

**THE FOUNDATIONS OF RADIOCARBON
CHRONOLOGY OF CULTURES BETWEEN
THE VISTULA AND DNIEPER:
3150-1850 BC**

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Editor's Foreword

This volume of the *Baltic Pontic Studies* focuses on the results of the research carried out so far into the absolute (radiocarbon) chronology of the area lying between the Vistula and Dnieper or the bio-cultural borderland between the West and East of Europe. Absolute chronology is treated here both as a research goal and fundamental premise in the broader studies of the chronometric and development synchronization of "borderland" cultural systems. In a series of articles devoted to individual taxa a considerable number of new ^{14}C dates have been compared. The dates concern source materials that have been chosen from the point of view of their representativeness and chronometric value ("short-lived" materials were preferred to minimize a potential error). The vast majority of analyses were purposefully made in the same ^{14}C laboratory of the *State Scientific Center of Environmental Radiogeochemistry of Ukrainian Academy of Sciences* in Kiev taking advantage of funds generously provided by the *Polish Committee for Scientific Research*.

The volume devoted to the "dark" section of the "borderland" history (3150-1850 BC) is the first but not the last publication on the broader issues mentioned above that we intend to present in the near future.

Editorial comment

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

Alla V. Nikolova

RADIOCARBON DATES FROM THE GRAVES OF THE YAMNAYA CULTURE AT THE INGULETS RIVER (THE KIROVOHRAD REGION)

For the purposes of analysis, researchers selected a group of the Yamnaya culture (YC) graves studied by the expedition of the Institute of Archaeology of the Ukrainian Academy of Sciences in 1990-1992. The graves were part of the burial site located in the south-eastern part of the Kirovohrad Region near the villages of Golovkovka and Protopopovka in the Aleksandria District (Fig. 1:A, B).

The burial site was situated on the watershed plateau of the Ingulets river and its tributary, the Beshka, and consisted of 48 individual mounds. The mounds formed separate groups that stood 0.5 to 2 km from each other (Fig. 1:C-I). All in all, 56 graves were found in 41 excavated burial mounds, and human bones were taken from 17 YC graves for ^{14}C calibration dating (Table 1). Below is a description of the graves.

1. DESCRIPTION OF MATERIALS

1.1. BURIAL MOUNDS NEAR GOLOVKOVKA

Barrow 3. Height: 0.4 m, diameter: 20 m. Made over grave 1 of the YC (Fig. 2:1).

Grave 1 (main, Fig. 2:2) was found in the centre of the barrow. At the level of the buried black earth, the grave was covered with wooden blocks up to 0.18 m wide. The rectangular pit, 1.85 m x 1.06 m in size, was oriented from south-west to north-east. The bottom of the pit lay at a depth of 1 m from the level of the black earth. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended along the body. The legs, bent at the knees and raised up, later

fell down in a rhombus. The bones were covered with ochre. To the left of the skull, there was a lump of ochre shaped in the form of a crimson oval “flat cake”, 9.5 x 8 x 4 cm in size. There was some brown rot on the floor of the pit.

Barrow 5. Height: 3 m, diameter - 35 m. There were two graves of the YC in this barrow (Fig. 2:3).

Stratigraphy of the barrow. The barrow was built in two stages. The earlier mound was made over grave 5; it is 2.3 m high and about 25 m in diameter. Two fire-beds were found under this mound at the level of the ancient horizon: one in the north-eastern sector of the barrow, and the other 2.5 m to the south-east of the grave. The second mound of the barrow was connected with grave 3; after it was built, the barrow reached its current size.

Grave 3 (Fig. 3:1) was sunk into the south-eastern sector of the first mound, and covered with wooden blocks at that level. The rectangular pit, 1.4 x 1.05 m in size, oriented with its long sides from north-east to south-west, was ruined at some stage. The pit was 1 m deep. At the bottom of the pit, along the long walls, there was a groove, 5 cm wide and 2-4 cm deep. Only the upper part of the skeleton was preserved; it lay in a foetal position on its right side, head to the north-east. The right arm was extended, and the left arm was slightly bent at the elbow. There was a sheep/goat hoof behind the skull, and some white rot, coloured with ochre, on the floor of the pit.

Grave 5 (main, Fig. 3:3) was found at the centre of the barrow. The pit, rectangular in projection, with rounded corners, was 2 x 1.2 m in size, with its long sides oriented from south-west to north-east. It was covered with wooden blocks, placed parallel to the long sides. The pit was 1 m deep from the level of the buried black earth. The skeleton lay in a foetal position on its back, head to the south-west, arms slightly bent at the elbows. The bones were covered with ochre, and there were several lumps of ochre behind the skull. The floor displayed brown rot and patches of ochre.

Barrow 6. Height: 3.3 m, diameter: 40 m. Three graves of the YC were found in this barrow (Fig 4:1).

Stratigraphy of the barrow. The first bank was made over grave 8; it was 1.7 m high and 15 m in diameter. Later, grave 9 was sunk into the southern edge of the barrow, and was subsequently covered with a bank (2.5 m high, 22 m in diameter). The construction of the second bank was connected with grave 11, sunk in the south-eastern sector of the barrow; it was local in nature and made no significant changes to the size of the barrow. The next bank of the barrow was connected to graves of the Catacomb culture (CC). The last bank of the barrow was made over grave 2 of the Mnogovalikovoi Pottery culture (MPC), and also connected to the construction of a moat around the previous bank, as fragments of vessels belonging to that culture which were found in the moat suggest.

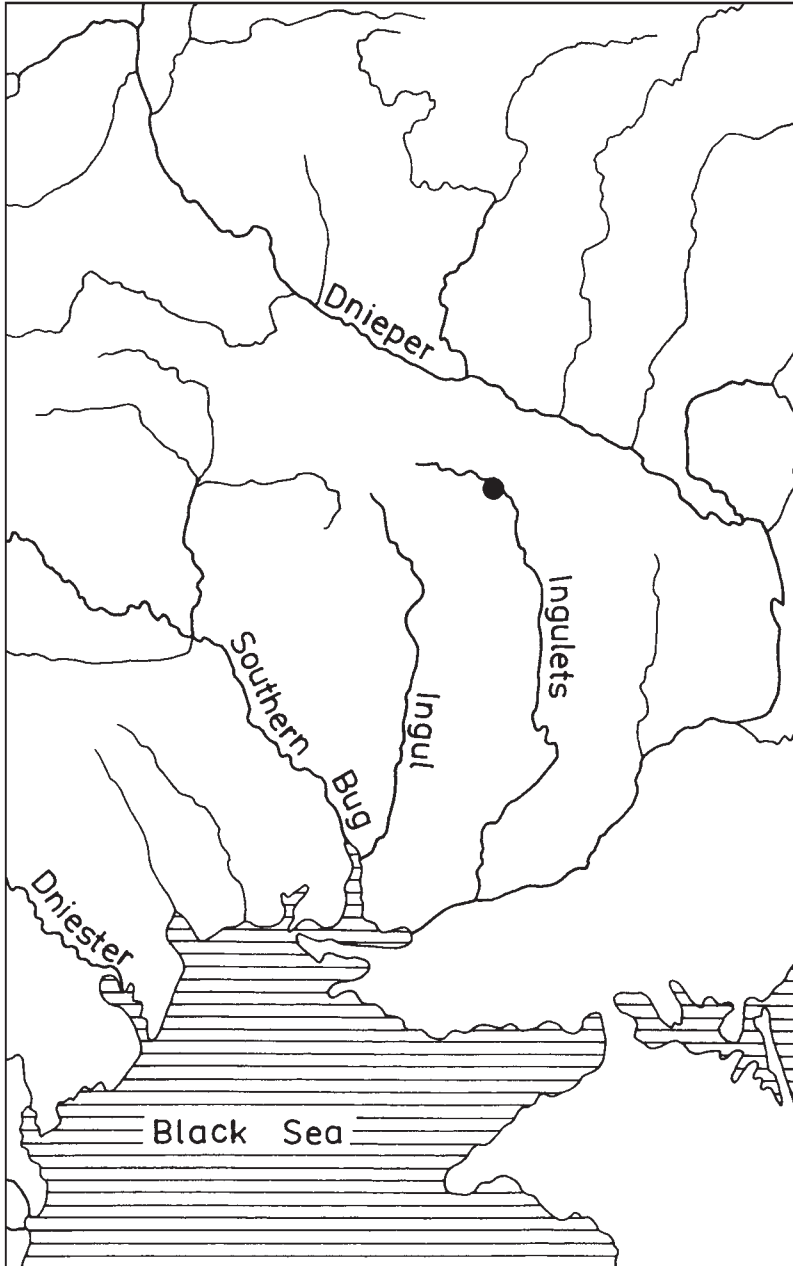
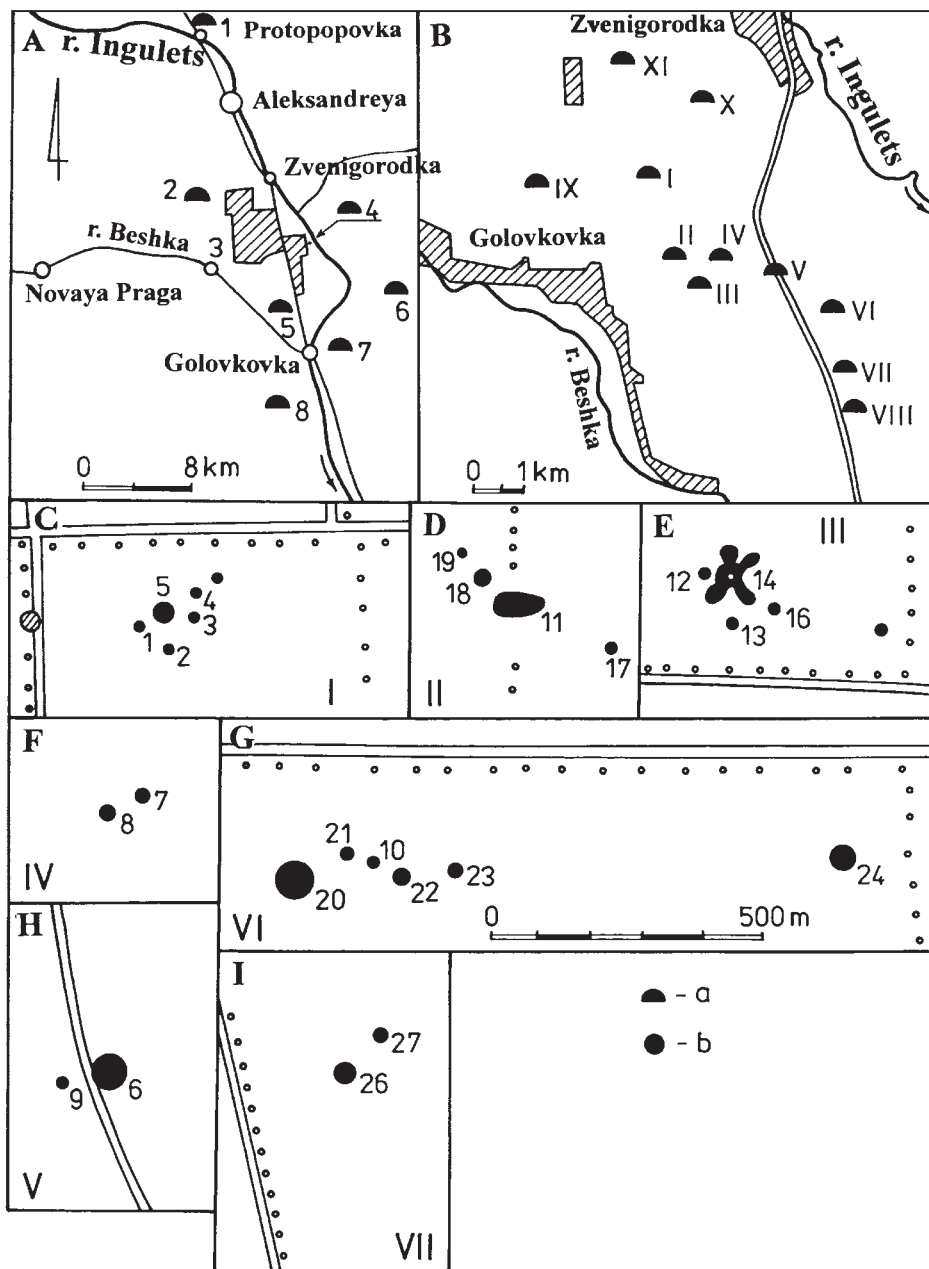


Fig. 1. Location (left) and layout (right) of the burial mound near the villages of Golovkovka and Protopovka in the Aleksandria District, Kirovohrad Region

A-B - layout of the location of the barrow groups; C-I - layouts of the location of the barrows within the barrow groups; (I-XI - barrow groups near the village Golovkovka). Legend: a - barrow groups; b - barrows



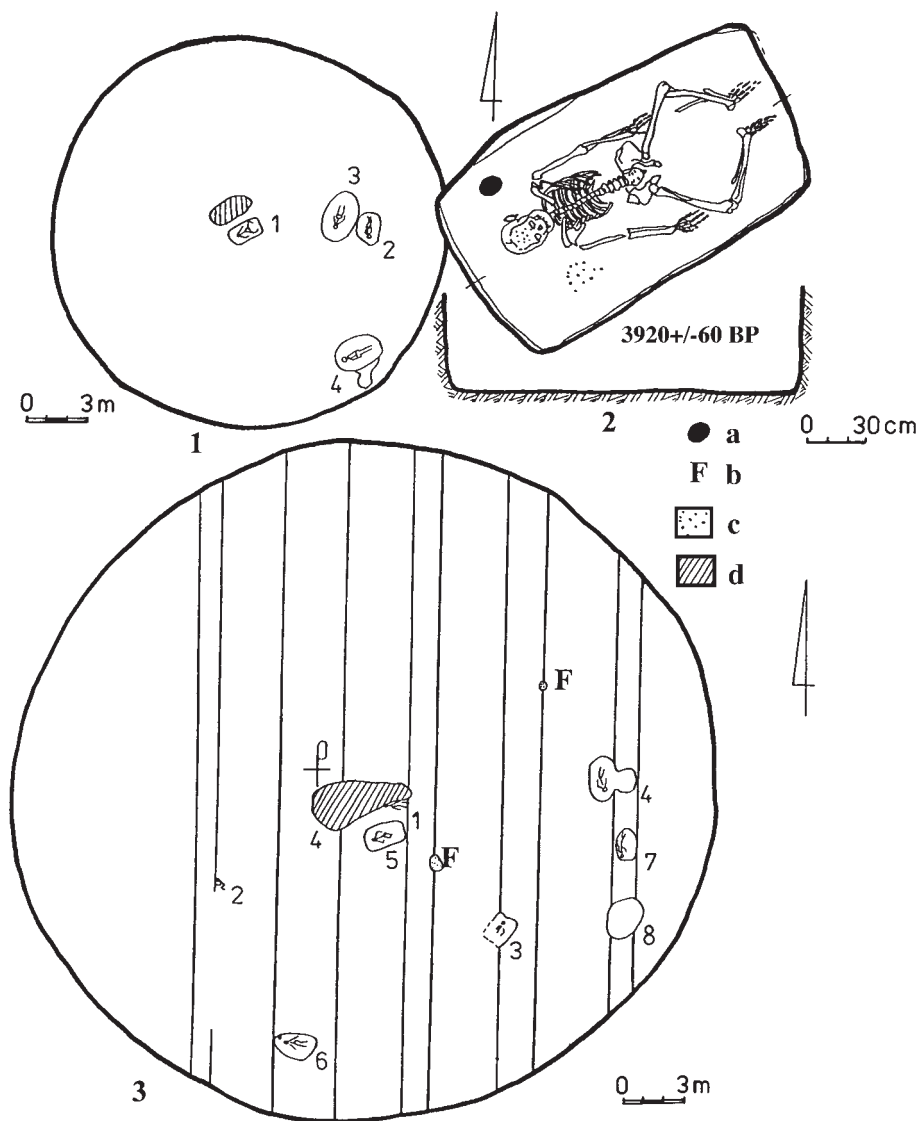


Fig. 2. Golovkovka, Aleksandria District, Kirovohrad Region

1 - general layout of barrow 3; 2 - plan and section of grave 1 of barrow 3; 3 - general layout of barrow 5. Legend: a - lump of ochre; b - remains of hearth; c - patches of ochre; d - diggins.

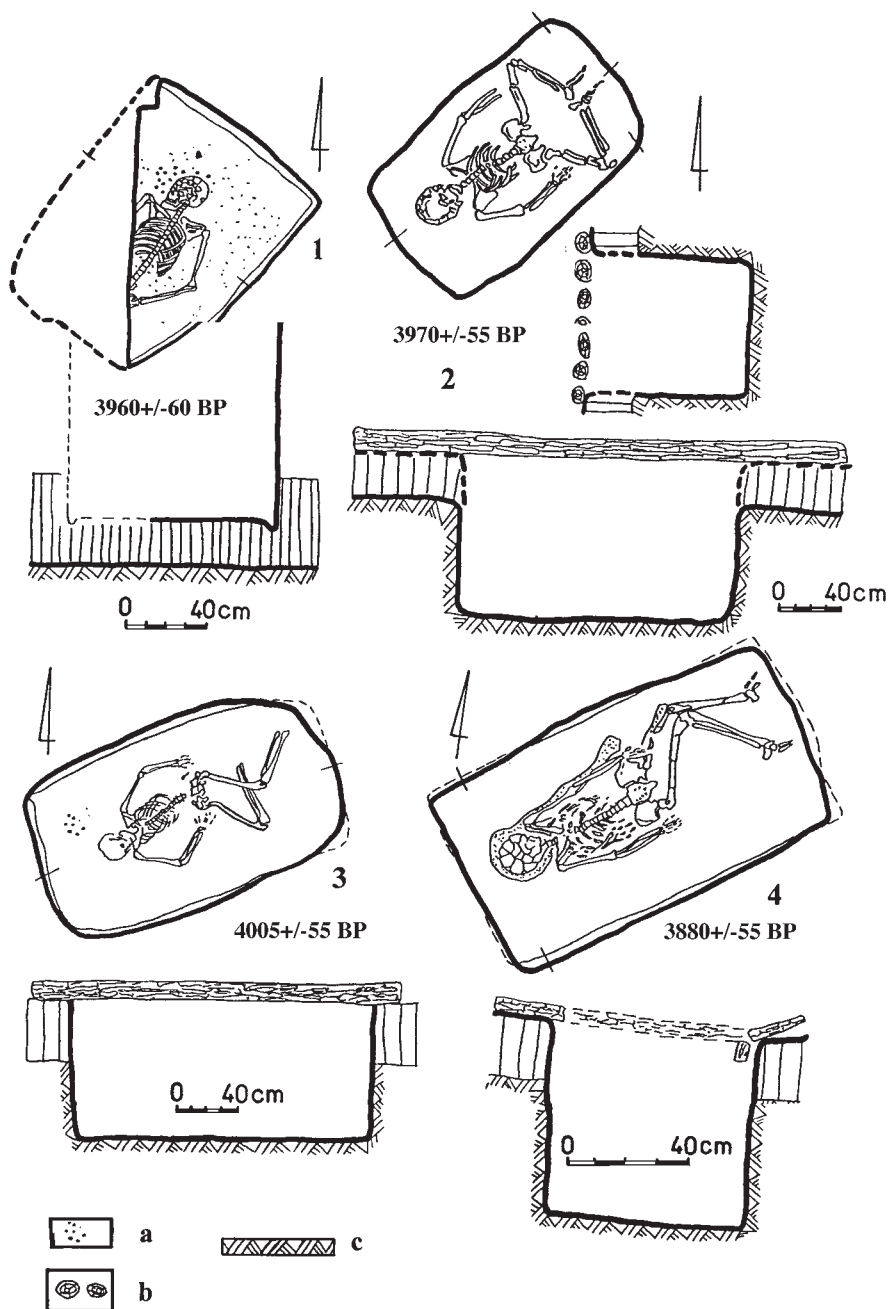


Fig. 3. Golovkovka, Aleksandria District, Kirovohrad Region

1 - plan and section of grave 3 of barrow 5; 2 - plan and section of grave 8 of barrow 6; 3 - plan and section of grave 5 of barrow 5; 4 - plan and section of grave 9 of barrow 6. Legend: a - patches of ochre; b - wooden shield; c - digging

List of ^{14}C datings

Site	Lab. No.	No barrow /No grave	Culture, Stratification Level	Date BP	Date BC 68% - 1 sigma	Date BC 95% - 2 sigma
Golovkovka	Ki-6718	3/1	YC 1	3920±60	2468-2312 2304-2296	2566-2524 2502-2270 2260-2202
Golovkovka	Ki-6730	5/3	YC 2	3960±60	2564-2526 2500-2398 2378-2348	2612-2280 2220-2210
Golovkovka	Ki-6731	5/5	YC 1	4005±55	2580-2460 2660-2640 2382-2338	2856-2820 2624-2394
Golovkovka	Ki-6719	6/8	YC 1	3970±55	2568-2522 2504-2450 2434-2402 2374-2356	2610-2598 2588-2290
Golovkovka	Ki-6720	6/9	YC 1	3880±55	2456-2418 2410-2284	2470-2192 2162-2146
Golovkovka	Ki-6721	6/11	YC 3	3850±55	2460-2314 2302-2296	2552-2542 2492-2198
Golovkovka	Ki-6722	7/4	YC 1	3980±60	2574-2452 2430-2402 2370-2360	2846-2826 2652-2648 2618-2288
Golovkovka	Ki-6723	11/5	YC 1	4030±60	2614-2464	2866-2810 2746-2726 2698-2450 2434-2400 2374-2354
Golovkovka	Ki-6724	12/3	YC 1	3950±50	2556-2536 2494-2444 2442-2398 2378-2348	2572-2518 2506-2288
Golovkovka	Ki-6727	14/2	YC ?	3910±55	2464-2316	2558-2532 2494-2270 2260-2202
Golovkovka	Ki-6725	14/3	YC ?	3895±55	2458-2312 2304-2294	2548-2544 2490-2196 2156-2150
Golovkovka	Ki-6726	14/4	YC ?	3840±50	2398-2378 2348-2198	2456-2184 2170-2140

Site	Lab. No.	No barrow /No grave	Culture, Stratification Level	Date BP	Date BC 68% - 1 sigma	Date BC 95% - 2 sigma
Golovkovka	Ki-6728	14/7	YC 1	3905±55	2500-2300	2580-2530 2510-2270 2250-2200
Golovkovka	Ki-6729	14/9	YC ?	3920±50	2580-2540 2500-2010	2580-2200
Protopopovka	Ki-6733	1/2	YC 1	3945±50	2580-2530 2510-2450 2430-2360	2590-2300
Protopopovka	Ki-6734	1/3	YC ?	3925±55	2560-2540 2500-2340	2580-2280 2230-2210
Protopopovka	Ki-6732	1/4	YC ?	3890±55	2410-2310	2570-2540 2500-2210

Grave 8 (main, Fig. 3:2) was located in the centre of the barrow. The clay discharge lay to the north-west and the south-east of the pit. The pit was rectangular in shape, 1.8 x 1.1 m in size, with its long walls oriented from south-west to north-east. At the level of the buried black earth it was covered with wooden beams (0.18 m in diameter), placed along the longer walls. The pit was 0.95 m deep. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the legs, bent at the knees and raised up, later fell down in a rhombus. The bones were coloured with ochre. The floor of the pit displayed brown rot.

Grave 9 (Fig. 3:4) was sunk in the barrow, 4.2 m to the south of the "0". The rectangular pit, 1.85 x 1 m in size, was oriented with its long sides from south-west to north-east. It was 0.9 m deep, and covered with wooden blocks placed across it. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the legs, bent at the knees and raised up, later fell down to the left. The bones were covered with ochre, especially intensive on the skull. Patches of ochre were also found under the skull and near the left hand. There was some brown rot on the floor of the pit.

Grave 11 (Fig. 4:2) was found to the east of the previous grave. The pit was trapezoid in shape, 1.7 x 0.85-1.15 m in size, with its long sides oriented from south-west to north-east. The entrance to the 0.7 m deep pit was blocked with beams, arranged across it. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the legs, bent at the knees and raised up, fell to the right. The skull, bones of the hands and the feet were coloured with ochre. There was brown rot at the bottom of the pit.

Barrow 7. Height: 0.9 m, diameter: 30 m. It contained one grave of the YC, and was constructed over that grave (Fig. 5:1).

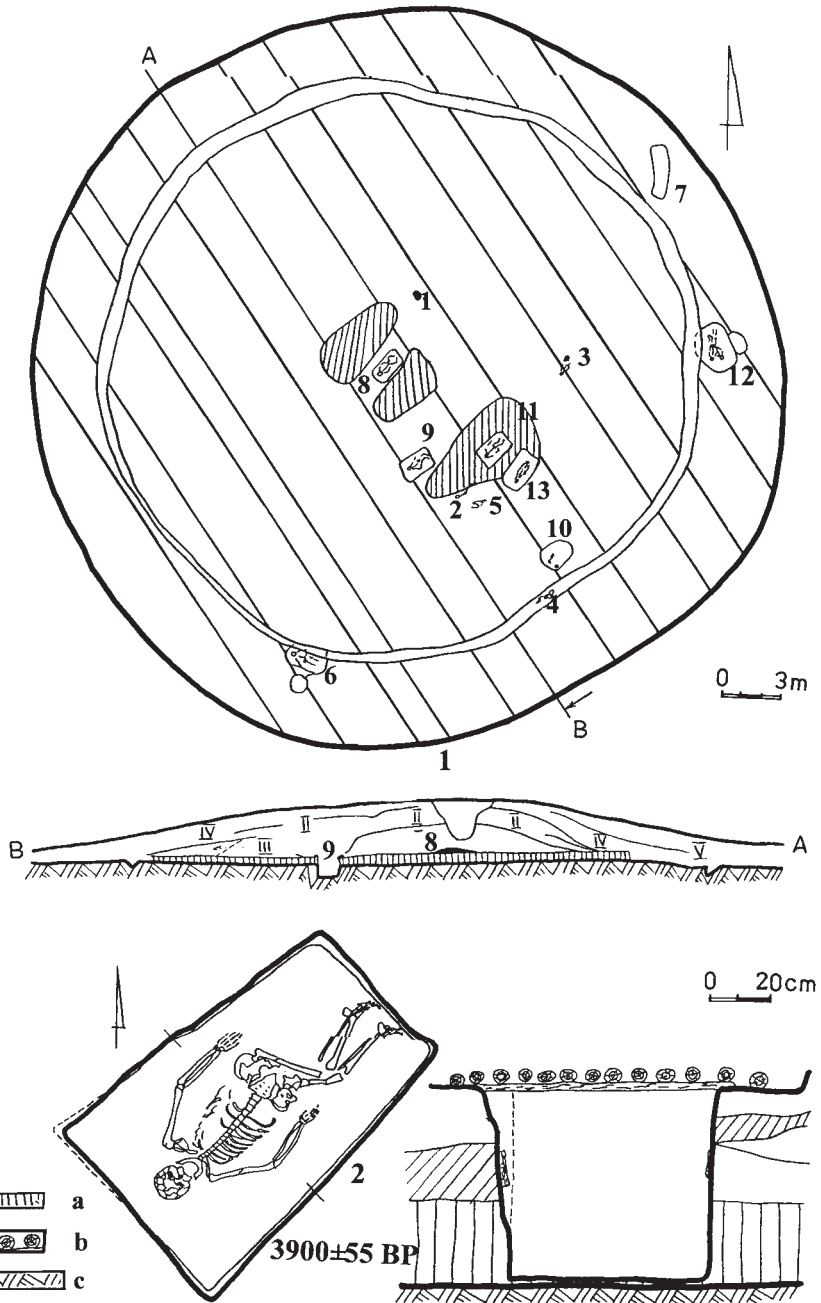


Fig. 4. Golovkovka, Aleksandria District, Kirovohrad Region

1 - general layout and section of barrow 6; 2- plan and section of grave 11. Legend: a - buried black earth; b - wooden shield c - digging

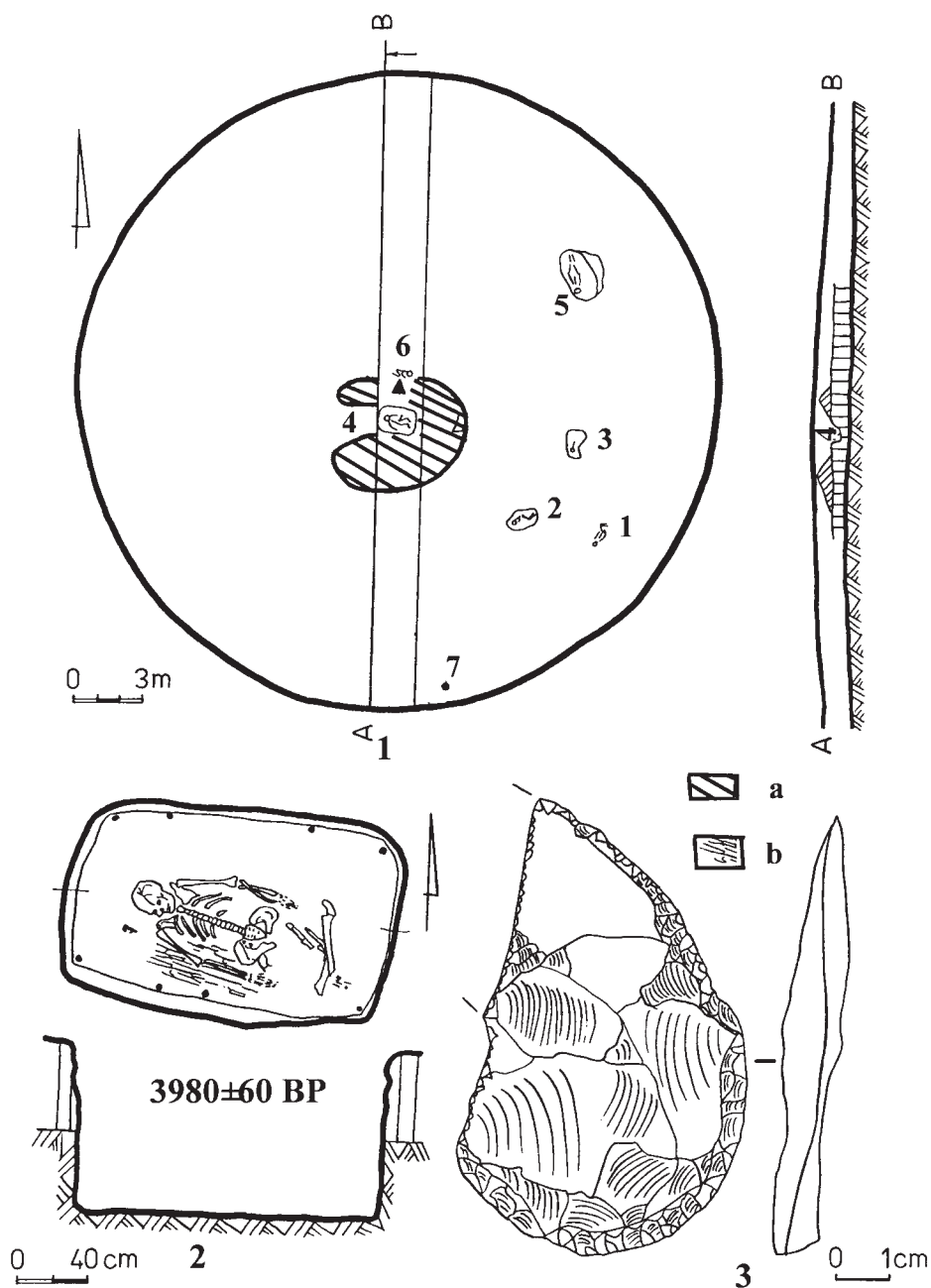


Fig. 5. Golovkovka, Aleksandria District, Kirovohrad Region
 1 - general plan and sections of barrow 7; 2 - plan and section of grave 4 of barrow 7; 3 - flint knife from grave 4. Legend: a - diggings; b - fibre rot from the mat

Grave 4 (main, Fig. 5:2) was found in the centre of the rectangular pit, 1.7 x 1.1 m in size, oriented with its long sides from west to east. The discharge lay to the north of the pit, which was 0.95 m deep. At the level of the buried black earth, the pit was covered with wooden blocks; in the south-eastern corner of the pit there was a block of granite, 0.4 x 0.3 x 0.08 m in size. The skeleton lay in a foetal position on its back, head to the west. The arms were extended; the legs, bent at the knees and raised up, later fell to the right. To the right of the skull, there was a fragment, 8 x 5.5 x 0.8 cm in size, of a flint knife with a broken blade (Fig. 5:3). The remaining piece, made of a flat flint flake, retouched on both sides, consisted of a part of the blade and the blunted base of the haft, and was possibly used as a scraper. In the bottom of the pit, along the walls, there were postholes 10 cm deep, 5 cm in diameter. The skull, bones of the hands and the feet were coloured with ochre. There were also the remains of a grass mat on the pit floor.

Barrow 11. It represented the so-called “maidan”, i.e. its bank was used for the production of saltpetre in the XVII-XVIII centuries, and, therefore, the major part of it was ruined. Only a small part of the ancient bank remained. There, two graves of the YC were found; the one that was chosen for determining the dates had presumably been connected to the construction of the second bank of the barrow.

Grave 5 (Fig. 6:2) was made in a pit 3 x 2.7 m in size, with its long walls oriented from south-west to north-east. On a ledge in the pit, 1.6 m deep from the “0” level, there was a shield made from ten beams. Below the ledge, there was a trapezoid pit, 1.95 x 1.45-0.9 m in size. The bottom of the pit lay 1 m below the ledge and displayed 8 postholes, 3-4 cm in diameter and up to 15 cm deep. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the legs, bent at the knees and raised up, later fell to the right. The bones were covered with ochre. There was brown rot at the bottom of the pit.

Barrow 12. Height: 0.5m, diameter: 20 m. It was made over a YC grave (Fig. 6:1).

Grave 3 (main, Fig. 7:2) was located in the centre of the barrow. The rectangular pit, with rounded corners, was 2.45 x 1.25 m in size, with its longer walls oriented from north-east to south-west. The pit was 0.6 m deep. The filling contained the remains of a wooden shield and lumps of ochre. The skeleton lay in a foetal position on its back, head to the north-east. The arms were extended, the legs, bent at the knees and raised up, later fell down in a rhombus. The skull and the bones were covered with ochre. The skull rested on a 15-cm earth “pillow”.

Barrow 14. The bank of the barrow originally reached the height of 6-8 m and was 60 m in diameter. Of seven graves of the YC that were found in the barrow, 5 were selected for analysis (Fig. 7:1).

Stratigraphy of the barrow. The central part of the barrow had been ruined by a pit (“maidan”) made for the production of saltpetre; the remaining “flaps” of the barrow suggested that the earliest of the excavated graves had been grave 7 and

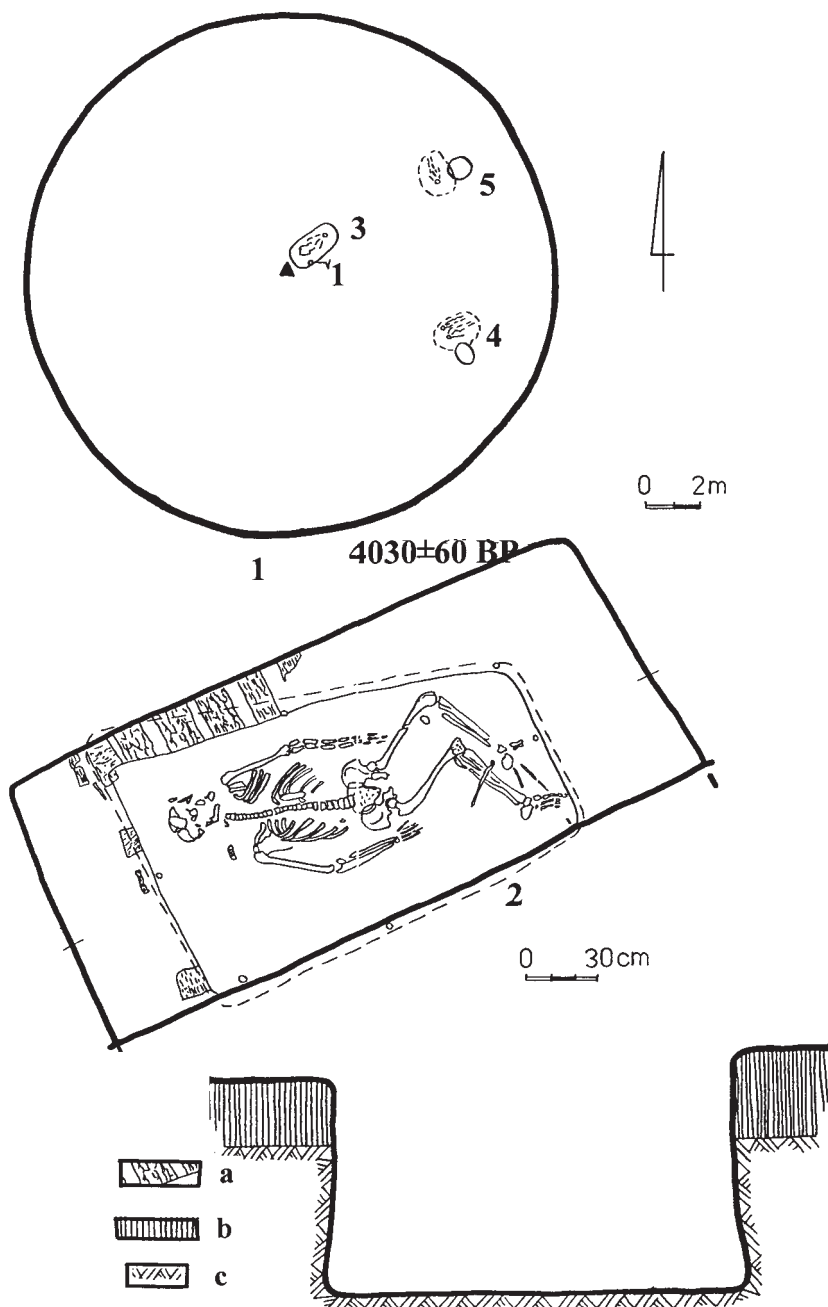


Fig. 6. Golovkovka, Aleksandria District, Kirovohrad Region

1 - general plan of barrow 12; 2 - plan and section of grave 5 of barrow 11. Legend: a - wooden shield; b - buried black earth; c - digging

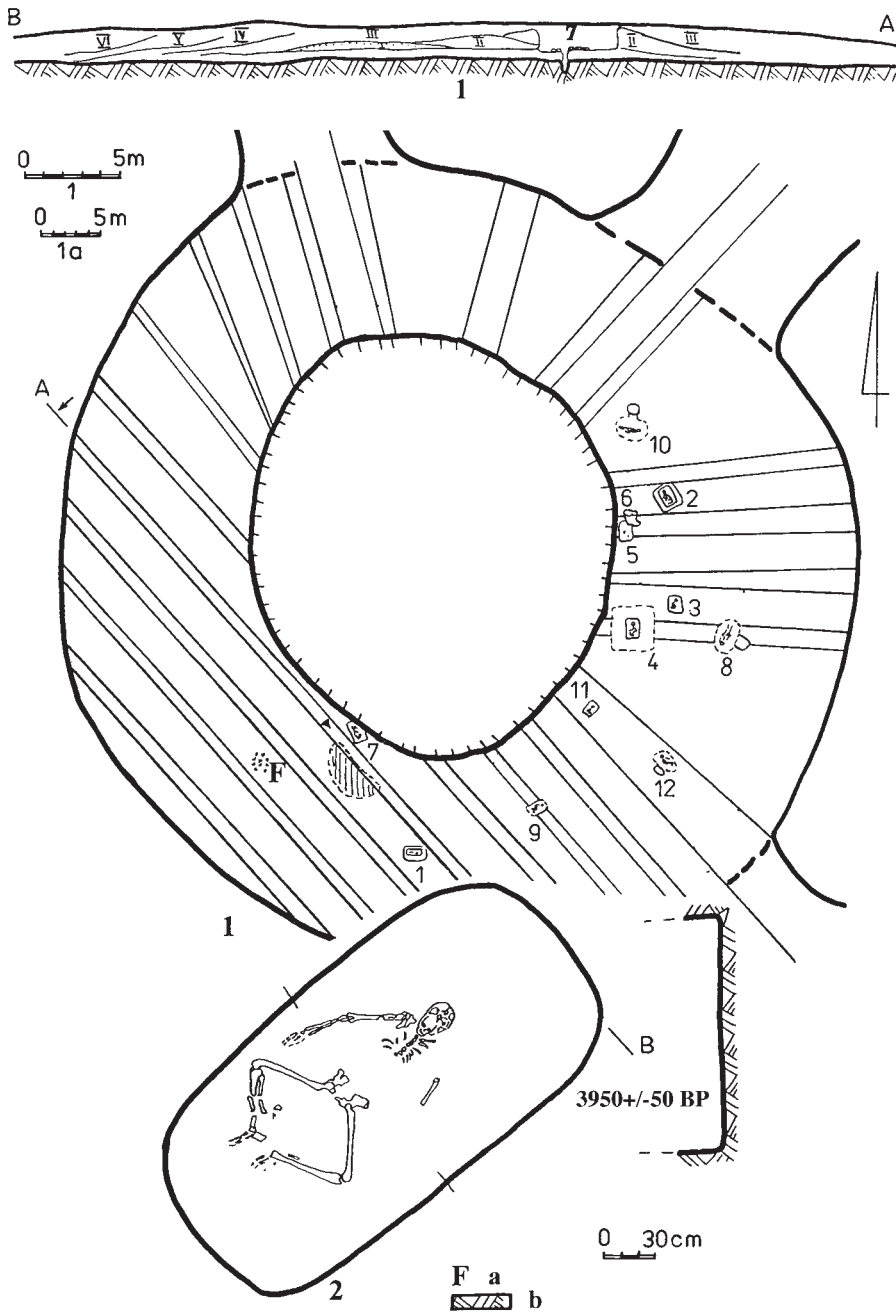


Fig. 7. Golovkovka, Aleksandria District, Kirovohrad Region
 1 - general plan and section of barrow 14; 2 - plan and section of grave 3 of barrow 12. Legend: a - remains of fire-beds; b - digging

that one of the traced banks of the barrow had been connected to that grave. The other excavated graves were sunk after grave 7.

Grave 2 (Fig. 8:1) was located at a distance of 18 m to the north-east of the assumed centre of the barrow. It was made in a pit 2.15 x 1.9 m in size, with its longer walls oriented from north-west to south-east. On a ledge in the pit, 1.85 m deep, there were wooden blocks. In the south-eastern corner of the pit there was a small pile of slightly burnt bones of a small animal (sheep-goat?). Below the shield there was a rectangular pit, 1.55 x 1 m in size, 0.65 m deep from the level of the ledge. The skeleton lay in a foetal position on its left side, head to the north-west. The left arm was extended, the right arm was bent at the elbow. The legs were bent at right angles to the body. On the floor of the pit were the remains of a grass mat, 1.15 x 0.65 m, covered with wooden rods. Under the skull and in the northern corner of the mat there were traces of ochre. In front of the skeleton there was a long wooden bar, 0.78 m long and 1 cm thick. Beyond the mat there were several bones of a small animal. Behind the head of the skeleton was a moulded vessel with a short straight neck, strongly contoured shoulders and a flat bottom. The shoulders were decorated with a "herringbone" pattern made with a comb-like instrument. The vessel was 14.1 cm tall, the diameter 12.2 cm at the rim, 16.6 cm in the body, and 6 cm at the bottom (Fig. 8:2).

Grave 3 (Fig. 8:3) was found 19.5 m to the south-east of the assumed centre. The rectangular pit, 1.3 x 1 m in size, was oriented with its long walls from north to south. The filling contained the remains of a wooden shield. The bottom of the pit lay 2.2 m deep from the "0" level. The skeleton lay in a foetal position on its left side, head to the north. Both arms were slightly bent at the elbows. The legs were bent at right angles to the body. There was a grass mat on the floor, with an unbroken layer of thin rods.

Grave 4 (Fig. 9:3) was found 15.5 m to the south-east of the assumed centre. At the depth of 1.1 m, there were partially preserved longitudinal ledges, 1.05 and 1 m wide, which had served as rests for the beams, 16 cm in diameter, that had been placed along the pit. One of the beams was partially burned. Below the shield, there was a rectangular pit with rounded corners, 1.7 x 1 m in size, with its longer walls oriented from north to south. The pit was 1 m deep from the level of the ledge. The skeleton lay in a foetal position on its back, head to the north. The arms were extended; the legs, originally bent at the knees and raised up, fell to the right. The bones were covered with ochre. The bottom of the pit was covered with a grass mat, sprinkled with ochre, and featured six postholes, 5 cm in diameter and 10 cm deep.

Grave 7 (Fig. 9:2) was found 15 m to the south-west of the assumed centre. Ledges, 1 m wide, were made at a depth of 1.5 m from the entrance level, and supported several beams, placed along the pit. Below the shield was a rectangular pit, its corners emphasised with vertical grooves. The pit, 1.8 x 1 m in size, and 1.1

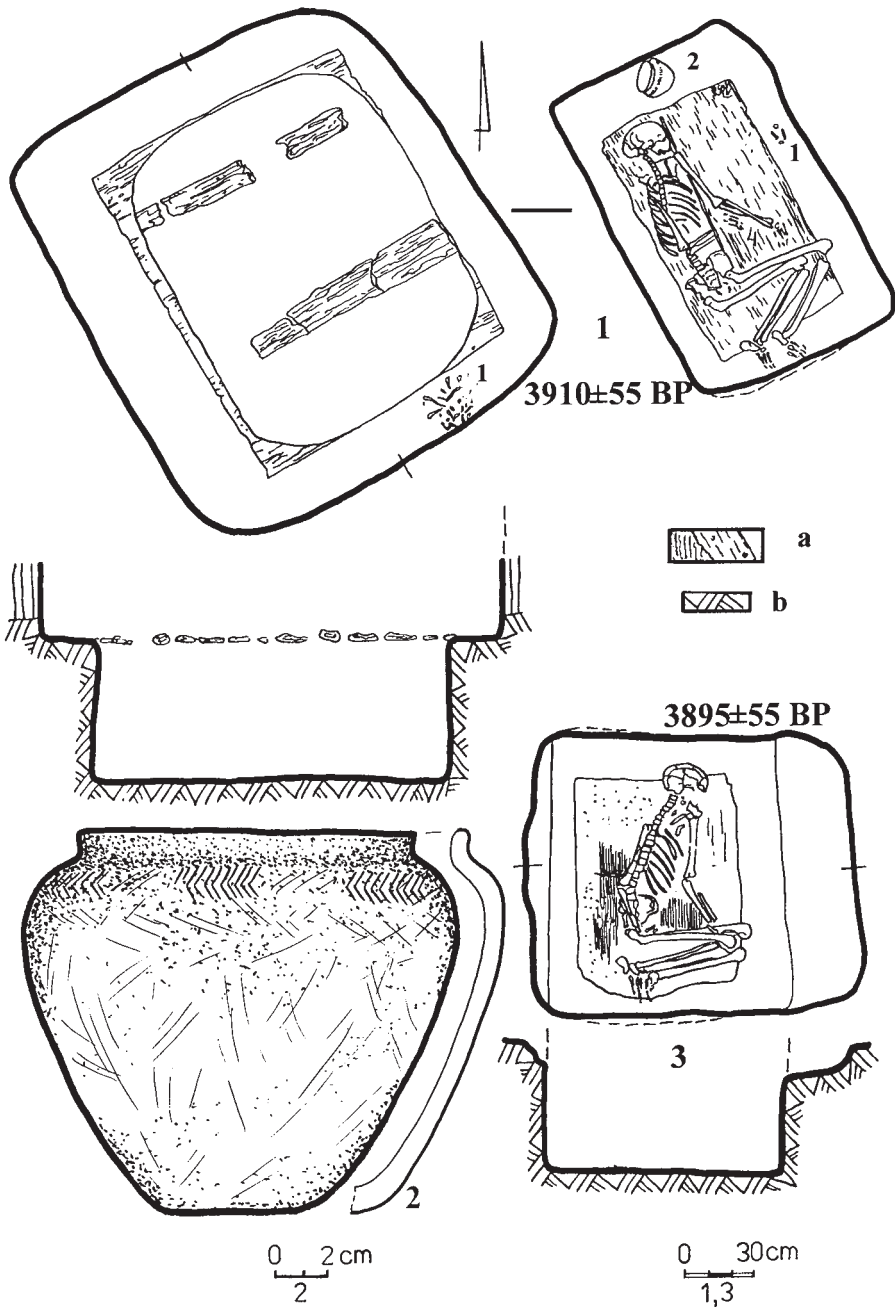


Fig. 8. Golovkovka, Aleksandria District, Kirovohrad Region

1 - plan and section of grave 2 of barrow 14 (1 - animal bones; 2 - vessel); 2 - vessel from grave 2; 3 - plan and section of grave 3 of barrow 14. Legend: a - fibre rot from the mat and wooden shield; b - digging

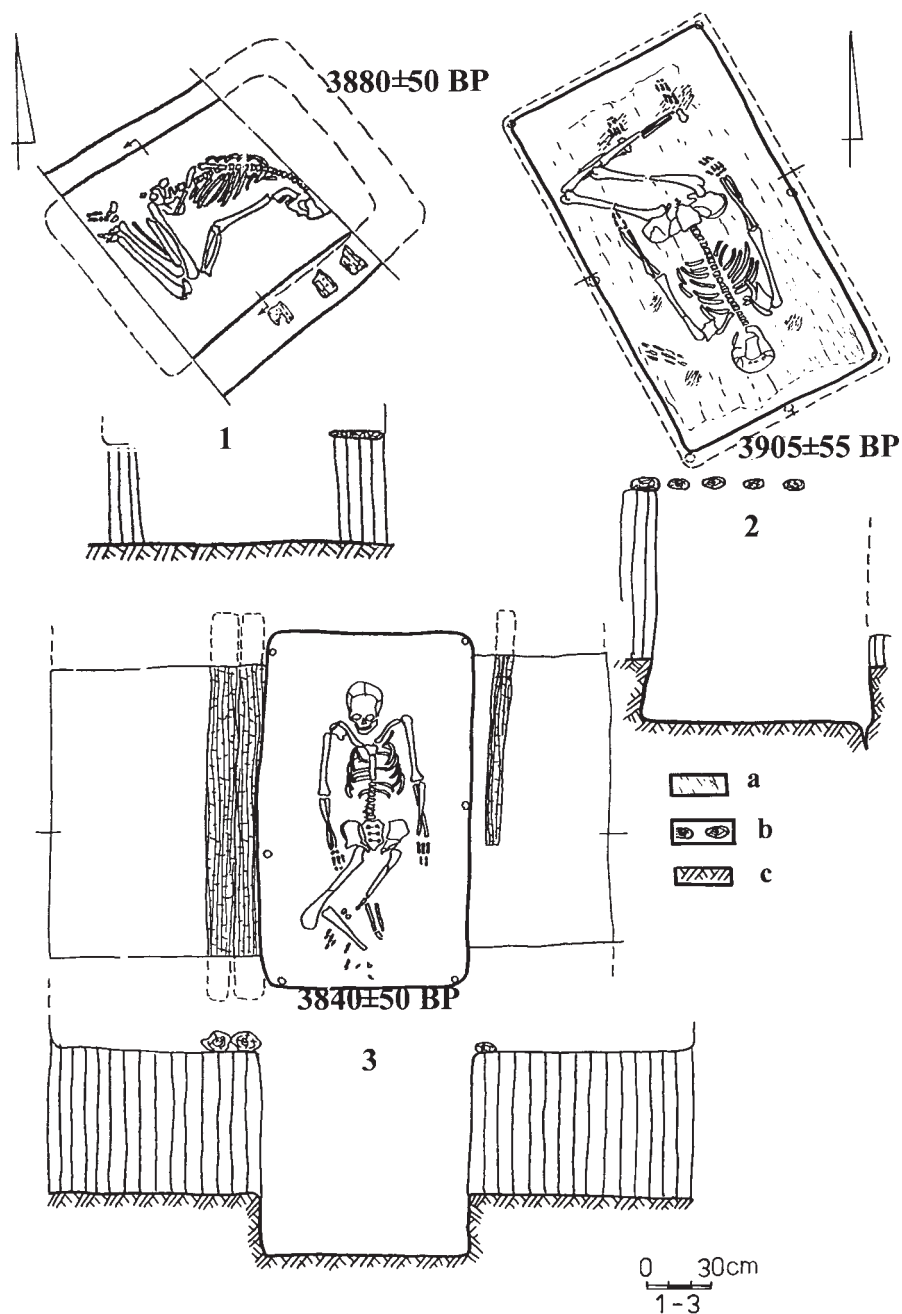


Fig. 9. Golovkovka, Aleksandria District, Kirovohrad Region

1 - plan and section of grave 9 of barrow 14; 2 - plan and section of grave 7 of barrow 14; 3 - plan and section of grave 4 of barrow 14. Legend: a - fibre rot from the mat; b - wooden shield; c - digging

m deep from the level of the ledges, was oriented with its long sides from south-west to north-east. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the legs, bent at the knees and raised up, later fell to the left. The bones were covered with ochre. There were patches of ochre and some brown rot on the floor. At the bottom of the pit, along the wall, there were six postholes with wooden remains inside. The hollows were 5 cm in diameter and 10 cm deep.

Grave 9 (Fig. 9:1) was sunk 22.5 m to the south-east of the assumed centre. 1.5 m deep from the "0" level there were several ledges, 0.12-0.2 m wide, which had served as the rests for 0.1 m wide wooden blocks placed across the pit. The filling of the pit contained one half of a granite grinder, oval in projection and semi-circular in section. The working facet of the grinder displayed traces of ochre. Its dimensions were 12.2 x 9.5 x 4.5 cm. Below the shield there was a rectangular pit, 1.1 x 0.8 m in size, with its longer sides oriented from north-east to south-west. The pit was 0.4 m deep from the level of the ledges. The skeleton lay in a foetal position on its left side, head to the north-east. Both of the arms were bent at the elbows. The legs were bent at right angles to the body. There was brown rot on the floor.

1.2. BARROW 1 NEAR THE VILLAGE OF PROTOPOPOVKA

The barrow stood on the high plateau of the Ingul's left bank. By the time the excavations began, the central part, and the north-eastern and south-western "flaps" had been ruined by earlier construction works. The remaining barrow was 2 m high, and 20 m in diameter.

Of the four graves of the YC found in the barrow, samples for analysis were taken from three (Fig. 10:4; 11).

Stratigraphy of the barrow. The barrow was constructed in two stages. The first bank was connected to grave 2. It consisted of 2 construction layers. The first of these, 0.9 m deep and 10 m in diameter, was made of black earth "pellets". In the process of making the bank, the buried black earth and the surface of the bank had been covered with a watery layer of soil. On top of this was the second layer, 0.5 m thick and 15 m in diameter, also made of black earth "pellets". The excavation team did not manage to trace the connection of the second black earth bank with a particular grave (Fig. 10:1-3).

Grave 2 (main, Fig. 10:4) was found in the centre of the barrow; the discharge lying to the south of the grave. At the level of the buried black earth, the pit was covered with a layer of cane and two layers of crossed thin rods. The rectangular

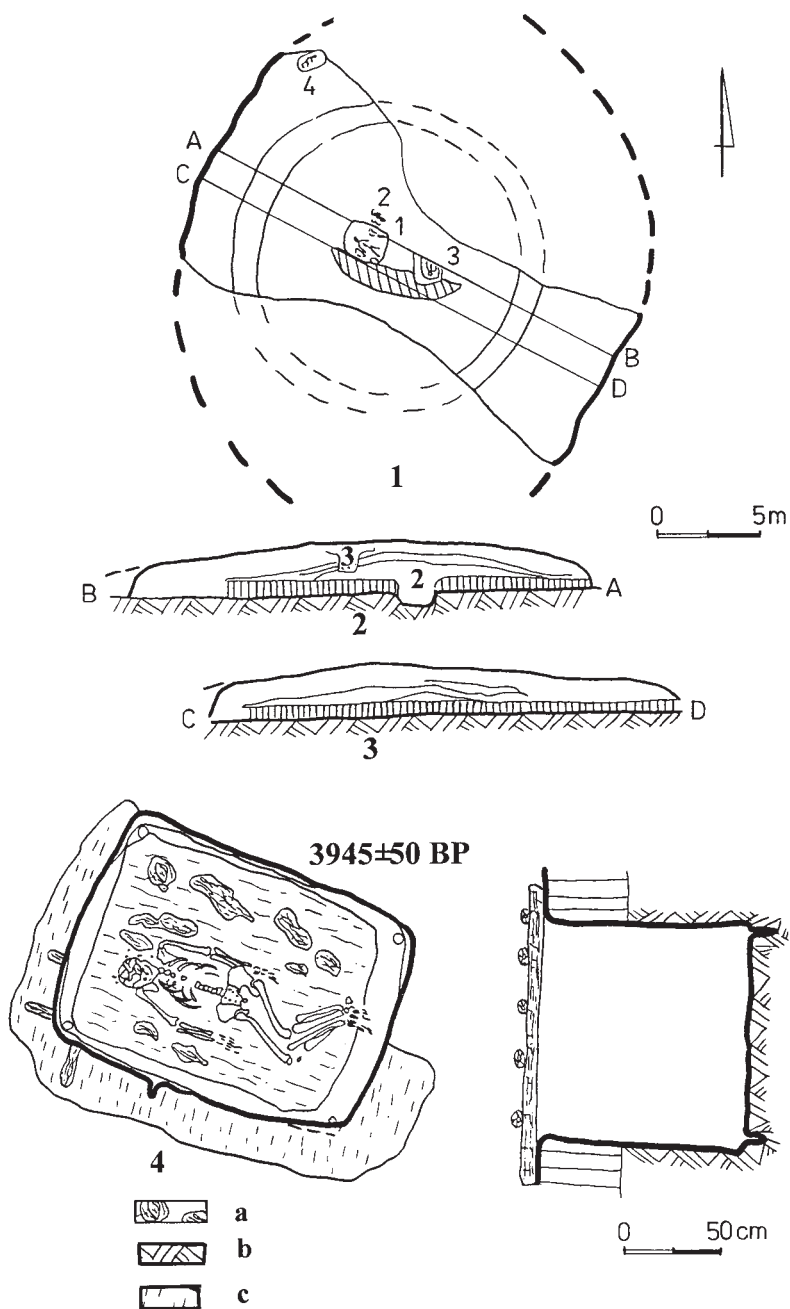


Fig. 10. Protopopovka, Aleksandria District, Kirovohrad Region

1 - plan of barrow 1; 2-3 - sections of barrow 1; 4 - plan and section of grave 3 of barrow 1. Legend: a - wooden shield; b - digging; c - fibre rot from the mat

pit, with rounded corners, was 2 x 1.6 m in size, with its longer walls oriented from north-west to south-east. The pit was 1.25 m deep from the level of the buried black earth. The skeleton lay in a foetal position on its back, head to the north-west. The arms were extended along the body; the legs, originally bent at the knees and raised up, fell to the right. The skull was intensively covered with ochre. Patches of ochre were also seen on the pelvis and the feet bones. There was brown rot at the bottom of the pit. In the corners at the bottom there were holes made by wooden poles, 5 cm in diameter and 11 cm deep.

Grave 3 (Fig. 11:2) was sunk into the centre of the last bank. There were ledges made, 0.5 m deep from the entry level, which served as rests for the beam cover placed across the pit. Below the level of the ledges there was a rectangular pit, 0.9 x 0.8 m in size, with its longer walls oriented from south-west to north-east. The pit was 0.6 m deep from the level of the ledges. The skeleton lay in a foetal position on its back, head to the south-west. The arms were extended; the leg bones were not preserved. There was some brown rot at the bottom of the pit.

Grave 4 (Fig. 11:1) was sunk 10.5 m to the north-east of the assumed centre. The rectangular pit, 1.5 x 0.96 m in size, was oriented with its longer sides from south-west to north-east. The bottom lay 2.7 m from the "0" level. The skeleton lay in a foetal position on its left side, head to the south-west. The left arm was extended, the right arm was bent at the elbow; the legs were bent at right angles to the body. There was some brown rot and patches of ochre at the bottom of the pit.

2. CHRONOLOGY (CONCLUSION)

2.1. RELATIVE DATING OF THE MONUMENTS

From the features of the burial rite, the presented group of graves may be divided into two groups: (1) graves with skeletons in a foetal position on their backs (12 graves); and (2) graves with skeletons in a foetal position on their side (5 graves, with 1 skeleton on its right side and 4 on their left side). Most of the graves of the first group were oriented in a westerly direction: skeletons in 8 out of 12 graves lay with their heads to the south-west; one to the west, one to the north-west, one to the north, and one to the north-east. In two of the graves, the skeletons were positioned either on the right or on the left side, heads to the north-east; and in three other graves, the skeletons lay in a foetal position on their left side with their heads to the south-west, the north-west and the north.

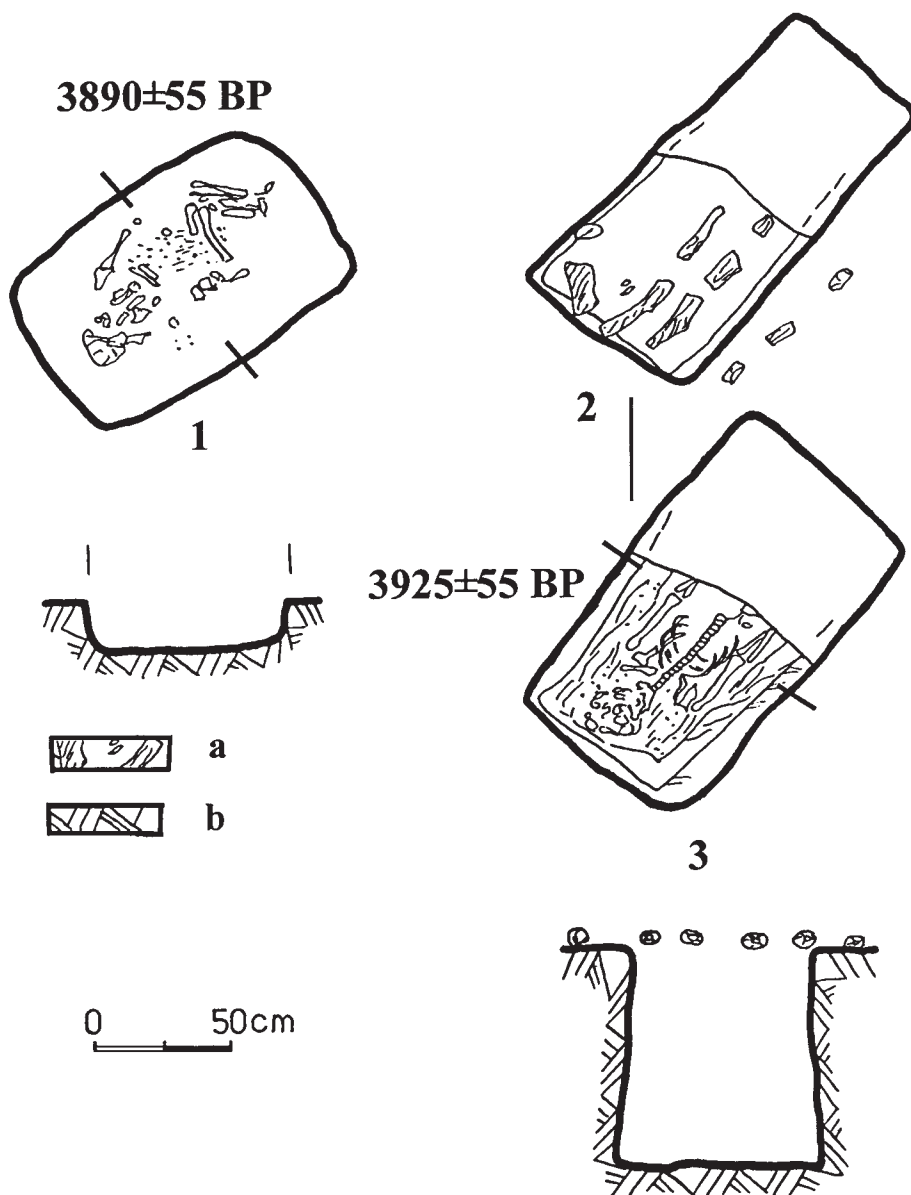


Fig. 11. Protopopovka, Aleksandria District, Kirovohrad Region

1 - plan and section of grave 4 of barrow 1; 2-3 - plans and section of grave 3 of barrow 1. Legend: a - wooden shield; b - digging

Stratigraphically, the graves can be divided as follows: in one case, only one type of grave was found (barrow 6), while in three other barrows there were graves in which the skeletons had been positioned in the same way but oriented differently, and there were graves in which both the position of the skeleton and its orientation were different (barrows 5 and 14 near the village of Golovkovka, and barrow 2 near the village of Protopopovka). In these barrows, graves that contained skeletons positioned on their backs had been made earlier than the graves with the skeletons in a foetal position on their right or left side. On the other hand, 5 graves with skeletons that lay in a foetal position on their backs, with their heads towards the south-west, the north-west, the west and the north, had some specific details such as postholes in the bottom of the grave. In general, this detail was typical for 40 percent of the graves studied at the burial site, and distinguished the site significantly from those in other regions of Ukraine, where this detail of the burial rite did not occur in more than 5 to 10 percent [Nikolova 1992]. It should be noted that the role of these postholes is not sufficiently clear, despite the assumptions of some researchers that they were used for installing some specific wooden constructions in the pits. Although wood was typically very well-preserved in this region, our observations suggest that no traces of wood were found inside the postholes in most of the graves. Possibly, before closing the grave, such constructions were removed from the pit, or else the postholes may have been designed for a completely different purpose. Whatever the case, this detail of the burial rite may probably be regarded as a specific ethno-cultural feature.

The analysis of the stratigraphic location of the features of the burial rite, made for all graves of the burial site concerned, suggests that the earliest graves were the small group of those which contained skeletons in a foetal position on their backs, with their heads to the east [Polin, Tupchenko, Nikolova 1992; 1993; 1994]. The next chronological group is represented by graves that contained skeletons that had been positioned on their backs, with their heads to the west and the south-west, the latter being the key direction in that burial site and occurring in about 70 percent of cases. Other graves that were made at the same time contained skeletons that were positioned on their right side and oriented towards the south-west. These graves displayed a specific feature: postholes at the bottom of the pit. The fact that the two ways of positioning the body coincided in time is proved by cases where a single bank covered graves of both kinds, as well as by graves where the bodies were buried on their backs that were made later than those containing skeletons that lay on their right side (for instance, Golovkovka, barrows 20, 25), and by several double and group graves [Polin, Tupchenko, Nikolova 1993:17; 1994:10]. The last chronological group of the burial site consists of graves containing skeletons in a foetal position on their left side. One of the graves, dated with the use of the ¹⁴ method, contained a vessel related to the ninth cluster, according to our classification [Nikolova, Mamchych 1997:108], and has a wide range of similarities both with the Late YC and the Early CC.

Within the above framework of chronological classification of the YC monuments of the Ukrainian steppe, these materials relate to the 3rd and the 4th chronological periods [Nikolova 1992:16].

2.2. ABSOLUTE DATING OF THE MONUMENTS

The analysis of the dates obtained using the ^{14}C method and the archaeological data brings us to the following conclusions.

a. According to the calibrated ^{14}C dates, with 95.5% probability (Table 1), the YC graves of this burial site had existed for a substantial time, and the graves were dated between 2866 - 2140 BC (Ki-6723, 4030 ± 60 - Ki-6726, 3840 ± 50 BP). However, taking into account standard deviations, the difference between individual radiocarbon dates of some graves amounts to 460-300 years (for example, Ki-6723 and Ki-6725).

Table 2

Calibration after Weninger 1993

Lab. No.	No. barrow /No. grave	Date BP	Date BC/AD cal
Ki-6718	3/1	3920 ± 60	2379 ± 85
Ki-6730	5/3	3960 ± 60	2446 ± 97
Ki-6731	5/5	4005 ± 55	2516 ± 72
Ki-6719	6/8	3970 ± 55	2472 ± 90
Ki-6720	6/9	3880 ± 55	2356 ± 89
Ki-6721	6/11	3850 ± 55	2296 ± 94
Ki-6722	7/4	3980 ± 60	2480 ± 93
Ki-6723	11/5	4030 ± 60	2539 ± 81
Ki-6724	12/3	3950 ± 50	2403 ± 81
Ki-6727	14/2	3910 ± 55	2377 ± 79
Ki-6725	14/3	3895 ± 55	2371 ± 83
Ki-6726	14/4	3840 ± 50	2285 ± 90
Ki-6728	14/7	3905 ± 55	2374 ± 80
Ki-6729	14/9	3920 ± 50	2386 ± 72
Ki-6733	1/2	3945 ± 50	2398 ± 78
Ki-6734	1/3	3925 ± 55	2388 ± 78
Ki-6732	1/4	3890 ± 55	2364 ± 85

b. The use of the B. Weninger program [Kadrow, Szymt 1996b: 104-108] somewhat reduces this time span (Table 2). According to these data, the dates of the graves for this burial site fall between 2620-2195 BC, while standard deviations of

individual calibrated ^{14}C dates fall in the range of 194 to 144 years (for example, Ki-6730 and Ki-6731).

c. Comparison of the data of the burial rite and of the calibrated ^{14}C dates obtained suggests that some of the graves which display the same sets of burial rite features differ substantially in their calibrated ^{14}C dates, while graves with different sets of features have close calibrated ^{14}C dates. The graves containing skeletons positioned on their backs display the broadest range of dates: 2539 ± 81 (Ki-6723) - 2285 ± 90 (Ki-6726) BC (Table 2); one grave containing a skeleton positioned on its right side dates back to 2446 ± 97 BC (Ki-6730). The range is somewhat narrower for the graves that contain skeletons positioned on their left side: it falls within 2386 ± 72 - 2364 ± 85 BC (Ki-6729 and Ki-6732). Of the 12 graves of the first group, nine fall into the range of 2539 ± 81 (ki-6723) - 2374 ± 80 (Ki-6728) BC (Table 2); meanwhile, the graves of this group, united by the occurrence of postholes in the floor of the pits, produce the most substantial difference in ^{14}C calibrations: 2539 ± 81 (Ki-6723) - 2285 ± 90 Ki-6726 BC.

d. Comparison of stratigraphic observations and of ^{14}C calibration dates in general points to their close compatibility, except in barrow 14, where the obtained ^{14}C dates of the graves do not correspond to their stratigraphical sequence. However, it should be noted that the severe ruination of the barrow's bank, and the former practice of using it for the production of saltpeter, not only prevented the researchers from determining the real stratigraphic sequence of the graves, but could also have influenced the quality of the original samples. According to the ^{14}C dates obtained, the graves containing skeletons positioned on their backs (Ki-6726 and Ki-6728) date back to a more recent period (3905 ± 55 and 3840 ± 50 BP) than the graves (Ki-6725, Ki-6727, Ki-6729) containing skeletons lying in a foetal position on their left side (3895 ± 55 BP, 3910 ± 55 BP, 3920 ± 50 BP, respectively).

Therefore, the results obtained from the ^{14}C dating of the YC monuments analysed allow us to address a number of issues linked to general problems of analysis and of the archaeological interpretation of radiocarbon dates for determining absolute dates of archaeological data [see in this volume: Nikolova, Radiocarbon dating...].

Translated by Maria Ogiyenko

ABBREVIATIONS

AO	– Arkheologicheskiye otkrytya, Moskva.
AJA	– American Journal of Archaeology, New York.
BPS	– Baltic-Pontic Studies, Poznań.
EA	– Eurasia Antiqua, Berlin.
FPP	– Folia Praehistorica Posnaniensia, Poznań.
KSIA	– Kratkiye soobshcheniya Instituta Arkheologii, Moskva.
KSIA AN USSR	– Kratkiye soobshcheniya Instituta Arkheologii AN USSR, Kiev.
KSIIMK	– Kratkiye soobshcheniya Instituta Istorii Materialnoy kul'tury, Moskva.
KSOGAM	– Kratkie Soobshcheniya Odesskogo Gosudarstvennogo Arkheologicheskogo Muzeya, Odessa.
MIA	– Materialy i issledovaniya po arkheologii, Moskva.
NA IA NANU	– Naukovy Arkhiv Instituta Arkheologii Nacionalnoi Akademii Nauk Ukrainu, Kiev.
SA	– Sovetskaya Arkheologia, Moskva.
SpA	– Sprawozdania Archeologiczne, Kraków.
ZFA	– Zeitschrift für Archäologie, Berlin.

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