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THE LATE NEOLITHIC FARMING ON THE TERRITORY OF THE PRUT - DNESTR INTERFLUVE

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The end of the neolithic period in the area between the Prut and Dnestr rivers is associated with two neolithic cultures - the local Bug-Dnestr culture, represented by its Dnestr variation and the alien central European one of the Liner Pottery, that existed here hin the second half on the fifthmillennium B.C. The latter appeared and developpehhere within about the last quarter of the fifthillennium B.C. The end of its existence can serve has a reliable fulcrum in defining the Upper Neolithic boundary ha the end of the fifthmillennium B.C. (Larina 1988, p. 21; Zhnovich 198h, p. 223). To define its lower limit is a more complicated task.

In the frames of the Bug-Dnestr culture, whose development has been retracecl within a thousand and a half years, the forth and the fifth phases are referred to its latest ones (Markevich 1974, p. 205). On the southern Bug they correspond to the Samchintsy and Savran phases (Danilenko 1969, p. 258). The researchers date them in the second half of the fifthmillennium B.C., while having referred the beginning of the Fourth (Samchintsy) phase to the middle of the fifthmillennium B.C. The finds of the Linear Pottery in Bug-Dnestr settlements in Soroka h (V=Savran phase) (Markevich 1974, p. 116), on the Bazkovo island (Samchintsy = IV phase) (Danilenko 1969, p. 66) and the vessel fragemnts of the Bug-Dnestr culture in the Linear Pottery settlements in Tira II (the Fourth phase = Samchintsy one) Institute ot Archeology and Ancient History ot Moldova, Moldavian Academy ot Sciences, Kishiniev 277612, Moldova. (Markevich 1973, p. 22) and Novie Rusesti I (IV = Samchintsy or II = Socoltsy phases) (Markevich 1974, p. 116-117) serve as one of the starting-points in syncronistic constructions of both these authors. however these are these data which instead of facilitating our task to link these two cultures with each other, they embroil the picture of their probable co-existence and contact. Such contacts were not possible at the second phase of the Bug-Dnestr culture because the Linear Pottery culture did not only exist on its "note" phase, it did not existed at all. Such contacts were possible at the Fourth (Samchintsy) phase but only about its end and with the carriers of the Linear Pottery culture from the Central Europe, but not with those from the area between the Carpathians and the Dnestr. We have no grounds to separate the settlements of Rusestii Noi I and Tira II from the main Linear Pottery cultural group of the Prut-Dnestr interfluve and date them down to the Samchintsy phase, moreover, generally speaking, Tira II is one of the latest (Larina 1988, p. 18). Most likely the contacts must have existed between the Linear Pottery culture of the Prut-Dnestr interfluve and the Bug-Dnestr culture at the fifth (Savran) phase, what is reflected in the diagrams made by V.I. Markevihh and V.N. Danilenko (Markevich 1974, p. 138; Danilenko 1969, tabl. 154). However the date of Soroka V takes us into the middle of the fifthmilennim B.C. 4545 ± 100, what has been marked by D.Ya. Telegin in the synchronistic table of the neo-eneolithic cultures in the Ukraine (Telegin 1982, tabl. 29). During the same period the Linear Pottery culture only starts to take shape on the Middle Danube during its most ancient earlier "noteless" (Stage) (Titov 1980, p. 73-327). Without recognizing the natural methods to be the absolute ones in any way, one cannot help noting the unreliable phase division of the Bug-Dnestr culture and not only proceeding from the facts of the interrelations with the Linear Pottery culture but also with the Dnepr-Donetsk one, culture, for example. It could not participate in exerting influence at the fourth (Samchisy) phase of the Bug-Dnestr culture in any way, because it only started to shape by the end of the Bug-Dnestr cultural development (Danilenko 1969;

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Marhevich, 1974; Telegin 1985) we shall venture to continue this brief survey of the relations between the fourth and fifth phases of the Bug-Dnestr cultural development and Linear Pottery culture and the Dnepr-Donetsk one, though from the first sight it has nothing to do with the subject of the present article.

The tasks, which has been put in defining the subject of this article, are to reveal the particularities of the farming structure within the frames of the economic system of the late neolithic tribes in the area between the Prut and Dnestr rivers. Especially as it was the moment for the accumulation and maximal development of the neolithic traditions, which were preparing the trahition to the new stage of the cultural and historical development - the Eneolithic period. However the data, which we propose, are interesting in themselves for characterizing the ancient farming while owing to the efforts of the specialists in contiquous branch of sciences, this problem can be considered as a whole. The data of palaeo geography, which includes the palaeoclimatic reconstructions based on palaeobotany (Z.V. Janushevich), palinology (K.V. Kremenetski), zoogeography (A.I. David, V.I. Tsalkin) allow it to characterize the environment wich the ancient population inhabited (D.M. Dolukhanov, N.A. Khotinski). With due regard for the geomorphological factore one can determine the settling patterns depending on the nature of locality and the local relief features. The palaeobotanical investigation characterizes the cultivated plants (Z.V. janushevich, N.N. Kuzminova). The traceological study of working implements together with the method for modelling the working processes allows it to partially reconstruct the main production processes (S.A. Semionov, G.F. Korobkova).

The economic orientation of the neolithic tribes is to a considerable extent connected with and conditioned by the nature of the territory they inhabit. The main sites of the Bug-Dnestr culture (Dnestr variation) are concentrated in the huth of the Middle Dnestr region in the vicinity of the town of hroka. It is here on the right bank of the Dnestr river that the main settlements of the fourth and fifth phases have been recovered : the upper Layer of Soroka I Layer I horizon "a" (100 sg.m) (Markevich 1974, p. 47, fig. 20), Soroka V of the Fifth phase (60 sg.m) (The same, p. 103, fig. 56), Tsikinovka I (80 sg.m) (The same, p. Il 9, fig. 67) on the left bank. Separate sites containing the finds of this period are defined by V.I. Markevich to the North : Naslavcea (2 pottery fragments) and Kalarashovca (Ifr.) of the Dondiusani region, and also to the huth : Holercani I (Ifr.) (Markevich 1973, p. I1-24). AII the remaining part of the Middle Dnestr region is free from the similar sites and the region belong to the archeologically well - investigated regions. The disposition of the Bug-Dnestr settlements along the banks of big rivers should be recongnized as one of the specific features which is peculiar to this culture, since the eastern monuments are also located along the course of the Southern Bug and its tributaries. At the same time the connection of the Bug-Dnestr settlements belonging to all the development phases (from the second half of the sixthmillennium B.C.) is absolute. The attribution of the sites, situated in the inland regions of the Prut-Dnestr interfluve (The same, p. 10-12, 22-25), to the Bug-Dnestr culture is beneath criticism due to the scarce and amorphous material on the one hand and their belonging to a different cultural tradition on the other hand.

The location of the monuments belonging to the Linear Pottery culture is in conformity with another Law. Numerous sethements (more than 50) occupy the whole central forest - steppe zone of Moldova from the Reut to the Prut river (adjoining the similar one of the Rumanian Moldova) (fig. 1). In the North the border is formed by the settlements of the Sinzhereia region - Culbolta and those of Floresti I and II. The Southern border was formed by the Boha river dividing the steppe zone from the forest - steppe one. The Dnestr settlement - Slobodzia-Voroncau of the Soroka region (Passek, Chernysh 1963, p. 22) and Linear Pottery materials in the vicinity of the thown of Ananiev of the Odessa province (Mainova Balka) (Dvorianinov 1982, p. 93-95) were found outside the marked territoty. All this ahready behongs to the inhand territory of the Bug-Dnestr culture. The fact of overhapping it with the monuments of the Linear Pottery culture is fairly curious since it

allows us to put several questions at a time. Was the territorial factor of special importance for the popuhation of the Bug-Dnestr culture and were their borders "transparent" ? Or did the sites of the Linear Pottery culture spring up here when the Dnestr variation of the Bug Dnestr culture was not existing any honger.

The settlements of the Linear pottery culture have been studied in the very South of the outlined area (Danceni I 3000 sg.m, Rusestii Noi I), as well as in the North and in the East (Floresti I 2000 sg.m, Gura-Camencei VI, Tira II, Rogojani II between 200 and 500 sg.m).

The development of the Prut-Dnestr Neolithic confines inself to the Atlantic period of Holocene, defined as a chimatic optimum. The considerabhe extention of the areas covered by broad - heaved forests, the mesophitization of the grass cover on the open plots of hand an the shrinkage of the forest - steppe zone under the conditions of Lowering the climate continentality is characteristic of the Atlantic period. The climatic conditions were warmer and more humid (Dohukhanov 1984, p. 15; Kremenetskii 1987, p. 9) and according to other data drier and warmer (Buchinskii 1957, p. 50).

The conclusions of geographers about favourable natural conditions during the existence of the late neolithic cultures are confirmed by the palinological definitions of K.V. Kremenetski (1987, p. 9-10). Moreover the whohe zone of the Central Moldova, were the settlements of the Linear Pottery cultrue such as Floresti I, Orgeebskoie lake, Danceni I, Rusestii Noi I and II were concentrated, were practicahhy embraced by his investigation. If from the contemporary point of view the Floresti region is situated within the area of the beltsy grass and grain steppe, the spectra composition on the level of the sterile intermediate layer which is under the layer and in the layer of the Linear Pottery culture indicated the existence of the forest - steppe in the given phace. The pollen total of the arboreal species reaches its maximum here. The percentage of the cruciferouses, but mainly of the Aster family in the herbage was very high. The forests consisted of Lime, elm, hornbeam, oak including a certain share of oriental hornbeam and an underwood of May rose and nutwood, alder was found along the Reut river. All this allowed the researcher to define the natural environment of the setllements in the vicinity of Floresti and Sinzhereia micro-region (more than half of the sites known today are concentrated here) as a meadow forest - steppe with plots of broad - leaved forests. In his opinion, the territory of the Beltsy steppe was reducting what indicates the more humid climatic conditions in comparison with the contemporary ones. The last statements also hold true while analizing the concrete living conditions on the settlements of Danceni I and Rusestii Noi I, II. These monuments are situated in the Southern Codri extremity on the border between the steppe and the forest-steppe. It is the steppe vegetation that is well-developped here now. However, during the existence of the settlements the diversigramineous and meadow-steppe vegetation, characterized by the domination of dicotyledonous grasses and a considerable share of the composite flowers in the herbage, was common here. The representatives of the Aster family and the worwoods formed a considerable proportion. The ranunculi, the cruciferouses, the Scrophulariaceae were also common.

The palaeobotanical investigation, carried out bu Z.V. Janushevich and N.N. Kuzminova completely confirm the palinological conlusions. The wild grasses such as *Aegilops sp., Festuca pratensis Huds., Agrostis alba L., Elitrigia sp., Bromus secalinus L., Phalaris sp., Poa sp., Arrhenatherum sp., Puccinellia sp., Setariaa sp.*, were growing on the forest-free plots. The remnats of these plants in the form of admixtures to the ceramic paste have been found in the materials of the settlements of Danceni I, Rogojani II, Rusestii Noi I, II, belonging to the Linear Pottery culture, as well as in those of Soroka I, II, III, V belonging to the Bug-Dnestr culture. It results from the charcoal examination taken from the settlements of Soroka II and III that the heaf-bearing species such as *Ulmus sp., Fraxinus sp., Quercus sp., Populus sp.* were growing around them (Markevich 1974, p. 13).

The fauna remains from the neolithic settlements confirm the stability of the

Moldavian landscape zones. The settlements of the linear Pottery culture have revealed bones of red deers, wild-boars, roes, more rarely of beavers, aurochses, wild horses (Tsalkin 1970, p. 218, tabl. 45; Dergaciov, Larina, Postica 1983, p. 135-136). The materials from the settlements of the Bug-Dnestr culture confirm and supplement the list of the animals that were common here. These are bears and wolfs, foxes and hares, badges, as well as birds such as wild ducks, geese, bustards, etc (David Markevich 1967; Taslkin 1970). The composition of the river ichtyofauna differed very little from the contemporal one what is confirmed by discovering the bones of sturgeons, sheat-fish, rutilus frisii, perches, roaches, ides (Markevich 1974, p. 176) at the settlements of Bug Dnest culture.

The composite and varied soil bearing of the land is distinguished by three large-spaced and heterogeneous groups : I - black earth and similar soils, 2 - two types of proper forest soils - grey and brown ones, 3 - flood soils. The Moldavian black earthes, covering more than 80 % of its territory are unique. They have been formed on various types of rocks under the diversigramineos meadow steppes and they posses high natural fertility. The percentage of the flooded soils is about 8 % of the total territory. The flood-plain layered, flood-plain slightly-saline, flood-silt-swampy soil are notable. The most common flood-plain layered soils are very fertile and are especially good for cultivating vegetables and gardens, suitable for watering (Rymbu 1980, p. 39-44). While drawing maps of the Moldavian sites, belonging to the linear Pottery culture with due regard for its specific soil fetures their propensity for certain locations is manifested very clearly. Their major part with the exception of a few ones occupies the flood-plain layered (Danceni I, Ialoveni I, Gura-Camencei YI, YII, Putinesti, Cubolta) and flood-plain slightly-saline (rusestii Noi I, II) soils.

The sites of the Sinzhereia micro-region as well as those concentrated along the Reut river partially occupy the flood-plain slightly-saline soils, partially they occupy the typical black earthes of medium and low humus contents and common black earthes. Chipirceni I, II and Izvori, Branesti I, XIII, standing on common black earth are separated from the flood-lands. The eluvial-deluvial light clays and loams as well as loess loams serve as soil - generating elements here. At present they are among the most fertile Moldavian lands (The same, p. 44-45). This situation predeterrnined the choice of the land to be settled by the farmers-carriers of the linear Pottery culture.

The sites of the Bug-Dnestr culture are mainly placed along the right bank of the Dnestr river between the town of Soroka and the village of Trifauti on the stripe of the flood-lands, the width of which does not exceced 50-100 m. The steppe slopes of the river banks are covered with wood and the soils on wich the sites are situated and around them are humus-carbonate stony ones. The mighty erosion processes are very active here, what is confirmed by the fact that the layers containing the materials of the Bug-Dnestr culture lie very deep. The settlement of Tsikinovka only is situated on the left gently sloping bank of the Dnestr river, the width of the flood-lands is 0,5-1 km here. From the point of view of farming works the similar location of Tsikinovaka I is very favourable. Whil analizing the geomorphological disposition of the sites belonging to the Bug-Dnestr culture in the vicinity of Soroka P.M. Dolukhanov (1984, p. 24) does not admit the existence of a non-deficient farming for them. V.I. Markevich states the same and points at the fashing as the main obstacle in the development of farming. However the Dnestr population made the acquaintance of cultivated plants rather early alreeady in the beginning of the fifthmillennium B.C. Due to its specific technological features the neolithic pottery is rather a beneficial source to make palaeobotanical definition which have actually been made by Z.V. Iasnushevich. The plant imprints on vessels and coating have been revealed by her for the settlements of Soroka I, II, III, V (Ianushevich 1976, p. 32-33, tabl. 6; 1986, p. 148, tabl. 41) belonging to the Bug-Dnestr culture. The settlements of the II and III phases belonging to the Bug-Dnestr culture (settlements of Soroka II layer I and Soroka III) "abruptly" show the impressions of three hulled wheat varieties spelt wheat emmer and dinkel wheat at a time. These two phases in the existence of the Bug-Dnestr culture are

logically attributed to the middle neolithic period according not only to its chronological phition - the first half of the fifthmillennium B.C. but also to the presence of the Crish culture sites in the forest-steppe zone of the Prut-Dnestr interfluve. This culture is associated with spreading of the productive economy the first half of the fifthmillennium B.C. in the Carpathian area, Hungary and the Trans-Carpathian province of the Ukraine, the Rumanian Moldova and the Prut-Dnestr interfluve. Though at present it is still the culture of one single "site" since the settlement of Sacarovca I has only been studied, hevertheless its typological position Crish IV and the established data 4700 ± 50 (Ianushevich 1986 p. 4) are associath with the II and III phases of the Bug-Dnestr culture along the Dnestr sites of the II and III phases coming from the area of the Körös-Cris-Starcevo culture are based on the direct relations of these two cultures during the middle development phases. The farming of the Sacarovca I inhabitants was based on the cultivation of spelt and emmer wheats, dinkel wheat, two varieties of barley (haked and hulled ones), oats were loess grown. leguminous plants-peas were also sown. The garden plants such as plums, alucha, cherries-sweet cherries grapes (the same, p. 4-10) have been indentified as well. Moreover the grapes stood close to cultivated plants (N.N. Kuzminova difinitions). Millet has been identified at the Crish settlement of Selichte. Against such a background the set of cultural plants in the Bug-Dnestr culture of the middle phases looks like an insipid copy, but the main features of this copy correspond to the original, because the set of the main hulled wheats (spelt what, emmer and dinkel wheat) are the same at the sites of these two cultures (table 1). This set is reproducted at the next phases as well. No other imprints related with the beginning of the late neolithic period - the fourth phase of the Bug-Dnestr culture habe been found than those belonging to barley without any variety features. But they have been revealed in connection with the fifth phase at the settlement of Soroka V. They are spelt wheat, emmer, dinkel wheat once again (Ianushevich, 1976, tabl. 6; 1986, p. 82-83, tabl. 20).

Thus the tribes of the linear Pottery culture which struck into this territory in the fourth quarter of the fifthmillennim B.C. were not inaugurating the farming era, but only strenthening it. The palaeobotanical definitions of Z.V. Iasnushevich and N.N. Kuzminova has been made on the bases of the plant imprints in the vessels from the settlements of Rusestii Noi I and II, Branesty, Gura-Camencei VI as well as those from Danceni I, Floresty I and Rogojani (table 2) (Yanushevich 1986a, tabl. 2). About 700 pottery fragments, bearing about 240 imprints, from 7 sites has been examined all together (table 3) we have indisputable data certifying the cultivation of five wheat varieties (spelt wheat, emmer, dinkel wheat, bread and club wheat) by the inhabitants of these settlemenhs. All this set has been completely accertained for Danceni I only and is directly connected with the number ot the analyzed fragments 637. There are clear evidences of the naked barly cultivation in Rogojani and hulled one in Danceni I. The numerous millet imprints are available from the latter settlement. It is usually met with the monuments of the linear Pottery culture in small quantities (Titov 1980, p. 273). Two oats imprints are present in Rusestii Noi I. It is no doubt that pea was cultivated by the population. There have been also found vetchling and vetch imprints, the two latter plants could be gathered for special purposes or could be weeds growing on pea fields (table 2).

The ethnobotanical descriptions and drawings made on the basis of this material can be of interest for the specialists (fig. 2). The Danceni I pottery assemblage bears the imprints of the entire spikelets impressed with their inner side. They are narrows and the rims of the outer glumes envelopping them from the back are clearly seen. The imprints of rachis segments, serving as an extention of the spikelets are also preserved. They are comparatively narrow as well (fig. 2,1). The Danceni I fragments bear the imprints of basal parts of spikelets the so-called "forks". They are preserved rachish segments with glume remains attached to them (fig. 2,3) and imprint of Tr. monococcum caryopsis is also present (fig; 2,4). It is impressed with the widest lateral surface of its caryopsis what is typical for this wheat variety. The dorsal

and ventral surfaces of the caryopsis are narrow and convex, the latter surface bears the impressions of a ventral furrow.

Triticum dicoccum Schrank impressions are met with the Danceni pottery more rarely in the comparison with the Tr. monococcum L. but its presence in the latter is beyond any doubt. In Danceni I fragment the spikelet is half-destroyed but it is wide and has two cariopsides and a wide rachis which is typical for Tr. dicoccum (fig. 2,5). The forks with a wider rachis and glume remains, whose belonging to Tr. dicoccum causes no doubt (fig. 2,6) are impressed in this fragment. Another fragment of the same house bears numerous fork imprints of various shapes and with preserved rachis of the Tr. monococcum and Tr. dicoccum types (fig. 2, 62) as well as those without rachides and with a wide base belonging to the dinkel Tr. spelta L. typme (fig. 2, 65). The imprint of the caryopsis belonging to the Tr. dicoccum type with a slightly bent dorsum and a narrow top (fig. 2,7) has been discovered.

From the other cereals barley and millet have been identified by the imprints from the settlements. Hordeum vulgare convar vulgar (hulled) is represented by two caryopsi imprints from subterranean house 1 in Danceni I. In one case caryopsis is impressed with its dorsal surface. The ribbing of outer lemma attached to the body is discerned on it. In another case the imprint shows a narrower caryopsis with a strongly pronounced ventral furrow gradually widening from the base to the top what is characteristic of Hordeum vulgare convar vulgare (hulled) (fig. 2.8 a,8). These two imprints are associated with hulled barley because the glumes with typical ribbing are preserved on the body.

Panicum rniliaceum L. is represented by the imprints of broom corn Panicum rniliaceum caryopsides. They bear no glume impressions what is explained by the small size of the caryopsides (fig. 2,9). The fine caryopsis features are imperceptible in damp clay. Their size and shape usually serve as a criterion for defining them.

There have been preserved the imprints which ressemble the naked wheat caryopsides in its shape (fig. 2,10). But these imprints bear neither any impressions of a ventral furrow, nor those of any germ. They can be the naked wheat caryopsides, impressed with their dorhal surface, but having preserved the traces of a germ. They can be naked wheat caryopsides, impressed with their dorsal surface, but having preserved of a germ. We have conventionally designated them as the caryopsidhs of Tr. aestivum s.l. because their shape and size are hose of the caryopsides of this type.

The Legumenous plants were common at the settlement of Danceni I. The clear-gut round-shaped imprints have been clearly identified by their morphological features and size as those of Pisum sp. (fig. 2,lla). The imprints of the Vicia sp. (fig. 2,11) and Lathyrus sp. seeds, which were most probably weeds growing in pea fields, has been identified in the same way. Judging by the size of its seeds and by the frequency of its occurence, Pisum sp., like cultivated cereals was also a cultivated plant.

The fruit plants have been identified as well : the imprints of the Prunus diuaricata L. type stones are avalable in Floresti I and Danceni I, the Chasus sp. imprints are met with Floresti I (fig. 2,12), the Cornus mas L. (fig. 2,13) and Cannabis sp. imprints are represented in Danceni I.

It could be noted a certain disregard on the part of the population belonging to the Bug-Dnestr culture for such a various assemblage of the plants cultivated by their immediate neigboures. The standard stemming as for back as form the first half of the fifth Milllenium B.C. remains unalterable for thehfth final phase of the Bug-Dnestr culture.

The whole assemblage of farming implements has been identificated in the tool assemblage of the neolithic tribes : dieging stick heads for the first cultivation, mattocks for the second cultivation, sickle-insets for the harvest, stone guerns, mullers and pests for the grain processing. The first ones (hne dihng stick heads) and the last ones (pests) are only present in the Liner Pottery culture. The rest of the tool assemblage is characteristic of cultivating legumenous plants and cereals (Istoria 1986, p. 32-47).

The number of farrning implements vary from site to site. The biggest percentage of them have been identified for the Linear Pottery culture : in Danceni I - more than l0% at the remaining settlements half as less : Gura-Camenceh YI - 5,3% Floresti I - 4%, Tira II - 2,5%. For the monument of the Bug-Dnestr culture this percentage is reduced by two times agaih : Soroka I, Layer hor. "a" 0,6%, Soroka V 1%, Tsikihovka 1-2% (only one sickle inset is covered by 2%).

The mattocks serve as ohe of the most importaht farmihg implemehts. They have practically beeh fouhd at all the sites of the Linear Pottery culture and the Bug- Dnestr one. The experimental study done on the similar implements has shown rather a high effectivity and productivity of the antler mattocks with a blade positioned perpendicularly to the axis of the slot for the helve inset. They were effective in any kinds of earthworks, but they are absent from the sites of the Linear Pottery culture. The mattocks with a blade placed obliquely and lehgthways were hot fit for digging up at all and were effective only by loosdning the already dug-up earth and in digging holes (Korobkova 1975, p. 37-38). Absolutely the same implements are met with the campsites of early farmers belonging to the Linear Pottery (fig. 3,12) and Bug-Dnestr culture (fig. 3, 10-11). In Soroka V V.I. Markevich reconstructs the mattock with a blade placed perpendicularly (1974, fig. 63/1) but to a sufficient extent it is only a simple reconstruction.

It wouhd be haive secret of the productive mattocks is beyond their powers. he first cultivation was most probaly made with the help of wooden implements which have not been preserved up to date. Wooden digging sticks, sticks with a trust foothard, hand implements for furrowing etc. (Krasnov 1971, p. 3-166) are notable among such implements, known to many primeval peoples. These implements could have bone or antler heads which G.F. Korobkova marks out in the Danceni I collection (fig. 3, 8-9). However these implements were also by 1, 6-2 times less productive than the mattocks (Korobkova 1975, p. 38). hat is why the question of the first cultivation for the late neolithic population of the Prut-Dnestr interfluve is left open. The same relates by the way to a somewhat later period- that of the early Cucuteni-Tripolie (Zbenovich 1989, p. 148).

The mattocks discovered at the settlements could only play an auxiliary role serving for crushing lumps of earth at the time of loosening, weeding and some other operation.

The planting of seeds or spikelets (only spikelets could be used for sowing the spelt wheat) into the soil was done manually (Yanushevich 1986, p. 76). However the use of animals can be assumed for these operations. V.A. Shnirelman points out the extremely important function of cattle for these operations, in farming it consisted in loosening the soil and trampling down the seeds into it. Besides pasturing the cattle in the croped field increased the soil fertility (Shnirelman 1980, p. 228).

The second important assemblage of the farming implements assemblage at the settlements of the Linear Pottery culture : in Floresti I they form 2,5% of the total, in Tira I (Korobkova 1987, p. 259-260, table 42, 43), in Danceni I their proportion is considerably higher, 6,2%. When they are identified with the help of the formally typological method their proportions are distributed asfollows : Danceni I -13,8%, Sinzhereia XI -1 l,l%, Gura-Camenci YI -6,7%, Floresti I -4,4%, Tira II -3,8%. These are regularly shaped plates having parallel sides and an erect or sligtly bent profile. Their length ranges between 2,5 and 4,5 cms, the width between 1,2 and 2,4 cm, the majority of them is made of large-sized plates (according to G.F. Korobkova) (fig. 3, 3-7). AII of them belong to the Karanovo type. Their setting could be wooden since no bone ones have been found at any campsite. In Danceni I in a inhabited semi-subrranean house of the housing complex n° 2 - 12 insets have been found which proove to be the remains of practically two sickles.

The sickle insets from the sites of the Bug-Dnestr culture differ drastically from the above described ones. AII of them served as constituent parts of compound implements posessing a blade of the reaping knife type (fig. 3, 1-2). The settlements present scarce finds : Soroka I, layer I or "a" - absolutely nothing (IY phase), Soroka V - 2 pieces

(0,31%), Tsikinovka I - 1 piece (2%). They are made on middle-sized plates 1,2 - 1,3 cm wide. V.I. Markevich underlines an insignificant existent of their wear. S.A. Semionov has intersted the similar artciles as "the simplest variation", which marked the begining of using flint hives as reaping ones (1974, p. 248). The Bug-Dnestr finds do not contradict the similar conclusion. The sickle insets of this type have been also found in connection with the earliest phases of the culture, beginning from the ceramicless Neolithic Soroka I layer 2. The only sickle insets found on the South Bug is attributed approximately to the same time (Danilenko 1969, p. 157, fig. 125/1).

An insignificant number of reaping knive insets has been also found at the settlement of Sacarovca I under the general predominance of the "Karanovo" type articles.

The fact that the carries of the Bug-Dnestr culture have the tools of this only h should be regarded as their "industrial development line" and the lacking necessite for their improvement. Since the experiments with the "Karanovo" type sickles have demonstrated that their productivity was not inferior to that of the coper sickle and the modern iron sickle is only double the productivity of the first one (Korobkova 1978, p. 48-49).

The above-cited opinion of S.A. Semionov has much in common with Kh. A. Amirkhanov's remark in the respect of the chronologically diagnostic and ethnospectific character of the harvesting tools (Amirkhanov 1987, p. 142). However it should be abstained from defining its own specific way of farming development in the respect of the Bug-Dnestr culture.

The following stage of earthenworks is connected with the theshing and ventilating of cereals. We cannot judge on these operations. They were in all probability being executed in the settlements or in their close vicinity.

The problem of storing grains plays an important role in reconstructing the faming sytem. Apparently a part of the gathered-in crops were being stored in pits, the other part had to be kept in the form of the unthrashed sheaves or spikelets detached from their culms. It specially regards emmer wheat which can only be sown by spikelets. Morever its transhing was so difficult that the separate grains used to be crushed gradually from time to time in case of need (Ianushevich 1986, p. 76). The barns, discovered in Danceni I semi-subteranean above-ground regularly-shaped structures-could evidently serve for storing grain in such a form. The model of the granary from Torna, Slovakia, can give an idea of them (Pavuk 1981, fig. 72). The dimensions of the similar barns are : the semi-subterranean ones 3,6 x 1,8 m, 4,4 x 2 m, while having the depth 1m (from the ancien level), the above-ground one 5,1 x 1,6, the sub-rectangular one having a surface of 8,5 sg.m. The finds from such structures have pratical purposes : coarsewares, quern fragments, mullers and pestles. The rounded and oval pits (diameter from 1,3 to 2 m, depth 1,0 - 1,5 m), discovered at the sites of the sites of the Linear Pottery culture, are interpreted on the basis of numerous ethnografic data, and there is no point in adducing them, as those relatied to seeds. The similar pit could from 50 to 100 cubm of grain. The majority of them have been found in Danceni I - 15. The remaining sites produce only rare pits. In Floresti I the pit inside the dwelling huts could serve for storing grain. It is indicated by the large surface of the hut foundation pits with a bottom dug up with additional pits. Outside the dwellings there are very few pits.

The problem of storing grain in the settlement belonging to the Bug-Dnestr culture is left open. Because of the riverside location of the settlements grain could not be stored in pits. The above-ground structures used for this purpose have not been discovered.

Very big vessels could also be used for storing grain, they could have a capacity of 10 liters and more. Very big oblong vessels with a pro projecting neck and typical Linear Pottery rounded harrow-mouthd ones are notable among the kitchen hutensits. The mouth rim of the similar coarseh wares have a diameter of 20-40 cm. In Danceni I they form some 20% of the assemblage. Each of these so called "barnes" has presented 1-2 coarsewares having a capacity of more than 20 liters.

The ceramic material from the settlements of the Bug-Dnestr culture is so scarce that it is no point adducing it in the connection with this parameter. Fragments fo 20 vessels have been found in Soroka I layer I vor "a", 14 in Soroka V, 7 in Tsikinovka.

After the thermal treatment of grain (drying) on hearth or in the oven (found in Danceni I it was processed into meal with the help of querns. The latter ones, ofter broken, have been discovered in all the settlements belonging to the Linear Pottery culture-30 pieces. In the respect of the sites they form less than 1 ho in Foresti I, slighly more than 1% in Tira II (Korobkov 1987, tabl. 42-43), more than 2% in Danceni I Two thirds of all the querns of the Linear Pottery culture are oblong and carinated. Their dimensions are 34 x 14 (predominating), 40 x 28 and 50 x 30, their thickness varies from 4 to 12 cm. Only a few of them are semi-square-shaped and their dimensions 22 x 19 cm. Two-hand mullers, having the dimentions of 25 x 14 and 45 x 20 cm, have also been found in Danceni.

The productivity of the querns can only be deterrnined in the comparison with the similar tools commonly used in the other cultures. Having prepared a compendium on the subject of querns, N.A. Ponomariov has stated that they were the main and only tool for processing grain into meal from the emergence of farrning up to the appearence of manual grindstones. Big-sizes two-hand querns were preceded by single-hand ones. The maximum dimensions depend on the movement kinematics, the lenght of the lower stone must not exceed 50 cm, the width -27 cm.

A part of the Linear Pottery culture querns belong exactly to this type of two- hand querns (Ponomariov 1955, p. 9). The length of the early Cucuteni-Tripolie querns hardly exceeded 20 cm, where are they were 15 cm wide. E.K. Chernysh has made a special reservation in the respect of the two-hand quern, found by N.N. Skakun at the settlement of Alexandrovka, in the Eneolithof the USSR (Chernysh 1982, p. 243).

We have not in vain dwelled on such a prosaic thing so long. In a number of cases the presence of two-hand querns allows the authors to raise the question of the arable farming existence.

Within the territory of the settlements the querns seemed to be forced out into the economic zones, what has been rather thoroughly investigated on the basis of Danceni I. Thus a well-preserved two-hand quern with a muller having the dimensions of 57 x 30 x 12 cm has been found within a dwelling-economic complex, consisting of a subterranean but with oven remains and several storing pits, whose purpose was quite clear. Querns have been fond in "barns" and their proximity.

The presence of querns at the sites of the Bug-Dnestr culture is minimum. Three fragments and a grindstone have been found in the settlement of Soroka V, but the author has not given any details of these finds. Sub-square single-hand querns, having the dimensions of 12 x 13 cm, are being reconstructed. The similar tools seem to pass on to the later phases of the Bug-Dnestr culture, as it is observed in the respect of the other class of farming tools-sickle insets. V.I. Markevich notes that common oval querns caracteristic of the Eneolitic happear in the end of the fourth phase, however he adduces neither the very querns nor the sites dating from the end of the fourth phase (Markevich 1974, p. 152).

Alongside with querns pestles and mortars served for the secondary grain processing, crushing spelt into groats. There are only fem pestles in the assemblage of the Linear Pottery culture. Sometimes the broken chisels of the Schhleistenkeil type served for this purpose. No mortars are known, but the existence hof pestles testifies to their existence as well. Moreover the crushing of hulled wheats could be only done with the help of hooden mortars and pestles. That is why it would be logically to surmise that the similar tools could be used by the carriers of the Linear Pottery culture as well as those of the Bug-Dnestr culture.

Summarizing the above-stated the preliminary conclusions can be drown in the respect of the character inherent in the farming of the neolithic population in the

area between the Prut and Dnestr rivers in the end of the fifth millennium B.C.

The most extensive data related to the settlements of the Linear Pottery culture allows us to define their farming as the polycultural one, since field (cereals), vegetable (legumenos) and maybe fruit crops were cultivated.

The lay-out of the settlements of Floresti I and Danceni I testifies to the havailability of free land plots to be used as kitchen-gardens adjoining dwellings and working structures. While analizin the dispositioh of these structures in the respect of each other and the distribution of the finds within the territory of these settlements we have succeede in retracing the connections between the dwellings and working structures. As a result, on the basis of this lay-out pattern 9 dwelling- productive complexes have been marked out in Danceni I, 6 - in Moresti I, as a matter of fact they prove to be househouldings, each occupying 400 -500 sg.m., 100 sg.m. of this surface were occupied by dwelling and working huts ihcluding a "court" territory, which is clearly identified by the disposition of accessories. Therefore about 300-400 s.gm of the total surface here left free for the putative cultivation of legumenous plants such as vetch, etchling, as well a that of the fruit crops such as alychah, plums, cherries, sweet cherries. The main bulk of the farmig production was beeing obtained (had to be obtained) from more spacious field, where the main cereals such as wheat, barley, millet were being cultivated. The evident preference was given to hulled wheats, which were very tolerant unpretentious in the respect of soils, resistant to drughts, colds, fungus diseases (Ianushehich 1986, p. 71-78; Zhukovski 1971, p. 100). The remaining cereals (hulled and naked barley, oats) were evidently of no great economic importance and only accompanied the main crops. Such a rich assemblage of the cultivated crops accounts for the presence of various granary types (pits, barns) within the territory of the settlements (Danceni I).

The calculation of the capacities taken by the working structures-pits and barns found in the settlement of Danceni I, yields rather considerable figures of the stored-up production for individual dwelling-productive complexes. The easiest task is to calculate and obtain the optimum figures in the respect of the pit capacities, since they were devoid of an above-ground part and were closed on the level of the ancient horizon. Thus the approximate pit complex capacity of Dwelling-productive complex 4 is 30 cubic m. It is more difficult to calculate the capacities of barn type structures. If we assume the walls to be 2 m high (V.M. Masson determines their height to be 2,5 m (Masson 1976, p. 107) in Geitun) the capactity of these structure will be between 13 and 17 cub.m.

The palinological analyses from the settlement produce interesting additional data concerning the farming pattern of the Linear Pottery culture in Moldova (Kremenetski 1989, p. 7-9). In Moresti I the sporo-pollen analysis indicates an abrupt reduction in the pollen amout of the arboraceous species and an increase (peak) of the hutwood pollen. These changes passed so quickly to allow the author to arrive at a conclusion of the forest reduction in the environs of the settlement and the increase of the hutwood proportion can indicate the fire-undercutting method (Zelikson 1977, p. 102-112).

The palinological columns show the pollen amount of the arboraceous species of 42,5% on the level of the Linear Pottery culture layer for the settlement of Tîrpesti (Rumanian Moldova), but only 21% with plenty of ash (Marinescu-Bîlcu, Carciumaru, Muraru 1987, p. 7-31). By the end of the neolithic period.

The similar has hot been observed on the level of the settlements of Danceni I and Rusestii Noi I, since they were situated in flood-lands covered with grass meadow steppe vegetation (Kremenetski 1989, p. 7- 9).

On the basis of the present day knowledge level we can define the Prut-Dnestr farming of the Linear Pottery culture as the stick-mattock farmers, having applied (in case of need) the fire-undercutting, fallow patterns of the semi- functional farming orientated predominantly at cultivating cereals or legumenous plants.

While examining the correct situation in the settlemnts, the farming occupation of their inhabitants prove themselves to be of different importance. In connection with Danceni I we can definitely speak about the existence of a non-deficient farming. It is confirmed by the direct and indirect data : the availability of a long series of the palaeobotanical definitions for cultivatec plants, the singling out of special pits an barns for storing, the farming production in the lay-out pattern of a settlement, the oher 10% proportion of the perfect type farming tools in the tool assemblage. This percentage is high enough if it is taken into consideration that the sphere of aplying the majority of these tools is outside the settlement territory. The development of the farming, producing a lot of fodder, predetermined the predominance of cattle-breeding over hunting in the settlement economy.

Opposite is the case when we examine the proportion of farming in the economic structure of the setlleent of Floresti I. An insignificant percentage of the working tools, connected with farming, of 4,3% the absence of special granaries allows us to speak about a lesser proportion of farming. the complex study of teh economy, inherent in the settlemetns of Floresti I and Tira II, with due reegard of palaeozoological, botanic definitions and the raceological study of working tools has allowed G.F. Korobkova to define the economy of its inhabitants as productive and multistructural where the leading part was played by cattle-breeding, where as the auxiliary role was given to farming while hunting and gathering were of ocnsiderable importance (Korobkova 1987, p. 165-168).

Some researches doubt the corrctness of such an approach (Skakun 1987, p. 16; Zbenovich 1989, p. 154). However the economy of the lower layer inhabitants is strangely in the greatest conformity not with the multicultural complex of the settlemetn of Danceni I but with the economy of the later period that is to say the upper layer of Floresti I (early Tripolie) (Tsalkin 1970, p. 99, tab. 42-47).

This apportionment, that is not in fabour of farming, must not be considered as an attribute of archaism. It only mirrors the concrete historical picture of the adaptability to natural surroundings - the so-called principle of optimization : choosing such an economic strategy which can provide for surviving at the minimum risk (Masson 1981, p. 123; Dolukhanov 1984, p. 8-9). This apparently accounts for the economic complexity in the frames of the joint cultural community of the Linear Pottery culture in the Prut-Dnestr interfluve.

Proceeding from the existence of several phases in the development of individual settlements, as well as from the idea of rapidly exausting loess soils the theory of "nomading farming" has been suggested for the Linear Pottery culture of Central Europe.

It essence lies in the fact that there existed the periodical cycles, undergone by each settlement, such as emergence, cultivating the arable land up to its exaustion, laying out the new fields, leabing for a new location and return. Certain settlements number 6-7 phases. This theroy is being critisized by some researchers (Voznikonovenie 1967, p. 19; Titov 1980, p. 279) the other ones are re-considering their materials (Ursulescu 1990, p. 36; 1991, p. 79) in it slight. On the basis of our data we can speak about a certain horizontal shift of the settlements within the limits of the former site but not about leaving it or coming back to it. The land, occupied by the Linear Pottery cutlure in the past, is also at present the most fertile ones in the Prut-Dnestr interfluve.

May be the materials, which could help in solving this problem, will be obtained later in the process of studying the settlements in the administrative region of Sinzhereia where they are situation close to each other at a distance of 2-4 km. The question, whether they belong to the same phase or represent the development phases of the same settlement, will be only claryfied after studying them.

Caried away by the description of the representative data, characterizing the farming of the Linear Porttery culture, we have lost sight of the final phases in the development of the Dnestr varaition in the Bug-Dnestr cutlure. It has partly happened

due to the fact that this subdivision played practilly no role in their economy, what has been confirmed by the analysis done by us.

While comparing the Linear Porttery material cutlure and the Bug-Dnestr one, the conclusiofn is drawn that their joint co-existence during two hundred years in the close proximity to each other had no effect in any sphere of their vital activities. Probably by the time when the Linear Pottery culture penentrated into the area beyond the Dnestr river, the Dnestr variation of the Bug-Dnestr culture had stopped to exist. The peopling of the internal territory of the Bug-Dnestr culture by the carriers of the Linear Pottery culture can be exactly explained in this way. It is beyond any doubt that it is necessary to continue to purposeful investigation of this period and the relevant cultures.

translated by Nikita MATYUPATENCO

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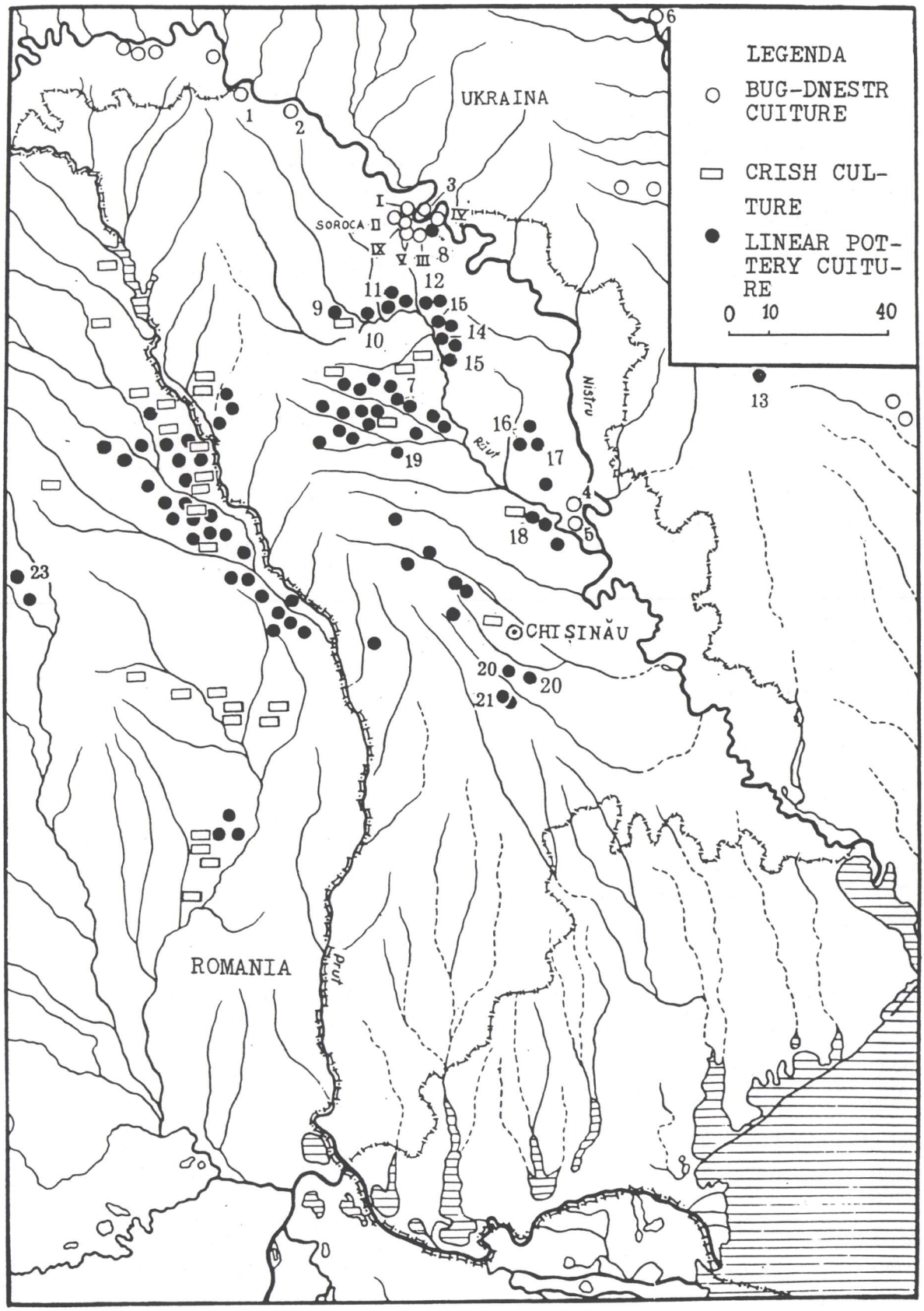

Figure 1. The map of the locations of the settlements of the late neolithic in Moldova : 1, II, III, Y - Soroka I, II, III, Y; 1 - Naslavcea; 2 - Kalarasovca; 3 - tichinvca; 4, 5 - Holercani I, II, 6 - Bazikov ostrov; 7 - Sacarovca I; 8 - Slobodzia Boroncau; 9 - Cubolta; 10 - Putinesti; 11 - Floresti I; 12 - Gura-Camencei YII; 13 - Gura-Camencei YI; 14 - Tira I, 15 - Rogojeni II; 16 - Chipirceni I, II; 17 - Izvoare; 18 - Branesti I, XIII; 19 - Danceni I; 20 -)aloveni I; 21 - Rusestii Noi I, II; 22 - Mainova Balca (Ananiev); 23 - Tirpesti.

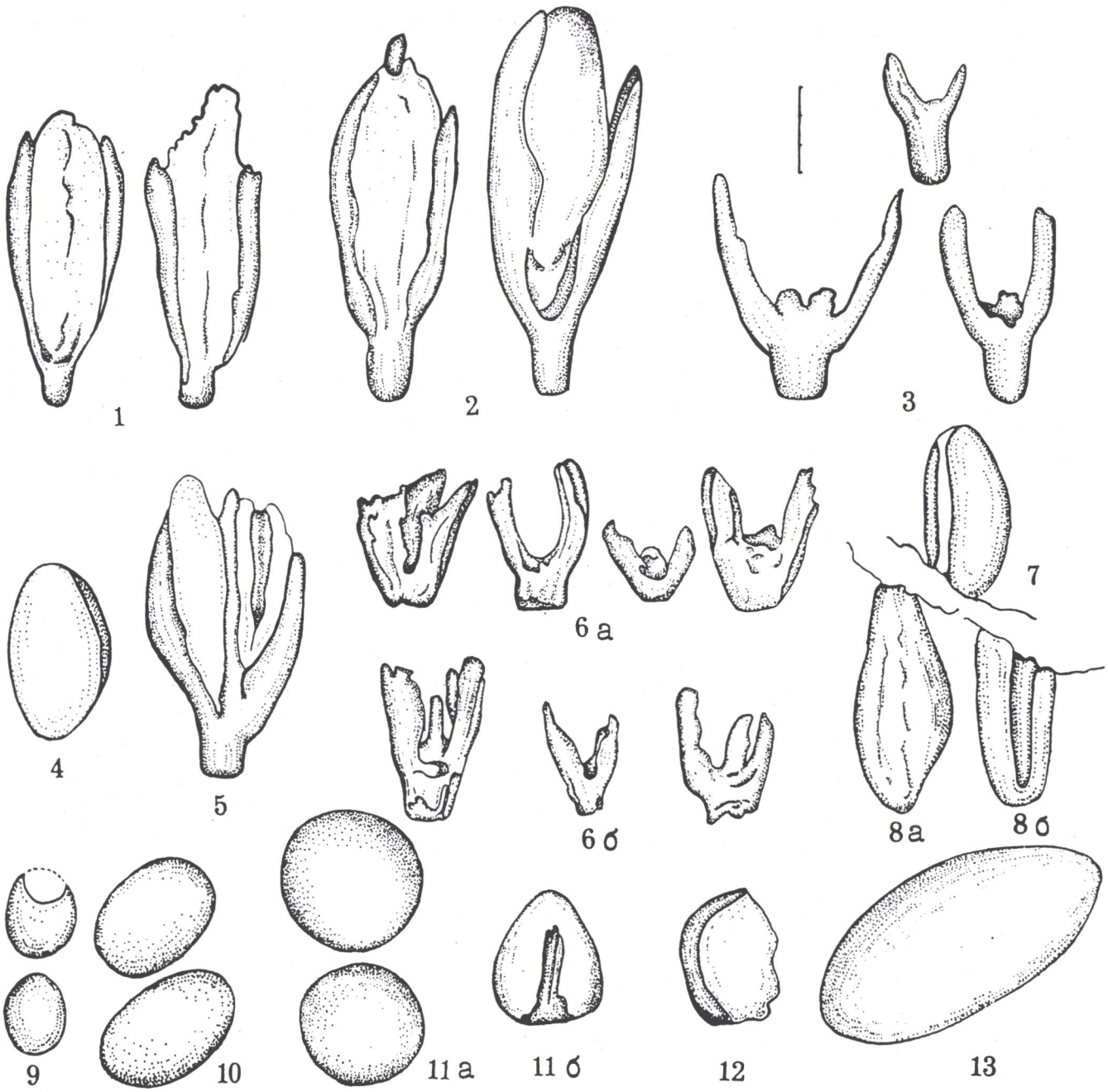

Figure 2. The picture of the plant imprints : 1, 2 - Triticum monococcum, the spikelets; 3 - Tr. monococcum, the forks; 4 - Tr. Monococcum, the caryopsid; 5 - Tr. monococcum, the spikelet; 6a - Tr. monococcum/Tr. dicoccum, the forks; 6b - Tr. spelta, the forks; 7 - Hordeum wlgare, the caryopsid; 8a - H. Bulgare the caryopsid, impressed with its dorsal surface; 8c - H. vulgare the caryopsid with its ventral surface; 9 - Panicum miliaceum, the cariopsids; 10 - Tr. aestivum s.l., the caryopsids; 11 - Pisum sp., the seed; 12a - Vicia sp., the seed; 12b - Prunus divaricata, the fragment of the stone; 13 - Cornus mas, the stone.

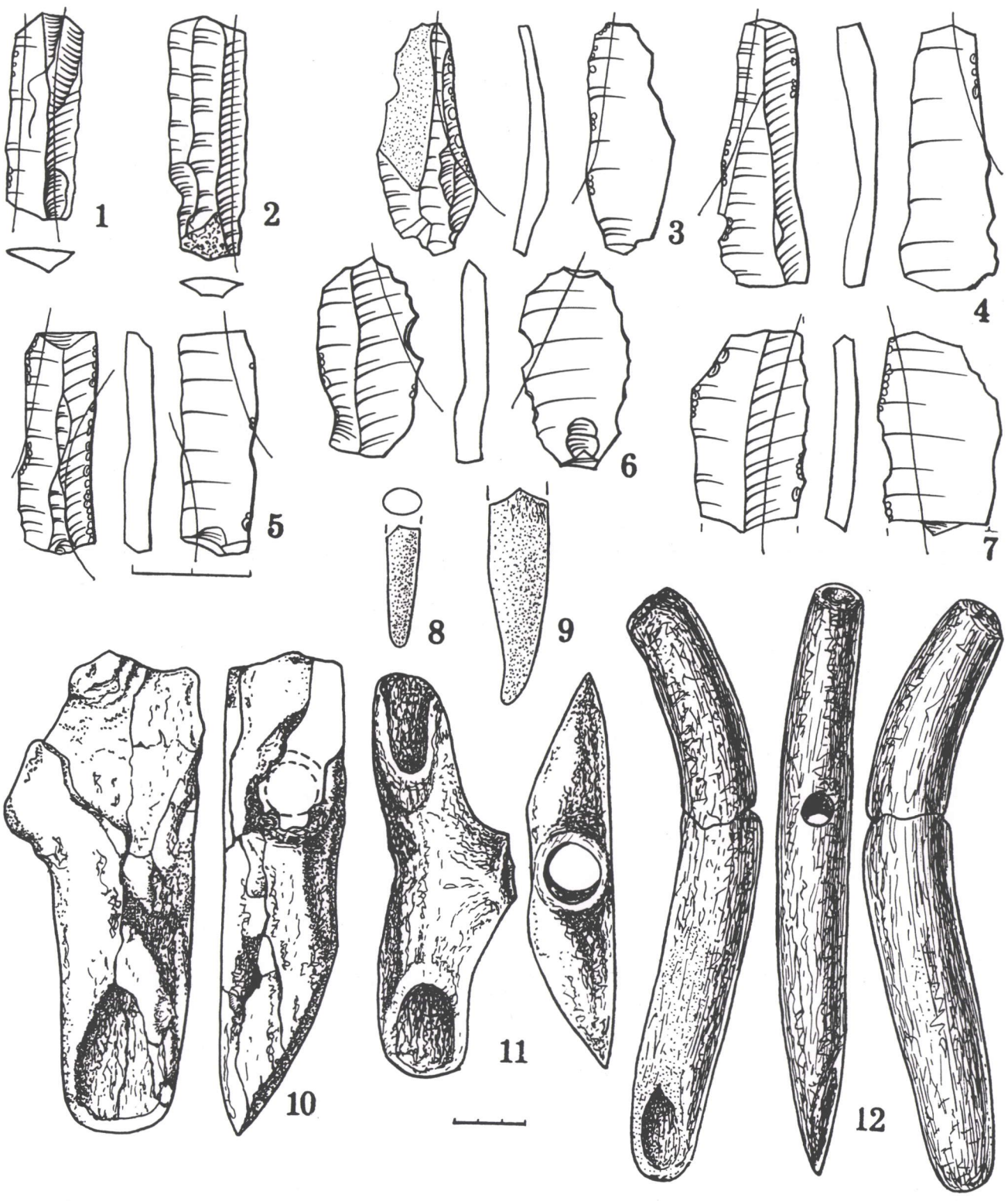

Figure 3. Farrning implements of flint (1-7) and antler (8-12). bug Dniester culture 1-2; 10-11 (by B. Markevich), Linear Pottery culture 3-9,12; 1-7 - Sickle insets; 8-9 - Stick heads; 10-12 - mattcoks.