influencing each other, came at a certain moment to the Trzciniec acculturation and to the disappearance of the Mierzanowice features.

Perhaps the success in acculturation of the Trzciniec culture consisted in this that this culture was in principle rather a "horizon of cultural integration" [Kośko 1979: 197-206]. This horizon encompassed many various units of socio-cultural organization on vast areas of the Central and Eastern Europe [Gardawski 1969: 15-28]. It unified the main elements of social structures whose particular realizations on various areas, however, must have differed considerably among one another. Their keystone might have been the religious plane [Gardawski 1969: 19].

The Trzciniec cultural model on its ideological level must have been open enough to be able to assimilate and reorganize such environmentally, economically, socially and culturally different areas as, e.g. Polesie and loess uplands of Małopolska. An important effect of reevaluation of the rules that controlled the life in the Mierzanowice culture was breaking the tendencies that were most important for this culture, i.e. autarkical tendencies of the stabilized microregions. The Mierzanowice cultural experiment that was based on the extreme adaptation of the socio-economic model to the anthropogenically considerably transformed environment of the loess uplands ended as it was bound by the traditions of the formal ideology of herdsmen at the time of the decline of the Neolithic.

CONCLUSIONS

To sum up the above remarks I would like to draw attention to several questions of a more general significance. In light of the sequence of the events reported here, and discussed more extensively in a book [Kadrow 1995, cf. also Kadrow 1994] it seems inadequate to search for only one factor (economic, climatic, political etc.) responsible for the variety of the concrete realizations of the socio-cultural process. The analysis of causes and results over a period of time reveals most often a set of mutual influences of a whole entanglement of factors, one of which — at a specific time and under specific conditions — played the most important role, and then due to the development of events — gave way to another (Fig. 2). At the same time the most fundamental factor of the dynamics of the socio-cultural systems should be considered reactions of individuals to their varied economic and political interests [Leach 1940: 62]. They were revealed with greatest strength at critical moments that were caused by various factors, both of an internal and external character.

At the turn of the Neolithic and the Bronze Age the role of the so called external influences was merely restricted to a few moments during which they not so much determined the causes of changes as these were inside the definite socio-cultural systems, but they rather determined the shape of the emerging new models of these systems. In one of the cases discussed the influence of a small group of the so called pan-European horizon (Corded Ware culture) under extremely favorable conditions of the already occurring environmental and economic transformations within the Funnel Beaker culture population appeared, however, to be decisive. The cultural model of the Corded Ware culture dominated indivisibly in Małopolska. On the other hand, the influence of the penetration by the Bell Beaker culture population of the areas discussed here on the appearance of the Mierzanowice culture may be defined as an accidental one. The dynamics of various internal processes that occurred at the junction of the Cracow-Sandomierz group population and the traditional Corded Ware culture trend was so great that one external impulse or another would surely lead to the reorientation of the direction of cultural evolution in Małopolska. As compared to the share of Bell Beaker culture elements in the rise of the Unetice culture circle or the so called *Blechkreiskultur* their significance in the formation and further development of the Epicorded Cirkum-Carpathian Culture Circle was considerably smaller.

However, in both so different cases it is difficult to speak of mass migrations and replacement of one population — in the physical sense — by a totally new one. It was different in case of spreading of the Mierzanowice culture onto the areas that had not been previously inhabited by the Funnel Beaker culture and the Corded Ware culture populations. The rise of the Nitra and Košťany groups may



Fig. 2. The scheme of evolution of socio-cultural processes on the loess uplands of Małopolska; A1 — Funnel Beaker culture in the Bronocice I-III phases, A2 — groups of the Funnel Beaker culture farmers in phases Bronocice III-V, A3 — groups of the Funnel Beaker culture breeders in phases Bronocice III-V, A4 — groups of the Funnel Beaker culture farmers at the decline of this culture, B1 — the pan-European Corded Ware culture horizon, B2 — the Central European Corded Ware culture horizon, B3 — the Corded Ware culture Cracow-Sandomierz group, B4 — Corded Ware culture groups that continued "old Corded Ware" traditions, C — small groups of the Bell Beaker culture population, D1 — proto-Mierzanowiece phase of the Mierzanowice culture, D2 — the early and classic phase of Mierzanowice culture, D3 — the late phase of Mierzanowice culture — horizon of the "prince's" graves", G — influences of the Füzesabony and Věteřow cultures, H — the Trzciniec culture, GAC — Globular Amphora culture; continuous lines — physical participation of the population of one of the cultural groups in the formation of a subsequent group, broken lines — cultural influences. On the right hand side of the diagram the selection of the most important factors that conditioned socio-cultural and economic evolution. On the opposite side calibrated radiocarbon time scale of events.

still be best explained in terms of migration of definite groups of people from the territory of Małopolska that settled totally new, foreign cultural environments South of the Carpathian Mountains. In both cases the factor that was favorable for those migrations was the demographic increase in Małopolska. Their reasons are to be looked for somewhere else.

However, this is a subject for another work.

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ECONOMY AND SOCIAL ORGANIZATION OF NORTHERN PONTIC STEPPE — FOREST-STEPPE PASTORAL POPULATIONS: 2750–2000 BC (CATACOMB CULTURE)

The rising of producing economy was the main factor of the common progress. It proved to the creation of the first states in the valleys of rivers in the Near East, then on the more wide territories. Productive forces of the agricultural and stock-breeding societies were not enough developed to housekeeping of specialized agricultural or stock-breeding branch of production. Only complex economy was possible. Nomadism appeared as a result of economical differentiation on the outlying areas of states and adaptation to environment.

Exploitation of the steppe areas by nomads at first give more economic effects than agricultural economy. Prerequisite of success of nomadism was existence of wide areas with good grass, water, small forests suitable for mobil stock-breeding. Climate changes in the beginning of the Subboreal period lead to the extension of the steppe areas in the southern part of Ukraine and all Eurasian steppe zone.

With the appearance of the wheel transport and horse domestication appeared the possibility to rule more large herds, increased the mobility of the steppe population. Work of the herdsman became easily than work of the farmer. The important factors were availability of yurt (nomad tent), which gave the possibility for nomadism [Artamonov 1947; Vaynshteyn 1971 and other]. According to A. Khazanov instead yurt may be used tent and striups were not so important [Khazanov 1975; Cradin 1992: 46].

The nomadic societies were dependent on farmers, because they have not developed craft and production of agriculture. So nomadism appeared as satellite of the agriculture. Incapable for the further development it belonged to the type of stagnated societies and according to A. Toynbee it has fate to disappear with rising of capitalism [Toynbee 1934: 21). Ukrainian steppes have good conditions for the development of stock-breeding. Valleys of the large rivers, such as Dnieper, Danube, Dniester and Southern Bug were suitable for whole-year grazing of herds. The appearance of the four-wheeled ox-drawn vehicle and chariot solved transport problems for the Catacomb population. This population, may been connected by its origin with Near East, had developed practical knowledge of the stock-breeding. Stock-breeding economy and early-class tendentions in the social organization were the main factors, which determined the special features of the Catacomb culture society.

Analysis of records give the possibility to assert that nomadic structure of life was not alien to the many groups of the Catacomb population, especially to the highest social strata of society. Investigation of the nomadic population life process is very hard, especially only with using of archaeological materials from the rare settlements, character of which is unknown (were it long-lasting settlement or season caravan site). Now we have some materials from such settlements, but it is not enough.

All it must been accounted during the reading of our article, devoted to the reconstruction of the economy and social organization of the Catacomb society. It was society, which created original type of half-nomadic economy, when the one part of population in the long-lasting settlements ensured another people with production of craft and agriculture. Another part of population — connected with stock-breeding migrated with herds some part of the year. This type of the economy received in literature name "trans-humans" [Adrianov 1985].

1. THE ARCHAEOLOGICAL SOURCES

To receive a good reconstruction in prehistory you must have a good records. Any exception to the rule is the Catacomb culture. We shall use only selected part of the archaeological sources, especially of Catacomb graves. The selective method is some statistical observation in order to receive representative result [Druzhynin 1970: 7]. In archaeological research all records, which we have, in other hand, are the selection from all existed remains [Bunyatyan 1982: 80]. So we can say that it is accidental selection. Archaeology have only fragmentary material for the sociological reconstructions. It is why we must have different archaeological sources. The main of them are data from the cemeteries, settlements and caravan sites. Criterion to the selection of burials was the complex of indications, which determined its Catacomb origin, two of them: 1. catacomb grave; 2. position of deceased.

More than 1200 burials from the territory of the Southern Bug, Northern Crimea, Lower Dnieper, North of Azov region, Orel-Samara region, Lower Don and Northern Donets were used for the statistics calculations. Preddonets, Donets, Srednedonets, Manych and the Ingul type burials were distinguished here by specialists. All the conclusions, connected with the ethnic and social structure of Catacomb population of the Northern Pontic area are on the base of this selection.

We must note that there are many ground cemeteries in Northern Pontic region, only on Lower Dnieper near 30. But they all were not excavated.

1.1.1. CATACOMB HERD

Bones of animals were in 15,6% of graves [Pustovalov 1992a: 125]: sheep -4,8%; horse -1,6%, cow -5,4%, indeterminated bones -3,8%.

1.1.2. CRAFT SPECIALIZATION.

A. Burials of metalworkers

Most full description of craftsman's burials is in the article by A. Nechytailo and A. Kubyshev. Today we know more than 20 complexes in which were artifacts, connected with metalwork [Nechytailo, Kubyshev 1991: 6-21]:

1. Pavlovka (Nikolaev region) mound 27, grave 20: burial chamber oval in plan, with circular entrance well, inhumation in supine position. In burial were: two clay tayeres, one of them with ornament, stone anvil, shell "Unio" and one pot (Fig. 1).

2. Novokrivorozhski GOK (Dnipropetrovsk region), quarry 3 — from destroyed mound — we have one ornamented clay tayere (now in museum of Krivoy Rog).

3. Kamenka (Dnipropetrowsk region), mound 2, grave 7: burial chamber oval in plan, inhumation of adult man in supine position with SE orientation. Near the left femur was clay conic tayere, h=5,6 cm, diam. 2,2-3,4 cm. On the sternum of



Fig. 1. Complex of founder from the Pavlovka, mound 27, grave 20.

deceased was red ochre paint. To the right of inhumation — skull of a child (Fig. 2: 1-2).

4. Velika Krinica (Zaporozhye region), mound 4, grave 7: clay casting spoon, triangular in plan with droplets of bronze slag; two stone tools, shell "Unio" and plate of wild boar fang.

5. Vasilivka (Zaporozhye region), mound 1, catacomb 20 (excavated by A.G. Pleshivenko in 1989): two clay tayeres, two clay casting spoons, stone anvil and other articles.

6. Pervomayevka (Kherson region), mound group 1, mound 2, catacomb 1. The burial chamber oval in plan, entrance well circular in plan, inhumation in supine position, with SE orientation. In burial were: casting spoon with traces of bronze two clay tayeres, one of them — ornamented, clay mould for trapezial in plan ingot, repeatedly used, pot, sandstone abrasive, stone pestle and anvil, flint scrapper.



Fig. 2. Complex of founder from: 1-2 — Kamenka, mound 2, grave 7; 3-26 — Gromovka, mound 1, grave 7.

7. Kairy (Kherson region), in burial: two casting spoons, mould for ingot, stone anvil and other tools.

8. Gromovka (Kherson region), mound 1, grave 7. Burial chamber oval in plan, entrance well circular in plan, inhumation in supine position, orientation to N. In grave were 25 different tools. They were to the right of deceased, from humerus to femur (Fig. 2: 3). Among the finds were: (a) the clay casting spoon with haft (Fig. 2: 4), 4,5x9cm, d. 2,5cm, l.of the haft — 3cm, cubic capacity — 18cm (142,7 g of bronze); (b) two conic clay tayeres; their height - 5.4-5.6 cm, diam, of holes from 2 - 2.2 to 0.6 cm; the colour of the tayeres is grey; clay with admixture of the fine sand, grey in cross-section; tayeres were with the traces of scale on surface (Fig. 2: 5-6); (c) anvil from the metamorphic limestone, conical in form, height — 3.5 cm; top of the anvil circular in plan, diam.4.5 cm, with the plain surface (Fig. 2: 7); (d) broken sandstone abrasive, with traces of long-time using, rectangular in plan, 13,5 cm long, 3,3 cm wide, thickness — from 1 to 2 cm (Fig. 2: 8); (e) four flint arrowheads, triangular in plan with notches in founding, height from 2,5 to 4 cm (Fig. 2: 9-11); (f) none flint flakes without retouch (Fig. 2: 12-20); (g) two bone awls from bead bones, 8,5 and 10 cm long, end of one broken off (Fig. 2: 21-22); (h) antler pressure flaking tool, fragmented, 11 cm long, circular in cross-section, diam. 1,2 cm (Fig. 2: 23); (i) broken plate from wild boar fang (Fig. 2: 24); (j) bone ring for archer, diam. 2,4 cm, th. 0,5 cm (Fig. 2: 25); (k) four shells "Unio" (Fig. 2: 26).

9. Voskresenka (Kherson region), mound group 1, mound 3, grave 3. Burial chamber oval in plan, inhumation with NE orientation. Near the left foot was clay casting spoon and tayere, near the right foot — stone pestle. Under the skeletal remains here were white decay, under the skull and in the north part of chamber — traces of ochre paint (Fig. 3: 1-4). The clay casting spoon or crucible had form of oval-triangular cup with deep spout and small thick haft (Fig. 3: 2). On the surface — traces of chalk and droplets of oxidized bronze. Crucible was grey, clay with fain sand. Its volume — 65 cm, probable weight of metal 515,4 g. Clay tayere conical in form, h = 4,5 cm; diam. of the hole — from 2 to 0,8 cm (Fig. 3: 3). Stone pestle — truncated cone in form, h = 13,3 cm, d = 4,5-5,5 cm (Fig. 3: 4).

10. Kalinovka (Kherson region), mound 1, grave 4. Burial chamber oval in plan, flexed inhumation on left side, SE orientation, one hand under the face, another — on the pelvis. In the grave were: broken tayere, sheep astragali, leaf-like flint arrowhead — h = 6 cm. Clay tayere had form of truncated cone, h = 4 cm, d/of hole/ = 1,6-0,5 cm (Fig. 3: 5).

11. Mala Ternivka (Zaporozhye region), mound 2, grave 2. Burial chamber oval in plan, circular well, inhumation in supine position, with S-SE orientation. To the right of the skull and near the pelvis — spot of red paint. In the SW corner of the chamber were: six different clay crucibles or casting spoons, two conic tayeres, eight



Fig. 3. Complex of founder from: 1-4 — Voskresenka, mound 3, grave 3; 5 — Kalinovka, mound 1, grave 4; 6 — Mala Ternivka, mound 2, grave 7.

moulds for 13 tetrahedral or pyramidal ingots, pieces of chalk and green clay, horn of the animal (Fig. 3: 7) [Kubyshev, Chernyakov 1985].

12. Davydivka (Kherson region), mound 1, grave 5. Burial chamber oval in plan, circular, inhumation on the right side, flexed. In the burial were: two bronze leaf-like knives, awl with wooden haft, bone pressure flaking tool, three arts from boar fangs, two flint arrowheads, three abrasive and fragment of one pot.

13. Novoye (Kherson region), in catacomb grave — one broken clay tayere.

14. Krasnovka (Crimea), mound 36, grave 20. Catacomb grave, inhumation

flexed on the back. Near — casting spoon, two tayeres, clay moulds for axe and oval ingots, stone anvil and abrasive.

15. Prishib (Lugansk region), mound 1, grave 9. One ornamented clay tayere, truncated cone in form, moulds for pyramidal ingot and shaft-hole axe; part of the pot and flint flake.

16. Lugansk (Lugansk region), mound 3, grave 16, catacomb oval in plan. In burial were: cup-crucible with spout, oval in plan, two clay crackled tayeres, clay mould for axe of Kolontayev-type, shell "Unio", shoulder-blade of a sheep with traces of working, pot.

17. Shakhtarsk (Donetsk region), mound 2, grave 5. Chamber oval in plan, inhumation flexed on the right side with SE orientation. In SE part of the burial chamber was find one clay crucible half-round cup, h = 4,5 cm, d = 22,3 cm, thickness of walls — 1,5 cm (Fig. 4: 1-3).

18. Kramatorsk (Donetsk region), catacomb grave excavated in 1938. Clay crucible, and mould with clay core for shaft-hole axe were find there. Crucible clay cup with spout, $9 \ge 10.8$ cm, h = 4 cm (Fig. 4: 5-13).

19. Pokrovka (Donetsk region) — burial with two flexed inhumations. With them were find: clay crucible, casting spoon, three tayeres, mould of axe, stone tools, pieces of chalk and clay, pots (Fig. 5).

20. Novoalekseyevka (Donetsk region) — in catacomb burial were two tayeres, three moulds for ingots, clay models of ingots, pot (Fig. 6).

21. Lakedemonowka (Rostov region), mound group 1, mound 1, grave 12. In chamber with divided skeleton were clay crucible — crackled half-round cup, d = 14.2 cm, deep — 1.8 cm, thickness = 1 cm.

22. Varenovka (Rostov region), mound 4, grave 5. Flexed inhumation in right side. In burial was find part of the crucible. It was a cup (diam. 22,0 cm, deep -2 cm, thickness of walls = 2,2 cm) with slag on the surface and charcoal inside. In grave also were stone mace, pot and piece of red paint.

23. Korotayevo (Rostov region), in catacomb grave, flexed in the right side inhumation, orientation to S. Near the skull was find ornamented pot. In the legs was crucible — a crackled cup with slag on the surface.

B. Burials of weapon-makers

Besides the graves with the bronze casting and metalwork articles there are burials with instruments for other crafts, among them of weapon-makers.

1. Vladimirovka (Kherson region), in oval chamber with circular well were skeletons of the adult man and a child. Near the man were the bowl and little bundle of arrows with flint arrowheads. Near his head was the wooden box with tools. In this box were: bone and wood pressures, five abrasive, two flint heads to dart, 33 flint articles (flakes, scrappers, cores); shafts of arrows, shell, tooth of animal, bronze nail, two bone tools.



Fig. 4. Complex of founder from: 1-3 — Shakhtarsk, mound 2, grave 5; 4 — Zaporozhye, settlement Durna Skela; 5-13 — Kramatorsk.



Fig. 5. Complex of founder from Pokrovka, mound 4, grave 3.



Fig. 6. Complex of founder from Novoalekseyevka, mound 1, grave 6.

2. Ternivka (Zaporozhye region), mound 2, grave 9. In catacomb grave were find some abrasive for shaft-producing, semi-finished flint arrowheads, abrasive, stone fabricator, ring for archer, many flint articles (pressure flaking tools, core, burins); circular pebble.

We have ten such complexes in our selection.

C. Burial of weavers

There are some burials with weaver's instruments. It is grave from Yuryevka (Zaporozhye region) with bone stakes from weaving loom. Another burial with such bone stakes was excavated in the grave 15 of mound 7 near Barvinovka (Zaporozhye region) [Otroschenko et al. 1987]. At first burials with such stakes were selected by I. Sharafutdinova in the region of the Southern Bug [Sharafutdinova 1977: 94-95] (Fig. 7: 11-13). Also burials with remains of combs are interpreted as graves of the weavers. Such complex was discovered by I. Pislary near Govorukha (Donetsk region) — in mound 7, burial 2 [Pislary 1982: 71-73] (Fig. 7: 1-10). Graves of weavers are also in the Orel-Samara region and on the right bank of the Dnieper.

D. Burials of painters

There are some burials with tools and attributes of the painters, for example: Naberezhnoye (Donetsk region), mound 1, grave 8. Burial chamber oval in plan, inhumation, near the legs of deceased were found: stone mortar with traces of red paint and pestle, two bone tools [Sanzharow 1989: 104] (Fig. 8). Pestle was produced from rose pebble (Fig. 8: 3). According to Sanzharov it was the burial of the painter [Sanzharov 1989: 106]. Another burial was near Zamozhnoye (Zaporozhye region) in mound 6, grave 3. In chamber was found circular wooden box with red paint and wooden and skin tools — also may be for painting [Otroschenko, Pustovalov 1981: 67-70].

D. Burials of priests (?)

There are some burials with the musical instruments. In 0,4-0,6% of graves of the "Eastern" funerary custom (flexed inhumation) was found bone flutes. In grave 35 from the mound 3 near Vinogradnoye (Nikolaev region; Ingul culture) was found the bone pipe, which was near the skin bag. It may been remains of bagpipe. Besides bagpipe in burial were wooden box with clay material for skull portraits, shell and wooden tools. It was the clay model of the deceased face (Fig. 9). Similar goods were in mound 6 near Barvinovka (Zaporozhye region). Burial chamber oval in plan, circular well, inhumation in spin position. Skeleton was without the third vertebrae. It means, that skull after the death was taken off from the skeleton. To the left of deceased were the pile of yellow-ochred clay for skull portraits, shells and bone tools, one of them with the sharp point, another with spade end. All the tools may be were in the skin bag. Such burials may been the graves of priests of different ranks (Fig. 10).



F i g . 7. 1-10 — complex from Govorukha, mound VII, grave 2; 11-13 — from Barvinovka; 13 — a skull with trepanation from Azov region.


Fig. 8. Complex of the "painter" from Naberezhnoye, mound 1, grave 8.

E. Burials of warriors

Near the 10% from Catacomb graves were the burials with the weapons. It were burials of warriors [Klochko, Pustovalov 1992: 118-141].

F. Burials with vehicles

More than 20 graves with different means of conveyance are known in Northern Pontic area. There were vehicles with two or four wheels — Marievka (Zaporozhye region), mound 11, grave 27; Bolotnoye, mound 14, grave 28 [Cherednichenko, Pustovalov 1991a: 206-216]. In some burials were only parts from vehicles and chariots, especially wheels [Novikova, Shilov 1989; Otroshchenko, Pustovalov 1991b]. Analysis of wheels and vehicles constructions give us possibility to conclude



Fig. 9. Vinogradnoye, mound 3, grave 35; burial with a bag-pipe: 1 - box, 2 - abrasive, 3 - yellow substance, 4 - Unio, 5 - Cardium, 6 - wooden cap, 7 - bone pipe.



Fig. 10. Complex from Barvinovka, mound 6, burial 13.

that for its producing were necessary good knowledge in technology and technic (Fig. 11).

G. Medicine

Analysis of anthropological sources give us interesting information about the Catacomb people. In 9% of burials were skulls with traces of successful trepanation (Fig. 7: 13).

S. Kruts wrote about the high skill of doctors, which used special instruments flint and bronze knives and blades for operations, medicinal herbs for anaesthesia and treatment [Kruts 1984: 95]. It was the high percentage among the Catacomb population with caries — near 20%, more than in Yamnaya or Srubnaya cultures — 5% [Kruts 1984: 96]. In the beginning of XX century in Russia similar difference was between the population of large cities and villages.



Fig. 11. Chariot and vehicle from : 1 — Marievka, mound 11, grave 27; 2 — Vidnozeno; 3 — wheel from Bolotnoye.



Fig. 12. Settlements of the Catacomb Unity at the Northern Pontic area.

1.2. THE EVERYDAY LIFE MONUMENTS OF THE CATACOMB UNITY ON THE TERRITORY OF THE NORTHERN PONTIC REGION

During the last 20-30 years the main attention of archaeologists was connected with investigations of mounds and burials of bronze age in steppe region. Excavations of settlements and camp-sites were very rare. The scientific reconstructions of Bronze Age history formed mostly on the information from the burial complexes. Main cultures of this period were named "Catacomb", "Yamnaya" (or Pit Graves) after the types of burial chambers. Such view on prehistory of Northern Pontic zone was one-sided. After the excavations of Mikhailovka settlement any everyday life monuments were investigated in the wide areas. Some excavations were carried by V. Nikitin, N. Olenkovski and S. Pustovalov some years ago [Nikitin 1989, 1991; Olenkovski, Pustovalov 1993]. The main investigations were in the Dnieper valley (especially on the banks of Kakhovka Sea), Southern Bug and Northern Sivash Littoral (Fig. 12). Geological conditions in valley of Molochna river are bad. Level of the water in contemporary rivers is more than 4000 years ago. Many settlements are covered by the large layer of soil. So to find any everyday monuments is very hard problem. Only some archaeologists — as O. Bodyansky or D. Telegin had a good fortune and found the steppe settlements. Y. Boldin discovered some monuments in Seragoz ravine [Boldin 1980].

There are 245 different everyday life monuments on the territory of the Northern Pontic. Among them 111 from Southern Bug [Nikitin 1991: 35], 129 — from Lower Dnieper, Sivash and Azov regions [Olenkovski, Pustovalov 1993], 5 — from the region of the Dnieper rapids [Shaposhnikova, Bratchenko 1985].

Most of this monuments are sites without archaeological layer and remains of houses — they are interesting only as fact of presence of ancient population in this region. There are 7 long — time settlements on Southern Bug and its tributaries, 11 — on the Lower Dnieper. Other monuments — 91 are tent sites. According to V. Nikitin they were sites of nomads in spring — summer — autumn period, so-called "letovka" [Nikitin 1991: 36].

Letovka-type settlements were situated in different places — on the banks of rivers, lagoons, steppe rivers valleys, in opened steppes. On the left bank of Dnieper and Sivash region most of sites were near the sources of water. Letovka--type settlements are without or with small archaeological layer (to 0,2 m), they had square from some sq.m to 100 sq.m. The surface finds are to some hundreds of fragmented pottery and flint articles. Complex of pottery show us that here were represented different groups of Catacomb population. On letovka near Peschanovka was pottery only of Ingul culture.

It is very difficult to select the long-lasting settlements from the letovka-type. Sometimes it was difference in archaeological layer — on settlements layer is more powerful. But in Subboreal period the soil layer raised very slowly. There are three investigated settlements of this period: Matveyevka-1, Mikhailovka and on isle of Bayda.

1.2.1. MATVEYEVKA-1

Settlement Matveyevka-1 is situated on the third terrace of the Southern Bug river, in 6 km from the Nikolayev. Area of the settlement excavated in 1975-1982 is 3000 sq.m. Thickness of archaeological layer in different places was from 0,2





Fig. 13. Settlement Matveyevka-1: 1 — general situation, 2 — plan of site.



Fig. 14. Matveyevka-1: flint, stone and bone tools from the site.

to 0.6 m. Here were discovered 3 buildings, 8 pits, remains of drainage system (Fig. 13).

Building 1 was in the north part of the settlement. The stone foundation 20x12 m, orientation N-S was preserved. Foundation was erected from two courses of limestone slabs with clay and crushed stone inside. Walls of the building were from sun-dried bricks. Remains of walls preserved as the clay layer 2-3 m wide near the foundation. Exit from the building was in the S side. To the right and to the left from exit were discovered drainage trenches oval in plan, may be from tents or some light houses (Fig. 13).

Building 2 was preserved in the form of the stone foundation of similar construction, 33x17 m with N-S orientation, square — 320 sq.m. Clay walls were plastered by the layer of silt with shells. The southern part of the building was divided by the stone masonry. On the square of the building were discovered 8 groups of stones, may been connected with wood pillars which supported the roof. Near the central group were stone pestle and hammer, near the eastern wall — a pot. In 2 m to NE side of the foundation was discovered the stone fence of limestone slabs 0,6x0,9 m. After the fence was discovered drainage(?) trench 1,8-2,6 m wide with depth 0,2 m (Fig. 13).

Building 3. With limestone foundation 16,2x12,6 m, N-S orientation, square-215 sq.m. In the central part was discovered the group of stones which supported the central pillar. In SE part of the building was the hearth — pot of crackled soil 1,0x1,2 m. Near one side of hearth was small semi-circular trench (Fig. 13). Trenches near the buildings were used for the drainage of the rain water, other were connected with the light tents.

According to V. Nikitin all buildings from Matveyevka-1 were enclosures and sheep-folds for winter period [Nikitin 1989: 147]. Such type of temporary settlements may be named "zimnik".

There are near 500 articles in collection of flint tools. Most of them are different scrappers, there are some push-planes on flakes and chisels (Fig. 14). Were found two flint leaf-like dart-heads (h = 9,5 cm), with broken shafts (Fig. 14: 7-8). The stone tools were abrasive, pestles, querns, different hammers and axes (Fig. 14: 22,16,18). Bone tools were rare — some awls, polisher, push-planes, astragali with hole, spindle whorls, haft for flint scrapper (Fig. 14: 14,23-27).

Bones of domestic animals from Matveyevka-1 belonged to cattle (61,3%), sheep-goat (28,3%), horse (6,5%), pig (1,3%). Similar herd was on the Catacomb time settlements in Crimea and Lower Don region.

According to V. Nikitin Matveyevka-1 can be dated back to the end of the 17th century bc^1 [Nikitin 1991: 148]. V. Nikitin regards that in the late-Catacomb period increased the part of the agriculture in economy of the steppe population, which we

¹ At Author's desire in the article of S.Z. Pustovalov dates are calibrated (BC) and uncalibrated (bc).



Fig. 15. Settlement Mikhailovka, the general plan of the upper layer.

can see on example of the Matveyevka-1. According to our opinion Matveyevka-1 was the season settlement of the nomads, where they lived only in winter.

1.2.2. MIKHAILOVKA

Mikhailovka (Novovoroncov district, Kherson region) is a multilayer settlement of the Copper and Early Bronze Age. In the upper layer were discovered materials of



Fig. 16. Mikhailovka, plan of the SW hill, the upper layer: 1 -stone foundations of the houses, 2 -wall, 3 -semi-dug-out, 4 -postholes.

the late Yamnaya and Catacomb culture [Lagodovska, Shaposhnikova, Makarevich 1962]. It was the period of the coexistence of two groups of the ancient population in this area.

Mikhailovka settlement was located on the right bank of Dnieper on three hills, two of them were surrounded by the deep ravines and valley of the Pidpilna river and the third was connected with the plateau. The central hill was defended by the stone walls. Here were two lines of defence which included two or more stone walls and moats (Fig. 15).

On the central hill were investigated two types of buildings — pit — dwellings and houses with the stone foundation (15x4,5m). One stone wall defended the SW hill of the Mikhailovka settlement. On this hill were discovered smaller houses —



Fig. 17. Mikhailovka: bronze artifacts.



Fig. 18. Mikhailovka, stone hammer-axes and stone tools.



Fig. 19. Mikhailovka: 1-19 — flint tools; 20-33 — bone and antler tools.

from 10 to 36 sq.m (complexes I-II). Complex III was the largest — to 160 sq.m, with dwelling house and enclosure. Complex IV was near the wall, square to 30 m. On the SW hill were two pit dwellings: 9,8x5 m and 4x1,5 m, depth — from 0,15 to 0,3 m, oval in plan. Walls of the buildings were erected on the stone foundation of clay with using of the wood constructions (Fig. 16).

There were 26 bronze objects: 3 daggers, 3 knives, flat axe, 19 awls and parts of the two-end forks [Otroschenko, Pustovalov 1991b]. From the upper layer came one part of the clay tayere and 260 clay spindle whorls (Fig. 17).

Among the flint tools — different scrappers, chisels, arrowheads, knives, heads of darts, dagger. The stone tools were also numerous: abrasive, anvils, chisels, hammers, pestles, querns, hoes. Were found some stone armament — hammer-axes (14) and two maces. Among the bone articles were hoes, awls, polishers, harpoons, etc. (Fig. 18-19).

Domesticated animals (89,3%):	
cattle (Bos taurus L.)	44,2%
sheep and goat (ovis aries L. and Capra hircus L.)	32,7%
horse (Equus sp.)	17,8%
pig (Sus scrofa dom.L.)	2,2%
dog (Canis familiaris L.)	3,1%
Wild animals — to 10.7% of the all bones.	

Investigators regard that in the period of the upper layer of the Mikhailovka settlement important place in the economy belonged to the ploughing agriculture. Besides the stock-breeding and agriculture population of the Mikhailovka settlement were busy in fishing, gathering and hunting.

1.2.3. THE BAYDA-ISLE FORTRESS

Bayda-isle fortress is situated on the isle of Mala Khortitsa (or Bayda), on the Dnieper (Zaporozhye). The isle is 520 m long and 180 m wide, with the high (12-14 m in the N and 3-4 m in the S side) stone banks. In the past island was connected with the right bank of the river (Fig. 20). On the highest part of Bayda were fortifications of 1736 and remains of the shipyard. First investigations were carried here by R. Yura in 1968, when the Catacomb materials were discovered [Yura 1969]. After 20 years V. Ilyinski discovered Catacomb layer near the 18th century fortress and some — on it territory [Ilyinski 1989]. It means that settlement of the Catacomb culture was larger than the fortress of 18th century.



Fig. 20. Bayda-isle fortress, the general plan.

The Catacomb fortress had a stone walls, remains of which were discovered during the excavations [Ilyinski, Pustovalov 1992]. Stone walls and fazes surrounded the territory at E and W sides. The first moat had 5 m wide and 1,8-2 m depth. In 7 m to N was the second moat — wide 4,4 and depth 1,5-1,7 m. On the bottom of the moat were found fragments of the Catacomb pottery. To the N from the second moat was riveted bank: h = 1,6 m, wide = 4 m. On the top of the bank were remains of the stone wall — obstruction with h = 1,5 m, and 3,5 m wide. Under the wall were the Catacomb culture pottery. To the N from this bank was investigated the next moat, 1,3 m wide and 1,0 m depth. On the bottom of the moat were the clay layers, may been connected with the daub of the second bank. There were found also triangular flint arrowheads and flint dart heads with broken points.

The second bank had the traces of the three building periods. At first the height of the bank was 1,0-1,1 m and 1,6 m wide. Than, in the second period it became 3,5 m wide with height 1,3-1,4 m. In the third period this bank increased to 4,5 m

wide and 2,3 m height (3,3 m with the moat). On the top of the hill in this period appeared the stone wall — wide of the foundation 1,5-2,0 m. In the central part was the citadel, surrounded from three sides by the stone walls. Wide of the stone obstructions — 3,5 m, h = 0,7 m. Between and under the stones were discovered fragments of the Catacomb pottery.

On the territory of settlement were buildings with the stone foundations. The large territory of the settlement was enclosure for cattle. It is hard now to say, was it long-lasting settlement or "winter" — type site.

2. THE ENVIRONMENT IN THE NORTHERN PONTIC REGION: 2750–2000 BC

2.1. THE MODERN MODEL

The modern environmental situation is the result of the long time evolution. This situation may be a model for the reconstruction of the environment in the times of the Catacomb culture. The steppe zone of Ukraine coincided with the region of the Catacomb unity of the Early Bronze Age. From W to E this zone is near 1000 km long and from 100 km (in the west) to 300 km (in the east) wide. Total square of it is near 240000 sq.km. There are some different areas in this zone. Area of deserted steppes is in the Sivash region (north and south). The area of the dry sod-cereal steppes have boards on line Berdansk-Tokmak-Nikopol-Kryvyi Rig-Voznesensk-Tiraspol-Reni. Partigrass-sod-cereal and partigrass steppe area with the north board on line Kharkov-Kremenchug-Pervomaysk-Tiraspol. The grassland's cereal-partigrass steppe with forest on the left bank of Dnieper, with the north board on line Kursk-Kiev and some isles on the right bank [Geographicheskiy atlas 1984: 108] (Fig. 21).

Ukrainian steppes have the flat relief [Marinich 1985]. There are some parts of this plain. The SW, central and North Crimea areas could been included to the North Black Sea Lowland, which in the eastern part passed to the Azov Sea Lowland. In the N part of the steppes is the board of the Dnieper Lowland and the S part of the Dnieper Hills. In the NW zone of steppes partly included south of Podolian an Central Moldova Hills. In E there are Donets and Azov Hills with mounds of crystallin rocks. In Crimea there are a Taranhkut Hill and the plain of Kerch Peninsula with the mud volcanoes.



Fig. 21. Map of ecological zones in Ukraine: 1 — deserted steppe, 2 — dry steppe, 3 — real steppe, 4 — forest-steppe.

The important influence on steppe landscapes have the stone rocks, at first of the Ukrainian Crystallin Shield (on Dnieper, Southern Bug and other rivers). In the valley of the Mokra Volnovakha there are bares of the Devon sandstones, limestone, shales and volcanites. There are Palaeogenic marl, limestones, sandstones and clay in the N part of the North Black Sea Lowland, on the boards of the Donets hill, in the plains of Dniester and Donets and in SW of the Kerch Peninsula. The Neogenic deposits bare in the river valleys: limestones, sandstones, clay. So all steppes were ensured by the building materials.

Water is very important for the economy of steppes. The year level of precipitation is near 400 mm but evaporation is 650 mm in the N part and 800 mm in S part of steppes [Mordkovich 1982: 27]. All steppe rivers are feeble, except Danube, Prut, Southern Bug, Ingul, Dnieper with Ingulets, Bazavluk, Orel, Samara, Vovcha, Konka, Molochna and Kalmius. There are lakes of liman-type — Dnieper, Bug, Molochansk and others. The underground water is connected with "pody" and "saucers" of the glacier or mixed origin, mainly in Sivash region. They are Mikhailovka pod (Zaporozhye region), Black Valley, The Green, Askania-Nova, Sivash (Kherson region) and others. In such places the ground water is near surface, some lakes preserved until the second half of summer. The most part of the water is high mineralized — to 50 gr/l by sulfate, chloride-sulfate or chloride salts [Marinich 1985: 124].

The precipitation are 412 mm in West and 325 mm in south of steppes, 430 mm in the north and 150 mm in south [Mordkovich 1982: 51]. From 75% no 80% of the precipitation are in spring or in summer and quickly evaporated. The main part in the vegetation of the steppe grass played the winter 40-90 mm of precipitation. The middle air temperature in January is +9 C and +23 C in July [Mordkovich 1982: 25-26].

To 90% of the steppe soils are the simple clay chernozems, formed on loess with 6-9% of humus. Chestnut colored soils are in Sivash region, in Donbass region — detritus chernozems. Thickness of chernozems is to 40-50 cm. The amount of green fitomass is: on grassland steppes — 2300 kg/ha, in steppes — 2300 kg/ha, droughty steppes — 1200 kg/ha, dry steppes — 700 kg/ha and deserted steppes — 100 kg/ha. The saline lands are typical for the steppe landscapes. In the north part they are in lowlands, at the south — on plateau.

There are more than 200 classes of grass in steppes. In the north areas to 25 classes/sq.m, center — 18/20 classes, south — 9-12 classes. Besides cereals there are many flowers, e.g. tulips, adonis, goose onion. In north areas there are "bayrak" forests, in south trees are only on the banks of the rivers.

There are such wild animals in steppes: wild boar, wolf, roe deer, hare, different rodents, many birds, serpents.

2.2. ENVIRONMENT OF THE CATACOMB PERIOD

Period of the existence of the Catacomb Unity is dated from 2750 BC to 2150/2000 BC (conventional dates — 2200–1800/1700 bc) [Bratchenko 1989b]. It was the period of the beginning and middle of Subboreal period.

G. Shvec carried out investigations of climate situation in steppes, based on evidence of the water level of Dnieper and its correlation with sedimentation (27m) in the lake Sakskoye in Crimea. It give a possibility for the reconstruction of the steppe climate from ca 2800 BC (2249 bc) with high precision [Shvec 1978]. At the period between 2900–2350 BC (2300–1900 bc) climate was humid, from 2150 to 2000 BC (1800–1700 bc) it became dry. The level of water in Dnieper between 2150–2000 BC (1800–1700 bc) was lowest.

Palinological investigations, carried by K. Kremenetski on the stratificated sections of the bogs in Moldova and Ukraine gave similar picture. The period of bad conditions was between 2750–2000 BC (2200–1700 bc) [Kremenetski 1991: 57]. Climate became more continental, precipitation were shortened on 50 mm [Kremenetski 1991: 143]. Difference between dates of G. Shvec and K. Kremenetski connected with low precision in dating of the bogs sections.

The fact of the aridisation of climate at the early Subboreal received wide admission [Khotinski 1982: 123-127]. The second half of the 3rd millennium BC (the end of the 3rd — beginning of the 2nd millennium bc) was the period of the large changes in medium flow — from 1,15 to 0,86! The current situation in steppes is in accordance with 1,0 of medium flow. So, we can to calculate precipitation in Catacomb culture period — from its beginning to the end, because the medium flow is in dependence of precipitation.

	TABLE 1	Preci	pitation	in	steppe	areas.
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		areas					
	grassland	real	droughty	dry	deserted		
year precipitation, mm	450	380	330	280	150		

We see, that the difference between all areas is near 15% [Mordkovich 1982: 27]. There are four areas from five which are in table 1 in the territory of Ukraine.

All areas at the beginning of the Catacomb period were moved to S on one zone. Main territory was under grassland, partigrass — cereal or cereal — partigrass steppes with forests and was similar to the forest-steppe region. In the middle of period we see the current situation, only were more forests. In the end of the Catacomb period climate became more continental, precipitation reduced. Board of the dry steppes became on line Berdiansk — Krivoy Rog — Tiraspol, in Crimea — at foothills. Dry steppes replaced area of the real steppes and last — area of the forest-steppe. That is why the Catacomb culture appeared at the north regions — near Kiev [Klochko, Rychkov 1989: 60-65]. Main precipitation arrived in the first half of summer, and after any rains were during 1-2 months. Middle temperature of winter — to -0,6 C, of summer +23,2 C. Dry winds continued for five days, often dusty tempests were in period from April to November (one time in 3-5 years). There were 23 such storms during the last 100 years. Winter is unstable with the snow period to 14 days [Shvec 1978: 17].

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We can suppose, that at the second half of the existence of Catacomb Unity climate situation became unfavorable for herdsman population of the open steppes. Most of population concentrated in the valleys of the large rivers. The Ingul tribes moved to the banks of the rivers and restricted here aboriginal population [Pustovalov 1991a: 104-122].

3. THE RECONSTRUCTION OF THE DEMOGRAPHIC STRUCTURE OF THE CATACOMB POPULATION IN THE NORTHERN PONTIC AREA

The demographic investigations are the important part of the historical reconstructions, based on the archaeological records. Man is the main component of society. Without the knowledge about the number of population at the appointed time in the appointed period it is difficult to carry out investigations of the ancient economy — how many were produced, what was for consumption, what was for reserve, what for exchange, etc. Number of population give the possibility to determine, if are known the whole group of the factors the economic potential of society, military potential, size of the different social groups of the population, etc. The demographic data help to concretize the form of the ethnical unity or the family-marriage relations.

Specialists offering different methods or the groups of methods for the reconstruction of the ancient population size. The first group is retrospective — from the known number of present population to calculate the previous situation. This method is available to the population that have settled, but not for the nomadic groups.

Other method is palaeoeconomical. The size of the ancient population calculated on the data about the size of the food production in the investigated area by the some economical system. This method give to archaeologist the figures of the maximum population size, if are known the size of the land development. But the last is very difficult.

The third method based on study of the ancient cemeteries and settlements. It can give the most real palaeodemographical picture. But only for the investigated areas. The North Black Sea steppes corresponded to this conditions.

Most of the methods, used by the archaeologists based on the materials connected with the settled populations — their settlements and cemeteries [Bibikov 1965, 1971; Masson 1976; Hassan 1981; Shmagliy 1986; Kolesnikov 1993 and other]. At the same time examples of the such methods, connected with the nomads and nomadic cultures are rare [Romanova 1986; Gey 1990; Gavriluk 1994]. The palaeodemographical investigations based on the data of the mound cemeteries are very difficult. At first it is unknown the total number of the mounds. That is why all the reconstructions can give only approximately size of ancient population. Before the calculations we must note such three assumptions:

- 1. concentration of mounds is connected with places of residence of the nomadic population;
- 2. all adult male population were buried in mounds, because it were on the higher level of the social system;
- 3. there is some correlation between the different sex-age groups in every population.

Our method of the palaeodemographical analysis consists of two independent parts. At first we calculate the total number of mounds and graves, then — the size of population. Then, on the base of the sex-age pyramid of the Catacomb Unity we must answer, all the people were buried in mounds or not.

On the map of the five Ukrainian regions (scale 1:100000) — Dnepropetrovsk, Zaporozhye, Kherson, Nikolaev and Crimea there are 11900 mounds — but it is only part of the total amount. Only in two regions: Kherson and Zaporozhye archaeologists calculated 4457 and 5878 mounds correspondingly. It can give us percent of mounds, which are on the geographical map. Then we can calculate the total number of the steppe mounds in five regions as A. Gey done it [Gey 1990]. But many mounds were destroyed by ploughing. For example, at the beginning of our century on the Khortitsa-isle were 129 mounds, now are only 29 [Kazachok 1991]. On the field near Yekaterinivka (Zaporozhye region) were 500 mounds, now are near 20. On the air photographs of the Solokha mound group we see 75 mounds, on the field — only 23. On the right bank of the Molochna river preserved only 25% of the mounds. Disappeared near 75% of all mounds, which were in steppes. We can say, that the total amount of mounds were near 139 000.

The medium average of the burials in mound is 5-7. For example, during 5 years (1973–1977) were investigated 1189 mounds with 6614 graves [Bunyatyan et al. 1989: 5]. During 1983–1988 in the steppe regions were investigated 918 mounds with 5298 burials. The medium average of graves is 6,7. Total number of graves in all mounds (139 000) may be near 780 000.

According to investigations, carried out by the Zaporozhye expedition catacomb graves were 21,5% of total size. So, in 780 000 graves were 167 700 catacomb units. According to our calculations in one grave were medium 1,22 of decease, so the size of buried can increase to 204 600. It is the general Catacomb cemetery. The medium age of the Catacomb population was 27 years [Kruts 1984]. Using the formula for the demographic calculations [Kuzmina 1974] we can calculate the medium size of the Catacomb Unity at the Northern Pontic area:

$$\frac{204600 (people) \times 27 (years)}{400 (years)} = 14000 \ people^2$$

The first data about the population size of the Catacomb Unity we can check by the analysis of the sex-age pyramides. But anthropological sources cannot be used for our purposes, because they were under the influence of the such factor, as safety of the child bones [Kruts 1984: Fig.11]. The total number of the child and adolescent burials is near 8,7%, which is lower than in the modern society. On the top of the pyramid anthropology give us the more real picture. But the number of the adult men is twice and elders — four times more than of the women. Some investigators regard this a situation as objective (A. Kisliy). They analyzed the data of the Catacomb and Yamnaya cultures and received the similar result. A. Kisliy writes that the most of the women died after the first childbirth in adolescent age [Kisliy 1990: 124]. But if we suppose that all the adolescent burials were women, it cannot solve the problem, because they are only 3,1-5,9% of all deceased.

There is a similar picture for the Kivutkalninsk cemetery in the Baltic region [Denisova, Graudone, Gravere 1985: 140]. Investigators connected it with the custom according to which all women were buried on the family cemeteries in the another places. But all the women from the tribe, which buried their people on the Kivutkalninsk cemetery in such a case also been buried at his family cemetery. If we have another picture, it is wrong.

The reconstruction of the Catacomb sex-age pyramid may have another explanation. We know about the existence of the initiation customs. All members of society, who did not passed this procedure of socialization, buried in another places with another ceremonies. For example, in India it was the custom of the "secondbirth" according to which children became the real members of society only in some age [Bongard-Levin, Ilzin 1985: 170]. We may have the same picture. May be all the uninitiated Catacomb people were not buried in mounds, but in the another places — on the trees, in water, cremated, buried in the burial ground. We have near 30 ground cemeteries of the Catacomb period on the Lower Dnieper [Olenkovski, Pustovalov 1993].

The adult burials formed 69,5 % and child — 22% according to our calculations [Pustovalov 1992a: 121]. We can to compare our reconstructions with the modern societies with the similar system of economy, in Asia or Africa, for example with the Zimbabwe [Demograficheskiy slovar: 142]. The sex-age pyramid of Zimbabwe is the young population with the high number of children — to 38,7%. Such a situation is in other countries — Afghanistan, Libya, Sudan, etc. (Fig. 22: 1).

² 400 years — the minimum period of the existence of the Catacomb Unity, uncalibrated dating; for calendar years results are different [Editor's comment]



Fig. 22. The population pyramid: 1 — model (Zimbabwe), 2 — Catacomb Unity; a – deceased, b – living, 3 — correlation between Zimbabwe and Catacomb Unity.

To compare it with the Catacomb pyramid we must to transmit it from the pyramid of deceased to the pyramid of living. We can use the simple formulae [Gey 1990: 87]. Results we show on the picture (Fig. 22: 2). As we can see, histograms of the adult population are similar (Fig. 22: 3). At the same time number of children in Catacomb part are low. So we can assert that in mounds was buried only some part of children.

Now we can to put the size of the Catacomb population in the accordance with the our model. The number of adult men and elders in the Catacomb Unity must be 47,3%, as in our model. Total population so must be:

$$\frac{11163 \ (people) \times 100\%}{47,3\%} = 23600 \ people$$

The Catacomb culture for the some time coexisted with Yamnaya culture in steppes of the Northern Pontic area and the last was the part of the one with Catacomb ethno-political system. In similar way we can receive the number of the Yamnaya culture population — near 28000 people. Near 40% of their burials are contemporary with Catacomb [Shaposhnikova, Fomenko, Dovzhenko 1986: 55-60]. So the number of the Yamnaya culture population, contemporary with Catacomb were near 11200 people. The total size of the steppe population in this period was 35000 people. Our previous calculations were connected only with the some part of the whole territories, when the monuments of this two steppe cultures were discovered. They also were in Kirovograd, Donetsk, Odessa regions of the Ukraine and in Moldova. Accordingly the size of population increase to 57000 people.

The population density of the Catacomb Unity was 1 people for 4,64 sq. km. From the anthropological sources we know, that the minimal area for nomadism is 3 sq.km. It was the medium density. Calculations of the population density in the synthetic squares give more different picture (Fig. 23).

The size and density of the population were closely connected with the amount of water in regions. In Crimea, some districts of Kherson and Zaporozhye regions it were 3-7 people on 100 sq.km. The highest density were on the right bank of Dnieper — 50 people on 100 sq.km, in foothills of Crimea and Sivash region — 49/31 people on 100 sq.km. Other regions, when the population density were higher than medium were Orel-Samara, territory between Southern Bug and Ingul, middle part of Molochna river. All this regions were connected with the mounds of the Catacomb aristocracy [Pustovalov 1990b].

According the calculations of N. Gavriluk the size of steppe population at the Northern Pontic area in the Iron Age was not more than 95000 people. His calculations based on the data of the ecological productivity of steppes [Gavriluk 1989: 24].



Fig. 23. Population density of the Catacomb Unity, people/ square km.

Having the reconstruction of the Catacomb Unity population we can calculate the size of the different strata of society and professional groups, etc. For example the burials of warriors are in 10-12% of all graves. So, the total number of the Catacomb warriors was near 5000-7000 people. In the large battles took part all adult men — near 14000-17000 people. The number of craftsmen were near 1000 people, most of them produced armament, to 30% — connected with metalwork. Other professions were singular.

4. THE RECONSTRUCTION OF THE HUSBANDRY SYSTEM AND THE WAY OF LIFE OF THE CATACOMB POPULATION IN THE NORTHERN PONTIC AREA

4.1. THE FOOD PRODUCTION

The quantity of sources for such reconstruction is not large. All the excavated settlements were described in the part 2 — the upper layer of Mikhailovka, Bayda-isle, Matveyevka-1. Part of the Catacomb settlements, which were on the banks of the rivers now is under the water. This reconstruction should been verificated by the future investigations.

The economy and husbandry of the steppe societies in the Bronze Age were complex [Masson 1964, 1967]. The husbandry of the Catacomb Unity were complex also [Popova 1955: 154]. O. Shaposhnikova noted, that at the Lower Dnieper husbandry was based on the nearhome cattle-breeding supplemented by agriculture and at the Northern Donets region — based on the semi-nomadic herds-breeding. For the upper layer of Mikhailovka was supposed the existence of the semi-nomadic herds-breeding. Most of population had the settled way of life, lesser moved with herds during the whole year [Lagodovska, Shaposhnikova, Makarevich 1962: 178].

All three settlements were connected with the different groups of the Catacomb population. All groups have different husbandry. So the reconstruction of the "Catacomb husbandry" is impossible. It is more expediency to define the husbandry of the different groups of population, which formed the complex Catacomb society.

Most of the late-Yamnaya and Catacomb (of the "Eastern" funerary custom) burials are connected with the river valleys [Otroshchenko, Boltrik 1982: 38-46]. The most of the Ingul Catacombs are on plateau. We can suppose, that Yamnaya and Eastern Catacomb population were more settled, than Ingul population, which lived in the open steppe territories. The large quantity of cattle on Matveyevka-1 an Mikhailovka is the evidence of the herdsmen cattle-breeding rather than nomadism. The mobile way of life was present in Catacomb economy.

It is known from the historical records that the work of the herdsman was more prestige, than the work of farmer in the nomadic society. The poor herdsman, who became farmer if it was possible returned to previous way of life [Markov 1976: 160]. The higher layer at the social system of the North Black Sea Littoral in the Early Bronze Age belonged to the Ingul tribes, the middle — for the Eastern Catacomb tribes, and lower for the Yamnaya culture tribes [Pustovalov 1991a]. We see the correlation between the place of Ingul population in the social and husbandry systems.

The Matveyevka-1 settlement is the typical "zimnik", when cattle were in winter. The large fortifications of the Bayda-isle and Mikhailovka at firstly defended herd, not people. So the mobile stock-breeding was the part of husbandry systems of all three groups of population. But the number of people, connected with it was different. The mobile way of life was typical more to the Ingul population than to Yamnaya culture tribes. The quantity of the animal bones in Catacomb burials were connected with ideology. In graves from Orel-Samara region were: 38% cattle, 38,7% — horse, 18,3% — sheep bones [Kovalova 1983: 54]. For our data cattle and sheep are in equal quantity in graves with the low percent of horse [Pustovalov 1992a: 125].

We have some evidence about the Catacomb agriculture. Cereals were discovered in burials [Korpusova et al. 1978; Kovalova 1983: 57]. There were discovered some wooden ploughs in burials [Bidzilya, Yakovenko 1973: 146-152]. The picture of the spike is on the stone hammer-axes from the Catacomb burials [Sharafutdinova 1980: 60-70]. Ornamentation of the Catacomb pottery regarded as the complex astronomical calendar, connected with the agricultural husbandry system [Chmy-khov 1991].

The mobile stock-breeding is connected with appointed ways of the nomad migrations. This ways are marked by the letovka-type and zimnik-type settlements. The time and the duration of moving is dependent from the size of herd and amount of grass on the pasture. In the historical times the direction of moving in the Northern Pontic area was meridional — from south to north in summer and from north to south in winter [Kirikov 1986: 8].

For the Catacomb period we can restore such way of moving. In winter most of the population living in the valleys of the large rivers (Dnieper, Southern Bug, Dniester). In spring after rains herds moved on the open steppe areas. In summer all herds concentrated near the sources of water in steppes on the letovka-type settlements. In autumn after rains herds moving to the open steppe areas, before the Winter period they return to the zimnik-type settlements to the river valleys (Fig. 12).

All the large settlements were near the river valleys (Mikhailovka, Matveyevka-1, Bayda, Konstantinovka-1, Chervona Ukraina, Tashino, Peresadovka-II, Novopavlovka-I, Krivorizke-II, Leontievka) or not far from the plateau (Peschanovka). All tent-sites and letovka-type settlements are in the open steppes, as in Alioshki Sands or the Seragozy gorge. Here the large settlement Novoukrainka was near the water — "pod", all the tent-sites were near the beginning of the gorge (Fig. 12). This is in correspondence with the demographic calculations. This mobile system was used by all groups of the Catacomb Unity population. At the beginning of it existence herds were at the open steppes during the whole summer, but after the change of the climate this period became short.

The palaeodemographic reconstructions give the possibility to calculate the size of the Catacomb herds — for 60 000 of people. It is known, that at the beginning of our century in Mongolia for one man were 17,8 heads of cattle [Mayski 1921: 67, 124]. In Kasakhstan were 5 horses, 4 cows, 10 rams, 2 camels on one yurt [Markov 1976: 203]. So it were near one million of cattle on the pasture-grounds at the Catacomb period. We must note, that one time for 10-12 years just took away to 50% of herds. It for one hand protected the pasture-grounds from degradation, on other hand withstood the growth of population.

One-directed husbandry systems are unstable. That is why the Catacomb population have other sources of the food production — agriculture, fishing, hunting.

4.2. CRAFT AND TRADE

The level of development of Catacomb society was marked by the burials of the craftsmen [Chernykh 1966; Berezanskaya 1978; Berezanskaya, Kravets 1989; Nechytailo, Kubyshev 1991]. Traditionally craft was investigated in the technological way. But it is necessary to study relations between the producer and consumer. The craft in nomadic societies was connected with the military interests and prestige requirements of the nobility [Kradin 1992: 73]. It was the first form of craft-work on the order. This working hypothesis was tested by the carried social delineation of the Catacomb society [Pustovalov 1992a].

The main features of the Catacomb nobility were besides the expenditure of labor on the building of burials large number of the craft production — armament, metal, mummification, painting of the chamber bottom, chariot or vehicle (or their part). In the burial custom reflected all professions, connected with the interests of the Catacomb nobility [Pustovalov 1990b]. At first it were gunsmiths, founders, wheelwrighters. Here we see the full complex of instruments and intermediate production. The territorial placing burials show us the territorial division of work [Nechytailo, Kubyshev 1991]. So it was the situation, when was the consumer, which supported craft and producer, who manufactured necessary things. In the nomadic societies this process was unfinished.

The representatives of the different professions had different positions in the social system. The gunsmiths, founders and wheelwrighters have high positions — till the second rank of nobility [Pustovalov 1990b]. Other craftsmen were among

the ordinary population. In other hand the burials of nobility with different tools are the evidence of patronage of nobility over this professions as it was in ancient Egypt.

The burials of the representatives of the different professions concentrated in the different territories — it was the division of labor. Sometimes it was connected with the nature resources. In the Ingul region was the stone for the battle hammeraxes, most of founders were in Donetsk region, near the copper deposits.

It is very difficult to do any reconstruction of trade on the archaeological sources. For the Catacomb period we have a great number of the Caucasian metal or imitations of it. We have the casting moulds for the bronze ingots from the Catacomb burial near Mala Ternivka. The form and weight of ingots are similar to weight and coin systems of Mesopotamia [Kubyshev, Chernyakov 1985: 39-54]. There are imports from Egypt in Catacomb graves [Safronov 1983].

4.3. CONCLUSIONS

The husbandry and economy of the Catacomb population had a complex character, with interethnical and intercommunal division of labor and predominance of the stock-breeding, which became more moving after the changing of climate situation. It was supplemented by the agriculture, hunting and fishing. This type of husbandry we can determine as the horizontal trans-humans.

5. THE CATACOMB ETHNO-SOCIAL ORGANISM OF THE NORTHERN PONTIC AREA

It is known, that mankind developing in the boards of the separate communities, nations, countries, states, etc. The general existing as a total combination of the separate, individual, as the development of the different socius. For it studying Y. Semenov proposed to use a category "the social organism" — "SO" [Semenov 1966]. SO is the separate society with the independent socioeconomic and political development, which coincided with the ethnic unities. Today it is an axiom that SO is the base for the formation of ethnos [Kubbel 1988: 171].

For the transitional period from the primitive society to state all specialists paid attention on the great significance of the socio-political and economical relations, realized in SO [Bromley 1983: 34]. For the transitional period to state the ethnic unity must coincide with SO and have the form of the Ethno-Social Organism — ESO.

The special investigation of the ethnic structure of the Catacomb population at the territory of Ukraine show existence of two large ethnical groups, which were closely connected one with another. They were: Western or Ingul and Eastern or Donetsk ethnical massives. The third component of this system was the population of the Yamnaya culture. All it give us the possibility to voice such a hypothesis: the unity of the Ingul burial custom reflected in the ideology of this population existence of the united ESO. Borders of the Ingul ESO were: at east — to Taganrog [Ilyukov, Kazakova 1988], at north east — on the banks of Orel, at north — to the Kiev region (but mainly at Kirovograd region), at west — on the Prut river, at south — to the Azov and North Black Sea Littoral and the Crimea foothills [Kovalova 1983; Klochko, Rychkov 1989; Dergachev 1986]. It were 700-750 km from west to east and 300-350 km from north to south. Only the complex ESO had possibility to control such large areas.

The foundation of the every ESO consists of three subsystems: economical, socio-political and cultural [Pavlenko 1989: 55]. Because the last subsystem we have as the ethnical unity we shall study the other two.

ESO is the transitional period to state formed the socio-economic center and agricultural periphery. In center concentrated administration with the ruler in on head. The power became hereditary. In the nomadic or herdsmen society center were the headquarter of the ruler, administration — close relatives and tribe members. All they became nobility. Power of the such system based on the phenomenon of the power-property, according to which rulers had right and possibility to manage all the common sources [Vasilyev 1982: 60-99]. The interior structure of ESO based on the family and tribal principles [Bunyatyan 1985: 21-43]. Every subsystem had its own socio-economical system and connected with center only by the noneconomical methods. Besides the regions of mining the level of prosperity determined by the deductions for center, some part played the professional differences.

Redistribution as the way of consuming appeared at the end of the primitive period. In states of the Ancient East, which appeared on the base of irrigation this system reached the higher level of its development. But among the nomads or farmers of the middle stretch this system had a small significance, because here the common property on land coexisted with the individual work in stock-breeding which led to the privatization of cattle and social differentiation [Bunyatyan 1985]. Redistribution in the nomadic societies received the total character only in the war period or after the gathering of tribute or taxes from the dependent population. The last was the stable source of the surplus product. At all cases it were after the war and strengthened the war upper crust. The war factor of the state appearance



Fig. 24. Molochansk temple, the first period (reconstruction).



Fig. 25. Molochansk temple, the second period (reconstruction).

played the large role in societies of the Frontier Asia and the Northern Pontic area [Melikishvili 1985: 3-34].

The end of the primitivity was accompanied by the appearance of the first forms of the exploitation. The earliest form of it was interethnical, because the



Fig. 26. Molochansk temple, the third period (reconstruction).

exploitation of the own tribe was banned by the religious notions. When one ethnos conquered another appeared the tribute relations [Khazanov 1979: 125-177]. Sometimes it led to establishing of the strict estate-caste system. It was the singular way of the state origin in conditions when the production forces were undeveloped. It was the way of the Catacomb society at the Northern Pontic area [Pustovalov 1991a: 104-122].

It turns out that the distribution of the social groups of Ingul and Donetsk population is in definite connection. On the Northern Pontic area at the more late period was absent the nobility of the Donetsk (Eastern) population. At the same time were Ingul nobility. It means that this two groups were in relations of domination-subordination. The third component of this system was the population of the Yamnaya culture, which at the late period almost had not burials of the nobility [Dovzhenko, Rychkov 1988: 14-27].

Analysis of the ethnotypology showed availability of the other features of caste systems and rules of transition from one caste to another [Pustovalov 1991a: 114-116]. Such features as the special graves — multi-Catacomb chambers, collective burials, rich child burials are the evidence of the heredity of power in this society. The main part of such burials concentrated in the middle of the Molochna river region.

Here were the large temple [Pustovalov 1993: 23-34]. It was the platform with 30000 m cubic capacity of stone and ground, which used for a long period of time

(Fig. 24-26). For our opinion Molochansk temple was the main temple for the whole Black Sea Littoral. This sanctuary was the center of the magnificent ceremonies which gathered many people. The purpose of this celebrations was to support the ideological inviolable and divine character of the birth of the ruler's power in the Catacomb society.

Not far from the Molochansk temple is situated the Stone Grave — sanctuary which was used in the Bronze Age and other periods. Its place of situation give us the possibility to suppose that it was temple of the Eastern Catacomb and Yamnaya culture population.

The Molochansk temple was situated on the dominated height, but the Stone Tomb in the river valley. So the region of the Molochna river was the social and cult center.

There are many burials of the well-to-do Ingul population near Molochna. There are twice more burials with armament and cenotaphs here. It is the evidence that this population supported their prosperity by the war actions [Klochko, Pusto-valov 1992]. This people took part in war actions and were the pier of the ruling clique — so they received some part of the war booty.

The burials of the gunsmiths and founders also concentrated near the Molochansk center [Nechytailo 1991]. Concentration of craftsmen here is the evidence in favor of the united ESO.

In the some period Ingul tribes spread to east and north-east in Donetsk region [Sanzharov 1991]. According to our data this territory was dependent from the North Black Sea Unity (burials of the Eastern population became poor). Such interesting in the new territories was connected with the copper and salt deposits. It is known that bronze was the strategic production for the early states. They organized expeditions and waged wars for raw materials. We have any direct evidence that the mining of the copper deposits in Donbass started at the Early Bronze Age. But many burials of the founders were investigated in this region. In the Late Bronze Age Donbass became the important center of the bronze metallurgy and metalwork [Berezanskaya, Kravets 1989: 156n.].

The higher level of prosperity in North Crimea and Sivash region based on war actions. Population of the Ingul region trained in mining. On the left bank of Ingulets and on Saksagan were the diabase stone. This stone was used for production of the battle hammer-axes, which were discovered on the whole Ca-tacomb territory and abroad. As it supposed S. Berezanskaya and S. Lyashko here was the center which produced the stone armament [Berezanskaya, Lyashko 1989: 21-22]. The Kriviy-Rog deposits of the ochre paint also were worked at this period.

Archaeological materials of the Catacomb Unity and other sources give us the evidence that on the territory of the North Black Sea Littoral created the complex ESO — The North Black Sea Ethno-Political Unity (NBSEPU). One of the reasons of it appearance was the aridization of climate and necessity of the hard reglamentation of husbandry and social life. The hierarchy of the social centers appeared. Main among them was Molochna center, subcentres were near Ingul and near Sivash. On the territory of the Molochna center (10-15 km) were the most of Ingul higher nobility burials, the largest and richest graves, two largest temples — Molochansk and the Stone Grave. To south and north from the Molochansk center were the centers of metalwork which worked for the Ingul nobility. Near lived warriors of the different arm of the service — archers, spearmen, charioteers. Army formed on the base of the ethnical division when the most prestige services belonged to the Ingul warriors. Other formed from the Eastern and Yamnaya culture population. With the development of war actions this tradition was violated [Klochko, Pustovalov 1992: 139].

The further investigations will discovery the new social centers. They may be in Orel region and on Lower Dniester (concentration of the multi-chamber burials). But the most of the Catacomb graves on the periphery are the burials of the ordinary population.

Our investigations give us the possibility to assert that in the Catacomb Unity of the Northern Pontic area established the estate-caste system with the domination of the Ingul population, which advanced rulers, priests, warriors — all administration, religious and military leaders. This tribes had the supreme power over the Eastern Catacomb and remains of the Yamnaya culture population. The ethnical features acquired the social content. At the same time all the ethnical groups had own complex estate system. Religion and customs of the Ingul population became popular and prestige among other groups. That is why the latest Yamnaya culture nobility on Molochna had the features of the Ingul rulers [Rassamakin 1989: 82-84].

The large territory of the Catacomb NBSEPU indicated the low level of the productive forces. The existence of Ingul nobility need large areas and sources. This areas controlled by the board population and professional warriors, or emergency volunteer corps if it was necessary. On opinion of L.Kubbel professional warriors fighted not only against the external enemies but the oppressed people [Kubbel 1987: 3-12], which was necessary for the caste system. The caste system preserved the features of all ethnic groups which were in the Catacomb NBSEPU. That is why all the integrational ethnic processes still unfinished, but the political unity have the common features reflected in the burial customs. That is why we can call (from the ethnopolitical point of view) all the abandoned by this population monuments "The North Black Sea Littoral Catacomb culture". From this culture we can select the Ingul, Eastern-Catacomb and Yamnaya culture ethnical components with different origin.

Conclusion about the existence of the complex ESO in the Northern Pontic area settled many contradictions and disparities in the investigation of the historical process in this region and give possibility revise not only the sociological notions about it from the point of view of the state origin, but the study and interpretation of sources.

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THE METALLURGY OF THE PASTORAL SOCIETIES IN THE LIGHT OF COPPER AND BRONZE PROCESSING IN THE NORTHERN PONTIC STEPPE — FOREST-STEPPE ZONE: 4500–2350 BC

Metallurgic production is one of the most technically complex kinds of human productive activities of early ages. Its development and functioning required a large amount of technical and nature knowledge and skills. It involved special requirements to the social structure and the level of development of ancient societies' productive forces, while being a strong stimulus for their development. Technical knowledge and skills necessary for dealing with investigation and exploration of ore materials; primary, for smelting metals from ores; obtaining artificial alloys with required features; blacksmith's finishing of items, and foundry accounted for high degree of specialization and could develop only if craftsmen were not involved in any other kind of productive activities. Obviously, this only represented a trend, which did not cause complete isolation of artisans-metallurgists from social and household collective work in communities they lived in and worked for.

On the early stage, in the Eneolithic and the Early Bronze Age, metallurgy developed relatively slowly and unevenly. Metal items, especially tools, gradually supplanted items made of stone and bone. In a number of regions, especially those remote from ancient centers of civilization, and possessing no ore supplies of their own, metal items had remained rare for a long time, and their quantity depended on intensive trade relations and the scope of metallurgic production of neighboring peoples acting as their trade partners. Processes of dissemination of knowledge in metallurgy during ancient times were considerably influenced by rather low amounts of natural copper ores, complicated technology of copper smelting, and specific features of blacksmith's copper finishing. During the Eneolithic and the Early Bronze Age, East European peoples adopted metalwork skills in an almost ready form, as a part of the ethno-cultural process, from their neighbors — peoples of the Balkans and the Caucasus which stood on higher stage of development. Knowledge in metallurgy could only be spread by small groups of artisans who transferred their knowledge to their pupils in the process of immediate productive activity.

Uneven ore supplies in different regions stimulated development of inter-tribe relations and exchange. Dissemination of the most advanced technical knowledge and skills also was an important cultural and integrative factor in development of the human society. These facts allow to regard metallurgical production as one of the most important and revealing kinds of human handicrafts in ancient times.

1. RESEARCH PROBLEMS

Metallurgical production of the Eneolithic and the Early Bronze Age has been in the spotlight of attention of archaeologists for quite a long time; and the science has made substantial progress since then.

A.M. Tallgren [Tallgren 1926], a Finnish archaeologist, compiled the first register of metal items and moulds discovered on the territory of Eastern Europe. Meanwhile, V.A. Gorodtsov [Gorodtsov 1928] referred a number of bronze items found in the north of the Black Sea region to legendary Cimmerians, thus having established efforts aimed at cultural association and dating fortuitous finds of metal items of the Bronze Age.

First efforts of conducting systematic research of ancient metallurgy with the help of methods typical for nature sciences were made by a group led by V.V. Danilevski at the Institute of Historic Technology GAIMK in Leningrad (1933). However, in 1935 this research work was interrupted by repressions. Only 12 years later A. Yessen, one of very few researchers who survived the repressions, addressed the topic of metallurgy again. In his book [Yessen 1947] he analyzed prerequisites for the Greek colonization, and selected metal items as examples to consider a wide range of issues connected with relations between the Northern Pontic region and the Caucasus, the Balkans, and the Asia Minor during the Bronze Age. In that work, hoards of bronze items were first used as direct pieces of evidence of relations between the ancient people that lived on the territory of Ukraine with the Balkans (the Shchetkovo and the Kozorezovo hoards), and the Caucasus (the Beryslav hoard). However, we believe that work contained a number of erroneous provisions which to a large extend defined further development of research in the field of ancient metallurgy in Ukraine. Among them were theses about lack of local sources of raw materials, and imported character of majority of metal items of the Northern Pontic region. Taken for granted, and developed by further researchers, those theses accounted for the fact that the Ukrainian territory was traditional regarded as a market for metal goods manufactured in neighboring regions. The role of local tribes was diminished to manufacturing, with the help of imported, "adopted" samples, of metal items of imported raw material (according to A. Yessen, from the Balkans and the Caucasus; and then, in the opinion of E. Chernykh, from the Carpathians and the Urals). A. Yessen was the first to introduce the notion of the "metalwork center of the Northern Black Sea region". By this notion, A. Yessen grouped metal items of the Late Bronze Age, found on the territory of the Northern Pontic region and undertook a complex study with regard to their types, chronology, and, to a certain extend, technology. Later, E. Chernykh developed this notion.

Next years brought a completely new stage in the ancient metallurgy studies. During that period nature science methods — particularly that of spectral analysis — were first applied to ancient metal items [Chernykh 1963]. In the first of his major works, E. Chernykh used statistic results of spectral analysis of a large number of metal items used by tribes of the Tripolye, the Eneolithic Chapli cemetery, as well as the Yamnaya, the Catacomb, and the Middle Dnieper cultures. That work dealt with the issues of sources of raw materials, alloys, directions and characteristic features of metal and metal item imports in Eastern Europe in the 4th — 2nd millennia BC [Chernykh 1966]. Special attention should be paid to a hypothesis about the origin of the metal found in the Chapli cemetery (the oldest steppe metal known by that time) which was believed to have been brought from copper-bearing sandstone of the Bakhmut hollow in the Donetsk region. Regretfully, later the Author gave up this assumption. Some provisions of that research are still valid; some have been developed and enlarged upon in further investigations conducted by E. Chernykh himself and other researchers.

In 1970 E. Chernykh began to re-orient from research work in the domain of metallurgy and metalwork of particular archaeological cultures [Chernykh 1970]. Advocating singling out ancient metal as a subject for independent research, he came to distinguishing between specific "metalwork centers". He introduced the notion of historic-metallurgical subdivisions which he described as "regions of similar metal production and metalwork performed by professional craftsmen". According to E. Chernykh, those centers were always limited by chronological and geographical frameworks, and beard some steady characteristic features: 1) a selection of categories of types of items; 2) technological ways of production; and 3) a combination of chemical and metallurgical copper groups [Chernykh 1976: 167]. Consequently, a notion of "metallurgical zone" was suggested — a system of related metallurgy and metalwork centers, also fitting into certain geographical and chronological frameworks — of a higher level of historical and metallurgical division.

The approach enabled the author, using maximum of facilities provided by the spectral analysis laboratory of the Institute of Archaeology at the Academy of Science of the USSR, to analyze a great number of copper and bronze items, as well as single out general stages of development of metallurgical production in Eastern Europe in 4500–2350 BC. However, that approach featured a number of drawbacks. Having limited himself to the statement that a center represented an "archaeological culture faction" [Chernykh 1976: 167], the author actually eliminated for himself the necessity to determine cultural affiliation of both individual metal items, and often even of complete metalwork centers. That trend appeared most obviously in his later paper [Chernykh 1976]. All of the Late Bronze Age metalwork centers he distinguished in Ukraine were not related to specific archaeological cultures. Having confined himself to spectral analyses and form-and-type graphs, using no metallographic research and moulds, the author actually neglected issues of technology, time and place of production, as well as cultural affiliation of both individual items, and types of items. Metallurgical production, investigated as abstract groups of metal and types of items, turned out to be a "thing in itself".

The results obtained in the course of that research are very difficult to use in concrete historical investigation for characterizing production of individual peoples, as well as for reconstructing a general historic process in Ukraine during the Late Bronze Age.

Some methods of interpreting spectral analyses results also arise objection. Some techniques are applied to study of both groups of metallurgically "pure" copper and artificial alloys, without taking into consideration micro-admixtures brought in the course of fusion. The research does not include study of sources of particular alloy components and issues of origin and development of specific alloy recipes. Hence, sources of raw materials for artificial alloys are looked for in nature, resulting in claiming on existing of so-called "Volga-Urals" and "Volga-Kama" metal groups in Ukraine. Meanwhile, these "groups" actually represent multicomponent stibium-arsenious and stibium-arsenic-Sn alloys. In other words, an alloy recipe was identified with the raw material source, regarded in a simplified manner, which is evident in an example of imported Caucasian copper and arsenious bronze the oldest kind of artificial alloys. Raw material sources are traditionally looked for outside the territory in question, Ukraine; ignoring geological research results obtained by Ukrainian specialists. Notwithstanding the fact that — according to the author — the largest of determined Late Bronze Age metal groups on the Ukrainian territory, the right-bank and the left-bank groups, have no definite sources of raw material, a conclusion was made about prevailing import of copper to Ukraine about 2500 BC, leading to a statement about "metalwork", and not "metallurgy".

The aforementioned is important not only for investigating ancient metallurgy on the territory of Ukraine, but also because conclusions made by E. Chernykh are rather often used by other researchers as arguments for all kinds of "influences", "borrowing", "imports", "invasions", and "expansions", that is, in the course of reconstruction of historic processes. Highly generalized description of material, low quality (or often lack of) pictures did not allow readers to judge on the author's ideas and, to a large extent, devaluated the great amount of facts collected by E. Chernykh.

Necessity of correlating metalwork centers with archaeological cultures and considering metal items while characterizing the Late Bronze Age archaeological cultures were stressed by V. Bochkarev [Bochkarev 1990].

Research conducted by E. Chernykh was substantially expanded and developed by S. Korenevski in the field of the Yamnaya and the Catacomb cultures [Korenevski 1974, 1976, 1978]. Using the same methods as E. Chernykh, S. Korenevski did not separate materials from archaeological cultures. Having accomplished thorough historical analysis and investigated individual categories of metal items (axes and knives), the author came to interesting conclusions about dynamics of dissemination of Caucasian-type shapes of metal items in the steppe; the time of emergence of local production, at first after Caucasian models, and later acquiring specific steppe features. Also of interest are observations about the use of metallurgically "pure" copper and arsenious bronzes by steppe metallurgists, different in selection of micro-admixtures from the Caucasian alloys. One of the most ancient types of metal socketed axes in Eastern Europe, the so-called Banabyuk-type axes were distinguished for the first time [Korenevski 1974].

The research conducted by N. V. Ryndina can be regarded as an example of successful application of nature science techniques. Using results of metallographical and spectrum analyses, she received a broad and objective picture of metal production of the Tripolye culture tribes [Ryndina 1971], as well as of metallurgy and metalwork of the Corded Ware culture of the Carpathian region, the Podolia and the Volhynia [Ryndina 1980].

The Tripolye culture is the most ancient of all presently known "metal-bearing" cultures in the right-bank Ukraine. The research conducted by N. V. Ryndina proved that emerging of metal-processing skills in this comparatively developed state was connected with dissemination of the Balkan-Danube Eneolithic cultures to this territory — the Tripolye culture being their Eastern flank — possessing by that time a rather highly-developed metal-processing technologies. Although N. V. Ryndina slightly overestimated the level of organization of production in the early Tripolye, and for that was criticized by S. S. Berezanskaya [Berezanskaya 1980] who proved it was inappropriate to speak about production centers in the early Tripolye on the basis of the materials available, the Tripolye culture did play a unique role in disseminating knowledge of metallurgy on the Ukrainian territory.

Research of metals of the Corded Ware culture of the Carpathian Mountains, the Podolia and the Volhynia conducted by N. V. Ryndina [Ryndina 1980] demonstrated a special importance of local copper ore deposits (primarily, the Velykiy Midsk in the Volhynia). This copper was used in major part of the investigated material. Also of value are such established facts as usage of high-quality Sn-bronze of the CT-groups (Carpathian-Transilvanian, according to E.N. Chernykh, which he distinguished on the basis of the Late Bronze Age materials of the south-western part of the USSR). As long ago as ca 2500 BC, foundry workers of the Corded Ware culture on the Ukrainian territory demonstrated complete similarity of local blacksmith's techniques with the Tripolye methods of metalwork, which suggested relations with western metallurgy centers.

This collective study aims at distinguishing new stages of development of metallurgical production in Ukraine in the Eneolithic and the Bronze Age.

Presently there is a certain discrepancy between the periodization accepted in archaeology and the periodization of the Early Metal Age on the territory of the USSR suggested by E. N. Chernykh. With regard to the tasks of this research, the periodization used here is based upon a scheme suggested by E. N. Chernykh [Chernykh 1978b] who distinguished three major stages of development of ancient metallurgy on the territory of the USSR.

Stage 1 — the Eneolithic. During that period, first metal items appeared in cultures of the Ukrainian South, and domestic metallurgical and metalwork production began. Chronologically, the first stage is limited by ca 4500–3150 BC. The first "metal-bearing" cultures in Ukraine included the Tripolye, monuments of the second stage of the Dnieper-Donets culture (the Nikolsk cemetery) and the Novo-danilovka-type monuments.

Stage 2, phase 1 — the Early Bronze Age. It was characterized by emergence of the Circumpontic metallurgical zone, wide spread of first artificial alloys, arsenious bronzes, and foundry technique using compound moulds. Dated ca 3150-2750/2350 BC, it included the Usatovo, the Sofievka, the Yamnaya, and the Kemi-Oba cultures and monument groups.

Stage 2, phase 2 — the Middle Bronze Age, characterized, on one hand, by the highest rise in production, based on the Early Bronze techniques and traditions, and, on the other hand, by emergence of new technologies which gained the lead during the Late Bronze Age. It is dated ca 2750/2350-1950 BC and includes the Corded Ware culture, the Catacomb culture and the Mnogovalikova Pottery culture.

Stage 3 — the Late Bronze Age. This was the period of preferable usage of quality Sn-bronzes and a technique of forging a "blind" socket into a highly-productive stone form. It is dated ca 1950–1000/900 BC and includes the Otomani, the Komarovo, the East Trzciniec, the Srubnaya, the Sabatinovka, the Stanovo (Suciu-de-Sus), the Gava-Goligrady, the Vysotskaya, the Belogrudovo, the Bondarikha, and the Belozerka cultures.

This study deals with only those cultures and monument groups which are represented by the discovered metal items and evidence of metalwork.

Sources for investigating metallurgical production include individual finds of metal items, hoards of metal items, traces of metal production in settlements: slags, metal drops, blacksmith's and ore-grinding instruments, moulds; the so-called "smelting-houses" — large collections of stone moulds typical for the Late Bronze Age; burial interments of foundry artisans, ancient ore excavation sites.

Probably, metal items are given major attention both in special investigations devoted to ancient metallurgy and metalwork in Ukraine, and in research works devoted to cultures, monument groups, and individual complexes. This is the best-investigated category of sources.

The oldest hoard of metal items discovered in Ukraine is the early Tripolye Karbuna hoard, which consists of 444 copper items [Sergeyev 1963]. Hoards of the Early Bronze Age in Ukraine are unknown; there are also several hoards dated back to the Middle Bronze Age, including the Kiev [Movsha 1957], the Stublo [Antoniewicz 1929], the Starobykovo, the Borodino [Krivtsova-Grakova 1949], the Ulyanovka, and the Rybakovka hoards [Chernyakov 1985].

Traces of metallurgical production in settlements are discovered more rarely and include slags, metal drops, different instruments connected with metallurgy and metalwork, moulds, crucibles, casting ladles, and smelting furnaces. In our view, rarity of those finds is accounted for by specific features of metallurgical production which made it necessary for productive complexes to be drawn outside the settlement. This phenomenon is also connected with lack of appropriate searching techniques and general low level of development of the Eneolithic and the Bronze Age settlement archaeology in Ukraine, as well as extremely limited investigated areas.

All burial interments of foundry craftsmen in the Ukrainian territory are dated back to the Early and Middle Bronze Age. The oldest of them are those in the Makeyevka tumulus [Kovaleva, Volkoboy 1977] and the Samara island [Kovaleva 1979]. Majority of the burial interments belong to the Catacomb culture, proving both the comparatively high social status of metallurgists in the Catacomb society, and relatively high level of development of foundry skills among the Catacomb tribes.

Most of researchers are unanimous in their opinion about the Ukrainian copper ore resources. According to E.N. Chernykh, the ore base of the Northern Pontic region and the Azov Sea region is poor and limited to scarce deposits of copper sandstones of the Donets basin [Chernykh 1976: 14]. Research conducted by S.I. Tatarinov discovered a large number of excavations dating back to the Late Bronze Age in the Bakhmut hollow deposits, and found traces of forging in immediate proximity to the excavations, and huts of ore miners of the Srubnaya and the Bondarikha cultures [Tatarinov 1977]. Investigation done by S.S. Berezanskaya in the domain of the Late Bronze Age settlements — and primarily of the Usovo lake — allowed her to make a reconstruction of ore excavation and production of bronze items by the Srubnaya culture tribes of the Donets basin [Berezanskaya 1980, 1990].

Spectrum analyses of the Donets ores showed close relationship to the socalled "pure" copper group from monuments of the Yamnaya, the Catacomb and the Kemi-Oba cultures [Chernykh 1976: 16]. Although cases of exploration of the Bakhmut hollow deposits of that period have not been discovered yet, scarce researched areas of excavation, and probability that traces of earlier excavations could be eliminated by later open pits suggest their existence.

As one of the major ore sources for metallurgists of the Corded Ware culture of Western Ukraine, N.V. Ryndina points out to a copper deposit discovered by S. Malkowski in 1928–1930 near village Velvkiv Midsk, the Sarny district of the Rivne region [Ryndina 1980: 33]. S. Malkowski's works contains information about ancient excavations near Velvkiv Midsk, represented by narrow corridor trenches, in filling masses of which he found drilled stone axes and ancient ceramics [Malkowski 1931a, 1931b]. Spectrum analyses results enabled N.V. Ryndina to speak about special role of Velykiy Midsk copper in total amount of metal of the Western Ukrainian Corded Ware culture. This copper accounts for about two thirds of finds included in collections of the Sub-Carpathian culture and the Pochapy-type monuments, as well as half of studied items of the Gorodsk-Zdolbitsa culture [Ryndina 1980: 35]. It is unlikely that such a small deposit could provide for stable copper supply to such a large region for a relatively long time. However, the facts discovered by N.V. Ryndina are of great importance, since they suggest that metallurgists of the Corded Ware culture largely used their own local metal (not necessarily from Velykiy Midsk, but also from many other similar deposits).

Search for copper supplies for ancient production, conducted by E.N. Chernykh, was concentrated on major deposits which have preserved their industrial value until now. However, interests of ancient ore miners most probably were different from interests and tasks of modern industrial complexes. Thus, in ancient Anatolia in the Early Bronze Age, small ore supplies, partly discovered only during thorough investigation performed by experts in ancient metallurgy, were found alongside with copper deposits [de Jesus 1978]. Similar observations were made by Y.S. Grishin on Kazakh materials. He stated that some minor deposits which presently have no industrial value, appeared to be fully excavated in ancient times [Grishin 1980b: 49]. Furthermore, during the oldest period, easy-to-notice, easy-to reach, and easy-to-smelt ores were used first. Those ores comprised the upper oxidized "cap" of copper ore deposits [Grishin 1980b: 38], which makes more difficult both to find these deposits in the course of modern geological research, and to search for ancient sources of raw material.

As appears from the forecast evaluation of the territory of Ukraine done by geologists, the region is rather rich in small deposits and ore displays, as well as

in several large industrial deposits [Metallogenia 1974]. Although the Ukrainian territory is equal to Anatolia in amounts of rich copper ores, very few specialized studies of ancient excavations have been conducted in Ukraine. Scarce research in this field presently allows only to mark suspected sources of individual Bronze Age cultures in Ukraine, with the hope that in future the country will be able to allocate necessary funds and find scientists to provide for an adequate level of research of the issue. According to available geological research results, Ukrainian territory cannot be considered poor in arsenium and tin — ores which were used in ancient times for obtaining artificial alloys. These ores were discovered in the Donets basin, in the Azov Sea region, the Dnieper basin, the Bug basin, the Volhynia, and the Carpathians [Metallogenia 1974]. Vitruvius Pollion, a Roman author (I century BC) wrote that a "Sandraka" mineral had been excavated in many places, but the best deposits were found at the Pont, in the vicinity of the Gipanisa river [Latyshev 1949: 213]. "Sandraka" means realgar or sulphurous arsenium.

2. METALLURGICAL PRODUCTION OF ENEOLITHIC TRIBES

The oldest metal items in Ukraine are dated back to the Eneolithic, ca 4500 BC. In the Carpathian area, the Prut basin, and the Dniester basin first series of metal finds belong to monuments of stages A and B of the Tripolye culture. Due these finds, E.N. Chernykh distinguished the early Tripolye metalwork center, which he regarded as the farthest eastern site in the system of the Eneolithic Balkan-Carpathian metallurgical zone, which in its turn had been formed under the original impulse from the Asia Minor [Chernykh 1978b: 58-59].

As proved by the research performed by N.V. Ryndina, the oldest in Eastern Europe Tripolye metalwork production went a long way in its development, traditionally divided into several stages corresponding with the Tripolye periodization worked out by T.S. Passek [Ryndina 1971].

2.1. EARLY AND MIDDLE TRIPOLYE

The Tripolye A. This period is represented mainly by copper decorations: beads, pipe-shaped beads, bracelets, clothes pendants, and amulets. Metal tools are rare;



Fig. 1. Metal articles of the Tripolye culture (after N.V. Ryndina). 1 - Tripolye A, 2 - Tripolye B.

they include awls, fishing hooks, single finds of axes and chisels (Fig. 1: 1). During that period metals underwent only blacksmith's work. As shown by metallographic studies performed by N.V. Ryndina, the Tripolye blacksmiths had perfectly mastered such operations as drawing, laminating, bending, cutting, pressing, perforating, sewing, welding, turning, grinding, polishing, hot and cold smithery with intermediate heating and annealing procedures [Ryndina 1971: 136-137]. Manufactured things differ from those produced by Balkan artisans both in technology and type.

Structural analysis of chemical and metallurgical features of the Balkan metal collections, done by E.N. Chernykh, discovered rather close relation of the Tripolye metal (the Karbuna hoard and other Tripolye A and B monuments) to the Gumelnita center. According to the author, the Early Tripolye blacksmiths and foundry workers obtained metal mainly from Bulgarian sources [Chernykh 1978b: 88].

Conclusions made by N.V. Ryndina were questioned by S.S. Berezanskaya who stated that the majority of metal items were received by the Tripolye people as ready-made goods by means of exchange [Berezanskaya 1980: 245]. However, new investigations of the Gumenita material by N.V. Ryndina confirmed her preliminary observations of specific features in the technique used by the early Tripolye artisans, and of its archaic character compared to the Gumelnita culture [Ryndina, Orlovskaya 1978: 298].

The Tripolye B. During that period, new metal tools appeared, including flat axes, axe-hammers, new types of ornaments — pins, temple rings, finger-rings, and round-wire rings. Some kinds of goods known from the early Tripolye remained: awls, fishing hooks, bracelets, beads, pipe-shaped beads (Fig. 1: 2).

As earlier, the majority of items were manufactured by local craftsmen. Only axe-hammers of the "Vydra" type can be regarded as imported [Ryndina 1971: 137].

According to N.V. Ryndina's observations, at that stage the Tripolye metallurgical production continued blacksmith's traditions of the previous period and mastered new techniques: figure smithery in special anvils and moulding — first to open moulds, and later also to folding moulds. Also, strengthening riveting of working tool heads was introduced. Traces of production of that period were discovered in Khabaneshti, Polivanov Yar, Novi Ruseshty, and Ariusht settlements [Ryndina 1971: 137-138]. No moulds of that period have been found yet, and assumptions about how they were used and what their peculiar features were are based on N.V. Ryndina's observations of some items' surfaces and typical metal structure. Those moulds were made of clay; open, two-fold or three-fold moulds with implanted for obtaining sockets were found [Ryndina, Orlovskaya 1978: 296].

Hence, according to contemporary views, metallurgical knowledge appeared on the Ukrainian territory in ready and relatively developed form, and was brought by the Balkan migrants who had created the Tripolye culture. In N.V. Ryndina's view, "the early-Tripolye items were made of imported metal within a production region with common technical traditions, lacking in its own resource base" [Ryndina 1971: 89]. This opinion is based on an assumption that the Dniester basin copper sandstones contained low percentage of copper and no native copper. Moreover, this is reportedly proved by spectrum analyses results which show relation of the Tripolye copper to the metal of the Karanovo IV — Gumelniţa center in Southern Bulgaria [Chernykh 1978b: 59]. However, in this case — as well as in all other efforts to interpret spectrum analyses results in order to discover ore sources — we can speak about statistical relation, and not about identity. Furthermore, only major deposits known to the author were considered as possible excavation centers.

Without arguing against the possibility of metal import from the Balkans by the Tripolye tribes, it should be noted that the argument about lack of copper in the river Dniester basin was refuted by a recent discovery of a major copper sandstone deposit containing high percentage of copper, including nature copper [Khrushchev, Galitski 1983]. No traces prehistoric excavations in that place have been found yet, since there has been no research organized.

2.2. METALLURGY OF THE ENEOLITHIC STEPPE POPULATION

Less profound research of this period has been done so far. The earliest steppe metal items were found in the Nikolsk cemetery of the Dnieper-Donets culture. Those were primitive hammered things: a ring (Fig. 2: 1), copper cylinder pipeshaped beads and a golden pendant made of a thin plate [Telegin 1985a: 160]. D.Y. Telegin synchronizes the IIc stage of the Dnieper-Donets culture (to which the Nikolsk cemetery also belongs) with the early-to-middle Tripolye period [Telegin 1985a: 170]. Maximum simplicity of forms and techniques of these items make it more difficult to answer the question of their origin; if those were imported items obtained from the Tripolye craftsmen, the latter should not have been proud of their quality, as by that time a much higher technical level had been achieved. Most probably, those were the first pieces of evidence of the Northern Pontic steppe tribes' acquaintance with the Balkan metallurgical traditions resulting from contacts with the Tripolye tribes.

The Novodanilovka-type cemeteries are dated back to the 2nd half of 5th millennium BC [Telegin 1985b: 311-320], and represent the first "metal-bearing" steppe monument group, which provided a relatively large number of metal items. Among them were string copper bracelets (the Mariupol, the Petro-Svistunovo, the Novodanilovka, and the Chapli cemeteries). All in all, eleven bracelets were found.



Fig. 2. 1 — the Nikolsk cemetery; 2 — the Novodanilovka-type monuments (after D.Y. Telegin); 3 — the Tsviklovtsi hoard; 4 — the Sofievka-type monuments (after E.N. Chernykh); 5 — the Usatovo-type monuments (after E.N. Chernykh).

Nine of them were made of a round metal bar, wound in 1,5-4 rounds. Some of the bracelets had thickened ends. One bracelet was made of a rectangular bar (the Chapli cemetery). Rounded barnacle-type convexo-concave pendants were found in the Chapli cemetery and in a ruined burial interment near village Vepryk in the Poltava region. Also found were small ring-like pipe-shaped beads, long pipe-shaped beads rolled of sheet copper, bent crampon-shaped plates used for decorating a head-dress [Telegin 1985b: 316] (Fig. 2: 2).

D.Y. Telegin points out to lack of known direct analogies to the whole complex of copper decorations of the Novodanilovka monuments in the Tripolye. Although string bracelets, copper pipe-shaped beads and ring-shaped pendants are rather common in the Tripolye complexes, barnacle-shaped decorations, made of gold, were found only in the Varna necropolis, while a number of items in this necropolis are unique [Telegin 1985b: 316-317], and most probably, they suggest early stages of local production formed under the influence of the Tripolye and directly the Balkan metallurgical traditions. E.N. Chernykh mentioned the same phenomenon, while stressing that, in his view, all items found in the Novodanilovka (the Middle Dnieper or the Dnieper-Donets, according to E.N. Chernykh) monuments, practically always were identical to the Early-Tripolye finds both in their chemical composition, and in types of some decorations, which suggested the influence of the Tripolye craft on development of metalwork among their steppe neighbors [Chernykh 1978b: 59].

An interesting idea was expressed by V. Zbenovich, who supposed that people of the Sredny Stog culture (meaning the aforementioned Novodanilovka monuments described by D.Y. Telegin) not only organized local production of copper goods of the metal obtained from the Tripolye tribes, but also disseminated it further east, up to the forest-and-steppe zone of the river Volga basin [Zbenovich 1985: 7].

In our opinion, the issue of origin of the Novodanilovka metal appears rather questionable. In 1966, E.N. Chernykh defined the Chapli cemetery metal as copper originating from the Bakhmut copper ore deposit located in the Donets river basin [Chernykh 1966: 67]. Later on, after receiving samples of the Bakhmut ore, he gave up this analogy [Chernykh 1976: 15-16], and confined himself to the statement that "scarce copper found in these (Novodanilovka-type) monuments is almost always identical to the Early-Tripolye metal both in its chemical composition and types of some decorations [Chernykh 1978a: 59], which probably should mean unquestionable proof for the Balkan origin of this metal".

In the area occupied by the Novodanilovka-type monuments, there are some more possible copper sources besides the Bakhmut deposit: the metallogenic region of the river Dnieper basin, including possible territories of the Alexandrovsk, the Vysokopolie, the Verkhovtsevo-Chertomlyk, the Sura, the Konka-Belozerka, and the Pokrovsk-Devladovo subzones; and the Azov Sea metallogenic region [Metallogenia 1974: 490-492].

2.3. CONCLUSIONS

Hence, presently available materials allow to make the following conclusions: copper metallurgy appeared on the territory of Ukraine in a ready, relatively developed form about 4500 BC, and was brought by the Tripolye tribes; the Balkans were the source region for this movement.

3. METALLURGICAL PRODUCTION IN THE EARLY BRONZE AGE

The Early Bronze Age lasted from the end of 4th millennium BC to the beginning of 2nd half of 3rd millennium BC and included the late Tripolye, the Yamnaya and the Kemi-Oba cultures.

3.1. THE LATE TRIPOLYE

The late Tripolye is presently divided into a number of local groups: the Koshilovtsy, the Tomashevka, the Zhvanets; monuments of the Kolomyishchyna, the Chapayevka, the Lukashi, the Sofievka, the Gorodsk-Kasperovka, and the Usatovo types [Movsha 1985a: 226].

Relatively large series of finds belong to only two groups: the Sophievka and the Usatovo; special studies included only these monument groups. According to those materials, E.N.Chernykh distinguished the Sophievka and the Usatovo metalwork centers [Chernykh 1978a: 64-65].

The Sofievka local group of the late Tripolye occurred on the territory of the leftand right-banks of the Middle Dnieper basin. Most of metal items were found in cemeteries: awls, flat axes, hatchets, long leaf-shaped hafted and haftless knives (Sofievka), diamond-shaped darts, long subtriangular-shaped daggers with triangular handles with holes or inlays for rivets (Krasniy Khutor), lamellar bracelets with sharpened ends, cylinder pipe-shaped beads, interlocking rings (Fig. 2: 4) [Movsha 1985a: 248]. Sofievka artisans continued to use the full range of the earlier Tripolye blacksmith's methods, developed some of them, for instance, lamination and cutting, and widely used the technique of casting into folding moulds [Ryndina 1971: 138-139]. Sofievka artisans used artificial alloys — arsenious bronzes — rarely; items made of metallurgically "pure" copper prevailed. E.N. Chernykh connected its origin to some "presently undefined region of the Balkan-Carpathians" [Chernykh 1970: 26]. Meanwhile, copper sandstones of the deposits lying in the Skvyra metallogenic area of the Ukrainian Crystalline Shield can be considered as an alternative source [Metallogenia 1974: 488].

The Usatovo local group (archaeological culture?) occupied the steppe zone of the north-western Pontic region, from the Lower Danube to the Southern Bug river. In the Usatovo settlement, a ceramic crucible was found; 67 metal items including flat axes, chisels, knives, awl, 14 daggers, spiral temple rings and pipe-shaped beads were discovered in the graves. Nine metal items were found in Mayaki; bone-handled daggers were found in the barrows near village Nerushay and village Ogorodnoye [Movsha 1985a: 251] (Fig. 2: 5).

Having accomplished metallographic testing of the Tripolye metal, L.V. Konkova observed at least three technological traditions occurring in the group. One of them is obviously related to the general tendency of development of the Tripolye metalwork and new methods of blacksmith's processing used in the early Tripolye items. This group of items also includes flat axes used as wedges, awls, beads, pendants, etc.

The second group bears evidence of certain technical recession compared to the developed Tripolye metalwork skills, and probably is connected with activities of steppe craftsmen. Main forms of metal items, new for the Tripolye, include large chisels with four-facet Caucasian-type heads, and handled daggers.

Big Usatovo daggers comprise the third group of items which are totally different in their technological characteristics (cast in a folding mould of high-quality As-bronze, arsenium surface plating) from other Usatovo items and were imported from Anatolia [Konkova 1979: 176].

In Usatovo, although a variety of blacksmith's methods worked out during the previous period, remained, goods made of the oldest artificial alloys, As-bronzes, became widely spread, first items made of Sn-bronze appeared, and the technique of casting into various folding moulds became common on the Ukrainian territory for the first time. No moulds have been found so far in the Usatovo monuments, and ideas of their usage and construction have been obtained of the basis of metallographic analyses.

The Gorodsk-Kasperovka group metalwork is represented by the Tsviklovtsi hoard including 68 metal items: 2 bracelets, 31 pipe-shaped beads, and 35 regular beads (Fig. 2: 3) [Movsha 1985a: 239], made in a traditional Tripolye blacksmith's technique of "pure" copper and arsenious bronze [Ryndina 1971: 139-140].

3.2. STEPPE TRIBES

Metalwork of steppe tribes of the Early Bronze Age is studied to a less degree than the Tripolye metalwork.

An assumption that the Novodanilovka metallurgical traditions continued in the steppe, is supported by moulds for casting axes found in post-Mariupol graves of foundry workers near village Velyka Makeyevka, the Dnepropetrovsk region, barrow group XII, barrow 2, burial interment 10 [Kovaleva et al. 1977: 20-22, Tables XV, XVI/, as well as the Samara island near Sokolovo, Novomoskovsk district of the Dnepropetrovsk region, tumulus 1, burial interment 6 [Kovaleva 1979: 64, Fig.6]. These are the most ancient burial interments of foundry craftsmen on the East European territory. The moulds discovered there were analogous to the most ancient of presently known axe moulds found in the Kura-Arax monuments of the Caucasus [Martirosyan 1964: 25-28, Fig. 1: 3; Kushnareva, Chubinishvili 1970: Fig. 40: 4, 5, 9; Munchayev 1975: Fig.30, 4-6], and in the Ezero and Nova Zagora Early Bronze settlements (Bulgaria) [Chernykh 1978a: Table 20: 6-8; 21: 10]. Such moulds were used for casting a series of axes found in the Middle Dnieper region (the so-called "Banabyuk" axes) [Korenevski 1974: 27]. Similar axes were found near villages: Grechaniki (the Poltava region), Grishintsi (the Kanev district), Gnidino (the Poltava region) [Korenevski 1974: Fig. 9: 5, 10], Zvenigorodka (the Cherkassy region; Fig. 3: 1-5). The only tested axe from this series of finds was made of metallurgically "pure" copper (Grechaniki).

Moulds found in the foundry workers' graves near Velyka Makeyevka and Sokolovo point out to local production of such axes (which are suggested further to be referred to as 'Sokolovo-type axes'). The nearest ore base for such production (judging from locations of the mould finds) could be deposits and ore displays of the Dnieper metallogenic area and, first of all, the Orekhovo-Pavlograd zone [Metallogenia 1974: 490-491].

Later, during the early Yamnaya period, a new production was developed which provided some Maykop-type versions of Caucasian axes and Group 1 and Group 4 knives [Korenevski 1978]. Metal composition, different from the Caucasian, as well as some differences in forms of items allow to speak about some steppe metallurgy of that period. However, lack of evidence is an argument against affiliating this type of metalwork with the Yamnaya tribes.

The Kemi-Oba metalwork is more recognized. The Kemi-Oba culture occupied the steppe Crimea and Lower Dnieper regions. Most of researchers tend to distinguish a certain special role played by Caucasian tribes in forming this culture [Shchepinski 1985: 331-336]. Metal articles of this culture are represented by awls, tangled knives, hatchets, chisels, an axe, and a "fork" (Dolynka) [Shchepinski 1985: 335]



Fig. 3. Moulds and axes from the Dnieper basin (the Sokolovo type). 1 - a mould, a casting ladle and a reconstruction of an axe from the grave near Velyka Makeyevka; 2 - a mould and a reconstruction of an axe from the grave near Sokolovo; 3 - Zvenigrodka; 4 - Grechaniki; 5 - Gnidino.



Fig. 4.1 — the Kemi-Oba culture; 2 — the Mikhailovka settlement; 3 — casting moulds, nozzles and ladles from the Catacomb graves found near Lugansk and Mala Ternovka.

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(Fig. 4: 1). Although all these items bear considerable resemblance to those of the North Caucasus (the Novosvobodnaya samples), a substantial number of tools manufactured of metallurgically "pure" copper of a non-Caucasian origin suggest existence of local — and rather developed — production, which E.N. Chernykh believed possible to single out as an independent metalwork center [Chernykh 1978b: 63].

The Kemi-Oba foundry workers probably received their arsenious bronzes from the Caucasus. As probable sources of "pure" copper, E.N. Chernykh suggested copper sandstones of the river Donets basin [Chernykh 1978b: 64]. Judging from the territory covered by the Kemi-Oba monuments, these sources also might have been deposits and ore displays of the Kryvoy Rog-Kremenchug zone of the Ukrainian Crystalline Shield [Metallogenia 1974: 489].

3.3. CONCLUSIONS

Hence, during the Early Bronze Age, two "spheres of influence" of two major contemporary metallurgical areas, the Caucasus and the Balkan-Carpathians, became established on the Ukrainian territory [Chernykh 1978a: 279]. The late Tripolye tribes continued to use many of Eneolithic blacksmith's traditions and mastered new techniques including complex casting into compound moulds and artificial alloys. Although having established local production, the steppe metallurgists continued to use and develop Caucasian traditions.

Up to the most recent times, opinions about the role of Caucasian metallurgy and its impact on the northern regions differed considerably from the present view [Chernykh 1966, 1978 a], and were understood as export of ready-made goods from the Caucasus to the steppe and further north. Latest investigations of the steppe metal by S.N. Korenevski [Korenevski 1974, 1976, 1978] and the Balkan metal by E.N. Chernykh [Chernykh 1978b] determined that imports were not the major factor in dissemination of the Early Bronze Age metallurgy and metalwork skills on the territory of Ukraine. Principally important was spread of special knowledge, most probably, by groups of professional metallurgists and blacksmiths.

4. METALLURGICAL PRODUCTION OF THE MIDDLE BRONZE AGE

The Middle Bronze Age, dated ca 3150–1950 BC included cultures of the Catacomb historic and cultural area, the Corded Ware cultural-and-historic entity, and the Mnogovalikova Pottery culture.

Earlier part of this period is characterized by the highest rise in production based on the Early Bronze technological methods and traditions. By the end of this period, new techniques had been developed which gained the leading position during the Late Bronze Age.

4.1. CORDED WARE CULTURE

The place of the Tripolye on the map of Ukraine was taken by the Corded Ware culture. Studies of metal articles of the Carpathian region, the Gorodsk-Zdolbitsa and the Strzyżów cultures of the Ukrainian Carpathian region, the Podolia, and the Volhynia allowed to obtain a vivid impression about the production, which the author suggested to regard as an individual metallurgical center covering all of the aforementioned cultures [Ryndina 1980].

A representative series of metal articles, found in monuments of the Corded Ware culture of the Western Ukraine and studied by N.V. Ryndina, includes the following items: round bar torques, round wire narrow-ended bracelets, spiral ear-rings, willow leaf-shaped temple rings, lamellar finger-rings, spectacles-shaped pendants, spiral pipe-shaped beads, a lancet-shaped arrow-head, wedge-shaped axes with edged side facets, daggers with leaf-like blades and holes for fastening handles to their semi-oval blade bases; a bitless fishing hook (Fig. 5: 1). Prevailing in this group were decorations common for the All-European Corded Ware culture class and synchronous Carpathian cultures.

Spectrum-analytical research showed that local artisans used Sn-bronzes, as well as metallurgically "pure" copper and As-bronzes. Metallographic investigations discovered that while having preserved the Tripolye blacksmith's skills of processing metallurgically "pure" copper and arsenious bronzes, the Corded Ware culture artisans developed a high-tech culture of Sn-bronze blacksmith's processing. Sn-bronze represented a new kind of artificial alloys and demonstrated emergence of the advanced metallurgical traditions that would gain the lead during the next epoch, in the Late Bronze Age [Ryndina 1980].



Fig. 5. 1— Corded Ware culture of the Carpathians, the Podolia and the Volhynia (after N.V. Ryndina); 2— the Middle Dnieper culture (after I.I. Artemenko); 3— the Kiev hoard.

As one of ore sources of this metallurgical center, N.V. Ryndina specified a copper deposit found near Velykiy Midsk of the Sarny district, the Rivne region [Ryndina 1980: 33]. Probably, this production could have other ore sources besides the Carpathian reserves and the Midsk deposit mentioned by N.V. Ryndina: other deposits of the Carpathian metallogenic zone, also able to supply arsenium, as well as deposits and ore displays of the Volhynia-Podolia metallogenic zone. In particular, this concerned a recently discovered Ukraine's largest copper ore deposit [Khrushchev, Galitski 1983], and deposits of the Volhynia (including Velykiy Midsk) and the Podolia metallogenic zones of the Ukrainian Crystalline Shield (the Podolia zone could also be a source of tin) [Metallogenia 1974: 481, 482, 486-487].

A large number of metal articles were discovered in the Middle Dnieper Corded Ware culture. Those were awls (Khodosovichi, Strelitsa), knives (Khodosovichi, Strelitsa), a "Kolontayevka"-type axe, another axe imitating boat-shaped stone axes; an axe made of arsenious bronze (Khodosovichi), temple rings (Dolinka, Khodosovichi, Proletariat), diadems, torques, bracelets, pipe-shaped beads (Strelitsa), socketed spear-heads (Strelitsa, Khodosovichi), a round pendant with an aperture in the middle (Ivakhny) [Artemenko 1985: 367-368] (Fig. 5: 2). Most of the items were made of arsenious bronze or metallurgically "pure" copper; two articles — a knife and a bracelet — were made of Sn-bronze [Artemenko 1985: 368]. A hoard of copper (?) decorations found in Kiev also belongs to the Middle Dnieper culture. It included a diadem, a moon-shaped pendant and three willow leaf-like temple rings [Movsha 1957] (Fig. 5: 3).

Probably, a hoard found in Starobykovo of the Chernigiv region, erroneously classed among evidence of the Srubnaya culture [Chernykh 1976; Lescov 1981], belongs to the Middle Bronze Age (Fig. 6: 1). The knife and the hatchet found there were identical to analogous Middle Bronze Age implements found in Bulgaria. Daggers (N-6-type knives), analogous to the Starobykovo dagger, were found in Ezero, Yambol, the Berekety necropolis [Chernykh 1978b: Tables 29, 6-9]. Hatchets (TD-32-type hatchets-chisels), very similar to the Starobykovo ones were found in Beloslav, and in the Emenska Peshtera hoard [Chernykh 1978b: Tables 27, 4, 5]. Similarities to the Starobykovo sickles are unknown; they are the most ancient metal sickles discovered on the territory of Ukraine up to the present. The metal composition of the hoard, metallurgically "pure" copper, is rather closely related to analogous metal group of the Middle Dnieper culture. Presence of 1% of copper in one of the sickles is not unusual for the Corded Ware culture metal implements.

A series of accidental finds of hammered luggless celts (type K-2, according to E.N. Chernykh) on the right-side Middle Dnieper region can be conditionally classed as belonging to the Middle Bronze Age. Part of them were made of Sn-bronze, while others were made of "pure" copper (Fig. 6: 2).



Fig. 6. 1 — the Starobykovo hoard; 2 — hammered celts from the Middle Dnieper basin; 3 — the Mnogovalikova Pottery culture; 4 — the Borodino hoard.

Deposits of the Skvyra metallogenic zone of the Ukrainian Crystalline Shield can be regarded as probable sources of ore for the Middle Dnieper culture [Metallogenia 1974: 488].

Socketed spear-heads alongside with the use of Sn-bronzes are an innovation of the Corded Ware metallurgists. Spear-heads from the Strelitsa and the Khodosovichi cemeteries are the most ancient cast socketed spear-heads ever discovered in Europe. According to E.N. Chernykh, casting implements with a so-called "blind" socket, together with prevailing use of Sn-bronzes, are characteristic features of a new stage in the development of metallurgy in Europe, the Late Bronze Age. In Eastern Europe, these technological peculiarities were first manifested in metallurgy of the Corded Ware tribes in Ukraine, during the Middle Bronze Age. Most probably, they appeared under the influence of the Únětice culture metallurgy.

4.2. CATACOMB CULTURE

During the Middle Bronze Age, the Yamnaya historic-cultural entity was substituted by the Catacomb historic-cultural entity which occupied vast territories of the steppe and forest-steppe zones of the North-Pontic region, stretching from the Volga river and the Caucasus foothills to the Lower Danube [Bratchenko, Shaposhnikova 1985].

E.N. Chernykh suggested that the Catacomb production should have been considered as a "rather powerful" metalwork center [Chernykh 1978b: 67].

Singling out of the Catacomb historic-cultural entity [Bratchenko, Shaposhnikova 1985] urged for a new approach to the distinguished metalwork center and reconsidering of its relations with individual cultures of the Catacomb historic-cultural entity. A.L. Nechytailo suggested uniting three metalwork centers — the Donetsk, the Azov-Crimean and the Lower Dnieper — within a framework of a single Catacomb metalwork center [Nechytailo 1988]. However, a detailed description of these centers has not been compiled yet, and researchers have to confine themselves to general classifications by cultures and separate categories of metal articles. Among the Catacomb cultures spread on the Ukrainian territory, the Donets, the Dnieper-Azov, and the Ingul cultures have been studied to the best extent.

The Donets Catacomb culture. The bulk of metal items found in burial interments of this culture consists of knives and four-facet bars (awls). Most of the knives have long leaf-shaped or pentagonal blades (widened in the upper part). Fewer are knives with wide triangular or leaf-shaped blades. During the late period, knives with abruptly widened flame-shaped upper part, often with a rest at



Fig. 7.1 — the Donetsk Catacomb culture; 2 — the Ingul Catacomb culture (after S.N. Bratchenko).

the blade's base, became more common. Short wedge-shaped hatchets, channelled chisels, narrow chisels, forks-hooks, socketed axes distinguished themselves among other bronze implements. Axe shapes also can be judged about by moulds found in burial interments of foundry workers. Up to now, about ten such graves have been discovered in this culture [Nechytailo 1988]. The most numerous groups of decorations include 1,5-2-turned bronze temple rings, spirals, rings, barrel-shaped and biconical beads, various pendants, lugged medallions. Also, there were silver beads, rings and bronze staff-like pins [Bratchenko, Shaposhnikova 1985: 411] (Fig. 7: 1).

The Dnieper-Azov Catacomb culture. Metal artifacts are rare in graves of this culture. Among them are knives, bars (awls), bronze temple rings and pendants [Bratchenko, Shaposhnikova 1985: 415]. It is also necessary to mention numerous "Kostroma-type" and "Kolontayevka-type" bronze axes found accidentally in the Lower Dnieper region [Korenevski 1976]. Burial interments of foundry artisans of this culture point out to existence of a local metalwork center [Nechytailo 1988] (Fig. 4: 3).

The Ingul culture. Metal articles are very rare in burial interments of this culture. Among them are several double-edged knives, a single-edged knife, bars (awls). Decorations include a pendant finished with a spiral ornament, and disk-shaped lugged medallions [Bratchenko, Shaposhnikova 1985: 417] (Fig. 7: 2).

Materials of other groups of the Catacomb monuments have not been systemized yet and could not be used in this paper.

Most of researchers in the domain of the Catacomb culture based their assumptions on conclusions drawn by E.N. Chernykh [Chernykh 1966]. Their gist is the following: the bulk of metal articles found in the Catacomb monuments were imported from the Caucasus; although the steppe population obviously knew metalwork, it produced practically no local forms of items, but copied Caucasian models, and made their items mainly of metal imported from the Caucasus. However, new materials and investigations by S.N. Korenevski and E.N. Chernykh proved those ideas to be too outdated. A large number of foundry workers' burial interments of the Catacomb culture, discovered up to now — much more than in other European cultures of this period — point out to a relatively high level of development of foundry among the Catacomb tribes. Research done by S.N. Korenevski showed that absolute majority of the Catacomb axes and knives found in the steppe zone were made of a metal different from the Caucasian-type. This is true not only for metallurgically "pure" copper group, which is definitely not of Caucasian origin, but also for arsenious bronzes which differed from the Caucasian type in a composition of micro-admixtures. The study proved that the Catacomb craftsmen had not copied Caucasian models, but had developed their own versions of the Caucasian types, and even original metal articles [Korenevski 1974, 1976, 1978].

Investigations conducted by E.N. Chernykh showed that arsenious bronzes which earlier had been regarded as specifically Caucasian metals, actually were the most ancient kind of artificial alloys typical for the whole Circumpontic metallurgical zone of the Early and Middle Bronze Ages. Referring to that period, one should speak not of dissemination of the Caucasian metallurgical imports, but of dissemination of the Caucasian metallurgical imports, but of caucasian original metallurgical skills [Chernykh 1978b]. All those data allow to speak of metallurgy, and not simply of metalwork, among the Caucaob tribes.

The "non-Caucasian" origin of the bulk of the Catacomb metal suggests a question of local sources of raw material. According to geological data, amounts of metal articles in burial interments, and location of foundry workers' graves, those sources could most probably be deposits of the Donetsk metallogenic region which presently is one of the most important ore bases of the republic [Metallogenia 1974: 485-486]. Explorations of those deposits dating back to the Catacomb period either have not been found yet (considering more than limited areas covered by research at ancient ore deposits of the Donets basin), or they were destroyed in the course of later explorations by the Srubnava and the Scythian tribes. For further Western regions of the Catacomb culture, ore bases could be represented by deposits and ore displays of the Kirovograd and the Azov Sea metallogenic regions of the Ukrainian Crystalline Shield, as well as by deposits of sedimentary case of the Shield in the Black Sea region and the Azov Sea area [Metallogenia 1974: 488-492]. As raw material for obtaining arsenious bronzes, the Catacomb metallurgists could have use polymetal ores of the Donets basin, primarily of the Nagolno-Petrovka subzone of the Donetsk metallogenic region [Metallogenia 1974: 485-486]. Deposits of this subzone bear traces of ancient explorations (information by S.N. Bratchenko).

Lack of metallographical investigations of the Catacomb metal makes it difficult to characterize the technical level of production of these tribes. However, considering numerous ceramic moulds found in burial interments of the Catacomb foundry artisans, and visual observations of the articles, one can affirm that during the period in question casting had been gaining importance and gradually transformed into the principle way of shaping metal items, while the role of blacksmith's work in production of most types of tools and weapons had diminished to only strengthening smithery done on the blade. Meanwhile, a rich variety of blacksmith's skills developed during the previous period continued to be used mainly in production of decorations.

Metalwork of the Yamnaya tribes of the early Catacomb period is represented by materials discovered in the upper layer of the Mikhailovka settlement. All in all, 26 different metal articles found there included awls, knives, a shaver, chisels, a hatchet, dart-heads (Fig. 4: 2). Metalwork implements: ore-grinding mortars, anvils, hammers, whetstones, a nozzle [Lagodovska, Shaposhnikova, Makarevich 1962] represent important pieces of evidence of production. Similar tools appeared artisans' graves of that period [Berezanskaya 1980: 246], which suggest relative prevalence of metallurgical knowledge among local population.

4.3. MNOGOVALIKOVA POTTERY CULTURE

At the end of the Middle Bronze Age in Ukraine, on the territories previously covered by the Catacomb and partially the Corded Ware culture, new monuments appeared, peculiar in ceramics decorated with multi-rib and drawn ornaments — the Mnogovalikova Pottery culture monuments [Berezanskaya 1986]. Metal articles of the Mnogovalikova Pottery culture are represented mostly by the late-Catacomb forms: knives, four-facet and round bars (awls), and pipe-shaped beads. Impressions about major implements can be made by articles from the Skakun, the Kolontayevo, the Rybakovka, and the Bandurka hoards, as well as numerous accidental finds. The finds included axes, long hatchets, socketed chisels, and knives. All those items were used in the Catacomb cultures [Chernykh 1966; Korenevski 1976] (Fig. 6: 3).

Metallurgical and cultural traditions different from those of the Catacomb cultures, are represented by articles of the Borodino hoard associated with the Mnogovalikova Pottery culture [Berezanskaya 1986: 12]. The Borodino (the Bessarabia) hoard included 5 metal items: three spear heads (of one of them only a socket remained), a dagger and a pin [Krivtsova-Grakova 1949] (Fig. 6: 4). One of the spear-heads was very close to fork-shaped heads of the Turbino cemetery in the Ural region both in its form and metal composition [Chernykh 1976: 45], which allowed to assume its imported origin. Other articles (made, as well as the first one, of silver-based alloys) are unique in their forms, techniques and decorations (in the so-called Mycenae style) and have no analogies among contemporary East European monuments. The fork-shaped head found in the Borodino hoard and analogous to Seyma heads, and similarity in form of another spear-head to the Seyma spear-head type allow to synchronize this hoard with monuments of the Eurasian Seyma-Turbino type [Chernykh, Kuzminykh 1987]. Those artifacts were extremely important for dealing with the issue of emergence of a new metallurgical tradition, which gained the East European lead during the Late Bronze Age. Main features of this metallurgical tradition include dissemination of Sn-bronzes and techniques of casting thin-sided socketed implements (first of all, spear- and celt-heads). E.N. Chernykh and S.V. Kuzminykh connected this phenomenon with emergence of an "original Seyma-Turbino impulse" coming from the East, or more exactly, from the Altay [Chernykh, Kuzminykh 1987: 103]. Lack of any information about such Altay center makes it difficult to consider this hypothesis and questions its demonstrability. Furthermore, the authors stressed on a typologically later character of the Seyma bronzes discovered to the East of the Ural ridge, compared to the East European finds. The origin of Sn-bronzes is unlikely to be found far in the East, considering the fact that such alloys had been used in Anatolia and the Balkans during the Early Bronze Age [Chernykh 1978b]. During the late Middle- to early Late-Bronze Age, cast socketed implements became quite common not only in Eastern Europe, but also in Central Europe where one cannot allude to the Sevma influence. As mentioned before, prototypes of the bulk of tools and weapons, socketed spear- and celt-heads, have been found in East European Corded Ware culture monuments — the fact also pointing out to local origin of the new metallurgical tradition. The four metal articles found in the Borodino hoard were made according to a Seyma-type technique, but different in form, decor, and in metal, which suggests another metallurgical tradition that occurred in Eastern Europe during the period in question, was technologically related to the Seyma tradition, but belonged to a different culture. We believe this is important for better understanding of origins of the Late Bronze Age metallurgical traditions in Ukraine, represented by the Krasniy Mayak, the Loboykovo, the Kardashinka, and the Zavadovka metalwork centers [Chernykh 1976].

4.4. CONCLUSIONS

During the Middle Bronze Age, as well as in the Early Bronze Age, two metallurgical traditions — the Caucasian and the European (or Balkan) — could be observed on the territory of Ukraine. Tribes of the Catacomb and further of the Mnogovalikova Pottery cultures continued to develop the Caucasian metallurgical tradition expressed in specific forms of metal articles, extensively used arsenious bronzes, and a rich variety of blacksmith's methods. At an early stage of their development, Corded Ware tribes made implements typical for the All-European Corded Ware environment and used techniques representative of the Balkan metallurgical traditions, although possessing some local features. However, the Corded Ware culture metallurgy had gradually attained local peculiar features which finally might have developed into a new original technological tradition that defined main trends of the Late Bronze metallurgy in Ukraine.

5. MAIN STAGES OF DEVELOPMENT OF TECHNOLOGY AND ORGANIZATION OF PRODUCTION

According to the generally accepted periodization of the Bronze Age, one can distinguish three stages of development of metallurgical technology.

1. The Eneolithic type is characterized by emergence of copper metallurgy brought to the territory of Ukraine in a rather developed form by the Tripolye tribes. The Balkans were the source region of this movement. During that period, a rich variety of blacksmith's methods were used: drawing, laminating, bending, cutting, pressing, polishing, and hot and cold smithery with series of heating and annealing procedures. At the end of that period, new techniques were learned: figure annealing in special anvils and casting, first into open moulds, and later, into closed folding moulds; also, enforcement riveting of implements' heads became more common.

E.N. Chernykh surmised existence of clan organization of metallurgists in the Balkan-Carpathian region of that time [Chernykh 1978a: 283].

Due to its technological peculiarities, metallurgy could never be a home craft in the classical meaning of this notion. It is hard to imagine every individual family researching and exploring ores, building melting furnaces, making coal, skillfully making furnace charge, and to expect them to know and use conditions of temperature regimes, accurately melt metals, make and use moulds, and finally, and produce various articles. All these factors were possible only on condition of high specialization and separation of miners and metallurgists from other members of the community. Probably, such separation accounts for relatively rare traces of metalwork in Eneolithic settlements. Meanwhile, occurrence of common technological skills, typical forms of metal articles and hoards of copper items found in the Tripolye settlements suggest existence of artisans who worked by orders, that is, of a relatively highly developed craft that had emerged with the Eneolithic.

2. Alongside with development of the Eneolithic blacksmith's processing, *the Early Bronze Age* featured wide-spread technique of casting into ceramic moulds. First artificial alloys, arsenious bronzes, became more common, as well as the oldest articles made of Sn-bronzes. Caucasian metallurgical traditions disseminated on the territory of Ukraine, primarily, in the Left-bank Ukraine, together with extensive influence of the Balkan metallurgical centers.

3. Although a variety of blacksmith's methods were in use during *the Middle Bronze Age*, casting had become especially important. During this period, a technologically high culture came into being: blacksmith's processing of Sn-bronzes, a new type of artificial alloys which gradually supplanted metallurgically "pure" copper and arsenious bronzes.

During the Early and Middle Bronze Age, metallurgical production on the territory of Ukraine rose to a new higher technological level. Geography of production grew larger, new cultural differences appeared and developed, and were manifested not only in types of metal articles, but also in different techniques, alloy recipes, and sources of raw materials. Moreover, finds of burial interments of foundry artisans mainly in the steppe cultures — with specific burial stock including moulds, nozzles, casting ladles point out to some regress in organization of production , to transformation of the production into a sort of a "family business", and higher degree of integration of artisans into kin collectives. Only at the end of that period commodity nature of metallurgical production regained its role. In particular, it was manifested by emergence of bronze hoards and moulds for weight ingots of metals discovered in a Catacomb burial interment near Malaya Ternovka of the Zaporozhye region [Kubyshev, Chernyakov 1985]. Such ingots of the same weight could only be used for trade.

Hence, the Early Bronze Age can be regarded as a beginning stage of commodity production of some bucolic societies represented by individual archaeological cultures [Klochko 1994].

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THE WEAPONRY OF THE PASTORAL SOCIETIES IN THE CONTEXT OF THE WEAPONRY OF THE STEPPE — FOREST-STEPPE COMMUNITIES: 5000–2350 BC

Considering the current level of knowledge, it is hardly possible to define accurately enough the period when warfare emerged as a social life phenomenon in Ukraine. The history of weaponry proves it originated form the Palaeolithic and the Mesolithic hunting implements which had been the oldest tools used by the man and had determined principle directions of human productive activities at early stages of development of the society. Although those implements could have been used against human beings as well, it is inappropriate to speak about warfare of that historically remote period.

Most probably, this social phenomenon emerged on the territory of Ukraine during the Neolithic in the course of development of productive activities, together with emergence of cropping and cattle-breeding accompanied by mass migration of population from Asia Minor and the Balkans, and struggle for fertile lands and pastures. Mesolithic hunter tribes had been forced out to Northern forests and swamps. Various archaeological monuments discovered on the territory of Ukraine, which belong to this period revealed articles which could be interpreted as the oldest special-purpose weaponry — maces and different types of axe-hammers made of firm kinds of stone, often of complex, and sometimes even of sophisticated forms, polished, with a drilled aperture for fastening to a haft. These weapons are often regarded as insignia of power which, however, does not exclude, but rather confirms their war fighting function. Remarkably, all those articles point out to emergence of a developed tradition of processing firm kinds of stone previously known only in the Middle East.

In the following characteristics of the weaponry, the implements from the Neolithic and Eneolithic periods are discussed together because it appears impossible to distinguish between them.

1. NEOLITHIC: 5000-3150 BC

1.1. STEPPE TRIBES

Weaponry of the steppe population of that period is best represented by materials of the Dnieper-Donets and the Sredny Stog cultures [Telegin 1985a, 1985d].

Arrow-heads. Triangular flint articles ground from both sides. Existed in two versions: with a level base: Vovnigi, Strilcha Skela, the Mariupol cemetery (Fig. 1:

11; 2: 4) and with a slightly concave base Vovnigi, Dereivka (Fig. 1: 3,12,13). *Dart-heads.* Flint articles polished from two sides:

- a) triangular level-base (Dereivka; Fig. 1: 9);
- b) triangular short-tanged (the Nikolsk cemetery, Alexandria; Fig. 1: 8). These dart-heads can be regarded as prototypes for the Seyma arrow-heads of the Bronze Age.
- c) Leaf-like long-tanged dart-heads: Petro-Svistunovo, prototypes of the Yamnaya and the Catacomb culture dart-heads.

Flat axes. Flint articles represented by a polished double-faced axe which was found in settlement Studenok 2 (Fig. 1: 1); a polished-bladed axe was found in the Mariupol cemetery (Fig. 2: 5,6); axes with polished blades and facets (Yama, the Mariupol grave, Fig. 1: 10). Flat polished axes made of firm kinds of stone were discovered in the Nikolsk and the Yama graves (Fig. 1: 7).

Hammers. The so-called "boats" can be considered as prototypes for fighting hammers. These were articles made of firm polished stone with a bored diametrical gutter, for instance, found in Vovnigi (Fig. 1: 4).

A developed, though a rather peculiar type of a fighting axe was discovered in the Mariupol cemetery (Fig. 2: 2). The sophisticated-shaped article was made of firm stone, was polished and had drilled haft hole in the middle part.

Maces. A round flattened artifact with a "collar" at the lower aperture was found in the Nikolsk cemetery (Fig. 1: 5). Cruciform maces displaying four knobs found in the Mariupol cemetery (Fig. 2: 1; 2: 3) represent the oldest finds of cruciform maces which are regarded as prototypes for the Bronze-Age Borodino-type maces.

Defensive armour. It is represented by finds in the Mariupol cemetery. Most probably, it was made of leather with plates made of polished boar fangs. The defensive armour included helmets of two types: dome-like helmets found in graves 6, 30, 74, and 83, and soft helmets represented only by broad bone "diadems", found in graves 50, 56, 86. Graves 6 and 30 revealed brest-plates — pectorals made of broad plates [Makarenko 1933].

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Fig. 1. The Dnieper-Donets culture: 1 — Studenok-2; 2 — Oskol; 3-4 — Vovnigi; 5-7 — the Nikolsk cemetery. The Sredny Stog culture: 8 — Alexandria; 9,12,13 — Dereivka; 10 — Yama; 11 — Strilcha Skela.



Fig. 2. The Mariupol cemetery: 1 — grave VIII; 2 — grave XXIV; 3 — grave XXXI; 4 — grave XXI; 5,6 — grave LI.

1.2. TRIPOLYE CULTURE

The Tripolye culture is on of major Late Neolithic cultures of Europe which covered vast territories of present-day Romania, Moldova and the forest-steppe zone of the right-bank Ukraine. Periods A and B are dated back to Late Neolithic/Eneolithic [Bibikov, Zbenovich 1985; Movsha 1985].

Arrow-heads are represented by triangular flint double-faced level-based articles (Fig. 3: 9-10).

Dart-heads are represented by flint double-faced level-based articles, usually triangular or leaf-shaped [Zbenovich 1975: 34] (Fig. 3: 4-5).

Flat axes were polished shale, or more seldom, flint weapons (Fig. 3: 7-8).

Axe-hammers include beak-hammers and rounded-butted axes. Beak-hammers are artifacts which feature elongated proportions with a long narrow face made of firm kinds of stone and furnished with a drilled hole (Karbuna hoard, settlement Okopy; Fig. 3: 11). Axe-hammers are also represented in the Karbuna hoard and in Luka Vrublevetskaya (Fig. 3: 6). A copper axe-hammer was found in the Karbuna


Fig. 3. The early and middle Tripolye culture: 1-5 — Floreşti; 6 — Luka Vrublevetskaya; 7-8 — Bernashevka; 9 — Nezvisko; 10 — Vladimirovka; 11 — Okopy.

hoard. This artifacts is a replica of respective stone weapons. V.G. Zbenovich classed some bone and stone articles among weapons [Zbenovich 1975]. Beak-hammers represent the most authentic articles among them [Zbenovich 1989: Fig. 43].

The Tripolye culture is the most ancient among Eastern European cultures which feature early stages of fortifications [Zbenovich 1975]. Local relief, in particular, plateau capes and terraces over river basins, surrounded by precipices and ravines, was used in combination with smaller man-made trenches and walls on the floor-side (Trusheshty, Khabasheshty, Polivanov Yar, etc.) [Zbenovich 1975]. V.A. Kruts offered a radically different approach to fortifications found in major Late Tripolye settlements which featured special planning of outer rows of huts representing houses-walls [Kruts 1990: 44].

It is difficult, however, to consider the principles of the Eneolithic military organization and tactics on the basis of the materials presently available. Still, observations made by N.V. Ryndina and A.V. Engovatova at the Tripolye settlement Drutsy 1 present a special interest: the settlement displayed about 100 flint arrow-heads. The settlement was located on a high cape. Major finds of arrow-heads were discovered on the edges of all huts which suggested attacks from the floor side. The attackers were people acquainted with the Tripolye arrow-making tradition [Ryndina, Engovatova 1990: 110]. Therefore one may suggest that bow was a common weapon used for storming fortifications. Relatively wide usage of flat-faced beat weapons (for instance, maces and axe-hammers) allows to argue that during the Eneolithic military action was aimed not only at physical extermination of the enemy, but also at stunning, presumably for taking him prisoner (Fig. 3: 6; 3: 11).

Materials of armaments revealed in the course of excavations do not allow to distinguish professional warriors of that period. The bulk of weapons of the period is rather simple: a bow and arrows, spear-darts, axe-hammers or beak-hammers. Eventually, the army was formed of community men. Single, often unique weapons like scepters, maces or hammers made of firm kinds of stone, perfectly polished, often of sophisticated shape, point out to emergence of chiefdoms. There are no obvious substantial differences in weaponry of major Late Neolithic cultures on the Ukrainian territory, while there are some versions of technological and cultural traditions with regard to stone processing. Military power of an individual society of that period depended more on a number of warriors than on quality of weapons and army organization.

Special niche was occupied by the Pit- and Comb Pottery cultures mostly of the forest zone [Neprina 1985]. These tribes were mostly involved in hunting and possessed only hunting weapons.

2. THE EARLY BRONZE AGE: 3150-2350 BC

At first, discovery of metallurgy did not have substantial impact on the rate of development of the historic process. However, representing an element of the technological process, this feature reflected qualitative changes which had occurred in the contemporary society.

2.1. TRIPOLYE CULTURE

The Tripolye culture continued to evolve in the right-bank Ukraine in early times of this period. However, the late Tripolye monuments differed from each other to a larger extent than the early Tripolye sites which prompts researchers to divide them into local versions and even to raise the issue of individual archaeological cultures within the framework of the late Tripolye [Movsha 1985a].

Articles of armaments are represented the most extensively in the monuments of the Usatovo and the Sofievka late Tripolye local groups; these groups display the most evident differences from the monuments of the previous period.

2.1.1. THE USATOVO GROUP

It covered the territory of the steppe North-Western Pontic region.

Arrow-heads. Alongside with traditional Tripolye heads — triangular level-based articles — the Usatovo settlement (Fig. 4: 7) revealed flint arrow-heads made in a new technique: on plates, with chopped-off edges. Some of the arrow-heads have concave bases (the Usatovo settlement; Fig. 4: 5); some, for instance, found in Usatovo, barrow 1, grave 13 (Fig. 4: 6) have level base, and some feature leaf-like shape (Fig. 4: 8). Similar technique of making arrow-heads appeared during somewhat earlier period in Central Europe, in the Funnel Beaker culture [Müller-Karpe 1974: Taf. 454].

Dart-heads. Flint triangular level-based dart-heads are analogous to dart-heads typical for the previous period and were found in Usatovo and Mayaki (Fig. 4: 4).

Flat axes. Those are represented by copper trapeziform articles (the so-called "chisels" in Usatovo, barrow 1, grave 13, and barrow 1, grave 12 (Fig. 4: 1-2). During that period, similar weapons were widespread in the Balkans and Asia Minor.

Daggers. They were characterized by a narrow subtriangular blade and a hole for fastening the dagger to a haft at the base. Two versions of daggers have been distinguished: with a blade lens-shaped in section and with a rib. A dagger with a lens-shaped blade section was found in Usatovo, barrow 1, grave 4 and had been made of As-bronze (Fig. 4: 3). This type of daggers, widespread at the Balkans and in Central Europe, is considered to be of the East Mediterranean origin and dates ca 3150 BC. Eventually, this type of metal daggers is the most ancient in Europe [Goldmann 1981]. Ribbed daggers — from Usatovo, barrow 1, grave 3 and grave 1 near Sukleya — were made of quality alloyed As-bronze and were arsenium-plated,





Fig. 4. The Usatovo group: 1 - Usatovo, barrow 1/13; 2 - Usatovo, barrow 1/12; 3 - Usatovo, barrow 1/4; 4 — Mayaki; 5,7,8 — Usatovo, settlement; 6 — Usatovo, barrow 1/13; 9 — Usatovo, barrow 1/1; 10 — Usatovo, barrow 1/3; 11 — a barrow near Sukleya.

which accounts for their silver hue [Ryndina, Konkova 1982] (Fig. 4: 9-11). Due to metal composition and technology of making, the articles may be classed among imports from Anatolia and dated ca 3150 BC.

Therefore, unlike articles of armament found in other Tripolye-culture monuments, the Usatovo weapons display similarity to a substantial amount of the Balkan and Anatolia elements. No stone axe-hammers were found in the Usatovo; though there appeared metal weapons represented by flat axes and daggers.

2.1.2. THE SOFIEVKA GROUP

Monuments of this group are located on the territory of the Kiev region. The weaponry was discovered in the Sofievka [Zakharuk 1952] and the Krasniy Khutor [Danilenko 1956] graves.

Arrow-heads. The excavation revealed triangular level-based (Fig. 5: 2-3) flint arrow-heads; arrow-heads resembling an isosceles triangle (Fig. 5: 6), and triangular concave-based arrow-heads made on plates (Fig. 5: 4-5). The two latter types are new for the Tripolye culture. Plate-based arrow-heads were mentioned above, while isosceles triangle-shaped arrow-heads are common for the Central European Funnel Beaker culture. A copper fine leaf-shaped short-tanged arrow-head was found in the Krasniy Khutor grave.

Dart-heads. A copper tanged head originates from the Sofievka grave (Fig. 5: 7).

Flat axes. The culture revealed flint flat axes with grinded blades (Fig. 5: 1). A copper axe from the Sofievka grave (Fig. 5: 8) is different from the Usatovo articles and features similarity to the Balkan axe-chisels [TD-16 — Chernykh 1978a].

Daggers. A dagger with holes used for riveting it to the "base" resembles the Usatovo articles (Fig. 5: 10), while daggers (or rather fighting knives) from the Sofievka cemetery — short-tanged, with a fine leaf-like blade (Fig. 5: 9) — are similar to a dagger found in the Pusztaistvanhaza of the Bodrogkeresztur culture [Müller-Karpe 1974: Taf. 454].

Axe-hammers. Discovered articles were made of firm kinds of stone, had polished faces and short proportions. Some of them had mushroom-shaped caps and imitations of casting seams (Fig. 6). These axes approximate axe-hammers of the Funnel Beaker culture. Their origin becomes more clear if considered in comparison with the Tripolye axes from the settlement of Troyanov of the Zhitomir region [Movsha 1985a: 237]. The Troyanov axes represent typical axe-hammers of the Funnel Beaker culture: according to M. Zapotocky, they refer to the types K VII and K VIII, characteristic of the Carpathian region [Zapotocky 1989]. The Troyanov



Fig. 5. The Sofievka cemeteries: 1.2-9 — Sofievka; 10 — Krasniy Khutor.

settlement also revealed a substantial amount of the Funnel Beaker culture ceramics which provides grounds for considering the impact this culture might have had on the late Tripolye of the Volhynia and the Kiev regions. This impact was displayed in emergence of the Central European and the Balkan types of weapons and vast dissemination of axe-hammers made of firm kinds of stone. Sofievka-type



Fig. 6. Axe-hammers from the Sofievka cemeteries: 1,3,4 - Sofievka; 2 - Krasniy Khutor.

axe-hammers appear to belong to an earlier type than the Funnel Beaker culture axes and are closer to their possible metal prototypes — copper axe-hammers of the Bodrogkeresztur culture.

Graves of the late Tripolye Sofievka group represent, for the first time, a complete set of offensive weapons including a bow, darts, an axe-hammer and a dagger, which later became the principle selection of armament for the Catacomb and the Corded Ware cultures. A large number of war-related articles in the Sofievka graves reflects a high degree of militarization of the society, most probably involved in a territorial expansion and permanent wars with their neighbors.



Fig. 7. The Globular Amphora culture: 1 — Kolosovka; 2 — Suyemtsy; 3 — Chernavoda; 4 — Mezhirechye.

With regard to this aspect, the Sofievka graves approximate some burial mounds of the Middle Dnieper Corded Ware and the Catacomb cultures.

2.2. GLOBULAR AMPHORA CULTURE

The late Tripolye of the right-bank Ukraine is immediately associated with monuments of the Globular Amphora culture, particularly of its eastern version widespread on the territory of the Podolia and the Volhynia [Sveshnikov 1985]. Finds of weapons in these monuments are not numerous and include flat flint axes peculiar for their trapeziform configuration and carefully grinded faces (Fig. 7: 1,3). An axe-hammer from Suyemtsy refers to the round-butted Tripolye type (Fig. 7: 2). A specific asymmetric leaf-shaped plate-based flint arrow-head was found in the Mezhirechye (Fig. 7: 4).

2.3. POST-MARIUPOL GRAVES

Notwithstanding a considerable number of monuments, weapons of the steppe population of the Early Bronze Age are represented rather poorly.

Special attention should be paid to finds of moulds for casting lugged axes discovered in "post-Mariupol" burial interments near the village of Mayevka of the Dnepropetrovsk region; barrow group XII, barrow 2, grave 10 [Kovaleva et al. 1977: 20-22, Tables XV, XVI] and on the Samara island in the vicinity of the village of Sokolovo, the Novomoskovsk district of the Dnepropetrovsk region; barrow 1, grave 6 [Kovaleva 1979: 64, Fig. 6]. These graves of foundry artisans are the most ancient in Eastern Europe [for more details on these graves, see an article of V.I. Klochko "The metallurgy..." in this volume].

2.4. THE YAMNAYA CULTURE

Regardless of wide territories covered by this culture and a substantial number of monuments, the study of the culture weapons leaves much to be desired. This is due to lack of weapons in graves and insufficient research of settlements. Scarce finds of articles of armaments in the graves often appear typical for some other culture. This is especially true for the late Yamnaya monuments, all of which contain the Catacomb-type weapons. This phenomenon will be discussed further in this study, while now the author suggests considering materials of the early Yamnaya period.

Dart-heads are represented by flint double-faced long-tanged articles with leaflike blades, for instance, like found in Antonovka, barrow 5, grave 7 and in Semenovka, barrow 2, grave 7 (Fig. 8: 1,3). This kind of dart-heads is common for the majority of European cultures ca 3150–2500 BC.

Heads with triangular blades and broad short tangs were discovered in Starogorozheno, barrow 1, grave 17, and in Mikhailovka settlement (Fig. 8: 2). They also occur in the Corded Ware and the Catacomb cultures. A pointed leaf-shaped dart-head from Mikhailovka settlement features a rather peculiar sample.

Axe-hammers from Mikhailovka settlement represent replica of the Sofievka axes, differing from the latter only in larger dimensions. Surprisingly big sizes of Mikhailovka hammers make them unique among other similar Bronze-Age we-apons. Most probably, those articles were not intended for daily usage, but were cult articles instead.

Daggers. A flint double-faced dagger found in Mikhailovka settlement represents a typical item of the Corded Ware culture.



Fig. 8. The Yamnaya culture: 1 — Antonovka, barrow 5/7; 2,4 — Starogorozheno, barrow 1/17; 3 — Semenovka, barrow 2/7.

A bronze dagger from Starogorozheno, barrow 1, grave 17 (Fig. 8: 4) features another unusual version of the Usatovo daggers. The latter had hafts made of organic materials, while the Starogorozheno dagger was whole-cast and had a metal haft copying the form of a wooden or a bone haft including holes unnecessary in such a case.

2.5. THE CATACOMB CULTURAL-HISTORIC ENTITY

The Yamnaya cultural-historic entity which had existed in the Ukrainian steppe was superseded by the Catacomb entity. Such a brief writing piece is unable to contain the abundance of articles of armaments in the Catacomb burial mounds of all cultures which belonged to this entity, as well as a substantial number of such graves investigated up to the present. Therefore, the Catacomb weaponry is a subject for discussion in a separate article [see an article by V.I. Klochko and S.Z. Pustovalov "The warfare..." in this volume].

2.6. CORDED WARE CULTURES

On the vast territories of the right-bank Ukraine the Tripolye culture was superseded by the Corded Ware culture which was generally synchronous with the Catacomb cultures.

2.6.1. CORDED WARE CULTURE IN THE AREAS OF CARPATHIANS, THE PODOLIA AND THE VOLHYNIA

The Sub-Carpathian culture, the Pochapy group of monuments, the Gorodsk-Zdolbitsa and the Strzyżów Corded Ware cultures occupied the territories of the Sub-Carpathian region, the Podolia and the Volhynia regions. Weaponry of these cultures is rather similar and is considered in complex.

Arrow-heads. Most common are flint triangular appertured articles with sharply protruding calks found in Rokitnoye, Rusilov, Torchin (Fig. 10: 8-9; 12: 4-5). The second type of flint arrow-heads typical for these monuments represent triangular level-based items, like those found in Klimovtsy (Fig. 10: 6). A metal lancet-shaped head was found in the Pochapy burial mound, grave 3 [Ryndina 1980: Fig. 3: 12].

Dart-heads featured two major types: flint items with short broad tangs and long pointed (Rusilov, Zozov; Fig. 10: 13; 11: 2) and short leaf-like blades (Gorodok, Ozliev; Fig. 11: 6; 12: 3).

Flat axes represent flint double-faced finished articles of two major types: trapezoid-shaped axes (Ostapie, Balichi, Krilos, Gorodok, Lotatniki; Fig. 9: 4,11,12;



Fig. 9. The Sub-Carpathian culture: 1-4 — Kavsko; 5 — Kulchitsy; 6,7,14,15 — Kolokolin; 8-11,16 — Balichi; 12 — Krilos; 13 — Lopatniki.



Fig. 10. The Podolia group of the Sub-Carpathian culture: 1 — Ostapie; 2 — Tomashivtsy; 3 — Verkhnaya Belka; 4 — Vorolivtsy; 5 — Berezhany; 6,7 — Klimovtsy; 8,9,13 — Rusilov; 10,11,15 — Belogorka; 12 — Kachanovka; 14 — Strygany (1-5 — the early stage, 6-15 — the late stage).



Fig. 11. The Gorodsk-Zdolbitsa culture: 1,5 – Zdolbitsa; 2 – Zozov; 3,6 – Gorodok; 4 – Zozov-II.

10: 1; 11: 3), as well as rounded-based axes (Zozov II, Kolokolin, Podgaytsy; Fig. 11: 4; 12: 1-2). Some of the axes had polished blades.

Axe-hammers were made of firm kinds of stone and had polished faces. Axe-hammers may be classed into several types: rounded-butted (Kavsko, Vorolivtsy, Berezhany, Malye Ilovichi, Strygany, Zdolbitsa, Cherniakhov; Fig. 9: 1-3; 10: 3-5,14; 11: 1; 12: 6) which represented a developed Tripolye tradition and differed from previous forms by their shorter proportions. Flat-butted axe-hammers were found in Belogorka, Lotatniki, Peredivanie (Fig. 9: 13). Prototypes of such axes were discovered in different layers of Ezero [Merpert (Ed.) 1979]. Axe-hammers from Tomavshitsy, Kolokolin, Balichi, Yasenovka (Fig. 9: 15; 10: 2) belong to the F-type



Fig. 12. The Strzyżów culture: 1 — Podgaytsy; 2 — Dikov; 3,4 — Ozliev; 5 — Torchin; 6 — Cherniakhov; 7,8 — the Stublo hoard.

axes of the Funnel Beaker culture as defined by M. Zapotocky [1989]. A hammer found in Balichi may be considered as a version of such weaponry (Fig. 9: 9).

Mushroom-shape-capped axe-hammers which were excavated in Balichi, Kolokolin, and Serniki (Fig. 9: 7,16) belong to the K-type of the Funnel Beaker culture, according to M. Zapotocky [1989].

Metal axes. Lugged axes were found among other articles of the Stublo hoard [Antoniewicz 1929: Abb.12]. Both axes represent versions of the Kostroma-type axes which are associated with the Ingul Catacomb culture. By its elongated tubular butt, one of them (Fig. 12: 7) resembles the Middle Bronze Age Balkan axes: T-16 and T-18, according to E.N. Chernykh. The other has a peculiar pole-axe-like face (Fig. 12: 8). The aforementioned differences between the Stublo axes suggest their local production by the Corded Ware culture metallurgists. An axe from Dereviannoye [Ryndina 1980: Fig. 1: 17] belongs to the Kolontayevka type haracteristic of the Donetsk Catacomb culture. However, axes of his type occur rather often to the West of the Dnieper as well.

Daggers. Flint leaf-like-bladed daggers, for instance, those found in Zlochev, Zdolbitsa, Krasov (Fig. 11: 5) are rather typical artifacts of the European Corded Ware culture.

Bronze daggers from Rusilov; Serniki, barrow 1, and Vysotskoye, barrow 8, with broad subtriangular blades and apertures for a haft to be fastened to a "base" represent the Central European dagger type ca 2500 BC.

2.6.2. THE MIDDLE DNIEPER CULTURE

The Middle Dnieper culture [Artemenko 1967, 1985] is represented by a large number of weapons.

Arrow-heads. Flint triangular fluted heads with broadly-positioned calks were excavated in Khodosovichi, barrow 1, grave 1, and barrow 10; Strelitsa, grave 53 (Fig. 13; 14). Level-based arrow-heads found in Strelitsa, grave 53 continue traditions of the Tripolye culture. In grave 53 of the Strelitsa burial mound, an arrow-head of equilateral triangular shape was found, which resembled arrow-heads common for the Baden culture. Flint tanged arrow-heads are represented by lancet-like articles found in Khodosovichi, barrow 10, grave 1; Strelitsa, grave 53 (Fig. 14), and triangular short-tanged heads from Strelitsa, grave 25 and grave 53, and Khodosovichi, barrow 10, grave 1 (Fig. 14; 15).

Dart-heads. Typical dart-heads were double-faced finished short-tanged articles (Fig. 15: 4). A metal dart-head with a triangular blade and a long tang was exca-



 $F\,i\,g$. 13. The Middle Dnieper culture: Khodosovichi, barrow 11/1.



Fig. 14. The Middle Dnieper culture: I - Khodosovichi, barrow 10/1; II - Strelitsa, grave 53.



Fig. 15. The Middle Dnieper culture: Strelitsa, grave 25.

vated from barrow 12, grave 1 of the Khodosovichi cemetery [Artemenko 1967: Fig. 18, 3].

Spear-heads. A cast socketed head with a leaf-like blade and asymmetrical positioned holes for fastening a shaft to the lower part of the socket (Fig. 13: 8-9) was found in Khodosovichi, barrow 11, grave 1 [Artemenko 1967: Fig. 47, 32]. It had been made of arsenious bronze. A cast copper head with a holly-like blade, open socket and two apertures in the lower part of the socket was found in Strelitsa, grave 53 [Artemenko 1967: Fig. 27]. A forged open-socketed head served as a model for a casting mould used for making this head (Fig. 14: II 19).

An arrow-head from Khodosovichi is rather similar to a cast head with a broad holly-like blade found in the village of Sukhiny of the Rzhishchev district as well as to a short-socketed head, cast — judging from its surface — in a ceramic mould which had a narrow pointed leaf-shaped blade and was found in the vicinity of Pereyaslav--Khmelnytsky, a town in the Kiev region. Those were the most ancient among metal socketed spear-heads known in Eastern Europe [Klochko 1993], similar to the Únětice culture spear-heads.

Flat axes. Excavations in Ivankovichi, Khodosovichi, barrow 10, grave 1; and barrow 11, grave 1, and Strelitsa, grave 53 (Fig. 13; 14) revealed flint trapezoid axes. Many of the axes had well-polished surfaces which might appear as a development of the Globular Amphora culture. Rounded-based axes were found in the gully of Sergeyeva Griva, barrow 2, grave 1, and the Dednoye Lake, barrow 2, grave 1 [Artemenko 1967: Fig. 29].

Axe-hammers. This type of armaments was represented by rounded-butted axes like those found in Burty, Zelenki, Gatnoye, and Stretovka (Fig. 16: 1,3-4). The Middle Dnieper axes of this type were distinguished for their short proportions and a rhomboid shape.

Axe-hammers from Zabara, Lipovets, Budkivka, and Khodosovichi, barrow 10 and 11 (Fig. 13: 30; 14: I 12; 14: II 21; 16: 2) represent F-type artifacts of the Funnel Beaker culture. A metal (bronze) copy of such an axe was found in the Khodosovichi burial mound, barrow 11, grave 1 (Fig. 13: 21). The so-called "boat-like" axes, for instance, like those found in Khirovka (Fig. 16: 5), may be regarded as a version of this kind of axe-hammers. Their peculiar feature was their pole-axe-like blade typical for the Balkan tradition [Merpert (Ed.) 1979]. An axe-hammer from Strelitsa, grave 53 (Fig. 14: II 21) features a flat butt and also represent development of the Balkan tradition. An axe-hammer excavated in Dolinka of the Monastyrshchina district belongs to the Akkermen type of the Catacomb culture.

A metal "Kolontayevka-type" axe found in the Khodosovichi burial mound, barrow 10, grave 1 (Fig. 14: I 13) most probably was imported from the areas covered with the Catacomb culture.

A flattened mace was found in the Strelitsa burial mound, grave 25 (Fig. 15: 5).

Some of the Middle Dnieper burial mounds — like Khodosovichi, barrow 10, grave 1, and barrow 11, grave 1, as well as Strelitsa, grave 25 and 53 (Fig. 13; 14; 15) — reveal several components of offensive weaponry: arrows, a spear, axe-hammers, a flat axe; or a metal axe, axe-hammer, a flat axe, and arrows; or arrows, darts, and a mace. Alongside with warrior burial mounds of the Catacomb culture, these represent the most ancient war burial mounds known in Eastern Europe.



Fig. 16. The Middle Dnieper culture: 1 — Zabara; 2 — Lipovets, barrow 266/5; 3,4 — Zelenka, barrow 343/5, 5 — Khirovka.

2.7. THE MNOGOVALIKOVA POTTERY CULTURE

The majority of weaponry of this culture is represented by the Catacomb and the Corded Ware cultures artifacts [Bratchenko 1985: Fig. 123]. Disc-shaped cheek-pieces associated with chariots may be regarded as an improvement brought in during that period.

The Borodino hoards the most distinguished among others due to a rich selection of weapons which belong to the period. The Borodino hoard's association with the Mnogovalikova Pottery culture is proved by finds of Borodino-type stone weapons in complexes of this culture.

Stone weapons of the Borodino hoard included maces and axe-hammers.

Maces. Several types of maces may be distinguished among discovered articles: globe-shaped maces, flattened-oval maces with rims at the lower apertures, and four--knobbed pear-shaped maces representing the Borodino type. Maces of all those types occurred in Catacomb monuments of the Northern Pontic region, and by the end of Early Bronze Age had been established as local types. All the maces revealed in the hoard had been made of talc shale, a rather soft stone, plastic enough to be easy to process, but lacking in strength as a weapon, which makes their possible usage as articles of armament rather dubious. Most probably, those were decorative artifacts. Intensive development of the talc shale deposits on the southern edge of the Ukrainian crystallin shield began during the Late Bronze Age, when talc shale was widely used for making casting moulds [Sharafutdinova 1985].

Axe-hammers. Three axe-hammers representing versions of the Akkerman axehammer type display a peculiar mushroom-shaped cap. As mentioned hitherto, the mushroom-shaped cap first occurred in some types of the Balkan axes and axes of the Funnel Beaker culture. During the Catacomb period, this feature was displayed on local-made axes. Actually, the Borodino type combines features of two types of the Catacomb axes: the Akkermen-type weapons and axe-hammers headed with mushroom-shaped caps. The third axe is distinguished by its broad pole-axe-shaped blade. All of the axes were made of Krivoy Rog nephrite. Metal weapons made of silver are rather rare: three spear-heads (one represented only by a socket), a dagger and a pin.

Spear-heads. This kind of weapons is represented by a head with a broad pointed leaf-shaped blade, a fork-shaped shaft, a long socket decorated with a cast ornament of triangles, three rims at the socket base and a lug. It was made of a silver--based alloy; the ornament on the socket was plated with gold. By its shape, this spear-head is similar to fork-shaped heads found in the Seyma and the Torbino cemeteries [Chernykh 1976: 45]. The other head displayed a pointed leaf-shaped blade, a powerful rib rhomb-shaped in section, a long socket strengthened by a rim at the base with turned-down lugs with holes to be fastened to a shaft. This spear-head was made of silver, the socket was encrusted with gold and decorated with a sinked ornament of zigzags, triangles and strokes. It is generally similar to the Seyma spear-heads in form; however, they vary substantially in metal composition as well as ornamentation (both with regard to subjects and ornamentation techniques). The spear head in question may be regarded as a prototype to the Golovurovo-type spear-heads of the Sosnitsa culture dated back to the Late Bronze Age. The third spear-head is represented by a socket (the blade perished), and it is similar in form and metal composition to the second head. However, its distinguishing features

are absence of lugs, presence of penetrating apertures on the socket, and sinking ornament representing a "running spiral" and summit-up triangles.

A dagger. This artifact was made of silver and encrusted with gold. The blade was cast in a folding mould with a funnel located from the pointing side. After being cast, the blade was forged, grinded, and three holes were perforated on the tang for fastening a haft. By its form and type of haft fastening, this dagger is similar to swords and daggers found in Circle B of the shaft graves [Mylonas 1957] in Mycenae, while different from the latter in ornamentation.

The Borodino hoard presents a new metallurgical and weaponry tradition which became dominating in Eastern Europe during the Late Bronze Age [for more detailed information, see article "The metallurgy..." by V.I. Klochko in this volume].

3. CHANGES OF AGRICULTURAL AND PASTORAL WEAPONRY (NEOLITHIC — EARLY BRONZE AGE)

Materials of the Early Bronze Age archaeological cultures which occurred on the territory of Ukraine point out to substantial changes in military craft during this period. Metal weaponry emerged, and alongside with efforts to realize traditional forms of stone weapons in metal, contemporary artisans developed new specific metal types of weaponry: daggers and socketed spear-heads. New kinds of military transportation means emerged, represented by four-wheel — and later also twowheel — vehicles-chariots [Cherednichenko, Pustovalov 1991].

Occurrence of a large number of weapons in burial mounds of this period reflects enhancing in significance of wars in pastoral societies' life-styles, as well as changes in economic and social structures of the societies expressed in emergence of warriors and establishment of military aristocracy.

Early stages of using a horse deserve special consideration. Many scholars refer emergence of horse-back riding in Eastern Europe to the Sredny Stog culture, argumentating their assumptions by materials excavated in the settlement of Dereivka dated back to the 4000 BC [Telegin 1986; Anthony, Telegin, Brown 1991]. D.W. Anthony dated early stages in using a horse for covering long distances and as a draught animal in harness to 3150–3000 BC [Anthony, Brown 1989]. These assumptions neglect the issues of differences between domesticated and non-domesticated equides. Two different issues are mixed in one: the issue of emergence of wheeled means of transportation and the issue early stages of using a harnessed horse, while results of special investigations in history of development of horse harness. A. Haüsler pointed out that development of wheeled vehicles should not be associated with the issue of using the horse harness, and affirmed that archaeological materials prove that only bull-drawn carriages had been used in the Neolithic and the Early Bronze Age [Haüsler 1992b].

Efforts to single out bone cheekpieces in the Early-Bronze Age materials have led to misunderstandings. Hence, I.F. Kovaleva distinguished the bone beak-hammers found in burial mounds of the Yamnaya culture in the Dnepropetrovsk region as "cheekpieces" and interpreted these burial mounds as "riders' graves" [Kovaleva 1993].

On the basis of studies conducted by N.N. Cherednichenko [1987] and new materials, one may distinguish the three principle stages of using a horse in the Eurasian steppes.

1. First period can be dated to *4th-3rd millennia BC*. The way of horse-back riding during this period remains unclear, as no information is available except the fact that by that time a horse had already been domesticated.

One can only assume that herds of domesticated horses were followed by mounted herdsmen. However, that did not mean wide-spread horse-back riding, and moreover, that did not prove emergence of cavalry as a kind of armed forces. There is also a possibility that during the period in question a horse was used in disc-wheeled cart gear similarly to the way donkeys and onagres was used for carrying war chariots in the Ancient East. Obviously, this assumption is hard to prove, as well as to negate. No authentic remainders of horse harness (that is, found on a horse's bones), and no horse graves related to this period have been discovered so far. If horse harness was used during this period, most probably, it looked like a modern halter or onagre gear common in the Ancient East. In addition to such a harness, a ring was used, which had been run through the animal's nostrils. In the East this kind of harness was in use until a new type of horse harness with cheekpieces appeared there about mid-2nd millennium BC. Presumably, such a harness was used in the steppe before cheekpieces were invented as long ago as in the first half of the 2nd millennium BC.

In general, this period should be defined as a period of herdsmen, that is, the period when horses were used by herdsmen in order to follow their grazing herds of horses. For this purpose people could domesticate new-born foals and later use them as means of transportation to follow their herds. Those domesticated horses could have been harnessed with a primitive gear similar to a halter, with no bit or cheekpieces.

A mono-axle chariot found in the Catacomb burial mound in the vicinity of village Marievka suggests that first efforts to use a horse as a draught animal may be dated by the middle of the 3rd millennium BC. However, it is important to note that M.V. Gorelik's attempt [1985] to relate the origin of chariots only to the Middle

East contradicts the archaeological materials which proves that Middle Eastern-type chariots (both bull-drawn four-wheeled vehicles on solid wheels and later versions of horse-drawn chariots on two perforated wheels) emerged — according to new information — in Eastern Europe about the end of 4th millennium BC. Early stages of development of wheeled means of transportation, including chariots, on the territory of Ukraine is dated back to that period.

2. Next period — 2nd millennium BC — differs from the previous one by emerging of a soft-bit harness with bone cheekpieces found in horse graves displaying remainders of harness. During this period, a horse was used as a draught animal. Horse-back riding continued to be of limited importance and was spread mainly among herdsmen. Emerging of cavalry as a kind of military force was practically impossible with use of soft bit, as necessary breaking-in could be done only with metal bit. Therefore, the second period is distinguished as draught, or rather, chariot stage of using a horse, and as a chariot stage of development of a steppe bridle.

3. The last stage commenced in the end of 2nd millennium BC to the early 1st millennium BC with emergence of metal bit, and has lasted till the present time. During this period, horse-back riding has become as wide-spread as the use of draught horses. Cavalry has developed into one of the main — and in some cases, the principle — kind of forces. Emergence of cavalry was likely to be brought in by economic reasons, since in the early 1st millennium BC steppe tribes passed on from settled to nomadic cattle-breeding, in which a horse was attributed a major role.

The need to protect huge herds and flocks, as well as the necessity to assimilate and capture new pastures, required an armed force which could be more mobile than chariots, easy to equip and could possess good cross-country abilities. In the contemporary conditions, cavalry alone could be such a force. From the Eurasian steppes cavalry disseminated to all other regions of the Old World as the main kind of armed forces.

Although a horse continued to be used as a draught animal, this period may be referred to as the period of horse-back riding. The period in question reflects a new stage in the development of a horse-bridle, since one may rightfully discuss emergence of a bridle after invention of metal bit.

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THE WARFARE OF THE NORTHERN PONTIC STEPPE — FOREST-STEPPE PASTORAL SOCIETIES: 2750–2000 BC (CATACOMB CULTURE)

Notwithstanding relatively good knowledge of the Catacomb society, gained by study of materials found in burial interments, no special investigation aimed at analyzing weaponry, military skills, and evaluation of political situation during the Catacomb period has been accomplished so far. Nowadays, collected materials allow to undertake such a study. This article aims at providing ethnic and cultural characteristics of weaponry of the Northern Pontic Catacomb entity; reconstructing weapons of some categories of warriors, army organization in general, and significance of war for this society.

The Catacomb society of the Northern Pontic region appears as a complex social body formed under dominance of the Ingul ethnic component. Besides this ethnos, the entity included the Eastern Catacomb population (conventionally, Donets) which lived in this territory, as well as remainders of late Yamnaya groups [Pustovalov 1990a, 1990 b]. A political, economic, religious center emerged within the area of dissemination of this ethno-social entity, on the territory between the river Molochna, the Sivash Lake region and the Krivoy Rog region. That was the place where major institutions of the society were located, including leaders' "headquarters", houses of nobility and warriors, principle sanctuaries, metalwork centers and ochre and stone supplies; also there were settlements, some of them fortified [Pustovalov 1990c, 1991]. The center was surrounded by periphery populated mainly by labor people. This periphery stretched from the Prut river in the West almost to the Don river in the East. The northern boundary lied on the conventional borderline between the steppe and the forest-steppe.

Life and activities of this complex body rested upon the early class or caste system common for Indo-European peoples, the Catacomb society being one of them [Abayev 1972: 26-37]. The upper caste was the Ingul ethnos; the Eastern Catacomb (conventionally, Donets) people comprised the middle caste, and remainders of the Yamnaya tribes belonged to the lower caste. Each of the castes, or ethno-social groups, featured considerable degree of caste inequality — more typical for the Ingul population than for the others. Ascent to an upper caste was strictly regulated and possible only according to certain rules (for men, mainly for war merits, for women by marriage) [Pustovalov 1990b].

Features of the class-caste system discovered in the Catacomb society and the revealed ethnic characteristics allow complex consideration of the issues of army organization and weaponry. Statistics used in the article are based on a large number of catacomb burial interments investigated on the territory of the Northern Pontic region (over 1200 burial mounds, according to a condition of fortuity). Data about the Yamnaya burial interments are based on published information on the Southern Bug river (931 graves) [Shaposhnikova, Fomenko, Dovzhenko 1986].

1. CHARACTERISTICS AND DATING OF CATACOMB WEAPONRY

1.1. THE INGUL CULTURE WEAPONRY

Bow and arrows. No bows have been found in the Ingul graves up to the present. Quiver sets were discovered in the Kovalevka (group 8,1/15) and the Zamozhnoye (5/4-5) graves [Kovpanenko, Chernykh 1984; Otroshchenko, Pustovalov 1991a]. Scarce finds of individual arrows were, most probably, evidence of wounds. Those were small deep-fluted arrow-heads with a pointed leaf-shaped blade. In most of the cases their calks were bevelled toward the shaft which accounted for their leaf-like shape, common for all arrows of the Catacomb period. This shape made them different from sharp-calked triangular arrow heads of the Yamnaya and the Corded Ware cultures. Examples of the Ingul arrows were found in the Zavod Vysokovoltnoy Apparatury, grave 19, and the Vinogradnoye, 32/10; 19/8 graves (Fig. 1: 9-15).

Darts. This kind of weaponry is very rare in the Ingul burial interments. An example of a dart-head, a small pointed leaf-shaped flint article with no clearly outlined tang was found in the barrow at Risovoye, 5/39b (Fig. 2: 7).

Sling. This kind of missile weaponry is represented by sling-stones found in Zamozhnoye, 8/1; Tselinnoye, 1/25; and Filatovka, 12/2. Generally such finds are rather rare, as well as other kinds of missile weapons.

Axe-hammers. This is the most common category of finds in the Ingul warriors' graves. This kind of weaponry is represented by types wide-spread in practically all



Fig. 1. Axes and arrows of the Ingul culture: 1 — Zamozhnoye, 8/1; 2 — Rakhmanovka, 4/13; 3 — YUGOK-65, 2/18; 4 — Shirokoye, 3/16; 5 — Zamozhnoye, 5/2; 6 — Zamozhnoye, 5/7; 7 — Vinogradnoye, 31/6; 8 — Orlianka, 3/9; 9-10 — ZVA, g.19; 11-13 — Vinogradnoye, 19/8; 14,15 — Vinogradnoye, 32/10.



Fig. 2. Axes and maces of the Ingul culture: 1 — Gorozhenko; 2 — Zamozhnoye, 2/9; 3 — Gr.6 km, 2/2; 4 — Martynovka, 1/7; 5 — Tselinnoye; 6 — Baratovka, 2/18; 7 — Risovoye, 5/39; 8 — Vinogradnoye, 3/36; 9 — Filatovka, 12/2; 10 — Menchikury, 1/29.

European fight-axe cultures. However, according to typology of axe-hammers, the Funnel Beaker culture in its early Central European stages of development, was the most similar to the Ingul culture.

Although every item is unique, the Ingul axes can be classed into two types: axehammers (AH) and axe-hammers with salient mushroom-shaped cap (AHS). Two subtypes can be distinguished within the AH-type: elongated (AHE) and shorter axe-hammers (AHSh). The AHE were found in the Zamozhnoye, 8/1; the YUGOK--65, 2/18; the Rakhmanovka, 4/13, and the Shirokoye, 3/6 graves. These articles were similar to axe-hammers of the Funnel Beaker culture, as defined by M. Zapotocky [Zapotocky 1989: 95-103]. AHSh are represented by finds in the graves of Zamozhnoye, 5/2; Gr.6 km., 2/2; Martynovka, 1/7; Tsylinnoye, 16/9; Baratovka, 2/28; Vinogradnoye, 31/6; Orlianka, 3/9; Gorozheno; Zamozhnoye, 2/9, 5/7 (Fig. 1: 5-7; 2: 1-6). Axes of this subtype are similar in general form to the G-type axes of the Funnel Beaker culture, though truncated proportions make them more close to axe-hammers of the Ukrainian Corded Ware culture.

Axe-hammers of the AHS type also split into two subtypes: elongated (AHSE) and shortened (AHSS) axes. The AHSE were found at the Zavod Vysokovoltnoy Apparatury, Grave 19; Staroobgdanovka, 1/4; and Orlanka, 4/9; and the AHSS were observed in Limantsy, 7/11 (Fig. 3: 1-4). By their general forms and mushroom-shaped caps, all of those axes were common to K-type axe-hammers of the Funnel Beaker culture of Central Europe [Zapotocky 1989]. However, the Ingul axes were peculiar for their high quality of surface finishing and firm facets outlining "shoulders" of the articles.

Axes from Vinogradnoye, 33/4, and Zlatopol, 25/15 (Fig. 3: 5,6) belonged to the types specific for the Corded Ware cultures of Ukraine, and, most probably, represent imports to the area.

Engraved ornamentation is another specific feature of the Ingul-culture axes, especially of axe-hammers. All those axes were made of very firm kinds of stone, porphyrite-diabase [Sharafutdinova 1980]; despite the difficulties in processing such firm stone, the articles were decorated with very sophisticated ornaments. Such a difficult, almost jeweller's stone-processing technique is not typical for the European cultures. This fact prompts to look for a solution in other regions. By the quality of stone processing, the Ingul axes can be compared only to known Anatolia axes from Troy II and the Dorak grave (Fig. 4: 1-6) [Mellart 1966: Pl.XXII]. Probably, it was the Anatolia impact that accounted for emergence of engraved ornaments on the Ezero axes [Merpert (Ed.) 1979: Fig.104,105]. All of those axes were made of firm kinds of stone and are remarkably well-done. They were all axe-hammers, and some of them had mushroom-like caps. N.Y. Merpert explained their emergence in Ezero by influences of the Funnel Beaker culture [Merpert (Ed.) 1979: 170, 172]. However, M. Zapotocky pointed out that emergence of the axe-hammers in



Fig. 3. Axes of the Ingul culture. Darts and arrows of the Donetsk culture: 1 — ZVA, g. 19; 2 — Starobogdanovka, 1/4; 3 — Orlanka, 4/9; 4 — Limantsy, 7/11; 5 — Zlatopol, 25/15; 6 — Vinogradnoye, 33/4; 7 — V.Belozerka, 4/4; 8 — Akkermen, 4/1; 9 — Novochernomorye, 7/5; 10 — Zamozhnoye, 4/7; 11 — V.Tokmak, 2/13; 12,13 — Vinogradnoye, 24/22; 14,15 — Akkermen, 6/9.



Fig. 4. Weapons from the Donetsk monuments and their analogies: 1-3 — the Dorak grave; 4-6 — Troy II; 7 — Akkermen, 8/7; 8 — Staromikhailovka; 9 — Zhdanov (Mariupol) museum; 10 — Lugansk; 11 — Kherson museum; 12 — Vinogradnoye, 24/22; 13 — Zlatopol, 7/20; 14 — Akkermen, 14/7; 15,16 — Riasnye Mogily, 5/17; 17 — Akkermen, 9/4-6; 18 — Lysiy Kurgan, 36; 19,20 — Frunze, 8/4

the Funnel Beaker culture had occurred under the Balkan and the Middle East impacts [Zapotocky 1989: 101]. Most probably, M. Zapotocky was right. For us it is important to know that during 4th millennium BC stone axe-hammers were wide--spread in the Balkans and Central Europe, and, that during that period prototypes of the Ingul axes have been discovered in the monuments of the Balkans and the river Danube basin.

Metal axes. In the Ingul culture, axes are represented by socketed elongated (often bent in a sickle-like curve) broadened toward the blade articles of the "Kostroma"-type, as described by S.N. Korenevski [1976] who provided a rather reliable definition of them as belonging to the Catacomb period. The bulk of axes of this type was discovered in the Lower Dnieper basin: in the vicinity of Krivov Rog, Tarasovka of the Yekaterinoslav district, Ulianovka, Elanets district of the Nikolayev region (a hoard), Kamenko-Dneprovsky district of the Zaporozhye region, the Kirovograd region, Kapulovka of the Nikopol district, the city of Krivoy Rog, Crimea, Mikhailovka of the Khortitsa volost, Rybakovka of the Odessa region (a hoard) [Korenevski 1976: 18-19], the city of Kherson [Tallgren 1926: Fig.989], from a collection of A.Paul (No 41-45), from the Kherson region, a collection of Alexevev (the State Ermitage, 93/8), a hoard in the barrow near Alexandrovka in the Orel-Samara river basin [Kovaleva 1981: Fig.5] (Fig. 5: 11-15). An elongated sickle-shaped face differentiates the "Kostroma"-type fighting axes from all other European axes of the 2nd half of 4th millennium and the 1st half of 3rd millennium BC and has similarities only among fighting axes originating from the Middle East. Meanwhile, the socket shape acts as a differentiating feature and proves these axes to be unique articles. In general, the origin of this type of axes remains rather vague. Finds of axes of this type in hoards together with the "Kolontayevka"-type axes (see below) suggest their rather long co-existence in the Northern Pontic region.

Maces. This category of finds is not numerous in the Ingul monuments. A cruciform mace was found in the barrow near Vinogradnoye, 3/36 (Fig. 2: 8). Globe-shaped maces were discovered in Filatovka, 12/2; Menchikury, 1/29; V.Tokmak, 1/9 (Fig. 2: 9,10). Maces have never been found in complex with axe-hammers. Cruciform maces represent a relatively rare type which seldom occurred in Eastern Europe beginning with the Eneolithic (the Mariupol cemetery). Globe-shaped maces found in the Ingul monuments belong to common Central European types. They are assumed to originate from the Middle East and disseminate in the Balkans and adjacent East European regions since the 1st half of 4th millennium BC [Berounska 1987].

Transportation vehicles found in the catacombs represented war implements [Cherednichenko, Pustovalov 1991]. Most probably, the Ingul burial ritual did not require a whole chariot or a cart to be put into the grave. However, central parts of wheels which were used as a door to close the cell entrance, occur rather often,



Fig. 5. The Catacomb maces and metal axes: 1 — Novocherkassk, 2/11; 2 — Pokrovskoye, 205/6; 3 — Kudinov, 1/9; 4 — V.Tokmak, 2/13; 5 — Voroshilovgrad (Lugansk); 6 — Kramatorsk; 7,9 — the Kolontayevka hoard; 8,10 — the Skakun hoard; 11 — the Kirovograd region; 12 — Kapulovka; 13 — Krivoy Rog; 14 — the Rybakovka hoard.



Fig. 6. Reconstruction of a chariot from grave 27 of the barrow 11 at the village of Marievka of the Zaporozhye region [S.Z. Pustovalov].

for instance, in Zamozhnoye, 5/2,4-5; 6/3, etc. Due to their specific construction (Fig. 6), these wheels are regarded as similar to those of Middle Eastern mono--axle chariots which had been widespread there since the end of 4th millennium BC [Gorelik 1985].

1.2. WEAPONS OF THE EAST CATACOMB TRIBES

Bow and arrows. Up to the present, bows were discovered in the following "Donetsk" graves: Akkermen, 2/3, 6/3, 12/4, 17/4; Vinogradnoye, 24/22; Stratilovka, 6/7; Frunze, 4/8. Although ill-preserved organic parts did not allow to define precisely the types of these bows, their dimensions — length 130-90 cm, width 2,5-6 cm, thickness 1 cm — prove those were compound bows. These finds may be regarded as another argument in favor of our thesis that compound bows appeared in Eastern Europe ca 2750 BC [Kośko, Klochko 1987].

Arrow-heads. Small flint arrow-heads, mostly leaf-shaped and deep-fluted, were found in Vinogradnoye, 24/22; V.Tokmak, 2/13; Akkermen, 6/9, 14/7; Riasnye Mogily, 6/17; Novochernomorie, 4/17; Solenyi, 1/6; Frunze, 8/4 (Fig. 3: 11-15; 4: 14-16,19,20). All of those arrows were typical for the Catacomb culture. In some of the "Donetsk" graves, in particular, in Lysiy Kurgan, g.36; Akkermen, 9/4-6, researchers discovered level-based triangular arrow-heads (Fig. 4: 17,18) typical for the Corded Ware culture found on the territory of Ukraine.

Arrow shafts are usually preserved badly. According to S.N. Bratchenko, their dimensions were: 45-60 cm long, and 4-6 mm thick [Bratchenko 1989a: 77-78]. Quiver sets included 10 to 20 arrows. Quivers were flat, elongated, 40 to 75 cm long and 8 to 12 cm wide. They were made of wood and leather (Zhelobok, 3/1; Kominternovskoye, 4/4; Voytove III, 4/10). Buckle sticks found in the Nikolayevka grave 7/8 in complex with 18 socketed arrows [Bratchenko 1989a: 80] point out to the fact that the quivers had had valves which would cover the mouth and had been locked by such a buckle. Quivers of this design were known in the Achemenidian Iran and among the Scythians of Ukraine during the Early Iron Age [Klochko 1977: 47-54].

Axe-hammers. This kind of weapons comprise a relatively scarce category of finds in the "Donetsk" graves which represent a part of the Northern Pontic group. Most of them, including Noviy Aksai, 8/6; V.Belozerka, 4/4; Khriashchevsky, 1/3; Lysiy Kurgan, 3/10; Donskoy, 5/29 [Bratchenko 1976: Fig. 26] belong to the types common for the Corded Ware culture in Ukraine, primarily, the Middle Dnieper and the Sub-Carpathian cultures. An axe from Zlatopol, 7/20 (Fig. 4: 13) is associated with the Ingul axe-hammer type (AHSh). Due to their elongated proportions and broadened pole-axe-shaped blades, axe-hammers from Akkermen, 8/7; Staromikhailovka; the Zhdanov museum; the Kherson museum; Lugansk, 3/3; Vinogradnoye, 24/22 (Fig. 4: 7-12) are singled out as a special type. There were efforts to associate these implements with the Borodino-type axes. However, S.N. Bratchenko pointed out to inadequateness of such analogy and argued that the Akkermen'-type axes (and we suggest that this definition be used as the type-name) referred to an earlier period [Bratchenko 1976: 144]. The Akkermen-type axes represent a developed version of the Troy-type axes: Troy II, the Dorak grave, being different from the latter only in smaller sizes and absence of decorations. However, an Ingul axe from a grave discovered in the vicinity of Rakhmanovka, 4/13 (Fig. 1: 2) bears relatively rich decor. The Akkermen-type axes represent yet another Anatolia element in the Catacomb cultures of tribes that once populated the territory of Ukraine. The Rakhmanovka find proves that axes of this type were used both by the Donetsk and the Ingul warriors. The Borodino-type axes represent further improvement of this line at the later final stage of the Catacomb — the Mnogovalikova Pottery culture. They feature a mushroom-shaped cap typical for the Balkan and East European axes since the beginning of 4th millennium BC including axes from Ezero [Merpert (Ed.) 1979] and the Funnel Beaker culture. Hence, the Borodino axes may be regarded as a syncretic type combining features of East Mediterranean and Central European weapons.

Metal axes. The Donetsk culture is represented by the "Kolontayevka"-type axes [Korenevski 1976: 19-23]. The area covered by these axes generally corresponds with dissemination of the "Kostroma"-type axes and includes the Middle and the Lower
Dnieper basins. Furthermore, numerous articles have been found in the Lower Don and Donets basins. Finds of moulds in the graves of Kramatorsk (grave 1) [Bratchenko 1976: Fig. 22,4] and Voroshilovgrad [Bratchenko, Shaposhnikova 1985: Fig. 109, 16] (Fig. 5: 5,6) may be used as an argument for local production of such axes by the Donetsk foundry specialists. An axe of this type was discovered in a Catacomb grave near Privolnoye [Bratchenko, Shaposhnikova 1985: Fig. 109,9]. Co-existence of the "Kostroma"-type and the "Kolontayevka"-type axes is suggested by finds in the hoards discovered at Skakun of the Kursk region and Kolontayevka of the Kharkov region [Krivtsova-Grakova 1955: Fig. 35, 1-11] (Fig. 5: 7-10).

A rich variety of forms of the "Kostroma"-type and the "Kolontayevka"-type axes points out to relatively long evolution of these implements in the Northern Pontic region. Although emergence of socketed axes in Ukraine is traditionally associated with the Northern Caucasus, archaeologists have questioned this assumption for quite a long time. Typological predecessors of the "Kolontayevka"-type axes are the "Novosvobodnaya"-type [Korenevski 1974: 14-22], or the Maykop group-III axes. A ceramic mould for making such axes — by the way, the only in the Northern Pontic region known up to the present — was found in the Catacomb burial mound near Prishib of the Lugansk region [Bratchenko, Shaposhnikova 1985: 409]. It has an open "belly" which is typical for the most ancient moulds used for making lugged axes in the Black Sea region [Chernykh 1978a: 136]. Such axe was found in a Kemi-Oba grave near Dolynka, the Krasnoperekopsk district of Crimea [Korenevski 1974: 24, Fig. 8,7]; the metal of the axe and other similar finds differed from that used in the Caucasus, which enabled S.N. Korenevski to raise the issue of independent metal production in the steppe, though under the Caucasian influence.

The mould from the Prishib grave is analogous to moulds discovered in VI-IV levels of Ezero [Merpert (Ed.) 1979, samples 108, 109]. One of these moulds was made of clay, the two other were made of talc shale; these are the most ancient stone moulds known in Europe. Levels VI-III of Ezero are synchronized with Troy I [Merpert (Ed.) 1979: 533].

The Novosvobodnaya implements are not the most ancient Balkan-type lugged axes known on the territory of Ukraine. The oldest of known axes belong to the "Banabyuk" type [Korenevski 1974: 27]. Moulds for this kind of axes were found in the Eneolithic (elongated, pre-Yamnaya) burial interments at Mayevka and Sokolovo of the Dnepropetrovsk region [Kovaleva, Volkoboy, Larina 1977: Tables XV-XVI; Kovaleva 1979: 64, Fig.6]. This allows to assume that southern Ukrainian tribes established relations with the Balkans and Anatolia from the 2nd half of 5th millennium BC, and that solution of the issue of origin of both Catacomb metal axes and the Catacomb culture in general lies within the framework of these relations.

Maces. The Donetsk monuments feature typical kinds of globe-shaped and pear-shaped maces discovered in the graves of Khriashchevsky, 1/3; Akkermen, 6/3;

V.Tokmak, 2/13; Kudinov, 1/9; Novocherkassk, 2/11; Pokrovskoye, 205/6 (Fig. 5: 1--4). Also, there were several single finds of the Borodino-type maces. As mentioned above, in general those were Middle-Eastern-type armament articles which had emerged in the Northern Pontic region in the Eneolithic (the Mariupol cemetery).

Means of transportation. Four-wheel means of transportation are represented in all Donetsk Catacombs, except for one. The oldest mono-axle chariot was found in grave 27 of the barrow 11 in the vicinity of the village of Marievka, the Zaporozhye region. The vehicle had a whole lower part of the body; light lath sides were fastened thereto. The chariot's detachable front was slightly bent down. The vehicle was found in a two-chamber Catacomb of total capacity of 44 cubic meters, the grave of an adult man with two dismembered skeletons and a skeleton of an adolescent lying by the chariot [Cherednichenko, Pustovalov 1991] (Fig.6).

In general, the Donetsk monuments contain more variations and different typed of armaments than the Ingul monuments. In our view, this is due to peculiar genesis of the Donetsk monuments which had existed for quite a long period. Available characteristics and typological comparison suggest the following conclusions. First, several categories may be distinguished within the analyzed materials:

- a) properly Catacomb types, to a certain extent strictly differentiated between the East-Catacomb and the Ingul areas;
- b) East- and Central European Corded types;
- c) Anatolia types.

Since progressive forms of weaponry were borrowed by tribes of certain cultural levels very quickly, armaments may be regarded as a reliable chronological benchmark. Therefore, taking into consideration parallels that existed in the cultures of Funnel Beaker culture, Troy II, the Dorak grave, Ezero, as well as construction of wheels, one may assume that the East-Catacomb and the Ingul populations appeared in the Northern Pontic region simultaneously.

2. ETHNO-SOCIAL CHARACTERISTICS

As described hitherto, the implements of the Catacomb burial interments include carts, their details or symbols (stings), metal and stone axes, stone dart-heads, arrow-heads and sling-stones.

Let us see how these kinds of armaments are represented in individual ethnic groups of the Catacomb ethno-political entity. Besides the aforementioned differences in kinds of weapons, individual ethnic groups varied largely in spread of particular articles (Table 1).

TABLE 1: OCCURENCE OF KINDS OF WEAPONS IN ETHNIC ARRAYS (%)									
kind of weapon	amount	wheel, chariot	axe	mace arrows	axe arrows	bow, arrows	spear, dart	sling	% of weapon- containing graves
ethnic array		%	%	%	%	%	%	%	%
amount	118	19	31	19	6	17	24	2	
Ingul	63	19,1	38,2	17,6	4,4	11,8	5,9	2,8	15,2
East Catacomb	33	12,1 11,8	15,2	21,2	9,1	24,2	18,2	-	5,4
Late Yamna	17		-	-	-	5,9	82,3	-	1,8
				Ten	dency				
Ingul		1,3	2,1	1,4	1,0	0,8	0,2	3,0	
East Catacomb		0,9	0,9	1,6	2,0	1,7	0,7	0,5	
Late Yamna		0,8	-	_	-	0,5	2,3	-	

Although two- or four-wheel chariots in both Catacomb and the Yamnaya arrays, they are more common for the Ingul graves. In the analyzed array, no carts occurred in the late East Catacomb burial mounds. Same phenomenon is observed in spread of axes (Table 1). Slings were found only in the Ingul graves. Maces are common both for the Ingul graves, and, in particular, for the East Catacomb monuments. Axes with arrows and single arrows are represented in middle level of the Ingul graves.

The bulk of weaponry common for the East Catacomb population include a bow and arrows, an axe and arrows, and a mace. The occurrence rate of an axe in combination with a chariot is within norm. Although more scarce than in the Yamnaya graves, spear-heads account for 18,2% of all finds. Dart-heads represent the only kind of weapons typical for the Yamnaya tribes (82,3%). Absolute majority of single arrow-heads found in the Yamnaya graves should be regarded as results of wounds. They have been found (often only their remainders) among the skeleton bones (for instance, in Babenkovo, 1.21; Tankovoye, 9/24; Staroye, 14/24 [Shchepinski, Cherepanova 1969]. Some features suggest relatively late character of such Yamnaya graves.

TABLE 2: DISTRIBUTION OF KINDS OF WEAPONS IN THE INGUL AND EAST CATACOMB GRAVES ACCORDING TO SOCIAL RANKS								
kind of weapon	amount	wheel, chariot	axe	mace & arrows	axe & arrows	bow, arrows	spear, dart	sling
social rank		%	%	%	%	%	%	%
amount	68	13	3	12	26	8	4	2
1st rank	16	50	12,5	6,3	25	6,3	-	-
2nd rank	20	25	5	30	30	10	-	-
3rd rank	32	-	-	15,6	50	15,6	12,5	6,3
			Tende	ency: INGU	L			
1st rank		2	2,1	0,4	0,7	0,6	-	-
2nd ranka		1	0,9	1,7	0,9	0,9	-	-
3rd rank		-	-	0,9	1,4	1,5	3	3,0*
			%: EAS	T CATACC	MB			
amount	33	4	3	7	5	8	6	-
nobility	8	12,5	_	37,5	25	12,5	12,5	
common	25	12	12	16	12	28	20	
		Te	ndency: E	AST CATA	COMB		-	-
nobility		1	_	1,4	1,4	0,6	0,8	
cammon		1	2	0,6	0,6	1,4	1,2	
* In three cases, sling stones were found in complex with arrow-heads, an axe and a mace (not included in this case)								

Therefore, each ethno-social group possessed its specific kinds of armaments. However, only complex investigation of the three ethno-social groups provides an appropriate system. Considering weapon-containing Ingul burial interments from the point of view of rules of ascent to an upper caste, it is important to note that a considerable number of them (up to 25%) have the East-Catacomb, or even the Yamnaya features including oval or rectangular shaft, writhed position of the body on the side or supine position, and occupance of funeral food; for instance, in Risovoye, 5/39b [Shchepinski, Cherepanova 1969]; Zamozhnoye, 5/2 [Otroshchenko, Pustovalov 1991a], Baratovka, 2/18 [Sharafutdinova 1980]. Simultaneously, the amount of late East Catacomb graves with weapons substantially decline to 3,4%. Transition to an upper caste can also explain rather high percentage of East Catacomb burial

mounds containing dart-heads, typical for the Yamnaya tribes. Meanwhile, in the late Yamnaya graves weapons occur only in 1,8% of cases.

Speaking about preferences in different kinds of weapons among the three ethnic groups which comprised the Northern Pontic ethno-social entity, one should keep in mind that for the Yamnaya and the East Catacomb cultures such a hierarchy was not definite enough and it occurred evidently only in the Ingul array.

For the late Yamnaya burial interments, according to criteria established by N.D. Dovzhenko and N.V. Rychkov, only remainders of transportation vehicles are likely to have a definite tendency to occur in the nobility graves. Arrow-heads and dart-heads occur mostly in graves of people who belonged to the lower social layer [Dovzhenko, Rychkov 1988].

Similar tendency is observed in the East Catacomb area (Table 2). No individual category of armament is definitely associated with a particular social group. The amount of war transportation vehicles and spear-heads represented in different graves does not exceed the average both in graves of nobility and those of ordinary warriors. According to a common tendency, only a mace (or a mace in combination with arrows) and an axe are typical for the nobility burial interments, while an axe with arrows and a bow occur rather more often in graves of common population. It is evident that warriors do not enjoy a special position in these ethno-social groups. Articles of armament do not represent the major feature of nobility graves, but act as evidence of property qualifications of the buried. During formation of the ethno-political entity, the military caste in the East Catacomb society was on early stages of its development. Grave 27 from barrow 11 discovered in the vicinity of the village of Marievka [Cherednichenko, Pustovalov 1991] may be regarded as a typical example of this phenomenon. Meanwhile, for the Ingul ethno-social array articles of weaponry represent the most obvious feature of the nobility graves. None of various kinds of weapons equally often occur in burial interments of different social layers of the noble. Hence, a wheel, a cart, an axe and a mace in combination with arrows are typical for the highest rank of the Ingul nobility and occur within norm in burial moulds of the second-ranking nobility.

A mace or an axe, or arrow-heads and sling-stones are common for graves of warriors of all social layers. However, a mace is more typical for graves of representatives of the second social rank, while an axe or arrow-heads suggest the burial interment of the third rank. Dart-heads occur only in graves of the latter. Correlating this information with data obtained in the course of developing ethnic characteristics, one may conclude that articles of armaments typical for higher social layers of other Northern Pontic ethno-social groups, in the Ingul group tend to represent lower castes of warriors. Therefore, warriors who had reached a higher social group comprised only the lowest layers of the latter. Occasionally they reached higher stages of social hierarchy. Therefore, a social distance between different ethnic groups of the Northern Pontic entity continued to exist after a transfer to a higher caste. Exceptions were possible only for chiefs — rulers, but these graves account for only a few cases for the whole array.

3. ARMY ORGANIZATION OF THE NORTHERN PONTIC ENTITY

Study of ethnic and social characteristics of the Catacomb and the late Yamnaya Northern Pontic arrays provide for general reconstruction of a system of army organization of this entity.

Presumably, individual kinds of forces were formed according to ethnic features, but in the process of development of the class-caste system, a certain part of warriors ascended from lower ethno-social groups to the higher group which brought in some departure from the original structure. Better and most effective weapons had been used by higher social layers of population of each of the three arrays, but gradually the best weaponry was concentrated in hands of the Ingul nobility which included the top representatives of other ethnic groups. This category of warriors used chariots on the battle-field acting as the main offensive force comparable in their function to tanks [Gorelik 1985: 183]. Chariot riders were armed with various weapons: bows, axes and maces. Obviously, this category used metal articles of armaments. Such weapons are represented on the Kernosovka "stela" [Krylova 1976]. Although the author dated it, as well as the Natalievka "stela", by the Eneolithic, it should be referred to the Early Catacomb period according to a selection and types of weaponry.

In the Ingul monuments, chariots occurred in 20-25% of all graves containing weapons. It is too much if, supposedly, the army were formed only of the Ingul population. However, since the army of this ethno-political entity also included groups of the East Catacomb and the late Yamnaya population, the real percentage of chariot riders among the population was substantially lower.

The bulk of the army consisted of infantry of two kinds:

- a) armed with flint-headed darts;
- b) armed with stone axe-hammers.

Besides the major weapons, the infantry had bows, maces, and possibly, slings. The first kind of infantry had been formed mainly of the East Catacomb and the Yamnaya population, while the Ingul population comprised the second kind.

Probably, a certain part of forces was armed with bows and slings and acted in avant-guard of the armed formation. Occurrence of defensive installations in the Catacomb settlements (for instance, Mikhailovka, etc.) suggests existence of adequate assault devices.

Composition of the Northern Pontic forces resembles the structure of Middle Eastern armies. This analogy is based upon profound grounds, as the whole Catacomb entity, and especially the Ingul culture, has extensive parallels with materials of that region [Klein 1968; Erdniyev 1982; Pustovalov 1990a]. Dating of the oldest Catacomb graves according to metal axes allows to use the structure developed by the Sumerians as a model of army organization about the mid of the 3nd millennium BC. This structure remained in the Middle East with minor improvements till the beginning of the 1st millennium BC [Diakonov 1983a]. In the Sumerian army, four-wheel chariots acted ahead of a line of heavily-armed infantry. A people's voluntary corps was deployed in the rearguard. The most typical army formation was a phalanx with the first line of warriors armed with spears, and the second line armed with axes. In the scattered formation, separate detachments consisted of archers, spearmen, and warriors armed with fighting axes [Diakonov 1983b]. As we see, the first kind of formation resembles the Yamnaya forces, and the second kind is more similar to the Catacomb, particularly the Ingul formation.

The fact of using the people's voluntary corps in important battles fought by the Catacomb army is supported by the following calculations. Articles of armaments occur in average 10% of graves. Meanwhile, Catacombs containing skeletons with traces of injuries, especially cranial traumas, should also be added to this amount. According to S.I. Kruts, such sculls comprise over 10% of the whole amount found. Moreover, the bulk of injuries are located on the left side of the coronar or the parietal bone [Kruts 1984]. Weapons occur only in about 20% of graves where the buried had cranial traumas. Cenotaphs also may be regarded as war graves. Their number in the Northern Pontic region amounts to 9% of all burial interments of adults. Therefore, 27% of the adult Catacomb population fought in battles which means that the majority of men of the Northern Pontic ethno-political entity had participated in wars during their lives. This is an average estimation; the percentage of warriors among the Ingul people is still higher.

4. WAR AND THE CATACOMB SOCIETY

The Catacomb society existed in conditions of unstable military-political situation. This is proved not only but a substantial number of weapon-containing graves, cenotaphs or occurrence of cranial injuries (while among the Yamnaya population only 3% of graves display evidence of this kind of injuries) [Kruts 1984], but by other aspects as well. Hence, many of the Ingul graves feature shafts with filling intended to disguise the burial place in the barrow (chernozem in the black earth layer, clay in the subsoil). Alongside with the largest shafts for the Catacomb nobility, there were some similar in size to burial interments of representatives of the lowest social layer (common to a larger extent for the Ingul, less for the East Catacomb nobility) [Pustovalov 1991b]. Apparently, this phenomenon was a result of unstable political situation which made it necessary to disguise graves, especially those of the noble.

Investigation of appropriate features connected with orientation of Catacomb graves proved that position of a grave in the barrow is connected mainly with the season. North-eastern and north-western sectors account for burial interments made in summer, while south-eastern and south-western sectors represent winter graves. Among summer-to-autumn graves, the majority belong to armed men who can be regarded as victims of warfare.

Therefore, a higher percentage of summer-to-autumn graves locates the war situation in particular regions. For the north-eastern and the eastern sector such situation occurred in the Lower Don, the Sivash Lake region, on the territory between the rivers of Orel and Samara, and in the Ingul river basin. For the north-western sector, it was typical for the Lower Don, the southern part of the Kherson region, the Sivash Lake region, the territory between the river Molochna and the Dnieper, the Krivoy Rog region and the Ingul-and-Bug basin [Pustovalov 1990d: 164, Table XVIII].

Territories with higher summer-to-autumn mortality rates coincide with areas of high occurrence rates of trepanation of the skull and graves with weapons. This serves as a proof for the conclusion that the military-political situation was particularly tense on the territory between the river Molochna and the Dnieper, as well as in the Sivash Lake region [Pustovalov 1990b, 1990c]. Experts have pointed out to dissemination of the Ingul population toward north-east as far as the Donets Mountain ridge and the Lower Don [Sanzharov 1991], which, with regard to the aforementioned, may be interpreted as a military expansion. Objects of such an expansions might include copper and polymetal deposits of the Donets basin.

5. CONCLUSIONS

The analysis provided hitherto suggests heterogenic origin of the Catacomb weapons. This statement may be used as an argument for the idea expressed by L.S. Klein concerning blending of Middle Eastern and West European features in the Catacomb culture [Klein 1968]. However, particular forms of this process have not been sufficiently defined up to the present times.

Analogues to the Catacomb weapons discovered in the Middle East, Central Europe and the Balkans, move the "lower" dating to the end of the 4th millennium BC and allow to consider the issue of much earlier emergence and more ancient character of the Catacomb entity [Bratchenko 1989a, 1989b]. It is also important to note that similar articles of armaments occur both in the Ingul and the East Catacomb graves, which points out to their relatively simultaneous existence.

Unlike any other steppe culture of the Bronze Age, the burial ritual of the Catacomb entity represents a variety of professions and handicrafts, as well as social status of the buried. The analysis results allow to single out weapon-containing burial interments into a separate social-professional group of warriors. In the course of major campaigns or territory defence, the army included people's voluntary corps. The latter was formed of all adult male population except elderly people and adolescents which was typical for this type of societies.

Individual kinds of forces were established according to the ethnic indications. More prestigious categories of warriors were formed of the Ingul ethnos, while the others included representatives of the Eastern Catacomb and the Yamnaya tribes. In the process of development of the society this principle ceased to be the major requirement, apparently, because of the necessity to reinforce the army. All these details should be taken into account while creating a concrete-historical model of the Northern Pontic ethno-political entity. Definite information about military organization and warfare situation may be useful for considering the questions of origin of the Catacomb people. However, this is a topic for a separate study.

Translated by Inna Pidluska

ABBREVIATIONS

AP	 Arkheologicheskiye Pamyatniki
AUSSR	 Arkheologiya Ukrainskoy SSR
TGIM	 Trudy Gosudarstvennogo Istoricheskogo Muzeya, Moskva
ESA	– Eurasia Septentrionalis Antiqua
JIES	- The Journal of Indo-European Studies
KSIA	- Kratkiye Soobshcheniya Instituta Arkheologii AN SSSR, Mo-
	skva
MIA	– Materialy i Issledovania po Arkheologii SSSR, Moskva
MASP	– Materialy po Arkheologii Severnogo Prichernomorya
SA	– Sovetskaya Arkheologiya
SE	 Sovetskaya Etnographiya
VDI	- Voprosy Drevney Istorii

REFERENCES

Abayev V.I.

1972 K voprosu o prarodine i drevneyshykh migratsyakh drevneiranskikh narodov. In: *Drevniy Vostok i antichniy mir*, 26-37. Moskva.

Adrianov B.V.

1985 Neosedloye naseleniye mira. Moskva.

Agapov S.A., I.B. Vasiliev, V.I. Pestrikova

1990 Khvalynskiy eneoliticheskiy mogilnik. Samara.

Aleksandrivskiy A.L.

1983 Evolutsiya pochv Vostochno-Evropeyskoy ravniny v golotsene. Moskva.

Alekseyeva I.L.

- 1976 O drevneyshykh eneoliticheskikh pogrebeniyakh Severo-Zapadnogo Prichernomorya. *MASP* 8: 176-186.
- 1978 Voprosy khronologii i periodizatsii ranney pory paleometallicheskoy epokhi Severo-Zapadnogo Prichernomorya. In: Arkheologicheskiye issledovaniya Severo-Zapadnogo Prichernomorya, 56-65. Kiev.

1992 Kurgany epokhi rannego metalla v Severo-Zapadnom Prichernomorye. Kiev. Andrianov B.V.

1982 Nekotoriye zamechaniya o definitsyakh i terminologii skotovodcheskogo khozyaystva. SE 4: 76-80.

Androsov A.V.

1980 Ob odnoy iz kategoriy orudiy truda epokhi bronzy. In: *Problemy arkheologii Podneprovya*, 97-105. Dnepropetrovsk.

Anthony D.W.

- 1986 The "Kurgan Culture", Indo-European Origins and the Domestication of the Horse: a Reconsideration. *Current Anthropology* 27(4): 291-313.
- 1992 The Archaeology of Indo-European Origins. JIES 19(3-4): 1-34.
- 1990 Migration in Archaeology: the Baby and Bathwater. American Anthropologist 92(4): 895-914

Anthony D.W., D.R. Brown

- 1989 Looking a Lift Horse in the Mouth: Identification of the Earliest Bitted Equids and the Microscopic Analysis of Bit Wear. In: *Early Animal Domestication and its Cultural Context*, 99-115. Philadelphia.
- 1991 The Origins of Horseback Riding. Antiquity 65: 22-38.

Anthony D., D.Y. Telegin, D.R. Brown

1991 The origin of horseback riding. Scientific American 265(6): 94-100.

Antoniewicz W.

1929 Der in Stublo in Wolhynien aufgefungene Bronzeschats. ESA IV: 18-24.

Arkheologiya

1985 Arkheologiya Ukrainskoy SSR, vol.I.

Artamonov M.I.

1947 Voprosy istorii skiphov v sovetskoy nauke. VDI 3: 68-82.

Artemenko I.I.

1967 Plemena Verkhnego i Srednego Podneprovia v epokhu bronzy. MIA 148. 1985 Srednedneprovskaya kultura. In: AUSSR, vol. 1, 364-375. Kiev.

Artyushenko A.T., R.Y. Arap, L.G. Bezusko, E.O. Ilves, T.M. Kayutkina, N.N. Kovaluch

1982 Noviye danniye o rastitelnosti Ukrainy v golotsene. In: Razvitie prirody territorii SSSR v pozdnem pleystotsene i golotsene, 173-179. Moskva.

Artyushenko A.T., S.I. Parishkura-Turlo, G.O. Parkhomenko, R.Y. Arap,

L.G. Bezusko

1984 Istoriya razvitia rastitelnosti Ukrainy v golotsene. In: Obshchaya i regionalnaya paleogeografiya, 104-120. Kiev.

Bar-Yosef O., A. Khazanov

1992 Introduction. In: Pastoralism in the Levant. Archaeological Materials in Anthropological Perspectives (Eds. O. Bar-Yosef, A. Khazanov), 1-9. Madison (Wisconsin). Berezanskaya S.S.

- 1978 O nachalnykh etapakh metallurgicheskogo remesla na Ukraine. In: Arkheologicheskiye isledovaniya na Ukraine v 1976-1977 godakh, 35-36. Uzhgorod.
- 1980 Pervye mastera-metallurgi na territorii Ukrainy. In: Pervobytnaya arkheologia — poiski i nakhodki, 243-256. Kiev.
- 1982 O remesle v epokhu bronzy na territorii Ukrainy. In: Kulturniy progress v epokhu bronzy i rannego zheleza, 12-13. Erevan.
- 1986 Kultura mnogovalikovoy keramiki. In: Kultury epokhi bronzy na territorii Ukrainy, 5-43. Kiev.
- 1990 Usovo ozero. Poseleniye srubnoy kultury na Severskom Dontse. Kiev.

Berezanskaya S.S., P. Kravets

1989 O metallurgicheskom remesle plemen donetskoy katakombnoy kultury. In: *Pervobytnaya arkheologiya*, 156-168. Kiev.

Berezanskaya S.S., S.M. Lyaschko

1989 Vyvchennya remesla za wyrobnychymi kompleksami z pamyatok doby bronzy. Arkheologiya 3: 18-30.

Berounska M.

1987 Bulavy ve stredni Evrope. Praehistorica XIII, Varia Archaeologica 4: 27-61.

Bibikov S.N.

- 1953 Poseleniye Luka Vrublevetskaya. MIA 38.
- 1965 Khozyaystvenno-ekonomicheskiy kompleks razvitogo Tripolya. SA 1: 48-62.
- 1971 Plotnost naseleniya i velichina okhotnits i ikh ugodiy v paleolite Kryma. SA 4: 11-32.

Bibikov S.N., V.G. Zbenovich

1985 Ranniy etap tripolskoy kultury. In: AUSSR, vol. I, 193-205. Kiev.

Bibikova V.I

- 1963 Iz istorii golotsenovoy fauny pozvonochnykh v Vostochnoy Evrope. In: Prirodnaya obstanovka i fauna proshlogo, vol.1, 119-146. Kiev.
- 1967 K izucheniyu drevneishykh domashnikh loshadey Vostochnoy Evropy (chast
 1). Buleten Moskovskogo Obshchestva Ispytateley Prirody, Otdel Biologii 72(3):
 106-118.
- 1969 Do istorii domestikatsii konya na Pivdennomu Skhodi Evropy. Arkheologiya 22: 55-67.
- 1970 K izucheniyu drevneyshykh domashnikh loshadey Vostochnoy Evropy (chast
 2). Buleten Moskovskogo Obshchestva Ispytateley Prirody, Otdel Biologii 75(5):
 118-125.
- 1975 Fauna Dereivki i yeyo osobennosti. In: Noveyshe otkrytiya sovetskikh arkheologov (chast 1), 84-86. Kiev.

Bibikova V.I., A.I. Shevchenko

- 1962 Fauna Mikhaylovskogo poselennya. In: Lagodovska O.F., Shaposhnikova O.G., Makarevich M.L., *Mikhaylivske poselennya*, 206-246. Kiev.
- Bidzilya V.I., E.V. Yakovenko
 - 1973 Ralo iz pozdneyamnogo pogrebeniya kontsa III nachala II tys. do n. e. SA 3: 146-152.

Bintliff J.

1984 The Neolithic in Europe and Social Evolution. In: European Social Evolution. Archaeological Perspective (Ed. J. Bintliff), 83-121. Bradford.

Blajer W.

1990 Skarby z wczesnej epoki brązu na ziemiach polskich. Wrocław-Warszawa-Kraków-Gdańsk-Łódź.

Bochkarev V.

1990 Faktory razvitya metalloobrabatyvayushchego proizvodstva yuzhnoy poloviny Vostochnoy Yevropy v epokhu sredney bronzy. In: Problemy drevney istorii Severnogo Prichernomorya i Sredney Azii, 4-5. Leningrad.

Bodyanski A.V.

- 1954 Drevneysheye yamnoye pogrebeniye v yuzhnom Pridneprovye. *KSIA* 3: 95-98.
- Boldin Y.I.
 - 1980 Obsledovaniye drevnikh balok Khersonskoy oblasti. In: Arkheologicheskiye otkrytya 1980 goda, 232. Moskva.

Bona I.

1961 Geschichte der frühen und mittleren Bronzezeit in Ungarn und im mittleren Donauraum. Annales Universitatis Scientiarium Budapestiensis de Rolando Eotvos nominatae, Sectio Historica, 3.

Bongard-Levin G.M., G.F. Ilzin

1985 Indiya v drevnosti. Moskva.

Bökönyi S.

1984 Rol stepey Evrazii v rasprostranenii konevodstva. In: *Problemy arkheologii stepnoy Evrazii*, 9-14. Kemerovo.

Bratchenko S.N.

- 1976 Nizhnye Podonie v epokhu sredney bronzy. Kiev.
- 1985 Kultura mnogovalikovoy keramiki. In: AUSSR, vol. 1, 451-458. Kiev.
- 1989a Luk i strily doby eneolitu-bronzy Pivdnia Skhidnoy Evropy. Arkheologiya 4: 70-81.
- 1989b Katakombnye kultury Severskogo Dontsa i Severo-Vostochnogo Priazovia. In: Problemy okhrany i issledovaniy pamyatnikov arkheologii v Donbasse, 27-29. Donetsk.

- Bratchenko S.N., O.G. Shaposhnikova
 - 1985 Katakombnaya kulturno-istoricheskaya obshchnost. In: AUSSR, vol. 1, 403--419. Kiev.
- Bromley Y.V.

1983 Ocherki teorii etnosa. Moskva.

Bruks K.

1952 Klimaty proshlogo. Moskva.

Buchvaldek M.

1986 Die Mitteleuropaische Schnurkeramik und das Nordliche Schwarzmeergebiet. *Památky Archeologické* 77 (2): 486-497.

Buchinskiy B.I.

1963 Klimat Ukrainy v proshlom, nastoyashchem i budushchem. Kiev.

- Budnikov O.B., Y.Y. Rassamakin
 - 1993 Eneoliticheskiy mogilnik v g. Krivoy Rog i yego mesto v sisteme stepnykh drevnostey. In: *The Fourth Millennium BC*, 116-125. Sofia.

Bunyatyan E.P.

- 1982 Metodika sotsialnoy rekonstruktsii po dannym ryadovykh skiphskikh mogilnikov. In: Teoriya i metodika arkheologicheskikh issledovaniy, 136-184. Kiev.
- 1985 O formakh sobstvennosti u kochevnikov. In: Arkheologiya i metody istoricheskikh rekonstruktsiy, 21-43. Kiev.
- 1989 Klassifikatsiya i tipologiya skotovodstva. In: Problemy istorii ta arkheologii davnogo naselennya URSR, 32-34. Kiev.
- 1994 Klasyfikatsiya ta tipologiya skotovodstva. In: Teoriya ta praktika arkheologicheskikh doslidzheniy, 73-101. Kiev.
- 1995 Skotarstvo yak sposib zhittya. In: Problemy arkheologii, Kiev (in press).

Bunyatyan E.P., V.F. Gening, S.Z. Pustovalov, N.A. Rychkov

1989 IPS — informatsionno-spravochnaya sistema po pogrebalnym pamyatnikam. Kiev.

Burdo N.B.

- 1993a Ranniy etap formuvannia Tripilskoi kultury. Arkheologiya 3: 19-30. Kiev.
- 1993b Naselennia rannogo etapa tripilskoi kultury mezhyricha Dnistra ta Pivdennogo Bugu (avtoreferat kandidatskoy dissertatsii istoricheskikh nauk). Kiev.

Cherednichenko N.N.

1987 Osnovnye etapy ispolzovaniya loshadi v stepakh Evrazii. In: *Kimmeriytsy i skify: tezisy dokladov seminara posviashchennogo pamiati A.I. Terenozhkina*. Chast II, 78-81. Kirovograd.

Cherednichenko N.N., S.Z. Pustovalov

- 1991 K voprosu o kolesnitsakh i kolesnichikh v obshchestve katakombnoy kultury. SA 4: 206-216.
- Chernyakov I.T.
 - 1985 Severo-Zapadnoye Prichernomorye vo vtoroy polovine II tysyacheletya do n.e. Kiev.

Chernykh E.N.

- 1963 Issledovania sostava mednykh i bronzovykh izdeliy metodom spektralnogo analiza. SA 3: 145-156.
- 1965 Rezultaty izuchenia khimicheskogo sostava metalla Bessarabskogo klada. SA 1: 270-272.
- 1966 Istoria drevneyshey metallurgii Vostochnoy Evropy. Moskva.
- 1970 O drevneyshikh ochagakh metalloobrabotki Yugo-Zapada SSSR. KSIA 123: 23-31.
- 1976 Drevnaya metalloobrabotka na Yugo-Zapade SSSR, Moskva.
- 1978a Gornoye delo i metallurgia v drevneyshey Bolgarii. Sophia.
- 1978b Metallurgicheskiye provintsii i periodizatsii epokhi rannego metalla na territorii SSSR. SA 4: 53-82.
- 1989 Metall i drevniye kultury: uzlovye problemy issledovania. In: Yestestvennonauchnye metody v arkheologii, 14-30. Moskva.

Chernykh E.N., S.V. Kuzminykh

1987 Pamyatniki seyminsko-turbinskogo tipa. In: Epokha bronzy lesnoy polosy SSSR, 84-105. Moskva.

Chernysh E.K.

- 1977 Formirovanie lokalnykh variantov tripolskoy kultury. In: *Noveyshiye otkrytia* sovetskikh arkheologov, 18-21. Moskva.
- 1982 Eneolit Pravoberezhnoy Ukrainy i Moldavii. In: *Eneolit SSSR*, 165-252. Moskva.

Chibilev A.A.

1990 Lik stepi. Leningrad.

Childe V.G.

1926 The Aryans: A study of Indo-European origins. London.

Chmykhov N.A.

- 1977 K semantike ornamentalnykh skhem katakombnoy keramiki. In: Nekotoriye voprosy arkheologii Ukrainy, 14-31. Kiev.
- 1991 Pro kosmichnu symvoliku katakombnoy pokhovalnoy keramiki. In: Pokhovalny obryad davnogo naselennya Ukrainy, 65-89. Kiev.

Coles J.M., A.F. Harding

1979 The Bronze Age in Europe. An Introduction to the Prehistory of Europe, ca. 2000 to ca. 700 B.C. London.

Comşa E.

1974 Istoria comunitatilor culturii Boian. Bucuresti.

Crişmaru A.

1977 Drăgușeni. Contributii la monografie arheologica. Botosani.

Danilenko V.N.

- 1956 Chervonokhutirskiy mogilnyk midnogo viku z tilospalenniam. AP 4: 92-98.
- 1959 Arkheologicheskiye issledovaniya 1956 goda v Chigrinskom rayone. *KSIA* 8: 13-21.
- 1969 Neolit Ukrainy. Kiev.
- 1974 Eneolit Ukrainy. Kiev.

Danilenko V.N., N.M. Shmaglij

1972 Pro odin povorotniy moment v istorii eneolitichnogo naselennya Pivdennoy Evropy. *Arkheologiya* 6: 3-19.

Dąbrowski J.

1987 Stan i potrzeby badań nad kulturą trzciniecką. In: Kultura trzciniecka w Polsce, 5-18. Kraków.

Demchenko T.I.

1990 Issledovaniya eneoliticheskikh kurganov v kotovskom rayone MSSR. In: Problemy issledovaniya pamiatnikov arkheologii Severskogo Dontsa, 62-63. Lugansk.

Demographicheskiy slovar

1985 Demographicheskiy slovar. Moskva.

Denisova R.Y., A.A. Graudone, R. Gravere

1985 Kivutkalnskiy mogilnik epokhi bronzy. Riga.

Dergachev V.A.

1986 Moldavia i sosedniye territorii v epokhu bronzy. Kishinev.

Dergachev V.A., V.Y. Sorokin

1986 O zoomorfnom skipetre iz Moldavii i proniknovenii stepnykh eneoliticheskikh plemion v Karpato-Dunayskiye zemli. *Izvestia Akademii Nauk Moldavskoy SSR* 1: 54-65.

Diakonov I.M.

1983a Rannedinasticheskiy period v Dvurechie i Elame. In: Istoria Drevnego Vostoka. Zarozhdenie klassovykh obshchestv i perviye ochagi rabovladelcheskoy tsivilizatsii, 162-232. Moskva. 1983b Perviye despotii v Dvurechie. In: Istoria Drevnego Vostoka. Zarozhdenie klassovykh obshchestv i pervye ochagi rabovladelcheskoy tsivilizatsii, 233-315. Moskva.

Ditz U.L.

1992 Zur Frage vorbronzezeitlicher Trensenbelege in Europa, Germania 70(1): 17-36.

Dobrovolskiy A.

- 1929 Zvit za arkheologichni doslidy na territorii Dniprelstanu roku 1927. Zbirnyk Krayevogo istorychno-arkheologicheskogo museyu 1: 61-160.
- Dovzhenko N.D., N.V. Rychkov
 - 1988 K probleme sotsialnoy stratifikatsii plemen yamnoy kulturno-istoricheskoy obshchnosti. In: *Noviye pamyatniki yamnoy kultury stepnoy zony Ukrainy*, 14-27. Kiev.

Dremov I.I., A.I. Yudin

1992 Drevneyshye podkurgannye zakhoroneniya Stepnogo Zavolzhya, SA 4: 18-30.

Druzhynin N.K.

1966 Nekotoriye filosophskie problemy statistiki. In: Voprosy filosophii, 1: 37-48.

Dyson-Hudson R., N. Dyson-Hudson

1980 Nomadic pastoralisms, Annual Reviev Anthropology 9: 15-61.

Ecsedy I.

1979 The people of the pit-grave kurgans in Eastern Hungary. Budapest.

Erdniyev U.Y.

1982 Arkheologicheskiye pamiatniki Yuzhnykh Yergenei. Elista.

Evans-Pritchard E.E.

1940 The Nuer. Oxford.

- Fedorov P.V.
 - 1973 Stratigrafiya chetvertichnykh otlozheniy krymsko-kavkazkogo poberezhya i nekotorye voprosy geologichnoy istorii Chernogo morya. Moskva.

Gardawski A.

1969 Kultury środkowo-wschodniej Europy w starszej i środkowej epoce brązu (XVI-XII stulecie przed n.e.). *Studia i Materiały Lubelskie* 4: 7-54.

Gavriluk N.A.

1989 Domashneye proizvodstvo i byt stepnykh skiphov. Kiev.

Gavriluk N.A., N.P. Timchenko

1994 Dinamika chislennosti i vosproizvodstva naseleniya stepnoy Skiphii. In: Paleodemographiya skiphskogo naseleniya Severnogo Prichenomorya, 22-45. Kiev. Gedl M.

- 1989 Wczesna epoka brązu. In: Pradzieje ziem polskich, vol. I-2, 393-487. Warszawa-Łódź.
- Geographicheskiy atlas

1984 Geographicheskiy atlas SSSR. Moskva.

Gerasimenko N.P.

1993 Prirodnaya sreda drevnego cheloveka Donbassa v golotsene. Kiev.

Gey A.N.

- 1983 Samsonovskoye poseleniye. In: Drevnosti Dona, 7-34. Moskva.
- 1990 Opyt paleodemographicheskogo analiza obshchestva stepnykh skotovodov epokhi bronzy po pogrebalnym pamyatnikam Prikubanya. *KSIA* 201: 78-87.

Gimbutas M.

- 1956 *The prehistory of Eastern Europe*. Part 1. American School of Prehistoric Research Bulletin 20.
- 1974 The destruction of Aegean and Eastern Mediterranean urban civilization around 2300 B.C. In: *Bronze Age Migrations in the Aegean*, 120-132. Park Ridge (New Jersey).
- 1977 The First Wave of Eurasian Steppe Pastoralists into Copper Age Europe. *JIES* 4: 277-339.
- 1980 The Kurgan Wave #2 into Europe and the Following Transformation of Culture. *JIES* 8: 273-317.
- 1989 The Language of the Goddess. San Francisco.
- 1991 The Civilization of the Goddess: the World of Old Europe. San Francisco.

Goldmann K.

1981 Die mitteleuropäische Schwertenwicklung und die Chronologie der Altbronzezeit Europas. Acta Praehistorica et Archaeologica 11/12: 131-181.

Gorelik M.V.

1985 Boyeviye kolesnitsy Perednego Vostoka III-II tysiacheletiy do n.e. In: Drevnaya Anatolia, 183-202. Moskva.

Gorodtsov V.A.

- 1905 Rezultaty arkheologicheskikh issledovaniy v Izyumskom uyezde Kharkovskoy gub. v 1901 g. In: *Trudy XII Arkheologicheskogo Syezda*, vol. I, 174-225. Moskva.
- 1907 Dnevnik arkheologicheskikh issledovaniy v Bakhmatskom uyezde v Ekaterinoslavskoy gub. v 1903 g. In: *Trudy XIII Arkheologicheskogo Syezda*, vol. I, 286-365. Moskva.
- 1928 K voprosu o kimmeriyskoy kulture. Trudy Sektsii Rossiyskoy Assotsiatsii Nauchno-Issledovatelskikh Institutov Obshchestvennykh Nauk 2: 46-60.

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Gozhyk P.F., V.A. Karpov

1989 Izmeneniya urovnya Chernogo morya v golotsene. Kiev.

Górski J.

- 1991 Osada kultury trzcinieckiej w Jakuszowicach, cz.I. Kraków.
- 1994 Z badań nad chronologią i periodyzacją kultury trzcinieckiej na obszarze lessów podkrakowskich. In: *Problemy kultury trzcinieckiej*, 23-49. Rzeszów.

Grishin Y.S.

- 1980 K voprosu o drevneyshikh sposobakh poiskov mednykh rud. In: *Problemy* sovetskoy arkheologii, 81-85. Moskva.
- 1980 Drevnaya dobycha medi i olova. Moskva.

Gvozhdetskiy V.M.

1936 Dvophazne zalisennya lisostepovoy zony Skhidnoy Evropy. Kiev.

Haheu V., S. Kurchatov

1993 Cimitrul plan eneolitic de linga satul Giurgiulesti. *Revista Archeologica* 1: 101-114.

Harding A.F.

1984 Aspects of Social Evolution in the Bronze Age. In: European Social Evolution. Archaeological Perspectives (Ed. J. Bintliff), 135-145. Bradford.

Hassan F.A.

- 1981 Demographic archaeology. New York.
- Haüsler A.
 - 1981 Zu den Beziehungen zwischen dem nordpontischen Gebiet Südost- und Mitteleuropa im Neolithikum und in der frühen Bronzezeit und ihre Bedeutung fur das indoeuropäische Problem. *Przegląd Archeologiczny* 29: 101-149.
 - 1992a Struktur und Evolution der Bestattungssitten im Neolithikum und in der frühen Bronzezeit Mittel- und Osteuropa, *Ethnographisch-Archäologische Zeitschrift* 33: 274-296.
 - 1992b Der Ursprung des Wagen in der Diskussion der Legenwart. Archäologische Mitteilungen aus Nordwestdeutschland 15: 179-190.
 - 1994 Archäologische Zeugnisse für Pferd und Wagen in Ost- und Mitteleuropa. In: Die Indogermanen und das Pferd, 217-257. Budapest.

Hensel W.

1973 Polska starożytna. Wrocław-Warszawa-Kraków-Gdańsk.

Iessen A.A.

1947 Grecheskaya kolonizatsia Severnogo Prichernomorya. Leningrad.

Ilyinski V.E.

1990 Razvedochniye raboty na o. Baydy (Kanzerskiy) v 1990 g. In: Vestnik krayeveda 2: 25-34. Zaporozhye.

Ilyinski V.E., S.Z. Pustovalov

- 1992 Fortetsi na o. Mala Khortytsya (Bayda). Pratsi tsentru pamyatkoznavstva 1: 142-156. Kiev.
- Ilyukov L.S., L.M. Kazakova
 - 1988 Kurgany Miusskogo poluostrova. Rostov.

Ivanov I.V.

- 1984 Izmeneniya pochv i prirodnykh usloviy stepnoy zony SSSR v golotsene. Pushkino.
- 1985 Izmeneniya klimata yuzhnoy Ukrainy v golotsene. In: *Problemy arkheologii Podneprovya*, 27-32. Dnepropetrovsk.

Jażdżewski K.

1981 Pradzieje Europy Środkowej, Wrocław-Warszawa-Kraków-Gdańsk.

de Jesus P.

1978 Metal Resources in Ancient Anatolia. Anatolian Studies 38: 92-102.

Kadrow S.

- 1988 Jama nr 10 na stanowisku 5 we Wronowicach-Paprzycy, gm. Tyszowce. Prace i Materiały Zamojskie 1: 25-33.
- 1994 Social structures and social evolution among Early-Bronze-Age communities in South-Eastern Poland. *Journal of European Archaeology* 2.2: 229-248.
- 1995 Gospodarka i społeczeństwo. Wczesny okres epoki brązu w Małopolsce. Kraków.

Kempisty A.

1978 Schyłek neolitu i początek epoki brązu na Wyżynie Małopolskiej w świetle badań nad kopcami. Warszawa.

Khazanov A.M.

1979 Klassoobrazovaniye: faktory i mekhanizmy. In: Issledovaniya po obshchey etnographii, 125-177. Moskva.

Khotinski N.A.

- 1977 Golotsen severnoy Evrazii. Moskva.
- 1982 Paleoekologicheskiye rekonstruktsii prirodnoy sredy golotsena (Model sovremennogo mezhlednikovya). In: *Paleogeographiya Evropy za poslednye* 100 tys. let. Atlas-monographiya, 123-127. Moskva.

Khruschev D.P., L.S. Galitski

1983 Perspektivy izuchenia medenosnosti pestrotsvetnykh formatsiy USSR. Visnyk Akademii Nauk URSR 3: 20-22.

Kirikov C.V.

¹⁹⁸³ Chelovek i priroda stepnoy zony X-XX vv. Evropeyskoy chasti SSSR. Moskva.

Kisliy A.E.

- 1989 Rekonstrukziya demograficheskoy struktury naseleniya stepey Severnogo Prichernomorya III-II tys. do n.e. (avtoreferat dissertatsii kandidata istoricheskikh nauk). Kiev.
- 1990 Sootnosheniye chislennosti polov: ekonomicheskiye potrebnosti i traditsii. Demographicheskiye issledovaniya 14: 119-131. Kiev.

Kiyashko V.Y.

1987 Mnogosloynoye poseleniye Razdorskoye I na Nizhnem Donu. KSIA 192: 73-80.

Klein L.S.

1968 Proiskhozhdenie donetskoy katakombnoy kultury (avtoreferat dissertatsii kandidata istoricheskikh nauk). Leningrad.

Klochko V.I.

- 1977 Novye dannye o tipakh skifskikh goritov i kolchannykh naborakh, IV vek do n.e. In: *Noviye issledovaniya arkheologicheskikh pamiatnikov na Ukraine*, 47-54. Kiev.
- 1993 Weapons of the tribes of the North Pontic zone in the 16th-10th centuries B.C. Baltic-Pontic Studies 1. Poznań.
- 1994 Metallurgicheskoye proizvodstvo v eneolite-bronzovom veke. In: *Remeslo* epokhi eneolita-bronzy na Ukraine, 96-132. Kiev.
- Klochko V.I., S.Z. Pustovalov
 - 1992 Do rekonstruktsii uzbroyennya ta viyskovoy spravy katakombnogo suspilstva Pivnichnogo Prychornomotya. *Pratsi tsentru pamyatkoznavstva* 1: 118-141.
- Klochko V.I., M.O. Rychkov
 - 1989 Novi pokhovannya katakombnoy kultury u Serednyomu Podniprovyu. Arkheologiya 3: 60-65.

Kłosińska E.

1994 Kultura trzciniecka w międzyrzeczu Prosny i Warty. In: Problemy kultury trzcinieckiej, 7-22. Rzeszów.

Kolesnikov A.G.

- 1989 K metodu opredelenya otnositelnogo prirosta naseleniya dla sravnitelnogo analiza drevnikh obshchestv. In: *Problemy istorii ta arkheologii davnogo* naseleniya Ukrainskoy RSR, 101-102. Kiev.
- 1993 Tripolskoye obshchestvo Srednego Podniprovia. Kiev.

Koman W.

1990 Badania mikroregionalne na Grzędzie Sokalskiej. In: Sprawozdania z badań terenowych w województwie zamojskim w 1990 roku, 11-19. Zamość. Konkova L.V.

1979 Metallograficheskoye issledovaniye metallicheskikh izdeliy iz pamiatnikov Usatovskogo tipa. In: F. Patokova, *Usatovskoye poselenie i mogilniki*, 161--176. Kiev.

Korenevski S.N.

- 1974 O metallicheskikh toporakh Maykopskoy kultury. SA 3: 14-32.
- 1976 O metallicheskikh toporakh Severnogo Prichernomorya, Srednego i Nizhnego Povolzhia epokhi sredney bronzy. SA 4: 16-31.
- 1978 O metallicheskikh nozhakh yamnoy, poltavkinskoy i katakombnoy kultur. *SA* 2: 33-48.
- Korenevski S.N., A.O. Nagler
 - 1987 Nekotorye voprosy izucheniya eneolita Tsentralnogo Predkavkazya i Mozdokskikh stepey. In: *Problemy interpretatsii arkheologicheskikh istochnikov*, 74-86. Ordzhonikidze.

Kostrzewski J.

- 1939- Od mezolitu do okresu wędrówek ludów. In: Prehistoria ziem polskich, -1948 118-359. Warszawa.
- Kostrzewski J., W. Chmielewski, K. Jażdżewski 1965 Pradzieje Polski. Wrocław-Warszawa-Kraków.

Kośko A.

- 1979 Rozwój kulturowy społeczeństw Kujaw w okresach schyłkowego neolitu i wczesnej epoki brązu. Poznań.
- 1985 Influences of the "pre-yamnaya" ("pre-pitgrave") Communities from Black Sea Steppe Area in Western European Cultures. In: L'eneolithique et le debut de l'age du bronze dans certaines regions de l'Europe, 57-72. Wrocław--Warszawa-Kraków-Gdańsk-Łódź.
- 1991 The Vistula Oder Basins and the North Pontic Region. JIES 19: 235-257.
- 1992 Z badań nad tzw. horyzontem starosznurowym w rozwoju późnoneolitycznej kultury społeczeństw Kujaw. Acta Universitatis Lodziensis, Folia Archaeologica 16: 85-95.

Kośko A., V.I. Klochko

1987 A Late Neolithic Composite Bow. Journal of the Society of Archer Antiquaries 30: 15-23.

1993 Prirodno-klimatichskiye izmeneniya i neoliticheskoye naseleniye stepnoy Ukrainy. In: Otochuyuche seredovyshche i starodavnye naselennya Ukrainy, 22-31. Kiev.

Kotova N.S., Y.Y. Rassamakin

1995 Eneolithic of Dnieper-Don territories. Kiev (in print).

Kotova N.S.

Kowalczyk J.

- 1959 Zagadnienie kultury mierzanowickiej zwanej także tomaszowską. Wiadomości Archeologiczne 26: 1-8.
- Kovaleva I.F.
 - 1979 Vytianutye pogrebenia Dnepropetrovskogo areala Volgo-Dneprovskoy istoricheskoy obshchnosti epokhi eneolita. In: *Kurgannye drevnosti stepnogo Podneprovia, III-I tysiacheletia do n.e.*, part 3, 61-79, Dnepropetrovsk.
 - 1981 Sever stepnogo Podneprovia v srednem bronzovom veke. Dnepropetrovsk.
 - 1983 Pogrebalniy obryad i ideologiya rannikh skotovodov. Po materialam kultur bronzovogo veka Levoberezhnoy Ukrainy. Dnepropetrovsk.
 - 1984 Sever stepnogo Podneprovya v neolite-bronzovom veke. Dnepropetrovsk.
 - 1993 Pogrebeniya vsadnikov i voznichikh v kurganakh Nadporozhya. In: Problemy arkheologii Podneprovia, 63-79. Dnepropetrovsk.

Kovaleva I.F., S.S. Volkoboy, Z.P. Larina

- 1977 Issledovaniya kurgannykh mogilnikov u sela Verkhnaya Mayevka v stepnom mezhdurechii rek Oreli i Samary. In: Kurgannye drevnosti stepnogo Podneprovia, III-I tysiacheletia do n.e., 8-113, Dnepropetrovsk.
- Kovpanenko G.T., L.A. Chernykh
 - 1984 Pokhovannia katakombnoy kultury na Pivdennomu Bugi. Arkheologiya 48: 47-61.

Kozachok N.L.

1991 Pamyatniki epokhi bronzy na o. Khortitsa. In: Drevnosti Stepnogo Prichernomorya i Kryma, 82-96. Zaporozhye.

Kozłowski L.

1928 Wczesna, starsza i środkowa epoka brązu w Polsce w świetle subborealnego optimum klimatycznego i jego wpływ na ruchy etniczne i zaludnienie Polski. Lwów.

Kradin N.N.

1992 Kocheviye obshchestva. Vladivostok.

Kremenetski K.V.

1991 Paleoekologiya drevneyshikh zemledeltsev i skotovodov Russkoy Ravniny. Moskva.

Krivtsova-Grakova O.A.

- 1949 Bessarabskiy klad, TGIM. Moskva.
- 1955 Stepnoye Povolzhie i Prichernomorie v epokhu pozdney bronzy. MIA 40.

Kruk J.

1980 Gospodarka w Polsce południowo-wschodniej w V-III tysiącleciu p.n.e. Wrocław-Warszawa-Kraków-Gdańsk.

- 1993 Rozwój społeczno-gospodarczy i zmiany środowiska przyrodniczego wyżyn lessowych w neolicie (4800-1800 bc), *Sprawozdania Archeologiczne* 25: 7-17.
- Kruts S.I.
 - 1984 Paleoantropologicheskie issledovaniya Stepnogo Pridneprovya (epokha bronzy). Kiev.
- Kruts V.A.
 - 1977 Pozdnetripolskie plemena Srednego Podniprovia, Kiev.
 - 1989 K istorii naselennia tripolskoy kultury v mezhdurechie Yuzhnogo Buga i Dnepra. In: *Pervobytnaya arkheologia. Materialy i issledovaniya*, 117-132. Kiev.
 - 1990 Planirovka poselenia u sela Talianki i nekotorye voprosy tripolskogo domostroitelstva. In: *Rannezemledelcheskiye poselenia - giganty tripolskoy kultury na Ukraine*, 43-47. Talianki.
 - 1993 Pitannya demografii tripilskoy kultury. Arkheologiya 3: 30-35.
- Krylova L.P.
 - 1976 Kernosovskiy idol (stella). In: Eneolit i bronzoviy vek Ukrainy, 36-46. Kiev.
- Kubbel L.E.
 - 1987 "Formy, predshestvuyushche kapitalicheskomu proizvodstvu" Karla Marksa i nekotoriye aspekty vozniknoveniya politicheskoy organizatsii. SE 3: 3-12.
 - 1988 Ocherki po testarno-politicheskoy etnographii. Moskva.
- Kubyshev A.I., I.T. Chernyakov
 - 1985 K probleme sushchestvovania vesovoy sistemy u plemen bronzovogo veka stepey vostochnoy Evropy. SA 1: 39-54.
- Kushnareva K.H., G.N. Chubinishvili
 - 1970 Drevneyshiye kultury Yuzhnogo Kavkaza V-III tysiacheletiya do nashey ery. Leningrad.
- Kuzmina E.E.
 - 1974 O nekotorykh voprosakh andronovskoy demographii. Izvestiya Sibirskogo otdeleniya AN SSSR (Seriya Obshchestvennykh nauk) 2: 102-116.
- Lagodowska O.F., O.G. Shaposhnikova, M.L. Makarevich 1962 *Mikhaylivske poselennya*. Kiev.
- Latyshev V.V.
 - 1949 Izvestia drevnikh pisateley o Skifii i Kavkaze. VDI 1:, 214-313.
- Leach E.
- 1940 Social and Economic Organisation of the Rowanduz Kurds. London.
- Lescov A.M.
 - 1981 Jung und spätbronzezeitlichen Depotfunde im nördliche Schwarzmeergebiet. Prähistorische Bronzefunde, Ab. 20, Bd 5. München.

Levine M.A.

1990 Dereivka and the problem of horse domestication. Antiquity 64 (245): 727-740.

Mace R.

1993 Transition between Cultivation and Pastoralism in Sub-Saharan Africa. Current Anthropology 34: 363-372.

Machnik J.

- 1966 Studia nad kulturą ceramiki sznurowej w Małopolsce. Wrocław-Warszawa-Kraków.
- 1967 Stosunki kulturowe na przełomie neolitu i epoki brązu w Małopolsce (na tle przemian w Europie Środkowej). In: *Materiały do prahistorii ziem polskich*, part III.1. Warszawa.
- 1973 Ze studiów nad związkami Kaukazu z obszarami karpackimi w początkach epoki brązu. *Archeologia Polski* 28: 127-165.
- 1978 Wczesny okres epoki brązu. In: Prahistoria ziem polskich, III, Wczesna epoka brązu, 9-136. Wrocław-Warszawa-Kraków-Gdańsk.
- 1987 Kultury z przełomu eneolitu i epoki brązu w strefie karpackiej. Wrocław--Warszawa-Kraków-Gdańsk-Łódź.
- 1991 The Earliest Bronze Age in the Carpathian Basin. Bradford.
- 1992 Neue Daten zur Problematik der Schnurkeramikkultur in Südostpolen. In: Die kontinental-europäischen Gruppen der Kultur mit Schnurkeramik, Praehistorica 19: 265-274.

Machnik J., J. Ścibior

1991 Die Chronologie der Schnurkeramikkultur (SChK) in Südostpolen. In: Die kontinental-europäischen Gruppen der Kultur mit Schnurkeramik. Die Chronologie der regionalen Gruppen (Ed. C. Strahm), 45-54. Freiburg i. Br.

Makarenko M.

- 1933 Mariupilskiy mohylnyk. Kiev.
- Malkowski S.
 - 1931a O złożu miedzi rodzimej w Wielkim Mydzku na Wołyniu. Sprawozdania Polskiego Instytutu Geologicznego VI.4: 752-774.

1931b Z geologii Wołynia. Rocznik Wołyński 2: 384-402.

Mallory J.P.

- 1976 The chronology of the early Kurgan tradition (Part I). JIES 4: 257-294.
- 1977 The chronology of the early Kurgan tradition (Part II). JIES 5: 339-368.
- 1989 In Search of the Indo-Europeans. Language, Archaeology and Myth. London.

Malyukevich A.E., V.G. Petrenko

1993 Usatovskiy kompleks s figurnymi pronizyami iz kurgana v nizovyakh Dnestra. In: Drevneye Prichernomorye, 24-31. Odessa. 1993 The East-West interaction in the mirror of the eneolithic and early bronze cultures in the northwest Pontic. *Revista Archeologica* 1: 23-41.

Marinicha A.M.

1985 Priroda Ukrainskoy SSR. Landshaphty i phiziko-geographicheskoye rayonizovaniye. Kiev.

Markevich V.I.

1981 Pozdnetripolskie pamiatniki Severnoy Moldavii. Kishinev.

Markov G.E.

- 1976 Kochevniki Azii. Struktura khozyaystva i obshchestvennnaya organizatsiya, Moskva.
- 1981 Skotovodcheskoye khozyaystvo i kochevnichestvo. Definitsii i terminologia. *SE* 4: 83-94.
- 1982 Problemy definitsii i terminologii skotovodcheskogo khozyaystva i kochevnichestva. SE 4: 80-87.

Martirosyan A.A.

1964 Armeniya v epokhu bronzy i rannego zheleza. Erevan.

Masson V.M.

- 1964 Sredniaya Azya i Drevniy Vostok. Moskva.
- 1976 Ekonomika i sotsialniy stroy drevnikh obshchestv. Leningrad.

Matyushin G.N.

1982 Eneolit yuzhnogo Urala. Moskva.

Mayski I.M.

1921 Sovremennaya Mongolia. Irkutsk.

Melikishvili G.A.

1985 Ob osnovnykh etapakh razvitya drevnego blizhnevostochnogo obshchestva. *VDI* 4: 3-34.

Mellart G.

1966 The Chalcolithic and Early Bronze Ages in the Near East and Anatolia. Beyrut.

Merpert N.Y.

- 1974 Drevneyshiye skotovody Volzhsko-Uralskogo mezhdurechya. Moskva.
- 1976 Drevneyamnaya kulturno-istoricheskaya oblast i voprosy formirovanya kultur shnurovoy keramiki. In: *Vostochnaya Evropa v epokhu kamnya i bronzy*, 103-127. Moskva.
- 1982 Eneolit Yuga SSSR i Evrasiyskiye stepi. In: *Eneolit SSSR*, 322-331. Moskwa.

Merpert N.Y. (Ed.)

1979 Ezero - rannobronzovoto selishche. Sophia.

Metallogenia

1974 Metallogenia Ukrainy i Moldavii. Kiev.

Mikhailov B.D.

1991 Prirodnaya sreda i razvitie khozaystvennykh form v Severnom Priazovye. In: Drevnosti Stepnogo Prichernomorya i Krima, part II, 18-28. Zaporozhye.

Milisauskas S., J. Kruk

- 1984 Settlement Organisation and the Appearance of Low Level Hierarchical Societies during the Neolithic in the Bronocice Microregion, Southeastern Poland. *Germania* 62: 1-30.
- 1989 Economy, Migration, Settlement Organization, and Warfare during the Late Neolithic in Southeastern Poland. *Germania* 67: 77-96.

Miśkiewicz J.

1978 Kultura trzciniecka. In: Prahistoria ziem polskich, III, Wczesna epoka brązu, 173-196. Wrocław-Warszawa-Kraków-Gdańsk.

Molodykh I.I.

1982 Grunty podov i stepnykh blyudets subaeralnogo pokrova Ukrainy. Kiev.

Mordkovich V.G.

1982 Stepniye ekosistemy. Novosibirsk.

Moszyński K.

1953 Ludy pasterskie, ich kultura materialna oraz podstawowe wiadomości o formach współżycia zbiorowego, o wiedzy, życiu religijnym i sztuce. Wrocław.

Movsha T.G.

- 1957 Mednye ukrashenia iz Kieva. Kratkiye Soobshcheniya Instituta Istorii Materialnoy Kultury 70: 94-98.
- 1961 O sviaziakh plemen tripolskoyi kultury so stepnimi plemenami mednogo veka. SA 2: 186-199.
- 1981 Problemy sviaziey Tripolia-Cucuteni s plemenami kultur stepnogo areala. *Studia Praehistorica* 5/6: 61-72.
- 1984 Khronologia Tripolye-Cucuteni i stepnye kultury rannego metalla v yeyo systeme. In: *Problemy arkheologii Srednego Podniprovia*, part 1, 60-83. Dne-propetrovsk.
- 1985a Pozdniy etap tripolskoy kultury. In: AUSSR, vol. I, 223-262. Kiev.
- 1985b Vzayemovidnosyny Tripolya-Kukuteni z sinkhronnymi kulturami Tsentralnoy Evropy. Arkheologiya 51: 22-31.
- 1985c Sredniy etap tripolskoy kultury. In: AUSSR, vol. I, 206-222. Kiev.
- 1993 Vzaemovidnosyny stepovykh i zemlerobskikh kultur v epohku eneoliturannebronzovogo viku. In: Arkheologiya 3: 36-51.

Müller-Karpe H.

1974 Handbuch der Vorgeschichte. Band 3. München.

Munchayev R.M.

1975 Kavkaz na zare bronzovogo veka. Moskva.

Mylonas G.E.

1957 Ancient Mycenae, the capital city of Agamemnon. New Jersey.

Nechayev A.A.

1990 Eneoliticheskiye poseleniya Zakubanya. In: Drevniye pamyatniki Kubani, 5-22. Krasnodar.

Nechytailo A.L.

- 1988 K voprosu o roli Donbassa v razvitii metallurgii epokhi bronzy. In: Aktualniye problemy okhrany i ispolzovaniya arkheologicheskikh pamyatnikov v Tsentralnom Donbasse, 15-17. Perevalsk.
- 1991 Svyazi naseleniya stepnoy Ukrainy i Severnogo Kavkaza v epokhu bronzy. Kiev.

Nechytailo A.L., A.I. Kubyshev

1991 Tsentry metalloobrabatyvayushchego proizvodstva Azovo-Chernomorskoy zony. In: *Katakombniye kultury Severnogo Prichernomorya*, 6-21. Kiev.

Neprina V.I.

1985 Kultura neolita s yamochno-grebenchatoy keramikoy. In: AUSSR, vol. I, 178-186. Kiev.

Neustupny E.

1969 Economy of the Corded Ware Cultures. *Archeologicke rozhledy* 21: 43-68. Nikitenko M.M.

1977 O datirovke balkovskogo rala. In: Noviye issledovaniya arkheologicheskikh pamyatnikov na Ukraine, 45-46. Kiev.

Nikitin V.I.

- 1989 Matveyevka-1 poseleniye katakombnoy kultury na Yuzhnom Buge. SA 2: 136-150.
- 1991 Katakombniye poseleniya i stoybishcha Pobuzhya. In: Problemy arkheologii Severnogo Prichernomorya, 34-38. Kherson.

Nikolayeva N.A.

1991 Dve traditsii kochevogo (polukochevogo) skotovodstva v Ponto-Kaspiyskikh stepyah. Sviaz ikh s drevneyshimi tsivilizatsiami. In: *Drevneyshiye obshchnosti zemledelcev i skotovodov Severnogo Prichernomorya*. Materialy Mezhdunarodnoy Konferentsii (Kishinev, 10-14 dekabra 1990). Kiev.

Nikolova A.V., Y.Y. Rassamakin

1985 O pozdneneoliticheskikh pamyatnikakh Pravoberezhya Dnepra. SA 3: 37-56.

Novikova L.A., Y.A. Shilov

- 1989 Pogrebeniya s litsevymi nakladkami epokhi bronzy (Khersonskaya oblast). SA 2: 127-135.
- Olenkovski M.P., S.Z. Pustovalov
 - 1993 Pamyatki eneolitu ta rannoy bronzy. In: Arkheologichna karta Nizhnyodniprovskogo regionu (Part 3). Kherson.
- Ostoja-Zagórski J.
 - 1989 Mikrostruktury społeczne epoki brązu w Europie Środkowej. Próba interpretacji. *Przegląd Archeologiczny* 36: 169-208.
- Otroshchenko V.V.
 - 1987 Okhrannyje raskopki v basseyne reki Molochnoy (osobennosti topografii kurganov). In: Problemy okhrany i issledovaniya pamyatnikov arkheologii v Donbasse, 104-106. Donetsk.
- Otroshchenko V.V., Y.V. Boltrik
 - 1982 Kulturno-khronologicheskoye i territorialnoye raspredeleniye mogilnikov Dnepro-Molochanskoy stepnoy oblasti. In: *Materialy po khronologii arkheologicheskikh pamyatnikov Ukrainy*, 38-46. Kiev.
- Otroshchenko V.V., S.Z. Pustovalov
 - 1987 Otchet o rabote Zaporozhskoy ekspeditsii v 1987 g. In: NA IA NAN Ukrainy, FE 1987/18
 - 1991a Obriad modelirovania cherepov u plemen katakombnoy obshchnosti. In: Dukhovnaya kultura drevnego naselenia Ukrainy, 8-100. Kiev.
 - 1991b Obryad modelirovki litsa po cherepu u plemen katakombnoy obshchnosti. In: Dukhovnaya kultura drevnikh obshchestv na territorii Ukrainy, 59-84. Kiev.

Otroshchenko V.V., S.Z. Pustovalov et al.

1982 Otchet o rabotakh zaporozhskoy ekspeditsii v 1982 g. In: Nauchniy Arkhiv Instituta Arkheologii Natsyonalnoy Akademii Nauk. Kiev.

Pashkevich G.I.

- 1989 Paleobotanicheskiye issledovania tripolskikh materialov mezhdurechia Dnipra i Yuzhnogo Buga. In: *Pervobytnaya arkheologia. Materialy i issledovania*, 132-141. Kiev.
- 1991 Paleoetnobotanicheskiye nakhodki na territorii Ukrainy (neolit bronza). Katalog, Kiev,
- 1994 Do rekonstruktsii asortimentu kulturnykh roslin epokhi neolitu-bronzy na territorii Ukrainy. In: *Starodavne vyrobnitstvo na territorii Ukrainy*, 175-194. Kiev.

Pastor J.

- 1965 Frühbronzezeitliches Gräberfeld in Vsechsvätych. Folia Archaeologica 17: 37-50.
- 1969 Košické pohrebisko. Košice.
- Patokova E.F., V.G. Petrenko, N.B. Burdo, L.Y. Polishchuk 1989 Pamyatniki tripolskoy kultury v Severo-Zapadnom Prichernomorye. Kiev.

Pavlenko Y.V.

1989 Ranneklasoviye obshchestva. Genezis i puti razvitiya. Kiev.

Penkala-Gawęcka D.

1987 Grupa krewniacza. In: Słownik etnologiczny. Terminy ogólne (Ed. Z. Staszczak), 150. Warszawa-Poznań.

Petrenko V.G.

- 1989 Pamyatniki eneolita i povorot epokhi k bronzovomu veku v Severo-Zapadnom Prichernomorye. In: *Istoriya i arkheologiya Nizhnego Podunavya*, 18-20. Reni.
- 1992 Opit korrelatsii klimaticheskikh i kulturnykh ritmov. In: Severo-Zapadnoye Prichernomorye. Ritmy kulturogeneza, 23-25. Odessa.

Pidoplichko I.G.

1938 Materialy do vyvchennya mynulykh faun URSR, vol. 2. Kiev.

Pislariy I.A.

1982 Pro tkatstvo v dobu midi-bronzy ta rannyogo zaliza. Arkheologiya 38: 70-82.

Popova T.A.

- 1955 Plemena katakombnoy kultury. Severnoye Prichernomorye vo II tys. do n.e. TGIM 24. Moskva.
- 1989 O roli naselenia Podnestrovia v formirovaniu tripolskoy kultury Bugo-Dniprovskogo mezhdurechia. In: *Pervobytnaya arkheologia. Materialy i issledovania*, 142-148. Kiev.

Pustovalov S.Z.

- 1987 Etnotipologia katakombnoy kultury Severnogo Prichernomorya (avtoreferat dissertatsii kandidata istoricheskikh nauk). Kiev.
- 1990a Drevnevostochnye religii i ideologia naselenia katakombnoy obshchnosti. In: Rekonstruktsia drevnikh verovaniy: istochnik, metod, tsel, 50-51. Leningrad.
- 1990b Ob obshchestvennom polozhenii masterov-remeslenikov. In: Problemy issledovania pamyatnikov arkheologii Severnogo Dontsa, 97-99. Lugansk.
- 1990c O formakh politogeneza v katakombnom obshchestve Severnogo Prichernomorya. Problemy izucheniya katakombnoy kulturno-istoricheskoy obshchnosti, 80-81. Zaporozhye.

- 1990d Problema etnicheskoy struktury drevnikh obshchestv. In: Formulizovannostatisticheskiye metody v arkheologii, 150-183. Kiev.
- 1991a Do rekonstruktsii sotsialnoho orhanizmu za materialamy katakombnykh pamyatok Pivnichnogo Prychornomorya. In: *Pokhovalny obriad davnioho poselennia Ukrainy*, 104-122. Kiev.
- 1991b Polovozrastnaya i sotsialnaya kharakteristika katakombnogo naselenia Severnogo Prichernomorya. Kiev (Pre-print).
- 1992a Etnicheskaya struktura katakombnogo naselenia Severnogo Prichernomorya. Kiev.
- 1992b Osobennosti orientirovok katakombnykh pogrebeniy Severnogo Prichernomorya. Zaporozhye.
- 1992c Vozrastnaya, polovaya i sotsialnaya kharakteristika katakombnogo naseleniya Severnogo Prichernomorya. Kiev.
- 1993 Deyaki blizkoskhidni elementy v ideologii katakombnogo naselennya Pivnichnogo Prychernomorya. Arkheologiya 1: 24-34.

Pustovalov S.Z., M.A. Stepanova

- 1994 Dinamika chislennosti stepnogo naselenia Ukrainy po materialam kurgannykh mogilnikov. In: Drevneyshye obshchnosti zemledeltsev i skotovodov Severnogo Prichernomorya V tys. do n.e. - V v. n.e., 100-102. Tiraspol.
- Rassamakin Y.Y.
 - 1987 Eneoliticheskiye pogrebeniya basseyna reki Molochnoy. In: Drevneyshye skotovody stepey yuga Ukrainy, 31-43. Kiev.
 - 1988 Otnositelnaya khronologia pozdneeneoliticheskikh pogrebeniy basseyna reki Molochnoy. In: *Noviye pamyatniki yamnoy kultury stepnoy zony Ukrainy*, 14-27. Kiev.
 - 1989 O nekotorykh problemakh izucheniya pogrebeniy epokhi ranney bronzy v Severo-Zapadnom Priazovye. In: Problemy okhrany i issledovaniya pamyatnikov arkheologii v Donbasse, 82-84. Donetsk.
 - 1992a Eneolit i ranniy bronzoviy vek Severo-Zapadnogo Priazovya (avtoreferat dissertatsii kandidata istoricheskikh nauk). Kiev.
 - 1992b Do vyvchennya kurgannykh sporud. Arkheologiya 4:
 - 1993 Eneolit stepnogo Prichernomorya i Priazovya (po pogrebalnym pamyatnikam). In: *The Fourth Millenium B.C.*, 5-28. Sofia.

Robertshaw P.T., D.P.Collett

1983 The identification of pastoral peoples in the archaeological record: an example from East Africa. *World Archaeology* 15: 67-78.

Romanova G.P.

1986 Demographicheskiy analiz paleoantropologicheskikh materialov mogilnika Lebedi-1. In: Arkheologicheskiye otkrytya na novostroykakh, 195-203. Moskva.

Rybalova V.D.

1964 Nekotorye novye dannye k izucheniyu pozdnetripolskoy kultury na Yuzhnom Buge. Arkheologicheskiy Sbornik Gosudarstvennogo Ermitazha 6: 75-82.

Ryndina N.V.

- 1971 Drevneyshiye metalloobrabatyvayushchiye proizvodstva Vostochnoy Evropy. Moskva.
- 1980 Metall v kulturakh shnurovoy keramiki Ukrainskogo Predkarpatia, Podolii i Volyni. SA 3: 24-41.
- 1993 Drevneyshiye metalloobrabatyvayushcheye proizvodstvo Yugo-Vostochnoy Evropy (nauchniy doklad doktora istoricheskikh nauk). Moskva.
- Ryndina N.V., A.V. Engovatova
 - 1990 Opyt planigraficheskogo analiza kremniovykh orudiy tripolskogo poselenia Drutsy I. In: *Rannezemledelcheskiye poselenia-giganty tripolskoy kultury na Ukraine*, 108-114. Talianki.

Ryndina N.V., L.V. Konkova

1982 O proiskhozhdenii bolshikh Usatovskikh kinzhalov. SA 2: 30-42.

- Ryndina N.V., L.B. Orlovskaya
 - 1978 Rezultaty metallograficheskogo issledovania. In: Chernykh E.N., Gornoye delo i metallurgia v drevneyshey Bolgarii, 286-321. Sophia.

Sanzharov S.I.

- 1989 Okhra v izobrazitelnoy deyatelnosti plemen epokhi sredney bronzy Donetchiny. SA 2: 97-107.
- 1991 Katakombnaya kultura na territorii Severo-Vostochnogo Priazovya (avtoreferat dissertatsii kandidata istoricheskikh nauk). Kiev.

Safronov V.A.

1983 Issledovanye kurganov v Srednem Prikubanye. In: Arkheologicheskiye otkrytya 1981 g., 132. Moskva.

Schäfer K.

1987 Die Schmirtenauer Kultur. Zur Ordnung der frühen Bronzezeit im Netze--Warthe-Raum. Bonn.

Semenov Y.I.

- 1966 Kategoriya "sotsialny organizm" i yeyo znacheniye dla istoricheskoy nauki. Voprosy istorii 8: 88-106.
- 1982 Kochevnichestvo i nekotorye obshchiye problemy teorii khozyaystva i obshchestva. SE 2: 48-59.

Sergeyev G.P.

1963 Rannetripolskiy klad u sela Karbuna. SA 1: 135-137.

Shamiladze V.M.

- 1982 O nekotorykh voprosakh klassifikatsii i terminologii skotovodstva Kavkaza. SE 3: 70-76.
- Shaposhnikova O.G.
 - 1970 Bagatosharove poselennya poblizu sela Razdolne na r. Kalmius. Arkheologiya 23: 142-151.
 - 1971a Do pitannya pro metallobrobku u plemen donetskoy katakombnoy kultury. *Arkheologiya* 1: 22-26.
 - 1971b Pamyatki typu nizhnego sharu Mikhaylovki. In: AUSSR, vol.I, 250-258. Kiev.
 - 1985 Pamyatniki nizhnemikhaylovskogo tipa. In: AUSSR, vol.I, 323-331, Kiev.
 - 1987 Epokha rannego metalla v stepnoy polose Ukrainy. In: Drevneyshiye skotovody stepey yuga Ukrainy, 3-16. Kiev.

Shaposhnikova O.G., V.N. Fomenko, N.D. Dovzhenko

- 1986 Yamnaya kulturno-istoricheskaya oblast (Yuzhno-Bugskiy variant). Svod Arkheologicheskikh Istochnikov 1-3. Kiev.
- Shaposhnikova O.G., V.N. Neprina
 - 1977 Novorozanovskoye mnogosloynoye oseleniye. In: Drevnosti Poingulya, 52-65. Kiev.
- Shaposhnikova O.G., N.T. Tovkailo
 - 1989 Nekotoriye itogi issledovania mnogosloynogo poselenia Pugach na Yuzhnom Buge. In: *Pervobytnaya arkheologiya. Materialy i issledovaniya*, 97-105. Kiev.
- Sharafutdinova I.M.
 - 1980 Ornamentovani sokyry-molotky z katakombnykh pokhovan na Inguli. Arkheologiya 33: 60-70.
 - 1982 Stepnoye Podneprovye v epokhu pozdney bronzy. Kiev.
 - 1985 Pro vyhotovlennia lyvarnykh form epokhy bronzy v Pivnichnomu Prychornomiryi. *Arkheologiya* 49: 63-75.

Shchepynski A.A.

1985 Kemi-Obinskaya kultura. In: AUSSR, vol. I, 331-335.

Shchepynski A.A., E.I. Cherepanova

1969 Severnoye Prisivashye v V-I tysiacheletiakh do n.e. Simpheropol.

Shilov V.P.

- 1975a Modeli skotovodcheskikh khozyaystv stepnykh oblastey Evrazii v epokhu eneolita i rannego bronzovogo veka. SA 1: 5-16.
- 1975b Ocherki po istorii drevnikh plemen Nizhnego Povolzhya. Moskva.

Shmagliy N.M.

1986 O sotsialno-demographicheskoy rekonstruktsii krupnykh tripolskikh poseleniy. In: *Internationales symposium über die Lengyel-Kultur*, 257-264. Nitra-Vien.

Shmagliy N.M., I.T. Chernyakov

1983 Derevyani psalii yamnoy kultury. Arkheologiya 42: 10-16.

- Shmaglij N.M., M.Y. Videiko
 - 1988 Issledovania kurgana epohi bronzy na krupnom tripolskom poselenii u s. Maydanetskoye. In: Noviye pamyatniki yamnoy kultury Ukrainy, 131-135. Kiev.
 - 1991 Kurgany i problema ischeznovenia tripolskikh protogorodov. In: Drevneyshiye obshchnosti zemledelcev i skotovodov Severnogo Prichernomorya. Materialy mezhdunarodnoy konferentsii (10-14 dekabra 1990, Kishinev). Kiev.
 - 1993 Tripilski protomista. Arkheologiya 3: 52-63.

Shnirelman V.A.

1980 Proiskhozhdenye skotovodstva. Moskva.

- Shramko B.A.
 - 1992 Pakhotniye orudya yuga Vostochnoy Evropy v bronzovom i rannem zheleznom veke. In: *Istoriya i arkheologiya Slobodskoy Ukrainy*, 220-221. Kharkov.
- Shvets G.I.
 - 1978 Mnogovekovaya izmennost stoka Dnepra. Kiev.

Simakov G.N.

1982 O prinzipakh tipologizatsii skotovodcheskogo khozyaystva u narodov Sredney Azii i Kazakhstana v kontse XIX – nachale XX v. SE 4: 67-76.

Simon K.

1990 Höhensiedlungen der älteren Bronzezeit im Elb-Saale-Gebiet. Jahresschrift für Mitteldeutsche Vorgeschichte 73: 287-330.

Sinyuk A.T.

1981 Repinskaya kultura epokhi eneolita-bronzy v basseyne Dona. SA 4: 8-19.

Spiridonova E.A.

- 1990 Prirodnaya obstanovka golotsena yugo-vostoka Russkoy ravniny. Buleten Kommissii po Izucheniyu Chetvertichnogo perioda 59: 144-149.
- 1991 Evolutsiya rastitelnogo pokrova basseyna Dona v verkhnem pleystotsene i golotsene. Moskva.

Subbotin L.V.

¹⁹⁸³ Pamyatniki kultury Gumelnitsa Yugo-Zapada Ukrainy. Kiev.

Sulimirski T.

1968 Corded Ware and Globular Amphorae North-East of the Carpathians. London.

Sveshnikov I.

- 1974 Istoria naselennia Peredkarpattia, Podillii i Volyni v kinchi III pochatku II tysiacholittia do nashoj ery. Kiev.
- 1985 Kultura sharovidnykh amfor. in: AUSSR, vol. I, 280-291. Kiev.

Tallgren A.M.

1926 La Pontide prescythique apres l'introduction des metaux. ESA 2: 5-246.

Tatarinov S.I.

1977 O gorno-metallurgicheskom tsentre epokhi bronzy na Donbasse. SA 4: 192-207.

Telegin D.Y.

- 1968 Dnipro-Donecka kultura, Kiev.
- 1970 Osnovni rysy ta khronologia serednyostogovskoy kultury. Arkheologiya 23: 3-22.
- 1971a Eneolitichni stely i pamyatky nyzhnomikhaylovskogo typu. Arkheologiya 4: 3-17.
- 1971b O kulturno-territorialnom chlenenii i periodizatsii neolita Ukrainy i Belorussii. SA 2: 3-31.
- 1971c Serednyostogovska kultura. In: AUSSR, vol. I, 221-231. Kiev.
- 1973 Serednyostogivska kultura epokhi midi. Kiev.
- 1985a Dnepro-Donetskaya kultura. In: AUSSR, vol. I, 156-172. Kiev.
- 1985b Pamyatniki novodanilovskogo tipa. In: AUSSR, vol. I, 311-320, Kiev.
- 1985c Radiokarbonne ta arkheomagnitne datuvannya trypilskoy kultury. Arkheologiya 52: 10-22.
- 1985d Srednestogovskaya kultura i pamiatniki novodanilovskogo tipa v Podneprovye i stepnom Levoberezhye Dnepra. In: *AUSSR*, vol.I, 305-320. Kiev.
- 1986 Dereivka. A settlement and Cemetery of Copper Age Horse Keepers on the Middle Dniepr. British Archaeological Reports. Internationales Series 287. Oxford.
- 1987 Kulturne nalezhnist i datuvannya vyprostanykh eneolitichnykh pokhovan stepnogo Podniprovya. Arkheologiya 64: 73-84.
- 1990 Stepnoye Podniprovie i Nizneye Podunavie v neolite eneolite. In: Kamenniy vek na territorii Ukrainy, 6-17. Kiev.

Telegin D.Y., O.S. Filenko

1982 Mogilnik srednestogovskoy kultury v Dneprovskom Nadporozhye. SA 1: 72-83.

Telegin D.Y., I.D. Potekhina

- 1987 Neolithic Cemetries and Populations in the Dnieper Basin. British Archaeological Reports. International Series 383.
- Točik A.
 - 1963 Die Nitra-Gruppe. Archeologické rozhledy 15: 716-774.
 - 1979 Vyčapy-Opatovce a dalšie pohrebiská zo staršej doby bronzovej na juhozápadnem Slovensku. Nitra.

Todorova H.

- 1979 Eneolit Bolgarii. Sofia.
- 1989 Ein Korrelationversuch zwischen Klimatanderungen und prähistorischen Angaben. In: Das Aneolithikum und die früheste Bronzezeit (C¹⁴ 3000-2000 b.c.) in Mitteleuropa: kulturelle und chronologische Beziehungen. Acta des XIV. Internationalen Symposiums Prag-Liblice 20.-24. 10. 1986, *Praehistorica* 15: 25-28.
- 1993 Klima und Strandverschiebungen in der postglazial Bulgariens. In: The Fourth Millennium B.C., 77-81. Sofia.

Toynbee A.A.

- 1934 Study of History, vol. III. London.
- Trifonov V.A.
 - 1991 Stepnoye Prikubanye v epokhu eneolita-sredney bronzy. In: Drevniye kultury Prikubanya, 92-166. Moskva.

Tsalkin V.I.

- 1970 Drevneyshiye domashniye zhivotnye Vostochnoy Evropy. Moskva.
- Tunia K.
 - 1986 Z problematyki środowiskowych uwarunkowań gospodarki pasterskiej na terenie górskiej strefy polskich Karpat Zachodnich w czasach prahistorycznych. Acta Archaeologica Carpathica 25: 219-230.

Tzvek O.V.

- 1980 Tripolskiye poselenia Bugo-Dneprovskogo mezhdurechia (k voprosu o vostochnom areale kultury Cucuteni-Tripolye). In: *Pervobytnaya arkheologiya. Poiski i nakhodki*, 163-184. Kiev.
- 1985 Osoblivosti formuvania skhidnogo regionu Tripilsko-Kukutenskoy spilnosti. In: Arkheologiya 51: 31-45.
- 1989 Bugo-Dniprovski variant Vostochnotripolskoy kultury (k problemie vydelenia lokalnykh kultur i variantov Tripolia). In: *Pervobytnaya arkheologiya. Materialy i issledovaniya*, 106-117. Kiev.

Vasilyev I.B.

1981 Eneolit Povolzhya (step i lesostep). Kuybyshev.
Vasilyev I.B., A.T. Sinyuk

1985 Eneolit Vostochno-Evropeyskoy lesostepi (voprosy proiskhozhdeniya i periodizatsii kultur). Kuybyshev.

Vasilyev L.S.

1982 Phenomen vlasti-sobstvennosti. In: *Tipy obshchestvennykh otnosheniy v sred*ne veka, 60-99. Moskva.

Vaynshteyn S.I.

1971 O sushnosti i roli patriarkhalnogo uklada v sotsialnoy istorii kochevnikov Azii. In: Tezisy dokladov na sessiyakh i plenumakh, posvyashchennykh itogam polevykh issledovaniy, 18-25. Moskva.

Veklich M.F.

- 1987 Problemy paleoklimatologii. Kiev.
- Videiko M.Y.
 - 1992 Ekonomika ta suspilnyi lad tripolskogo naselenia Pivdennogo Pobuzhya. Etapy B-II/C-I (avtoreferat dissertatsii kandidata istoricheskikh nauk). Kiev.
 - 1994 Issledovania poseleniy srednego etapa Tripolskoy kultury na r.Kodime. In: Drevneye Prichernomorye, 18-25. Odessa.

Vinogradova N.V.

1983 Plemena Dnestrovsko-Prutskogo mezhdurechia v period rascveta tripolskoy kultury. Kishinev.

Vladar J.

1973 Osteuropäische und mediterrane Einflüsse im Gebiet der Slowakei während der Bronzezeit. *Slovenská Archeológia* 21: 253-357.

Wróbel H. (Taras H.)

- 1991 Badania nad osadnictwem kultury trzcinieckiej. Lubelskie Materiały Archeologiczne 6: 209-252.
- 1994 Próba systematyki ceramiki kultury trzcinieckiej na Wyżynie Wschodniomałopolskiej i Zachodniowołyńskiej oraz w północnej części Kotliny Sandomierskiej. In: *Problemy kultury trzcinieckiej*, 51-73. Rzeszów.

Yakar J.

1979 Troy and Anatolian Early Bronze Age Chronology. *Anatolian Studies* 29: 51-67.

Yakubenko E.A.

1982 Materialy poseleniya epokhi medi-bronzy Durna Skela v sobranii GIM USSR. In: Drevnosti stepnogo Podneprovya, 19-28. Dnepropetrovsk.

Yarovoy E.V.

1985 Drevneyshiye skotovodcheskiye plemena Yugo-Zapada SSSR. Kishinev.

Yura R.A.

- 1969 Raboty Khortitskoy ekspeditsii v 1968 g. In: Arkheologicheskiye issledovaniya na Ukraine v 1968 g., part III, 247-249. Kiev.
- Zakharchuk Y.M.
 - 1952 Sofiivskiy tilopalniy mohylnyk. AP 4: 121-122.
- Zapotocky M.
 - 1989 Streitäxte der Trichterbecherkultur: ihre Typologie, Chronologie und Funktion. *Praehistorica* 15: 95-103.

Zbenovich V.G.

- 1966 Pro kynzhaly Usativskogo typu. Arkheologiya 20: 38-46.
- 1972 Rozvidkovi roboty na pivdennomy Bugi. In: Arkheologichni doslidzhennia v Ukraini, part 4, 352-357. Kiev.
- 1973 Eneolit Pivnichno-Zakhidnogo Prichernomorya. In: Materialy z antropologii Ukrainy 7.
- 1975 Oboronni sporudy ta zbroya u plemen trypilskoy kultury. *Arkheologiya* 15: 32-40.
- 1976 K probleme sviazey Tripolia s eneoliticheskimi kulturami Severnogo Prichernomorya. In: *Eneolit i bronzoviy vek Ukrainy*, 57-69. Kiev.
- 1985 Do problemu stanovlennya eneolitu. Arkheologiya 51: 1-11.
- 1989 Pamyatniki rannego etapa tripolskoy kultury na territorii Ukrainy, Kiev.
- 1990 K probleme krupnykh tripolskikh poseleniy. In: Rannezemledelcheskiye poselenia-giganty tripolskoy kultury na Ukrainie, 10-12, Kiev.

Zbenovich V.G., V.A. Shumova

1989 Tripolskaya kultura Srednego Podnestrovia v svete novykh issledovanii. In: Pervobytnaya arkheologiya. Materialy i issledovaniya, 97-106. Kiev.

Zolotun V.P.

1970 Nekotorye svoystva paleopochv i voprosy datirovki kurganov na yuge Ukrainy. *MASP* 6: 168-181.

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