CEMETERIES OF THE SOFIEVKA TYPE: 2950–2750 BC

Janusz Budziszewski Małgorzata Daszkiewicz Sławomir Kadrow Viktor I. Klochko Aleksander Kośko Nikolay Kovalyukh Viktor F. Petrougne Jerzy Raabe Yuriy Y. Rassamakin Vadim Skripkin Barbara Stolpiak Mihailo Y. Videiko

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Editor's Foreword

The history of research into the cemeteries of the Sofievka type of the Tripolye culture (from the village of Sofievka near Kiev) is about 50 years old. However, the research has not provided yet any comprehensive report on the cemeteries, nor a full presentation of material finds or their thorough analysis. This can be justified by the extraordinary character of the said set of sources and their place outside the civilizational standard of the late eneolithic in the Northern Pontic zone.

The aim of this volume is to present the Sofievka issues from a wider perspective of the border zone of the three cultural areas: circumpontic, circumcarpathian and circumbaltic. The papers included in this volume show both a full array of sources, as far as it is possible at present, and the analytical documentation of their multidirectional genetic implications.

Therefore, this volume should encourage wider discussion of Central European conditioning of the development of the Tripolye culture, or generally, of the mechanisms of cultural contacts in the border zone between eastern and western Europe in the first half of the 3rd millennium BC.

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Mihailo Y. Videiko

CEMETERIES OF THE SOFIEVKA TYPE. FIELD RESEARCH, STATE OF PUBLICATION OF SOURCES AND GENERAL POSITION IN THE SYSTEMATICS OF TRIPOLYE CULTURE

In almost 50 years of research into Sofievka type cemeteries (Fig.1) two aspects can be distinguished. One of them consists in procurement of sources and their selective presentation (including preliminary classification), the other involves the application of the data to advance numerous transregional synthetic theories [cf. among the earliest, e.g., Gimbutas 1956: 109-110; Cabalska 1967:53; Sulimirski 1970:186-188; Šiška 1972:145n]. The present article provides an account of the first aspect, being a general introduction into the materials part of the work.

1. CEMETERIES. HISTORY OF RESEARCH

The history of the research shall be presented from three points of view: record of field work, methods of documentation and interpretation, and publication of materials.

1.1. FIELD WORK

The first eight graves of the Sofievka type were discovered by Ivan Samoylovski and L. Shalina in 1947 (Expedition "Kiev the Great" of the Ukrainian Institute of Archaeology). They were situated on the dune near the village of Sofievka (Fig.1). In an area of 56 sq.m I. Samoylovski excavated 8 cremation graves with pottery, flint tools and copper items. Many finds from the destroyed graves were on the surface of the dune — broken pots, pottery, flint blades, flat axes, copper beads, stone hammer-axes. In April 1948 the director of Institute, Petro Efimenko, visited



Fig. 1. Range of the Sofievka type sites: a - settlements; b - cemeteries (1 - Chernin; 2 - Krasny Khutor; 3 - Sofievka; 4 - Zavalovka; 5 - Chapayevka - single grave). Following V. Kruts with additions by the author.

Sofievka with Ivan Samoylovski and Yuriy Zakharuk. They gathered many finds in the area of the destroyed cemetery. Y. Zakharuk continued the investigations: from April 25th till May 10th and from August 29th till September 26th, 1948. He opened 139 cremation graves. In 1963 Y. Zakharuk and V. Kruts continued investigations on the Sofievka cemetery. In an area of 140 sq.m they found one cremation, flint tools and a group of three small pots. Besides graves, on the territory of the dune pottery from the Bronze and Early Iron Age and the Kiev Rus period were found. Thus, during the years 1947-1948 and in 1963 there were found 148 (8+139+1) graves belonging to the Tripolye culture.

The second cemetery near the village of Krasny Khutor (Fig.1) was discovered by Valentin Danilenko in the spring of 1950 (Expedition "Kiev the Great"), when he explored one cremation (number 167 of our catalogue). During the 1951 expedition, directed by Mikhail Makarevich, there were recovered 168 cremation graves in an area of 195 sq.m. V. Danilenko, V. Rybalova, S. Odintcova, E. Goncharova, A. Savchuk and post-graduate students Z. Baranovich and V. Kanivets also took part in this expedition. The cemetery was partly destroyed during World War Two according to one report 20 graves suffered.

The next cemetery was discovered by Vladimir Kanivets on September 25th, 1950 and the excavation took place between September 27 and October 4, 1950 (Expedition of the Ukrainian Institute of Archaeology) near the village of Chernin (Fig.1). G. Titenko and A. Furems (Kiev) took part in this expedition. In an area of 40 sq.m they opened 94 cremation graves.

The last, fourth cemetery was discovered and excavated by Vladimir Kruts (Ukrainian Institute of Archaeology) near Zavalovka in 1962 (Fig.1). The excavated area comprised nearly 200 sq.m. V. Kruts opened 16 cremation graves. The cemetery was partly destroyed by pits of a Bronze Age village, and partly during World War Two. V. Kruts assumed that there were about 50 graves here.

In 1968 Vladimir Kruts and Anatoliy Kubyshev found a single cremation near Chapayevka (during investigations of the Tripolye settlement and the inhumation cemetery of the B-II period). They assumed that here there was a cremation cemetery belonging to the C-II period, which was destroyed by ploughing (Fig.1).

Thus, during the period between 1947 and 1968 there were opened four cemeteries and one single grave, in all 428 cremation graves (this number was confirmed after the revision of reports and publications).

The actual number of burials is a matter which needs to be resolved and we shall return to this problem in the latter parts of this book.



Fig. 2. Sofievka cemetery: A - general plan of the excavations 1947-1948 (a - range of bones from destroyed graves; b - excavations from 1947); B - example of documentation of the smallest exploration unit (2x2) - research of I. Samoylovski, Following I. Samoylovski, Y. Zakharuk.

1.2. METHODOLOGY OF THE EXCAVATIONS AND INTERPRETATION OF THE REMAINS

All of the cemeteries were divided into areas 2x2 sq.m (Chernin, Sofievka, Zavalovka) or 1x1m (Krasny Khutor) with the numbering done by letters and figures (Fig.2:A). Surface and finds levelled from conventional zero (in Sofievka: NW side of sq.9-z), and sometimes finds levelled from the surface (Krasny Khutor). All finds were traced in the general drawings (Fig.2:B) and the daybooks of the excavations (Fig.3). Stratigraphy of the dune was fixed on a general cross-section (Fig.2:B), local stratigraphy of the cremations was entered in daybooks, only in written form. All finds were recorded in lists (see archival materials). Every pot with ashes or a pile of burnt bones and every plot of scattered bones and ashes received a number as a seperate cremation grave, because it was impossible to establish the extent of every

grave in the sand [Zakharuk 1952; Kanivets 1956; Danilenko, Makarevich 1956; Kruts 1968], Fig.4, 5.

Only I. Samoylovski described pots and ashes, which were as near each other as one cremation grave. This methodology is close to the views expressed in this work [cf. in this volume: Videiko, Archaeological...and Kośko, Videiko, Origins...].

1.3. LITERATURE ON THE MATERIALS (PUBLICATIONS AND ARCHIVAL REPORTS)

a. Publications

The first articles about the excavations of Sofievka cemetery appeared in 1952. I. Samoylovski published a description of eight cremations, which were opened in 1947. He published the situation plan of the cemetery and descriptions of some objects from the graves and other gathered items [Samoylovski 1952:121-123, Fig.1--3].

In the same journal Y. Zakharuk presented a short report on the excavations of Sofievka cemetery in 1948. Information included descriptions of the dune, excavations, a funeral ceremony and categories of the grave goods. Illustrations were provided of the general plan, the cross-section of the dune and 31 objects from the cemetery such as, for example, weapons, beads, flint tools, and ceramics [Zakharuk 1952:112-120,Fig.1-4].

Publications on Krasny Khutor and Chernin appeared in 1956. V. Danilenko and M. Makarevich gave information about the cemetery and the 44 graves. The illustrations depicted the following: the plan of the cemetery, a general view of the cemetery, cremations (photographs), selected ceramics, hammer-axes, and copper and flint articles [Danilenko, Makarevich 1956:92-98, Fig.1-3, Tab.1]. V. Kanivets published concise information about the excavations of Chernin cemetery, with a description of 39 cremations and categories of grave goods. The illustrations depicted the following: the plan of the cemetery, a view of the central part of the cemetery, and finds [Kanivets 1956:99-110, Fig.1-4, Tab.I-II].

V. Kruts published full information about the Zavalovka cemetery in 1968 — with a table of the main parameters of graves and an analysis of grave goods. In the illustrations were the plan of the cemetery and some goods from cremations: copper and amber beads, flint arrowheads, and a clay figurine [Kruts 1968:126-130,Tab.1, Fig.1-3].

Some general information about the Sofievka type is contained in the first volume of the "Archaeology of the Ukraine" [Arkheologiya 1971:201-204, 1985:246-248], and in a monograph by V. Kruts devoted to the late Tripolye monuments on the Middle Dnieper [Kruts 1977].





Fig. 3. Sofievka cemetery - 1948, drawings from the daybook of Y. Zakharuk: A - sq. 13-P, grave 135 (138) - "burnt bones in grey, ashy soil"; sq. 13-0, graves 137 (139), 138 (140), 139 (141) - "September 5, view from the north-west".



Fig. 4. Krasny Khutor cemetery. An example of horizontal mapping of the range of graves. Based on field documentation of V. Danilenko and M. Makarevich.



Fig. 5. Sofievka cemetry - 1947 (1), 1948 (2-6). Examples of horizontal mapping of the range of graves. Based on the documentation of I. Samoylovski and Y. Zakharuk.

The first attempt at a full publication on the cemeteries appeared in 1991, in a monograph by V. Dergachev and I. Manzura, which was the first attempt in the historiography of all burial complexes, connected with the final (C-II) Tripolye in the territories of Romania, Moldova and Ukraine [Dergachev, Manzura 1991:143-191, Fig.90-112]. Publication of the Sofievka cemeteries used the archival reports and collections, with illustrations of most of the complexes and plans of the cemeteries. It was very hard work to prepare such a work 30-40 years after the last excavations. This was particularly the case with regard to the Sofievka and Krasny Khutor sites; there are some mistakes in the text and illustrations of this monograph, which are also uncomplete. Later V. Dergachev published a translation of this book in Germany [Dergachev 1991].

b. Archival reports

All the archival materials connected with the excavations of the Sofievka type cemeteries are in the Scientific Archive of the Institute of Archaeology (National Academy of Sciences of Ukraine) in Kiev.

Chernin. Kanivets V.I., Otchet o raskopkakh mogilnika u s. Chernin Vyshne Dubechanskogo rayona Kievskoy oblasti v sentiabre-oktiabre 1950 goda, 39 pp., 21 illus., 2 drawings, daybook of excavations, list of finds, negatives (F.E. n.1091-1950/13).

Krasny Khutor. Danilenko V.N., Makarevich M.L., Otchet o rabote Borispolskogo otriada ekspeditsii "Bolshoy Kiev" v 1951 godu (Krasnokhutorskiy mogilnik), 34 pp., 26 illus., 1 drawing, 3 daybooks of excavations, list of finds, negatives (F.E. n.1199-1951/8b).

Sofievka. 1. Samoylovski I.M., Tilopalny nekropol epokhi midi bila s.Sofievka v okolitsakh Kieva. Korotkiye povidomlennia pro rozvidkovi rozkopki 1947 g., 17 pp., 24 illus. (F.E.n.755-1947/27).

2. Zakharuk J.M., Otchet o rabote Sofievskoy arkheologicheskoy ekspeditsii Instituta Arkheologii AN Uk. SSR 1948 goda, 103 pp., 3 drawings, daybook of excavations, negatives of photographs, list of finds (F.E.n.885-1948/9). All previous publications on Sofievka were prepeared using only these two reports.

3. Zakharuk J.M., Sofievskiy mogilnik kak istochnik k izucheniyu epokhi bronzy v Sredniem Podniprovyu — Ph.D. dissertation in history (F.12.N.319-177p.).

4. Zakharuk J.M., Kruts V.A., Raskopki pozdnetripolskogo poselenya u s. Sofievka Borispolskogo rayona Kievskoy oblasti, 21 pp., 16 illus., 13 drawings, 2 daybooks of excavations, negatives, list of finds (F.E.n.4410-4414-1963/8a).

Zavalovka. Telegin D.Y., Mitrofanova V.I., Berezanskaya S.S., Kruts V.A., Otchet ob arkheologicheskikh issledovaniyakh v zone Kievskogo vodokhranilishcha v 1962 godu, 84 pp., 40 illus., 58 drawings, daybooks, list of finds, negatives (F.E. n.3996-3999-1962/1).

cemetery	year	exc. area	graves	exc. by	publications
Sofievka	1947 1948 1963	56 sq.m 500 sq.m 140 sq.m	8 139 1	I. Samoylovski Y. Zakharuk Y. Zakharuk V. Kruts	Samoylovski 1952 Zakharuk 1952 Zakharuk, Kruts 1963
Krasny Khutor	1950 1951	– 195 sq.m	1 168	V. Danilenko M. Makarevich V. Danilenko	Danilenko, Makarevich 1956
Chernin Zavalovka Chapayevka	1950 1962 1968	40 sq.m 200 sq.m *	94 16 1	V. Kanivets V. Kruts V. Kruts A. Kubyshev	Kanivets 1956 Kruts 1968 Kruts, Kubyshev 1971
In all	1947 1968	1131 sq.m	428		Dergachev, Manzura 1991

Cemeteries of Sofievka type. History of field investigations and publications

* Single grave, may be from destroyed cemetery.

The finds from the excavations are now in the Institute of Archaeology (National Academy of Sciences of Ukraine) in Kiev. They are located in two places: Scientific Funds and the Archaeological Museum. There are four collections:

1. *Chernin*, N II/190, excavations of V. Kanivets in 1950 of the late Tripolye cemetery near v. Chernin, Vysshaya Dubechnya district, Kiev region. In the collection: pottery, flint, copper items, ashes from cremations.

2. Krasny Khutor, N II/197, excavations of V. Danilenko and M. Makarevich in 1951 of the late Tripolye cemetery near Krasny Khutor (Kiev). In the collection: pottery, flint, some stone hammer-axes, copper beads, ashes and cracked bones from graves. 3. Sofievka, N II/102, excavations of I. Samoylovski and Y. Zakharuk (1947, 1948, 1963) on the late Tripolye cemetery near Sofievka, Baryshev district, Kiev region. In the collection: pottery, copper objects, beads, some stone hammer-axes, flint, some burnt bones and ashes from cremations, finds from following periods.

4. Zavalovka, N II/518, excavations of V. Kruts in 1962 near v. Zavalovka of Vysshaya Dubechnya district, Kiev region. In the collection: pottery, flint, stone tools and beads, ashes from cremations, pottery of the Early Bronze Age period.

In the exposition of the Museum are the best finds from all four cemeteries: a collection of stone hammer-axes, copper knives and daggers, large flint blades, flat axes, arrowheads, copper beads, one copper bracelet, pottery, and one pot with ashes.



Fig. 6. Ranges of types (groups) of the late Tripolye culture: A - Vykhvatintsy; B - Usatovo; C - Brynzeny; D - Gordineshty; E - Troyanov; F - Gordosk; G - Lukashi; H - Sofievka; I - boards of types; J - boards of local variants; K - boards of regional zones. Following V. Dergachev, I. Manzura.

The problem of definition concerns, in particular, (a) the question of identification of unique genetic features of the "type", and (b) the nature of the difficulties that have been experienced in the identification of its sepulchral version that is essential to its identification.

The first monuments of the Sofievka type were discovered at the end of the nineteenth century (Kirillovskie Vysoty, etc.), but until the cemetery excavations they were related to the Gorodsk-Usatovo type [Passek 1949].

Definition of the Sofievka type became possible only after the excavations of 1947-1951. In 1953 Y. Zakharuk created the conception of Sofievka type [Zakharuk 1953:78-80], as a special type of the late Tripolye (Fig.6).

a. We have three versions of the origin of the Sofievka type:

1. The Sofievka type was the outcome of the development of the Tripolye culture on the Middle Dnieper, from period B I/II, from types of Kolomiyshchina-Chapa-yevka-Lukashi [Zakharuk 1953, 1971; Kruts 1977].

2. Kievo-Tripolye culture (or the Sofievka type) appeared not as the result of an evolution of the Tripolye culture, but after an assimilation of the Tripolye elements by the local Neolithic population, and transformed later to the Dnieper-Desna culture [Danilenko 1953:81].

3. The Sofievka type appeared as a result of the interaction between the local Tripolye component (type Lukashi) and Tripolye types from the Dniester-Prut region, but the last influence came over the Troyanov type of Volhynia region [Dergachev 1980:142], or from the Zhvanets type from Dniester as well [Movsha 1985:249].

It seems to us that V. Dergachev is right, because he took into consideration materials from the Dniester area, which were unknown to V. Kruts or Y. Zakharuk.

b. The first problem is that there is absent a full publication of all materials from the excavations. Then there are the problems of interpretation of this materials: What was a cremation grave? Grave goods? Funeral customs? Next are the problems of study by specialists: typological identification of flint tools, technology and typology of pottery, petrographical studies of stone and flint raw materials, metallurgy of the Sofievka type, weapons and absolute chronology. The study of these records will give us the possibility to create a new view of the problems of the origin and the dissapearence of the Sofievka type cemeteries, origins of the cremation custom in the Copper Age, and inter-cultural relations in this period.

We understand that it is not possible to solve all these problems. Our main aim is to make available to all scholars the brilliant archaeological complexes from Ukraine which awaited full publication for 40 years.

Translated by Mihailo Y. Videiko and Piotr T. Żebrowski

SOURCES

Mihailo Y. Videiko

ARCHAEOLOGICAL CHARACTERISTICS OF THE SOFIEVKA TYPE CEMETERIES

This publication was prepared using archival materials - not only reports, but daybooks, drawings, lists, photographs. We tried to present fuller and more correct information than in a previous publication [Dergachev, Manzura 1991]. At first it was necessary to present all descriptions and illustrations of complexes according to the existing interpretation (cremation grave = cultural point). This does not mean, however, that we fully accept it, because "graves" identified during field exploration are in most cases fragments of larger ritual areas, which means that they are exclusively features. A full determination of ranges of these actual graves-tombs has not been, however, possible at present [cf. in this volume: Videiko, "Cemeteries...", Kośko, Videiko, "Origins..."]. Therefore, the term "grave" is used in this text in accordance with the nomenclature convention justified by "tradition".

Corrections of grave inventory structures concern mainly flint artefacts, which were comprehensively analysed for the first time by J. Budziszewski [see in this volume: Budziszewski, "Flint..."]. This led him to examine the correspondence between the data included in the field daybook, drawings and inventories (object call numbers). An outcome of the examination has been comments on "information asynchronisms" or stressing in the text certain doubts concerning the connection of a particular artefact with a given grave. Such doubts are signalled by "?" or "commenting footnotes" marked with an asterisk.

The numbering of the graves in this part is as follows:

Chemin: according to the report of V. Kanivets.

Krasny Khutor: our new numbering resulted in putting in brackets the numbers used in the report and the publications of V. Danilenko and M. Makarevich, and V. Dergachev in the following way: 1) report number, 2) present publication number. In their report, V. Danilenko and M. Makarevich at first described cremations in urns under numbers 1-101, but some of them were empty vessels. Then they described cremations - from 1 to 94, reserving some numbers for destroyed "graves". Then, when the first publication was prepared, V. Danilenko and M. Makarevich numbered all cremations (in vessels and without) from 1 to 165. This numbering was used by V. Dergachev [Dergachev, Manzura 1991]. For example: grave 162(75C-158): 162 - our numbering, 75C - from the report, means "cremation 75", 158 - number of present publications.

Sofievka: the enumeration of 1947 excavations - following I. Samoylovski; of 1948 - following Y. Zakharuk - according to the text of his dissertation, not of his report in which under number 94 is listed an empty pot. The numbering in the publication of V. Dergachev is from the text of the report, and we give it in brackets, after our numbers.

Zavalovka: according to reported publications [Kruts 1968; Dergachev, Manzura 1991].

Illustrations. Most of the illustrations are new, but in the case of objects which did not survive, the original illustrations from reports and daybooks are used. Consequently, both forms and scope of documentation differ, e.g. there have been difficulties in determining the scale of drawings.

1. TOPOGRAPHY OF THE CEMETERIES

The Sofievka cemetery was situated on a sand dune on the left bank of the Dnieper. The cemetery occupied a part of the top and slope of the dune. The cemetery at Krasny Khutor was situated on the top of a sand dune on the left bank of the Dnieper. The length of the dune was 75m, the width 50m, and the height 12,5m. The Chernin cemetery occupied the top of a narrow sand dune (length 380 m, width 40-90m). The height of the dune was 5m over the Dnieper valley. This dune was a part of the sand hills which divided the left river of Dnieper from the old riverbed. The Zavalovka cemetery was situated on a sand dune on the left bank of the Dnieper. The height of the dune was nearly 9m over the level of riverbed. The top of the hill was 50m x 30m size. So all the cemeteries were situated on the sand dune on the left bank of the Dnieper with a height 5-12m over the riverbed, not far from the water. Only one grave of the Sofievka type was on the right, high, bank of Dnieper (near Tripolye settlement and inhumation cemetery of B-ll period at Chapayevka) [see in this volume: Videiko, "Cemeteries...", Fig.1].

2. STRATIGRAPHY

All cemeteries have similar stratigraphy, because they are situated on sand dunes.

Chernin

Layer 1, 0 -0,03m - grass soil.

Layer 2, 0,03-0,34m - yellow sand.

Layer 3, 0,34-0,48 (or 0,66) m - buried soil.

Layer 4, from 0,48 (0,66) m - yellow sand, then - white sand.

All graves were in yellow sand (level 4), at a depth of 0,36-0,59m. Level 3 (buried soil) was not destroyed by graves, so it appeared after the cemetery.

Krasny Khutor

Layer 1, 0 - 0,2m - dark soil.

Layer 2, 0,2-0,6m - yellow sand with remains of cemetery.

Layer 3, from 0,6m - white sand.

All cremation graves were opened in yellow sand (level 2) at a depth of 0,5m.

Sofievka

Layer 1, 0-0,2m - grey-yellow sand.

Layer 2, 0,2-0,4m - grey sand.

Layer 3, 0,4-0,5m - buried soil.

Layer 4, 0,5-0,85m - yellow sand with cremation graves.

Layer 5, from 0,85m - white sand.

Some finds were opened in levels 1-3 (a result of contemporary ploughing). Also on the dune were excavated inhumation graves of Kiev Rus (tenth-twelvth century AD), among surface finds was included pottery of the Middle Dnieper culture and the Early Iron Age.

Zavalovka

Layer 1, 0-0,2m - grey sand.

Layer 2, 0,2-0,6m - yellow sand.

Layer 3, from 0,6m - white sand.

All cremations were opened in yellow sand (level 2), at a depth of 0,4-0,6m. Some graves were destroyed by pits of the Early Bronze Age (Middle Dnieper culture).

Results of the excavations of four cemeteries show us that all the graves were in yellow sand, under the buried soil. The upper soil horizon was not destroyed by graves. Buried soil appeared later than cemeteries. In grave inventory descriptions, typological identifications of the following authors have been used: J. Budziszewski - flint artefacts [Budziszewski, "Flint...", in this volume]; V.I. Klochko, A. Kośko - stone axes-hammers [Klochko, Kośko, "Weapons...", in this volume]; V.I. Klochko - copper artefacts [Klochko, "Copper...", in this volume]; R.F. Mazurowski - amber artefacts [Mazurowski 1983].

In the case of pottery, in the absence of appropriate classifications of pottery for the Tripolye culture, general assumptions have been used of systematic typology of the pottery of the Funnel Beaker culture [Kośko 1981:23-42]. In respect to the macromorphology, the following typological groups (hereafter: "t.g.") have been distinguished: "basic" t.g. - I = platter, II = vase, III = pot, and "special" t.g. - IV = amphora, V = beaker, VI = jug, VII = cup, VIII = cover. While decorations have been classified by decoration zone (a - edge, b - external under-edge, c - belly) and by decoration technique (a - pressing/incising with a die, b - pressing/incising with a cord, c - engrave, d - painting, e - relief-convex, 0 - no decorations). Thus, a record reading t.g.I-b-e stands for platter, externally decorated under the edge with a relief ornament. The purpose of this classification is to adapt the data published now to future interregional and intercultural comparative studies¹.

Anthropological analyses attempted in this study have not broadened the characteristics of the "Sofievka" populations².

3.1. CHERNIN CEMETERY (FIG.1)

To determine the locations of individual graves (references to squares), two kinds of call numbers have been used. One corresponds to the attached plan of the cemetery (Fig.1) [foll. Dergachev, Manzura 1991:311 - with the editor's adaptations] and the other one to the author of the study.

Grave 1

Sq.A-3 [D-IV-1/D-IV-2], depth 36-42cm. Pile of ashes, oval in plan, 25x25x6cm. Above the cremation is the horizon of sand (10cm), on which grave 2 was found.

Grave 2

Sq.A-3 [D-IV-2], depth 23-31cm. Pile of ashes, oval in plan, 23x32x8cm.

¹ Typological data have been included at the editor's request.

 $^{^2}$ In the opinion of Dr S. Segeda (National Academy of Sciences of Ukraine, Institute of Archaeology) who analysed the osteological sources, their state of preservation and type of storage make it impossible to broaden our knowledge of the subject



Fig. 1. Chernin cemetery: the general plan (after V. Kanivets). 1 - vessels with burnt bones and ashes; 2 - pile of burnt bones; 3 - spot of ashes and scattered burnt bones; 4 - empty vessels; 5 - destroyed part of site .

Sq.A-3 [D-IV-2], depth 42cm. Vessel (t.g.III-0) and burnt bones. 3cm to the west of vessel, in the sand is an ordinary flint arrowhead with straight base (Fig.2:2).

Grave 4

Sq.B-3 [C-IV-3], depth ? Large vessel (t.g.?) with burnt bones. On the bones was a small vessel with ashes (t.g.II-b-a), Fig.2:1.

Grave 5

Sq.A/B-3 [C-IV-4/D-IV-2], depth 25-40cm. Pile of burnt bones, circular in plan, 30x30x15cm. In the center of pile is a fragment of vessel (t.g.?), Fig.2:3.

Grave 6

Sq.B-3 [C-IV-3], depth 30-39cm. Pile of burnt bones, pear-like in plan, 40x--35x-9cm. In the central part are bones mixed with ashes.

Grave 7

Sq.B-3 [C-IV-3], depth 45cm. Spot with burnt bones, pear-like in plan, 36x32cm.

Grave 8

Sq.B-3 [C-IV-4], depth 18-32cm. Pile of burnt bones, 25x23x14cm, under the west part of grave 9. In the central part are bones mixed with ashes. The NW part of the cremation is divided from grave 5 by a 7cm sand horizon.

Grave 9

Sq.B-3 [C-IV-4], depth 18-37cm. Pile of burnt bones, oval in plan, 28x28x19cm.

Grave 10

Sq.B-3 [C-IV-4], depth 18-28cm. Pile of burt bones, oval in plan, 22x16x10cm. In the central part are bones mixed with ashes. Under the pile is a broken vessel (t.g.?). Among the bones is a flint flake (lost).

Grave 11

Sq.B-3 [C-IV-centre], depth 30-45cm. Pile of burnt bones, circular in plan, 20x20x15cm, covered by spot of burnt bones, oval in plan, 35x28cm. In the central part of the pile are bones mixed with ashes. Between the bones is a cylindrical copper bead (type IIBe2). To E of pile is part of an ordinary flint blade knife refitted from 2 burnt fragments - variant B (Fig.2:4). It is refitted with an artefact from grave 52.

Grave 12

Sq.B-3 [C-IV-1/C-IV-2], depth 60cm. Vessel (t.g.IV-?) with burnt bones of adult man. Among bones - 4 copper beads (types 3x IIBe2, 1x IIBe3) and 3 flint tools (ordinary blade knife - variant B, flake side-scraper and refitted from 5 burnt fragments two parts of undefined blade tool used as striker), Fig.3:1. Bones and goods with traces of red ochra paint.

Sq.B/C-3 [B-IV-3/4,C-IV-1/2] depth 38cm. Spot of burnt bones, oval in plan, 34x30cm.

Grave 14

Sq.C-3 [B-IV-1/3], depth 29-54cm. Northern part of the spot burnt bones, in central part mixed with ashes, diam. 18cm. To W from spot - small vessel (t.g.III-0), Fig.3:2.

Grave 15

Sq.C-3 [B-IV-1/3], depth 29-54cm. Southern part of spot of burnt bones, in central part (7x5cm) mixed with ashes.

Grave 16

Sq.C-3 [B-IV-4], depth 49cm. Low part of the vessel (t.g.?) with burnt bones.

Grave 17

Sq.C-3 [B-IV-4], depth 35-43cm. Pile of burnt bones, oval in plan, 42x23x8cm.

Grave 18

Sq.C-3 [B-IV-4], depth ?. Vessel (t.g.IV-?) with burnt bones and ashes (Fig.3:3).

Grave 19

Sq.C-3 [B-IV-4], depth ?. Vessel (t.g.IV-0) with burnt bones (Fig.3:4).

Grave 20

Sq.C-3/4 [B-IV-4,B-I-3], depth 33-50cm. Pile of burnt bones, pear-like in plan, 29x34x17cm. In central part bones mixed with ashes (diam.13cm, thickness 3cm).

Grave 21

Sq.A-3/4 [D-I-3/D-I-1], depth 41cm. Pile of burnt bones, irregular in plan, 24x34cm. To NE of pile - low part of broken (?) vessel (t.g.?).

Grave 22

Sq.A-4 [D-I-1], depth 43cm. Vessel (t.g.IV-?) with burnt bones and ashes (Fig. 4:1).

Grave 23

Sq.A-4 [D-I-1], depth 41-54cm. Pile of burnt bones, circular in plan, 17x27x13 cm, covered by spot of burnt bones 25x32cm. On surface of spot - spiral copper bead (type IIBe3).

Grave 24

Sq.A/B-3/4; [C-I-3/C-IV-4/D-I-1/D-IV-2], depth 32-43cm. Pile of burnt bones, oval in plan, 30x22x11cm.

Grave 25

Sq.B-4 [C-I-4], depth 24-30cm. Pile of burnt bones, oval in plan, 18x24x6cm, covered by spot of burnt bones, irregular in plan, 25x40cm.

Sq.B-4 [C-I-4], depth 34. Vessel (t.g.?) with burnt bones (Fig.4:2)

Grave 27

Sq.B-4 [C-I-4], depth 20-31cm. Pile of burnt bones, circular in plan, 18x19x11 cm, covered by spot of burnt bones, circular in plan, 28x28cm.

Grave 28

Sq.B-4 [C-I-4], depth 34-42cm. Pile of burnt bones, circular in plan,18x18x8cm. In central part bones mixed with ashes. NE part of pile covered of burnt bones.

Grave 29

Sq.B-4/5 [C-I-4/C-II-3], depth 23-36cm. Pile of burnt bones, oval in plan, covered by spot of scattered burnt bones.

Grave 30

Sq.B-5 [C-II-3], depth 23cm. Pile burnt bones, circular in plan, 20x20cm. Covered by spot of burnt bones. Among bones - ordinary blade striker made from fragment of flint knife. Near the pile broken vessel (t.g.II-0?), Fig.4:3.

Grave 31

Sq.B-5 [C-II-3], depth 23cm. Pile of burnt bones under the SW part of large spot of burnt bones. Circular plan, 10x10cm.

Grave 32

Sq.B-4/5 [C-I-4/C-II-3], depth 44cm. Vessel (t.g.V-0?) with burnt bones (Fig. 4:4).

Grave 33

Sq.B-5 [C-II-3], depth 44cm. Vessel (t.g.III-0) with burnt bones. Among bones - 5 copper beads (type IIBe1). Near the vessel - flint ordinary arrowhead with straight base (Fig.5:1).

Grave 34

Sq.B-4/5; [C-II-3/C-I-4], depth 44cm. Vessel (t.g.?) with burnt bones.

Grave 35

Sq.B-4 [C-I-4], depth 34-41cm. Pile of burnt bones, irregular in plan, 28x18x7cm, covered by spot of burnt bones.

Grave 36

Sq.B-4 [C-I-4], depth 34-47cm. Pile of burnt bones, circular in plan, 30x28x13 cm, partly covered by spot of burnt bones. Among bones - refitted from 3 burnt fragments part of ordinary blade knife - variant B (Fig.4:5).

Grave 37

Sq.B-4 [C-I-4/C-I-2], depth 34-41cm. Pile of burnt bones, oval in plan, 16x-20x-7cm, covered by spot of burnt bones, irregular plan, 32x20cm. In center bones mixed with ashes. To S and NW from the pile - 2 small vessels (t.g.III-c-c; III-0), Fig.5:2.

Sq.B-4 [C-I-2], depth 34-44. Pile of burnt bones, oval in plan, 25x14x10cm. In central part bones mixed with ashes, covered by spot of burnt bones.

Grave 39

Sq.B-4 [C-I-2], depth 54cm. Vessel (t.g.IV-?) with burnt bones of man 16-18 years old and ashes. Low part of the vessel was broken in past (Fig.5:3).

Grave 40

Sq.B-5 [C-II-1], depth 32-53. Pile of burnt bones, in central part mixed with ashes, 37-26cm, covered by spot of burnt bones, 40x50cm. Among bones - 10 burnt flint arrowheads (5 ordinary pieces with straight base - Fig.5:4a-e, 3 slim pieces with straight base - Fig.5:4g-i, 1 big piece with concave base - Fig.5:4f, 1 undefined - lost).

Grave 41

Sq.B-5 [C-II-1], depth 37-47cm. Pile of burnt bones, 20x20x10cm under the S part of spot of burnt bones 30x42cm. In central part, bones mixed with ashes.

Grave 42

Sq.B-5 [C-II-3], depth 37-52cm. Pile of burnt bones, 14x14x15cm, under the N part of spot of burnt bones. Among bones - 5 flint tools: asymmetric blade perforator made from knife and used as striker, burnt bifacial flake knife and 3 burnt arrowheads (2 ordinary pieces with straight base and fragment of slim atypical piece), Fig.6:1.

Grave 43

Sq.B-5 [C-II-3/C-II-1], depth 41cm. Vessel (t.g.III-0) with burnt bones. Among bones - 2 small copper shackles (type IISH) and burnt arrowhead (slim with straight base). Near the NE side of pot was vessel (t.g.II-0) without remains of cremation (Fig.6:2).

Grave 44

Sq.B-5 [C-II-2], depth 41. Vessel (t.g.III-0) with burnt bones (Fig.6:3).

Grave 45

Sq.B-5 [C-II-1], depth 41cm. Vessel (t.g.III-c-a) with burnt bones adult man and adolescent 13-15 years old, which was on the remains of cremation 46 (Fig.6:4).

Grave 46

Sq.B-5 [C-II-1], depth 30-62cm. Pile of burnt bones, oval in plan, 40x25x32cm, covered by the spot of burnt bones, 70x50cm. In central part of pile bones mixed with ashes (diam. 13cm.) Spot surrounded by the circle of horse teeths, thrusted in sand. Among bones flint flake (lost), to the S - broken vessel. On remains of grave 46 - vessel with bones of grave 45.

Grave 47

Sq.B-5 [C-II-2], depth 60cm. Low part of the vessel (t.g.IV-0?) with burnt bones (Fig.7:1).

Sq.B-5 [C-II-2], depth 47cm. Pile of burnt bones, 15x11x12 cm, covered by circular spot of burnt bones, 30x28cm. Among bones - 2 flint artefacts: side-scraper with bifacial retouch and ordinary chip. Near the pile 3 vessels (t.g.I-0; III-0; IV-0), Fig.7:2.

Grave 49

Sq.B-5/6 [C-II-2/C-III-1], depth 46-60cm. Pile of burnt bones, circular in plan, 17x17x14cm, covered by circular spot of burnt bones, 30x30cm. In central part of pile bones mixed with ashes (diam.14cm). Among bones - 2 fragments of flint artefacts: scaled piece made from flake and ordinary chip (Fig.8:1).

Grave 50

Sq.B/C-6 [C-III-1/B-III-3], depth 40-44cm. Pile of burnt bones, 20x11x4cm. Among bones flint flake (Fig.8:5).

Grave 51

Sq.B-4 [C-I-1], depth 40cm. Part of vessel (t.g.?) with burnt bones of the child. In 10cm to NW - vessel (t.g.I-0), Fig.8:2.

Grave 52

Sq.B/C-4 [C-1-2/B-1-4], depth 43-54. Pile of burnt bones, circular in plan, 20x20x11cm, covered by spot of scattered burnt bones, irregular in plan, 60x20cm. Among bones - 2 copper beads (type IIBe?) and refitted from 15 burnt fragments (between them singular pieces from graves 11 and 63) 2 flint ordinary blade knives - variant B. In 10cm to N - broken vessel (t.g.?), Fig.8:3.

Grave 53

Sq.C-4 [B-I-3], depth 52cm. Vessel (t.g.III-0) with burnt bones (Fig.8:4).

Grave 54

Sq.C-4 [B-I-3], depth 55cm. Broken vessel (t.g.?) with burnt bones.

Grave 55

Sq.C-4 [B-I-3], depth 63cm. Vessel (t.g.?) with burnt bones and ashes (Fig.8:6).

Grave 56

Sq.C-4 [B-I-4], depth 43-50. Pile of burnt bones, circular in plan, 18x18xcm. In central part bones mixed with ashes. Among bones burnt fragment of flint ordinary blade knife - variant B (?). To NW from pile on depth 43cm - burnt flint arrowhead (ordinary with straight base), Fig.9:1.

Grave 57

Sq.C-4 [B-I-4], depth 47cm. Pile of burnt bones, oval plan, 25x20x7cm. In central part bones mixed ashes. Partly covered by spot of scattered burnt bones, circular in plan, 27x28cm.

Sq.C-4 [B-I-4], depth 45cm. Vessel (t.g.IV-0) with burnt bones. In low part of vessel - two holes (5x4 and 3,8x5cm), Fig.9:2.

Grave 59

Sq.C-4 [B-I-3], depth 36-41cm. Pile of burnt bones, irregular in plan, 32x36x5cm. Among bones - clay spin-wheel (Fig.9:3).

Grave 60

Sq.C-4 [B-I-1], depth 51-59cm. Pile of burnt bones, irregular in plan, 30x15x8cm, covered by sand (11cm). On sand - scattered burnt bones of cremation 61.

Grave 61

Sq.C-4 [B-I-1], depth 40-57cm. Pile of burnt bones, rectangular in plan, 32x--21x-17cm. To SW continued by spot of scattered bones, 50x25cm.

Grave 62

Sq.C-5 [B-II-3], depth 49cm. Vessel (t.g.II-0) with burnt bones. To N from vessel - in sand - undefined flint arrowhead (lost), Fig.9:4.

Grave 63

Sq.C-5 [B-II-3], depth 49-75cm. Pile of burnt bones oval in plan, 40x28x26cm. Near the pile is part of a copper tool (type ?) and 17 flint artefacts: 8 ordinary chips (Fig.9:51-s) and 9 chunks. Among the bones lie fragments of a vessel (t.g.?) and 14 flint artefacts: 3 burnt ordinary arrowheads with straight base (Fig.9:5a-c), a flake perforator (Fig.9:5d), an ordinary flake (Fig.9:5e), 5 burnt fragments of blade tools - Fig.9:5f-h (between them 2 pieces refitted - Fig.9:5f, and 1 piece refitted with a knife from grave 52), 2 burnt fragments of an undefined flake tool (Fig.9:5i-j) and 1 fragment of burnt chip (Fig.9:5k) and chip - lost.

Grave 64

Sq.C-4/5 [B-I-4/B-II-3], depth 44cm. Vessel (t.g.III-a,b-a, near t.g.II-?) with burnt bones of adult man. Among the bones are 4 flint artefacts: a fragment of plunging flake and 3 chips from scaled pieces (Fig.10:1). The vessel of grave 64 was on the bones of grave 65.

Grave 65

Sq.C-4/5 [B-I-4/B-II-3], depth 44-66cm. Pile of burnt bones, 25x35x22cm. Under the pot of grave 64 is an asymmetric perforator, refitted from 4 fired fragments and made from a blade knife and used as a striker. Among the bones are 3 flint artefacts: the fired fragment of an undefined blade tool, an amorphous flake presser and a fragment of a micro-scaled piece (Fig.10:2).

Grave 66

Sq.C-4 [B-I-2], depth 70cm. Vessel (t.g.IV?-?) with burnt bones of adult man. Among the bones are 5 flint artefacts (an ordinary blade knife - variant C, refitted from 5 fired fragments two parts of an ordinary blade knife - variant C, a slim arrowhead with straight base, a flake spike-ended presser and a fragment of an undefined blade tool and 10 small oval-round stones (Fig.11).

Grave 67

Sq.C-4/5 [B-I-2/B-II-1], depth 35cm. Spot with burnt bones, irregular-oval in plan, 30x42cm. In the central part lie bones mixed with ashes.

Grave 68

Sq.C-5 [B-II-1/B-II-3], depth 37-60cm. Pile of burnt bones, circular in plan, 25x2x3cm. In the central part (diam. 15cm) are bones mixed with ashes. Among the bones is part of an ordinary flint flake refitted from 3 burnt fragments (Fig.12:1).

Grave 69

Sq.C-5 [B-II-1/B-II-3], depth 53-60cm. Pile of burnt bones, circular in plan, 40x42x7cm, covered by sand. On the sand, in W part are remains of cremation 68, in E part are scattered bones of cremation 71. In the sand is an ordinary flint arrowhead with concave base (Fig.12:2).

Grave 70

Sq.C-5 [B-II-3/B-II-4], depth 40-55cm. Pile of burnt bones, circular in plan, 20x22x15cm, partly covered by spot of scattered burnt bones. 45x58cm. To NW from pile (depth 40 cm) - fragment of vessel (t.g.?).

Grave 71

Sq.C-5 [B-II-3/4], depth 40-54cm. Pile of burnt bones, circular in plan, 20x-20x-14cm, partly covered by spot of scattered burnt bones. Among bones - burnt flint side-scraper (Fig.12:3).

Grave 72

Sq.C-5 [B-II-1], depth 40-67cm. Pile of burnt bones, circular in plan, 22x22x27 cm, partly covered by spot of scattered burnt bones, 30x25cm.

Grave 73

Sq.C-5 [B-II-2/B-II-4], depth 30. Spot of scattered burnt bones, cirkular in plan, 38-36cm. To S of spot - part of broken vessel (t.g.?).

Grave 74

Sq.C-5 [B-II-2], depth 39cm. Spot of scattered burnt bones, irregular in plan, 38-36cm. May be the part of cremation 75(?).

Grave 75

Sq.C-5 [B-II-2], depth 39-73cm. Pile of burnt bones, oval in plan, 34x28x34cm.

Grave 76

Sq.C-5 [B-II-4], depth 39cm. Spot of scattered burnt bones, 14-26cm.

Grave 77

Sq.C-5/6 [B-II-4/B-III-3], depth 39cm. Spot of scattered burnt bones, irregular in plan, 70x22cm. Among bones - flint micro - scaled piece. Near the spot - small vessel (t.g.II-0), Fig.12:5.

Sq.C-6 [B-III-3], depth 39-50cm. Pile of burnt bones, 24x20x11cm, partly covered by spot of scattered burnt bones. Among bones - flint ordinary flake (Fig.12:4).

Grave 79

Sq.C-6 [B-III-1], depth 39cm. Spot of scattered burnt bones, circular in plan, 40x42cm. Near the spot - vessel (t.g.III- 0), depth 54cm; in 10cm to S - flint ordinary arrowhead with concave base (Fig.12:6).

Grave 80

Sq.C-6 [B-III-1], depth 45-57cm. Pile of burnt bones, irregular in plan, 30x-38x--12cm. Among bones - part of burnt horn hammer-axe (Fig.12:7).

Grave 81

Sq.C-6 [B-III-4/B-III-3], depth 62cm. Low part of vessel (t.g.?) with burnt bones of adult woman (?) and ashes. On bones - traces of red paint.

Grave 82

Sq.C-6 [B-III-1/B-III-2], depth 53cm. Vessel (t.g.?) with burnt bones.

Grave 83

Sq.C-4 [B-I-1], depth 37cm. Vessel (t.g.?) with burnt bones.

Grave 84

Sq.C/D-4 [B-I-1/A-I-3], depth 36cm. Spot of scattered burnt bones, pear-like in plan, 35x35cm. Among bones - 3 burnt flint artefacts: ordinary arrowhead "with straight base", ordinary blade striker and refitted from 2 fragments part of flake. Near in 18cm - broken vessel (t.g.?), Fig.12:8.

Grave 85

Sq.D-4 [A-I-3], depth 37cm. Small vessel (t.g.?) with burnt bones.

Grave 86

Sq.C-5 [B-II-1], depth 39-70cm. Pile of burnt bones, circular in plan, 20x20x31 cm. Southern part of pile covered by spot of scattered burnt bones.

Grave 87

Sq.C/D-5 [A-II-3/A-II-4/B-II-1/B-II-2], depth 39-70cm. Pile of burnt bones, circular in plan, 20-20-31cm. In sand, over the pile - ordinary flint arrowheads with concave base (Fig.12:9).

Grave 88

Sq.C/D-5 [A-II-4/B-II-2], depth 39-47cm. Pile of burnt bones, 32x22x8cm. Among bones - flint scaled piece (Fig.12:10).

Grave 89

Sq.D-5 [A-II-4], depth 39cm. Spot of scattered burnt bones, oval in plan, 32x26cm.

Sq.D-6 [A-III-3], depth 50-66cm. Pile of burnt bones, irregular in plan, 35x-20x-16cm. To NW in sand - part of broken vessel (t.g.). Among bones part of burnt stone axe (type ?), 2 stones and 2 flint tools: burnt double spike-ended presser on blade and side-scraper with bifacial retouch (Fig.13:1).

Grave 91

Sq.D-6 [A-III-3], depth 50-70cm. Pile of burnt bones, mixed with ashes, 7x-7x-20cm, partly covered by spot of scattered burnt bones, oval in plan, 36x22cm. In 10cm to W - large vessel (t.g.?).

Grave 92

Sq.D-6 [A-III-4], depth 50-61cm. Pile of burnt bones, mixed with ashes, 13x-13x-11cm.

Grave 93

Sq.D-6 [A-III-4], depth 63-75cm. Pile of burnt bones, mixed with ashes, 20x--20x-12cm. In central part of pile - low part of small vessel (t.g.?), Fig.13:2.

Grave 94

Sq.C-5 [B-II-2], depth 39cm. Spot of scattered burnt bones, irregular in plan, 25x30cm. To E from spot - broken vessel (t.g.?).

Destroyed graves

Some materials that were obtained at the cemetery do not have sufficient documentation to connect them to the inventories described above. They include copper articles of IIBe1 x2 and IIBe3 types (Fig.13:3) and five flint artefacts: 2 burnt ordinary arrowheads with straight base, an initial scaled-piece made from a natural piece, a fragment of an undefined tool on a pseudo-blade and an imitation of a bifacial flake knife (Fig.13:3).



Fig. 2. Chernin. 1 - grave 4; 2 - grave 3; 3 - grave 5; 4 - grave 11.



Fig. 3. Chernin. 1 - grave 12; 2 - grave 14; 3 - grave 18; 4 - grave 19.


Fig. 4. Chernin. 1 - grave 22; 2 - grave 26; 3 - grave 30; 4 - grave 32; 5 - grave 36.



Fig. 5. Chernin. 1 - grave 33; 2 - grave 37; 3 - grave 39; 4 - grave 40.



Fig. 6. Chernin. 1 - grave 42; 2 - grave 43; 3 - grave 44; 4 - grave 45.



Fig. 7. Chernin. 1 - grave 47; 2 - grave 48.



Fig. 8. Chernin. 1 - grave 49; 2 - grave 51; 3 - grave 52; 4 - grave 53; 5 - grave 50; 6 - grave 55.



Fig. 9. Chernin. 1 - grave 56; 2 - grave 58; 3 - grave 59; 4 - grave 62; 5 - grave 63.



Fig. 10. Chernin. 1 - grave 64; 2 - grave 65.



Fig. 11. Chernin. Grave 66.



Fig. 12. Chernin. 1 - grave 68; 2 - grave 69; 3 - grave 71; 4 - grave 78; 5 - grave 77; 6 - grave 79; 7 - grave 80; 8 - grave 84; 9 - grave 87; 10 - grave 88.



Fig. 13. Chernin. 1 - grave 90; 2 - grave 93; 3 - from the destroyed graves.

3.2. KRASNY KHUTOR CEMETERY (FIG.14)

In the text, besides the grave call numbers adopted here, also "historical call numbers", which were used in earlier studies are given in brackets. The reasons for this have already been given in the introductory remarks to Chapter 3. When determining the location of features, square metre call numbers according to the field daybook have been taken into account (in Dergachev and Manzura's publication of 1991, the numbering is moved by 1 metre to N).

All graves were registered 50cm below the surface.

Grave 1(1)

Sq.H/I-4. Vessel (t.g.III-0) with burnt bones of adult man (Fig.15:1).

Grave 2(2)

Sq.H/I-4. Broken vessel (t.g.III?-0?) with burnt bones of adult man (Fig.15:2).

Grave 3(3)

Sq.G-4. Low part of vessel (t.g.?) with burnt bones. Among the bones are 3 flint artefacts: two parts of blade spike-ended presser used as striker and refitted from 6 fired fragments, a scaled-piece made from the flake of an axe and an amorphous striker made from a flake tool (Fig.15:3).

Sq.G-4: [i.e. near graves 3(3), 9(9) and 168(81C-164)]. Initial scaled-piece made from fragment of blade tool (Fig.15:5)

Grave 4(4)

Sq.E-4/5. Vessel (t.g.III?-c-a) with burnt bones of adult man (Fig.15:4).

Grave 5(5)

Sq.D-4. Vessel (t.g.III?-0?) with burnt bones of young man. Under the bones, in pot - flint undefined blade tool (lost) with traces of brown substance (may be remains of skin case), Fig.15:6.

Grave 6(6)

Sq.I-5. Large vessel (t.g.III-0) with burnt bones (in the anatomical order). To SE from vessel (30cm), among pile of burnt bones - copper bead (type IIBe?), Fig.16:1.

Grave 7(7)

Sq.H-4/5. Vessel (t.g.III-a-a) with burnt bones (Fig.16:2).

Grave 8(8)

Sq.H-5. Vessel (t.g.III-c-e) with burnt bones of adult man (Fig.16:3).

Grave 9(9)

Sq.G-5. Vessel (t.g.?) with burnt bones of young man.



Fig. 14. Krasny Khutor cemetery: the general plan (after V. Danilenko and M. Makarevich). 1 - vessels with ashes; 2 - empty vessels; 3 - spot of ashes and scattered burnt bones; 4 - destroyed part of site. Plan with our new numeration, the first numbers in text.

Grave 10(10)

Sq.E/F-5/6. Vessel (t.g.III-0) with burnt bones of young man (Fig.16:4).

Grave 11(11)

Sq.D-5. Vessel (t.g.III?-0) with burnt bones of adult man (Fig.16:5).

Grave 12(12)

Sq.D-4/5. Broken vessel (t.g.III?-0) with burnt bones of adult man. To SE near pot - stone axe (type 1B), Fig.17:1.

Grave 13(13)

Sq.C-5. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 14(14)

Sq.I-6. High vessel (t.g.III-c-b,e) with burnt bones of adult man. Among bones - copper bead (type IIBe?), Fig.17:4.

Grave 15(15)

Sq.H-6. Vessel (t.g.III-c-a,e) with burnt bones of adult man. Near the pot-small vessel (t.g.?), Fig.17:2.

Grave 16(17)

Sq.F-6. Vessel (t.g.III-c-b,e) with burnt bones of adult man. Near pot - flint spike-ended presser on blade used as striker (Fig.17:3).

Grave 17(18)

Sq.J-7. Vessel (t.g.III-c-b,e) with burnt bones of adult man (Fig.17:5).

Grave 18(19)

Sq.J-7. Vessel (t.g.III-0) with burnt bones of adult man (Fig.18:1a). Near - empty vessel (t.g.III-0) - Fig.18:1b.

Grave 19(20)

Sq.J-7. Broken vessel (t.g.?) with burnt bones.

Grave 20(22)

Sq.H-7. Vessel (t.g.?) with burnt bones of adult man.

Grave 21(23)

Sq.H-7. Vessel (t.g.III-0) with burnt bones of adult man (Fig.18:2b). Near* - empty broken vessel (t.g.III-0), Fig.18:2a.

[* The connection between the vessel and the object is not certain. It may be vessel 16-sq. H-6, near grave 91 (6C-98)].

Grave 22(24)

Sq.G/H-7. Vessel (t.g.?) with burnt bones of adult man.

Grave 23(25)

Sq.G/H-7. Vessel (t.g.III-0, near t.g.II...) with burnt bones of adult man (Fig. 18:3).

Sq.G-7. Vessel (t.g.?) with burnt bones of adult man. Among bones - two pieces of skull with traces of trepanation.

Grave 25(27)

Sq.F-7. Vessel (t.g.III-c-e) with burnt bones (Fig.18:4).

Grave 26(28)

Sq.L-8. Vessel (t.g.III-c-e) with burnt bones of adult man (Fig.19:1).

Grave 27(29)

Sq.K-8. Broken vessel (t.g.IV-0?) with burnt bones of adult man. Among bones - copper bead (type IIBe2) and refitted from 3 burnt flint fragments two parts of tanged blade dagger (Fig.19:2).

Grave 28(30)

Sq.J-8. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 29(31)

Sq.J-8. Broken large vessel (t.g.III?-c-e) with burnt bones of adult man. Among bones - copper bead (type IIBe2) and flint double perforator on flake (Fig.19:3).

Grave 30(32)

Sq.J-7. Vessel (t.g.III-0) with burnt bones of adult man (Fig.20:1).

Grave 31(37)

Sq.I-8. Vessel (t.g.III-c-b) with burnt bones of adult man (Fig.20:2).

Grave 32(37a)

Sq.I-8. Broken vessel (t.g.II-III-0?) with burnt bones. On the pile - small vessel (t.g.?) and spiral copper bead (type IIBe3). Among bones - 3 flint artefacts: refitted from 2 burnt fragments ordinary blade striker, blade blunt-ended presser made from striker andordinary chip (Fig.21:1).

Grave 33(38)

Sq.H/I-8. Low part of the vessel (t.g.III-0) with burnt bones of adult man. Among bones - 2 flint artefacts: refitted from 2 fragments double end-scraper made from blade knife and burnt fragment of undefined blade tool used as striker. To W from vessel - stone axe (type 1B), Fig.21:2.

Grave 34(39)

Sq.L-8. Vessel (t.g.III-0) with burnt bones of young man (Fig.22:1).

Grave 35(40)

Sq.L-9. Vessel (t.g.III-0) with burnt bones of adult man (Fig.22:2).

Grave 36(41)

Sq.L-9. Broken vessel (t.g.?) with burnt bones of adult man.

Grave 37(42)

Sq.K/L-9. Vessel (t.g.IV-c-b) with burnt bones of adult man (Fig.22:3).

Grave 38(43)

Sq.K-9. Large vessel (t.g.III-0) with burnt bones of adult man (Fig.22:4).

Grave 39(44)

Sq.K-9/10. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 40(45)

Sq.J-10. Vessel (t.g.III-0) with burnt bones of adult man. Under the bones - 4 flint artefacts: refitted from 2 burnt fragments part of blade dagger or asymmetric knife, burnt fragment of second similar tool, burnt fragment of ordinary arrowhead with straight base and ordinary blade striker (Fig.23:1).

Grave 41(46)

Sq.I/J-9. Vessel (t.g.III-c-b,e) with burnt bones of adult man (Fig.23:2).

Grave 42(48)

Sq.H-9. Vessel (t.g.III-c-e) with burnt bones of adult man (Fig.23:3).

Grave 43(49)

Sq.H/I-9/10. Broken vessel (t.g.?) with burnt bones of adult man.

Grave 44(51)

Sq.G-9. Vessel (t.g.?) with burnt bones of adult man.

Grave 45(52)

Sq.G-9. Broken vessel (t.g.?) with burnt bones of adult man. Among bones - broken bone bead and 5 flint artefacts: two ordinary arrowheads with concave base (lost) and 3 strikers (first made from flake perforator, second - from ordinary flake, third - from scaled-piece), Fig.23:4.

Grave 46(54)

Sq.G-9. Part of vessel (t.g.III-0?) with burnt bones of adult man. Near - low part of empty vessel pot (t.g?), Fig.24:1.

Grave 47(55)

Sq.L-10. Vessel (t.g.III-c-e) with burnt bones of adult man. Near - empty vessel (t.g.IV-0), Fig.24:2.

Grave 48(55a)

Sq.E-10. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 49(57)

Sq.K-10. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 50(58,58a)

Sq.J-10. Vessel (t.g.III-0) with burnt bones of adult man. Among bones - copper bracelet (type IIBr) and 2 flint artefacts: tanged blade dagger and blade end-scraper (Fig.25:1).

Sq.J-10. NE from vessel 50(58,58a) - copper bead (type IIBe3), Fig.25:2

Grave 51(59)

Sq.I/J-10. Low part of the vessel (t.g.?) with burnt bones of adult man.

Grave 52(60)

Sq.I-10. Vessel (t.g.III?-c-e) with burnt bones of adult man. Among bones - 2 fragmentary spiral beads (type IIBe3). Near - empty vessel (t.g.IV-0), Fig.25:3.

Grave 53(61)

Sq.I-10. Vessel (t.g.III-c-e) with burnt bones of adult man. Among bones - amber (?) bead (type ca 1EII) and 2 flint tools: blade blunt-ended presser used as striker and amorphous flake presser (Fig.26:1).

Grave 54(63)

Sq.H-10. Vessel (III-IV-?) with burnt bones of adult man. Among bones - copper bead ? (type IIBe?) and 2 blade amorphous strikers made from fired fragments of tool which can be refitted (Fig.26:2).

Grave 55(64)

Sg.L-11. Broken vessel (t.g.?) with same burnt bones of adult man. Sq.L-11. 50cm to SE from grave 55(64) - copper bead (type IIBe2), Fig.26:3.

Grave 56(65)

Sq.K-11. Broken vessel (t.g.?) with burnt bones.

Grave 57(66)

Sq.J/K-10/11. Vessel (t.g.III-0) with burnt bones of adult man (Fig.26:4).

Grave 58(66a)

Sq.H-11. Vessel (t.g.?) with burnt bones of adult man. Among bones - 2 copper beads (type IIBe1-2).

Grave 59(67)

Sq.G-11. Vessel (t.g.?) with burnt bones. Between bones - 4cm level of sand. May be remains of two cremations (?). Under the bone - piece of sandstone.

Grave 60(68)

Sq.G-11. Broken vessel (t.g.?) with same burnt bones. Near (to W) - fragment of flint undefined blade knife (Fig.26:5).

Grave 61(69)

Sq.K-12. Low part of the large vessel (t.g.III?-c-e) with burnt bones of adult man (Fig.26:6).

Grave 62(70)

Sq.J-12. Vessel (t.g.?) with burnt bones of adult man.

Grave 63(71)

Sq.I-12. Vessel (t.g.III-0) with burnt bones of adult man. Among bones - flint amorphous striker made from axe fragment (Fig.26:7).

Grave 64(72)

Sq.I-12. Vessel (t.g.?) with burnt bones of adult man.

Grave 65(73)

Sq.I-12. Vessel (t.g.III-c-b) with burnt bones of adult man. In the pot - copper bead (type IIBe1) and 9 flint artefacts: amorphous striker/hammer made from natural piece and 8 ordinary chips (Fig.27:1).

Grave 66(74a)

Sq.H-12. Broken vessel (t.g.?) with burnt bones of young man. Near - the low part of empty vessel (t.g.?).

Grave 67(75)

Sq.H-12. Broken vessel (t.g.?) with burnt bones of adult man (Fig.27:2).

Grave 68(76)

Sq.G-12. Vessel (t.g.III-0) with some burnt bones. Near - empty vessel (t.g.?), Fig.27:3.

Grave 69(77)

Sq.G-12. Vessel (t.g.?) with burnt bones. Near - vessel (t.g.?) with animal bones (?).

Grave 70(79)

Sq.G-12. Broken vessel (t.g.III?) with burnt bones of adult man (Fig.27:4).

Grave 71(80)

Sq.J-13. Broken vessel (t.g.?) with burnt bones of young man.

Grave 72(81)

Sq.I/J-13. Vessel (t.g.?) with burnt bones of adult man. Among bones - part of bone awl (Fig.27:5).

Grave 73(82)

Sq.H/I-12/13. Vessel (t.g.III-0) with burnt bones of adult man (Fig.28:1).

Grave 74(83)

Sq.H-13. Vessel (t.g.III-b,c-a,e) with burnt bones of adult man. Among bones - flint arrowhead made from tip of bigger specimen, amorphous striker made from flint flake and 4 burnt fragments from at least 3 blade tools (one of them - undefined knife), Fig.28:2.

Grave 75(84)

Sq.H/I-13. Vessel (t.g.III-0) with burnt bones of adult man. Among bones - 7 burnt flint artefacts: 4 ordinary arrowheads with concave base, 1 ordinary arrowhead with straight base, 1 amorphous arrowhead and small chunk. To S from grave 75 - broken empty vessel (t.g.?), Fig.28:3.

Grave 76(85) Sq.H-14. Vessel (t.g.III-c-b,e) with burnt bones of adult man (Fig.29:2)

Grave 77(86)

Sq.G/H-13. Low part of the broken vessel (t.g.?) with burnt bones of adult man (was covered by low part of another vessel), Fig.29:1.

Grave 78(87)

Sq.G-13. Low part of the broken vessel (t.g.III?-c-a,e) with burnt bones of adult man (Fig.29:3).

Grave 79(88)

Sq.H-14. Broken vessel (t.g.III-0) with burnt bones of adult man (Fig.29:4).

Grave 80(89a)

Sq.H-14/15. Low part of vessel (t.g.III?) with burnt bones of adult man. Among bones - small vessel (t.g.VI-0), tooth of animal and 9 flint artefacts: double blunt-ended presser on blade, 6 burnt arrowheads (2 big specimens with concave base, 2 ordinary specimens with concave base, 1 slim specimen with straight base, 1 ordinary specimen with straight base), fragment of undefined tool and small chunk (Fig.30:1).

Sq.H-14 - burnt fragment of flint big arrowhead (Fig.30:2).

Grave 81(89b)*

Sq.H-15. Vessel (t.g.?) with burnt bones of young man. Among bones - large copper bead (type IIBe2) and burnt flint big arrowhead with concave base (Fig. 30:3).

[* The rationale for isolating this feature raises certain doubts. This is most probably the lower part of grave 80(89a).]

Grave 82(89c)

Sq.H-15/16. Vessel (t.g.III-0) with burnt bones of adult man. Among bones - copper bead ? (type IIBe?), bird bone ? and 4 flint artefacts: amorphous arrowhead, burnt ordinary blade striker and 2 burnt fragments maybe the same ordinary blade knife - variant B (Fig.30:4).

Grave 83(90)

Sq.I-14/15. Broken vessel (t.g.?) with burnt bones of adult man.

Grave 84(91)

Sq.F-15. Broken vessel (t.g.?) with burnt bones of young man. Among bones - part of flint blade. Near, on sq.F-15 - refitted from 3 fired flint fragments part of ordinary blade knife variant A and refitted from 2 fragments part of undefined blade tool used as striker (Fig.30:5).

Sq.F-16. South from grave 84(91) - refitted from 2 fragments part of stone axe (type 1A/B) and 4 burt flint artefacts: ordinary arrowhead with concave base, chip from blade tool and 2 fragments of ordinary blade knife - variant B (Fig.41:1)

Grave 85(92)

Sq.C-15. Low part of the vessel (t.g.?) with burnt bones of adult man.

Sq.D-15 - burnt fragment of flint ordinary blade knife (variant C) or tanged dagger (Fig.31:1).

Grave 86(1C-93)

Sq.G-1. Pile of the burnt bones of adult man, oval in plan, 26x10x10cm. Among bones - 2 burnt ordinary arrowheads (first with concave base, second with straight base) and 15 pieces of bone beads (Fig.31:2).

Grave 87(2C-94)

Sq.F-1. Pile of the burnt bones of adult man, circular in plan, 20x20x6cm. Among bones - flint scrapper (lost).

Grave 88(3C-95)

Sq.I-6. Small spot of scattered burnt bones of young man.

Grave 89(4C-96)

Sq.I-6. Pile of burnt bones of adult man, circular in plan, 20x20x7cm. Among bones - copper bead (type IIBe2) and flint ordinary dagger made from blade knife and used as striker (Fig.31:3).

Grave 90(5C-97)

Sq.H/I-6. Pile of burnt bones of young man, oval in plan, 20x28x8cm. Among bones - copper bead (type IIBe?) and flint scrapper *.

[* The connection of the artefacts with the feature raises particular doubts. The existing documentation lacks positive verification].

Grave 91(6C-98)

Sq.H-6. Pile of burnt bones of adult man, circular in plan, 20x20x9cm. Among bones* - empty broken vessel (t.g.III- 0),Fig.31:4.

[* The identification with the object is not certain.]

Grave 92(7C-99)

Sq.K-7/8. Pile of burnt bones of adult man, circular in plan, 30x30x10cm.

Grave 93(7aC-99a)

Sq.L-7. Pile of burnt bones.

Grave 94(8C-100)

Sq.J-7. Pile of burnt bones, circular in plan, 20x20x12cm. Among the bones - flint double spike-ended presser on blade (Fig.31:5).

Grave 95(9C-101)

Sq.I/J-7. Pile of burnt bones of adult man, circular in plan, 20x20cm.

Grave 96(10C-102)

Sq.I-7. Pile of burnt bones of young man, circular in plan, 18x18x9cm.

Grave 97(11C-103)

Sq.I-7. Pile of burnt bones of adult man. Circular in plan, 20x20x7cm. Among bones - copper bead (type IIBe2), Fig.31:6.

Grave 98(12C-104)

Sq.I-7. Pile of burnt bones of adult man, circular in plan, 21x21x8cm.

Grave 99(13C-105)

Sq.I-7. Pile of burnt bones of adult man, circular in plan, 19x19x5cm.

Grave 100(14C-106)

Sq.E-6/7. Pile of burnt bones of adult man, oval in plan, 25x35cm.

Grave 101(15C-107)

Sq.J-8/9. Pile of burnt bones of adult man, circular in plan, 20x20x7cm. Near the pile - 3 small vessels (t.g.: II-0 + VIII-0; III-0). Among bones - copper bead (type IIBe2) and refitted from 4 fragments ordinary blade knife - variant B (Fig.31:7).

Grave 102(16C-108)

Sq.J-8. Pile of burnt bones of adult man, oval in plan, 23x15cm. Near - empty vessel (t.g.III-0), Fig.32:1.

Grave 103(17C-109)

Sq.I-8. Pile of burnt bones of adult man, circular in plan, 23x23x6cm. Among bones - copper bead (type IIBe1) and part of copper knife (type IK?), Fig.32:2.

Grave 104(18C-110)

Sq.I-7. Pile of burnt bones of adult man, circular in plan, 20x20x14cm. Among bones - broken vessel (t.g.III-c-b,e) and 2 flint artefacts: asymmetric blade perforator used as striker and refitted from 3 burnt fragments part of ordinary blade knife (variant B) used as striker (Fig.32:3).

Grave 105(19C-111)

Sq.H/I-8. Pile of burnt bones of adult man, circular in plan, 20x20x14cm. Among bones - stone axe (type 1B), Fig.32:4.

Grave 106(19aC-111a)

Sq.H-8. Pile of burnt bones of adult man, oval in plan, 30x20cm.

Grave 107(20C-112)

Sq.G/H-7/8. Pile of burnt bones of adult man, oval in plan, 35x20cm.

Grave 108(21C-113)

Sq.G-8. Pile of burnt bones of adult man, circular in plan, 20x20cm.

Grave 109(22C-114)

Sq.M-9. Pile of burnt bones of adult man, oval in plan, 25x20cm. Among bones - copper bead (type IIBe1), Fig.32:5.

Grave 110(23C-115)

Sq.L/M-9. Pile of burnt bones of adult man, oval in plan, 26x19cm.

Grave 111(24C-116)

Sq.K-9. Pile of burnt bones of adult man, circular in plan, 20x20cm.

Grave 112(25C-117)

Sq.K-9/10. Pile of burnt bones of adult man, circular in plan, 23x23cm.

Grave 113(26C-118)

Sq.J-9. Pile of burnt bones of adult man, circular in plan, 18x18cm. Among bones - flint tanged blade dagger (Fig.33:1).

Grave 114(27C-119)

Sq.J-8/9. Pile of burnt bones of adult man, oval in plan, 27x21x16cm. Among bones - 6 copper beads (types 4x IIBe1, 2x IIBe2) and 2 flint artefacts: refitted from 3 fired fragments ordinary blade dagger used as striker and chip from square axe (Fig.33:2).

Grave 115(28C-120)

Sq.I/J-9. Pile of burnt bones of adult man, circular in plan, 22x22cm. Among the bones are located 2 flint artefacts: a double spike-ended presser on a blade (lost) and an amorphous striker made from a square axe fragment (Fig.33:3).

Grave 116(29aC-121)

Sq.I-9. Pile of burnt bones of adult man, circular in plan, 26x26x19cm. Among the bones are 2 copper beads (type IIBe2) and 9 burnt fragments of flint blade tools (probably from 2 tools, one of them a tanged dagger or asymmetric knife). Above the pile is an ordinary blade striker (Fig.34:1).

Grave 117(29C-121a)

Sq.I-8/9. Pile of burnt bones of adult man, circular in plan, 22x22x17cm. On the pile is a small vessel (t.g.VIII-0), a copper bead (type IIBe1) and 11 burnt flint artefacts: 4 arrowheads (a large specimen with a concave base, an ordinary one with a concave base, an ordinary specimen with straight base and an arrowhead made from the tip of a bigger one), a flake (lost) and four parts of, probably, one undefined blade tool, refitted from 6 fragments (Fig.33:4).

Grave 118(30C-122)

Sq.I-9. Pile of burnt bones of adult man, circular in plan. Among the bones are 2 copper beads ? (type IIBe?). Under the pile is a fragment of a stone axe (type 1B), which is refitted with an artefact from grave 119(31C-123); see Fig.34:2.

Grave 119(31C-123)

Sq.I-9. Pile of burnt bones of adult man, circular in plan, 24x24x16cm. Among the bones lie 4 copper beads (types 1x IIBe1, 2x IIBe2, 1x IIBe3), part of a stone axe (type 1B) refitted with fragments found under grave 118(30C-122) and above grave 120(32C-124), 13 flint artefacts: 8 burnt arrowheads (1 large specimen with concave base, 3 ordinary specimens with concave base, 1 slim specimen with straight base and 2 arrowheads made from the tips of larger specimens), refitted from 2 burnt fragments of a large asymmetric blade knife, a

spike-ended presser made from the fragment of a blade knife, a side-scraper, a chip from an axe and a small fragment of an undefined tool (lost), Fig.34:2.

Grave 120(32C-124)

Sq.H/I-9. Pile of burnt bones of adult man, circular in plan, 25x25x18cm (under the vessel of cremation 42(48)). Among bones - stone axe (type 2) and 2 flint tools: tanged dagger and ordinary blade striker (Fig.35). Above pile - fragment of stone axe, which is refitted with artefact from grave 119(31C-123) - see Fig.34:2.

Grave 121(33C-125)

Sq.G-9. Pile of burnt bones of adult man, circular in plan, 20x20x13cm.

Grave 122(34C-126)

Sq.G-9. Pile of burnt bones of adult man, circular in plan. Among bones - 2 flint tools: ordinary blade striker and amorphous striker made from flake (Fig 36:1).

Grave 123(34aC-126a)

Sq.F/G-9. Pile of burnt bones of adult man, circular in plan. NE from pile (depth 25cm) - stone axe (type 1B), Fig.36:2.

Grave124(35C-127)

Sq.F-9. Pile of burnt bones of adult man, circular in plan, 18x18x16cm.

Grave 125(36C-128)

Sq.K-10. Pile of burnt bones of adult man, circular in plan, 23x23x16cm. Among bones - 4 copper beads (types 3x IIBe1, 1x IIBe2), Fig.36:3.

Grave 126(37C-129)

Sq.K-10. Pile of burnt bones of adult man, circular in plan. Among bones - 6 flint artefacts: atypical large arrowhead with notch in base, striker made from flake tool and 4 flakes (Fig.36:4).

Grave 127(38C-130)

Sq.J-10. Pile of burnt bones of adult man, circular in plan, 21x21x17cm. Among bones - copper bead (type IIBe2), copper dagger (type ID1), copper awl (type IAw2), whetstone shale, 2 stone axes (types 1A/B, 1B) and 5 flint artefacts: refitted from 3 fired fragments big asymmetric blade knife used as striker, small asymmetric blade knife, 2 fragments of undefined blade tools (1 lost) and amorphous flake striker (lost), Fig.37.

Grave 128(38aC-130a)

Sq.K-10. Pile of burnt bones of adult man, circular in plan, 19x19x14cm. Among bones - burnt flint ordinary arrowhead with concave base and hammer made from flint square axe (Fig.38:1).

Grave 129(39C-131)

Sq.J-10. Pile of burnt bones of adult man, circular in plan, 20x20x18cm. In 15cm to N (on sq.J-9) - ordinary blade knife - variant C (lost), Fig.33:5.

Grave 130(40C-132)

Sq.J-10. Pile of burnt bones, circular in plan, 22x22cm. Among bones - 2 burnt flint big arrowheads with concave base (Fig.38:2).

Grave 131(50C-133)

Sq.J-10. Pile of burnt bones of adult man, circular in plan.

Grave 132(51C-134)

Sq.I-10. Pile of burnt bones of adult man, circular in plan. Among bones - copper bead (type IIBe?).

Grave 133(51aC-134a)

Sg.I-10. Pile of burnt bones of adult man. Among bones - big asymmetric blade knife (Fig.38:3).

Grave 134(52C-135)

Sq.I-10/11. Pile of burnt bones of adult man, circular in plan, 20x20x18cm. Among bones - copper dagger (type ID2) with bone rivet, 4 copper beads (types 2x IIBe1, 2x IIBe2), fragment of bone bead and 3 flint artefacts: fragment of undefined blade tool and 2 ordinary arrowheads with concave base (Fig.38:4).

Sq.I-11. 25 cm to E from pile 134(52C-135) - ordinary flint arrowhead with concave base (Fig.38:5).

Grave 135(53C-136)

Sq.H-10. Pile of burnt bones, of adult man, circular in plan. Among them - copper bead (type IIBe2), Fig.39:1.

Grave 136(54C-137)

Sq.H-10. Pile of burnt bones of adult man, circular in plan, 22x22cm. Among bones - 2 copper beads ? (type IIBe2), Fig.39:3.

Grave 137(55C-138)

Sq.H-10. Pile of burnt bones of adult man, circular in plan, 20x20cm. Among bones - copper bead (type IIBe2) and 4 flint artefacts: ordinary blade knife - variant B, blade spike-ended presser used as striker, striker made from flake from axe and hammer made from fragment of axe (Fig.39:2).

Grave 138(56C-139)

Sq.G/H-10. Pile of burnt bones of adult man, circular in plan.

Grave 139(57C-140)

Sq.E-10. Pile of burnt bones of adult man, circular in plan.

Grave 140(58C-141)

Sq.K-10/11. Pile of burnt bones of adult man, circular in plan. Among bones - 4 copper beads (type IIBe2), Fig.39:4.

Grave 141(59C-142)

Sq.K-11. Pile of burnt bones of adult man, circular in plan.

Grave 142(60C-143)

Sq.K-11. Pile of burnt bones of adult man.

Grave 143(61C-144)

Sq.J-11. Pile of burnt bones of adult man. Among bones - part of flint tool*. [* The attachment of the artefact to the feature raises particular doubts].

Grave 144(61aC-144a)*

Sq.I-13. Pile of burnt bones of adult man, circular in plan. Among bones - 3 copper beads (types 1x IIBe1, 2x IIBe2), Fig.40:1.

[* Taking the complex of artefacts to be a feature is highly debatable. There is no sufficient justification in the daybook]

Grave 145(62C-145)

Sq.J-11. Pile of burnt bones of adult man, circular in plan, 19x19x16cm. Among bones - 2 copper beads (types 1x IIBe1, 2x IIBe2) and copper flat arrowhead (type IAr), Fig.40:2.

Grave 146(63C-146)

Sq.H-11. Pile of burnt bones of adult man, circular in plan. Among bones - refitted from 2 fired fragments ordinary blade striker (Fig.40:3).

Grave 147(64C-147)

Sq.H-11. Pile of burnt bones of adult man, circular in plan. Among bones - piece of copper bead ? (type IIBe?).

Sq.G-11. Between graves 60(68) and 147(64C-147) - burnt fragment of big arrowhead (Fig.40:4)

Grave 148(65C-148)

Sq.F-11. Pile of burnt bones of adult man, circular in plan. Among bones - 4 copper beads (types 3x IIBe1, 1x IIBe2), Fig.40:5.

Grave 149(66C-149)

Sq.F-11. Pile of burnt bones of adult man. Near the pile - 2 flint tools: atypical, small ordinary blade knife - variant A and striker made from flake from axe (Fig.40:6).

Grave 150(66aC-149a)

Sq.E-11. Pile of burnt bones of adult man, circular in plan.

Grave 151(67C-150)

Sq.H-11/12. Pile of burnt bones of adult man, circular in plan.

Grave 152(68C-151)

Sq.H-11/12. Pile of burnt bones of adult man, circular in plan.

Grave 153(69C-152)

Sq.F-12. Pile of burnt bones of adult man, circular in plan.

Grave 154(70C-153)

Sq.I-13. Pile of burnt bones of adult man, circular in plan. Among bones - copper bead (type IIBe2), Fig.40:7.

Grave 155(70aC-153a)

Sq.H-13. Pile of burnt bones of adult man, circular in plan. Among bones - 3 copper beads ? (type IIBe?).

Grave 156(70bC-153b)

Sq.G-13. Pile of burnt bones of adult man, circular in plan. North from pile - fired flint ordinary arrowhead with concave base (Fig.40:8).

Grave 157(71C-154) Sq.I-13/14. Pile of burnt bones of adult man, circular in plan.

Grave 158(72C-155) Sq.I-14. Pile of burnt bones of adult man, circular in plan.

Grave 159(73C-156)

Sq.I-14. Pile of burnt bones of adult man, circular in plan.

Grave 160(73aC-156a)

Sq.I-14. Pile of burnt bones of adult man, circular in plan.

Grave 161(74C-157) Sq.G-13/14. Small pile of burnt bones of adult man.

Grave 162(75C-158)

Sq.J-15. Pile of burnt bones of adult man, circular in plan. Among bones - fragments of vessel (t.g.?).

Grave 163(76C-159)

Sq.J-15. Destroyed pile of burnt bones.

Grave 164(77C-160)

Sq.I-15. Pile of burnt bones of adult man, circular in plan.

Sq.I-15. Flint end-scraper on flake (Fig.40:9).

Grave 165(78C-161) Sq.H-15. Pile of burnt bones of adult man, circular in plan.

Grave 166(79C-162) Sq.H-15. Pile of burnt bones of adult man, circular in plan.

Grave 167(80C-163)

Sq.G-12. Pile of burnt bones of adult man, circular in plan, 30x30x12cm. Among bones - copper dagger (type ID1) and stone axe (type 1A), Fig.41:2.

Grave 168(81C-164)

Sq.G-4/5. Pile of burnt bones of adult man. Near the bones - flint double blunt-ended presser made from blade knife used as striker (Fig.40:10).

Grave 169(165)*

Sq.G-6. Destroyed pile of burnt bones. Among the bones are 3 flint artefacts: part of ordinary blade knife refitted from 2 fired fragments - variant A; a striker made from a scaled-piece of flake from an axe and an ordinary burnt arrowhead with straight base (Fig.41:3).

[* The complex of artefacts is not directly documented; it is an effect of an "office reconstruction"].

Grave 170(28a)?

Sq.M-8. Vessel with burnt bones. Among the bones are 2 copper beads (type IIBe1) and 2 amber beads (type 1AIb), including one semi-finished product (Fig. 41:4).

Destroyed graves

At the cemetery, some materials were collected without methodical documentation (Fig.42-43). This applies to copper goods: beads (type IIBe1, Fig.42:a-c); stone: axes (types 1B and 2, Fig.42:d-e); and 20 flint artefacts: burnt fragment of a large blade (Fig.43:a); part of an ordinary blade knife refitted from 3 burnt fragments variant A (Fig.43:b); fragments of 2 ordinary blade knives - variant B (Fig.43:c-d); 2 burnt fragments of blade daggers or knives (Fig.43:e-f); a burnt fragment of a blade spike-ended presser used as striker (Fig.43:g); 5 burnt fragments of undefined blade tools used as strikers (Fig.43:h-l); 3 burnt fragments of undefined blade tools (Fig.43:m-o), fragment of ordinary chip (Fig.43:p), fired chip from axe (Fig.43:q), amorphous flake striker (Fig.43:r) and 2 burnt arrowheads (large and ordinary specimens with concave base, Fig.43:s-t).

Among materials from the cemetery at Krasny Khutor are three flint artefacts without "tags", which cannot be identified today with any artefacts missing from the inventories described above. These are: a burnt fragment of a large asymmetric blade knife and 2 big arrowheads with concave base (Fig.42:f-h).



Fig. 15. Krasny Khutor. 1 - grave 1; 2 - grave 2; 3 - grave 3; 4 - grave 4; 5 - near graves 3,9,168(81C-164); 6 - grave 5.



Fig. 16. Krasny Khutor. 1 - grave 6; 2 - grave 7; 3 - grave 8; 4 - grave 10; 5 - grave 11.



Fig. 17. Krasny Khutor. 1 - grave 12; 2 - grave 15; 3 - grave 16; 4 - grave 14; 5 - grave 17.



Fig. 18. Krasny Khutor. 1 - grave 18(19); 2 - grave 21(23); 3 - grave 23(25); 4 - grave 25(27).



Fig. 19. Krasny Khutor. 1 - grave 26(28); 2 - grave 27(29); 3 - grave 29(31).



Fig. 20. Krasny Khutor. 1 - grave 30(32); 2 - grave 31(37).



Fig. 21. Krasny Khutor. 1 - grave 32(37a); 2 - grave 33(38).



Fig. 22. Krasny Khutor. 1 - grave 34(39); 2 - grave 35(40); 3 - grave 37(42); 4 - grave 38(43).



Fig. 23. Krasny Khutor. 1 - grave 40(45); 2 - grave 41(46); 3 - grave 42(48); 4 - grave 45(52).



Fig. 24. Krasny Khutor. 1 - grave 46(54); 2 - grave 47(55).


Fig. 25. Krasny Khutor. 1 - grave 50(58,58a); 2 - near grave 50(58,58a), sq.J-10; 3 - grave 52(60).



Fig. 26. Krasny Khutor. 1 - grave 53(61); 2 - grave 54(63); 3 - near grave 55(64), sq.L-11; 4 - grave 57(66); 5 - grave 60(68); 6 - grave 61(69); 7 - grave 63(71).



Fig. 27. Krasny Khutor. 1 - grave 65(73); 2 - grave 67(75); 3 - grave 68(76); 4 - grave 70(79); 5 - grave 72(81).



Fig. 28. Krasny Khutor. 1 - grave 73(82); 2 - grave 74(83); 3 - grave 75(84).



Fig. 29. Krasny Khutor. 1 - grave 77(86); 2 - grave 76(85); 3 - grave 78(87); 4 - grave 79(88).



Fig. 30. Krasny Khutor. 1 - grave 80(89a); 2 - near grave 80(89a), sq.H-14; 3 - grave 81(89b); 4 - grave 82(89c); 5 - grave 84(91).



Fig. 31. Krasny Khutor. 1 - Sq.D-15; 2 - grave 86(1C-93); 3 - grave 89(4C-96); 4 - grave 91(6C-98)?; 5 - grave 94(8C-100); 6 - grave 97(11C-103); 7 - grave 101(15C-107).



Fig. 32. Krasny Khutor. 1 - grave 102(16C-108); 2 - grave 103(17C-109); 3 - grave 104(18C-110); 4 - grave 105(19C-111); 5 - grave 109(22C-114).



Fig. 33. Krasny Khutor. 1 - grave 113(26C-118); 2 - grave 114(27C-119); 3 - grave 115(28C-120); 4 - grave 117(29aC-121a).



Fig. 34. Krasny Khutor. 1 - grave 116(29C-121); 2 - grave 119(31C-123).



Fig. 35. Krasny Khutor. Grave 120(32C-124).



Fig. 36. Krasny Khutor. 1 - grave 122(34C-126); 2 - grave 123(34aC-126a); 3 - grave 125(36C-128); 4 - grave 126(37C-129).



Fig. 37. Krasny Khutor. Grave 127(38C-130).



Fig. 38. Krasny Khutor. 1 - grave 128(38aC-130a); 2 - grave 129(39c-131); 3 - grave 130(40C-132); 4 - grave 133(51aC-134a); 5 - grave 134(52C-135); 6 - near grave 134(52C-135), sq.I-11.



Fig. 39. Krasny Khutor. 1 - grave 135(53C-136); 2 - grave 137(54C-138); 3 - grave 136(55C-137); 4 - grave 140(58C-141).



Fig. 40. Krasny Khutor. 1 - grave 144(61aC-144a); 2 - grave 145(62c-145); 3 - grave 146(63C-146); 4 - near grave 147(64C- 147), sq.G-11; 5 - grave 148(65C-148); 6 - grave 149(66C-149); 7 - grave 154(70C-153); 8 - grave 156(70bC-153b); 9 - near grave 164(77C-160), sq.I-15; 10 - grave 168(81C-164).



Fig. 41. Krasny Khutor. 1 - near grave 84(91), sq.F-16; 2 - grave 167(80C-168); 3 - grave 169(165); 4 - grave 170(28a)? Copper, stone and flint finds from the destroyed graves.



Fig. 42. Krasny Khutor. Copper, stone and flint finds from the destroyed graves.



Fig. 43. Krasny Khutor. Flint finds from the destroyed graves.

3.3. SOFIEVKA CEMETERY (FIG.44)

A complex, also methodologically, history of excavations at the cemetery, justifies emphasising the three stages of its exploration.

3.3.1. EXCAVATIONS OF 1947 (BY I. SAMOYLOVSKI)

Grave 1

Exc.IV, depth 3-18cm. Vessel (t.g.?) with burnt bones. 80cm from the pot to SWW was a fragment of flint from an ordinary blade knife - variant B. In the same distance, but to the other direction from the pot was a broken vessel (t.g.?) and a lower part of the vessel (t.g.?), which may have been the remains of another cremation (?). The second half of a flint tool from this grave was found on the surface in an undefined part of the site in 1948 (Fig.45:3).

Grave 2

Exc.V, depth ?. Pile of burnt bones. On the bones was a copper chisel (type IC) and 3 copper beads (types 1x IIBe1, 2x IIBe2). Nearby were two broken vessels (t.g.?), Fig.45:1).

Grave 3

Exc.V, depth 3-20cm. Vessel (t.g.III-a,c-a,e) with burnt bones. Among bones - flint big asymmetric blade knife. Near - small vessel (t.g.?) and two broken vessels (t.g.?), Fig.45:2.

Grave 3A

Exc.V, depth ?. Vessel (t.g.?) with ashes in 40cm from grave 3.

Grave 3B

Exc.V, depth ?. Broken vessel (t.g.?) with burnt bones.

Grave 4

Exc.V, depth 3-20cm. Broken vessel (t.g.III-0) with burnt bones (Fig.45:4).

Grave 4A

Exc.V, depth 18cm. Broken vessel (t.g.III-c-a,e) with burnt bones in 65cm from grave 4 (Fig.45:5).

Grave 4B

Exc.V, depth ?. Vessel (t.g.III-c-b) with burnt bones, Fig.46:1.

Grave 5

Exc. - . Large vessel (t.g.III-0) with burnt bones. Among bones - fragment of undefined blade tool (lost). Near - broken vessel (t.g.?), Fig.46:2.



Fig. 44. Sofievka cemetery: the general plan (after Y.Zakharuk). 1 - pile of burnt bones; 2 - vessels with burnt bones and ashes; 3 - empty vessels; 4 - "isolated" flint artefact; 5 - remains of destroyed graves. Plan with our new numeration, the first number in text.

Exc. - . Large vessel (t.g.) with burnt bones. Among bones - fired slim arrowhead with straight base (?) made from chip from flint axe (Fig.46:3).

Destroyed graves

At the cemetery, some materials were collected "from the surface", e.g. 2vessels (t.g.III-0), stone axe (type 1A) and burnt fragment of flint undefined blade tool (Fig.47:1).

3.3.2. EXCAVATIONS OF 1948 (BY Y. ZAKHARUK)

On the surface of completely destroyed, NW part of the site were found several flint artefacts:

Sq.A-2 - fired fragment of undefined blade tool used as striker (Fig.47:2a); Sq.F.2 - abia fragment (Fig.47:2b):

Sq.F-2 - chip from axe (Fig.47:2b);

Sq.A-3 - ordinary arrowhead with concave base (Fig.47:2c);

Sq.G-4 - ordinary arrowhead with straight base (Fig.47:2d) and ordinary arrowhead with concave base (Fig.47:2e);

Sq.H-4 - amorphous striker made from natural piece (Fig.47:2f).

Grave 1

Sq.K-5, depth 36cm. Spot of burnt bones, triangular in plan. Among bones - part of 3 broken vessels (t.g.?), stone with traces of red paint.

Grave 2

Sq.K-5, depth ?. Spot of burnt bones. Among bones - 8 fragments of 3 vessels (t.g.?). Near the spot - triangular flint arrowhead.

Sq.G-6. On the surface - flint ordinary arrowhead with straight base (Fig.48:5).

Grave 3

Sq.H-6, depth ?. Small pile of burnt bones, 8x8x5cm. Near the pile - copper flat square axe (type IAx), Fig.48:1.

Grave 4

Sq.I-6, depth 39cm. Pile of burnt bones of childe (?), 21x10x6cm. Among bones - 9 copper beads (types 2x IIBe1, 2x IIBe2, 3x IIBe3, 2x ?), 4 copper rings (type IIR), 2 cylindrical grey-green stone beads (all finds without traces of fire), Fig.48:2.

Grave 5

Sq.J-6, depth 34cm. Vessel (t.g.?) with burnt bones.

Grave 6

Sq.J-6, depth 30cm. Burnt bones and small broken vessel.

Sq.J-6, depth 36cm. Pile of burnt bones. Among bones - two small stones.

Sq.J-6. On the surface, not far from the graves 5,6,7 - two burnt flint arrowheads: slim specimen with straight base and big one with concave base (Fig.48:3).

Grave 8

Sq.F-7, depth 21cm. Low part of the Vessel (t.g.?) with burnt bones. Among bones - 2 small copper nails (type IIN). Near the vessel - small stone axe (type 1A), Fig.48:4.

Grave 9

Sq.G-7, depth 17cm. Pile of burnt bones, 12x9x5cm. Near the pile - broken vessel (t.g.?).

Grave 10

Sq.G-7, depth 16cm. Pile of burnt bones, 14x14x12cm.

Grave 11

Sq.H-7, depth 29cm. Pile of burnt bones, 26x15x12cm (see Fig.49:1).

Grave 12

Sq.H-7, depth 27cm. Broken vessel (t.g.?) with burnt bones. To S (between graves 11-12) on depth 28cm in sand - stone axe (type 1B), Fig.49:1.

Sq.I-7, depth 70 cm. Fragment of flint ordinary blade knife - variant B. It is refitted with artefact from grave 44 (Fig.55).

Grave 13

Sq.J-7, depth 39cm. Vessel (t.g.III-b,c-d,e; red painting) with burnt bones (Fig.-49:2).

Grave 14

Sq.J-7, depth 36cm. Pile of burnt bones, 4x3x3cm. On bones - copper awl (type IAw1). Near the pile - miniature vessel (t.g.IV- 0). NW of the grave s boundary, another vessel was recorded (t.g. IV-0), Fig.49:3.

Grave 15

Sq.J-7, depth 35cm. Small vessel (t.g.III-0) with burnt bones (Fig.49:4).

Grave 16

Sq.J-7, depth 35cm. Pile of burnt bones.

Grave 17

Sq.J-7, depth 38cm. Vessel (t.g.III-0) with burnt bones (Fig.50:1).

Grave 18

Sq.J-7, depth 33cm. Pile of burnt bones, 10x14x5cm.

Sq.J-7, depth 33cm. Pile of burnt bones. On the pile stone axe (type 2), flint square axe and copper awl (type IAw?). Among bones - two pieces of copper flat axe (type IAx) and copper knife (type IK1), Fig.50:2.

Grave 20

Sq.K-6/7, depth 20cm. Pile of burnt bones. Among bones - tooth of animal.

Grave 21

Sq.K-7, depth 35cm. Broken vessel (t.g.?) with burnt bones.

Grave 22

Sq.K-7, depth 33cm. Vessel (t.g.III?-b-a) with burnt bones. Among bones - copper bead (type IIBe3) and flint ordinary blade knife - variant B (Fig.51:1).

Grave 23

Sq.K-7/8, depth 30cm. Pile of burnt bones, 20x14x6cm.

Sq.L-7. On surface - flint ordinary arrowhead with concave base (Fig.51:2).

Grave 24.

Sq.M-7, depth 39cm. Pile of burnt bones, 24x20x4cm.

Sq.F-8. On surface - flint amorphous striker made from axe (?) fragment (Fig.51:3).

Grave 25

Sq.G-8, depth 15cm. Broken pot with burnt bones.

Grave 26

Sq.G-8, depth 28cm. Broken vessel (t.g.III-c-a) with burnt bones (Fig.51:4).

Sq. G-8, depth ? A single vessel (t.g.?)

Sq.G-8. On surface - 2 flint artefacts: chip from square axe (Fig.51:5) and fragment of small, probably palaeolithic blade.

Grave 27

Sq.H-8, depth 32cm. Large broken vessel (t.g.?) with burnt bones. On the vessel - traces of copper oxide.

Grave 28

Sq.H-8, depth 9cm. Pile of burnt bones, 20x19x5cm.

Grave 29

Sq.H-8, depth 11cm. Pile of burnt bones, 25x22x8cm. Among bones - piece of belemnite.

Sq.I-8. On surface - fired flint ordinary striker on blade (Fig.52:2).

Grave 30

Sq.J-7/8, depth 31cm. Pile of burnt bones, 17x15x6cm. On the bones - copper shakle - holder (type IISH), Fig.52:1.

Sq.J-8, depth 26cm. Broken vessel (t.g.?) with burnt bones.

Grave 32

Sq.K-8, depth 32cm. Large vessel (t.g.III-c-e) with burnt bones. Among bones - tooth of animal. Near the pot - small vessel (t.g.VIII-0), Fig.52:3.

Grave 33

Sq.K-8, depth 40cm. Pile of burnt bones, 10x8x4cm.

Grave 34

Sq.K-8, depth 45cm. Pile of burnt bones, 20x16x6cm. Near the pile vessel (t.g.III-a,b,c-d,e; red painting), stone axe (type 1B) and 3 flint artefacts: damaged square axe, massive amorphous striker made from flake tool and refitted from 2 fragments ordinary blade knife - variant A (Fig.53).

Grave 35

Sq.K-8, depth 22cm. Pile of burnt bones, 14x12x4cm.

Grave 36

Sq.K/L-8, depth 24cm. Pile of burnt bones, 10x10x4cm.

Grave 37

Sq.L-8, depth 31cm. Small broken vessel (t.g.III-c-e) with burnt bones. Among bones - flint ordinary blade striker. Near the pot - small vessel (t.g.?-?-d; red painting), Fig.54:1.

Grave 38

Sq.H-9, depth 22cm. Vessel (t.g.II-0) with burnt bones. Among bones - copper bead (type IIBe1-2), Fig.54:2.

Sq.I-9, on depth 21-23cm two small vessels (t.g.?), maybe from grave 38 or 39.

Grave 39

Sq.J-9, depth 30cm. Pile of burnt bones, 20x16x9cm, partly coloured by red paint. Among bones - flint amorphous striker on flake Fig.54:3.

Grave 40

Sq.J-9, depth 38cm. Pile of burnt bones, 20x11x3cm. Among bones - flint nodule (probably amorphous striker made from natural piece), Fig.54:4.

Grave 41

Sq.J-9, depth 41cm. Broken pot with burnt bones.

Grave 42

Sq.J-9, depth 26cm. Pile of burnt bones, 13x9x4cm.

Grave 43

Sq.K-9, depth 25cm. Pile of burnt bones,13x10x7cm. In 5cm from the pile, on depth 34cm - flint amorphous striker made from natural piece, on other hand - small flint blade (Fig.54:5).

Sq.K-9, depth 32cm. Flint square axe probably from grave 43 (Fig.54:6).

Grave 44

Sq.L-9, depth 75cm. Pile of burnt bones, 25x20x10cm. Near the pile - broken vessel (t.g.III-c-a,e), vessel (t.g.?) and stone axe (type 1A/B). To NE from pile, depth 66cm - 2 flint artefacts: damaged square axe and fragment of ordinary blade knife - variant B, which is refitted with piece from sq.I-7 (Fig.55).

Grave 45

Sq.M-9, depth 48cm. Pile of burnt bones, 20x16x5cm. Among bones - fragment of flint undefined tool on blade with low angle retouch on end-scraper front. Near the pile - flint amorphous striker made from square axe fragment (Fig.56:1).

Grave 46

Sq.M-9, depth 70cm. Vessel (t.g.III-b,c-d; red painting) with burnt bones (Fig.-56:2).

Grave 47

Sq.F/G-10, depth 1cm. Broken vessel (t.g.?) with burnt bones. Near - next vessel and flint fragment of undefined blade tool used as striker (Fig.56:3).

Grave 48

Sq.G-10, depth 2cm. Pile of burnt bones 30x24cm. Among bones - 4 broken vessels (t.g.?).

Grave 49

Sq.G-10, depth 2cm. Scattered burnt bones.

Grave 50

Sq.G-10, depth 7cm. Broken vessel (t.g.?-?-d; red painting) with burnt bones.

Grave 51

Sq.H-10, depth 16cm. Pile of burnt bones, 22x15x5cm.

Grave 52

Sq.H-10, depth 15cm. Pile of burnt bones, 30x23x5cm.

Grave 53

Sq.H-10, depth 15cm. Pile of burnt bones, 16x12x9cm.

Grave 54

Sq.H-10, depth 18cm. Pile of burnt bones, 14x9x8cm.

Grave 55

Sq.H-10, depth 11cm. Pile of burnt bones, 7x7x4cm.

Grave 56

Sq.H-10, depth 19cm. Pile of burnt bones, 34x12x5cm.

Grave 57

Sq.H-10, depth 18cm. Pile of burnt bones, 18x15x6cm.

Sq.I-10, depth 26cm. Pile of burnt bones, 24x16x3cm.

Grave 59

Sq.I-10, depth ?. Small pile of burnt bones.

Grave 60

Sq.J-10, depth 26cm. Pile of burnt bones, 8x4x3,5cm.

Sq.J-10. On surface - flint chip and 2 micro-chunks. Depth 51cm - flint spikeended presser on blade maybe from grave 60 (Fig.56:4)

Grave 61

Sq.J-10, depth 19cm. Spot of scattered burnt bones, 20x25cm.

Grave 62

Sq.K-10, depth 47cm. Pile of burnt bones, 16x14x4cm.

Grave 63

Sq.K-10, depth 49cm. Broken vessel (t.g.?) bones. Near the grave - flint fragment of undefined blade tool used as striker (Fig.57:1; see also Fig.57:2).

Grave 64

Sq.L-10, depth 52cm. Pile of burnt bones, 23x15x5cm. Among bones - burnt flint fragment of undefined blade tool. Near the pile broken vessel (t.g.III-b,c-d; red painting) and stone axe (type 1B), Fig.57:2. Above the pile, on depth 35-52cm - 4 flint tools: ordinary blade dagger, small asymmetric blade knife, ordinary blade striker and amorphous presser made from chunk (probably from axe), Fig.57:3.

Sq.L-10. On surface - 2 flint ordinary arrowheads (first with concave base, second with straight base). Depth 32cm - flint amorphous (pseudo-tanged) arrowhead. Depth 68cm - flint ordinary arrowhead with straight base (Fig.57:4). Probably all these tools are connected with grave 64.

Grave 65

Sq.L-10, depth 50cm. Vessel (t.g.III-0) with burnt bones. Near the pot - stone hammer (type 3), Fig.58.

Grave 66

Sq.M-10, depth 61cm. Broken vessel (t.g.?) with burnt bones. North of the grave another vessel was recorded. (t.g.?).

Grave 67

Sq.N-10, depth 71cm. Pile of burnt bones, 18x10x5cm. Among bones - flint flake. Near the pile - flint square axe, Fig.59:1.

Grave 68

Sq.G/H-11, depth 2cm. Pile of burnt bones, 20x16x5cm. Among bones - 12 small pieces of copper things (type ?) and 2 burnt flint arrowheads (ordinary specimen with straight base and tip fragment of big specimen), Fig.59:2.

Sq.I-11. On surface - flint arrowhead (lost).

Grave 69

Sq.J-10/11, depth 32cm. Pile of burnt bones,20x17x12cm. In 12cm to E, on depth 32cm - flint flake (Fig.59:3).

Grave 70

Sq.K-11, depth 34cm. Pile of burnt bones, 16x14x6cm. Among bones - flint spike-ended presser made from pseudo-blade knapped from square axe (Fig.59:4).

Grave 71

Sq.K-11, depth 42 cm. Pile of burnt bones, 27x24x8cm. Among bones - flint big asymmetric blade knife. On the pile - copper awl (type IIAw1) with traces of wooden handle on one side. Near the pile - fired flint amorphous blade striker and 2 broken vessels (t.g.III-0; ?), Fig.60:1.

Grave 72

Sq.K-11, depth 62cm. Pile of burnt bones, 20x15x4cm. Near the pile - flint amorphous striker made from natural piece (Fig.60:2).

Grave 73

Sq.K-11, depth 62cm. Pile of burnt bones, 24x18x6cm.

Grave 74

Sq.K/L-11, depth 20cm. Pile of burnt bones, 18x15x14cm. Near the pile - 2 vessels (t.g.III-c-e), Fig.60:3. One of the vessels - partly covered by cremation 75.

Grave 75

Sq.K/L-11, depth 56cm. Pile of burnt bones, 25x24x12cm.

Grave 76

Sq.L-11, depth 67cm Small vessel (t.g.III-0) with burnt bones (Fig.61:1).

Grave 77

Sq.L-11, depth 68cm. Vessel (t.g.III-c-e) with burnt bones (Fig.61:2).

Grave 78

Sq.J-11, depth 25cm. Spot of scattered burnt bones,14x3cm.

Grave 79

Sq.J-11, depth 21cm. Pile of burnt bones, 19x14x9cm. To N from the pile - piece of sandstone.

Sq.J-11, depth 65cm - Flint big arrowhead with concave base (Fig.59:5).

Grave 80

Sq.K-11, depth 30cm. Pile of burnt bones 16x4x8cm.

Grave 81

Sq.J/K-11, depth 24cm. Pile of burnt bones, 22x20x9cm. Among bones - animal tooth.

Sq.L-11, depth 70cm. Vessel (t.g.?-?,c-d; red painting) with burnt bones.

Grave 83

Sq.L-11, depth 86cm. Pile of burnt bones, 18x22x9cm. Among bones - two burnt flint fragments of undefined blade tool. Near the pile - broken stone axe (type 2), Fig.61:3.

Sq.L-11, depth 19cm - flint amorphous blade striker; depth 85cm - flint ordinary blade striker (Fig.61:4). Maybe both of these tools are connected with grave 83.

Grave 84

Sq.L-11, depth 77cm. Pile of burnt bones, 20x12x8cm. To W from the pile, between graves 83 and 84 - copper ring (type IIR), Fig.61:5.

Grave 85

Sq.M-11, depth 80cm. Small pile of burnt bones, 7x6x3cm.

Grave 86

Sq.M-11, depth 84cm. Burnt bones and 4 broken vessels (t.g.?) in one pile. On the pile - large vessel (t.g.I-0), Fig.62:1.

Grave 87

Sq.I-12, depth 22cm. Pile of burnt bones.

Grave 88

Sq.I-12, depth 24cm. Pile of burnt bones,13x6x3cm. In 25 cm to E - fragments of the broken vessel (t.g.III-0), Fig.62:2. Near the pile of grave 88, on surface (depth 2cm) of sq.H-12 - small vessel (t.g.II-b-a), stone hammer (type 3) and fragment of flint square axe (maybe striker?), Fig.62:3.

Grave 89

Sq.J-12, depth 35cm. Small pile of burnt bones, 11x7x3cm.

Grave 90

Sq.J-12, depth 37cm. Burnt bones.

Grave 91

Sq.J-11/12, depth 34cm. Pile of burnt bones, 22x20x7cm.

Grave 92

Sq.J-12, depth 60cm. Pile of burnt bones, 10x11x4cm. On the pile - stone with traces of red paint. There are some red paint also on the burnt bones.

Grave 93

Sq.J-12, depth 42cm. Pile of burnt bones. To W from the pile (on depth 50cm) - clay spin-wheel (Fig.63:1).

Grave 94(94,95)

Sq.K-12, depth 61cm. Small vessel with burnt bones (t.g.III-b-a). In 50 cm to SW - vessel (t.g.II-0) with clay spin-wheel in him (Fig.63:2).

Sq.K-12, depth 39cm - flint fragment of ordinary blade knife - variant C, probably from the grave 94(94,95), Fig.63:3.

Grave 95(96)

Sq.L-12, depth 82cm. Pile of burnt bones, 10x6x3cm. Near the grave 95(96) -2 vessels (t.g.III-0, Fig.63:4a; III-?-d; red painting, Fig.63:4b)*. [* The identification of the vessels with the object is not certain.]

Grave 96(97)

Sq.L-12, depth 71cm. Broken vessel (t.g.?) with burnt bones. In 20cm to S, on depth 75cm - broken vessel (t.g.?).

Grave 97(98)

Sq.L-12, depth 56cm. Pile of burnt bones, 30x20x12cm.

Grave 98(99) Sq.L-12, depth 69cm. Small vessel (t.g.?) with burnt bones.

Grave 99(100)

Sq.L-12, depth 70cm. Low part of broken vessel (t.g.III-c-e) with burnt bones. Among bones - animal tooth. Near the grave - vessel (t.g.III-b-a), Fig.64:1.

Grave 100(101)

Sq.L-12/13, depth 77cm. Large vessel (t.g.III-c-b,e) with burnt bones (Fig.64:2).

Grave 101(102) Sq.L-13, depth 77cm. Vessel (t.g.III-0) with burnt bones (Fig.64:3)

Grave 102(103)

Sq.M-12, depth 32cm. Vessel (t.g.III-0) with burnt bones (Fig.64:4).

Grave 103(104)

Sq.M-12, depth 78cm. Pile of burnt bones, oval in plan, 16x4x6 cm.

Grave 104(105)

Sq.M-12, depth 84cm. Pile of burnt bones, oval in plan, 14x12x6cm.

Grave 105(106)

Sq.M-12, depth 85cm. Pile of burnt bones, oval in plan, 18x12x6cm.

Grave 106(107)

Sq.M-12, depth 40cm. Pile of burnt bones, oval in plan, 26x18x6cm.

Grave 107(108)

Sq.J-13, depth 31cm. Pile of burnt bones, oval in plan, 25x20x5cm.

Grave 108(109)

Sq.I/J-13, depth 38cm. Pile of burnt bones, oval in plan, 16x14x4cm.

Grave 109(110)

Sq.J-13, depth 48cm. Pile of burnt bones, oval in plan, 26x22x7cm. Among bones - two conic clay spin-wheels.

Grave 110(111)

Sq.L-13, depth 60cm. Pile of burnt bones. Near the pile - broken vessel (t.g.I-0), Fig.65:1.

Grave 111(112)

Sq.L-13, depth 76cm. Pile of burnt bones, 20x18cm. In 15cm to NE, on depth 83cm - stone axe (type 1A/B), Fig.65:2a.

Between grave 111-112, on depth 69cm - stone axe (type 1A/B), Fig.65:2b.

Grave 112(113)

Sq.M-13, depth 86cm. Pile of burnt bones, 30x15x5cm. To S from the pile - vessel (t.g.IV-0), Fig.65:3; see also Fig.65:2b.

Grave 113(114)

Sq.M-13, depth 86cm. Pile of burnt bones, oval in plan, 40x30x9cm. Not far from the pile - vessel (t.g.I-b-a), Fig.65:4.

Sq.E-15. On surface - 5 flint chips from square axe, four of them are refitted (Fig.65:5).

Grave 114(115)

Sq.H-15, depth 90cm. Pile of burnt bones, oval in plan, 32x16x7cm. To N from pile, depth 15cm - refitted from 2 burnt flint fragments part of ordinary blade knife - variant B (Fig.66:1).

Between graves 114(115), 115(116) and 116(117) - broken stone axe (type 1B), Fig.66:3.

Grave 115(116)

Sq.H-15, depth 90cm. Pile of burnt bones, 12x12x5cm. To NE from grave 115 - 2 small vessels (t.g.II or III-0 and t.g.?), near them 2 flint arrowheads (ordinary specimen with straight base and undefined one - lost), Fig.66:2; see also Fig.66:3.

Grave 116(117)

Sq.H-15, depth 90cm. Pile of burnt bones, 14x10x3cm, see Fig.66:3.

Grave 117(119)

Sq.H-15, depth 19cm. Pile of burnt bones, oval in plan, 20x11x5cm.

Grave 118(120)

Sq.H-16, depth 25cm. Low part of vessel (t.g.?) with burnt bones.

Sq.N-8, depth 50cm - flint ordinary arrowhead "with straight base" (Fig.66:4).

Grave 119(121)

Sq.N-9, depth 31cm. Pile of burnt bones.

Grave 120(122)

Sq.O-9, depth 23cm. Spot of burnt bones, 40x40cm, circular in plan.

Grave 121(123)

Sq.O-9, depth 3Ocm. Pile of burnt bones, 35x26x20cm.

Sq.O-9. On surface - flint chip (Fig.66:5).

Grave 122(124)

Sq.N-10, depth 28cm. Pile of burnt bones, 25x25x5cm.

Sq.N-10, depth 53cm. Flint ordinary arrowhead with straight base (Fig.66:6).

Grave 123(125)

Sq.O-10, depth 23cm. Pile of burnt bones, 38x20cm. Among bones - 3 copper rings (type IIR), Fig.66:7.

Grave 124(126)

Sq.O-10, depth 33cm. Pile of burnt bones, oval in plan, 27x21x8cm. Among bones - copper tetrahedral awl (type IAw1), Fig.66:8.

Grave 125(127)

Sq.O-10/11, depth 26cm. Pile of burnt bones, oval in plan, 23x18x6cm. Among bones - 2 glass beads (destroyed during the analysis).

Grave 126(128) Sq.O-11, depth 25cm. Pile of burnt bones, 18x15x5cm.

Grave 127(129) Sq.N-11, depth 26cm. Vessel (t.g.?) with burnt bones.

Sq.N-11, depth 22cm - refitted from 2 burnt flint fragments part of undefined blade tool (Fig.66:9); depth 12cm - flint flake (lost).

Grave 128(130) Sq.O-11, depth 30cm. Pile of burnt bones, 12x10x3cm.

Grave 129(131) Sq.O-11, depth 24cm. Pile of burnt bones, oval in plan, 20x15x4cm.

Grave 130(132) Sq.N-11/12, depth 24cm. Pile of burnt bones, oval in plan, 50x30x15cm.

Grave 131(133)

Sq.N-11/12, depth 31cm. Pile of burnt bones, 15x13x3cm.

Grave 132(134)

Sq.O-12, depth 42cm. Pile of burnt bones, 19x11x5cm.

Grave 133(135)

Sq.N-12, depth 32cm. Pile of burnt bones, 10x8x5cm.

Grave 134(136)

Sq.O-12, depth 28cm. Pile of burnt bones, 18x10x5cm.

Grave 135(137)

Sq.O-12, depth 22cm. Pile of burnt bones, oval in plan, 28x26x6cm.

Sq.P-12, depth 25cm - flint ordinary arrowhead with straight base (Fig.67:1).

Grave 136(138)

Sq.O-13, depth 32cm. Pile of burnt bones, oval in plan, 32x23x6cm.

Grave 137(139)

Sq.N-13, depth 22cm. Pile of burnt bones, oval in plan,28x16x5cm.

Grave 138(140)

Sq.N-13, depth 23cm. Pile of burnt bones, oval in plan, 20x14x8cm.

Grave 139(141)

Sq.N-13, depth 22cm. Vessel (t.g.IV-0) with burnt bones (Fig.67:2).

Sq.O-14, depth 35-70cm - a fragment of a flint micro-blade, probably unconnected to the cemetery.

Destroyed graves

At the cemetery, some materials were collected without methodical documentation. This applies to clay goods: vessels (t.g.II-0; V-0), spin-wheels (Fig.68); to glass goods: beads (destroyed during analysis); to copper goods: awls (type IAw1), knives (types IK1-2), rings (type IIR), and beads (types IIBe1, IIBe2, IIBe3), Fig.69; to stone goods: axes (types 1A, 1B), beads, and fire stone (Fig.70); and to flint: 13 small chunks, an ordinary blade knife refitted from 2 fragments - variant A (Fig.71:1f), part of tanged blade dagger refitted from 2 burnt fragments (Fig.71:1b), a burnt fragment of an undefined blade tool (Fig.71:1h), a burnt fragment of an undefined blade tool used as striker (Fig.71:1a), a spike-ended presser made from the scaled fragment of a blade tool (Fig.71:1g), 4 arrowheads (2 ordinary specimens with concave base and 2 undefined - lost - specimens)[Fig.71:1c-d], an amorphous arrowhead or small fragment of an undefined blade tool (Fig.71:1e).

Among the artefacts from the Sofievka cemetery there are also 7 flint arrowheads without tags: 3 ordinary specimens with concave base (Fig.71:2d-f), 1 slim specimen with straight base (Fig.71:1a), 2 ordinary specimens with straight base (Fig.71:2b-c), 1 specimen made from the tip of a larger arrowhead (Fig.71:2g). Four small arrowheads lacking from the above inventories must be among them.

3.3.3. EXCAVATIONS OF 1963 (BY Y. ZAKHARUK AND V. KRUTS)

Grave 1

Sq.5, depth 1,25-1,35m. Pile of burnt bones, oval in plan, 20x18x10cm.

Other finds

Sq.6, depth 1,58m.On square 20x20cm - small vessels (t.g.III-0; III-b-a; VIII-c-a), Fig.72:1.

Sq.6, depth ?. 3 flint blades.

Sq.14, depth 47cm. Vessel (t.g.?).

From surface. Pottery, spin-wheel and stone tool (Fig.72:2).



Fig. 45. Sofievka - 1947. 1- grave 2; 2 - grave 3; 3 - near grave 1-2; 4 - grave 4; 5 - grave 4A.



Fig. 46. Sofievka - 1947. 1 - grave 4B; 2 - grave 5; 3 - grave 6.


Fig. 47. Sofievka - 1947/1948. 1 - finds from destroyed graves (1947); 2 - finds from surface of the cemetery (1948).



Fig. 48. Sofievka - 1948. 1 - grave 3; 2 - grave 4; 3 - near the graves 5,6,7, sq.J-6; 4 - grave 8; 5 - sq.G-6.



Fig. 49. Sofievka - 1948. 1 - between the graves 11-12; 2 - grave 13; 3 - grave 14; 4 - grave 15.



 $F\,i\,g$. 50. Sofievka - 1948. 1 - grave 17; 2 - grave 19.



Fig. 51. Sofievka - 1948. 1 - grave 22; 2 - near grave 23, sq.L-7; 3 - near grave 24, sq. F-8; 4 - grave 26; 5 - near grave 26, sq.G-8.



Fig. 52. Sofievka - 1948. 1 - grave 30; 2 - near grave 29, sq.I-8; 3 - grave 32.



Fig. 53. Sofievka - 1948. Grave 34.



Fig. 54. Sofievka - 1948. 1 - grave 37; 2 - grave 38; 3 - grave 39; 4 - grave 40; 5 - grave 43; 6 - probably from grave 43, sq.K- 9.



Fig. 55. Sofievka - 1948. Grave 44.



Fig. 56. Sofievka - 1948. 1 - grave 45; 2 - grave 46; 3 - grave 47; 4 - near grave 60, sq.J-10.



Fig. 57. Sofievka - 1948. 1 - grave 63; 2 - grave 64 and between graves 63-64; 3 - above grave 64; 4 - near grave 64, sq.L-10.



Fig. 58. Sofievka - 1948. Grave 65.



Fig. 59. Sofievka - 1948. 1 - grave 67; 2 - grave 68; 3 - grave 69; 4 - grave 70; 5 - near grave 79, sq.J-11.



Fig. 60. Sofievka - 1948. 1 - grave 71; 2 - grave 72; 3 - grave 74.



Fig. 61. Sofievka - 1948. 1 - grave 76; 2 - grave 77; 3 - grave 83; 4 - near grave 83, sq.L-11; 5 - grave 84.



Fig. 62. Sofievka - 1948. 1 - grave 86; 2 - grave 88; 3 - near grave 88, sq.H-12.



Fig. 63. Sofievka - 1948. 1 - grave 93; 2 - grave 94(94,95); 3 - near grave 94(94,95), sq.K-12; 4 - grave 95(96)?



Fig. 64. Sofievka - 1948. 1 - grave 99(100); 2 - grave 100(101); 3 - grave 101(102); 4 - grave 102(103).



Fig. 65. Sofievka - 1948. 1 - grave 110(111); 2 - grave 111(112) and between graves 111-112(112-113); 3 - grave 112(113); 4 - grave 113(114); 5 - near grave 113(114), sq.E-15.



Fig. 66. Sofievka - 1948. 1 - grave 114(115); 2 - grave 115(116); 3 - near graves 114-116(115-117); 4 - near grave 118(120), sq.N- 8; 5 - near grave 121(123), sq.O-9; 6 - grave 122(124), sq.N-10; 7 - grave 123(125); 8 - grave 124(126); 9 - near grave 127(129), sq.N-11.



Fig. 67. Sofievka - 1948. 1 - near grave 135(137), sq.P-12; 2 - grave 139(141).



 $F\,i\,g$. 68. Sofievka - 1948. Vessels and clay spin-wheels from surface of the cemetery.



Fig. 69. Sofievka - 1948. Copper finds from surface of the cemetery.



 $F\,i\,g\,.$ 70. Sofievka - 1947/1948. Stone axes and beads from surface of the cemetery.



Fig. 71. Sofievka - 1948. Flint tools from surface of the cemetery. 1 - from surface; 2 - unlabelled.



Fig. 72. Sofievka - 1963. 1 - group of finds, sq.6; 2 - finds from surface.

3.4. ZAVALOVKA CEMETERY (FIG.73)

Grave 1.

Sq.C-5, depth 60cm. Pile of burnt bones, circular in plan, 30x12cm. Among the bones is a broken vessel (t.g.?), two amber beads (type ca 1AIa - spindle - shaped), 5 copper beads (type 3x IIBe1, 1x IIBe2), and a pebble (Fig.74:1).

Grave 2.

Sq.C-5, depth 55cm. Pile of burnt bones, circular in plan, 20x18cm. Among the bones are two flint ordinary arrowheads with straight base, one of them burnt (Fig.74:2).

Grave 3.

Sq.C-5, depth 60cm. Pile of burnt bones, 40x40x18cm. Among the bones are 4 burnt flint artefacts: fragment of an undefined blade tool (lost), ordinary arrowhead with concave base, fragment of a large atypical tanged arrowhead, part of an amorphous flake presser refitted from 3 fragments (Fig.74:3).

Grave 4.

Sq.C-5, depth 45cm. Pile of burnt bones, circular in plan, 40x40x15cm. Among the bones are 2 burnt flint artefacts: 2 fragments of a blade spike-ended presser and a fragment of ordinary arrowhead with straight base (Fig.74:4).

Grave 5.

Sq.D-6, depth 60cm. Pile of burnt bones, circular in plan, 20x20cm. Among the bones lies part of a broken vessel (t.g.?), Fig.74:5.

Grave 6

Sq.D-5, depth 50cm. Pile of burnt bones, circular in plan, 25x25x10cm.

Grave 7

Sq.D-5/6 ,depth 58cm. Pile of burnt bones, circular in plan, 0x20x20cm. Among the bones are 4 burnt flint artefacts: a small fragment of an undefined blade tool, a fragment of an undefined flake tool, a fragment of a micro-scaled-piece and a chunk (Fig.75:1).

Grave 8.

Sq.D/E-5/6, depth 40cm. Pile of burnt bones, circular in plan, 18x18x10cm.

Grave 9.

Sq.E-5, depth 48cm. Pile of burnt bones, circular in plan, 20x20x15cm.

Grave 10.

Sq.E-5/6, depth 42cm. Pile of burnt bones, circular in plan, 20x20x15cm.

Grave 11.

Sq.D/E-6, depth 38cm. Pile of burnt bones, circular in plan, 8x28x14cm. On the bones is an ordinary flint blade striker (?) [Fig.75:2].



Fig. 73. Zavalovka cemetery: the general plan (after V. Dergachev, I. Manzura). 1 - vessels (?) with burnt bones; 2 - piles of burnt bones; 3 - pits of the Bronze Age, Middle Dnieper culture; 4 - destroyed part of site.

Grave 12.

Sq.E-6, depth 40cm. Pile of burnt bones, circular in plan, 23x23x15cm.

Grave 13.

Sq.C/D-6, depth 40cm. Pile of burnt bones, circular in plan, 16x16x10cm. Among the bones is a burnt fragment of an undefined flint blade tool (Fig.75:3).

Grave 14.

Sq.B-4, depth 34cm. Pile of burnt bones, oval in plan, 40x25x11cm.

Grave 15.

Sq.B-4, depth 39cm. Pile of burnt bones, circular in plan, 24x24x15cm. On the N part of the pile is a schematic clay figurine, among the bones is the fired fragment of a flint flake (Fig.75:4).

Grave 16.

Sq.A-4, depth 40cm. Pile of burnt bones, circular in plan, 30x30cm, covered by a spot of scattered burnt bones, circular in plan, 60x60cm. Among the bones is a pebble and 4 flint artefacts: 3 parts of blade big asymmetric knife or tanged dagger refitted from 5 burnt fragments, a spike-ended presser on a blade refitted from 3 burnt fragments, a burnt blade spike-ended presser, a side-scraper with a bifacial retouch and ordinary chip (Fig.75:5).

Destroyed graves

Besides the described objects, 7 flint artefacts were found in the explored area: 3 fragments of undefined burnt blade tools (Fig.76:1a-c), 1 burnt fragment of an undefined blade tool used as a striker (Fig.76:1d), a burnt amorphous arrowhead made from a chip (Fig.76:1e), and 2 amorphous flake pressers (one of them burnt; Fig.76:1f-g.

At the cemetery, some materials were collected without methodical documentation. These collection include pottery and 6 flint artefacts: the burnt fragment of an undefined blade tool (Fig.76:2a), an ordinary arrowhead with straight base (Fig.76:2b), a burnt ordinary arrowhead with concave base (Fig.76:2c), a burnt scaled-piece made from the fragment of an undefined blade tool (Fig.76:2d), and parts of two flakes refitted from 3 burnt fragments (Fig.76:2e-f).

In the publication of materials from the Zavalovka cemetery [Dergachev, Manzura 1991], there were mentioned 3 fragments of pottery (Fig.76:3a-d) and 8 flint artefacts which today are missing: 1 undefined blade tool, probably an ordinary striker (Fig.76:3e); 1 fragment of an undefined blade tool (fig.76:3f); 5 arrowheads (Fig.76:3g-k); and 1 axe ? (Fig.76:31).



Fig. 74. Zavalovka. 1 - grave 1; 2 - grave 2; 3 - grave 3; 4 - grave 4; 5 - grave 5.



Fig. 75. Zavalovka. 1 - grave 7; 2 - grave 11; 3 - grave 13; 4 - grave 15; 5 - grave 16.



Fig. 76. Zavalovka. Finds from destroyed graves. 1 - from a layer; 2 - from surface; 3 - unlabelled [lost - foll. Dergachev, Manzura 1991]

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CHRONOLOGY OF SOFIEVKA TYPE CEMETERIES: ARCHAEOLOGICAL AND ISOTOPIC ONE

Chronology is an important component of all historical - archaeological reconstructions. The age of any culture can be established, in many cases, from: the indirect features (ceramics, instruments, typological analogies, etc.) or isotope (here: ^{14}C) data.

Implementation of the radiocarbon method has not only extended the range of expedients and approaches in archaeology, but also has permitted researchers to obtain "independent", or using the previously adopted terminology, "absolute" data. The interest in the problems of radiocarbon dating has considerably increased in the past few years. This is explained by the latest achievements in this field connected with the transfer of radiocarbon data onto calendar temporal scale. At present, the calibration curves, the so-called ten-year and twenty-year period curves, up to 8000 BP have been worked out by different radiocarbon laboratories by radiocarbon measurements of dendrosamples containing 10-20 tree rings and generalized by Stuiver, Becker, Pearson and others [Stuiver and Becker 1986; Stuiver and Pearson 1993]. A computer program permitting the researcher to obtain plausible intervals of the calendar time with a various degree of probability was worked out based on the obtained curves [e.g. van der Plicht 1993]. Since the chronological reconstructions, as a rule, are made in the calendar temporal scale, application of the radiocarbon method for dating of archaeological sites has gained a new impulse. In this connection, the chronological dependence obtained earlier by the radiocarbon method is coming entering the stage of refinement, as illustrated in the present article.

1. RELATIVE CHRONOLOGY

Chronology of the Sofievka type cemeteries was based on the indirect data for a long period of time. According to some estimations, the Sofievka type belonged to an earlier time than the sites of Usatovo (Northern Black Sea littoral) type, T.G. Movsha considered them to belong to the earlier type because there are no ceramics with cord ornamentation in the Sofievka graves, though some types of ceramics are similar to those found in Zhvanets (Dniester area), and the dagger from Krasny Khutor is similar to the one found in Verteba cave, simultaneous to Zhvanets. The Dniester area monuments are considered to precede the Usatovo ones [Movsha 1985:254-255]. V.G. Zbenovich looked upon Sofievka and Usatovo cemeteries as simultaneous based on a correlation of the copper daggers [Zbenovich 1966:44; 1972:20- 21]. V.A. Kruts wrote in his article that the Sofievka type is simultaneous to the Tripolye culture from Volhynia (Troyanov type) dated earlier than the Usatovo type [Kruts 1977:148-149]. According to V.A. Dergachev, the Sofievka type is simultaneous to the Usatovo type (similar daggers) and Dniester area Tripolye types (ceramics, plastic arts) and also the Gorodsk type (ceramics, similar types of dishes) [Dergachev 1980:141]. Thus, all researchers dated the Sofievka cemeteries back to late Tripolye - C-II, though placing it in the end or in the beginning of this period, or in the middle of it.

2. RADIOCARBON CHRONOLOGY

According to isotope dating obtained in the end of the 1960s and in the beginning of the 1970s, Usatovo type monuments were dated back to 2600-2300 conv BC, Gorodsk type - to 2700-2600 conv BC. For a long time isotope chronology of Tripolye was based only upon non-calibrated ¹⁴C data and C-II stage was dated between 2800/2750-2400/2350 conv BC [Arkheologiya 1985:254-255; Telegin 1985].

The calendar age of Tripolye C-II was dated 3580-3245 (3530-3175) BC by V.G. Petrenko [Patokova et al. 1989:4].

Tables 1 presents radiocarbon data for late Tripolye C-II cultures, obtained by different radiocarbon laboratories and may serve as the basis for relative chronology, confirming and adjusting the data obtained by other methods. Table 1 also shows the values of the calendar intervals, corresponding to the obtained dating (for probability 68,2% - 1 sigma and 95,4% - 2 sigma). As we can see, some calendar intervals, in the majority of cases, correspond to one datum. This may be explained by an ambiguous connection: radiocarbon data - calendar age, due to different concentrations of radiocarbon in the atmosphere of the past. Graphically the obtained

Tab∣e 1

Sites	Etape	Lab. No.	¹⁴ C age, BP	Intervals of calibrated ages, cal BC	
				1δ	2 δ
Evminka	C-I	Ucla-1466B	4790±100	3690-3680 3660-3500, 3450-3440, 3430-3380	3780-3350
Evminka	C-II	Ucla-1671B	4890±60	3764–3736, 3716–3634	3894–3888 3796–3620, 3590–3526
Mayaki	C-II	KIGN-2 80	4475±30	3340–3030, 2980–2930	3610–3600, 3520–2870, 2800–2790
Mayaki	C-II	KIGN-282	4580±120	3500–3420, 3380–3090	3630–3570, 3540–3020, 3000–2920
Mayaki	C-II	Bln-609	4340±65	3032–2942, 2936–2886	3296–3272, 3270–3238 3172–3170, 3106–2870, 2806–2772, 2720–2702
Mayaki	C-II	Le-645	4340±65	3032–2942, 2936–2886	3296–3272, 3270–3238 3172–3170, 3106–2870, 2806–2772, 2720–2702
Mayaki	C-II	Ki-870	4670±110	3630-3340 3150-3140	3660–3090, 3060–3040
Mayaki	C-II	Ucla-1642B	4375±110	3300–3230, 3180–3170, 3110–2880	3360–2860, 2820–2690
Usatovo	C-II	Ucla-1642	4333±60	3032–2964, 2958–2950, 2932–2884	3260–3244, 3100–2872, 2804–2776, 2716–2706
Gorodsk	C-II	Grn-5099	4651±35	3500-3452 3440-3426, 3380-3364	3510–3404 3388–3350
Danku	C-II	Le-1054	4600±80	3500-3456, 3378-3306, 3230-3186, 3160-3116	3608-3604, 3512-3402, 3388-3256, 3246-3098

¹⁴C Chronology of the late Tripolye types

Sites	Etape	Lab. No.	¹⁴ C age, BP	Intervals of calibrated ages, cal BC	
				1δ	2δ
Krasny Khutor (c) grave 2	C-II	Ki-5038	4280±110	3040–2860, 2820–2670	3310-3230, 3190-3160, 3120-2570, 2520-2500
Krasny Khutor (b) grave 6	C-II	Ki-5016	4140±110	2876–2794, 2784–2582	3014–3000 2926–2450, 2438–2402, 2372–2368
Krasny Khutor (c) grave 98	C-II	Ki-5039	4160±90	2876–2842, 2832–2796, 2784–2616	2912–2550, 2542–2490
Sofievka (c) grave 1	C-II	Ki-5012	4320±70	3032–2946, 2936–2874, 2798–2782	3262–3244, 3100-2860, 2816–2690, 2680–2664, 2634–2628
Sofievka 1963 (c) sq.m. 11	C-II	Ki-5013	4270±90	3028–2980, 2928–2860, 2816–2692, 2680–2666, 2632–2630	3254–3248, 3096–2580
Sofievka (a) from the cemetery	C-II	Ki-5029	4300±45	3016–2998, 2926–2876, 2790–2788	3034–2870 2804–2772, 2716–2704
Zavalovka (c) grave 6	C-II	Ki-5015	4290±90	3034–2866, 2810–2748, 2726–2698	3296–3276, 3268–3238, 3104–2608, 2600–2588
Zavalovka (c) grave 10	C-II	Ki-5014	4230±80	2914–2860, 2816–2690, 2680–2664, 2634–2628	3030–2972, 2932–2574, 2512–2510

Material for datings from Sofievka type cemetaries: a - charcoal, b - organic material from the inside of the pot, c - burnt bones.

results are shown in Fig.1. The most ancient of the studied monuments is Evminka, which dates back to the beginning of the fourth century BC. The next two groups of simultaneous monuments - Mayaki, Danku, Gorodsk and, to an extent, Usatovo may be noted. The earlier phase of existence of Mayaki settlement is simultaneous to the late phase of Evminka. The next group of later simultaneous cemeteries includes Krasny Khutor, Sofievka and Zavalovka.

It may be concluded that these cemeteries existed somewhat longer than the Usatovo ones. The only datum of Gorodsk settlement is not quite correct and does not correlate with the Sofievka ones. All materials from the cemeteries show that


Fig. 1. Radiocarbon chronology of the late Tripolye culture (1σ) . 1 - Evminka, 2 - Mayaki, 3 - Usatovo, 4 - Gorodsk, 5 - Danku, 6 - Krasny Khutor, 7 - Sofievka, 8 - Zavalovka.

they existed for a relatively short period, as indicated by isotope data, within 200-250 years.

Sofievka type monuments may be considered, based on isotope data, as the latest ones of the Tripolye stage C-II. It is conceivable that they existed when other cultural alternatives of Tripolye had already stopped existence. Their calendar age may be between 3300-2900 BC. Thus, the latest Tripolye monuments existed until the beginning of the third millennia BC - the Early Bronze Age.

3. COMMENT ON METHODS USED IN THE PREPARATION OF THE FOSSIL BONES FOR RADIOCARBON ANALYSIS

Burned bones from Sofievka type cemeteries were used as the main material for radiocarbon data. It is known that the organic part of the bones, comprising 10-20% of the body mass, consists of thin collagen fibers, closely connected with non-organic hydroxyapatite crystals. The large surface area and porous structure of bones make them an excellent medium for sorption of humic acids transferred by ground waters. The removal of strange ¹⁴C from the material to be dated is important for dating burned bones. In results of the research, it was found that the content of young carbon may reach several per cent of total carbon in the collagen of bones. We worked out the method of selective distribution of carbon fractions of organic matter by treating the collagen with fluoric-hydrogenous acid.

This method is based on the fact that the introduced carbon precipitates on the bones with silicates and other mineral components, because humic acids chemically are organic analogues of silicon acid.

Fluoric-hydrogenous acid easily dissolves the silicate basis and selectively transfers the introduced organic into a colloid state. In this case, the main organic matter of the burned bones - collagen - practically does not dissolve. It permits one to preserve the dating fraction of the carbon and to achieve practically total removal of organic contamination.

A sample of fossil bones was reduced to fragments of 3-5 mm in size and treated with 0,5-1 N solution of fluoric-hydrogenous acid for 24 hours at room temperature. The collagen was washed with water and treated with 2 N solution of fluoric-hydrogenous acid at room temperature for 24 hours. After washing, when Ph+7, the collagen was dried and used for receiving a counting form of radiocarbon.

Translated by authors

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ABSOLUTE CHRONOLOGY OF THE SOFIEVKA TYPE IN THE LIGHT OF "WIGGLE MATCHING" ANALYSIS

All radiocarbon dating calibrations presented in this paper have been carried out with a computer program Radiocarbon Calibration <calKN> April 1993, Dendro and Archaeological Wiggle Matching by Bernhard Weninger of Cologne University (Germany). Calibrations carried out with programs based only on probabilistic interpretation of measurements (e.g. Probabilistic Calibration of Radiocarbon Time Scale, Silesian Technical University, Gliwice, Poland, ver. 4.0, 1989, or Radiocarbon Calibration Program, 1993 ver. 3.03, Quaternary Isotope Lab, University of Washington) do not yield the actual age of the sample. This is so because each dated sample can be usually matched to a number of more or less probable readings of its calendar age (cf. in this volume: Kovalyukh, Videiko, Skripkin, Chronology..., Table 1). Weninger's program (details in Weninger 1986), thanks to a built-in statistical test, gives for each sample a single, most probable calendar age with a respective standard error. An important novelty of this program is, however, the possibility of "fitting" a series of dates from a specific archaeological context into the appropriate wiggles of the calibration curve (cf. Manning 1995: 126-133). Thus, it is possible with this program to determine the calendar age of specimens with significantly greater precision (Tables 1-5).

The calibration of individual dates from Sofievka type cemeteries (Table 1, Fig.1) sets their duration at 2950-2740 BC. High values of standard errors of measurements, however, make us admit the possibility of extending this period by a hundred years "up" or "down". The archaeological assessment of the length of existence of the cultural phenomenon known as the Sofievka type makes us assume that it was a short-lived phenomenon (cf. Kadrow, Kośko, Videiko, Pottery..., in this volume). A radical version of this assumption, namely that the dated sets were exactly contemporary and short-lived, thanks to wiggle matching, permits us to set their age at ca 2890 BC with a proper allowance for standard error (Fig.2). A more realistic assumption about the transience (as far as archaeological research permits) of the Sofievka type, admitting the possibility that it existed for 100-130 years, allows to set the absolute chronology brackets of the type under discussion at 2920-2790 BC (Fig.3). At the same time the result of the "wiggle matching" analysis sugge-

	Lab. Number	Date BP	Std. dev	cal BC
1	Ki-5038	4280	110	2859 ± 170
2	Ki-5039	4160	90	2742 ± 123
3	Ki-5012	4310	70	2953 ± 96
4	Ki-5013	4270	90	2830 ± 144
5	Ki-5014	4230	80	2790 ± 110
6	Ki-5015	4290	90	2877 ± 146
7	Ki-5016	4140	110	2720 ± 144
8	Ki-5029	4300	45	2928 ± 59

List of dated samples from cemeteries of the Sofievka type (acc to Kovalyukh, Videiko, Skripkin in this volume)

Tab∣e 2

List of dated samples from cemeteries of the Bodrogkeresztúr culture (acc to Forenbaher 1993)

	Site	Lab. Number	Date BP	Std. dev	cal BC
1	Tiszalúc	GrN-1612(?)	5100	40	3876±63
2	Tiszalúc	GrN-1613	5085	40	3870 ± 60
3	Tiszalúc	GrN-1612(?)	5020	40	3834 ± 74
4	Tiszalúc	GrN-1612(?)	4920	60	3703 ± 55
5	Tiszapolgár-Basatanya	Deb-5	4960	130	3783 ± 138
6	Tiszapolgár-Basatanya	Deb-4	4820	140	3545 ± 166

Tab∣e 3

List of dated samples obtained from sites of the Cotofeni culture (acc to Forenbaher 1993)

	Site	Lab. Number	Date BP	Std. dev	cal BC
1	Ostrovul Corbului	LJ-3797	4520	60	3217±105
2	Ostrovul Corbului	LJ-3799	4360	60	2965 ± 70
3	Ostrovul Corbului	LJ-3798	4360	50	2965 ± 60
4	Baile Herculane	LJ-3533	4460	80	3172 ± 142
5	Baile Herculane	LJ-3534	4360	100	3024 ± 161
6	Baile Herculane	LJ-3535	4350	60	2965 ± 68
7	Baile Herculane	LJ-3536	4300	60	2944 ± 84



 $F\,i\,g$. 1 Test – results for calibration of single dates



Fig. 2 Test - archaeological + dendro wiggle matching



Fig. 3 Test - archaeological + dendro wiggle matching



Fig. 4 Comparison of the chronological position of the Sofievka type with the datings of the selected cultures (a-e - see Tables 1-5)

sts a possibility of isolating older sets (dates: Ki-5013, Ki-5038, Ki-5015, Ki- 5029, Ki-5012) and younger (Ki-5039, Ki-5014, Ki-5016), which does not necessarily contradict the transience of the Sofievka type. The relevance of these results is lessened by significant standard errors of absolute age measurements of all specimens (from ± 45 to ± 110). Unfortunately, none of these datings can be called high precision, however.

A comparison of the chronological position of the Sofievka type with the datings of the culture groups (Tables 2-4; Fig.4) which in the light of the analysis (cf. Kadrow, Kośko, Videiko, Pottery..., in this volume) could have inspired its formation and development, and with the western section of the Yamnaya culture (Tab. 5) allows to draw certain conclusions. Data that we have at our disposal today clearly indicate that the Sofievka type could have been affected by the Cotofeni and Kostolac cultures in their rather late phases and by the Cernavoda II culture, which is not analyzed here due to the lack of radiocarbon datings. This must have happened contemporaneously with the beginnings of the expansion of the Yamnaya

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Tab∣e 4

	Site	Lab. Number	Date BP	Std. dev	cal BC
1	Vučedol	z-1821	4500	100	3192±148
2	Vučedol	z-1820	4370	90	2999 ± 132
3	Pivnica	KN-232	4500	55	3217 ± 106
4	Pivnica	GrN-8010	4290	60	2929 ± 107
5	Pivnica	KN-145	4180	70	2762 ± 104
6	Gomolava	GrN-7372	4450	70	3156 ± 143
7	Gomolava	GrN-7371	4360	60	2965 ± 70
8	Gomolava	GrN-15681	4310	35	2907 ± 38
9	Gomolava	GrN-13167	4210	60	2785±90

List of dated samples obtained from sites of the Kostolac culture (acc to Forenbaher 1993)

Table 5

List of dated samples obtained from sites of the Yamnaya (west) culture (acc to Forenbaher 1993)

	Site	Lab. Number	Date BP	Std. dev	cal BC
1	Baia Hamangia	Bln-0029	4090	160	2662 ± 210
2	Baia Hamangia	KN-038	4060	160	2640 ± 222
3	Cernavoda	Bln-0062	4260	100	2821 ± 154
4	Varna	Ki-89	4210	60	2785 ± 90

culture to the lower Danube. There is an about 500-year difference in datings of the decline of the Bodrogkeresztúr culture and the chronologically proximate horizon of Hunyadihalom-Lažňany and late phase of the Lublin-Volhynia culture, on the one hand, and the Sofievka type, on the other. Therefore, evident late Polgár traditions in the last mentioned type should be treated as a result of the indirect, multistage and protracted inheritance process.

Translated by Piotr T. Żebrowski

ANALYSIS

Janusz Budziszewski

FLINT MATERIALS FROM CEMETERIES OF THE SOFIEVKA TYPE

1. METHOD OF ANALYSING MATERIALS

1.1. ASSESSMENT OF INVENTORY HOMOGENEITY

Cemeteries of the Sofievka type were located on sandy dunes in geological conditions favoring vertical displacements of artefacts, if only as a result of natural phenomena [Kempisty, Więckowska 1983: Tables 8 and 9]. All sites were partly destroyed by human activity and also by eolian processes already before excavations were undertaken. Excavators failed to observe traces of grave pits on any of the sites. This prevents a reliable distinction of individual grave assemblages, and each inclusion of a particular artefact in some specific assemblage is burdened with a considerable risk of error. These difficulties notwithstanding, one cannot forego attempts to eliminate technologically foreign intrusions from the investigated assemblages and to distinguish inventories from the various graves, however tentative these results might be. The homogeneity of inventories from cemeteries of the Sofievka type was assessed basing on formal and technological links between the artefacts classes distinguished in them as well as on planigraphy and refittings.

The analyses of formal and technological connections between the various classes of artefacts are unfortunately variously effective in the case of different groups of finds. Predominant in the studied assemblages are artefacts representing the macrolithic blade technology. In this case tool production consisted largely in transforming successive forms, this linking the artefact classes that were distinguished in an unequivocal manner. Since there are is no evidence that other blade techniques were used, the several fragments of small bladelets that were found scattered on the surface of sites in Sofievka and Krasny Khutor can be interpreted as foreign admixtures. A similarly homogeneous and well documented tool group is that of large core implements, namely square axes and bifacial knives. The Strzyżów-type bifacial sickle-shaped knife recovered from the ground surface in Krasny Khutor has to be regarded as a foreign admixture. The fairly small and not very diversified group of retouched flake tools also appears to be homogeneous, although interpretations in this case cannot be viewed as absolutely certain. The situation gets much more complex when we come to arrowheads which were found in great numbers in the various inventories. Isolated specimens thereof are among the most common finds in dune areas [Kozłowski 1923: 107-8]. Studies in diverse parts of Europe have shown that various communities are capable of producing arrowheads of a single and well defined form [Borkowski 1987] but that they can also use arrowheads highly diversified as regards morphology [Uerpmann 1976: Abb. 22]. Regrettably, the morphometry of arrowheads of different communities of the Late Neolithic and Early Bronze Age has not been analyzed in the area with Sofievka type cemeteries. Given this, there are no grounds for eliminating any of these artefacts, even when facts established elsewhere suggest that their retouch or shape show them to belong to a different context. It is thus certain that the analyzed collections will feature arrowheads that are foreign intrusions. This fact must be kept in mind when classifying the various finds and drawing inferences from analyses thereof.

Maps of the various cemeteries show that archaeological materials there form concentrations of various sizes. Although flint artefacts were often discovered some distance away from the cremated body remains, they are usually associated with them in an obvious manner. The resultant concentrations may be treated as remains of individual grave assemblages.

This approach was verified by refitting of the recovered materials. In more than 70 cases the attempts were successful, and in many others it was possible to determine that ill-fitting fragments nevertheless do come from the same specimen. In a vast majority of cases it was possible to refit fragments recovered from distinct concentrations of artefacts. In exceptional cases the picture was more complex. A blade knife fragment from grave 44 in Sofievka fitted an isolated artefact discovered more than five meters away (70 cm below ground surface). In Chernin a fragment of a blade knife from grave 52 fitted an artefact recovered close to grave 11, more than two meters away. Such cases may be seen as due to site erosion or as traces of rituals preceding interment. Materials recovered from adjacent features lent themselves to refitting equally rarely, and this may be interpreted as evidence of disturbance of older graves during a new burial. Situations of this kind are documented by refitted fragments of blade knives recovered from graves 52 and 63 in the cemetery in Chernin, as well as by fragments of a stone adze from around grave 119 in Krasny Khutor.

Analysis results confirm the statistical validity of the adopted interpretation of the concentrations of materials, at the same time supporting the theoretical reservation that the available procedures cannot rule out errors. In each individual case we may have to do with foreign material admixtures and also with a depletion of the assemblage subsequent to its deposition. One must always bear this in mind when analyzing the distinguished "grave inventories".

The limitations outlined above as well as gaps in documentation preventing

the exact localization of some of the finds prompted the division of the analyzed materials into the following four groups:

1. "grave inventories" whose more or less precisely localized artefacts combine with cremated body remains to form distinct concentrations;

21. "isolated" artefacts from outside the features, that is to say finds precisely located but unconnectable to any specific concentration of artefacts;

22. "isolated" artefacts from the ground surface, collected without recording their precise position; and

23. unlabelled "isolated" artefacts stored together with all the others but without any indication of their origins.

1.2. RAW MATERIAL ANALYSIS

A considerable percentage of the analyzed artefacts are completely charred, white in color, which usually makes raw material identification impossible. There are also many fired specimens, discolored to an extent which greatly hinders proper identification. The mention of these facts is meant not only to underline the difficulties in raw material analysis. The quantities of fire-damaged specimens and the nature of this damage may provide insights into interesting aspects of burial rituals.

Raw material analyses of large samples of materials from the considered cemeteries were performed by V.F. Petrougne (cf. his contribution in this volume). His findings provided the basis for most of the conclusions concerning raw material economy presented in this paper. My experience allowed me only to identify Volhynian flint macroscopically and to distinguish it from the other flint varieties.

1.3. MORPHOLOGICAL AND TECHNOLOGICAL ANALYSIS OF FLINT MATERIALS

The analysis of flint artefacts is traditionally based on interpretations of the ways in which they were made [e.g. the definitions of "tool" or burin; cf. Ginter, Kozłowski 1990: 35, 79, 83], on their morphology [e.g. the definition of "point"; cf. Ginter, Kozłowski 1990: 83] and traces of use [e.g. the definition of scaled piece *piéce esquillée* in French; cf. Migal 1987]. To satisfy formal requirements it would be necessary to perform separate classifications of materials for each of the above aspects and formulate final conclusions only on the basis of these classifications. However, this does not seem to be a practical possibility. The need for a separate classification with regard to use traces is usually insisted upon with special emphasis [Ginter, Kozłowski 1990: 79-80]. Even this, seemingly obvious, requirement cannot

be fulfilled. To ignore the presence in inventories of scaled pieces or hammers will always make the classifications incomplete and often render the comprehension of the investigated assemblages altogether impossible [Szymczak 1987; Małecka-Kukawka 1992].

Studies of the flint inventory cannot be treated as a one-time project whose success can be gauged by its depth of detail the number of distinguished artefacts classes. Rather, these studies should be seen as a process involving many phases, each geared to achieving a different goal. The first step is the compilation of a general list of artefact classes occurring in the given assemblage. The distinguished categories should enable the discernment of the basic principles underlying flint production in the studied assemblage. Although the proposed definitions should aim to describe the morphological canons of the distinguished categories, all the three kinds of features (including macro-traces of use!) are helpful in their creation. Experience tells us that in the process it is impossible to come up with a universally valid hierarchy of significance of the various features: one feature may receive an entirely different rank in various contexts, to mention but the shaping of the truncation in truncated blades and trapezes. Researchers must thus rely on intuition here, and the investigative process certainly cannot be formalized.

It is only in the next stage of analyses that the findings arrived at can be verified by detailed morphometric definition of the various tool categories [Sałaciński 1987: 117-137) or of differences between their varieties [Borkowski 1987], as well as by reconstructing the techniques used in making the various forms [Migal, Sałaciński 1996] or ways in which they were used [Korobkova 1981]. Each of these kinds of study requires its own unique methods, and meaningful results are possible only when the materials meet certain quality standards. All this means that a thorough description and understanding of specific flint industries must be arrived at in stages, a process usually taking up many years of study.

The analysis of flint inventories from cemeteries of the Sofievka group was deliberately limited to the first stage of the investigation process. The study was complemented with an occasional look at techniques of making the macrolithic blades occurring in large numbers in the inventories in question.

Studies of Palaeolithic flint assemblages suggest that the cultural tradition governing this particular production domain is best described by the quantitative structure of the major tool classes occurring in them [Kozłowski 1980: 40-47]. Accordingly, it was assumed that the most important step in the analysis of flint inventories is the making of a standard list of major tool classes and statistical analysis of the frequency of their occurrence [Lech 1988]. Regardless of what we mean by "cultural tradition" defining the chronological-territorial units thus revealed, we can be sure that differences in the frequency of occurrence of the basic tool types cannot be interpreted in the way proposed above in the case of materials:

 from settlement points displaying a markedly different character (not just workshop or grave assemblages but also assemblages from the diverse settlement points), and - materials in which the basic tool types are not the final forms of the production process but represent the various stages of reshaping artefacts.

It appears that both the above factors albeit independently of one another, to a various degree and in different times determined the character of Neolithic flint assemblages in Central Europe. It seems they are the main reason why attempts to order Neolithic flint assemblages in a way typical for the older periods of the Stone Age [e.g. Balcer 1983] usually end in failure.

The two factors listed above also determine the character of the available Sofievka type inventories. Today we have in hand only materials from cemeteries which have been outside cultural circulation in the way peculiar for such finds. This makes it impossible to directly compare their structure with the structure of materials from settlement sites. What is more, the differences between collections from various cemeteries may depend more on changes in rituals rather than in flint working traditions. At the same time, already the preliminary analysis of materials showed that tool making in our case consisted largely in reshaping artefacts.

This kind of situation calls for an analysis different from the standard typological-statistical method based on a fixed typological list of fully disjoint categories [Kozłowski 1971; Kaczanowska 1985: 12-15]. Here the materials will be described employing a detailed multi-stage classification which, although devised with specimen morphology as the most important criterion, nevertheless also takes into account the forms out of which the particular specimens were fashioned as well as visible traces of use.

The classification may be presented in generalized form as a list of types present in the analyzed inventories. This list differs considerably from those previously compiled for similar assemblages [Kozłowski 1971: 145; Balcer 1975: 89-139; Kaczanowska 1985; 12-15]. It lacks the category of retouched blades because detailed morphometric analyses of a similar blade industry [Sałaciński 1987: 137-144] have demonstrated that no such tools actually existed and that this category is an artificial lumping together of diverse form types. In its place are several types of knives, daggers and blade pressers. Also lacking in the classification below are the so called combined tools, although quite a number of specimens in the examined assemblages have several elements formed. These specimens must either comprise a specific separate tool type (cf. the case of trapezes mentioned above) or be the result of reshaping. The specific nature of the analyzed finds made it necessary to distinguish separate groups of pressers and strikers. The plentiful and diverse collection of these forms made it possible to suggest a detailed division thereof, although the functional similarity and amorphous shape of many of the specimens made this job extremely difficult. It was also no easy task to categorize the rich collection of arrowheads since most of the specimens were damaged to an extent preventing detailed morphometric determinations. It was thus decided to divide them in a very general manner, basing on features that are easily measurable and to some extent possible to reconstruct, namely the manner of fashioning the base, size and elongation (length-to-width ratio). All the categories were in the end grouped according to the character of half-products out of which they were fashioned.

List of flint artefacts types present in cemeteries of the Sofievka type (Fig.1-9).

1. Debitage

11. Blades

12. Flakes

121. Ordinary flakes

1221. Ordinary chips: small flakes, usually not exceeding 30 mm in size, produced in the course of splitting natural pieces or larger flakes with a hard hammer; some of the smaller specimens resemble micro-scaled flakes

1222. Chips from polished axes: pieces similar to ordinary chips but with fragments of polished axes surface on their upper faces

2. Tools

21. Blade tools

211. End-scrapers. Many of the tool types described below feature ends in the form of diverse end-scraper fronts, but it is only in exceptional cases that these fronts define the nature of the given implement. Such specimens are made from small (40-70 mm long, 20-30 mm wide, 5-10 mm thick) fragments of blade knives having sides worked with moderately steep (ca. 50°) retouch (Fig. 2:a). If the end-scraper fronts do not extend to both ends of the specimen, its base may have the form of a specific truncation.

212. Ordinary blade knives. Tools worked to give prominence to long lateral edges of the blades.

2121. Ordinary blade knives variant A. These are made from distinctly curved massive blades from the initial stages of core exploitation (often blades showing part of the preparation of a crest). They are more than 200 mm long and 30-40 mm wide, and their thickness remains around 10 mm. Their retouch usually just slightly modified the lateral edges (Fig.1:a), one of which is sometimes worked with slightly denticulated single-series retouch (Fig.1:b). The angles of so prepared lateral edges hover around 40° . The bases and tips of the tools are usually natural, or, less frequently, formed into a flat end-scraper front or transverse truncation with retouch on one side. These tools were probably used as inserts-knife edges, also as sickle inserts.

2122. Ordinary blade knives variant B. Tools made from distinctly curved large blades, about 150 mm in length, 20-30 mm wide and 7-10 mm thick. At least one edge is formed by single-series retouch, usually slightly denticulated, at an angle of about 50° (Fig.2:b). The bases and tips are shaped into transverse or slightly oblique truncations, often featuring additional flat retouch on the ventral side, as in the Upper Palaeolithic "Kostenki-type knives" [Kozłowski 1969: 45-46; Belayeva 1977]. These tools were repeatedly rejuvenated. The implements with the other edge also worked had the truncations at their ends slightly concave or notched (Fig.2:c). The "gloss" preserved on the edges suggests that the tools were used as inserts-knife edges, including also sickle inserts.

2123. Ordinary blade knives variant C. These tools represent the final stage of reshaping the ordinary blade knives. They are about 110-130 mm long, 10-20 mm wide and less than 10 mm thick (Fig.3:a). The lateral edges are retouched with steep (about 70°) retouch, making the pieces similar to double blunt-ended pressers. They may also have served as inserts-knife edges used to scrape hard materials [Skakun 1993a, 1993b].

213. Asymmetric blade knives. Asymmetrically worked tools, giving prominence to one of the blade s lateral edges.

2131. Small asymmetric blade knives made from unsuccessful short blades, 70-80 mm long, some 30 mm wide and about 7 mm thick. Edges are formed by retouch as in the big asymmetric knives, with bases remaining natural (Fig.3:b).

2132. Big asymmetric blade knives, usually made from strongly curved small blades from the final stages of core exploitation. They are about 120 mm long, around 25 mm wide and less than 7 mm thick. The straight edge is formed with moderately abrupt ($40-50^\circ$) retouch, and the oblique edge is usually steeper than that. The bases are natural or in the form of a truncation similar to that on "Kostenki-type knives" (Fig.3:c). Specimens with gloss indicate that some of their number were used as inserts-sickle blades. At the same time they appear to resemble in shape the ordinary blade daggers and hence also the Usatovo-type copper daggers [Zbenovich 1966]. The base of one specimen carries traces indicating that it was used as a striker. 214. Daggers blade points similar in shape to copper daggers from Chalcolithic assemblages.

2141. Tanged blade daggers made from distinctly curved blades, 125-160 mm long, about 25 mm wide and up to 10 mm thick. The distal part is formed as in the asymmetric blade knives. The tapering base part, formed with slightly more abrupt retouch, ends with a slightly oblique truncation (Fig.4:a) or, more rarely, with a narrow end-scraper front. The form of these implements suggests that they are flint substitutes of Bodrogkeresztúr/Lažňany copper knives [cf. in this volume: Klochko, Copper..., Fig.1:5; see also: Patay 1961: Tab.II-6; Šiška 1972: Abb.35].

2142. Ordinary blade daggers made from fragments of blade knives by fashioning a symmetric point with abrupt (60-70°) retouch. Their bases are shaped into end-scraper fronts or left in natural state. The daggers are about 110 mm long, 20-30 mm wide and about 9 mm thick (Fig.4:b). Their bases usually carry traces of crushing, sometimes of an intensity typical for strikers. The crushings make these implements reminiscent of spike-ended pressers, but their form suggests that originally they were rather flint substitutes of Usatovo copper daggers [Zbenovich 1966]. 215. Asymmetric blade perforators made from small (ca. 80 mm long) fragments of ordinary blade knives. They are about 25 mm wide and anywhere between 6 and 11 mm thick. Their slightly asymmetric point is formed with abrupt (60-70°) retouch, and their base always carries traces of use as strikers (Fig.4:c). This latter fact, as well as formal similarities to spike-ended pressers and strikers suggest that these implements may have been the original "ideal" form of a tool which might be described as perforators-strikers. 216. Blade pressers. A distinctive feature of this group of tools are use traces in the form of small crushings of the edges. However, the types described below have a well defined form repeatedly occurring in the analyzed inventories.

2161. Spike-ended blade pressers, most of them made from broken off and abruptly retouched (55-80°) distal parts of daggers. Their length ranges from 35 to 65 mm, the base width is between 15 and 20 mm, and the thickness is 5-8 mm (Fig.4:d,e). The retouch of lateral edges is usually disrupted by small crushing scars, but the most intense crushing is on the base and distal ends of specimens. In one specimen the crushing is so severe that it produced a degree of rounding typical for strikers. Although these finds are distinguished principally by the specific traces of use on them, the presence of analogous pieces made from flakes (category 2261) indicates that there existed an idea of such a tool form.

2162. Double spike-ended pressers on blades, probably made from used-up knives and daggers with abrupt $(70-80^{\circ})$ retouch of two pointed tongues. This gives the specimens a spindle shape (Fig.4:f). Their length is 70-90 mm, maximum width is slightly in excess of 15 mm, and the thickness is about 8 mm. The retouch of lateral edges is undercut by crushing scars.

2163. Blunt-ended blade pressers made from used-up ordinary blade knives by forming a peg-shaped tongue, some 80 mm long and 10-15 mm wide (Fig.5:a) with steep ($60-70^{\circ}$) retouch. The tongue is usually ended with a narrow end-scraper front, and the retouch of lateral edges is undercut by crushings. Their bases carry traces of use as strikers.

2164. Double blunt-ended pressers on blades made from used-up ordinary blade knives by fashioning peg-shaped tongues like those described above on both ends. In some cases a clearly wider fragment of the original knife survives between the two tongues (Fig.5:b), and sometimes both tongues are back-to-back, giving the implement the form of a narrow peg (Fig.5:c). Some of the tang tips carry traces of their use as strikers.

217. Blade strikers, a tool category distinguished by use traces in the form of fine crushings of edges in the distal part of specimens. These micro-crushings are so plentiful they give the impression that they were meant to produce a rounding on the pieces. Traces of this kind are also in evidence on some of the tools described above, but the usual practice was to fashion strikers out of fragments of destroyed tools. The existence of a series of strikers sticking to a specific shape pattern suggests that there was a conception of their typical form.

2171. Ordinary blade strikers, with one of their rounded tips broader and slightly asymmetrically rounded, the other being fashioned into a short peg-like tongue. Their length is 55-75 mm, width ranges from 25 to 30 mm, and they are from 5 to 11 mm thick (Fig.5:d,e).

2172. Amorphous blade strikers which are small (30-45 mm long) fragments of blade tools with rounding typical for strikers on their tips. These pieces are the result of *ad hoc* use of waste material of any shape (Fig.4:g).

22. Flake tools.

221. Arrowheads.

22111. Big arrowheads with concave base, usually with meticulous retouched covering nearly all of both sides of the specimens. They are from 27 to 43 mm long, 16 to 25 mm wide, and 3 to 6 mm thick. Most specimens have length-to-width ratios of 1.2-1.6 and straight sides (Fig.6:a,b); much fewer pieces are more elongated (1.8-1.9 ratios), and these are often less regular in shape and their sides are sometimes convex (Fig.6:c) or concave.

22112. Ordinary arrowheads with concave base, usually shaped with simple retouch, often with less care than the large forms. Although here too the largest number of specimens have straight sides, there are more finds with convex or concave sides, and there are exceptional cases of distinctly asymmetric implements. These arrowheads range in length from 13 and 25 mm, their width is 12-20 mm, and thickness is 2-5 mm. The largest specimens, over 21 mm long, are also the most slender ones, with their length-to- width ratio ranging from 1.4 to 1.7 (Fig.6:d). The medium-sized specimens (17-21 mm long) are usually slightly squatter (1.2-1.4 ratio; Fig.6:e), and the smallest ones are the widest of all (0.9-1.2 length-to-width ratio; Fig.6:f).

22121. Slim arrowheads with straight base, usually shaped with simple retouch. The base edge is retouched with the least care, and is therefore often rather irregular. These tools are usually 27-32 mm long (in exceptional cases this figure is merely about 22 mm), 11-18 mm wide, and 2.5-5 mm thick. The length-to-width (slimness) ratio is in most cases 1.7-1.9 (Fig.6:g), and exceptionally as high as 2.5 (Fig.6:h).

22122. Ordinary arrowheads with straight base, normally shaped with simple retouch which tends to be less meticulous in the base part, which is sometimes clearly convex as a result. The specimens predominantly have straight sides, but there are also pieces with convex or concave sides and occasional asymmetric forms (Fig.6:k). These arrowheads are anywhere between 13 and 26 mm long, 10 to 22 mm wide and 2.5 to 5 mm thick. Most of the specimens exceeding 20 mm in length have slimness ratios of 1.3- 1.5 (Fig, 6:i), and more compact forms, with these ratios in the 1.0-1.2 range, are much less frequent (Fig.6:j). The smaller arrowheads are usually less regular (Fig.6:k,l) and their length-to-width ratio ranges from 1.0 to 1.6. 22131. Arrowheads made from tips of bigger specimens, featuring a straight base with traces of breaking, only partly trimmed down with additional retouch. They are usually small (14-18 mm long) and stocky, with the slimness ratio standing at around 1.2 (Fig.6:m).

22132. Amorphous arrowheads, which are ad hoc creations, small in size. Some of them are oval-shaped and carelessly retouched (Fig.6:n), while others are specially selected triangular chips with just some traces of edge shape correction.

22133. Other arrowheads, unique in shape, not fitting any of the preceding categories. Large slim arrowhead with notched base and rounded sides (Fig.6:o) and a fragment of a large arrowhead with a massive tang (Fig.6:p).

222. Bifacial flake knives, with rounded base, one edge straight and the other bent, forming an angle of about 125° . There was only one choice specimen in the studied

inventories, carefully worked with flat surface retouch. It is 65 mm long, maximally 27 mm wide and 9 mm thick (Fig.7:a). The other specimen is a slightly smaller (51 x $30 \times 8 \text{ mm}$) imitation of this form, executed with simple and in part bifacial retouch (Fig.7:b).

223. Flake end-scrapers. There was only one specimen in the inventories, with a narrow end-scraper front formed by retouch in the proximal part of a small pseudo-blade (Fig.7:g).

224. Flake perforators. These are usually small (some 40 mm in diameter), less frequently large, but always relatively thick (8-17 mm) flakes with one or more sharp and short tongues executed with partially bifacial retouch (Fig.7:c,d). The natural shape of the flakes was often made use of when fashioning the tongues.

225. Side-scrapers small flakes with one edge entirely or partly covered with moderately abrupt retouch on one (Fig.7:e) or both sides (Fig.7:f). The retouched edge is usually about 40 mm long.

226. Flake pressers.

2261. Spike-ended flake pressers, analogous in shape to the spike-ended blade pressers, but made from flakes (Fig.8:a) or pseudo-blades from destroyed axes (Fig.8:b). 2262. Amorphous flake pressers, which are small but relatively thick flakes (or, in fact, chips with the largest dimension usually around 30 mm), in most cases having one edge shaped with retouch on one side, undercut with fine crushings (Fig.8:c,d). 227. Amorphous flake strikers.

2271. Strikers made from ordinary flakes, usually small in size, the biggest dimension being 30-55 mm, but relatively thick (7-12 mm), with traces of crushing and rounding on two opposite-lying tips. The shape of some of these tools suggests that they represent the final stage of flake pressers use (Fig.8:e). Others, slimmer in shape, resemble spike-ended blade strikers and pressers (Fig.8:f).

2272. Strikers made from flakes from axes. These are flakes or large slender chips struck off polished axes, with one gently rounded tip that was crushed and rounded in the course of use. Their form is frequently reminiscent of spike-ended pressers or the typical blade strikers (Fig.8:g).

2273. Strikers made from flake tools. Small and large specimens with short tongues that were destroyed (crushed and rounded) during use (Fig.8:h,i). They appear to be the final stage of utilization of flake side-scrapers and perforators.

228. Micro-scaled pieces. Small (15-35 mm in length and width, 5-13 mm thick) bipolar scaled pieces (Fig.7:i), usually made from flakes or chips. There was also one specimen made from a split blade tool and another from a polished axe chip (Fig.7:h).

23. Tools made from natural pieces and chunks.

231. Square axes, about 100 mm in length and slightly asymmetric in shape. One of the narrower sides is straight while the other is arched, making the cutting edge only slightly wider than the width of the medial part of the specimen (Fig.9:a). The cutting edge is about 40 mm wide, and the head between 18 and 25 mm; the maximum thickness of these implements is 20-25 mm. Polishing is confined to the



Fig. 1. Ordinary blade knives - variant A (A- Sofievka, from the ground surface; B- Sofievka, grave 34).



Fig. 2. A- double blade end-scraper (Krasny Khutor, grave 33); B-C- ordinary blade knives - variant B (B- Sofievka, grave 44; C- Sofievka, near grave 1/1947).



F i g. 3. A- ordinary blade knife - variant C (Chernin, grave 66); B- small asymmetric blade knife (Krasny Khutor, grave 127); C- big asymmetric blade knife (Krasny Khutor, grave 133).



Fig. 4. A- tanged blade dagger (Krasny Khutor, grave 50); B- ordinary blade dagger (Sofievka, grave 64); C- asymmetric blade perforator (Chernin, grave 65); D-E spike-ended blade pressers (D- Sofievka, grave 60?; E- Krasny Khutor, grave 137); F- double spike-ended presser on blade (Chernin, grave 90); G- amorphous blade striker (Sofievka, grave 83?)



Fig. 5. A- blunt-ended blade presser (Krasny Khutor, grave 53); B-C- double blunt-ended pressers on blades (B- Krasny Khutor, grave168; C- Krasny Khutor, grave 80); D-E- ordinary blade strikers (D-Sofievka, from outside the features - sq.I-8; E- Krasny Khutor, grave 122).



Fig. 6. A-C- big arrowheads with concave base (A- Sofievka, from outside the features - sq.J-11; B- Krasny Khutor, unlabelled artefact; C- Krasny Khutor, grave 130); D-F- ordinary arrowheads with concave base (D- Sofievka, from outside the features - sq.G-4; E- Krasny Khutor, grave 119; F- Sofievka, from the ground surface); G-H- slim arrowheads with straight base (G- Sofievka, grave 5+6+7?; H-Chernin, grave 43); I-L- ordinary arrowheads with straight base (I- Chernin, unlabelled artefact; J-Sofievka, from outside the features - sq.G-6; K- Chernin, grave 63; L- Krasny Khutor, grave 75); Marrowhead made from tip of bigger specimen (Krasny Khutor, grave 119); N- amorphous arrowhead (Krasny Khutor, grave 75); O-P- other arrowheads (O- Krasny Khutor, grave 126; P- Zavalovka, grave 3).



Fig. 7. A-B- bifacial flake knives (A- Chernin, grave 42; B- Chernin, unlabelled artefact); C-D- flake perforators (C- Krasny Khutor, grave 29; D- Chernin, grave 63); E-F- side-scrapers (E- Chernin, grave 12; F- Chernin, grave 48); G-flake end-scraper (Krasny Khutor, from outside the features - sq.I-15); H-I-micro-scaled pieces (H- Krasny Khutor, grave 3; I- Chernin, grave 88).



Fig. 8. A-B- spike-ended flake pressers (A- Chernin, grave 66; B- Sofievka, grave 70); C-D- amorphous flake pressers (C- Zavalovka, from outside the features; D- Krasny Khutor, from the ground surface); E-F- strikers made from ordinary flakes (E- Sofievka, grave 39; F- Krasny Khutor, grave 45); G- striker made from flake from axe (Krasny Khutor, grave 149); H-I- strikers made from flake tools (H- Krasny Khutor, grave 126; I- Sofievka, grave 34).



Fig. 9. A- square axe (Sofievka, grave 43?); B- hammer (Krasny Khutor, grave 137); C- striker made from natural piece (Sofievka, grave 43); D- striker made from axe fragment (Krasny Khutor, grave 63).



Fig. 10. Scheme of tool production organization in the Sofievka group, based on macrolithic blades imported from Volhynia.

larger surfaces of specimens next to the cutting edge. The heads are usually glossy. 232. Hammers. The distinctive feature of this tool category are use traces in the form of impact crushing of the edges or sides of specimens. There were two examples in the analyzed materials, both made from large fragments of square axes. Traces of smashing are along what once used to be the narrow sides of the axes (Fig.9:b). Dimensions: $60-65 \times 40-50 \times 20 \text{ mm}$.

233. Amorphous pressers made from chunks, analogous in form to the amorphous flake pressers made from chips that could have originated from destroyed axes. 234. Amorphous strikers.

2341. Strikers made from axe fragments. Although these are markedly more massive than the typical blade strikers, they clearly resemble them in shape: one of their rounded tips is visibly wider than the other (Fig.9:d). Dimensions: $40-60 \times 35-40 \times 15-25 \text{ mm}$.

2342. Strikers made from natural pieces, namely small, relatively flat nodules. The largest dimension is 45-60 mm and the pieces are 10-25 mm thick. They usually have crushed edges along their entire circumference. The most intense traces concentrate around the discernible short peg-shaped tongues (Fig.9:c). The base of one the specimens, clearly bipolar in shape, shows crushing characteristic for hammers.

3. Chunks

An attempt was made to include specimens surviving in fragmentary form in appropriate categories. Unfortunately, in the case of some of the tools this proved impossible, and these finds were grouped in additional categories that reflect the insurmountable obstacles in analysis:

212-3?. Fragments of undefined blade knives.

213-4?. Fragments of blade daggers or asymmetric knives.

212-7?. Fragments of undefined blade tools.

212-7?2. Fragments of undefined blade tools used as strikers, being fragments of undefined blade tools carrying traces of use as strikers on one tip, and traces of truncation or thermal fracture on the other. It is impossible to judge whether these are fragments of tools used as strikers or strikers made from destroyed blade tools. 2211-3?. Undefined arrowheads.

223-7? Fragments of undefined flake tools.

21-3?. Fragments of undefined tools.

Given that the numbers of specimens in the various categories listed above cannot be interpreted in the simple traditional manner, the analyses based on the presented ordering of materials must also differ from those employed in the classical typological-statistical method. The basic role here has to be played by indices documenting the morpho-technological character of the examined collections. These are customarily calculated as a percentage of specimens of a given class in a broader category of artefacts. Since there are large numbers of fragmentary artefacts, the indices can often be just approximations, computed using the imprecise figure of the minimum number of finds identified as belonging to a given category. In order to calculate the various indices here, the above ordering was rearranged to allow combinations of the distinguished categories of artefacts to meet specific needs. In this approach the proposed classification served either as a typological list of non-disjoint categories or as a compilation of several disjoint classification lists.

The same method was used not only to analyze the numbers of artefacts in the various categories but also the frequency of their occurrence in grave inventories.

When comparing inventories from the various cemeteries using the simple quantitative method it is possible to interpret differences in the same categories of artefacts only, such as the preferences for diverse types of arrowheads. Quantitative differences in the occurrence of different tool categories such as arrowheads or axes may be interpreted only after taking into account factors stemming from differences in burial rituals.

1.4. FUNCTIONAL ANALYSIS

With the above assumptions in place, there was no need for detailed use-wear analyses at the presented stage of study. However, all macroscopic traces of use high gloss, crushings and smoothing were noted. The positioning of high gloss served only to help reconstruct the morphological sense of the various implements and recreate the history of reshaping each form.

The observed crushing and smoothing were given functional sense. Forms with such use traces are usually being described in the literature as fabricators or retouchers. When these traces occur on the tip, the implements are sometimes regarded as blunt-ended borers [Balcer 1975: 110]. The copious and diverse collection of artefacts of this kind in materials from cemeteries of the Sofievka group provide a good opportunity to examine the sequence of use wear accumulation, and also to explore the relations between these traces and the various elements of specimens morphology. Analyses of this kind allow to include a vast majority of the examined forms in the category of strikers (or *briquets* in French), well described in the literature, used to kindle fire with pyrite and marcasite [Patte 1960; Witthoft 1966; Champion 1976; Chelidonio 1988; Nieszery 1992]. This interpretation is in good accord with the exceptional copiousness of artefacts of this type in materials from the analyzed crematory cemeteries. When use wear is not too intense, it is impossible to macroscopically distinguish them from marks caused by pressing a hard material of any kind. These forms have been described as pressers. It may be surmised however that a great majority of amorphous pressers are in fact initial strikers. It were only the blade pressers, with numerous traces of work down their long lateral edges, that served a different function initially at least and deserve to be described as "fabricators".

1.5. ANALYSIS OF RITUAL AND SOCIO-ECONOMIC FACTORS AFFECTING GRAVE GOODS

The specific nature of the considered inventories calls for an expansion of the standard flint artefacts analyses aimed at a tentative explanation of the significance of the various forms in individual assemblages. There are two questions to answer here:

- (i) Do all categories of artefacts qualify as grave goods, or were some of the specimens connected with burial rituals?
- (ii) What were the principles of selecting the various artefact categories to serve as grave goods?

In this context, the state of preservation of the artefacts and regularities in the co-occurrence of various artefact categories in individual assemblages were examined. All finds with traces of fire on them were noted, assuming these traces were acquired during cremation of the dead. Attention was also paid to all indications of other practices leading to the destruction/"killing" of a flint artefact, such as breaking or splitting them. The results of these observations were taken into account when exploring dependences between the kind of artefacts deposited in the grave and the number of grave goods. All this served to identify funeral flint inventories typical for each cemetery and to assess these inventories quantitatively, distinguishing those that were poor, rich or in some way exceptional. It was also examined how graves with similar grave goods were positioned within a cemetery.

Regrettably, the insufficient numbers of analyzed materials made it impossible to employ more advanced statistical methods.

2. FLINT INVENTORIES FROM CEMETERIES OF THE SOFIEVKA TYPE

2.1. CHERNIN

The north-eastern part of the cemetery was completely destroyed before explorations were launched, but the south-western part survived in good condition (cf. in this volume: Videiko, Archaeological..., Fig.1). The manner in which the site was explored makes it impossible to reliably distinguish at this point in time the various individual assemblages. Nonetheless, a series of isolated features suggest that the graves were small, probably some 50 cm in diameter. They contained concentrations of charred bones (e.g. graves 1+2, 14+15) which were sometimes accompanied by a vessel (e.g. graves 21, 52, 71) and in other cases by urns with body cremation remains (e.g. graves 22+23, 39+40, 62+63). Less frequently, the cremated human remains were placed in urns (e.g. grave 53+754) which could have been accompanied by a vessel (e.g. graves 43+44, 51). It is estimated that there are 55-65 graves in the preserved part of the cemetery. 27 of them (or about 45%) contained flint inventories (Table 1).

The average number of artefacts in a grave flint inventory from Chernin is relatively high more than three. This figure is deceptive, however, as one of the assemblage is very large. About two-thirds of the inventories are decidedly poor, containing not more than two artefacts. In most cases the grave goods consisted of tools. Flake forms were less than half as numerous, and quartzite pebbles occurred in two cases.

Blade tools were the most frequent forms deposited in graves. Usually, these were ordinary knives, with less frequent perforators, pressers and strikers. The surprisingly rare occurrence of the latter artefacts and the contexts in which they appear suggests they were an ordinary element of grave goods. Noteworthy is the lack of asymmetric knives and daggers in the inventories. The blade tools whose raw material could be identified were all made from Volhynian flint. Only one specimen was identified by V.F. Petrougne (in this volume) as "gaize-Cenomanian flint".

Arrowheads were placed in graves almost as frequently as blade tools, but their numbers were clearly higher. Straight-based forms predominate decidedly. This predominance may have been even more pronounced than it would appear from Table 1 since the manner of execution of ordinary arrowheads with notched base (especially of the finds from the vicinity of graves 79 and 87) is more reminiscent of the Early Bronze Age. None of the eight arrowheads whose raw material could be identified were made from Volhynian flint.

Flake tools were deposited in graves with the same frequency but in evidently smaller numbers. The predominant forms were side-scrapers and scaled pieces, while strikers were absent altogether. Of the 11 flake tools whose raw material was identifiable, only one side-scraper was made from Volhynian flint. Particularly noteworthy is the appearance in the Chernin cemetery of unique knives with bifacial flat surface retouch (Fig.7:a,b), the only ones of their kind in materials of the Sofievka group.

Also worth noting is the absence of square axes and forms made from their fragments in the grave goods. It is hard to judge to what extent this is a reflection of the flint industry standards of the community responsible for the Chernin cemetery on the one hand and of the burial customs on the other. The plunging flake from grave 64 may be evidence of the production of square axes.

Flake forms were deposited in graves just as frequently as the various tool categories, and they are relatively numerous. Raw material could be identified in 16 cases, but only two of the specimens appear to be made from Volhynian flint.

Almost 40% of the finds are charred. More than 30 refittings were successfully made during studies of these materials, which means that special care was taken during the burial rituals to deposit the tool remains. Different categories of imple-

Tab∣e 1

Flint inventory from Chernin

	Types of artefacts																							
FEATURES	121	1221	2122	2123	215	2162	2171	212-7?1	212-7?2	22111	22112	22121	22122	22133	2211-3?	222	224	225	2261	2262	223-7?	228	3	TOTAL
Grave 3													1											1
Grave 10	1?																							1
Grave 12			1						1									1						3
Grave 30							1																	1
Grave 33+42					1								3	1		1								6
Grave 36			1																					1
Grave 40										1		3	5		1									10
Grave 43												1												1
Grave 46		1?																						1
Grave 48		1																1						2
Grave 49		1																				1		2
Grave 50	1																							1
Grave 52			2																					2
Grave 56			1										1											2
Grave 62+63	1	10						2	1				3		1		1				1		9	29
Grave 64+65	1	3			1			1												1		1		8
Grave 66				2				1				1							1					5
Grave 68	1																							1
Grave 69											1													1
Grave 71																		1						1
Grave 77																						1		1
Grave 78	1																							1
Grave 79											1													1
Grave 84	1						1						1											3
Grave 87											1													1
Grave 88																						1		1
Grave 90						1												1						2
TOTAL	7	16	5	2	2	1	2	4	2	1	3	5	14	1	2	1	1	4	1	1	1	4	9	89
Unlabelled artefacts													2			1					1	1		5
TOTAL	7	16	5	2	2	1	2	4	2	1	3	5	16	1	2	2	1	4	1	1	2	5	9	94

ments were exposed to fire to a different extent. Three out of four arrowheads and almost the same proportion of blade tools were charred, as compared to less than one out of four flake tools (not one of which was a scaled pieces) and some 15% of flakes and chips.

Looking at the dependences between the kinds of artefacts deposited in graves, the traces of fire on them, and the sizes of assemblages in which they occur, it is possible to divide the flint grave goods from Chernin into three groups. The least rich ones contain one or two artefacts flakes, chips or scaled pieces; in exceptional cases a flake tool or perhaps a flint striker. These artefacts were usually deposited in graves in uncharred form. One gets the impression that they ended up in graves as a result of an intention to place there "just some flint piece". They constitute almost 40% of assemblages. A grave typically contained anywhere between one and ten tools. Not more than three blade specimens and flake tools were present in any one grave, and the size of assemblages appears to depend on the number of arrowheads. Although the arrowheads may occur alongside other tool classes, they alone constitute the richest inventory of the group, and in most cases appear to have been deposited singly. The poorer grave assemblages are entirely charred, with the exception of single arrowheads; however, the connection of some of the latter with the Sofievka group materials remains doubtful. In the larger assemblages only some of the artefacts are charred. Assemblages of this type amount to about 45% of all assemblages with flint goods. In four of these large assemblages, containing from two to nine tools, there were also from two to 19 chips, chunks or quartzite pebbles. The significance of these additions is not clear.

The graves with flint goods are concentrated in the south-western half of the cemetery. Those with the least quantity of materials are grouped along the north-eastern boundary of this zone, while graves with rich goods and those containing arrowheads are along the north-western periphery, i.e., arranged diagonally in the central part of the site.

The tentative interpretation of grave goods from the Chernin cemetery differs radically from the conclusions arrived at by A. G. Kolesnikov [1993]. This is also true of analyses of the other cemeteries. The differences stem from an entirely different understanding of the fundamental evidence categories.

2.2. KRASNY KHUTOR

The north-western and south-eastern extremities of the cemetery were destroyed prior to the beginning of excavations. The remaining part probably survived in good state, although the relatively large quantity of materials collected on the surface may be cause for concern. The methods used to explore the site do not allow us today to distinguish separate assemblages with reliability, especially in the

Flint inventory from Krasny Khutor

	Types o													f						
	1	21	221	222	11	121	122	123	131	132	12-3?	141	142	13-4?	15	161	162	163	164	171
Grave 86+87	-	-	-	-	2	2	5	2	2	5	2	2	2	2	2	2	2	2	2	2
Grave 5																				
Grave 3+168																1			1	
Grave 89													1			-			-	
Grave 169						1							1							
Grave 16						1										1				
Grave 104							1								1	1				
Grave 04							-								1		1			
Grave 20																	1			
Grave 27												1								
Grave 32			1									1						1		1
Grave 45							-			-								1		1
Grave 122																				1
Grave 22					1															-
Grave 120					1							1								1
Grave 117		12										-								+
Grave 119		1.		1						1						1				
Grave 101+114				1			1			1			1			1				
Grave 40 ± 116				1			1						1	3						2
Grave 115							1							5						2
Grave 112							1					1								
Grave 50 ± 120					1			1				1								
Grave 30+129					1			1	1	1		1								
Grave 127									1	1										
Grave 130		4																		
Grave 126+128		4																1		
Grave 53										1								1		
Grave 133										1										
Grave 134							-													
Grave 137	<u> </u>			<u> </u>	<u> </u>		1	<u> </u>			<u> </u>		<u> </u>	<u> </u>	-	1			<u> </u>	┣_
Grave 54								1												

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																1														212-7?2	e f
						2							1	1																22111	a c i
		3			1								3	1				2											1	22112	ts
													1																	22121	
											1		1	1											1				1	22122	
													2	1																22131	
																														22132	
					1																									22133	
																														223	
																					1									224	
													1																	225	
				1																										2262	
							1										1	1												2271	
	1																								1					2272	
					1													2									1			2273	
																											2			228	
	1				Ľ																									232	
										1																				2341	
																														2342	
																													1	21-3?	
																														3	
2	4	4	1	2	8	2	s	ы	1	2	7	3	13	6	2	2	2	5	ы	1	1	1	2	1	ы З	1	5	1	3	TOTAL	

	Types of														f					
FEATURES	11	121	1221	1222	211	2121	2122	2123	2131	2132	212-3?	2141	2142	213-4?	215	2161	2162	2163	2164	2171
Grave 146																				1
Grave 60											1									
Grave 149						1														
Grave 63																				
Grave 65			8																	
Grave 74											1									
Grave 75																				
Grave 156																				
Grave 80+81+82							1												1	1
Grave 84	1		1			1	1													
TOTAL	1	5	10	2	2	3	5	1	1	3	2	4	2	3	1	4	2	2	2	7
Artefacts from outside the features														1						
Artefacts from the ground surface	1		1	1		1	2							2		1				
Unlabelled artefacts										1										
TOTAL	2	5	11	3	2	4	7	1	1	4	2	4	2	6	1	5	2	2	2	7

central richest part of the cemetery. The well isolated features from the fringes of the cemetery suggest that the graves were small, some 50 cm in diameter [cf. in this volume: Videiko, Cemeteries..., Fig.4]. Only one grave, number 84 at the edge of the destroyed area, had its goods scattered over the surface of more than one square meter. The graves contained from one (e.g. graves 10 and 16) to four (grave 4+5+11+12) cremation urns. In most cases one or two urns were accompanied by charred remains deposited loosely in the grave pit (e.g. graves 3+9+168, 15+90, 48+139). There were much fewer numbers of pit graves (e.g. number 100) in which cremation remains were sometimes accompanied by a vessel (e.g. graves 91 and 104). According to estimates, there were about 100 graves in the surviving part of the cemetery, and 40 of their number contained flint relics (Table 2).

The average number of flint artefacts in the grave inventories in Krasny Khutor is high almost four specimens. The grave goods usually consisted of tools, rarely accompanied by flakes, and in just one case by a single blade.

The most frequently occurring and most numerous in Krasny Khutor graves were blade tools. Predominant among them are knives, with the ordinary variety occurring twice as often as the asymmetric type. The second most numerous category

176

	artefacts																						
2172	212-7?1	212-772	22111	22112	22121	22122	22131	22132	22133	223	224	225	2262	2271	2272	2273	228	232	2341	2342	21-3?	3	TOTAL
																							1
			1																				2
															1								2
																			1				1
																				1			9
	2						1							1									5
				4		1		1														1	7
				1																			1
			4	2	1	1		1													1	1	14
		1		1																			6
2	9	2	9	19	2	7	4	2	1		1	1	1	4	3	4	2	2	2	1	2	2	144
										1													2
	3	5	1	1									1										20
			2																				3
2	12	7	12	20	2	7	4	2	1	1	1	1	2	4	3	4	2	2	2	1	2	2	169

of blade tools are strikers, but these appear to be evidence of burial rituals merely adding to the volume of inventories. Daggers, especially the tanged specimens are relatively numerous, and also present are spike-ended blade pressers as well as the blunt-ended pressers and end-scrapers which are known only from this site. The blade tools which could be identified as to raw material were all made from Volhynian flint.

Arrowheads were encountered half as often, although their numbers are also high. Specimens with concave base outnumber those with straight base three to one. This tendency is underlined by the presence of a unique specimen, large and slim, with a notched base and rounded sides (Fig.6:o). Also relatively numerous are arrowheads made on an ad hoc basis from destroyed larger forms or chips. Of the seven specimens whose raw material could be identified, at least four are made from non-Volhynian flints.

Amorphous strikers made from flakes, chunks and in one case from a natural piece occur in the inventories with the same frequency but in much smaller numbers. Their significance in the inventories appears to be only as evidence of burial rituals. Just one out of four of these finds is made from Volhynian flint.

Ordinary flake tools and scaled pieces occurred in just three assemblages. All are made from Volhynian flint. Flakes ended up in graves equally rarely but in quite large numbers. A single blade was also among the finds. The flakes, originating from axes, and the one blade were made from Volhynian flint, whereas the remaining finds represented other raw materials.

There are no square axes in the Krasny Khutor materials, but at the same time artefacts made from destroyed specimens of such axes occur in almost one in four of the grave assemblages. They include hammers, strikers made from large fragments or flakes, a flake scaled piece, two chips fragments of polished surfaces, and a plunging flake. Almost half of these finds are made from non-Volhynian flints. V.F. Petrougne distinguished among them both local varieties and flints from along the Dniester. The contexts in which the artefacts from this group were found suggest that they were not alternative offerings, but that they document just one way of acquiring raw materials for more amorphous flint production.

More than 55% of the finds from Krasny Khutor bear traces of fire. More than 30 refittings were done in the course of examining the recovered material, and this means that great care was exercised to deposit all fragments of tools charred in the course of burial rituals. Not all categories of artefacts were subjected to fire treatment to the same extent. Nearly 95% of arrowheads are charred, as are 60% of blade tools and just under 15% of the other artefacts.

Three basic groups may be distinguished in the flint grave goods in Krasny Khutor, basing on the kind of tools that were deposited, traces of fire they bear, and the size of assemblages they were found in. The first are inventories with blade tools. The poor ones consist of one to five implements, there usually being one or two, in exceptional cases three ordinary blade tools. These are often accompanied by strikers of diverse type, and sometimes a flake tool or scaled piece. Although assemblages of this type account for more than half of grave furnishings, single arrowheads occur in just two cases. The richer assemblages with blade tools just three of which are known contain from five to seven artefacts. These include at least three ordinary blade tools and always a single arrowhead. Normally only some of the specimens in these assemblages carry traces of charring. Five grave furnishings consisting exclusively of strikers, in one case accompanied by numerous chips, may be treated as a variety of the poorest assemblages. These objects are probably apparent grave goods, being in fact remains of burial rituals.

The second group of inventories consists of assemblages with arrowheads, containing between one and eight artefacts. The poorest assemblages consist of arrowheads alone, while the richer ones contain also strikers and flakes. The arrowheads nearly always carry traces of fire. There were eight assemblages of this type in Krasny Khutor.

The last group of inventories, represented by two assemblages, boast the richest grave goods. They are combinations of rich varieties of both the types described above, containing three or four blade tools, eight or nine arrowheads, and either a chip or a chunk. Nearly all the arrowheads and some of the blade tools bear traces of charring.

The graves containing flint artefacts, regardless of the richness and kind of their furnishings, are scattered throughout the area of the cemetery, tending to concentrate in its center, as do other graves in fact.

2.3. SOFIEVKA

The northern part of the cemetery was destroyed completely before excavations were undertaken, while almost all of the western part was considerably damaged by wind erosion. The scale of this erosion and the displacements of materials it brought about is illustrated by the performed refittings of flint materials. A fragment of a blade knife from grave 44 was discovered more than five meters to the north-west of it, while a part of a stone adze from grave 64 was found lying more than two meters east of the feature. It is thus no wonder that more than half of the flint finds recovered from this site cannot be associated with specific graves.

Today it is no longer possible to distinguish individual assemblages in a reliable manner, given the state of preservation and manner of documenting relics from the cemetery. However, a number of distinctly isolated concentrations of materials indicate that individual graves were up to one meter in diameter (cf. in this volume: Videikio, Cemeteries..., Fig.5:1]. Each usually contained several concentrations of charred bones and sometimes grave goods in the form of one or two vessels and flint, stone or copper artefacts, often deposited close to the bone concentrations (e.g. graves 34-36, 44, 114-117; [cf. Videiko, Cemeteries..., Fig.5:3-4, 5:6]). Sometimes a part (e.g. graves 17-19, 62-64 [cf. Videiko, Cemeteries..., Fig.5:2, 5:5]) or all of the remains (e.g. grave 8) were placed in urns. According to estimates, there were at least 70 to 80 graves in the surviving part of the cemetery. Today flint finds can be associated with only a third of their number, but this figure appears to have been reduced as a result of the state of preservation of the site.

The average number of flint artefacts in a grave inventory in Sofievka is low just two but this may be due to the considerable ruination of the site. The flint objects are practically nothing but tools, with single blade or flakes occurring sporadically (Table 3).

Blade tools are the most frequently occurring and most numerous category in Sofievka. Ordinary and asymmetric knives are the predominant types, and strikers are also plentiful. The only identifiable raw material is Volhynian flint. The single blade that was recovered from the site is also made from this kind of flint.

The second most frequent tool category deposited in graves comprises square axes as well as pressers and strikers made from their fragments. In this case too the identifiable raw material was Volhynian flint, the only exception being a loose

Tab∣e 3

Flint inventory from Sofievka

	Types of artefacts																															
FEATUDES	Ţ	21	221	222	121	122	123	131	132	141	142	161	171	172	12-7?1	12-772	2111	2112	2121	2122	2132	211-3?	261	271	273	31	33	341	342	1-3?		OTAL
Grave 3/1947	-	-	-		2	2	0	5	∾ 1	2	2	5	2	2	5	2	2	2	2	2	2	2	2	2	5	2	2	0	5	2	3	1
Grave 5/1947		-					-		-					-	1																	1
Grave 6/1947							1											-	1													1
Grave 5+6+7	┢																1		1													2
Grave 19							T																			1						1
Grave 22						1																										1
Grave 34					1																				1	1						3
Grave 37													1																			1
Grave 39+40																								1					1			2
Grave 43	1																									1			1			3
Grave 44						1																				1						2
Grave 45															1													1				2
Grave 47																1																1
Grave 60												1																				1
Grave 63+64								1			1		1		1	1		1		2	1						1					10
Grave 67		1																								1						2
Grave 68																	1			1												2
Grave 69		1																														1
Grave 70+71									1					1									1									3
Grave 72																													1			1
Grave 83													1	1	1																	3
Grave 88																												1				1
Grave 94(94,95)							1																									1
Grave 114+115						1														1		1										3
TOTAL	1	2			1	3	1	1	2		1	1	3	2	4	2	2	1	2	4	1	1	1	1	1	5	1	2	3			49
Artefacts from outside the features		1	2	3		1							1		1	1	1	3		5		1						1	1		2	24
Artefacts from the ground surface					1					1		1			2	1		2				2								1	13	24
Unlabelled artefacts																		3	1	2	1											7
TOTAL	1	3	2	3	2	4	1	1	2	1	1	2	4	2	7	4	3	9	3	11	2	4	1	1	1	5	1	3	4	1	15	104

find of an amorphous striker with traces of polishing on its surface which was made from a local raw material.

Slightly less frequent but occurring in greater numbers in the graves were arrowheads. Specimens with straight base predominate, but the larger assemblages always feature also forms with concave bases, mostly large in size. About half of the artefacts whose raw material could be identified are made from Volhynian flint. Among the other raw materials V.F. Petrougne distinguished specimens made from flints originating in the Ukrainian Shield zone.

The explored graves did not yield any ordinary flake tools, but there were fairly numerous strikers made from pebbles of local flints as well as strikers made from flakes struck off these pebbles or tools made out of them. The specific function of these implements as well as the technology and raw material setting them off from the rest of the inventory suggest that they are not so much elements of standard grave furnishings as items connected with burial rituals.

Merely around one-fourth of the flint artefacts from Sofievka carry traces of fire, most frequently arrowheads, and slightly less often (25-30%) blade tools. The other artefacts are not affected by fire. It appears that prior to deposition in the graves the tools were killed /destroyed in some other manner. Practices of this kind are documented by broken blade knives and destroyed axes from graves 34-36 and 44. Similar customs may be surmised in the case of inventories in which the blade tools and axes are replaced by strikers made from these implements (e.g. graves 37 and 45). These strikers appear to have a twofold role in grave inventories, namely that of a gift symbolizing the tool from which it was made, and of a tool used in the course of burial rituals.

Looking at the relationships between the kinds of deposited artefacts, the manner of their destruction and size of inventories of which they are a part, we can divide the grave goods in Sofievka into the poor and the rich. The former contain one or, less frequently, two artefacts. They come in two kinds. On the one hand we have inventories featuring a blade tool or a striker made from such a tool. Two inventories including strikers made from natural pieces and a flake may be seen as a variant of this kind of grave goods, although they are probably not grave goods in the strict sense of the term but rather evidence of burial rituals. The artefacts from poor assemblages were not charred. They account for about 40% assemblages with flint goods. The poor assemblages of the second kind consist exclusively of arrowheads, all of which are charred. Only three such inventories were discovered. The two discoveries of single uncharred axes cannot be regarded as poor grave goods. These implements were all accompanied by artefacts made from other raw materials, namely lithic adzes and copper tools, and should thus be seen as a unique variant of rich inventories. The rich inventories typically consist of two or three specimens, in most cases an axe together with a blade tool, and possibly also a striker or flake. One such assemblage consisted of a blade knife and two arrowheads. Some strikers and blade tools in a number of these assemblages are charred. The exceptionally rich inventory from grave 62-64 appears to represent a variant of this kind of grave goods. It features three blade tools (including the only dagger recovered in Sofievka), two blade strikers, a presser made from a chunk (probably originating from an axe), probably four arrowheads, and also a lithic adze. Two of the flint tools display signs of charring.

The graves with flint goods concentrate in the central part of the cemetery. The richer ones (with axes) tended to be closer to the cemetery's north-eastern limit, while the poor ones occupied the site's center. Graves with arrowheads as well as the isolated finds of these implements were distributed mostly around the periphery of the cemetery, the exception being the richest grave 62-64 which was right at its center.

2.4. ZAVALOVKA

This small cemetery was almost completely destroyed before archaeologists commenced their excavations. Because of this, it is impossible to say today whether the graves were larger units, each containing several concentrations of charred bones, or whether each small concentration of remains constitutes a separate unit. The fairly modest surface collection of artefacts suggests that whatever its arrangement the cemetery was tiny, comprising not more than 16 or so graves (Table 4).

At least half of the uncovered grave features contained flint objects. The grave goods were fairly modest, on average numbering two or three artefacts in every inventory, usually tools. The size of flint inventories and the small number of recovered artefacts precludes quantitative analyses of the entire collection. However, several basic facts are worth noting.

Nearly 90% of the discovered artefacts bear traces of fire. All categories of artefacts were consigned to flames, and the charring is usually so intense that quite a number of the finds cannot be fully identified.

Blade tools were placed in graves most frequently and in the greatest numbers. Arrowheads were half as frequent and much less numerous. The dominant category of these implements are arrowheads with a straight base. Noteworthy among their number is an untypical specimen with a massive tang (Fig.6:p) and the fact that the only find of this category whose raw material could be identified was made of Volhynian flint. Also worth noting is the small number of strikers, among which there are no flake forms or implements made from natural pieces. There are just a few flake tools, scaled pieces and flakes. None of the three finds in this group which could be identified as to raw material were made from Volhynian flint. The grave inventories lack any trace of the use of axes. However, one of the published unlabelled finds was probably an amorphous axe (cf. in this volume: Videiko, Archaeological..., Fig.76:3e).

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Tab∣e 4

	Types of artefacts																		
FEATURES	121	1221	213-4?	2161	2171	212-7?1	212-7?2	22112	22121	22122	22132	22133	225	2262	223-7?	228	231	3	TOTAL
Grave 2										2									2
Grave 3						1		1				1		1					4
Grave 4				1						1									2
Grave 7						1									1	1		1	4
Grave 11					1														1
Grave 13						1													1
Grave 15	1																		1
Grave 16		1	1	1									1						4
TOTAL	1	1	1	2	1	3		1		3		1	1	1	1	1		1	19
Artifacts from outside the features						3	1				1			2					7
Artifacts from the ground surface	2					1		1		1						1			6
Unlabelled artifacts					1	1		1	2	1		1					1?		8
TOTAL	3	1	1	2	2	8	1	3	2	5	1	2	1	3	1	2	1?	1	40

Flint inventory from Zavalovka

The graves with arrowheads were clustered together in the center of the cemetery.

2.5. DIFFERENCES BETWEEN FLINT INVENTORIES FROM THE VARIOUS CEMETERIES

Flint materials from the various Sofievka group cemeteries differ considerably from each other. Virtually the only element they share is the leading role of an industry relying on macrolithic blades imported from Volhynia, more than 200 kilometers away. Differences in access to the Volhynian flint blades should therefore perhaps be viewed as the most important factor differentiating the studied assemblages.

The grave goods from cemeteries in Zavalovka and Chernin are considerably poorer, both in terms of quantity and quality. In both these sites the tool set was augmented using amorphous flake core processing and the splintering technique applied to local raw materials of inferior quality [cf. Petrougne, Petrographical..., in this volume]. Also noteworthy is the presence in Chernin of a greater number of variant C of the ordinary blade knives in very advanced stages of exploitation. The difficulties in accessing Volhynian flint blades suggested by the previous observations are not justified by the geographical position of the Chernin and Zavalovka sites [cf. Petrougne, Petrographical..., Fig.1]. It would thus seem that the communities responsible for these cemeteries occupied a place in a strictly hierarchical Volhynian flint distribution market that was opposite to the communities from Sofievka and Krasny Khutor. A comparison of the size of the various sites and the numbers of copper artefacts shows that differences between the sites were not confined to the flint industry alone. The cemeteries in Zavalovka and Chernin were probably used by peripheral groups living on the extremities of the Sofievka ecumene, while Sofievka and Krasny Khutor represent the principal centers of this tradition.

Considerable differences are also apparent between flint inventories within each of the above groups. These signify differences not just in funeral rituals and flint production, but also the much more important differences in socio-economic organization.

In Krasny Khutor the flint artefacts were charred more than twice as often as in Sofievka where they were sometimes killed by breaking or splitting. Also the role of strikers in the two sites was different. All this suggests that the ritual involving body cremation was still not fully established in the days when the Sofievka cemetery was operational. This hypothesis is also supported by data unrelated to the flint industry, such as the large size of graves in Sofievka, uncharacteristic for cremation graves. It may thus be surmised that the site dates to an older period, something that is confirmed by the few radiocarbon dates available from the two sites [sf. Kovalyukh, Videiko, Skripkin, Chronology..., in this volume].

The grave goods in Sofievka are considerably less rich than in Krasny Khutor. One of the principal artefact categories in the former cemetery was the square axe which was of no significance whatsoever in Krasny Khutor, and this despite indirect evidence in the recovered materials of a continued widespread use of these tools. In Sofievka graves containing arrowheads are few in number, poor and confined to the edges of the cemetery. In Krasny Khutor on the other hand they are almost twice as frequent, with richer grave goods and distributed in the standard manner. These differences had to be due to socio-economic transformations taking place among Sofievka communities, which appear to consist in the emergence within these communities of a group of people who were buried with unique grave goods including military equipment a bow [cf. Klochko, Kośko, Weapons..., in this volume]. Worth recalling in this context that V.F. Petrougne distinguished among the arrowheads in Sofievka specimens made from flints originating in the Ukrainian Shield zone. This may be an indication of the direction from which this trend arrived [Petrougne, Petrographical..., Fig.1]. Another possible indication of this trend

may be the relatively numerous flint daggers in grave inventories in Krasny Khutor. It cannot be ruled out however that, similarly as in the case of the appearance of end-scrapers, the daggers may simply be a consequence of an increasing richness of grave goods.

The transformations referred to above must have affected the flint industry. The demand for arrowheads stimulated the development of core exploitation techniques geared to flake production. Evidence of this process is the appearance of ordinary flake tools in the Krasny Khutor materials. There also emerge differences between flint industries that are easily detectable by means of classical typological analyses and which consist in various preferences for different types of implements within the same important tool category. In Sofievka the numerically predominant type of arrowhead is the one marked by a straight base, whereas in Krasny Khutor an even more popular form is that with the concave base. This change may be seen as possibly due to influences from the south [cf. Klochko, Kośko, Weapons...].

The inventories from Zavalovka and Chernin are also different, although the paucity of materials in this case hinders the relevant analyses. The Chernin materials contain clearly more arrowheads (although they are still of the straight-base variety), the flake tools are clearly present, while there are relatively fewer blade tools and no axes whatsoever. Applying the same kind of reasoning that was used in the case of Sofievka and Krasny Khutor, it may be concluded that the cemetery in Chernin is relatively younger. This suggestion is supported by the percentage of artefacts charred in the course of burial rituals which in Chernin is similar as in Krasny Khutor. Also in tune with these observations are the relatively early ¹⁴C dates for two graves in the Zavalovka cemetery [cf. Kovalyukh, Videiko, Skripkin, Chronology...and Kadrow, Absolute..., in this volume]. However, out of tune with all these dependences, the percentage of charred forms in materials from Zavalovka is higher than in Chernin, in fact being the highest among all the cemeteries considered here. If this is not an incidental situation, it may point to the direction from which the body cremation ritual arrived to the Sofievka group.

As for the areas with which the communities from Zavalovka and Chernin maintained contacts, it is worth recalling the bifacially retouched knives found in Chernin. Their closest analogy is the specimen from the Pit- and Comb-marked Pottery culture site of Pogorelovka-Vyrchishche on the middle Desna [Neprina, Zaliznyak, Krotova 1986: Fig.63:34]. Materials from this region, including also those from the site just mentioned, contain also numerous analogies of the arrowhead with massive tang recovered from the Zavalovka cemetery [Neprina 1976; Neprina, Zaliznyak, Krotova 1986]. Both these forms fit in the long flint working traditions of the Pit- and Comb-marked Pottery and Volosovo cultures of the vast Eastern European Lowland and the Valday Upland [Zimina 1981: Plates 63:7-8 and 64:28; Kraynov 1987: Fig.4].

3. FLINT INDUSTRY OF THE SOFIEVKA TYPE

Throughout the development of the Sofievka type, the principal element of its flint industry was processing of macrolithic blades imported from Volhynia. These blades were obtained from carefully prepared single-platform cores with the debitage surface shaped by crests and a meticulously prepared striking platform ensuring a steep angle de chasse. The characteristic features of these blades include:

- small butts, finely faceted, clearly standing out against the width of the pieces (Fig.1:a,b);
- a visible lip along the entire length of the butt which lacks a bulb (the proximal part of the lower face of the blades is often downright concave);
- parallel lateral edges and distinct curving of specimens, most pronounced in the medial part (Figs 1:b and 3:c).

Experiments intended to reconstruct the technique of making such blades were performed by Witold Migal, whose kind assistance is gratefully acknowledged here. Migal's findings suggest that the above features were the product of exploiting uniquely prepared cores with the use of a soft wooden punch. At the same time many elements of the core shaping are similar to features known from the older Tripolye assemblages produced with the help of copper punches. The production technique responsible for blades of the Sofievka group thus appears to be a deteriorated form of the Chalcolithic traditions typical for the older Tripolye workshops from Volhynia.

Originally, the cores were more than 20 cm long (Fig.1). They were repeatedly re-prepared, and thereby shortened, during exploitation. They remained in use until they provided blades about 12 cm in length (Fig.3:c). The final and useless blades finally finishing off the core were 7-8 cm long (Fig.3:b).

The complete absence of crested blades and the mere trace presence of Volhynian flint flakes in the studied assemblages show that only carefully selected blades arrived to the areas occupied by the Sofievka people. The examined materials contained no traces whatsoever of alternative blade processing. What is more, the processing of local raw materials is highly primitive, employing the hard hammer and lacking core form preparation. This suggests that the Sofievka people were nor familiar with the technique of making macrolithic blades, and that their skills were apparently limited to just retouch-shaping specific tools.

The parameters of the blade determined the kind of tools that was fashioned out of it. The largest specimens over 15 cm in length were usually used to make ordinary blade knives (Fig.1, 2:b). Medium-sized blades (12-16 cm long) also served to make tanged daggers (Fig.4:a), while the shortest pieces were fashioned into asymmetric blade knives (Fig.3:b,c). All these tools were later reshaped many times. The modifications could have consisted in repeated sharpening of the same tool, such as an ordinary blade knife (Figs 2:c and 3:a), by means of retouch. Also, the given tool could have been turned into a different type of implement. The analyzed inventories provide evidence of a whole range of such reshapings (Figs 2:a, 4:b,c, 5:a,b,e) which are schematically illustrated in Fig.10. It appears that, generally speaking, tool production in the initial phase consisted mostly in fashioning implements utilizing the long lateral edges of blades (diverse knives). In the next phase, these were usually turned into tools whose crucial elements were suitably shaped tips, namely the smaller daggers, asymmetric perforators, some of the pressers and, finally, the end-scrapers. The remains of fully used blade tools served as pressers/strikers. The same fate befell fragments of destroyed axes and flake tools.

The blade industry of the Sofievka group is marked by strong influences of the copper production traditions, evident in:

- the organization of production in a specialized center which then exported implements but not the know-how,
- tool production organization consisting in repeated remodeling of used-up forms,
- the form of some of the tools, notably the daggers and square axes.

Industries of this type are known from several groups of slightly older Chalcolithic sites scattered over a large area of central Europe. The shared features of these industries transcend the borders of archaeological cultures. Suffice it to say that good analogies of almost all the blade tool categories distinguished in the Sofievka group can be found, for example, in the Funnel Beaker culture assemblages of the Little Poland Upland which are about 500 years older in age [Balcer 1975: Figs 16-24]. Analogies in raw materials use suggest that the flint blade industry of the Sofievka group was taken over from the slightly older assemblages of the Tripolye culture from Volhynia [Peleshchyshyn 1990; Konopla 1990]. At this point in time it is impossible to say whether the similarities between the two areas have to do with the genesis of the Sofievka group or whether they have appeared already in an earlier phase of the Tripolye culture [Kruts 1977]. In the beginning of the 3rd millennium BC, the flint blade industry of the Sofievka group gives the impression of being a relic of a previous age.

Because of the manner of tool production organization in the Sofievka group, the numbers of specimens belonging to each tool category in the various inventories cannot serve as indicators of cultural traditions. Rather, they could serve to illustrate the raw material affluence and function of the individual settlement points. Indications of cultural uniqueness must be sought among subtle morphological and technological differences between specimens of the same tools categories. Worth mentioning in this context is the preparation of distal and proximal ends of blades for hafting, a process characteristic for the Sofievka type and consisting in the fashioning of distinctive truncations similar to those on the Upper Palaeolithic "Kostenki-type knives".

In the older stage of the Sofievka group, the macrolithic blades arriving from Volhynia were also accompanied by square axes. These too are typical components of Chalcolithic flint industries, and their ties with copper tool production are sometimes seen in morphological features of secondary significance, such as for example the slight widening of the cutting edge in some of the flint specimens [cf. Videiko, Archaeological..., Fig.50:2, and also Dobeš 1989: Abb. 1]. As the significance of flint axes in the burial rituals of the Sofievka group decreases, the manner of their acquiring also changes. In Krasny Khutor we have specimens imported from the middle Dniester area [cf. Petrougne, Petrographical...] and even more numerous evidence of independent production of these tools from local raw materials.

The third important element of the flint industry of the Sofievka type is arrowheads production. Arrowheads are already known from the older assemblages of the Tripolye culture, but these were slightly different in shape and usually much larger [e.g. Ryndina, Engovatova 1990: Fig.3; Sorokin 1991: Fig.16]. The fact that the production of this type of implements was related with the older Tripolye tradition may be confirmed by the relatively large percentage of Volhynian flint specimens in the Sofievka materials as well as by the predominance in most inventories of straight-based forms. The production of these tools evolved considerably in the Sofievka type, this being shown by the dominance of arrowheads with concave bases in Krasny Khutor. The presence of arrowheads made from flint from the Ukrainian Shield zone indicates the areas where the influences stimulating this evolution process originated. This theory is supported by the fact that production of arrowheads with concave bases had a long tradition in the steppe regions in the Southern Bug and Dnieper river basins. Specimens of this kind are known not only from the Yamnaya culture which is contemporaneous to the Sofievka group [Shaposhnikova 1985: 343] in the area in question these implements boast an extremely long tradition [Rassamakin 1994].

The ties to southern regions discernible in arrowheads production are important, being indirect indications of the origins of the socio-economic transformations taking place in the history of the Sofievka group. These transformations are also apparent in the specific role of this class of artefacts in burial rituals - as well as in the flint industry. Analyses of raw materials used to make arrowheads from Krasny Khutor and Chernin show that this production developed independently of the Volhvnian production center relying mainly on local raw materials. It is probably no accident that the richer grave goods with arrowheads recovered from Krasny Khutor usually contain also flakes or strikers made from flakes and flake tools, They probably document the evolution of a flint industry which is distinct as regards technology (flake core) and organization (individually completed production cycle, from raw material acquisition to production of the final form). In this part of Europe, flint production of this kind is typical for later times the turn of the Neolithic and the Bronze Age. Richly furnished graves of flint knappers/arrowhead makers are known from the Catacomb culture along the Don [Smirnov 1983; Nikolova, Bunyatyan 1991], as well as from the Middle-Dniester culture along the Upper Dnieper [Artemenko 1964] and from the Corded Ware culture in Little Poland [Tunia 1979].

The previously discussed affinities of the knives shaped with bifacial flat surface retouch, which are exotic among the Sofievka materials (Fig.7:a,b), may be an important contribution to analyses of the origins of this manner of tool formation in the part of Europe in question. The technique took hold along the middle Dnieper slightly later at the turn of the Neolithic and Bronze Age [Artemenko 1964; 1987] while in Volhynia and Little Poland only in the Early Bronze Age [Machnik 1977].

The performed analyses show that the flint industry of the Sofievka type is a good illustration of the transition of Chalcolithic flint processing into that typical for the turn of the Neolithic and the Bronze Age. The facts emerging from evidence from the investigated cemeteries appear to be a *signum temporis* for communities inhabiting this part of Europe in those days. Many analogies to them may be indicated in materials of the so called Złota culture, a small community of those times inhabiting the border with the Globular Amphorae ecumene in the Vistula valley [Krzak 1976; Machnik 1979; Lederman 1980; Ścibior 1991a, 1991b]. Although both these groups are still not too well known, they appear to resemble *the Gateway communities* in a number of respects [Hirth 1978].

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PETROGRAPHICAL-LITHOLOGICAL CHARACTERISTICS OF STONE MATERIALS FROM LATE-TRIPOLYE CEMETERIES OF THE SOFIEVKA TYPE

Investigated collections from the four monuments^{*} comprise both sedimentary and crystallic (magmatic and metamorphic) rocks, with generally prevailing burnt flits samples, however, actually unstudied due to the aforementioned feature.

The article uses common geological and mineralogical terms [Polovinkina at al. 1948; Polovinkina 1966; 1968a; 1968b; Atlas 1973; Geologcheskiy 1978], except for few specially outlined cases, and are not provided with special explainations in the text.

Principle methods for studying the stone collections included expert-visual and immersion-microscopic [Tatarsky 1965: 207-209, 286] techniques which provide for actual integrity of the artefacts, which was inevitably lost, for instance, in the process of making thin sections, selection of representative samples for silicate chemical analysis, potassium-argon dating, etc. Although standard thin sections are indispensable for principally important evaluation of mineral argerate texture, in this particular case their lack was partly compensated for by viewing under the microscope of several - instead of one - immersion samples taken from different parts of an article. For flint rocks, these were thin scales (taken accroding to the technique initiated by G.I. Bushinsky) easily received with the help of wringing technology. In the case "battle-axe", slightly changed by hypergenesic processes, a rather accurate evaluation of texture is achieved through investigation in reflected light or under lens, while immersion allows to define mineral composition of the powdered samples. Calcedonite preparations obtained through a similar technique allow not only to compare the flints represented in the collections to each other or regional standards, but also to find their analogs, for instance, in reference books [Atlas 1973]. Finally, classification of articles into specific groups according to their material on the grounds of visual evaluation was done in case of maximum similarity of series of features [Petrougne 1971:295] to those of similar but immersion-tested rocks.

^{*} The paper does not discuss the full set of "Sofievka" sources [see Videiko, "Archaeological...", in this volume]. It is based on a certain selection of the sources whose nature was justified by the author's objective: to identify the general principles of differentiation between "stone materials" with respect to raw materials and genesis.

No	Specified types of flint material	Names	of monuments a (visual/im)	nd number of mersion)	samples
		Chernin	Krasny Khutor	Sofievka	Zavalovka
1	"Volhynia" of touronian age	11/19	7/4	0/1	44/13
2	"Dniester plated" and cenomanian apogaize	5/5	2/3	-	2/1
3	"Moraine" Northern hornfelsoidal	1/4	14/4	-	0/5
4	"Dnieper–Kanev"	-	-	-	1/1
5	gelatinous-like- apoinoceramoidal of the Ukrainian Shield zone	1/0	1/3	_	0/3
6	gelatinous-like- apoinoceramoidal of the Middle Dniester zone	0/4	2/4	_	0/1
7	gelatinous-like- apoinoceramoidal of Northern re-deposited (?)	-	0/1	_	_
8	"glauconized" re-deposited	0/3	-	-	1/2
9	undefined – non-affiliated	0/1	0/2	0/1	-
10	Total	18/36	26/21	0/2	48/26

Cemeteries of the Sofievka type. Types of the flint raw material

Obviously, selection of materials for immersion preparations theoretically involve at least macroscopic uniformity of the raw material, although this provision is not always observed in practice: if a large knife made of so-called "Volhynia flint" rather often displayes samples of smoky well-transparent stone as well as grey opaque material, this cannot be neglected, while if similar calcedonite is used for making smaller arrowheads, one sample might appear purely smoky, and another is grey, without any transition in color, this might cuase an illusion of different raw material, although, naturally, the material is the same.

Therefore, in general, the collections flint is characterized by groups (Table 1) as well as by statistically representative series of tools, flakes chunks of unitype material (preferably, at least ten samples), due to small amounts of sampling, provides a rather limited affiliation with possibile locations of raw material sources, and appears to be regional, that is, to be related to major parts of Ukrainian territory [Bondarchuk 1959; Pasternak at all 1968:Fig.22; Spravochnik 1975; Granitoidnye 1984]. Only in case of some unique artefacts, for instance, chops of a wedge-shaped tool from the Zavalovka ground cemetery (see below), the affiliation can crusially limit the source are of the mateial.

Identification of individual artefacts materials with raw stuff originating from a particular geological outcrop, after it is preliminary referred to a major region usualy implies additional use of series of parallel investigations (according to the "artefact material - anticipated result material" scheme) by means of such modern petrological-mineralogical study techniques as chemical, spectroscopic, petrofabric and electronomicroscopic analyses, as well as thermography, diffractometry, petrophysics (definition of resistance to monoaxis compression, porosity, electromagnetic and radioactive dimensions, etc.), possibilities of which have already been demonstrated by the author in some papers, although they have not been discussed in full in Ukrainian archaeological literature.

1. FLINT ARTEFACTS

Table 1 and Fig.1 offers an idea about types of flint as the most widely spread stone represented by articles in all the four collections. Table 1 includes both generally known terms like "Volhynia flint" [Kanivets 1956:102] "Volhynia-Podolia flint" [Danilenko, Makarevich 1956:97], or "Dniester plated flint" [Bibikov 1953:78-80] or "moraine flint"; as well as terms suggested by the author according to a set of characteristic features, including territory of occurence, microfaunistic (apospiculose, apoinoceramoidal, etc.) or secondary mineralogical characteristics (glauconitization), and macroscopic (gelatinous-like) feature of the stuff. Although detailed description of microscopy or dissemination areas go beyond the scope of this publication, generalizations offered below are drawn from personal experience of many years of intent investigation of hundreds of thousands flint samples both from archaeological collections and natural outcrops mentioned or neglected in the regional table of Ukraine and neighboring states.

Almost all of the most sophisticated flint artefacts of the ground cemeteries under discussion were made of smallest-texture and homogeneous "Volhynia flint", smoky, often with grey patches and stains.

In the Krasny Khutor cemetery these artefacts are presented by end-scraper on blade (grave 50) [see Videiko, Archaeological..., Fig.25:1, in this volume], ordinary blade knife (grave 137) [see Videiko, Archaeological..., Fig.39:2], big asymmetric blade knife (grave 133) [see Videiko, Archaeological..., Fig.38:3], ordinary blade daggers (graves 89, 114) [see Videiko, Archaeological..., Fig.31:3;33:2], double spike-ended presser (grave 94) [see Videiko, Archaeological..., Fig.31:4], blunt-ended pressers (graves 32, 168) [see Videiko, Archaeological..., Fig.21:1;40:10], ordinary blade strikers (graves 120,146) [see Videiko, Archaeological..., Fig.34:1].

In burial interments near Chernin there were ordinary blade striker (grave 84) [see Videiko, Archaeological..., Fig.12:8], asymmetric blade perforator (grave 42) [see Videiko, Archaeological..., Fig.6:1] and ordinary blade knives (like those from 66 complex) [see Videiko, Archaeological..., Fig.11].

The stuff descrived hereabove prevails in the Sofievka monument and is represented by fragmented (graves 44,45) [see Videiko, Archaeological..., Fig.55,56:1]



Fig. 1. The orientated scheme of the flint bearing areas and separate deposits of silicites along the periphery of the burial ground of the Sofievka type in the territory of Ukraine (without the most remote the Carpathian, the Crimea, the Donets regions and also apportionment of zone of paleoabrosional or alluvial reckposit of flint raw material). 1 - the area of spreading of the moraine type flint; 2 - the Desna type flint, 3 - the Volhynia type flint, 4 - the Dnieper-Kanev type flint, 5 - the Shield type flint, 6 - the chert type, the gaize type and the "plated" type from Podolye (Dniester) and Volhynia, 7 - Middle Dniester type flint, 8 - Bakshal type flint, 9 - location of the Sofievka type, 10 - border of the examined area

and actually undamaged sqare axes (graves 19, near 43,67) [see Videiko, Archaeological..., Fig.50:2,54:6,59:1] also spike-ended presser made from pseudo-blade knapped from square axe (grave 70) [see Videiko, Archaeological..., Fig.59:4], ordinary blade knives (graves 22,44 and surface) [see Videiko, Archaeological..., Fig.51:1,55,71:6], big asymmetric blade knife [grave 71 - see Videiko, Archaeological..., Fig.60:1], spike-ended presser (near grave 60) [see Videiko, Archaeological..., Fig.56:4], fragments of undefined blade tools (graves 45,47) [see Videiko, Archaeological..., Fig. 56:1, 56:3]. Actually, the same stuff was used for a series of straight- and concave-based arrowheads (from surface) [Videiko, Archaeological..., Fig.71:1].

Most of scarce flint finds in the Zavalovka cemetery represent burnt opaque samples, practically impossible to determine diagnostically.

Kinds of flint and other siliceous rocks, represented by single samples are not included in Table 1.

For instance, among the Krasny Khutor finds there is a hammer made from fragment of axe made of apoinoceramoidal stuff (the one in which fragments of mollusc folds are completely substituted by calcedony, but still, as well as in other kinds of ghost flint can be traced due to relict shapes outlined by clay microadmixture) in grave 137 [see Videiko, Archaeological..., Fig.39:2]. Another hammer made from square axe from grave 128 [see Videiko, Archaeological..., Fig.38:1] from the same cemetery has of white polished (dead on the fracture) alomost opaque calcedonite with thin dark-brown and black lining of broad facets. Most probably, this mine-ral argerate is of residual-infiltration nature without even approximate territorial affiliation.

An amorphous striker made from axe fragment found in grave 63 [see Videiko, Archaeological..., Fig.26:7] was made of so-called "plated" hornfelsoidal Dniester stuff.

Of special interest is brownish-yellow striker made from flake from axe found in the grave 137 [see Videiko, Archaeological..., Fig.39:2]. Actually that was primary calcite-flint "Malinovtev-type" rock [Petrougne 1992: 13] from the Middle Dniester basin which completely lost the carbonate component as a result of hypergenic lixiviation already in the culture layer, and presently represented by undersolid microquartz-calcedony agregate, ash-grey in the fraction.

Occurrence of such rock in the grave directly points to the fact that cultural relations existed between the Middle Dnieper and the canyon part of the Dniester basin during the late Tripolye period.

The cemetery near Chernin reveales an ordinary blade knife of gaize-flint cenomanian material (grave 66) [see Videiko, Archaeological..., Fig.11], and arrowheads made of apoinoceramoidal stuff of presumably Northern origin (grave 69) [see Videiko, Archaeological..., Fig.12:2] as well as of some stuff of indefinite origin (grave 69) [Videiko, Archaeological..., Fig.12:2].

In the Sofievka area, those artefacts were represented by arrowheads [Videiko, Archaeological..., Fig.71:2] made of small-impregnated brown-grey translucent "gelatinuos-like" flint, presumably originating from the Upper-Chalk residua from the teritory of the Ukrainian Shield in the Southern Bug-Dnieper basin; and arrowheads [Videiko, Archaeological..., Fig.71:2], probably from the Stara Ushitsa area in the Dniester region, which displays apoinoceramoidal flints besides apospicular cenomanian flints [Gavrilishin at al. 1991:21]. Furthermore, in the Sofievka ground cemetery there was a single flake of heavily sanded light-grey siliceous rock, not presented in the Table 1 (grave 67) transitive to calcedony alevro-sandstone consisting of fragmented qartz, often in clay coating, scarce glauconite grains in calcedony fulfilment cement. According to large-size spherulithic microtexture of the calcedony substratum (with individual indivisibles up to 0.1-0.2 mm long), this is presumably new infiltration formation from the Tertiary sands section like those occuring in the Southern Bug, Dnieper, Northern Donets basins, initially covering crystallic rocks of the Ukrainian Shield and then going North.

2. NON-FLINT ARTEFACTS

Archaeological-petrographical characteristics of other, non-flint kinds of stone stuff (from sedimentary to magmatic and metamorphic rocks) which occur in the cemeteries is performed on a by-complex basis.

2.1. "BATTLE-AXES"

Krasny Khutor. A "battle axe" (type 2) found in grave 120 [see Videiko, Archaeological..., Fig.35] was made of ash-grey argillaceous (most probably, metahallusitebased) fractioned quartz undersolid basal-cemented alevrolithe which made the raw-material easy to process, but the ready artefact was virtually unfit for multiple beat, and moreover, for battle use. This makes the artefact similar to some early- and middle Tripolye drilled axes made of ash-carboniferous rocks [Petrougne 1967:56], marbles and ofiocalcite [Petrougne 1968:21], and there's nothing strange that it survived till our time in fractioned form.

A "battle-axe" (type 1B), broken in old times, had been made of igneous rock of oligophyric andesite type with apointersertal- doleritic texture (of plagioclase grains, monoclinic pyroxen, basaltic-like hornblende, accessory magnetite and apatite. It was found in grave 119 [see Videiko, Archaeological..., Fig.34:2]. Greenish on the surface and mouse-grey in fracture, the rock is crossed by a thin vein, and obviously is less solid compared to other axes of standard forms and dimensions. Most probably, the material originates from the Carpathian region, the Prut river basin, that is, the South-West. Presumably, this was also source territory of xenolite-bearing andesite (according to its texture and composition), represented in a greenish-brown "battle axe" (type 1) from grave 127 [see Videiko,

Archaeological..., Fig.37]. With other conditions equal, a "battle-axe" (type 1B) from grave 12 [see Videiko, Archaeological..., Fig.17:1] can be considered as originating from the Carpathians or at least the Western part of the Ukrainian Crystallic Shield. The material of that axe - grey with greenish hue palaeoandesite or diabasic porphyrite (a thin section is required for more precise definition) occurs not only in the Carpathians, but also in the Volhynia region [Petrougne 1993:385].

The rest of "battle-axes" (types 2x1B and 1A) are represented by gabbro-amphibolites, green-grey on the surface and almost black in the fracture, of massive structure and apogabbro- hypidiomorphicgranular texture - from graves 33,123,167 [see Videiko, Archaeological..., Fig.21:2,36:2,41:2]. Usually these crystallic rocks comprise plagioclase, green hornblend (something of brownish shade, probably because of heating in the open air in the burial fire), in some cases with slight admixture of biotite or ore mineral (magnetite) scales. The nearest outcrops of similar metamorphic rocks are located in the Southern Bug region, the Gorny Tikich and the Gniloy Tikich river basins [Spravochnik 1975:163] that is, regions to the South from the cemeteries, in the central part of the Ukrainian Crystallic Shield.

Genetically similar to these rocks is the material of a fragment of the "battle-axe" (type 2) found beoynd the grave [see Videiko, Archaeological..., Fig.42]. It was made of dark-grey pointed, and exfoliated (possibly due to successive heating and abrypt cooling) material. The article, covered by a glue pellicle for preservation at the museum, requires study of thin sections. However, its material can be preliminary classed among rare-biotite plagioclase amphibolites, similar in origin to that of the previously considered artefacts.

Finally, the part of "battle-axe" (type 1A/B) broken along the drill-line partially corroded on the polished surface, consists of smallgrained pyroxen-plagioclase gneiss of micrograinoblastic texture, which developed up to 4 mm brown hue as a result of hypergenesis. The material's origin remains unclear; it might be both native rock of the Ukrainian Crystallic Shield and moraine rock brought from the North [Ve-klych 1982:Fig.2], considering low firmness and decay of the material.

Sofievka. Erupted rocks of the Sofievka collection of artefacts are represented, first of all, by grey hornblend diabasic porphyrite of a "battle-axe" (type 3) - from grave 65 [see Videiko, Archaeological..., Fig.58], presumably of material from the Western part of the Ukrainian Crystallic Shield [Petrougne 1993:385-386]; and secondly, by two "battle-axes" typical of the late Tripolye graves.

The first artefact (type 1B) was discovered near graves 114- 115-116 [see Videiko, Archaeological..., Fig.66:3], and consists of clinoenstatite andesite of microdoleritic texture, greenish-grey on the surface and almost black in a fresh fracture, presumably of the Carpathian origin (but not necessarily from the territory of the Transcarpathian region of Ukraine). Of similar origin is another prominent "battle-axe" (type 1) - from surfece [see Videiko, Archaeological..., Fig.70], made of hypersthenic andesite of similar microdoleritic texture; both materials belong to the effusive class, most probably to well-holocrystalline textures of a Carpathian type [Maleyev 1964:196]. Intrusive rocks are presented in the Sofievka cemetery by grey smallgrained biotite-hornblent granite, originating, most probally, from the Western Volhynia or somewhere to the South of the Kiev region [Granitoidnye 1984:Fig.4-5] used in a standard "battle-axe" found in grave 8 (type 1A) [see Videiko, Archaeological..., Fig.48:4]; by amphibolized, originally pyroxenic gabbro of relict ophytic texture in an artefact of a similar form "battle axe" (type 1A/B) - from grave 44 [Videiko, Archaeological..., Fig.55] (presumably from outcrops in the central part of the Ukrainian Crystallic Shield, along the Southern Bug, the Tikich river basin or the Uman - Novy Mirgorod pluton); and genetically related to it gabbro-amphibolite represented in a drilled polished and than intensively corroded broken "battle-axe" from grave 19 (type 2) [see Videiko, Archaeological..., Fig.50:2] featuring apodiabasic heterogranuloblastic texture and massive structure.

2.2. PEBBLES, WHETSTONE AND FRAGMENTS OF SANDSTONE

Chernin. Of ten smaller subellipsoidal pebbles found in grave 66 [see Videiko, Archaeological..., Fig.11], only three (IAF: No 91, No 92, No 97) feature traces of possible utilization represented by marks of beating or rubbing on the oposite edges. The material of the first of them, as well as that of similar pebbles No 88, No 89, No 90, No 94, No 95 is vein quartz (represented by samples of various colour, from glass-like to milky-white, multigrained, granulated, cataclasic, etc.), sometimes slightly ferrous. Pebble No 91 (judging from traces of wear, possibly, a stamper for grinding ochre) consists of smallgrained quartzitic sandstone with quartz contiguity cement. Unlike the others, pebble No 93 consists of smallgrained (0.2 to 0.7 mm) aplite or felsite-aplite (thin section study is required for more exact definition).

One with two pebbles from grave 90 [see Videiko, Archaeological..., Fig.31:1] (IAF: No 124) with unclear layered texture and one grinded-in working surface (currant-grinder) consists of quartz-feldspathic pyroxen-hornblend black firm smallgrained gneiss-quartzite of heterogranuloblastic texture and bearing features of cataclase.

All the aforementioned pebbles are, most probably, of local moraine origin.

Zavalovka. Peculiar for scaresity of its stone artefacts, this cemetery reveales, in addition to aforementioned itms, two smaller pebbles: one, found in grave 16, [see Videiko, Archaeological..., Fig.75:5] of mylonitic quartzite sandstone of unclear layered structure (due to alteration of differently coloured layers up to 0.8 mm thick) with smaller negative cavities formed in the course of lixiviation of previously displayed minerals, according to a rather typical scheme of pseudomorphic formation [Grigoryev, Zhabin 1975:266]; and another pebble, found in grave 1 [see Videiko, Archaeological..., Fig.74:1] and represented by leucocratic migmatite-permatoid quartz-feldspathic agregate of heterogranuloblastic texture.

Both artefacts (under 50 mm in diameter) bear no traces of utilization and, judging from their material, most probably represent local moraine pebbles, possibly moved by running waters.

Krasny Khutor. A thin flat whetstone from grave 127 [see Videiko, Archaeological..., Fig.37] was made of pricked out along layers grey-brown finequartzousargillaceous (kaoline with fine distribution of ferric hydro-oxides) South-Western argillolith, generally, not more close than similar vend outcrops [Kopelyovich 1965:-27,Fig.1] - of the palaeozoic origin, or possibly Carpathian mezozoic-tertiary folded section.

Sofievka. Among the complex's sedimentary rocks, there are two fragments of light-grey quartz sandstone, displaying no traces of utilization, with quartz contiguity cement [see Videiko, Archaeological..., from destroyed graves] (IAF: No 436, No 437); the second fragment features small (up to 1 cm) imprints of lamellibranch mollusc shells; both fragments are presumably from the local tertiary sediment section. The latter is connected with two fragments of white low-firmness inequigranular arkose sandstone (on kaolinite cement) - from graves 79 and 92 [see Videiko, Archaeological...].

Firm grey inequigranular arkose (almost quartzite-like) sandstone with quartzous-argillaceous pointed-ferrous contiguity -regeneration cement was used as material for a combined article (subsquare pestle-grinder, which also possibly served as a little anvil for cold forging - ?) - from surface of site [see Videiko, Archaeological..., Fig.72:2]. Possible origin of this artefact (presumably Western) remains unclear.

2.3. BEADS

A collection of beads gathered from the surface of blown sands of the Sofievka cemetery [see Videiko, Archaeological..., Fig.70] includes a fractured jet bead, most probably relatively new (19th century), as was earlier assumed by a recognized authority in the field, G.G.Lemmlein, due to the refraction factor close to similar constant displayed by raw materials of the Caucasian deposits. However, a toroidal bead of calcite agregate with organogenous structure relicts (a relict shell?) can belong to the Enelithic period. Three cyllinder-shaped pipelike beades of pale-olive organic material may also be associated with the late Tripolye monument group (as similar to materials of the Usatovo graves in the Alexandrovka barrow near Odessa, excavated with the author's participation in 1993). The aggregate refruction factor $(1,610\pm0.002)$ suggests possibly even Mediterranean origin (elevated character of gemmological raw material urges for considering these definitions to be preliminary, though necessary, since this information appeared in generalizing publications [Kruts 1977:121]).

3. CONCLUSIONS

Therefore, from the archaeological-petrographical point of view, the stones of aforementioned monuments can be split into five separate groups. In order of declining numbers of investigated samples these include: first, touronide or so-called "Volhynia" flint, tending, in primary deposit state, to the region of Upper Chalk sedimentaries (Fig.1) of Western Ukraine (which was imported to the Dnieper basin) [Pasternak et al. 1968:Fig.22]. Notwithstanding territorial proximity, not a single microscopic proof was found for utilization in the Kiev region graves smoky calcedony stuff from the Desna river basin (Fig.1), resembling, in appearance, some kinds of the Volhynia flint. Second, these are local rocks, mainly associated with moraine material of the Dnieper freeze [Veklych 1982:Fig.2] partially re-deposited (due to alluvial-fluvioglacial processes rocks, flint included). Third, intrusive and metamorphic formations of gabbro-amphibolite and gneiss group of the Southern Bug basin and Central (and possibly part of Western) part of the Ukrainian Crystallic Shield. Forth, materials excavated somewhere in the Middle Dniester region and mouth parts of its tributaries located in the area. Fifth, effusion and, not excluded, also some sedimentary rocks of the territory of the Volcanic Carpathians to the West of the river Prut, which is also the origin location of such exotic material occurring in some other Tripolye monuments, as zadeitite [Petrougne 1994:256f.].

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POTTERY STYLISTICS OF THE SOFIEVKA TYPE, GENETIC-CULTURAL QUALIFICATION

Any attempt at cultural or genetic classification must take into account two perspectives: (A) endogenous, i.e. within the system of the Tripolye culture, and exogenous, i.e. "extratripolyan" which falls into two ranges of identification. The first (B), called "Balkan", including cultures directly originating from the Balkans and the Carpathian Basin and the second (C), "circumbaltic", originating from the forested area of eastern Europe or related to the cultures of the Central European Lowlands. The pottery from the Sofievka type cemeteries reveals the prevalence of endogenous design features.

A. In order to establish the cultural and genetic position of the Sofievka type materials, sedimentation and sepulchral sources have so far been analyzed together. The results are available as two, significantly different theories [cf. Videiko, Cemeteries..., in this volume].

The first assumes that the type discussed here developed endogenously on the Dnieper [Zakharuk 1954; Kruts 1977]. The Sofievka type is considered to be yet another stage in the development of the local Tripolye culture. Under this assumption the morphology and ornament of the Sofievka pottery would be directly related to the Lukashi type, i.e. its roots would reach back to the Chapayevka and Lukashi types [Kruts 1977:136].

The second theory developed by V. Dergachev, while not rejecting the role of local background, draws attention to the existence of a component which does not fit into the Lukashi type traditions [Dergachev 1980:142]. This component is the prevalence of round amphorae with handles on their shoulders, vessels with tall, conical and tapering lips as well as bulbous forms with decorations on lips (up to 50% of all vessels). This is believed to be the evidence of the intensity of influence of the Troyanov and partially of the Gorodsk types. The impact of the Dniester and Prut variety of the Tripolye culture, specifically of the Brynzeny type, can be noticed as well. In sum, the Sofievka type pottery stylistics would be a synthesis of various Tripolye traditions originating in different regions: local (Lukashi type) and imported ones (Fig.1).



Fig. 1. Context of groups (types) of the Tripolye culture related to the origins of the Sofievka type. Legend: a-d - range of Tripolye culture types (a - Sofievka, b - Troyanov, c - Gorodsk, d - Brynzeny); e - northwestern range of the Polgár circle (Bodrogkeresztúr, Malice, Lublin-Volhynia cultures).

A re-analysis of these theories involving a detailed review of features of sepulchral pottery justifies the stressing of significant differences between the Lukashi and Sofievka types [cf. the hiatus theory advanced earlier: Zbenovich 1976:40]. It can be even suggested that in the case of the Sofievka type we deal with the effects of migration.

All researchers into the Sofievka type agree that it was a short-lived phenomenon. Thus it is difficult to isolate "early" or "late" stages in it [see in this volume: Kovalyukh, Videiko, Skripkin, Chronology..., Kadrow, Absolute...and Budziszewski, Flint...]. It should be also added that a genetic explanation of this phenomenon only within the framework of the Tripolye culture seems to be impossible now.

B. The set of "Balkan-Carpathian" features of the Sofievka type sepulchral pottery is relatively small. This component is made up of the following elements: (a) types of shoulder-placed handles of developed contours, in particular when seen in profile (Fig.2:1-3), (b) a handle placed on the edge and ornamental elements in form of "lumps-handle" reised above the lip edge (Fig.2:4), (c) edge decorations giving the effect of a wavy brim (Fig.2:5), (d) decorations located along the border of the above-edge and external under-edge zones (Fig.2:6-7), (e) belly or rather shoulder decorations, most often in the form of horizontal lines pressed with a "point-like" die (Fig.2:8-9), (f) belly decorations, also mainly on shoulders in the form of "points", "bars" or "lines" often notched with a finger or die (Fig.2:10-13). The widest assortment of the above-named features was found at the cometery in Sofievka (features: a, c, d, e, f). However, they can be also found at the other burial grounds in Krasny Khutor (a, b, e, f), Chernin (a, e) and Zavalovka (b, f).

The genetic identification of the outlined set of features admits of an assumption about the existence of two chronologico- cultural levels of their reception. The early level is defined by Polgár analogies, mainly late ones, which matches the "classic" dating of the Sofievka taxon [cf. Videiko, Cemeteries..., in this volume and the remarks on the "endogenous perspective" made above]. The later level is marked by the references to the horizon of late Baden-Kostolac-Cotofeni II/III-Cernavoda II, matching the latest radiocarbon chronology of such objects [cf. Kovalyukh, Videiko, Skripkin, Chronology...and Kadrow, Absolute...]. We have found it justified to outline here both references quoted above in the form of (1) a register of typological analogies in pottery stylistics and (2) a genetico-cultural identification of the adaptation process of "Balkan-Carpathian" features.

1. The register of analogies includes these elements of the "Balkan-Carpathian" component that have been earlier deemed diagnostic (a-f).

a. Such handles belong to the most frequently encountered elements characteristic of the whole Polgár circle and related cultures. They appear already in the Tiszapolgár [e.g. Bognár-Kutzián 1972; Šiška 1968]. An unsual abundance of such handle forms is observed in the Bodrogkeresztúr culture [e.g. Bognár-Kutzián 1963]. They also sporadically survive in cultural complexes of the Hunyadihalom-Lažňany horizon [Budinský-Krička 1963:Fig.224:8, 10 - Male Zalužice-Lažňany]. However,



Fig. 2. Exogenous, Balkan-Carpathian stylistic features of the sepulchral pottery of the Sofievka type.

they are typical for postclassical - meaning without white painting - complexes of the Lublin-Volhynia culture [Kadrow, Kłosińska 1989:Fig.5:b, d, e, g, i, j - Łańcut; Kruk, Milisauskas 1985: Fig.22:b2, b3, c1,c3 - Bronocice]. It is also worth mentioning that they are a frequent component of the complexes of the late Band Pottery culture of phase III in the Kuiavia region [Czerniak 1980: Fig.22:1, 23:1; Grygiel 1986: Fig.23:2, 25:6].

The same type of handles is recorded in late Baden, both in the Carpathian Basin [Kalicz 1963:Fig.VI:4 - Center] and in Małopolska [Godłowska 1968: Fig.XXVI:6; 1979: Fig.187:7 - Kraków-Nowa Huta-Zesławice] as well as in the Cotofeni culture in phases I-III [Roman 1976: Fig.50:2,3, 53:4 - Locusteni; 75:2, 3, 5: 77:9 - Herculane "Peştera Hoților"]. It has to be stressed, however, that they are quite rare in these materials in stark contrast to the wealth of applications of this element in late Polgár designs. It does not seem either that individual types of these handles have any value as precise chronology indicators.

Shoulder-placed handles of developed contours were recorded in the material from cemeteries in Sofievka (graves 14, 44, 112, 139), Krasny Khutor (graves 27, 47, 52) and Chernin (18, 19, 39, 47, 48, 58).

b. Handles placed on edges and "lumps-handle" reised above the lip edge are a characteristic elements of many types of vessels of the Bodrogkeresztúr culture [e.g. Bognár-Kutzián 1963], of the Hunyadihalom-Lažňany horizon [Budinský-Krička 1964: Fig.6:1 - Male Zalužice-Lažňany; 1968: Fig.3:4,9,10 - Šebastovce; Bruckner 1970: Tab.II:2 - Vajska; Bognár - Kutzián 1969:34, Fig.1, 2:1, 3, 7 - Hunyadihalom] and of the Lublin-Volhynia culture [Kadrow 1989: Fig.7:4, 10 - Strzyżów; 1992: Fig.7:c,q,k, 8:d - Kosina; Kadrow, Kłosińska 1989: Fig.8:d,f,h; 9:c - Łańcut; Zakościelna 1986: Fig.8:1; 9:1, 5; 10:3, 5; 12:8; 13 - Wąwolnica].

This form of handles is also occasionally encountered in the late Baden of the Carpathian Basin [Roman, Nemeti 1978: Fig.5:3, 9 - Sinnicolau Mare "Sąlişte"] and Małopolska [Godłowska 1968: Fig.XXVI:15 - Kraków-Nowa Huta-Zesławice]. They are also found in the Kostolac culture [Tasić 1979: Fig.XXVIa:2 - Pivnica kod Odžalca] and in the Cotofeni culture [Roman 1976: Fig.55:3, 5, 8, 9 - Locusteni].

This type of handles was found only at cemeteries at Krasny Khutor (grave 80) and Zavalovka (grave 1).

c. Lip edge notching, or edge decorations giving the effect of a wavy brim due to incising, pressing with various dies or fingers, appears already in the decline of the classic phase of the Malice culture [Kamieńska 1973: Tab. II, IV, VI, XI; Kadrow 1988: Fig.10:3, 5, 6; 1990: Fig.11:n, o], and occurs infrequently in the Rzeszów phase of the said culture [Kadrow 1988: Fig.3:3, Komorowski 1958: tab. CV-CVII; Masson, Merpert 1982: Tab. XCIV]. This way of finishing edges is characteristic of certain complexes of the Lublin-Volhynia culture [Kadrow, Kłosińska 1989: Fig.7 - Łańcut; Kruk, Milisauskas 1985: Fig.22a, 23 - Bronocice; Zakościelna 1986: Fig.9:1, 5 - Wąwolnica; Kadrow 1992: Fig.7:e, f; 8:a, e, f - Kosina] and of groups of the Hunyadihalom-Lažňany horizon [Budinský-Krička 1968: Fig.3:4, 10 - Šebastovce].

Only rarely was this form of finishing edges identified in the late Baden of the Carpathian Basin [Roman, Nemeti 1978:Fig.12:4 - Ciumeşti III; 62:1, 2, 7, 8 - Cehaluţ] and Małopolska [Godłowska 1968: Fig.V:4; XXVIII:27 - Kraków-Nowa Huta- Zesławice; Kozłowski 1966: Fig.IV:39 - Witkowice; 1968: Fig.XIX:13, 14, 15] as well as in the Kostolac [Tasić 1979b:Fig.XXVIa - Pivnica kod Odžalca] and Cotofeni [Roman 1976:Fig.48:2; 59:8 - Locusteni; 68:6, 7, 9 - Nandru "Peştera Curata"] cultures.

This form of edges can be observed only at the cemetery in Sofievka (graves 3, 94 and from the surface).

d. Decorations located along the border of the above-edge and external under-edge zones are known primarily from late, post-classic complexes of the Lublin-Volhynia culture [Kruk, Milisauskas 1985: Fig.22a, 23 - Bronocice; Kadrow, Kłosińska 1989: Fig.7 - Łańcut; Kadrow 1992: Fig.7:e, f - Kosina].

Analogous decorations can be observed in late Baden in the Carpathian Basin [Kalicz 1963: Fig.V:1 - Center; Roman, Nemeti 1978: Fig.62:1, 2, 7, 8 - Cehaluţ] and in Małopolska [Godłowska 1968: Fig.XXVIII:27 - Kraków-Nowa Huta-Zesławice] as well as in the Coţofeni culture [Roman 1976: Fig.48:6 - Locusteni].

Such decorations were found at the cemetery in Sofievka (graves 88, 94, 99).

e. Belly or rather shoulder decorations, most often in the form of horizontal lines (less frequently in the form of more complicated patterns) pressed with a ", point-like" die, are already known in the decline stage of the classic phase of the Malice culture [Kamieńska 1973: tab. IV, V, VIII, XI; Kadrow 1990: Fig.11:b, e, f]. Occasionally such decorations also occur in the beginning of the Rzeszów phase [Moskwa 1964: Fig.19 - Rzeszów; Bronicki, Kadrow 1988: Fig.9:10 - Majdan Nowy; Kruk, Milisauskas 1983:9 - Bronocice; Masson, Merpert 1982: Tab. XCIV - Volhynia sites]. In the classic complexes of the Rzeszów phase [Kadrow 1988: Fig.2:4, 8 - sites in Rzeszów] these decorations take the form of the so-called suspended triangles or grape clusters which are characteristic primarily of the Tiszaug group of the Tiszapolgár culture in its B phase [Bognár-Kutzián 1972:176-178, Fig.20:5, 8, Tab. LXXIII]. Quite occasionally this type of decorations is encountered on vessels from the classic phase of the Lublin-Volhynia culture [Zakościelna 1981: Fig.6, 7 - Wawolnica; 1982: Fig.5 - Las Stocki]. In later complexes of this culture this type of decorations is even less frequent. It occurs as quite large, round, shallow dents forming triangles. Sometimes such dents accompany handles which are raised above the lip edge [Kadrow 1992: Fig.7c, 8 - Kosina; Kadrow, Kłosińska 1989: Fig.5a, 8f, g, 9g - Łańcut]. In Bronocice, at a settlement dated to the decline of the Lublin-Volhynia culture, decorations in the form of horizontal lines made with a "point-like" die experience a renaissance [Kruk, Milisauskas 1985: Fig.22a1, 23].

The type of decorations analyzed here was also recorded in the late Baden of the Carpathian Basin [Novotný 1958: Fig.XLVI:3-5 - Nitransky Hrádok; XLVII:4 - Hurbanowo; Kalicz 1963: Fig.VI:5 - Center; Roman, Nemeti 1978: Fig.3:6-11, 14, 15, 20 - Arad "Gai"; 17:4-6; 18:1, 2 - Berea; 46:1, 3-5 - Salacea "Dealul Vida"] and of Małopolska [Kozłowski 1966: Fig.IV:37; 10:h, k, l, - Witkowice II; Godłowska 1968:

Fig.III:5; IV:13; XIII:5, 12 - Kraków-Nowa Huta-Zesławice] and in the Kostolac [Milojcić 1953: Fig.10:1 - Bubanj; Tasić 1979b: Fig.XXV:3 - Gomolava; XXVIa:6, 8, 10 - Pivnica kod Odžalca] and Cotofeni [Roman 1976: Fig.60:6 - Locusteni; 79:4 - Herculane "Peştera Hoților"] cultures.

Decorations of this type are encountered at cemeteries in Krasny Khutor (graves 74, 78), Chernin (graves 45, 64) and Sofievka (graves 4A, 26, 44).

f. Belly decorations, mainly on shoulders, in the form of "points", "bars" or "line sections". Dome-like bumps [e.g. Ścibior 1993: Tab. VII:5; XII:7, 15], as well as conical, elongated, corrugated ones, etc. are observed on vessels of the Lublin-Volhynia culture and the whole Polgár circle.

This type of decorations was also recorded in the late Baden of the Carpathian Basin [Novotný 1958: Fig.XLIX:1 - Želna-Drevenik; Roman, Nemeti 1978: Fig.4:7] and of Małopolska [Kozłowski 1966: Fig.IV:2; Godłowska 1968: Fig.II:13; XIII:5, 12; XXVII:3 - Kraków-Nowa Huta-Zesławice] and in the Kostolac [Tasić 1979b: Fig.XXV:5 - Gomolava; XXVI:7-10 - Karlovci] and Coţofeni [Roman 1976: Fig.47:14-29; 48:1-14; 80:2] cultures. An unsual abundance of this type of decorations was recorded at the sites of the last-mentioned culture.

Such bumps appear at the cemetery in Sofievka (graves 3, 32, 37, 100 and from the surface), Chernin (graves 32, 45, 64, 66), Krasny Khutor (graves 4, 8, 15, 16, 17, 26, 29, 53, 61, 78).

All the above-mentioned elements (a-f) occur quite frequently at a settlement in Cernavoda of the Cernavoda II culture [Berciu, Morintz, Roman 1973].

Besides the above-mentioned features, lids could be counted - with certain reservations - among Polgár elements (Krasny Khutor - graves 101, 116; Sofievka - grave 32) since they are very typical of the Carpathian Basin [Bognár-Kutzián 1972:133-134; 1963:Tab. CXXIIB]. The same can be thought of vessels resembling "canula" (Sofievka - graves 17, 26, 44, 95; Chernin - graves 19, 48) which are so very characteristic of the Bodrogkeresztúr culture. Polgár analogies are displayed also by pot-shaped vessels of group I according to Kruk and Milisauskas [1985: Fig.23] known from cemeteries in Sofievka (graves 3, 15, 32, 87, 94), Chernin (graves 33, 34), Krasny Khutor (graves 6, 15, 23, 41, 42, 74). In the Lublin-Volhynia culture, vessels shaped like a half-barrel are popular. Single specimens of such vessels were found in Zavalovka (grave 1) and Chernin (grave 48).

2. The examples quoted above prove the obvious ties of Sofievka type sites with the circle of "Balkan-Carpathian" cultures. First and foremost, with late Polgár cultures of the Hunyadihalom-Lažňany horizon or/also with the cultures of the late Baden-Kostolac-Coţofeni II/III-Cernavoda II horizon. The doubt admitted to here arises from the assessment of "Balkan" ties of the Tripolye culture. Having grown from the Balkan cultural environment it was almost throughout its development the environment's Northern Pontic outpost. Therefore, it can be assumed that despite growing autonomy of development, particularly noticeable in phase C, south-western contacts fostered by various mechanisms were continued, albeit to a

different, generally decreasing, degree. This is evidenced by the stylistics of Tripolye pottery. Therefore, it can be assumed that the "Balkan-Carpathian" set of features recorded at Sofievka type cemeteries is a "conglomeration" of: (a) recessive forms of late Polgár designs, borrowed in the transition period between phases B and C, and (b) more recent impulses from the circle of the Baden-Kostolac-Cotofeni II/III-Cernavoda II cultures. The proportions in which both traditions should be viewed are temporarily difficult to determine. It is a result of the current state of research into the North Balkan and Central European contacts of the Tripolye culture and of methodological barriers in such research.

a. The absence of grooved or painted ornaments in the above-mentioned materials or of *"scheibenförmige*" handles, typical of the Carpathian Basin of the Hunyadihalom-Lažňany horizon, draws attention to the late complexes of the Lublin-Volhynia culture in Małopolska. It seems that the greatest number of elements in common with the Dnieper sites have sites of the Lublin-Volhynia culture in the vicinity of Rzeszów (Łańcut, site 10 and Kosina, site 35). However, one should first and foremost mention Bronocice where almost all the elements listed above in the context of Sofievka materials as typical of the Polgár circle are present. Uneven and selective saturation of the Dnieper sites with Polgár elements points to the complex nature of their reception. Similarly as in the case of eastern influence on the eneolithic cultures of the Carpathian Basin [Ecsedy 1979:11-13, 47-58] one has to take into account various forms of inter-cultural contacts. These include penetration by single individuals or mainly by small groups as well as multifaceted, long-lasting and functionally complex ties.

Stressing the crucial role of the Lublin-Volhynia culture in its late phase in these interactions, one should not forget their "deeper" background i.e. earlier, not necessarily direct, contacts with the environment of the Tiszapolgár culture. Polgár inspirations in the development of groups of the Tripolye culture have been reported already many times. In case of the Gorodsk-Troyanov or Brynzeny type materials Tiszapolgár imports (settlements Brynzeny-Tsyganka and Kosteshty) and stylistic borrowings [settlement Troyanov and others; cf. Titov, Markevich 1974] were recorded. Clear Tiszapolgár influence was identified in the eastern part of the Tripolye culture. It was even assigned the function of one of the generators of this group [Tsvek 1985; 1989]. The said impulse would be noticeable in this case already at stage B of the Tripolye culture (4200-4000 BC) in numerous imitations of Tiszapolgár pottery. The groups of eastern borderland of the Tripolye culture, located between the rivers Southern Bug and Dnieper, formed a genetic substratum for the agglomeration around Kiev [cf. Kruts 1994:10 and older literature quoted there]. They were at the same time an intermediate link in the process of transmitting here Tiszapolgár impulses.

The period of influence of the late Lublin-Volhynia culture is contemporaneous with the Hunyadihalom-Lažňany horizon, which is synchronized with the late phase of the Bodrogkeresztúr culture [Bognár-Kutzián 1969:40-42] and the beginnings of the Baden culture. Alternatively, it is placed in a separate, narrow time horizon

between the decline of the former and the beginning of the latter culture [Pavúk, Šiška 1980: 139, 147-148]. This corresponds approximately to the years 3650-3550 BC. Both the direction of transmission and its chronology clearly isolate this stage of "polgarization" of the Tripolye culture from the traditional framework of "Balkan" references of the said culture i.e. from the period of phases A-B. The latter period was dominated by references to the basins of the Tisza and Danube.

Besides pottery the range of ties between the late Tripolye and Polgár cultures is also documented by other sources coming from Sofievka cemeteries. Among them are knives [cf. Šiška 1972:140-143 and in this volume: Klochko, Kośko, Weapons..., Klochko, Copper...]. It must be also emphasized that Tripolye features are identified in late Polgár materials like small triangular flint arrowheads in the Bodrogke-resztúr culture [Kaczanowska 1980:39] or the frequent use of troughlike retouching in the Lublin-Volhynia culture [Kadrow 1989:27].

b. The aggregate of quoted references defined as younger ones focuses our attention at the basin of the Tisza, the areas on the Danube at the mouths of the Drava and Sava rivers and at its lower course. It was there that the Baden culture developed in its late phase [Dimitrijević 1979], namely Baden IV [acc. to Němejcová-Pavúková 1981] or Baden IIb [acc. to Sochacki 1980]. Other cultures that developed in the same area are Kostolac [Tasić 1979a] and Cotofeni, phases II and III [acc. to Roman 1976; 1977; Tasić 1979b] - Fig.3. The absolute chronology of this period extends from 3000 to 2600 BC [cf. also Breuning 1987: Fig.22, 23]. On the scale of contacts of the Tripolye culture with the Balkan-Carpathian environments outlined above this stage would mean a return to the "sources of inspiration" from the times of the Tiszapolgár culture.

In the cultural environment of the Carpathian Basin it is yet another period of the exposure of steppe and eastern European influences, in this specific case of the Yamnaya culture (Pit-Grave culture), Fig.4. This is related to the migration of a part ot its western branch [cf. Shaposhnikova 1985] towards the interior of the Basin. According to I. Ecsedy [1979:56]: "the spreading of the majority of pit-grave kurgans must have occurred in the period directly preceding Cotofeni and its early phase, and it must have been afterwards that closer connections with local populations began to establish (Cotofeni, Foltesti, and Protoglina)". After about 3100 BC the Yamnaya culture develops an extensive zone of multidirectional transmission of cultural patterns of the Baltic-Pontic dimension [cf. Kośko 1991:244-250]. Cultural patterns were transmitted not only in the western direction [e.g. Gimbutas 1986; 1991:384-387; cf. also Fig.4]. Due to the mechanism of contact strengthening certain fringe elements of certain cultures reached the Dnieper. These cultures included Baden IV-Kostolac-Cotofeni II/III-Cernavoda II. At the same time the Yamnaya culture appeared there. The problem of the assumed "reverse current" has not been analyzed yet. Sources supporting it have not been catalogued, either [cf. Potushnyak 1985: 301-305]. Thus it is difficult to present a more substantive version of the hypothesis.



Fig. 3. Contact zone of the Baden, Kostolac and Cotofeni cultures in the period immediately preceding the hypothetic transmission of this circle's features in the direction of the middle Dnieper. Following Z. Sochacki with modifications and additions by the authors. Legend: a - the range of closed Baden culture settlement; b - the maximum eastern range of dispersed Baden culture settlement; c - directions of permeation of dispersed Baden culture elements in to the range of Cotofeni culture; d - directions of influence of Cotofeni culture on Baden culture; e - the northern range of intensive influence of the Kostolac culture on the Baden culture; f - directions of the farthest range of influence of the Kostolac culture on the Baden culture; g - the principal direction of influence of Anatolia on the Baden culture.

C. The set of features that are classified as "circumbaltic" includes relatively few decorative elements. These are: (a) a belly motif of an incised zigzag - xB-18 [cf. Kośko 1981] (Fig.5:1), (b) an analogous motif of a "bird's feather" - xH-96 (Fig.5:2) and (c) mainly under-edge motifs of a "hole" - /x/S-... (Fig.5:3). The widest as-



Fig. 4. Cultural context of the occidental migration of the Yamnaya culture following M. Gimbutas with additions by the authors. Legend: a - Yamnaya culture; b - Balkan and Central European cultures under the influence of the Yamnaya culture,; c - influence of the Yamnaya culture (#2 Kurgan Wave); d - Tripolye culture area (x - Sofievka type)


Fig. 5. Exogenous, circumbaltic features of the sepulchral pottery of the Sofievka type.

sortment of the above-mentioned elements was found at the cemetery in Krasny Khutor (features a, b) and at locations in Chernin and Sofievka (c).

The above-named features very frequently occur in cultures genetically related to the sphere of the Central European Lowlands (Funnel Beaker culture, Globular Amphora culture). It must have been from there that they were adapted (features a, b) into the Dnieper-Donets culture [Dolukhanov, Tretyakov 1979]. According to the cited authors, the Funnel Beaker culture exerted about 3700 - 3150 BC "a great influence on the neolithic cultures located in the western part of the Russian Lowland". The reception of its features is a mark of the "late stage" of the Dnieper-Donets culture. According to V.F.Isavenko this process should be tied to sub-period IIB of the Pripets neolithic in Polesie by dating it somewhat after 3150 BC [Isayenko 1976:115]. Thus it is difficult to identify the direct sources of the stylistic innovations in the Tripolye culture. This opinion is supported by the fact of chronological placement of the Sofievka type cemeteries in the period when the impact of "forest" - East European communities on the "loess" cultural environments (from 3700/3600 and specifically from 3150 BC) was particularly strong. The impact is visible both in the area of the upper Vistula [cf. Kruk, Milisauskas 1985: Tab. VII] and on the middle Dnieper [Kruts 1977:147].

Besides pottery the ties between late Tripolyan and "circumbaltic" cultures are documented by the stone axes of the Sofievka type, hammers [cf. Klochko, Kośko, Weapons...] and amber beads (Krasny Khutor, graves 8, 53, 170; Zavalovka, grave 1) [cf. Videiko, Archaeological..., in this volume].

As far as the detailed cultural and chronological identification of better known taxons of the Polish Lowlands is concerned, it must be said that out of three features referred to above as "northern" only the first two can be classified with any greater detail. In both cases of "zigzag" and "bird's feather" it is possible to relate to the periodization schedule of the Funnel Beaker and Globular Amphora cultures.

a. The motif of an incised zigzag located on the belly appears on the Polish Lowlands not earlier than 3650 BC. What is specifically meant here are materials of the Funnel Beaker culture of the Kuiavia IIIB phase [Kośko 1981:47] and less chronologically certain phase I of the Globular Amphora culture [Szmyt 1996]. The same motif appearing under the edge is dated a little earlier at about 3850 BC. It must be observed, however, that the incision technique combined with a zigzag is not a frequent design in the area in question, at least not in phase IIIB of the Funnel Beaker culture. These conclusions are not contradicted by observations from other areas of Central Europe bordering on the eastern part of the continent. It is impossible to make these conclusions any more specific on the basis of data from the "forest" - Eastern European zone.

b. The so-called "bird's feather" is a stylistic marker of the Globular Amphora culture. This motif appears already in the oldest complexes of sources of this culture coming from phase I [Szmyt 1996] dated at circa 3850 - 3500 BC. It is characteristic that only very slowly did it permeate other non-amphora environments, e.g. it reached the Funnel Beaker culture only in the Kuiavia phase V [after 3150 BC -Kośko 1981:47n.].

Little is known about the transmission of this feature to the region of Eastern European forest. It is known there from certain groups included in the complex of cultures characterized by comb-pierced pottery, e.g. "Listvin type" stylistics [authors' observations]. The position of these groups is not precisely determined.

More informative for our discussion is the radiocarbon review of the beginnings of the Volhynia-Dnieper penetration route of the Globular Amphora culture and of the lower limit of the Sofievka type. Such a review justifies a relatively close synchronization of the two phenomena at the period from 3000 to 2950 BC. In this light it is admissible to perceive the Globular Amphora culture as the main (single?) medium of the "circumbaltic" complex of features.

Keeping in mind the above remarks it must be said that both stylistic elements reveal a certain horizon of contacts of the Dnieper communities with Central European environments, primarily from the Lowlands, at the threshold of the 3rd millennium BC, more precisely between 3000 and 2700/2650 BC.

* * *

The stylistic-genetic assessment of pottery presented here does not exhaust the subject of the topogenesis of the Sofievka variety of Black Sea neolithic. However, it is a meaningful contribution towards its explication. The main conclusions of the analyses can be formulated as follows:

- Sofievka pottery stylistics (specifically its sepulchral variety) cannot be treated

as a simple continuation of earlier links in the development of pottery of the Dnieper Tripolye culture (Lukashi type);

- the common feature of identified exogenous components is their occidentalism or ties with western borderlands of Tripolye, primarily with the basins of the Tisza and the Vistula rivers;
- the dominant "external tradition" is the "Balkan" component (southern) viewed as a "conglomeration" of traditions of such cultures as Tiszapolgár, Lublin-Volhynia (late phase), Baden IV, Kostolac, Coţofeni II/III, that is those that are located in the basins of the Tisza/lower Danube and to a lesser degree of the upper Vistula.
- far less clear is the influence of the circumbaltic zone (the north), the borderland between the catchment areas of the two seas, identified as a hypothetic component of the Globular Amphora culture.

These conclusions correspond to the topogenesis of other innovations in the development of the Dnieper Tripolye culture observed in flintworking, stoneworking - weaponry or in copper working [cf. in this volume: Budziszewski, Flint..., Klochko, Kośko, Weapons...and Klochko, Copper...].

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TECHNOLOGY OF THE SOFIEVKA TYPE POTTERY. PRELIMINARY REPORT ON PHYSICO-CHEMICAL EXAMINATIONS

This paper presents preliminary results of physical and chemical analysis of thirteen pottery fragments. These samples contain four fragments from a settlement and five fragments from a cemetery site (Sofievka type), as well as four potsherds belonging to the Matwy group of Funnel Beaker culture.

The study was intended to give an answer to the questions of technological contrast between settlement and cemetery potsherds (Sofievka type) as well as to the relation between ceramics of the Sofievka type and the Matwy group.

As a result of macroscopic analyses of technology of pottery connected with the Sofievka type a hypothesis was framed concerning the existence in its manufacture of two recipes: sepulchral and settlement [Kruts 1977:122]. The vessels found in graves would have a different pottery mass, to be more exact, together with the admixture of crushed shells there were also found organic fragments and ochre (which gave the vessels a characteristic red colour) and they also differ by their thin walls and "fragility". Taking into consideration the fact that similar observations were made on eneolithic cremation burial grounds from Moravia and Silesia [Medunová-Benešová 1967:374; Bukowska-Gedigowa 1975:15], the authors thought it useful to submit this, supposedly more extensive, "regularity" to physico-chemical verification.

This project was enlarged by submitting the "Sofievka" pottery to comparative analysis with the pottery connected with the so called Mątwy component (with the admixture of crushed shells, decorated with band-comb motives) of the Funnel Beaker culture, from Kuiavia (Inowrocław-Mątwy, Bydgoszcz voivodeship, site 5) whose origin is identified with the North Pontic environment [Kośko 1981:97-122] documents a weighty direction of the late Tripolye (phase C) contacts.

In order to answer these questions the following analyses were be done: colour analysis before and after refiring, X-ray diffraction, TG, DTG and DTA analysis, analysis of ceramic properties before and after refiring (apparent density, open porosity and water absorption), chemical analysis by XRF and microscopic studies of thin sections. Only colour analysis could be made of all thirteen ceramic fragments. This situation has made it difficult to find reasonable answer for all questions mentioned above (the authors hope to continue the research).

1. METHODS

1.1. COLOUR ANALYSIS

Determination of colour of cutting plane of ceramic fragments was done both before and after refiring in a laboratory chamber furnace. Refiring was done with the following parameters: atmosphere -air, heating rate - 200°C/h, soaking time at the peak temperature -1h. The slices for colour analysis were cut perpendicularly to the vessel axis. The colours were identified according to the shade guide edited by the Federation Europeenne Des Fabricants de carreaux Ceramiques C.E.C..

1.2. X-RAY DIFFRACTION

Analysis was carried out with a DRON 1.0 X-ray diffractometer, and was performed with the following parameters: radiation -Co K α conditions of Co lamp's work - U=34kV, I=20mA; form of work - step 0.04° 2 θ ; radiation range - 1.5-70° 2 θ . The samples for measurement were grounded to a fine powder and sedimentated from water suspension on the thin glass plates. This kind of treatment was performed for five samples.

1.3. TG, DTG AND DTA ANALYSIS

Samples for measurement were milled in an agate mortar and passed through a 120-mesh sieve. Analysis was performed for air-dried samples. Examination was carried out with a Derivatograph-Q-1500D thermoanalyser with the following parameters: samples were heated to 1000°C; heating rate - 10°C/min; paper feed -2mm/min; atmosphere - air, static; reference material - α Al₂O-3, crucible - platinum; sensitivity - TG 200mg, DTG 500uV, DTA 250uV. This analysis was made for eight samples.

1.4. CERAMIC PROPERTIES (APPARENT DENSITY, OPEN POROSITY AND WATER ABSORPTION) ANALYSIS

Ceramic properties were analyzed both before and after refiring. Samples cut out of the potsherds were refired in a laboratory chamber furnace. Refiring was done with following parameters: atmosphere - air, heating rate - 200°C/h, soaking time at the peak temperature - 1h. Ceramic properties were examined using the hydrostatic weighing method. Eleven samples were analyzed.

1.5. CHEMICAL ANALYSIS

Analyses of six samples were made in the laboratory of the Arbeitsgruppe Archaometrie FU Berlin by WD-XRF (Dr.Gerwulf Schneider). It was performed of ignited samples. Loss of ignition was estimated after refiring in air at temperature 900°C (heating rate 200°C/h, soaking time at the peak temperature 1h).

1.6. MICROSCOPIC STUDIES OF THIN SECTIONS

Thin sections were prepared from the samples by the following method: a thin slice was cut from each sherds with a diamond-edged cutting wheel. One face of the slice was ground on a series of glass plates to a fine finish using 200-1000 grade carborundum powders. The slice was then mounted on a microscope slide and ground down to a thickness of ca 30um using various grades of carborundum powder (the lapping down was finished using 1200 grade carborundum). The cut sample was attached to the microscope slide as well as to the covering microscope glass was supported by means of Canada Balsam glue. All sections were examined on a Carl Zeiss Jena polarizing Amplival type microscope, equipped with a stepping stage. Estimations were made of the percentages of different clastic materials using (Eltinor type) integration stage (point-counting method). Granulometric analysis was made area-counting method. Thin sections of five samples were studied under polarizing microscope.

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2. RESULTS

2.1. COLOUR ANALYSIS BEFORE AND AFTER REFIRING

Colour analysis was made at first. Colour of samples before and after refiring at temperatures range from 600 to 1100°C was shown in Table 1. This analysis was carried out to resolve the problem of similarity of raw material as well as to estimate original firing temperature approximately. Results are shown in Table 1.

Tab∣e 1

Colour analysis data

Sample	Site	Colour	Temperature [^o C]					
number		before	600	700	800	900	1000	1100
		refiring		Colou	r after reti	ring		
1	Bortniche	A11/D11/F10	F10/D11/F10	D11/F10	F10	F10	F10	G12
2	Korarovche	A10	F10	F10	F9	F10	G10	G12
3	Evminka	E11\A10	F9	F9	F9	F9	F9	G11
4	Zazimye	D11/A12	D11	D11	D11	D12	D12	A9:C9
5	Zavalovka	E9/E9:A9\A9/E9	E9	E9	F8	F8	F8	F9
6	Krasny Khutor	A9:C9	D8	D8	D8	F7	E8	F8
7	Sofievka	A10:F10\F10:A10	F10	F10	F10	F10	F10	E10
8	Chernin	D8/A11\A10/F8	F8/ D 8	F9/D8	F9/D8	F9	F9	G12
9	Chernin	F8/A11\A10/F8	D8:A8/F9	F9/D8/F9	F9/D8/F9	F9	F9	G12
10	Mątwy	A10\A11	D10	D10	D11	F9	F11	F12
11	Mątwy	A10/A9/A12	C9	D9	D9	F8	F9	F12
12	Mątwy	A9	E7	F7	E8	F9	F9	F12
13	Mątwy	A11	A5\B5	A5\C5	D5	D7	E9	E10



a - the reaction of refiring at temperature 1100° C allowed to divide the samples into the so called "raw material" groups according to the colours of the clay matrix and to the vitrification stage of sample. On the basis of these analyses, samples were divided into six groups as following:

- G, sample No.1, 2, 3, 8 and 9
- A:C only sample No.4
- F,1, sample No.5 and 6
- F,2, sample No.10, 11 and 12
- E,1, sample No.7
- E,2, sample No.13

b - it is assumed that pottery made of the same $body^1$ and fired in the same conditions should change their colour in a similar manner with rising firing temperature. If a sample originally fired at a certain temperature is fired once again, then, if the original firing temperature is exceeded, the colour of the sample should change. If, however, the original firing temperature is higher than the temperature of refiring there will be no change in the sample's colour. This relation can be noticed only if the firing conditions of the original firing and refiring are the same, i.e. the soaking time at the peak temperature, the heating rate and particularly the gas atmosphere inside the kiln.

If investigated samples were not originally fired in air atmosphere changes in colour which can be observed after refiring at temperature of 600°C are not connected with exceeding of original firing temperature but with burned of unburned carbonized organic substance or changes in oxidation stage of iron.

On the basis of colour analysis original firing temperature can be estimated (approximately, only macroscopic examination) and together with results of another analysis gave information about the probable original firing temperature range.

2.2. X-RAY DIFFRACTION

X-ray diffraction, first of all, was conducted to check if the investigated samples contain clay minerals or not. The absence of clay minerals could suggest that during original firing the temperature of their decomposition was exceeded. The presence of clay minerals could help to speak about the type of raw material used. Another problem is the possible presence of aluminium silicates and calcium silicates phases. If their presence in examined, samples would be confirmed, it will be possible to draw conclusions concerning the original firing temperature. It is however necessary to remember the influence of chemical composition of ceramic body on the temperature at which particular phases appear. The possible rehydration and rehydroxilation of clay materials, in the case when sample contains carbonates the possible recarbonization also should be taken into account. The results of X-ray diffraction are presented in Table 2.

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¹ It should be explained that the term body describes a raw material prepared through a speccial processes as for example weakening or washing (some times the raw material can also be used directly in production without any additional treatment).

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Table 2

Sample number	Phases	Intensivity
1	quartz alkali feldspars hematite maghemite? smectite	major compound trace compound trace compound
3	quartz hematite smectite monohydrocalcite?	major compound trace compound trace compound
4	quartz calcite smectite monohydrocalcite?	trace compound
10	quartz plagioclase alkali feldspars smectite sepiolite? illite or micas	major compound trace compound trace compound
13	quartz calcite plagioclase illite	trace compound trace compound

2.3. TG, DTG AND DTA ANALYSIS

This analysis was carried out to check if the analyzed samples show effects of dehydration and dehydroxylation of clay minerals, decomposition of carbonates, burning of organic substance and growing of new phases. The results of TG analysis are shown in Table 3.

ТG	ana	ysis	data
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	Sample number									
1	Bortniche	T[⁰ C] dm/m	20-240 12,11%		240-600 6,97%		600-700 0,26%	700-900 0,21%	900-1000 0,06%	20-1000 19,61%
3	Evminka	T[⁰ C] dm/m	20-255 11,11%		255-600 5,86%		600-750 0,41%	750-900 0,09%	900-1000 0,09%	20-1000 17,56%
4	Zazimye	T[⁰ C] dm/m	20-255 5,02%		255-600 3,98%		600-700 0,39%	700-910 8,10%	910-1000 0,07%	20-1000 17,56%
6	Kr. Khutor	T[⁰ C] dm/m	20-225 9,02	225-400 3,94		400-570 2,4	570-700 0,48	700-900 0,19	900-1000 0,29	20-1000 16,32
7	Sofievka	T[⁰ C] dm/m	20-200 12,9	220-345 4,22		345-600 4,48	600-700 0,32	700-900 0,35	900-1000 0,13	20-1000 22,4
9	Chernin	T[⁰ C] dm/m	20-255 13,12	255-360 2,88		360-580 3,36	580-700 0,32	700-900 0,16	900-1000 0,16	20-1000 20
10	Mątwy-5	T[⁰ C] dm/m	20-225 7,71%		225-600 4,72%		600-740 0,43%	740-900 0,25%	900-1000 0,03%	20-1000 10,14%
13	Mątwy-5	T[⁰ C] dm/m	20-235 3,07%		235-600 3,11%		600-685 0,53%	685-905 11,65%	905-1000 0,26%	20-1000 18,62%

All samples belonging to the cemetery ceramic group have two effects of loss of mass in the temperature range of ca 200-600°C correspond with wide exotherm with several maxima. These effects are not observed in the rest of the samples. Only for two samples thermal decomposition of calcite can be observed (sample No.4 and 13).

Gain in weight connected with the oxidation of Fe_{2+} to Fe_{3+} was not observed.

2.4. ANALYSIS OF CERAMIC PROPERTIES BEFORE AND AFTER REFIRING (APPARENT DENSITY, OPEN POROSITY AND WATER ABSORPTION)

This kind of analysis, first of all, was made to determine the original firing temperature. While during refiring the original firing temperature is increased, in the first, there are changes in the pore structure and after them changes of the open porosity and, therefore, of the apparent density and water absorption are observed. Results of analysis of ceramic properties are presented in Table 4.

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Tab	lе	4
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Ceramic properties analysis (apparent density – g/cm³, open porosity – %, water absorption – %) before and after refiring

Sample						Te	mperati	$re [^{o}C$					
number		20	400	600	700	750	800	850	900	950	1000	1050	1100
1	dv	1,42	1,49	1,48	1,47	1,43	1,46	1,53	1,51	1,53	1,52	1,53	1,57
	P	48,1	44,6	45,9	44,3	44,2	43	42,9	42,6	41,5	40,9	40,7	39,1
	N	34	29,8	31	30	30,9	29,4	28,3	28,2	27,2	26,9	26,7	24,8
2	dv	1,35	1,39	1,36	1,31	1,29	1,32	1,33	1,2	1,15	1,19	1,17	1,16
	P	50,3	49,1	49,8	48,3	49	48,6	47,4	43,7	50,9	55,6	55,7	57,3
	N	37,3	35,2	36,7	36,8	38	36,7	35,6	36,3	44,2	46,6	47,5	49,1
3	dv	1,28	1,29	1,29	1,27	1,27	1,29	1,32	1,33	1,34	1,35	1,37	1,36
	P	51,7	52,2	53,2	52,7	52,3	51,9	49,2	48,2	48,2	47,9	47,2	46,4
	N	40,3	40,4	41,2	41,5	41,1	40,3	37,4	26,3	35,9	35,4	34,5	34
4	dv	1,99	1,99	1,91	1,85	1,72	1,68	1,68	1,46	1,42	1,39	1,37	1,37
	P	23,6	24	27,1	28,6	32,5	33,2	32,9	36,3	39,4	42,1	43,9	44,3
	N	11,9	12,1	14,2	15,5	18,9	19,8	19,7	24,9	27,7	30,3	32,1	32,4
5	dv	1,19	1,2	1,2	1,19	1,15	1,18	1,19	1,19	1,16	1,21	1,21	1,24
	P	55,6	55,5	56,2	55	56,9	56,3	56,2	56,6	57,7	56,6	56,1	56,6
	N	46,7	46	46,8	46,3	49,7	47,6	47	47,4	49,9	46,9	46,2	45,7
6	dv	1,3	1,33	1,31	1,31	1,28	1,3	1,31	1,32	1,31	1,33	1,35	1,37
	P	51,3	50,6	51,4	50,1	51,9	50,7	50,7	50	51,2	50	49,4	50,1
	N	39,6	37,9	39,2	38,2	40,8	39	38,6	37,9	39,1	37,5	36,6	36,6
7	dv	1,37	1,45	1,44	1,42	1,57	1,51	1,42	1,4	1,43	1,45	1,45	1,47
	P	47,6	45,3	46,9	46,2	47,1	41,3	44,2	44,4	45,8	44,7	44,6	45,1
	N	34,7	31,2	32,7	32,4	33,3	27,4	31,1	31,7	31,9	30,7	30,7	30,7
10	dv	1,81	1,8	1,78	1,77	1,77	1,76	1,77	1,78	1,92	1,97	2,04	2,2
	P	30,7	31,1	32,2	32,3	33	31,9	31,7	30,5	25,2	22,6	17,9	8,4
	N	16,9	17,3	18,1	18,2	18,7	18,1	17,9	17,2	13,1	11,5	8,8	3,8
11	dv	1,82	1,78	1,74	1,73	1,69	1,67	1,69	1,71	1,7	1,71	1,7	1,82
	P	30,7	32,8	34,2	34,2	36,3	35,4	35,7	34,1	34,5	33,9	34	30,1
	N	16,9	18,4	19,6	19,7	21,4	21,1	21,1	20	20,2	19,8	20	16,5
12	dv P N	1,74 33,1 19	1,74 34,4 19,8	1,71 35,3 20,7	1,67 36,3 21,7	1,56 39,6 25,4	1,53 39 25,5	1,52 39 25,6	1,59 33,4 21	1,57 33,7 21,4	1,5 35,7 23,8		
13	dv	1,76	1,75	1,71	1,61	1,67	1,51	1,48	1,46	1,43	1,41	1,39	1,37
	P	33,6	34	35,4	38,7	38,9	39,8	41,6	41,4	43,1	44,3	44,1	46,8
	N	19	19,5	20,7	23,9	24,8	26,4	28,2	28,6	30,1	31,1	31,7	34,1

Results of chemical analysis give information on major and trace elements of the samples investigated. These elements are connected with the ceramic body, the clay matrix as well as the clastic admixtures. The results of this analysis sometimes is influenced by secondary effects from burial. Results of this analysis are presented in Table 5.

Table 5.

Chemical analysis. Analyses were made in the laboratory of the Arbeitsgruppe Archaometrie FU Berlin by WD-XRF (Dr.Gerwulf Schneider). Analysis of ignited samples, major elements in percent by weight, normalized to a constant sum of 100%. the original total is given in the column "Total", loss of ignition at 900°C is given in column "LOI", traces are in ppm, elements in brackets are determined with lower precision

A. major elements

Sample	SiO ₂	TiO ₂	Al_2O_3	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P_2O_5	(S)	(CI)	LOI	Total
number		% by weight											[%]	
1	51,14	0,96	23,60	16,01	0,050	0,21	2,32	0,07	0,30	5,34	0,02	0,01	19,55	99,71
3	64,37	1,18	18,59	7,30	0,032	0,28	2,40	0,04	0,11	5,65	0,00	0,00	12,20	98,57
4	61,30	0,81	14,30	4,64	0,043	0,29	17,18	0,22	0,54	0,68	0,04	0,01	17,40	100,40
7	58,66	1,14	26,41	12,43	0,042	0,17	0,40	0,03	0,11	0,60	0,02	0,00	12,68	100,84
10	62,88	0,85	17,45	7,72	0,085	2,23	2,78	0,65	3,78	1,58	0,00	0,01	10,11	99,57
12	50,53	0,68	17,42	4,90	0,054	1,44	21,41	0,22	1,94	1,41	0,04	0,00	17,39	99,66

B. traces elements

Sample	V	Cr	Ni	(Cu)	Zn	Rb	Sr	(Y)	Zr	(Nb)	Ba	(La)	(Ce)	(Pb)	(Th)
number		ppm													
1	220	174	40	24	43	13	228	17	188	22	1972	7	31	42	27
3	149	112	44	31	111	20	205	25	227	19	1690	10	44	18	22
4	97	90	19	5	26	26	232	16	181	17	1150	9	38	19	15
7	254	181	47	22	28	17	24	16	238	19	217	9	31	22	22
10	114	116	44	21	112	150	211	35	203	17	1542	42	82	23	24
12	142	114	52	28	108	107	299	32	117	9	1223	60	125	23	18

It is clear that from only six analyses very preliminary interpretations can be made. Due to the variation of composition within one group of pottery, comparisons must be made on a statistical basis which needs at least about twenty samples for one group to be compared with another group of a similar size. Anyhow, some observations are clear. All samples from Ukraine are made from a clay extraordinary low in sodium and potassium and thus very different from the samples from Matwy. One of the three samples from the settlement has a high content of calcium which is explained by a different temper consisting of calcite. This sample has also a lower iron content connected with lower contents of titanium, vanadium, chromium and nickel. This may indicate a different clay source within the same area. Because of the large variation within the four samples from Ukraine nothing can be said about the difference between the samples from the settlement and the one from the cemetery. The high phosphorus contents of two samples from the settlement, as usual connected with elevated barium and strontium contents, probably are secondary effects from burial. The large variations in iron may be another typical feature of the clays used in that area.

The two samples from Mątwy are clearly different in composition from all Ukrainian samples. The clay is lower in titanium and much higher in sodium, potassium and magnesium than the clay used at the Ukrainian site. One of the two samples form Mątwy is high in calcium due to a different temper.

2.6. MICROSCOPIC STUDIES OF THIN SECTIONS

Examination of thin sections under polarizing microscope was performed to speak about type of matrix and first of all to estimate clastic admixtures. It means type of minerals, their percentage, percentage of particular grain fractions as well as percentage of matrix and clastic material in sample's area. Results of these analysis give information about formula. The term formula describes the specific combination of matrix and clastic material which, for example, could depend on the function of vessels. On the basis of the same clay material ceramic bodies with the same matrix but with different clastic material can be formed (intentional admixtures of clastic material). The results of thin section analysis are shown in Table 6, 7, 8, 9, 9a and 10.

Table 6

	Matrix	Clastic material							
Sample			gr	ains diameter [mn	n]				
number		Total	[0,01-0,1]	(0,1-0,5]	> 0,5				
	% of area								
1	57,8	42,2	9,8	32,4	-				
3	62,5	37,5	2,7	27,4	7,4				
4	59,5	40,5	1,4	28,9	10,2				
10	68,6	31,4	12,9	18,5	-				
13	53,5	46,5	1,1	12,1	33,3				

Matrix and clastic material in particular fraction

	Clastic material								
Sample	grains diameter [mm]								
number	[0,01-0,1] [0,1-0,5] > 0,5								
	% of whole clastic material								
1	80	20	-						
3	73	25	2						
4	57	57 40							
10	90	90 10 -							
13	71	25	4						

Granulometric analysis data

Tab∣e 8

Maximum grains diameter

	Clastic material							
Sample	grains diameter [mm]							
number	[0,01-0,1]	[0,1-0,5]	> 0,5					
	maximum grains diameter [m]							
1	0,1	0,3	_					
3	0,1	0,5	0,6					
4	0,1	0,5	0,8					
10	0,1	0,15/0,4	-					
13	0,1	0,5	2,0					

Pseudomorphs after bioclasts² can be observed in sample No.4 and 13. These, however, seem not to be from the same origin. In sample No.1 and 3 the pores have the same shape like the bioclasts in sample 4. At the rims of some of these pores unidentified material (relics from bioclasts or contamination from burial ?) can be observed.

Samples from Mątwy ceramic group are different from the rest (Sofievka type), but are not similar to each other. Sample No.10 is very decisively different, without any traces after bioclasts, is very well sorted (only several well rounded grains of quartz were added). In the next sample (sample No.13) admixtures of bioclasts are observed.

Unfortunately for the samples of cemetery ceramic group thin sections could not be made.

 $^{^2}$ The attribution of the clasts is not quite clear because of untypical shape. It could be also calcareous shale.

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Table 9

Planimetric analysis data

A - 10	00%	clastic	materi	ial
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Sample	Clastic material									
number	Q	PI	Af	Car	Bio	Mus	Px	Om	Rf	Bioc
	% of area									
1	66,7	-	1,3	0,6	-	-	-	16,0	-	15,4
3	78,6	-	-	-	-	-	1,6	6,3	2,4	11,1
4	51,8	1,2	-	-	1,2	-	-	22,3	-	23,5
10	78,2	-	1,0	3,0	-	2,0	2,0	9,9	3,9	-
13	55,7	3,8	3,3	6,3	-	1,0	_	7,6	1,0	21,4

B - 100% matrix and clastic material

Sample			Clastic material								
number	MATRIX	Q	PI	Af	Car	Bio	Mus	Px	Om	Rf	Bioc
	% of area										
1	57,8	28,1	-	0,5	0,3	-	-	-	6,8	-	6,5
3	62,5	29,5	-	-	-	-	-	0,6	2,4	0,9	4,2
4	59,5	21,0	0,5	-	-	0,5	-	-	9,0	-	9,5
10	68,6	24,6	-	0,3	0,9	-	0,6	0,6	3,1	1,2	-
13	53,5	25,9	1,8	1,5	2,9	-	0,5	-	3,5	0,5	10,0

Q – quartz

Car - carbonates

Px - pyroxenes

Bioc – pseudomorphs after bioclasts

PI – plagioclase Bio – biotite

Om – opaque minerals * – pores after bioclasts Af – alkali feldspars Mus – muscovite Rf – rocks fragments

Table 10

Results of thin section analysis

Sample	grains size [mm]								
number	[0,01-0,1]		[0,1-0,5]	> 0,5					
	type of clastic material								
1	Q Om Af Car	Por Q	Por						
3	Q Om	Q Om	Px Rf Por	Q Por					
4	Q Om B	Q Om	PI B Ps	Ps					
10	Q Om Af Mus Car Px	Rf Q Om	Af Mus Car Px Rf *						
13	Q Om Af PI Mus	Q Om	PI Car Rf Ps	Ps					

Q – quartz Om – opaque minerals Af alkali feldspars PI – plagioclase Mus – muscovite B – biotite Car – carbonates Px – pyroxenes Rf - rock fragments

Por - pores after bioclasts

Ps - pseudomorph after bioclasts

* - grains diameter up to 0,15 mm,

only well rounded quartz up to 0,4 mm

1. For all investigated samples the colour is due to unburned carbonized organic substance and only to a less extend to Fe_{2+} . Firing was done in a more or less reducing atmosphere connected with fumigation.

There are two groups connected with clearly(!) another type of substance responsible for fumigation. All samples of the cemetery pottery group belong to the one group, to the second one the rest of sample.

2. In the case of technological parameters samples were decidedly divided into three groups:

- sample No.4, the best parameters (lowest open porosity and water absorption)
- all samples belonging to the cemetery ceramic group (sample No.5, 6 and 7) and three samples belonging to the settlement ceramic group (sample No.1, 2 and 3)

- all samples belonging to the Mątwy ceramic group

3. In the case of original firing temperature samples were divided into the following groups:

- 600-700°C sample No.13 and 4
- 700-800°C sample No. 10, 12 and 1
- 800-900°C sample No.11, 2 and 3
- 900-950°C all samples of cemetery ceramic group

4. Pseudomorphs after bioclasts only can be are observed in samples originally fired in lower temperature than the samples with pores after bioclasts³.

5. Clearly differs the formula of sample No.10. In the rest of samples, Mątwy and settlement group, admixtures of bioclasts can be observed (cemetery ceramic group could not be studied). Samples Mątwy group are not of the same origin as the rest.

6. Samples were buried in other conditions, clearly another:

- two samples of cemetery ceramic group (sample No.1 and 3)
- samples Mątwy group
- samples No.7 (cemetery ceramic group) and 4 (settlement)

7. In chemical analysis two samples from Mątwy are clearly different in composition from all Ukrainian samples.

8. It is very important to continue these analysis and to make all kind of analysis for every type of ceramic group (and for more ceramic samples) to be sure that the described above results are representing particular groups.

³ It is the typical behavior for bioclasts during firing [see Daszkiewicz, Raabe, Jelitto 1996].

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WEAPONS FROM SOFIEVKA TYPE CEMETERIES

There are three categories of objects made of flint, stone, horn, and copper that can be unquestionably identified as weaponry, or rather as weaponry and signs of social position ("insignia"). These are: (a) small arrowheads (identified here as a symptom of the bow-arrow, or possibly arrows-quiver set), (b) axes and hammers, and (c) knives and daggers. The present paper will deal with their typological and genetic characteristics. It will also offer a preliminary interpretation of their socio-organizational function [cf. also genetic and raw material characteristics given in V.F. Petrougne, Petrographical... in this volume].

1. TYPOLOGICAL AND GENETIC IDENTIFICATION

Bow - arrowheads. Collection of flint arrowheads from the cemeteries includes 121 examples (Krasny Khutor - 48, Sofievka - 32, Chernin - 28, Zavalovka - 13). Most of them are triangular in plan, with a straight concave base (types 22111-22112 after Budziszewski) [cf. Budziszewski, Flint..., in this volume]. Another type has equilaterial triangular form (types 22121-22122 after Budziszewski). The third type - with barbs, is new for the Tripolye culture. Unique are the leaf-like arrowhead from Zavalovka and the leaf-like arrowhead with haft from Sofievka.

There are between 1 and 10 arrowheads in different graves [according to the interpretation of graves by Y.Zakharuk and others - cf. Videiko, Archaeological..., in this volume]. In one grave there are different types of flint arrowheads. Such is typical for Yamnaya and early Catacomb cultures of the Early Bronze Age. Later in the Catacomb and the Corded Ware cultures the number of arrowheads increased to 15-20 examples in one grave.

At Krasny Khutor cemetery, in grave 145 was recorded a hypothetical small copper arrowhead [cf. in this volume: Budziszewski, Flint...and Klochko, Copper...], an incidental form difficult to interpret genetically.

Axes - hammers. Collection of stone axes - hammers consits of 29 different examples found in Sofievka (15), Krasny Khutor (13) and Chernin (1) [cf. Videiko, Archaeological..., in this volume]. In this collection, three types, markedly different both in terms of form and origins, can be distinguished (1-2 - axes, 3 - hammer), Fig.1.

Type 1 - "Sofievka": with short proportions and separated blunt side (11 artefacts in Sofievka - graves 8, 12, 34, 44, 64, 111, 114-115-116 and from surface and 10 in Krasny Khutor - graves 12, 33, 84, 105, 118-119, 123, 127, 167 and from surface). Most of them display an imitation of the casting seam (Fig.1:2,3). One axe, from Krasny Khutor (grave 12), has a faceted body.

Type 2 - "Balkan": boat-like axes (2 in Sofievka, graves 19, 83 and 3 - in Krasny Khutor, grave 120 and from surface), Fig.1:4.

Type 3: hammer bean-like in plan (2 in Sofievka, grave 65 and 88), Fig.1:5.

This list can be supplemented with a single horn axe recorded in grave 80 in Chernin whose functional identification, however, is not clear.

Axe-hammers most vividly display extratripolyan traditions of "Sofievka" weaponry. This is especially visible in types 1 and 3.

Type 1. Sofievka type axes are the only form of a battle axe within the Tripolye culture that is absolutely peculiar to it. However, its range of occurrence is restricted to one regional group. Its typological definition [cf. preliminary formulation: Zakharuk 1952] needs specifying to guarantee a correct genetic analysis.

Taking into account the 13 best-preserved forms from among those recorded in "Sofievka" cemeteries, the morphological description of the type can be presented as follows: a pentagonal axe in horizontal projection, with a short (L1:L3 = 3.5 - 7.0, Fig.1:1) and wide (W1:W2 = 1.3 - 1.7) butt with a longitudinal "casting seam" along the back (75%) in the form of a ridge or rarely a "strip" (two cases); rectangular or slightly trapezoidal (isosceles trapezoid) in side view, with sometimes slightly marked asymmetry, a "droop", at the cutting edge (two cases) or the butt-end (one case). The main distinguishing feature of this type is undoubtedly the horizontal projection correlated with the symmetry of the side view. These two characteristics best set apart the forms in question from the rest of battle axes of the East European and Balkan-Central European provinces. This applies both to the proportions and to the presence of the "seam". These distinguishing characteristics are best visible in objects classified as subtype A. The others, classified as subtype B, show a greater susceptibility to extra-sofievkian analogies (description of the differentiation Fig.1:1).

There are two directions of topogenetic identification of type 1 "Sofievka": (a) a direct reference to metal Balkan prototypes, or (b) a tentative reference to the Central European tradition of stone battle axes.

a. It can be argued that axes of type 1 appear as imitations of the copper axes of the previous period. Axes of "Sofievka type" are similar to the copper axes - types



Fig. 1. Review of stone axe-hammer types from Sofievka type cemeteries. 1 - Description of metric identifiers of subtypes (A, B) of type 1 - "Sofievka" (a - forms with a "casting seam"; b - forms without a "casting seam"); 2, 3 - Type 1 - "Sofievka"; 4 - Type 2 - "Balkan"; 5 - Type 3 - hammer.

Szekely-Nadudvar, Handlova and Mezokerestes according to M. Novotná [Novotná 1970:23-24] of Bodrogkeresztúr culture. Axes from Sofievka are nearer to copper prototypes than axes of the Funnel Beaker culture [see types K-VII and K-VIII after M. Zápotocký, which have a flatter body: Zápotocký 1989]. However, a weak aspect of the above identification is a striking time and space discrepancy between "prototypes" and "emulations" i.e., "Sofievka" forms. It also must be mentioned that Polgár features identified in "Sofievka" materials are related to groups lacking any substantial tradition of using copper axes [cf. Kadrow, Kośko, Videiko, Pottery..., in this volume].

The hypothesis under discussion offers no guidelines for the assessment of the formation chronology of the Sofievka type.

b. On the scale of the main cycle of changes of Central European battle axes, set by the lowland groups of the Funnel Beaker and Corded Ware cultures, "Sofievka" forms should be placed at the point of contact between type X [fol. Jażdżewski 1936; cf. Herfert 1962 - *"die flachen Knaufhammeräxte"*] and Pan-European type A [fol. Glob - Struve; Struve 1955], Fig.2:1.2. An inclination towards the forms of the Funnel Beaker culture is validated by the overall similarity of proportions of the horizontal projection and the symmetry of the side view (as a positively dominant feature). It can be added that in type X of the Funnel Beaker culture *"casting seams"* are occasionally recorded [cf. Herfert 1962:1106 - *"Brandenburgischer Typ Variante mit Mittelrippe"*]. This, however, concerns areas very distant from the North Pontic region, located west of the Oder. The *"seam"* and rare cases of asymmetry in side view could suggest connections with type A of the Corded Ware culture.

Looking at the Sofievka type from the perspective of the borderland of the southeastern group of the Funnel Beaker culture and the southeastern borderland of the Corded Ware culture, which is also justified by their assessment in terms of origins and raw materials made by V.F. Petrougne [cf. Petrougne, Petrographical...], we notice certain analogies to its subtype 1B distinguished earlier [e.g., Gajewski 1953:161 - Stocki Las, grave V; Bronicki 1991:340 - type III:14, 18]. It also must be noticed that unfinished axe of type 1 was found by N.M. Shmagliy in the Tripolye village of Troyanov (Volhynia region). There were also found clay models of such axes [Arkheologiya 1971:Fig.54]. This type of axe may have been widespread in different late Tripolye monuments - at first of the Troyanov and Sofievka types. They also often occur in the southeastern group of the Funnel Beaker culture [cf. Bąbel 1980:19-23; Gumiński 1989:109-113]. It is hard to assess the genetic implications of this observation; whether it is a symptom of:

- a state of transformation leading to the formation of a "paragon form" (subtype 1A), or rather
- a state of disintegration of the said "form".

The indicated direction of search for the origins has certain chronological consequences. The time frame of the hypothetical contact (state of transformation) of type X of the Funnel Beaker culture with type A of the Corded Ware culture can be put at 3150 to 2900 BC at the earliest. However, a single analogy to the form "with



Fig. 2. Central European range of possible "prototypes" of stone axe-hammers from Sofievka type cemeteries - types 1 and 3. a - eastern limit of occurrence of type X axes, fol. K. Jażdżewski (dense hatching marks type X concentration zone); b - eastern limit of occurrence of type A and B-J axes, fol. K.H. Struve; c - Sofievka type cemeteries; d - examples of hammers of type 24.111, fol. A. Kośko, M. Zaorski. Following the above mentioned authors and J. Machnik.

cannelure" from Krasny Khutor could be taken as a valuable indicator of the upper watershed of usage. The form was recorded in the layer of the Yamnaya culture, in the village of Mikhailovka which is treated as parallel to Ezero IV, i.e., circa 2700 BC [2180 \pm 100 conv BC, Shaposhnikova 1985:340,351]. This is consistent with a relatively late ¹⁴C date for the said "Sofievka" site [2190 \pm 110 conv BC, cf. Kovalyukh, Videiko, Skripkin, Chronology, in this volume]. One should not forget, however, about the complex - ambiguous in cases of specific observations - stratigraphy of the Mikhailovka site [Lagodovska, Shaposhnikova, Makarevich 1962].

The above remarks do not exhaust the subject of the topogenesis of the axe form under discussion. Future studies of the subject ought to, in the first place, conduct a full inventory and typologically identify stone materials from the northwestern part of the Pontic Plateau. Such an inventory or cartogram should exclude "preforms" and give the actual range of the Sofievka type.

Type 2. The origin of type 2 is connected with the Balkans. Such axes appeared in the period Tripolye A [Zbenovich 1975].

Type 3. The origin of type 3 is not clear. Similar hammers were found in the Tripolye cemetery of Vykhvatincy - grave 16(9/52), and in the mound - group "Shakhta

Pavlogradskaya", mound 1, grave 7; group 1 v. Sokolovo, mound 6, grave 7 [Dergachev, Manzura 1991:230, Fig.9; Kovalova 1984:31, Fig.5]. In the times of Sofievka type cemeteries, hammers are not typical finds for North Pontic cultural centres. In contrast, a considerable concentration of these forms is found in the circle of Central European Corded Ware cultures or successive cultures of the Danubian Early Bronze Civilization. The hammer from Sofievka fits into the type described here as "loaf-like hammers, with the opening placed symmetrically and of a round-oval cross-section" [Kośko 1979:38-39; Zaorski 1989 - type 24, 111]. From the eastern part of the Baltic Sea catchment area (catchment areas of the Oder and Vistula Rivers), four examples of the type in question are known, none of which is precisely dated, however (Goczałków Górny, prov. of Wałbrzych, Zbąszyń, prov. of Zielona Góra, Skarbienice, prov. of Bydgoszcz, Sarniak, prov. of Chełm), Fig.2:3.

It seems highly probable that the origins of the hammer ought to be placed in a sphere spatially and culturally coinciding with the hypothetic originating area of type 1 "Sofievka" axes (Fig.2).

Summing up, it can be suggested that Central European cultural centres made a substantial contribution to the development of stone weaponry/insignia forms used in the Dnieper Tripolye culture. This opinion is supported by considerable evidence of the analysis of design of "Sofievka" pottery [cf. Kadrow, Kośko, Videiko, Pottery...] and presence of amber beads in graves (Krasny Khutor - graves 8, 53, 170 and Zavalovka - graves 1).

Knives and daggers. Copper and flint knives were found in Sofievka and Krasny Khutor, copper daggers in Krasny Khutor [see Klochko, Copper..., in this volume]. One dagger from Krasny Khutor was in a skin scabbard with a whetstone. A similar whetstone came from the Lažňany cemetery [Šiška 1964] and Mayaky cemetery [Patokova et al. 1989:62,Fig.23:7].

Copper forms of knives/daggers appear in the Tripolye culture (in Sofievka and Usatowo types) as "imports", or rather effects of external inspirations from the areas of the Carpathian Basin and Anatolia [cf. Klochko, Copper...]. Whereas flint forms can be taken as their local substitutes, or "replicas" [cf. Budziszewski, Flint...].

2. THE ISSUE OF SOCIAL STRATIFICATION

Weaponry includes a stone axe ("battle axe") - hammer, a bow with arrowheads, and a dagger or a knife (copper or flint). Copper daggers were rare and may have been used as particular markers of a social position.

There are various types of weapons in the Sofievka-type cemeteries, connected with various cultural traditions: Tripolye (triangular arrowheads), Carpathian (type

2 of stone axes, arrowheads - equilaterial and with barbs, and leaf-like knives), Central European (type 1 and 3 of stone axes - hammers), Mediterranean (copper daggers). This reveals the wide contacts and "international" character of the Sofievka population.

The large number of weapons in the cemeteries is unusual and may reflect a continual war related to the conquest of the left bank of the Dnieper by the Tripolye populations.

These "political relations" must have had social consequences. At the decline of the Tripolye culture, we find clear manifestations of social stratification on the middle Dnieper, namely the emergence of the stratum of chieftains. This is expressly evidenced by sepulchres that are particularly abundant in weaponry/insignia. The examples are Krasny Khutor - grave 127 (adult man) and Sofievka - grave 19 [cf. Videiko, Archaeological...]. Having analyzed such data in greater detail, an attempt was made to distinguish in the "Sofievka community" three inventory strata, or types of sepulchres. According to this division 8.9% of graves would belong to tribal/clan "top brass" [Kolesnikov 1993].

It is characteristic that the manifestations of stratification concern only the two cemeteries named above (especially Krasny Khutor) that are commonly believed to be older than others [cf. in this volume: Kovalyukh, Videiko, Skripkin, Chronology..., Kadrow, Absolute..., Budziszewski, Flint...]. In Chernin, only single graves with "chieftain distinctions" were recorded (graves 80, 90) and only with a stone and a horn axe. Zavalovka, in contrast, is deprived of any signs of such distinctions.

Therefore, it is difficult to assess to what extent "Sofievka" socio-organizational traditions were continued on the middle Dnieper after the demise of the Tripolye culture, for instance in the successive Middle Dnieper culture [Artemenko 1967:125-127; Klochko 1994b:186-190].

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COPPER OBJECTS AND QUESTIONS OF "SOFIEVKA METALLURGY"

Copper finds in cemeteries are quite rare, which is typical for the neolithic period. But at the same time the grave goods presented here represent the wide set of types known at this period in Europe [Klochko 1994a:149-154].

Altogether, 202 copper artefacts were found. Of this number 150 were found in graves, i.e. in complexes [cf. Videiko, Archaeological..., in this volume].

In particular sites the proportion of copper items in graves was as follows: Chernin - 8.51% (8 graves containing copper), Krasny Khutor - 22.94% (39 graves), Sofievka - 9.59% (14 graves) and Zavalovka - 6.25% (1 grave).

1. TYPOLOGICAL DIFFERENTIATION

Two typological groups may be distinguished in this collection: I - tools/arms and II - ornaments. The share of artefacts that were assigned to the above groups (including hypothetically to group II those objects that have been poorly preserved - ca. 17 items) in specific cemeteries is given below:

/ 1		
Chernin	I - 0%	II - 100% (19 artefacts)
Krasny Khutor	I - 7.41% (6)	II - 92.59% (81)
Sofievka	I - 19.57% (18)	II - 80.43% (748)
Zavalovka	I - 0%	II - 100% (4)

In this group 9 units of classification may be distinguished: types and subtypes (Fig.1:1-9).

Awls (type IAw). Eleven awls were found in Sofievka (graves 14, 19, 71, 124 and from surface) and one in Krasny Khutor (grave 127). Their length ranges from 2cm to 7cm. Sofievka awls are tetrahedral in the cross-section (IAw1). The awl from Krasny Khutor is short and round in the cross-section (IAw2). (Fig.1:1-2).

Flat axes (type IAx). Two axes were found in Sofievka (grave 19 and on the surface), one of them broken. Axes were produced in casting forms, and are broad and thin in the cross-section (Fig.1:3).

Chisel (type IC). One chisel came from Sofievka (grave 2/1947). It is short, with a riveted blunt side (Fig.1:4).

Knives (type IK). Four knives were found in Sofievka (grave 19 and on the surface) and one (?) in Krasny Khutor (grave 103). They have leaf-like blades with a delta-like haft - more (IK2) or less (IK1) noticeable and are lenticular in the section (Fig.1:5-6)¹.

Daggers (type ID). Three daggers were found in Krasny Khutor (graves 127, 134, 167). They have triangular blades, and are connected with a haft by four (ID1) or two (ID2) rivets. One dagger had a bone rivet (Fig.1:7-8).

Arrowhead (type 1Ar). One (?) leaf-like flat arrowhead was found in Krasny Khutor (grave 145) (Fig.1:9).

1.2. TYPOLOGICAL GROUP II

In this group 7 units of classification may be distinguished: types and subtypes (Fig.1:10-17).

Bracelet (type IIBr). One bracelet was found in Krasny Khutor (grave 50). The bracelet had contracted terminals and was produced from a copper strip (Fig.1:10). A second bracelet, about which E.Chernykh has published [Chernykh 1966], is not connected with the cemeteries. It may be an accidental surface find from an unknown place.

Cylindrical - spiral beads (type IIBe). They were found in all cemeteries. They were produced from a broad rolled copper strip. There are two types of cylindrical beads: short (to 1 cm - IIBe1) and long (> 2 cm - IIBe2). Spiral beads (IIBe3) were

¹ Compare the criterion of distinguishing knives on the basis of morphological characteristics of the handle part with another criterion, namely the cross-section of the blade. The latter criterion was applied to the typological assessment of flint artefacts [see Budziszewski, Flint..., in this volume]. According to this criterion, the objects may be included in the "daggers" type (Editor's comment).



Fig. 1. Types of copper artefacts found in Sofievka type burial grounds.

found in Sofievka, Krasny Khutor and some in Chernin. They were produced from a narrow rolled copper strip (Fig.1:11-13).

Rings (type IIR). Eleven rings originated in Sofievka (graves 4, 84, 123 and on the surface). They were produced from round copper wire or copper wire tetrahedral in the cross-section(Fig.1:14).

Nails (type IIN). Two decorative small nails (h=4cm) were discovered in one grave at Sofievka (grave 8). They are tetrahedral in the cross-section, with amorphic riveted nail-heads (Fig.1:15).

Shackle-holders (type IISH). Two shackle-holders were found in Sofievka (grave 30 and on the surface) and two in Chernin (grave 43). One holder from Sofievka was made from a wire tetrahedral in the cross-section wire (Fig.1:16). It may be a decoration of a haft of an axe-hammer. Small shackles from Chernin may be used for decoration of a skin strip (Fig.1:17).

2. THE CULTURAL IDENTIFICATION

Awls. Such types of awls (IAw1 - IAw2) were widely spread throughout the Balkan-Carpathian region in the Copper Age. A given kind of artefact is hardly identifiable from the cultural point of view. There is a great variety which combine a number of cultures and groups throughout the above-mentioned circle.

Flat copper axes. Axes belong to the Altheim type, connected with the Carpathian region (Altheim-Vučedol-Mondzee-Kreis). Casting moulds for such axes were found in Vučedol [Novotná 1970:18-19].

Chisel. The form of the chisel is similar to chisels from Dabas (which were connected by P. Patay with the Bodrogkeresztúr culture) and grave 1 of the Rashkovce cemetery in Slovakia [Chernykh 1978:103-105].

Knives. This is the oldest type of the copper knives in Europe which have flint prototypes. Similar knives (IK1) are known in cemeteries of the Bodrogkeresztúr culture - Pushtaystvanhasa [Müller-Karpe 1974:Taf.754] and the Lažňany group - Šebastovice and Barca [Šiška 1972:140-143, Abb.35,1,4]. According to S. Šiška, such knives are typical for Bodrogkeresztúr culture.

Daggers. Ussually the copper daggers from Krasny Khutor are compared with the daggers from Usatovo mounds [Zbenovich 1966; 1975]. The latter have Mediterranean prototypes. Metallographic- and spectro-analyses of the "large" Usatovo daggers show that they are similar to daggers from the Anatolia, which have been dated back to the first part of the third millennium BC. Daggers from the Usatovo mounds may have been imported from Anatolia [Ryndina, Konkova 1982]. All other daggers - from Usatovo and Krasny Khutor - are of local production, carried out according to Mediterranean prototypes. In the third millennium BC those types of



Fig. 2. Genetic background of Sofievka copper metallurgy - spatial dimension of technological inspirations. a - extent of cultures (B - Bodrogkeresztúr, T - Tripolye); b - extent of groups (L - Lažňany, U - Usatovo; c - Lažňany; d - Usatovo; e - representative sites of the Sofievka type; f - extent of the Sofievka type.

daggers were spread throughout Europe instead of the haft types [Goldman 1981].

Bracelet. This is very similar to examples from the Sebastovice cemetery of the Lažňany group [Šiška 1972:140] and the Branč cemetery of the Ludanice group [Lichardus, Vladar 1964]) in Slovakia.

Beads. The cylindrical beads (IIBe1-2) are of the widely spread type of decorations in the Copper and Early Bronze Age in Europe [IIBe2 - see Kośko, Klochko 1991:130-133]. Spiral beads (IIBe3) are typical for the Balkans and the Carpathian Basin and unknown in the present Tripolye monuments.

Rings. These were a widely spread type of copper decoration in the Copper and Bronze Age.

Nails. Similar bronze nails are known from the mound graves of the Early Bronze Age in Ukraine, where they were used for decoration of the hafts of stone battle axes-hammers.

Shackles-holders. Similar holders were found in the Tripolye cemetery of Vykhvatintsy, contemporary with the Sofievka type and the Early Bronze Age mounds in southern Ukraine.

To sum up the presentation of cultural identification, one should point to the main relations of the complex of artefacts studied with the stylistic traditions of the Balkan-Carpathian metallurgical centres, among them mainly of the Bodrogke-resztúr culture (together with the Lažňany group). Much more modern is the share of the indirect prototypes from the area of Anatolia (Fig.2).

3. TECHNOLOGY

Spectroanalytical investigations of copper were carried out by E. Chernykh [Chernykh 1966]. Results show us that most of the copper objects were produced from pure copper, except for one bead from Krasny Khutor, produced from As-bronze (Table 2). Whole group of metals is homogeneous, which suggests that all objects were produced in one center, using copper from one deposit. According to E.Chernykh, it was a deposit from an "unidentified region in the Balkan-Carpathian zone" [Chernykh 1970:26].

Today such an explanation is unsatisfactory. Balkan deposits have different micro-admixtures [Chernykh 1978]. This is why the homogeneous copper from the Sofievka type cemeteries cannot be connected with the Balkans. Among the types of copper objects there are different examples, connected with the Tripolye, Bodrogkeresztúr, Mediterranean and other traditions, but they all were produced from the same copper. According to specialists, the purity of the Sofievka copper can be explained by its origin from minerals, connected with the oxidised top layers of deposit. Usually such a situation represents the beginning of mining.

n. an.	object	cemetery	grave	year
368	awl	Sofievka	surface	
369	chisel	Sofievka	2	1947
370	flat axe	Sofievka	19	1948
371	flat axe	Sofievka	3	1948
374	knife	Sofievka	surface	1947
376	knife	Kr. Khutor		
377	bead	Kr. Khutor		
378	awl	Sofievka	19	1948
379	knife	Sofievka		1948
381	bead	Sofievka	surface	1947
382	bead	Kr. Khutor		
383	bead	Kr. Khutor		
384*	bracelet	Kr. Khutor	50	
387	bead	Kr. Khutor	surface ?	
394	knife	Sofievka ?		1948 ?

List of copper artefacts from the Sofievka cemetery submitted to physico-chemical analyses of the composition of raw material. According to E.N. Chernykh

* Analysis n. 385, 386 — from bracelets, which are not connected with graves of Krasny Khutor. They are surface finds from unknown place.

Table 2

Spectroanalytical investigations of copper from Sofievka and Krasny Khutor cemeteries. After E. Chernykh 1966

n.an.	Cu	Sn	Pb	Zn	Bi	Ag	Sb	As	Fe	Ni	Co	Mn	Au	Р
368	В	I	0,001	-	0,001	0,08	-	-	tr	-	-	-	-	-
369	В	-	0,001	-	0,001	0,04	-	-	0,001	0,002	-	-	-	-
370	В	-	-	-	-	0,01	-	-	tr	0,0012	-	-	-	-
371	В	< 0,001	0,0016	-	-	0,013	-	-	< 0,001	-	-	tr	-	-
374	В	?	0,001	-	_	0,055	-	-	0,001	-	-	0,001	-	-
376	В	-	-	-	0,001	0,027	-	-	tr	_	-	-	-	-
377	В	-	0,003	-	-	0,005	-	-	tr	0,0009	-	-	-	0,2
378	В	0,001	0,0017	-	-	0,015	-	-	tr	_	-	-	-	-
379	В	-	0,001	-	?	0,02	-	?	tr	0,001	-	-	-	-
381	В	-	0,001	-	?	0,08	-	-	0,001	-	-	tr	-	0,3
382	В	-	0,001	-	-	0,033	-	-	0,003	0,001	-	tr	-	>1
383	В	-	0,001	-	-	0,016	-	-	tr	-	-	-	-	-
384	В	0,0003	0,0014	-	?	0,0063	-	-	0,007	0,001	-	tr	-	< 0,1
387	В	-	0,001	-	0,001	0,008	-	1,50	< 0,001	0,002	-	-	-	0,1
394	В	?	0,003	-	0,003	0,01	0,01	1,90	0,0015	0,42	-	-	-	?

The source of the Sofievka copper can be located among deposits of the copper sandstones in the Skvira metalbearing region of the Ukrainian Crystalline Shield, which is not far from the cemeteries of the Sofievka type [Metallogenia 1974:488].

Metallographic investigations of copper objects from Sofievka and Krasny Khutor, carried out by N.Ryndina, show that all of the objects were produced using different copper-smithing technologies. Semi-finished flat axes, knives and daggers were produced in closed double-sided casting moulds [Ryndina 1971:138-139].

It seems that Sofievka shows us the products of a local center of metallurgy and metalworking. This center was connected with local deposits of copper (the Skvira region) and different technological traditions (local - Tripolye; Carpathian -Bodrogkeresztúr, Lažňany; Mediterranean - Anatolia), Fig.2.

Such amalgamation may only be the result of immediate contacts between the carriers of those three technological traditions [Klochko 1994a].

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GLASS BEADS FROM SOFIEVKA CEMETERY

The history of glassmaking has been studied for many years and from several angles. Technological, typological, genetic and theoretic studies have been made. All of them, however, aimed at defining the place that in the life of prehistoric communities was occupied by glass. Sometimes, however, we do not have enough data to analyze sources in so many aspects. This is exactly what we have to deal with in the case of glass items from the cemetery in Sofievka. To carry out a formal analysis we are left only with the number of glass items found and their general description and location. Namely, four colour beads were found, two of them in a grave and the other two on the surface. This data is insufficient to conduct a full technological analysis, either. There is not enough data to determine the technique used to make the beads. Despite so many gaps the beads deserve attention because they have been subjected to a chemical composition analysis. Spectroanalytical investigations carried out at the Archaeologico-Technological Laboratory of the Institute of the History of Material Culture in Petersburg have given the following results (Table 1).

An attempt to comment on these results follows from their chronological placement, namely in first half of the 3rd millennium BC [cf. Kadrow, Absolute..., in this volume]. The site's chronology resulting from radiocarbon dating offers us interpreting possibilities for discussion on the origins of glassmaking. In the future, we can expect to have more radiocarbon datings of individual sites where glass objects have been found. We can probably verify the chronology of specific stages in the development of glassmaking.

The beginnings of glassmaking are placed in the 5th/4th millennium conv BC presumably in Mesopotamia. A discussion as to the origins of glassmaking, in which Egypt competes with Mesopotamia as the cradle of glassmaking, has been going on among glass historians since the beginning of this century [a review of opinions on the subject and a description of glassmaking centres in Mesopotamia can be found in: Barag 1962:9-27; Moorey 1985]. The first millennium in the history of glassmaking is believed to be the period of formation of the industry in connection with faience manufacture. Faience, variously characterized by researchers, in its transitional phase leading to the development of glass is treated as a category of the same

	gr. 123(125)	gr. 123(125)	surface	surface
Lab. No	287/26	287/27	319/40	?
colour	light-green	light-biruse	wine-rose	bright-brown
SiO ₂	base	base	base	base
Na ₂ O	13,0	16,0	6,0	11,0
K ₂ O	6,0	9,0	6,0	6,0
CaO	12,0	20,0	13,0	4,5
MgO	0,28	0,1	0,35	0,1
Al_2O_3	0,8	0,75	1,4	3,2
Fe ₂ O ₃	0,35	0,75	1,1	0,5
MnO	0,04	0,06	6,0	0,016
PbO	1,2	1,2	0,05	0,09
CuO	0,9	0,75	0,035	0,006
TiO ₂	0,012	0,07	0,02	0,01
SnO ₂	0,005	-	0,01	-
As	0,35	0,27	-	-

Resultes of spectroanalytical investigations of the glass beads from Sofievka cemetery

technological process. This makes it difficult to separate centres manufacturing faience from those producing glass. Working on this assumption N. Venclová lists together probable European and non European workshops manufacturing faience and glass in the Early Bronze Age [Venclová 1990:421]. The leading centres are Mesopotamia, Syria with Palestine, the Caucasus, Egypt and Crete. The 3rd and 2nd millenniums BC witnessed also the formation of glassmaking centres on the Crimea, the northern coast of the Black Sea and the Ukraine [Bezborodoy, Zadneprovsky 1965:127-142]. In North Pontic tribes they began to appear at the turn of the 3rd millennium BC. According to A. Ostroverkhov, in the southern district of Kherson, in a kurgan of the late Yamnaya culture, were found glass beads shaped as stars [Ostroverkhov 1981:224-225]. It is in this context that the recording of four glass beads at the cemetery in Sofievka, near Kiev, dated to the 3rd millennium BC, should be analyzed. Specifically interesting in this context are the two beads coming from grave 123(125), a homogenous feature. The other two also come from the same cemetery but it is difficult to attribute them to specific features. The beads were subjected to a spectral analysis. The results thus received were matched to interpretation methods developed by M.A. Bezborodov [1975], Y.L. Shchapova [1973, 1983], M. Dekówna [1982] and T. Stawiarska [1984, 1987]. The major guideline following from the works of these authors is to find out the formula according to which the glass in question has been made and then the types of glass based on its ingredients. Among the ingredients are SiO₂, Na₂O, K₂O, CaO, MgO, Al₂O₃. In the next stage a separate chemical type is separated into subtypes depending on the formula norm. The next stage of the analysis involves special features of glass like colouring, decolouring and fogging agents. The indices calculated below are helpful in these investigations (Table 2).

Т	а	b	I	е	2
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	gr. 123(125)	gr. 123(125)	surface	surface
nN	287/26	287/27	319/40	?
$\frac{Na_2O}{K_2O}$	2,16	1,77	1,0	1,83
$Na_2O + K_2O$	19,0	25,0	12,0	17,0
$\frac{K_2O}{Na_2O+K_2O} \times 100\%$	31,57	36,0	50,0	35,29
$rac{CaO}{MgO}$	42,85	200,0	37,14	45,0
$\frac{MgO}{CaO+MgO} \times 100\%$	2,28	0,49	2,62	2,17
$FN = \frac{Na_2O + K_2O}{CaO + MgO}$	1,54	1,24	0,89	5,15

Proportions and sums of glass ingredients

The examination of proportions and sums of major glass ingredients justifies the following conclusions.

1. The formula, or a recipe for the kind and amount of basic raw materials consciously introduced to the glassmaking mix has been established. When determining the ratio of alkalic ingredients to calcium-magnesium ones (Na₂O+K₂O: CaO+MgO) in finished glass according to Y.L. Shchapova's method, we have found that in glass items no. 287/26, 287/27, 319/40 the ratio is lower than 3. This means that the glass was made according to the three-ingredient formula (sand + soda + limestone). For the unmarked bead found on the surface formula norm = 5.15, which points to a two-ingredient formula (silico-calcium sand+soda).

Two- or three-ingredient formulas co-occurred in the period of their development. We believe that the use of a particular formula depended on the local availability of raw materials.

2. The analysis of the alkalic ingredients suggests that all the beads are made of ash glass. In the glass under discussion it must be ash of continental plants (plant ash is a source of sodium compounds), which is evidenced by the ratio of Na₂O:K₂O lower than 3:1. Beads no. 287/26, 287/27, 319/40 are of the sodium-potassium-calcium-silicon type (Na₂O - K₂O - CaO - SiO₂) while the unmarked bead is of the sodium-potassium-calcium-aluminium-silicon type (Na₂O - K₂O - CaO - Al₂O₃ - SiO₂). Plant ash was used as an alkalic ingredient in the Middle East, Mesopotamia and Central Asia [Shchapova 1983].

3. The proportion of calcium to magnesium shows that the glass is almost magnesium-free and that the calcium component is very pure. The proportion of CaO to MgO in the glass of bead no. 287/27 is 200:1. Such a high proportion of CaO to MgO is similar to that found in glass items from a settlement of the Věteřov culture in Blucin, in Moravia analyzed by J. Olczak. He found the ratio to be 120:1 and 130:1 [Olczak 1993:279-291]. It is highly probable that in Blucin the traces of the oldest glassmaking workshop in Central Europe were found. The proportion of calcium to magnesium may be a relic of a glassmaking tradition brought to Europe from the East.

4. The glass items from grave 123(125) owe their colouring to cupric and lead oxides (CuO and PbO). Glass item no. 319/40, however, displays a higher content of manganese oxide (MnO), namely 6%. Depending on its concentration manganese either colours or discolours glass. According to M.A. Bezborodov [1956:82-83] manganese was a local technological characteristic of glassmaking in the North Pontic region in the Middle Ages. It may have been a remote vestige of an earlier tradition whose trace we found in the bead from Sofievka. This is even more probable when one thinks of rich deposits of manganese ore in the Caucasus.

Also worth noting is the presence of few tenths of a percent of arsen (As) in the two glass items from grave 123(125). It may be a proof of a certain relation between copper- and glassmaking [Bouzek 1985; Klochko 1994:135-166].

The above conclusions show that the four beads from the cemetery at Sofievka, dated at the beginning of the 3rd millennium BC, originate from two different glassmaking traditions: a two- and a three-ingredient one. It is true that all of them were made with the use of plant ash (the source of sodium), but in one case we have recorded exceptionally pure limestone raw material. Of interest is also an increased concentration of manganese. All these elements place the glass items under discussion in the Eastern tradition while suggesting that they may come from various centres, quite possibly from Anatolia as A.S. Ostroverkhov believes [Ostroverkhov 1985:179]. Attention should also be given to the reference, through the CaO/MgO ratio, to the glass from the Věteřov culture settlement in Blucin, which may be evidence of the movement of glassmaking tradition from North Pontic areas to Central Europe.

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ORIGINS OF NEOLITHIC-ENEOLITHIC CREMATION RITES IN EUROPE AND SOFIEVKA TYPE RITUALS

Cremation rites are not adequately identifiable from the point of view of archaeology. In practice we register their specific states, places of burial strictly limited as far as space is concerned - in the form of pit graves and in cinerary urn graves. The awareness of this fact requires caution when we evaluate the European beginnings of the complex of funerary rituals in which we are interested.

1. THE STATE OF SOURCE DOCUMENTATION AND DISCUSSION OF THE GENETIC INTERPRETATION OF EARLY FORMS OF DEVELOPMENT OF CREMATION RITES

The above remarks are particularly justified with reference to the epochs: Mesolithic - Neolithic - Eneolithic within which the beginnings of a given rite are observed [Cabalska 1964; 1967; Kalicz 1963:14-18; Voigt 1963; Jażdżewski 1981:147].

In this initial stage two periods were distinguished [Cabalska 1967:41]: I - of incidental applications of cremation with respect to a narrow category of the dead (for example, in the form of "size of punishment") and II - applications in the character of "a distinct burial rite".

PERIOD I - before ca. 3600/3500 BC (2800/2700 conv BC). The oldest manifestation of rites in which we are interested is dated to the turn of the eighth millennium BC and is connected with a Mesolithic community of the Maglemose culture. The cremated burial of the "layer" type was found in the area of the Melsted settlement on the island of Bornholm [Becker 1951:100, 171]. Of similar character are observations about the barely later Mesolithic settlements of the Komornica culture of Wieliszew in Mazovia [Więckowska 1975:418]. The next discovery which was already connected with an agrarian population is dated to the second half of the sixth millennium BC. Burnt human bones were found in an anthropomorphic vessel (the so-called Venus of Gorzsa) of the Körös culture, uncovered on a site located near the confluence of the Tisza and Marusza rivers [Gazdapusztai 1957:12]. A little bit more frequent, although many times more problematic, is the evidence of cremation from the decline of the sixth millennium and from the first half of the fifth millennium BC connected with the Vinča culture and the Linear Band Potterv culture [Garašanin 1958:17; Kahlke 1954:90f; Vencl 1961:114; Hoffmann 1973; Kaufmann 1976:70-73]. An intensification of source evidence of given rites (mainly in the form of cinerary graves) is dated to the decline of the first half and the second half of the fifth millennium BC. This concerns in particular the Northern zone of the Balkan-Central European cultural province, to be more exact, the areas occupied by the Stroke Ornamented culture, and especially the Rössen culture [Schranil 1928:46; Kaufmann 1976:70-73; Wolff 1911; Stroh 1938:83-84]. An important phenomenon of this period was the transmission of "the agrarian version" of the ritual discussed here beyond the areas of the loess uplands, among others, to the area of the lowland [Kulczycka-Leciejewiczowa 1979:161]. This "version" of cremation seems to have been adapted at that time in the environment of co-creators of the "Megalithic circle", the proof of which might be, for example, the cinerary grave of the Stroke Ornamented culture from Kowal in Kuiavia that was placed in a stone box and is dated to the middle of the fifth millennium BC [Czerniak 1980:205]. It is possible that the phenomenon signalled here activated a long-term process of development of "the Northern model" of cremation rites (whose determinant would be non-cinerary burials - in great measure "laver" ones) which are documented by the more recent studies of its Lowland manifestations; especially from the later periods [recently, Wierzbicki 1992:86-87]. However, in our evaluation here we assume that the primeval pre-sources of the said "model" were surely inherent in the endogenous ritual traditions of the Lowland communities of the Mesolithic epoch (Fig.1:a).

At the turn of the fifth and fourth millennia BC an important centre of the development of the cremation rite was located in the basin of the Upper Tisza, within the circle of the Polgár culture [cf. Šiška 1968]. The share of cremation graves as well as cinerary and pit ones is discernable here since in the Polgár III phase (the Tiszapolgár culture) [Šiška 1964:339-340] and the Polgár IV phase (the Bodrogkeresztúr culture, Lažňany group) it was intensified [Šiška 1966:62; 1972; Nevizánsky 1984:278-288].

About 35% of the graves in the Lažňany group (generally dated within the Hunyadihalom-Lažňany horizon to ca. 3650-3500 BC) [Kaczanowska 1980] contained the remains of a cremation [Nevizánsky 1984:288]. Both the pit and the cinerary graves, which were dominant, occurred here. The equipment of these burials was created out of pottery (one to three vessels) and, in individual cases, flint artefacts and amber fragments. Along with the influences of the Polgár centre, cremation infiltrates beyond the arc of the Carpathians, e.g. into the basin of the Upper Oder [Nowothing 1937]. It seems that the phenomenon signalled here may be treated as a prologue to the process representative of period II (Fig.1:b).

PERIOD II - after ca. 3600/3500 BC (2800/2700 conv BC). According to M. Cabalska, in the middle of the fourth millennium BC two "early centres" of crystal-

lisation of the "cremation as a different funeral rite" may be distinguished: those of the Baden and Middle Dnieper (which are later named Sofievka) [Cabalska 1967:45]. In her interpretation, manifestations of the growth of significance noticed there would constitue "a logical and purposeful crowning of the ideological-ritual attitude based on the spiritual concept of God the Creator and immortal soul". The process would have external roots as a derivative of a new wave of influences from the Near East: "along the same trade routes which caused the dissemination of the knowledge about copper and bronze" [Cabalska 1967:43, 45]. An important role in the construction of this hypothesis was played by the studies of N. Kalicz [1963], who interpreted the Baden culture as the Northernmost group of the early bronze cultural complex, including Anatolia and the Balkans. This conception was supported by later studies by V. Němejcová-Pavúková [1981] concerning the internal structure of the said "complex" as well Z. Sochacki's [1991:14] studies on the spatially similar "zone of influence". According to the latter author "the origin of the funeral rites [in the Baden centre] which appears "in waves" has not yet been explained, but the participation of South-Eastern impulses is most probable (\ldots) . Anatolian influences encompassed (even though in varying degree) many fields of life of the Baden culture population (...), they made it the then main transmitter of achievements and customs of the Near East within the Central European cultures which were developing more slowly" [Sochacki 1985:49]. In the case of cremation rites a particularly convincing identifier of "the Anatolian influence" was considered to be a burial ground in the centre - and specifically the anthropomorphic cinerary urn from grave 3 - of the Ozd group which suggested the possibility of the "infiltration of a small group of Anatolian population on the Upper Tisza(?)" [Kalicz 1963:7-14; Sochacki 1980:195; 1983:130; 1985:49].

However, Anatolia as well as the Tigris-Euphrates basin do not provide material for observations of convincing manifestations of the adequately early cremation rites which might have directly motivated the hypothesis quoted above [Jażdżewski 1981:171]. The oldest findings of this ritual are connected in the Near East with the site of the late Neolithic culture Halaf Yarim Tepe II, dated to the early centuries of the sixth millennium BC (a bi-ritual burial ground with 5 cremation graves "which were accompanied by remains of the intentionally broken vessels, among them anthropo- and zoomorphic vessels" [Bieliński 1985:234]). However, in the next millennia inhumation decisively prevailed in this region. A good illustration of this may be the burial rite of Mesopotamia of the early dynasty time (ca. 2800-2340 BC) where "inhumation was still the rule on all sites"; only sporadically was there found "a partial cremation" of the dead bodies [Ławecka 1989:61-62]. It is difficult to say how much this picture may be changed as a result of further investigations on sites, for example in relatively poorly recognized Anatolia.

At the same time one should note that the above observations may create a good background for the revision of the hypothesis of the exclusively Anatolian roots of growing importance of cremation in the middle of the fourth millennium BC. Such an attempt has recently been presented by L. Nikolova [Nikolova 1993].

According to her, the genesis of the Baden centre should be looked for to the north, in the Central Danube zone where the oldest objects may be found that are typical for it. She indicates the old cremation traditions in Central Europe (cf. earlier remarks concerning endogenous development of the "northern model" of cremation), exposing as the oldest links of the Baden centre the settlement environments of the Lažňany and Ohrozim groups. The cremation rite was spread from this area to the areas of the western part of the Lower Danube basin (the Kostolac and Cotofeni cultures) - Fig.1.

2. THE BADEN CENTRE — THE DANUBE RITUAL MANIFESTATIONS OF THE LATE ENEOLITHIC PHILOSOPHICAL AND RELIGIOUS TRANSFORMATION

The range of the initial area of the centre may be identified with the territory of the Boleráz group (horizon) [Němejcová-Pavúková 1981; 1984; Sochacki 1980; 1985] and the Funnel Beaker culture groups which developed similarly to an Ohrozim type in Moravia [Medunová-Benešová 1967]. Therefore, these would be the areas between the Danube and the Drava, river basins of the Wag, Morava and Upper Oder (Fig.1:b, c). Within the area occupied by the above-mentioned group the "cremation funeral rite appeared suddenly"; in a not very clear genetic and developmental dependence on "the contemporary or almost contemporary" centre of development of the cremation rite from the Upper Tisza which is connected with the Lažňany group [Němejcová-Pavúková 1970; cf. Šiška 1972 and the earlier remarks].

The area in which this phenomenon has been studied most thoroughly within the barrow burial grounds of the Ohrozim type (generally dated to ca. 3650-3350 BC) [Pleslová-Štiková 1987:418] is Moravia. There, only cremation graves of the cinerary urn type were found. "Burnt bones, without ashes were deposed in pots and more seldom in bowls, beakers and in single cases into an amphora or a jug". "In most cases the cinerary urns were reversed which placed the burnt bones in their upper part" (in four cases holes were found in the bottoms). Also, the vessels that accompanied them were turned down. Their number might have been as many as six (most often we can find two or three of them in the graves). In graves there were also found, apart from pottery, stone axes as well as flint tools and a fragment of "a spiral" and a fragment of copper wire. The whole of the burial pottery was very badly burnt ("technologically different"); hence, it was also susceptible to destruction. Cinerary urns were placed either in shallow "pits" or on the earth surface and many of them were "secured" with stones which either covered or surrounded the place of the burial. Over a single grave or a cluster of graves rather low (up to 0.8m) oval earthen mounds were erected whose dimensions in projection were: from 4 to 21m x 2 to 9m [Medunová-Benešová 1967: 366-370]. The Ohrozim model



Fig. 1. Balkan-Central European cultural regions (areas) with participation of the cremation rites in the fourth-third millennia BC. Legend: a - southern boundary of "the Northern model of cremation rites" (of Funnel Beaker culture and the "forest"-East European subneolithic cultures); b - the oldest centres of "cremation as a distinct funeral rite" south of the arc of the Carpathians (L - Lažňany group, O - Ohrozim group); c - centres of early Baden culture; d - the Sofievka centre; e - Sofievka type sites; f - directions of transmission of the cremation rites in the Balkan zone according to L Nikolova [1993]; g - directions of transmission of the Balkan cremation rites in Central Europe.

of cremation rites was also found north of the arc of the Carpathian Mountains, among the Funnel Beaker culture on the Upper Oder [Bukowska-Gedigowa 1975].

Within the "pure" objects of the Boleráz group the burial rites are not so well recognized and it is difficult to present a reliable assessment of the extent to which cremation was applied there [Nevizánsky 1985:251, 257]. Attempts at transferring observations from Moravia to other territories [cf. Němejcová-Pavúková 1970:185] are premature [Sochacki 1980:195]. Also due to these reasons the characteristics available concern a wider chronological perspective, namely the early (Boleráz)

and classical horizons of the Baden culture (dated roughly to ca. 3600-2800 BC [Němejcová-Pavúková 1981:286; Sochacki 1983:137]). This attempt is also motivated by the multi-phase development of large Baden burial grounds, also those which concentrated exclusively on cremation burials. An analysis, carried out in such a manner, may lead one to conclude that "cremation was secondary in the burial rites of the Baden culture population" [Sochacki 1980:194-195] and this sounds too general.

Corrected in such a way, the Baden centre in its range would also include, apart from the territory mentioned earlier, the river basins of the Tisza and Upper Elbe. These two areas demarcate at the same time two potential directions of the transmission of cremation rites. Of the 725 graves of the Baden culture listed by G. Nevizánsky, 225 (i.e. ca. 31%) were cremated burials [Nevizánsky 1985:258]. They were found on 22 sites which were concentrated in three areas: in the basin of the Upper Tisza, in the region of the bend of the Danube and between Lake Balaton and the Danube. The largest site in which cremations were found exclusively was the burial ground in Pilismarót-Basaharc, located within the latter of the above-mentioned "regions" and classified as Boleráz [Torma 1968, 1970, 1971, 1972; Nevizánsky 1985; cf. Sochacki 1980:194]. Between the Danube and the Drava there were also located other large burial grounds which either contained only cremations (Fonvód) or the number of cremations was significant (Budakalász). Neither the scope of the publications nor their form in some cases are satisfactory. This concerns in particular the lack of publications on the Pilismarót-Basaharac burial ground which was most important for the evaluation of the Baden model of cremation rites. It is generally known that in the Baden culture both cinerary urn and pit burials occurred, often utilising a stone cover. Amphoras, pots and bowls were mainly used as urns, sporadically jugs were used and in one case an anthropomorphic vessel (Center - cf. earlier remarks). In the graves there were also found some other vessels (one to three).

Since ca. 3200/3100 BC the scope of the centre began extending towards the area between the Sava and the Drina and included cultures which were close to Baden such as Kostolac and Cotofeni [Nikolova 1993 - also see more literature there], Fig.1:f.

3. SOFIEVKA CENTRE — RITE MODEL, GENETIC INTERPRETATION

In spite of the considerable interest that the discovery of Sofievka type burial grounds was accompanied by [cf. Videiko, Cemeteries..., in this volume], there exists no thorough analysis of the (a) morphological structural and (b) genetic aspects of the Sofievka model of cremation rites in the literature on the subject.

a. All the interpretations of the "Sofievka" rites offered so far were determined on the basis of a lack of a comprehensive analysis of data collected on site, i.e. a critical analysis of norms of identification applied during excavations of: (aa) objects (graves) and (ab) their shapes or character of sequences of ritual behaviour consolidated in the fillings [cf. Videiko, Cemeteries..., in this volume].

aa. Starting with J. Zakharuk's excavations in 1948, every vessel filled with bones (ashes) was identified as a grave as well as every cluster of bones [Zakharuk 1952; Danilenko, Makarevich 1956; Kanivets 1956, Kruts 1968]. On this basis a "classical" image of the Sofievka burial grounds was shaped and this image exists both in the literature which deals directly with the Tripolye culture and in more general studies on demography and social organization [e.g. Arkheologiya 1971; Kolesnikov 1993]. However, attention should be paid to the fact that already at that stage archaeologists were aware of the possibility of other interpretations. We can cite as an example here the application of more complex multi-aspectual identification norms by I. Samoylovski (during his studies of the Sofievka cemeterv in 1947) [Samoylovski 1952:121-123]. The present analysis of all the premises - recordings in the diary, plans, photographs - reveals falsifications of the actual picture of the necropolis. As an illustration of this, we may use a schematic division - into separate graves - of groups of cinerary urns which were located in a distance of 10-30 cm from one another. In many cases they were recorded against the background of "bone concentrations" or over such "concentrations" which was interpreted as symptoms of vertical stratigraphy. The above-mentioned groups of "graves" were identified as sites of multiple "family burials" which, considering "the sedimentation properties" of the dune environment is difficult to imagine in practice.

ab. In the case of objects that were dug into the dune and badly damaged as a result of eolic processes as well as later settlement processes, there is an obvious difficulty in establishing the ranges of the grave "pits". This also concerns the above-mentioned type of burial grounds where their outlines have not been established. For instance, it is not possible to consider as such the statements that bones - ashes of "non-urn" burials - were inserted in the round pits of small dimensions: 18-30cm wide and not less than 40-60cm deep (V. Kanivets's observations in the Chernin burial ground). Formation of such a pit on a dune foundation was simply impossible. Due to these reasons, all the previous attempts at characterization of the Sofievka cremation rites require a re-analysis. As a point of reference such recent (now holding) attempts as those by V. Kruts [Kruts 1977:120-121] should be mentioned. Kruts revealed the following features:

- the presence of both cinerary urn burials and pit ones (round pits);
- application of fabric containers in the case of the latter;
- deposition of equipment both before and after cremation of the body;
- location of graves in groups which may be interpreted in categories of family relations.

We think that apart from the possibilities of a re-analysis inherent in the documentation available from field investigations and the materials themselves (e.g. space analysis of glued objects - artefacts), it is worth paying attention to the information value of observations of cremation burials of the Polgár cultural circle.

Of special importance here is the module of the biritual rites of the Tiszapolgár burial ground in Tibava [Šiška 1964] which was contemporary of the BI/BII phases of the Tripolye culture. The Tibava burials were located in rectangular pits, from 70 to 170cm x 50 to 100cm dimensions, East-West oriented. In the case of cremation burials, the bones were placed in cinerary urns or in "concentrations". Sometimes both these forms co-occur in graves. What is also worth noting is the presence of ochre. Among the equipment, apart from pottery (between 2 and 37 vessels) there were also found flint, stone, copper and gold artefacts. The inventory was located by the dead person's head or legs; this principle was also observed in case of cremation graves. The genetic relation of these burials with the rites of the Lažňany group, chronologically closer to the Sofievka type cemeteries, seems to be obvious. However, in this latter case the quality of observations of the rite features is much worse. These facts justify reaching for "the Tibava module" which seems to be one that yields good cognitive results in spite of the possible methodological doubts.

The above-outlined "module" of cremation burials transferred to the Sofievka type burial grounds induces us to decrease the number of graves: Krasny Khutor before re-analysis 170 graves = ca. 39 graves after re-analysis; Sofievka - 147 = ca. 30; Chernin - 94 = ca. 16; Zavalovka - 16 = ca. 4 [cf. Videiko, Archaeological..., in this volume]. In all, instead of 440 burials found in the literature, ca. 89 burials should be suggested. The set of equipment changes correspondingly. An example of this type of correction may be the reconstruction of one of the Chernin burials which combined nine "graves" (39, 40, 41, 45, 46, 47, 52, 62, 63) including four cinerary urn and five non-cinerary urn ones. Its inventory consists of four vessels which were used as cinerary urns, 12 arrowheads and 20 other flint artefacts (fragments of flint artefacts from "graves" 62 and 63 are glued together!) and a fragment of a copper object. In the case of the above-mentioned "graves" 62 and 63 the area plan situates them in stratigraphic relation: the cinerary urn "grave" (62) stands on the non-cinerary (urn) "grave" (63). Also in a similar relation occur "graves" 45 and 46. This arrangement may be considered a model for the Sofievka type burial grounds [cf. Videiko, Archaeological..., in this volume].

b. The genetic location of the Tripolye culture, its connection with the Balkan--Central European cultural province as well as the general knowledge of geography of civilisational currents in the middle of the fourth millennium BC justify combining the Sofievka model of cremation rites with the processes of its development discussed above (Fig.1:d, e). Taking into consideration the absolute chronology of the Sofievka cemeteries [cf. in this volume: Kovalyukh, Videiko, Skripkin, Chronology..., Kadrow, Absolute...], it means concentrating attention on three possible identifications of the generator of the "centre": (ba) (the early Tripolye, middle Tripolye or early-late Tripolye) local roots, (bb) relations with the "Northern model", or (bc) indirect borrowings from the circle of the Carpathian Basin (reception of the following models: bca - Baden or bcb - Polgár). Evaluation of the reliability of the hypotheses that have been pointed out above should take into consideration not only the results of comparative analyses, but also typological-genetic features of grave inventories.

ba. In V. Kruts's work [1977], as well as in that done by his predecessors, the direct relations of the Sofievka "type of relics" with the older link of the Dnieper Tripolye culture Lukashi "type" and to a smaller degree the Volhynian Gorodsk-Troyanov "type" have been well-documented [cf. Dergachev 1980:142 and Videiko, Cemeteries..., in this volume]. This context of the "genetic background" justifies extension of the search area of the potential endogenous inspirations of cremation in the direction of "the Eastern Tripolye culture" [Tsvek 1985], where the initial zone for its Dnieper faction should be located. In all the above-mentioned centres of the Tripolye culture there are no manifestations indicating that a cremation rite was used. On the other hand, it is worth mentioning that the set of sepulchral observations that is spatially or chronologically most related to the Sofievka concerning the Tripolye culture from Chapayevka gives evidence of inhumation, to be more exact, of supine burials, laid on the back and genetically identified as an expression of contacts with the Dnieper-Donetsk culture or with the Funnel Beaker culture [Movsha 1985:26]. Thus, we can state that the cremation cemeteries of the Sofievka type are the first objects of this kind within the Tripolye culture. So the cremation rites which we study here may not have been derived from the local, early- or middle-Neolithic traditions.

bb. As far as a comparative analysis of the features of the "Sofievka" rites with the Northern model is concerned, one's attention is drawn to its mostly "non-cinerary urn" character. "The Northern motive" is also emphasized by the developmental position of the Tripolye culture communities of the Sofievka stage [Kruts 1977]. This is a period of their extreme closeness with the cultural environment of the forest zone, and at the same time, of the development of ties with the Neolithic peoples of the Central European Lowland [cf. Dolukhanov, Tretyakov 1979] where the "non-cinerary urn" cremation rites are more and more often seen [Wierzbicki 1992:83ff.]. It should be remembered that the Sofievka type cemeteries were registered in a landscape which was very untypical for the Tripolye culture - the dune areas of a vast valley, north of the forest-steppe (loess) boundary of the Upland; it was representative for the "forest communities". Also, in the grave inventories of the Necropolis people we are discussing here northern influences became distinct in the following versions: forest-East European as well as Central European [cf. in this volume: Kadrow, Kośko, Videiko, Pottery..., Klochko, Kośko, Weapons...]. Therefore, it cannot be precluded that in the development of the "Sofievka centre" some role might have been played by the impulses from the cultural circle of a long-lasting tradition of cremation (taken from the Mesolithic?) whose best-known centres were found in the Central European Lowland.

This interpretation is weakened, however, by the formal and quantitative shortage of adequate manifestations of cremation from the spatially indirect areas (Volhynia, the Lublin Upland). On the other hand, it is possible to refer to observations of scattered cases of the application of cremation within the Volhynian group of the Globular Amphora culture [Sveshnikov 1983:12-13] of a similar, late chronology after circa 3150 BC [Szmyt 1996]. Another indirect authentication of the said conception may be found by drawing attention to the direct continuation of the Sofievka cremation traditions in the spatially and chronologically successive Middle Dnieper culture [Artemenko 1967:72-99] whose genetic relations with the circum-Baltic circle are obvious [recently Kośko 1994a:156; as well as the most recent investigations by M. Kryvoltsevich - personal communication]. We should also remember that it was just at the beginning of the third millennium BC that in this circle grew the number of sources proving the use of cremation [cf. Voigt 1963; Wierzbicki 1992:83ff].

bc. The motivation for searching for genetic references in the circle of the Carpathian Basin is provided by typological-genetic analysis of grave inventories: flint artefacts, pottery, copper artefacts and arms [cf. in this volume: Budziszew-ski, Flint..., Kadrow, Kośko, Videiko, Pottery..., Klochko, Kośko, Weapons..., Klochko, Copper...], which, among other things, reveals the heritage of the Polgár circle. In the case of a comparative analysis of the Sofievka cremation rites with similar rites in the area of the Carpathian Basin we can notice a general asynchronism of the similarities observed: ritual features and inventory features, i.e. typological specificity of equipment in particular graves.

bca. If large, exclusively cremation burial grounds are found in the Baden centre (the Ohrozim-Boleráz "horizon"), then this similarity is not manifested in the most numerous group of elements of grave equipment, namely in pottery. It is difficult to see the early Baden features among the vessels from the Dnieper burial grounds as is the case with late Tripolye features among the sepulchral pottery of the Baden circle. The only general plane of analogy is the dissimilarity ("peculiarity") of the technology of manufacture of this group of ritual objects; it is found both among the materials of the Ohrozim type as well as those of the Sofievka type [Medunová-Benešová 1967:374; Bukowska-Gedigowa 1975:15-17; Kruts 1977:121]. In a non-pottery group of grave inventories one's attention is drawn by the presence of stone axes, although these forms are different from the Sofievka type.

bcb. However, while in the Polgár environment no large, exclusively cremation burial grounds have been found (Tiszapolgár culture, Lažňany group), Polgár features are still clearly legible in the vessel stylistics from the Sofievka cemeteries [cf. Kadrow, Kośko, Videiko, Pottery...]. The similarity also concerns the non-pottery inventories, and in particular the presence in both cases of copper daggers [Šiška 1972:140-143]. Previously we also indicated the similarities in the sphere of funerary ritual ("Tibava module").

The Polgár inspirations in the development of the Tripolye culture have been observed many times. In case of materials of the Gorodsk-Troyanov or Brynzeny "type" the Tiszapolgár "imports" have been found (Brynzeny-Tsyganka, Kosteshty IV settlements) or stylistic borrowings (Troyanov et al.) [Titov, Markevich 1974]. The Polgár "influences" were explicitly recognized in the region of the "Eastern Tripolye culture", simply ascribing to them the function of one of the generators of this group [Tsvek 1985; 1989]. This impulse would be legible here already at stage B of the Tripolye culture (4200-4000 BC), becoming pronounced in numerous "imports" and imitations of Tiszapolgár pottery.

The above-mentioned groups of the Tripolye culture, located in the eastern border zone of the scope of its communities, should be considered to be an indirect source of transmission of the Polgár tradition into the region on the Dnieper. These traditions might have also referred to the ideological ritual models, includingcremation rites. However, at least thus far, this has not been documented by observations of the funerary rites of the middle Tripolye and early-late Tripolye communities stages B/CI).

Our observations as outlined above justify our conclusion that the unequivocal (directly confirmed by sources) identification of the genetic background of the Sofievka cremation centre is impossible at present. Within the Dnieper Tripolye culture cremation appears as an exogenous ritual that also continued to exist after the culture's disappearance. Neither is the social-ideological context of this adaptation known. In the social organization dimension a certain indication may be a simultaneous appearance of the stone battle axes, recognized as a sign of the emergence of a leader stratum ("insignia").

The main difficulty in solving this puzzle lies in the state of recognition of the closest cultural hinterland of the Sofievka "agglomeration" as far as forms of funerary ritual are concerned (on the basis of more general experiences of a considerable reduction of observations of cremation in the practice of area, archaeological prospection may be assumed). In such a situation of the two admissible conceptions of the genesis of the Sofievka cremation centre: "Northern" (cf. the "Northern model" of cremation) or the Polgár, the former seems to be better justified on the grounds of general knowledge (Fig.1).

This opinion has a wider foundation in the presently revised conception of the directions of adaptation of cremation in Europe. When we reject the monocentric interpretation which is contradictory to the available source documentation and which indicates extra-European inspirations (Anatolia, the Near East), we consider justified paying more attention to the polycentric intra-European interpretation, contained in the hypothesis of the "Northern model", i.e. to the archeometric and multi-aspectual analysis of all the manifestations of cremation in the area of the Central European Lowland and the western part of the forest zone of Eastern Europe [cf. on the question of relations between these areas: Kośko 1994b]. When we look at the problem from this perspective, both Eneolithic cremation centres - the Baden and the Sofievka - should be interpreted as results of the North (Neolithic-subneolithic cultures) which in given cases offered qualitatively new states of symbolic culture (Fig.1). It may be assumed that the main reason for this phenomenon was the ideological reinterpretation of cremation in the circle of the

Eneolithic culture, ascribing to it the "external" ideological valorization whose roots might have been in the circles of the Anatolian and Near Eastern civilisation [cf. in this volume: Klochko, Kośko, Weapons...- genetic identification of daggers, Klochko, Stolpiak, Glass...].

Translated by Andrzej Pietrzak

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ABBREVIATIONS

AAC	Acta Archaeologica Carpathica, Kraków.	
AR	Archeologické rozhledy, Praha.	
AP	Arkheologichni Pamyatki URSR, Kiev.	
BPS	Baltic-Pontic Studies, Poznań.	
KSIA	Kratkiye soobshcheniya Instituta Arkheologii, Moskva.	
KSIA AN USSR	Kratkiye soobshcheniya Instituta Arkheologii AN USS	R,
	Kiev.	
MIA	Materialy i issledovaniya po arkheologii, Moskva.	
SA	Sovetskaya Arkheologia, Moskva.	
SIA	Slovenská archeológia, Bratislava.	
SNMP	Sbornik Národniho Musea v Praze, seria A - Histori	ie,
	Praha	
SprA	Sprawozdania Archeologiczne, Kraków.	
SZAUSAV	Študijné zvesti Archeologického ústavu SAV, Nitra.	

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