
EXCAVATIONS AT BODAKI (UKRAINE) AND THE IMPORTANCE OF FLINTWORKING ACTIVITIES IN THE ENEOLITHIC

by Nathalya N. Skakun

The Eneolithic of the Southeastern Europe, the Balkans and the territory of Rumania, Moldavia and Ukraine evidenced the flourishing of agricultural cultures. The fourth millenium BC witnessed the increase in the number of sites accompanied by the appearance of large carefully planned fortified settlements and the growth of exchange networks between different areas¹.

These processes reflected important advances in economy based on agriculture and animal husbandry accompanied by mastering of copper treatment², and the growth of specialization in some crafts³, including flintworking. The introduction of metal implements seemingly should result in the end of the flintworking technologies. Meanwhile the hardness of copper was not sufficient to substitute flint implements by the metal objects. In some cases the formers proved their high efficiency⁴. Thus in spite

¹ E.K. Chernish, *Eneolit Pravoberejnoi Ukraini i Moldavii*, in *Eneolit SSSR*, Moskva, 1982, p. 166-350; H. Todorova, *Kamenno-mednata epoha v Bolgaria*, Sofia, 1986; J. Lichardus, M. Lichardus-Iten, G. Bailloied, J. Cauvin, *La protohistoire de l'Europe. Le Néolithique et le Chalcolithique*, Paris, 1985; T.G. Movsha, *Tripilska-Kukutenska spilnost-fenomen u starodavnei istorii Shidnoi Evropi*, in *Zapiski naukovogo tovaristva imeni T. Shevchenka*, CCXXV, 1993, Lviv, 24 0 59; N.I. Merpert, *Bolgarskie zemli v V tisiacheletii do n.e. i nekotorii voprosi drevneshei istorii Evropi*, in *PAV*, 9, 1995, p. 96-103; Gh. Dumitroaia, D. Monah (eds.), *Cucuteni aujourd'hui. 110 ans depuis la découverte en 1884 du site eponyme*, BMA, II, Piatra-Neamt, 1996; D. Monah, F. Monah, *The Last Great Chalcolithic Civilization of Old Europe*, in C.-M. Mantu, Gh. Dumitroaia, A. Tsaravopoulos (eds.), *Cucuteni. The Last Great Chalcolithic Civilization of Europe*, Thessaloniki, 1997, p. 15-95; M.M. Shmaglii, *Veliki Tripilski poselenia i problema rannih form urbanizacii*, Kiev, 2001, 129 s.

² E.N. Chernih, *Gornoe delo i metallurgia v drevneshei Bolgarii*, Sofia, 1978, 387 s; N.V. Rindina, *Drevneishee metalloobrabativauchee proizvodstvo Jugo-Vostochnoi Evropi: (Istoki razvitiia v neolite i eneolite)*, Moskva, 1998, 287 s.

³ S.N. Bibikov, *Hoziaistvenno-ekonomicheskii kompleks razvitogo tripolia*, in *SA*, 1, 1965, p. 8-62.

⁴ S.A. Semenov, *Izuchenie pervobitnoi tehniki metodom eksperimenta*, in *Novie metodi v arheologicheskikh issledovaniiah*, Moskva - Leningrad, 1963, p. 191-214; Idem, *Eksperimentalnii*

of richness of some areas of the Southeast Europe in copper⁵, the flintworking tradition was not interrupted. At the contrary, it achieved sophistication⁶. This time span saw the intensive exploitation of large cobbles of chalk flint procured from outcrops accompanied by the advances in lithic technology. As a result a new type of preforms, large regular-sized blades, appeared. The manufacture of these highly efficient standard blanks was impossible without professional skills of artisans. Notice that modern flintknappers could not replicate those Eneolithic artifacts as famous flint blade 44 cm long from the Varna hoard⁷. Sophisticated flintworking technology and specialization witnessed radical changes in the organization of this activity comparing with the preceding periods⁸. The exploration of archaeological sites and structures directly related to the flintworking activity is of crucial importance for analysis of the lithic technology and its role in prehistoric economy⁹.

metod izuchenia pervobitnoi tehniki, in *MIA SSSR*, 139, 1965, p. 216-222; Idem, *Kamennie orudia epohi rannih metallov*, in *SA*, 2, 1969, p. 3-14.

⁵ E.N. Chernih, *op.cit.*, 387 s; N.V. Rindina, *op.cit.*, 287 s.

⁶ N.N. Skakun, *Kremneobrabativauchee proizvodstvo v epohu paleometalla Bolgarii*, in *III Seminar on petroarchaeology*, Plovdiv, 1984, p. 83-92; Eadem, *Novi dannii pro razvitok virobniictva v epohu eneolita na territorii Bolgarii*, in *Arheologia*, 52, 1985, p. 33-41; Eadem, *Opit rekonstrukcii hoziaistva drevnezemel'delcheskih obchestv epohi eneolita prichernomorskogo raiona Severo-Vostochnoi Bolgarii*, Avtoref. Ist. Nauk. 1987, Leningrad, 18 s.; Eadem, *Evolution des techniques agricoles en Bulgarie chalcolithique: (d'après les analyses tracéologiques)*, in *Préhistoire de l'agriculture: Nouvelles approches expérimentales et ethnographiques* (Monographie du CRA, No. 6), Paris, 1992, p. 289-303; Eadem, *Epoha eneolita – vremia vozniknovenia rannih form remesla*, in *Severo-zapadnoe Prichernomorie – ritmi kulturogeneza*, Odessa, 1992, p. 18-19; Eadem, *New implements and specialization of traditional industries in the Eneolithic of Bulgaria*, in *Traces et fonction: les gestes retrouvées. Études et recherches archéologiques de l'Université de Liège*, 50, Liège, 1993, p. 139-145, 303-307; Eadem, *Razvitie kremneobrabativauchego proizvodstva v epohu razvitogo eneolita v jugo-vostochnoi Evrope*, in *Tripilska kultura Ukraini. TD majdunar. Nauchn. Konf.*, Lviv, 1993, p. 60; Eadem, *Razvitie proizvodstv v epohu eneolita Bolgarii*, in *Pulpudeva*, 6, 1993, p. 152-164; Eadem, *K voprosu o kremneobrabativauchem proizvodstve epohi eneolita v Jugo-Vostochnoi Evrope*, in *Arheologia*, 3, 1996, p. 124-128; Eadem, *Novii dannii o raskopkah tripolskogo poselenia Bodaki*, in *Arheologichni doslidjennia na Ukraini 1998 / 1999*, Kiev, 1999, p. 42-43; Eadem, *Epoha eneolita – vremia vozniknovenia rannih form remesla v zemel'delcheskih kulturah jugo-vostochnoi Evropi*, in *Sudba uchenogo: K 100-letiu so dnia rojdenia B.A. Latisheva*, Sankt-Petersburg, 2000, p. 235-243; Eadem, *Arheologicheskie vkladishi molotilnoi doski, eksperimenti i etnograficheskie paralleli*, in *AV*, 8, 2001, p. 106-119.

⁷ I. Ivanov, *Skrovichata na Varninska halkoliten nekropol*, Sofia, 1978.

⁸ N.N. Skakun, *Kremneobrabativauchee proizvodstvo ...*, in *loc.cit.*, p. 83-92; Eadem, *Novi dannii pro razvitok virobniictva ...*, in *loc.cit.*, p. 33-41; Eadem, *Opit rekonstrukcii hoziaistva ...*, Avtoref., 18 s; Eadem, *Evolution des techniques agricoles ...*, in *loc.cit.*, p. 289-303; Eadem, *New implements and specialization ...*, in *loc.cit.*, p. 139-145, 303-307; Eadem, *K voprosu o kremneobrabativauchem ...*, in *loc.cit.*, p. 124-128; Eadem, *Novii dannii ...*, in *loc.cit.*, p. 42-43.

⁹ Eadem, *Vivchannia eneolitichnogo poselenia-maisterni bilia s. Bodaki*, in *TD dopovedei i povidomlen I Ternopil'skoi obl. Nauch. Kraeznavchoi konf.*, Ternopil, 1990, p. 43; Eadem, *Razvitie kremneobrabativauchego proizvodstva ...*, in *loc.cit.*, p. 60; Eadem, *Raskopki poselenia – masterskoi u sela Bodaki*, in *Severo-vostochnoe Priezov'ie v sisteme evraziiskih drevnostei (eneolit – bronzovii*

Among these the settlement of Bodaki located at Volyn, the territory of the Ternopol Region of Ukraine (fig. 1), is worth to mention. The site is referred to the Developed Middle Tripolye, late fourth-early third millennia BC, and is located in the extreme northwestern area of the spread of this culture. The site sits at the elevated terrace of the Goryn River. Early occasional archaeological work conducted several times in the 20th century witnessed the richness of the site by flint artifacts. Along with the proximity of the sources of the Volyn flint it hinted at the specialized character of the settlement¹⁰. The long-term excavation campaign carried out from 1987 corroborated this view and provided a wealth of new data on the site located in one of the less known areas of the Tripolye Culture¹¹.

Narrow gorges and streams emptying to the Goryn River in the vicinities of Bodaki, are abound in flint nodules of different shape and size. Six flint outcrops have been discovered within the 5 km distance from the site.

vek), 1, Donetsk, 1996, p. 19-20; Eadem, *Nekotorii itogi izuchenia tripolskogo poselenia Bodaki*, in *Poselenia: sreda, kultura, socium*, Sankt-Petersburg, 1998, p. 65-68.

¹⁰ A. Cynkałowski, *Materiały do pradziejów Wołynia i Polesia Wołyńskiego*, Warszawa, 1961; Idem, *Osiedle kultury trypolskiej w Bodakach nad Horyniem*, in *WiadArch*, 34, 1969; T.A. Popova, E.K. Chernish, *Tripolskoe poselenie u s. Bodaki*, in *ZOAO*, II, 35, 1967, p. 173-179; M.A. Pelechishin, *Starodavni plemena Pricarpattia i Zahidnoi Volini za dobi neolitu ta eneolitu*, in *Starodavne naselennia Pricarpattia i Volini*, Kiev, 1974, p. 96-152; Idem, *Tripolskaia kultura Zapadnoi Volini*, in *Arheologia Pricarpattia, Volini i Zacarpattia*, Kiev, 1990, p. 26-35; Idem, *Problemi istorii tripolskikh plemen Zahidnoi Volini, mejirichcha Zahidnogo Bugu ta Dnistra*, in *Praci Arheologichnoi komisii*, CCXXXV, 1998, Lviv, p. 175-179.

¹¹ N.N. Skakun, *Vivchannia eneolitichnogo ...*, in *loc.cit.*, p. 43; Eadem, *Novie raskopki eneoliticheskikh poselenii v nizoviah Dunaia*, in *AV*, 3, 1995, p. 58-69; Eadem, *Raskopki poselenia ...*, in *loc.cit.*, p. 19-20; Eadem, *Le rôle et l'importance du silex dans le chalcolithique du sud-est de l'Europe (sur la base du matériel provenant de fouilles du campement de Bodaki)*, in *La Préhistoire au Quotidien*, Grenoble, 1996, p. 223-235; Eadem, *Novie raskopki tripolskogo poselenia Bodaki*, in *Novie issledovania arheologov Rossii i SNG*, Sankt-Petersburg, 1997, p. 22-25; Eadem, *Raskopki poselenia Bodaki*, in *AO 1993*, 1997, g. 130; Eadem, *Novii raskopki na tripolskom poselenii Bodaki*, in *Razvitie kulturi v kamennom veke*, Sankt-Petersburg, 1997, p. 137-138; Eadem, *Nekotorii itogi izuchenia ...*, in *loc.cit.*, p. 65-68; Eadem, *Novii dannii ...*, in *loc.cit.*, p. 42-43; Eadem, *Funkcii orudii truda i arheologicheskii kontekst*, in *TD Severnogo arheologicheskogo kongressa. Ekaterinburg - Hanti-Mansiisk*, Hanti-Mansiisk, 2002, p. 252-253; N. Skakun, A. Samzun, *Results of the investigations of an Eneolithic site with lithic workshop in South-Eastern Europe*, in *XIV International congress prehist. and protohist. sci.*, Liège, 2001, p. 238; N.N. Skakun, A. Samzun, E.G. Starkova, B.I. Mateva, *Bodaki – poselenie-masterskaia na severo-zapade tripolskoi kulturi*, in *Tripilskii svit i iogo susidi. TD mijnar. Naukovo-praktichnoi konf.*, Zbaraj, 2001, p. 54-55; N.N. Skakun, A. Samzun, B.I. Mateva, *Funkcii orudii truda i problemi izuchenia specializirovannih poselenii*, in *TD Severnogo arheologicheskogo kongressa. Ekaterinburg - Hanti-Mansiisk*, Hanti-Mansiisk, 2002, p. 238-239; N.N. Skakun, E.G. Starkova, *K voprosu o mejkulturnih sviaziah v epohu razvitogo Tripolia BII (po keramicheskim materialam poselenia Bodaki)*, in *Neolit - eneolit Juga i neolit Severa Vostochnoi Evropi*, Sankt-Petersburg, 2003, p. 132-139; N. Skakun, B. Mateva, I. Palaguta, N. Rindyk, A. Samzun, H. Starkova, L. Yakovleva, *To the Problem of Production of the Late Stages of Tripolye Culture*, in *9th Annual meeting of EAA. Final Program and Abstracts*, Sankt-Petersburg, 2003, p. 86.

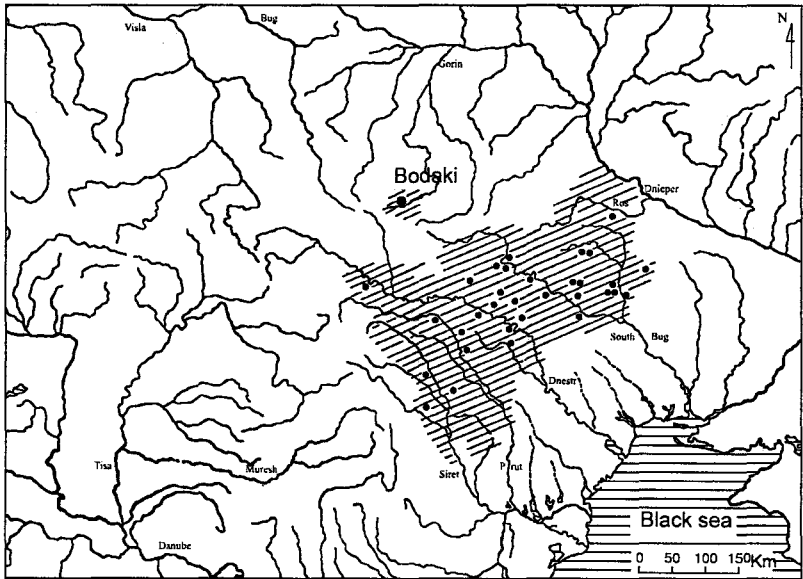


Fig. 1. Map of the Tripolye sites of the BII period.

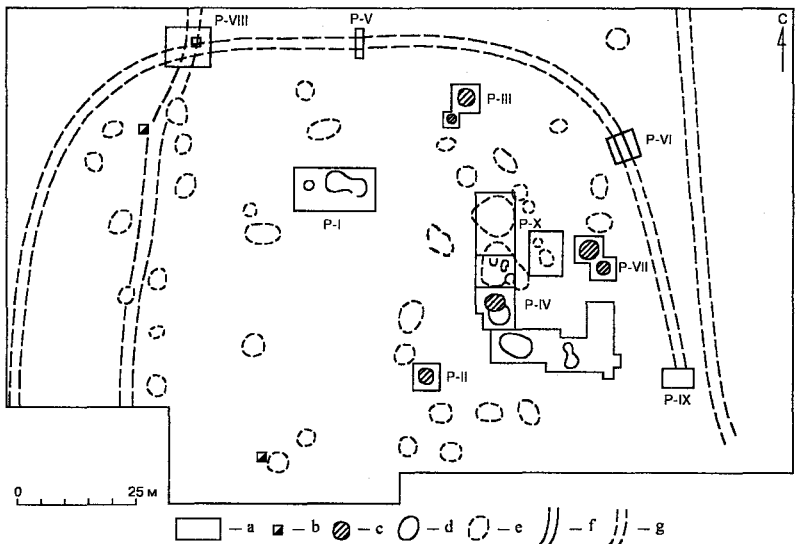


Fig. 2. Houses and other structures at Bodaki: a – excavation trenches; b – probe trenches; c – fragments of pise constructions; d – excavated semipit dwellings and waste pits; e – supposed semipit dwellings and waste pits; f – excavated plots of ditch; g – supposed ditches.

The flint occurs in layers embedded in limestone not far from the surface, thus enabling its extraction. Two sources are located in immediate vicinity of the Tripolye site, 1 km from the eastern portion of the village, and 100 m from its western portion. These sources produced fine-grained homogeneous flint lacking fissures with rare inclusions. The flint is mostly black not transparent or semi-transparent. Occasionally gray or banded concretions of different size and shape occur. The cortex is smooth, compact, and thin (less than 0.1 cm thick). The Volyn flint, along with the Donetsk one, is admitted as being the best raw material available at the territory of Ukraine¹².

Electromagnetic prospecting revealed that the habitation site covered ca. 1.5 ha. It was surrounded at three sides by a ditch. It was horse-shoe-shaped in plan view and wedge-shaped in cross section¹³. Its length was 245 m, width 2 m in the upper part and 15 to 17 cm in the bottom, and up to 2 m depth¹⁴. Houses were tightly clustered in compounds forming in plain view two rows stretching from north to south. These were surrounded by storage pits. The central space of the village was almost empty (fig. 2). There were two kinds of domestic structures: aboveground dwellings with cellars covering 10 to 12 sq. meters, and semi-subterranean structures covering 6 to 22 sq. meters. The remains of the aboveground structures were represented by rectangular „ploschadki” with heavily burned clay occasional lying in several layers while the lower layers demonstrated traces of planking. Similar structures are known from the settlements of Veselyi Kut and Garbuzin, located at the Bug - Dniestr Rivers watershed, as well as from some Late Tripolye sites of Moldavia¹⁵. A model of the dwelling from Rossokhovatka could corroborate the fact of the existence of the houses of this type¹⁶. The semi-subterranean structures, oriented mostly from NW to SE (occasionally in NE direction), as well as dug out bottoms of houses are oval-shaped or 8-shaped in plain view. They consisted of two pits (large and smaller one) joined by a low bulkhead. The dwellings were dug into the terrace slope, thus the northern walls were higher while the southern ones low or even not manifested in relief.

¹² V.G. Bondarchuk, *Geologia Ukraini*, Kiev, 1959; V.F. Petrun, *K petrograficheskomu opredeleniu sostava i raionov dobichi mineralnogo ciria rannezemledelcheskih plemen Jugozapada SSSR*, in *KSIA*, 111, 1967, p. 50-58.

¹³ N.N. Skakun, V.A. Tarasov, *Rezultati primenenia magnitorazvedki i kappametrii pri issledovanii tripolskoi kulturi Bodaki*, in *AV*, 7, 2000, p. 60-69.

¹⁴ N.N. Skakun, T.A. Popova, *K voprosu ob oboronitel'nykh sooruzheniakh epohi eneolita*, in *Tripil'skii svit i iugo susidi. TD mijnar. Naukovo-praktichnoi konf.*, Zbaraj, 2001, p. 50-51.

¹⁵ E.V. Tsvek, *Domostroitelstvo i planirovka tripolskikh poselenii po materialam raskopok poselenia Shkarovka*, in *Eneolit i bronzovii vek ukraini*, Kiev, 1976, p. 46-57; Eadem, *Nekotore aspekti domostroitelstva u plemen vostochnotripolskoi kulturi*, in *Peterburgskaia trasologicheskaja shkola i izuchenie drevnih kultur Evrazii*, Sankt-Petersburg, 2003, p. 241-254; V.I. Markevich, *Pozdnetripolskie plemena Severnoi Moldavii*, Kishinev, 1981, 194 s.

¹⁶ E.V. Tsvek, *Vostochnotripolskaia kultura i kontakti ee naselenia s eneoliticheskimi plemenami poprutia i Podnestrovia, Neolit - eneolit Juga i neolit severa Vostochnoi Evropi*, Sankt-Petersburg, 2003, p. 109-122.

The discovery of presumably contemporaneous mud houses with cellars and semi-subterranean structures is of relevance to the continuing debate concerning the Tripolye building traditions¹⁷.

One of the largest semi-subterranean structures (covering 20 sq. meters) was located in isolation in the northern empty portion of the village (fig. 2, P-I). More than 1500 flint pieces were unearthed, including cores, blades and their fragments, preforms, finished tools and waste (flakes, stone chips, small chips etc.). The eastern corner of the structure yielded the largest cores concentration located nearby the hearth. It consisted of 52 cores. Like all cores from Bodaki, it served for the manufacture of large blades. Cores vary from 12 to 25 cm in length, and 12 to 15 cm in width (fig. 3). The majority of the cores are wedge-shaped with unifacial flaking. Their backs are covered partly or completely by cortex, occasionally flattened by transversal scars oriented from lateral ridges to the center. Usually the core bases are not damaged. Flaking surfaces are mostly slightly convex with 4 to 8 blade scars. Platforms, formed by several large scars, are trimmed by additional small scars, overhangs have been eliminated. The flaking angle is more than 80 degrees. Only one cone-shaped core measuring 15 to 6 to 4 cm has flaking surface along the perimeter. The cores look like not exhausted due to their size. Meanwhile the flaking was finished when the core size did not permit to obtain blades with dimensions desired. Lithic waste consists of flakes of different size, with occasional cortical laterals or bulbar scars, core rejuvenation flakes, crested blades, small stone chips, etc. (fig. 4). The lithic waste evidenced the core shaping (including platform preparation forming of ridges, shaping of the future flaking surface) took place in the structure. These operations were followed by core exploitation with subsequent platform and flaking surface rejuvenation. Only 17 unbroken blades have been discovered (fig. 5/1). These are large standard pieces 12 to 15 cm length and 2.5 to 3 cm width, slightly convex in profile, with parallel sides. Distal ends are more curved. The blades are with one or two dorsal ridges, thus forming triangular or trapezoidal cross section. Slightly curved flat or faceted butts are of ellipsoid or trapeze-like shape. Numerous fragments allow reconstructing larger pieces, up to 4.5 cm width (fig. 6). Experiments have been demonstrated that the blades could be obtained by pressure technology in core clamps using a lever¹⁸. Among the blade fragments some pieces could be considered as preforms, while others (irregular, crude, and shortened) were really waste. Among the latter proximal thick fragments of regular blades 2 to 3.5 cm length prevailed. Distal fragments with curved profile were less frequent. The analysis of numerous transversal fragments allows reconstructing the fragmentation technology. It began with notches made on lateral edges of blades by blunting retouch, thus outlining the future breaks. After it the blades were broken into a number of standard pieces using special clamps.

¹⁷ O.G. Kolesnikov, *Tripilske domobudivnictvo*, in *Arheologia*, 3, 1993, p. 68-73; E.V. Tsvek, *Nekotore aspekti domostroitelstva u plemen vostochnotripolskoi kulturi*, in *Peterburgskaia trasologicheskaia shkola i izuchenie drevnih kultur Evrazii*, Sankt-Petersburg, 2003 a, p. 241-254.

¹⁸ J. Pelegrin, *La production des grandes lames de silex du Grand-Pressigny*, in *Matériaux productions du Néolithique à l'Âge du Bronze*, Paris, 2002, p. 131-147.

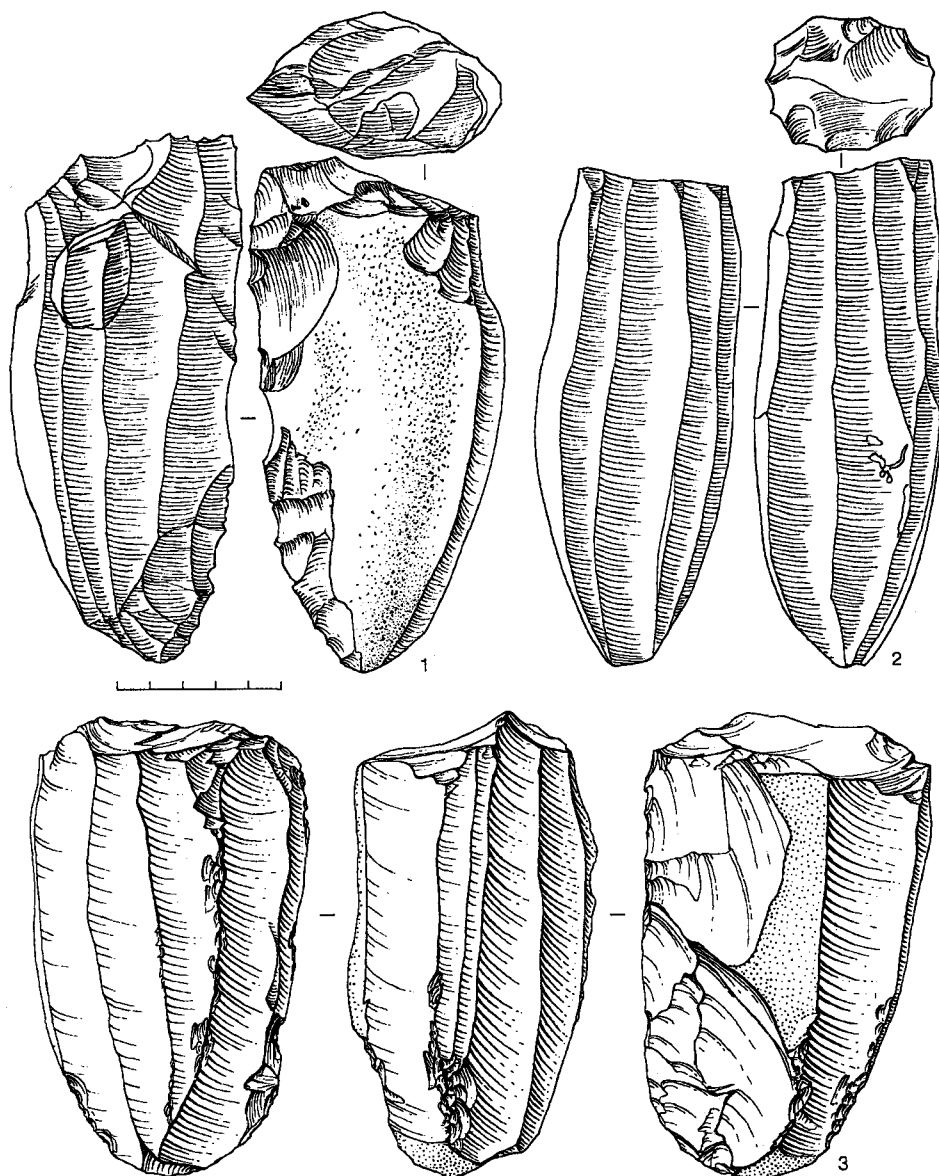


Fig. 3. Cores from the workshop.

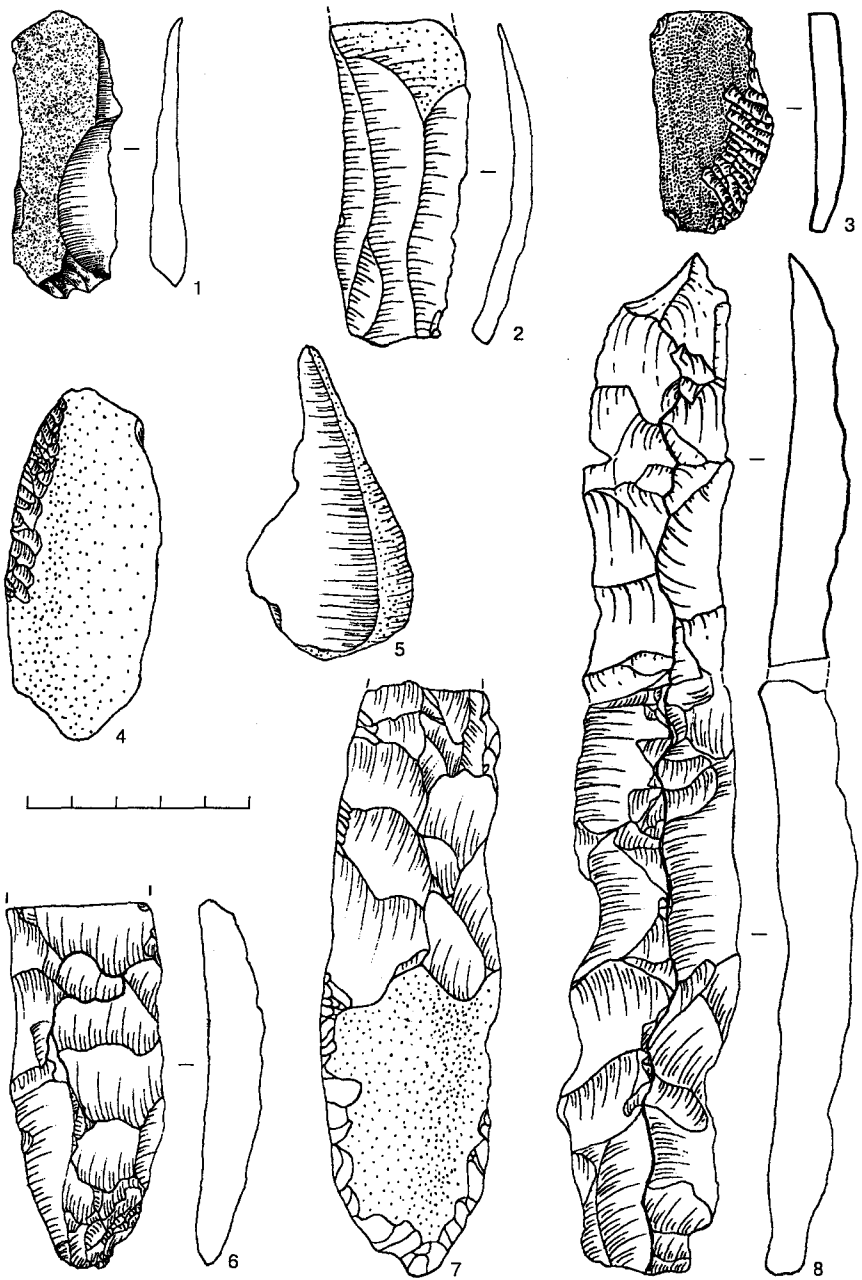


Fig. 4. Lithic waste from the flintworking.

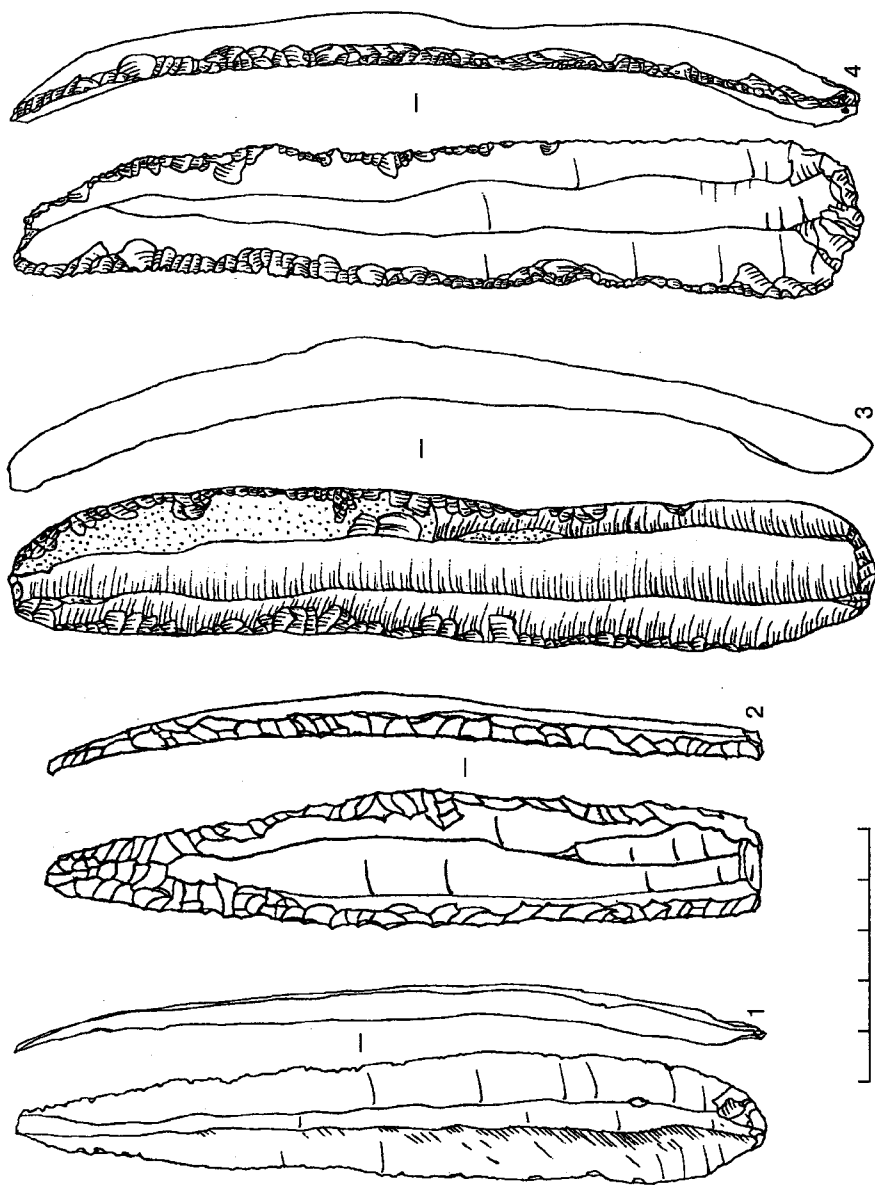


Fig. 5. Lithic tools from the workshop and other domestic structures.

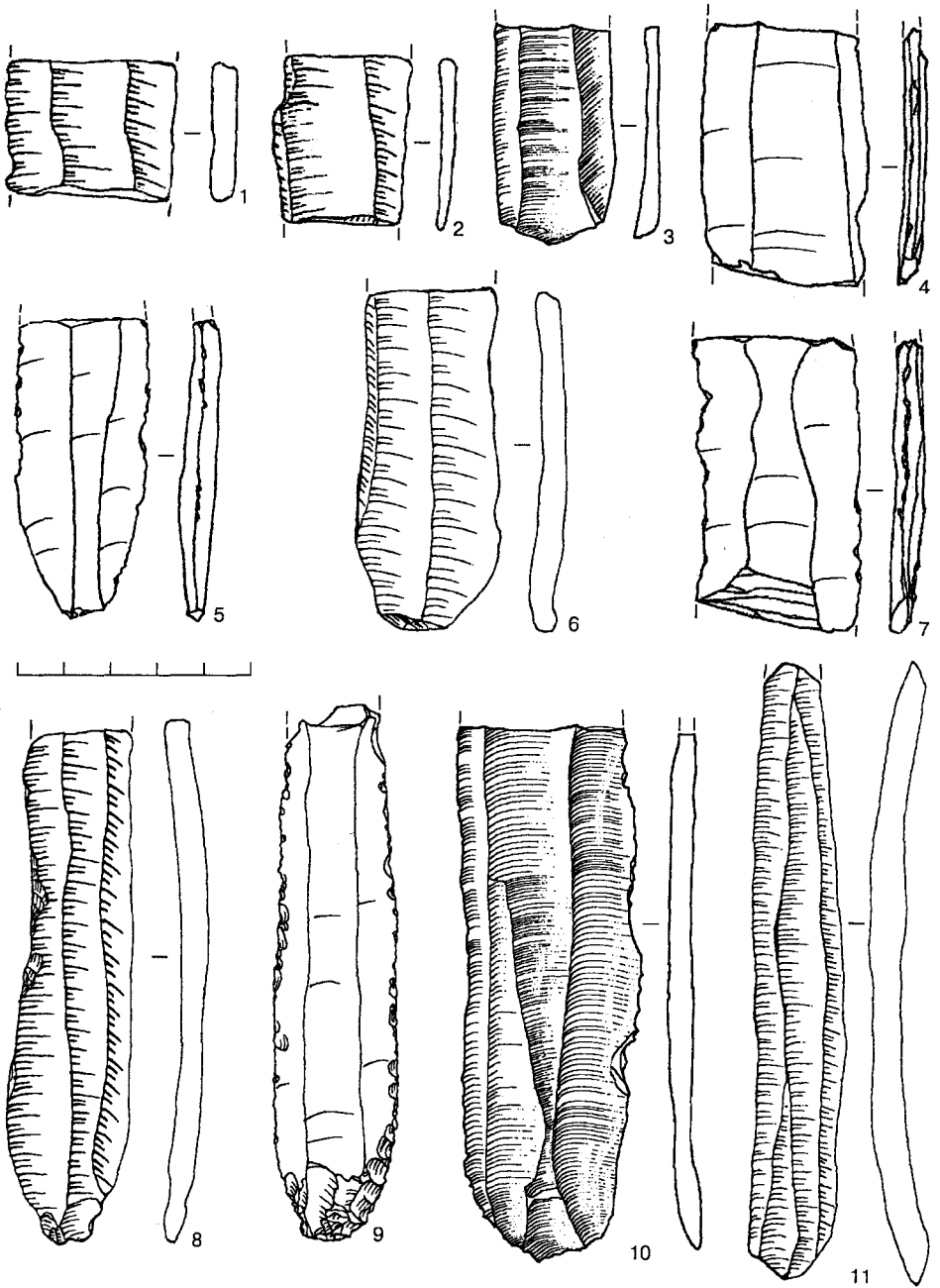


Fig. 6. Lithic tools from the workshop and other domestic structures.

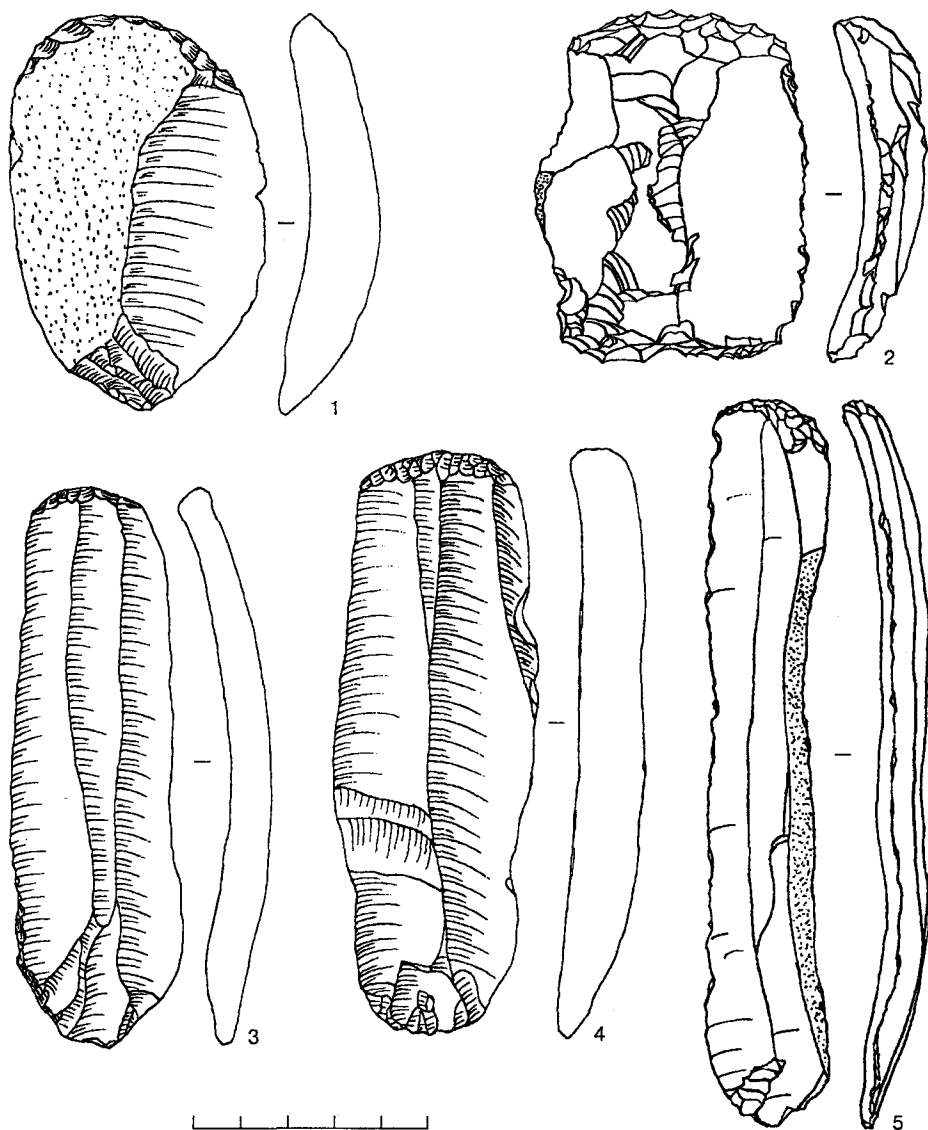


Fig. 7. Lithic tools from the workshop and other domestic structures.

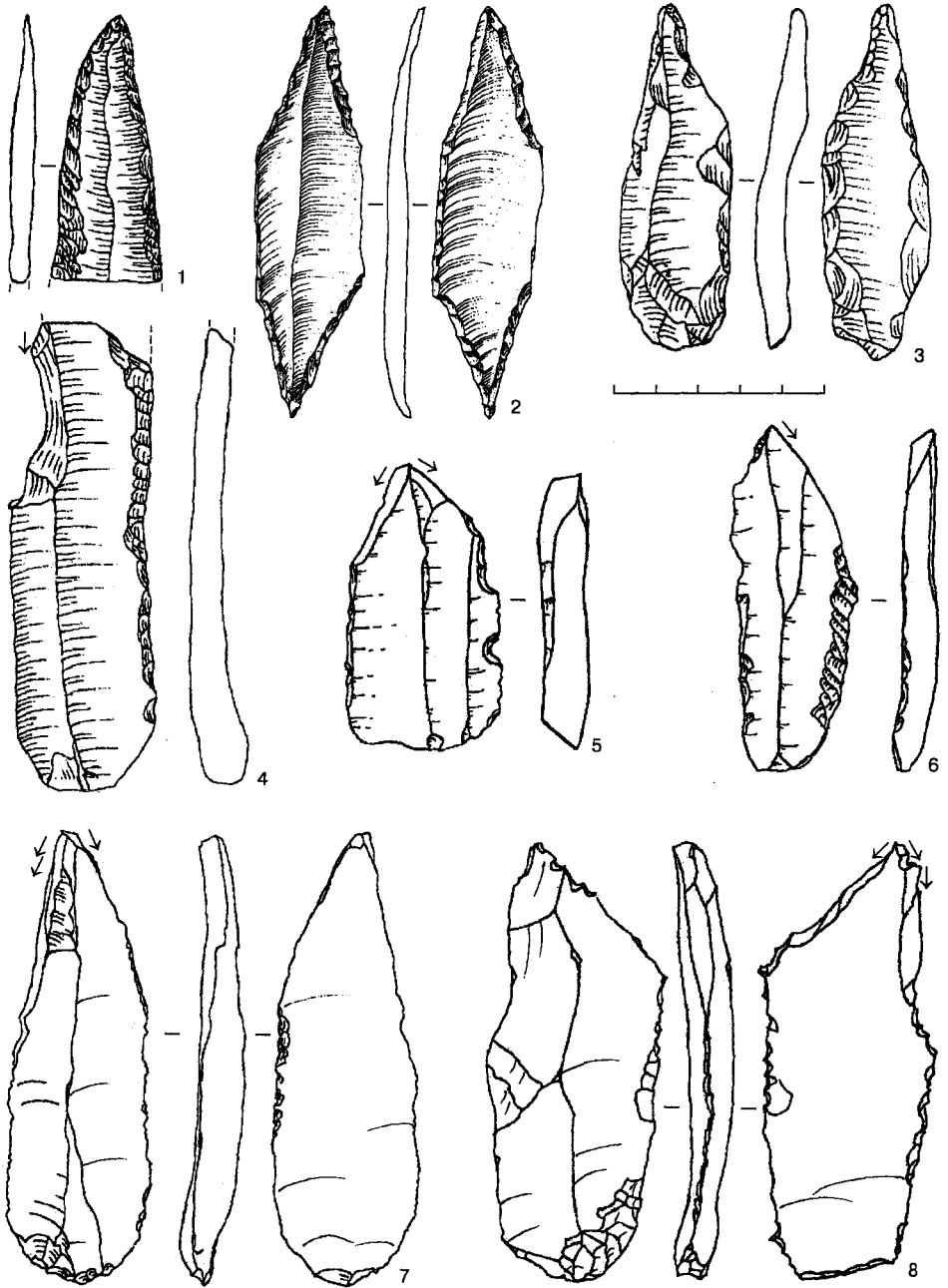


Fig. 8. Lithic tools from the workshop and other domestic structures.

Apart from cores and blades, the structure produced finished tools, including a dagger-knife, endscrapers, drills, burins, retouched blades and flakes etc. (fig. 5/2; 7-9).

The unique knife-dagger belongs to those few tool types which require unbroken blades as preforms. Its length is 16 cm, it is slightly curved in profile and trapeze-like in cross section. The entire piece except portions joining the butt is covered by scars of retouch, blunting along laterals and flat pressure parallel near the tip (fig. 5/2). These tools are rather rarely found, but the area of their distribution covers not only the Tripolye Culture but also the cultures of the Lengyel - Polgar type at Poland and Hungary¹⁹. This tool type survived during the Late Tripolye (Kruts, 1977), it is also occurred in the early pastoral cultures²⁰. Similar dagger-knives are reported from Western Europe, where they were produced in great quantities in the lithic workshops of Grand Pressigny (France) and exported to great distances, for instance, to Switzerland²¹.

Endscrapers (73) are usually made on elongated proximal or medial portions of regular blades, straight or slightly curved in profile. Their size varies from 7 to 12 cm length and 2.5 to 3 cm width. The majority of the scrapers are with convex working edges. The use of the regular-sized blanks facilitated the manufacture of standard tools (fig. 7/3-4). The only exception is a blade tool 18 cm length with curved profile, trapeze-like in cross section with partly cortex back (fig. 7/5). Some endscrapers are made on crude massive blades curved in profile, with wide faceted butts. The dorsal side of some tools demonstrates cortex portions or crested scars. Endscrapers on flakes (14) are represented by large quadrangular or rounded pieces, occasionally with dorsal surface totally or partly covered by cortex. The tools are with steep retouched working edges (fig. 7/1-2).

Burins (24) made on blades and flakes include several varieties (fig. 8/4-8). Burins at blades are mostly made on proximal fragments. These are angle and dihedral, while burins at flakes are dihedral, some multifaceted. Drills (17) are morphologically different (fig. 8/1-3). Apart from the various blanks used (blades, flakes, stone chips etc.) they differ in shape, location of the tip and character of tip treatment. Some are with triangular tips while others are with rod-like tips or

¹⁹ A. Zakoscielna, *Aus den Untersuchungen der Lublin-Wolynie-Kultur mit bemalter Keramik. Feuersteinindustrie*, in *A Turning of Age. Jubilee book dedicated to Professor Jan Machnik on his 70th Anniversary*, Krakow, 2000, p. 509-543; J. Budziszewski, *Flint working of the south-eastern group of the Funnel Beaker Culture: exemplary reception of Chalcolithic socio-economic patterns of the Pontic zone*, in *The western border area of the Tripolye culture*, Poznań, 2000, p. 256-282; I. Bognár-Kutzián, *The Copper Age Cemetery of Tiszapolgár-Basatanya*, Budapest, 1963.

²⁰ I.L. Alekseeva, *Kurgani epohi paleometalla v Severo-Zapadnom Prichernomorie*, Kiev, 1992; S.S. Berezanskaia, *Kammedobivauchee I kamneobrabativauchee proizvodstvo*, in *Remeslo epohi eneolita - bronzi na Ukraine*, Kiev, 1994, p. 8-54; M. Kaczanovska, J. Kozłowski, *Umwandlungen in den spataneolithischen Steinindustrien im mittleren Donaugebiet*, in *A Turning of Age. Jubilee book dedicated to Professor Jan Machnik on his 70th Anniversary*, Krakow, 2000, p. 240-255.

²¹ N. Mallet, *La Grand-Pressigny: ses relations avec la civilisation Saône-Rhone*, in *Supplément au Bulletin de la Société des Amis du Musée du Grand-Pressigny*, Grand-Pressigny, 1992; J.-C. Marquet, *La Préhistoire en Touraine*, Chambray, 1999; Ch. Strahm, *Geschäftete Dolchklängen des Spätneolithikums*, in *JBHMB*, XLI-XLII, 1961-1962, p. 447-477.

shouldered with symmetrical or asymmetrical tips. The last group of tools is composed of 12 globular hammerstones 3 to 7 cm in diameter. Their surfaces, partly covered by cortex, are with large scars and traces of blows.

The subterranean structure produced numerous blade and flake fragments (141), bearing traces of blunting or sharpening retouch (fig. 9). The lateral sides of some blade fragments are with marginal regular pressure unifacial or bifacial retouch.

The use-wear analysis of 600 flint tools and blade fragments has been demonstrated that the majority of pieces were not used. Apart from globular hammerstones, among tools with use-wear there are pressure retouchers made on fragments of three crude flint blades with intentionally blunted lateral sides. Working portions are located near the butts. Two elongated antler pieces were used in the same function.

The composition and abundance of lithics from the structure, mostly lacking use-wear as well as discovery of the lithic processing tools indicate that the structure could be interpreted as a specialized lithic workshop for blade and tool manufacture. Two rounded storage pits 160 cm in diameter and 170 cm depth, located nearby, yielded numerous flint waste. One pit produced more than 1000 small stone flakes and chips forming a breccia, and 22 cores similar to the above mentioned.

We argue that the workshop and adjacent pits constituted a single manufacturing center used by a group of professional artisans. It is worthwhile to note the discovery of the sub-rectangular in plain view ochre spot located at the compact floor of the workshop. It measures 40 to 60 cm. One of its sides was a cushion made of baked clay while four corners were marked by four cores vertically driven into the floor up to the half of their length. The artifacts differ from all other cores known at Bodaki. They are smaller, with perimetral platforms and heavily smoothed ridges. Probably this discovery hints the existence of a manufacturing cult. Chernysh²² believed in the possibility to identify such cults in Tripolye based on the discoveries of numerous flint flakes driven into the clay plaster of the platforms located near the houses at Nezwisko.

Lithic processing was executed not only at the village but beyond its limits too. A row of six flint clusters partly destroyed by plough each consisting of 100 to 250 pieces has been identified near the western edge of the village 100 m from the raw material outcrop. The concentrations lacked in cores but produced several elongated oval-shaped flint concretions and pebbles with 'knobby' surface. Some are with strike off extremities and traces of several preparatory scars to form a platform. The clusters were dominated by cortical and semi-cortical flakes, flakes with longitudinal and transversal dorsal scars, small flakes with convex bulbs, etc. Blades and their fragments were not numerous. The artifacts are typical for workshops where the cortex removal and initial trimming of concretions were executed.

Other village households and structures produced numerous lithics too. Meanwhile their composition differs from the workshop. First, no house produced so many cores and blades, so abundant debitage and lithic waste, etc. Second, the tool diversity at houses are greater comparing with those from the workshop.

²² E.K. Chernish, *Tripolskie masterskie po obrabotke kremnia*, in *KSlA*, p. 111, 1967, p. 60-66.

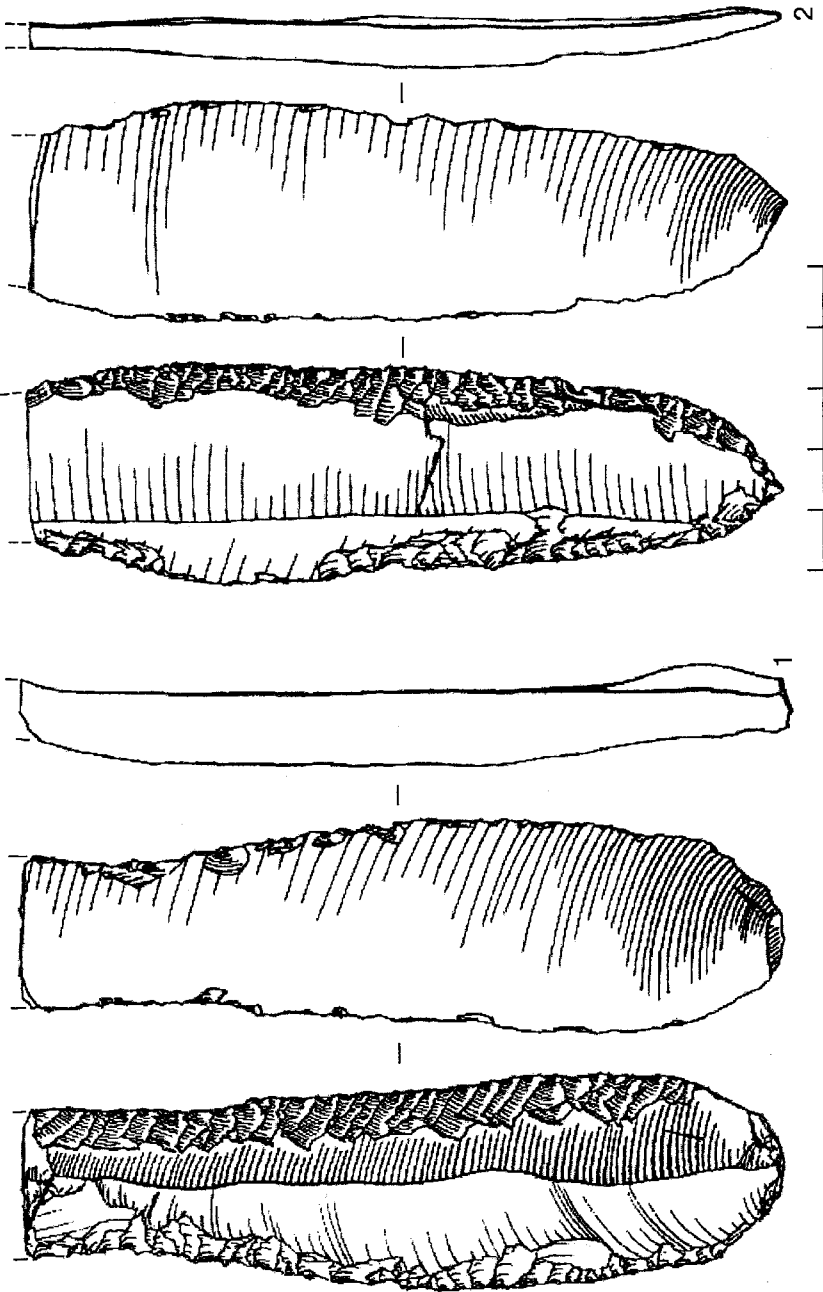


Fig. 9. Lithic tools from the workshop and other domestic structures.

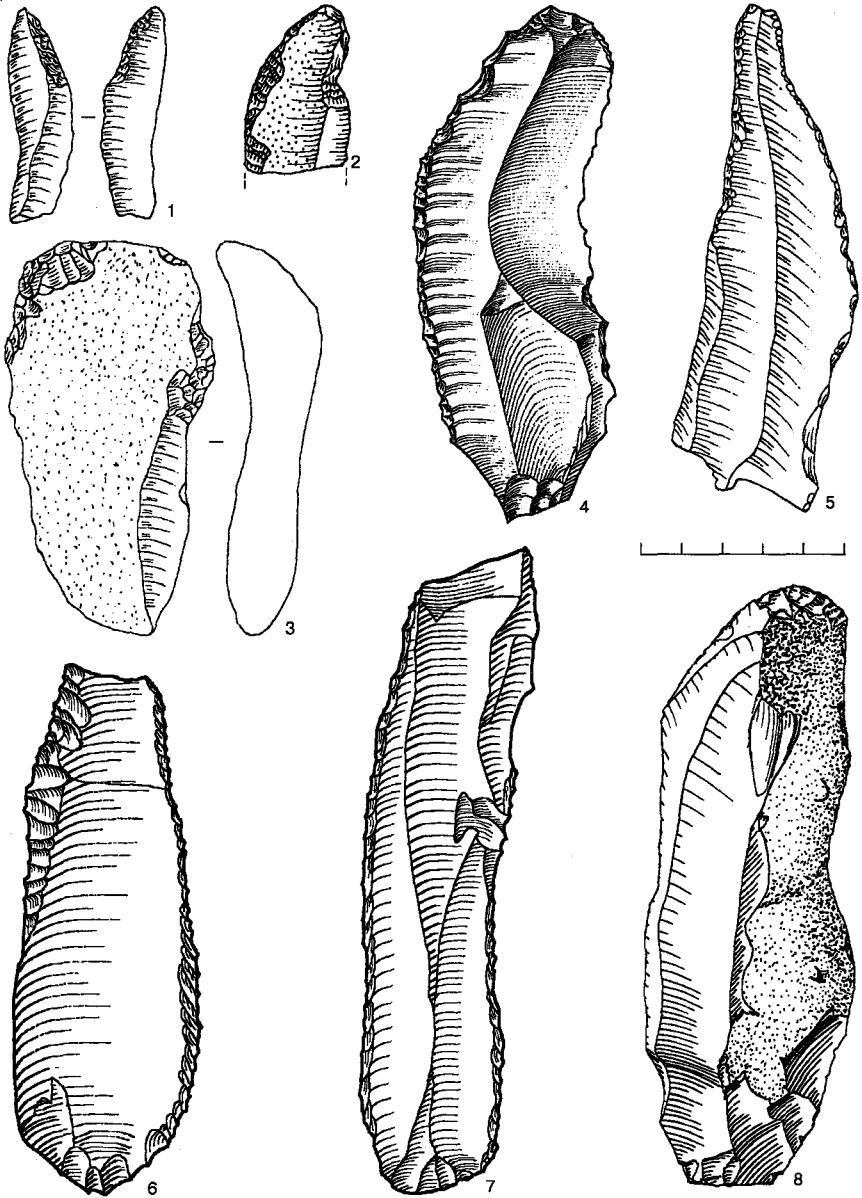


Fig. 10. Lithic tools from the workshop and other domestic structures.

Apart from the types above mentioned it includes lateral flake scrapers, scrapers on stone chips, notched blade and flake fragments, splintered pieces, sidescrapers on large flakes and chips with working edges formed by irregular retouch etc. (fig. 10). It is to be noted that not only regular-sized blades but also crude massive flakes, curved blades and stone chips were widely used as blanks for endscrapers, drills, burins, etc. Some houses and the cultural layer yielded arrowheads, dart heads and occasional axes.

Arrowheads (21) are triangular in outline, with straight or concave base. They differ in size with 2 to 6 cm length (fig. 11/1-6). Their surfaces are completely flattened by retouch, rarely treated along the perimeter. Similar point types occurred at the other Tripolye sites as well as in the cultures located eastwards and westwards²³.

Axes are represented only by 3 fragments (fig. 11/7). They are small (6 to 8 cm length and 4.5 to 5.5 cm width), made of gray not transparent flint and have trapeze-like outlines. Their backs and adjoining parts are worked by large scars while laterals are shaped by smaller scars. The working edges are convex, symmetric in profile. These are grounded and polished.

The comparative study of the tools from Bodaki with those reported from the Tripolye settlements of the same age (Nezvisko, Voroshilovka, Rakovets, Brynzeny VIII etc.) demonstrates similarities in those tools as endscrapers on blades, different drills, burins, blades with pressure retouch. Flint axes are not typical for the inventory of Bodaki and the specimens represented here are smaller than typical pieces of the same age from Polivanov Yar II²⁴.

The specialization of the prehistoric inhabitants of Bodaki in flintworking shaped the lithic inventory, which differs from the findings from the ordinary Middle Tripolye villages where only small-scale workshops or individual working posts have been explored. These villages produced some cores, debitage and lithic waste along with unfinished tools, tools lacking use-wear, tool fragments etc. The assemblages yielded numerous imported pieces made of the Volyn flint²⁵. Meanwhile among those the blade tools prevailed while the Bodaki houses evidenced wide use of debitage (flakes, irregular and crested blades etc.) as tool preforms. These blanks were of worse quality comparing with the preforms produced at the specialized workshop. The fragments of unfinished tools, stone chips and cortical flakes with traces of pressure retouch were also discovered. These pieces, being very crude, could not be transformed into tools. Thus their treatment was probably executed for tests, maybe associated with learning (fig. 4/3).

²³ V.G. Zbenovich, *Oboronitelnie sooruzhenia i orujie u plemen tripolskoi kulturi*, in *Arheologia*, 15, 1975, p. 32-40.

²⁴ T.A. Popova, *Kremneobrabatativauchee proizvodstvo tripolskih plemen (po materialam poselenia Polivanov Iar)*, in *Pervobitnaia arheologia: Poiski i nahodki*, Kiev, 1980, p. 145-162; Eadem, *Polivanov Iar*, Sankt-Petersburg, 2003.

²⁵ I.I. Zaec, N.N. Skakun, *Rezultati issledovania proizvodstvennogo inventaria poselenia Voroshilovka*, in *Rannezemledelcheskie poselenia giganti na ukraine. TD mejdunar. konf.*, Kiev, 1990, p. 105-108; S.O. Gusev, *Tripilska kultura Srednego Pobujjia (rubeju IV - III tis. do n.e.)*, Vinnica, 1995; M. Yu. Videiko, *Tripilska civilizacia*, Kiev, 2001.

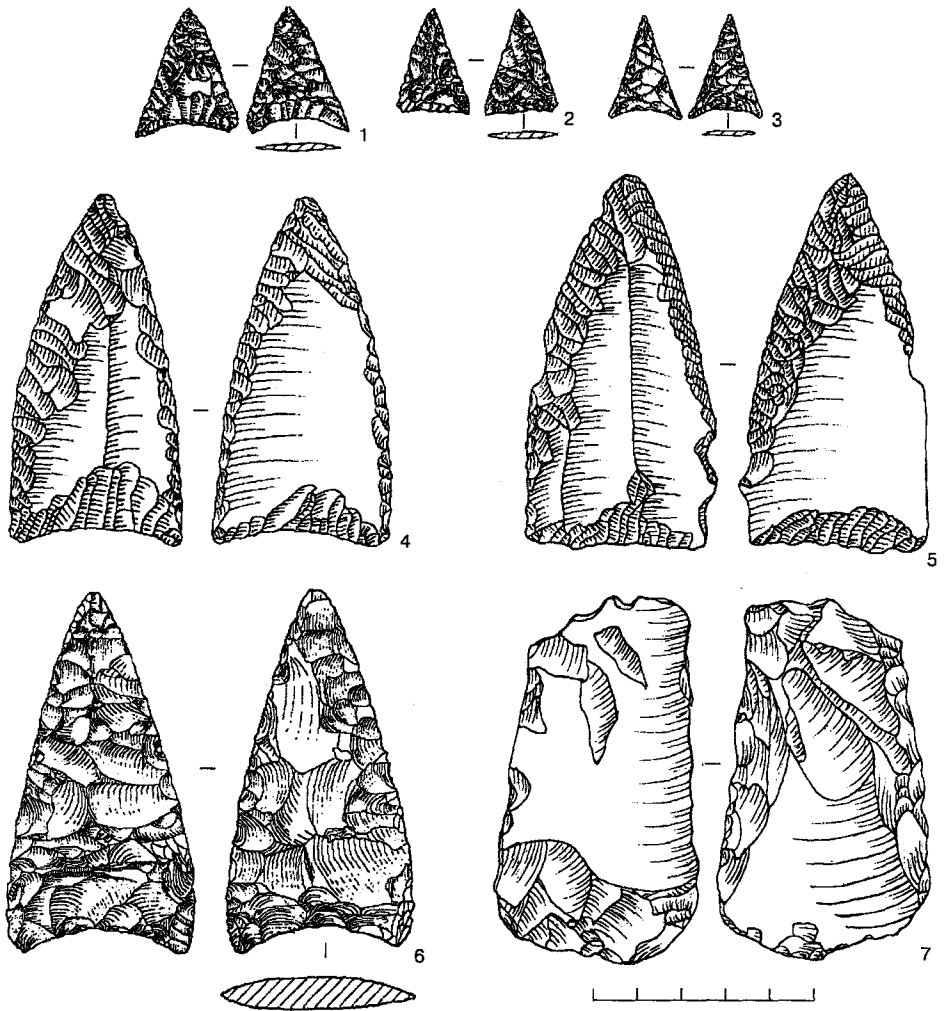


Fig. 11. Lithic tools from the workshop and other domestic structures.

Thus the flint was procured at Bodaki from the source located nearby. Core preparation and shaping took place on special workshops beyond inhabited space and at the specialized communal workshop. Core exploitation and tool manufacture were executed in this workshop and less frequently in other households and village structures. Such great number of blades and tools not used could not be explained by the local needs. Thus I argue that the majority of these were produced for exchange. Flint workshops have been discovered in other areas of the Tripolye Culture. Among these two types could be identified. First, there are small family workshops located nearby households oriented to the local consumption, which were more widespread at the early phase of the culture. Later large communal workshops associated with raw material sources appeared. Their production was oriented toward the intra- and inter-culture exchange. Some villages of the Dniestr area as Bodaki demonstrate the co-existence of both workshop types²⁶. Moreover, there are workshops oriented toward specialized manufacture of particular tool types. For instance, Polivanov Yar I yielded remains of the workshop for flint axes manufacture²⁷.

The functional study of Bodaki is yet to be completed so only preliminary results lacking comprehensive statistics could be presented now. Meanwhile the data in our disposal are sufficient to characterize in general terms the subsistence activities of the village inhabitants. The use-wear analysis has been revealed that the majority of utilized tools from the workshop served for flint processing while tools from the houses were used for different purposes. The wear occurred not only at blade tools and blade fragments but also at implements made on lithic waste. Among the tools used there are mostly implements connected with main subsistence (agriculture, herding, hunting, and fishing) and manufacturing activities.

Among agricultural implements (ca. 3%) there are the sickle inserts of Karanovo type and grinding slabs discovered in all dwelling structures unearthed. Medial fragments of blades were used as sickle inserts without additional treatment or sharpened by flat retouch. The grinding slabs, represented by unbroken specimens and fragments, are rounded or elongated, measuring from 50 to 70 cm to 40 to 60 cm and even 4 to 7 cm. Paleobotanic evidence witnessed the cultivation of wheat and barley in the northwestern areas of the Tripolye culture²⁸.

Numerous bone remains belonging to different domestic and wild animals, and fish witnessed herding, hunting and fishing. Apart from the nutritional value, these activities produced raw materials for different needs, including antler and bone for tool manufacture. Different kinds of implements were associated with these activities. Among these endscrapers, cutting knives and borers (30% of tools) were used for hide and skin treatment, making of clothes, shoes etc.

²⁶ E.K. Chernish, *Tripolskie masterskie ...*, in *loc.cit.*, p. 60-66.

²⁷ T.A. Popova, *Polivanov Yar*.

²⁸ Z.V. Yanushevich, *Kulturnie rastenia Jugo-Zapada SSSR po paleobotanicheskim issledovaniyam*, Kishinev, 1976; G.A. Pashkevich, *Paleobotanicheskie nahodki na territorii Ukraini: (Neolit - bronza)*, Katalog, Kiev, 1991; Z.V. Yanushevich, K.V. Kremeneckii, G.O. Pashkevich, *Paleobotanichni doslidjennia Tripil'skoi kulturi*, in *Arheologia*, 3, 1993, p. 143-152.

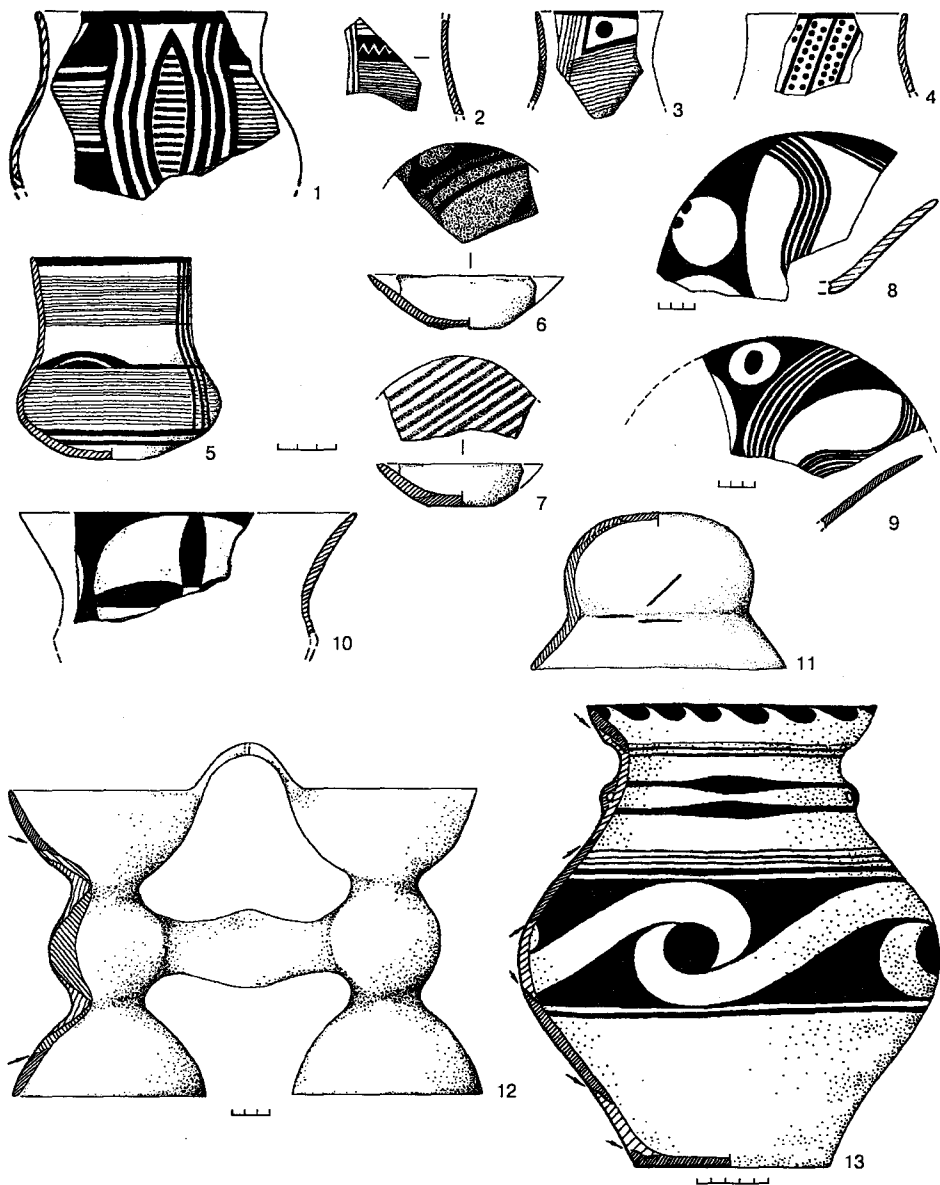


Fig. 12. Pottery from Bodaki.

Small saws, scrapers, planing knives, drills and burins (27% of tools) served for antler and bone treatment. The diversity of antler hoes, bone awls, borers, needles, harpoons etc. witnessed developed bone working technology. The unique antler artifact is worth to mention. This is an antler piece 7 cm long with cut wide end and splintered narrow end with a hole (other hole was outlined nearby). Ideally polished surface of the antler is decorated by the incised spiral design (fig. 12).

Tools for treatment of organic materials (wood, grass and reed) constitute 25%. Different saws, scrapers, knives, drills and burins served for woodworking. Their quantity and functional diversity indicate the importance of wood in the community life. Numerous imprints of slabs, blocks and timber at the wall plaster of burned houses allow reconstructing the woodworking technology. Apart from housing, wood was used for making various goods including hafts served in composite tools. Large knives served for cutting grass to feed animals and reed for thatch and manufacture of different goods.

The flintworking activities (associated with 15% of tools) were described above while discussing the lithic workshop. It should be emphasized that the traces of this activity in the houses are not numerous comparing with the workshop. In the former cases these are represented by occasional cores, lithic processing tools, and lithic waste. Among lithic processing tools there are flint slabs used for the manufacture of objects of soft stone.

Specialized ceramic workshop with an oven witnessed the developed local pottery manufacture. The oven was a dome-like structure with wooden carcass plastered by clay. It had two fire-chambers divided by a pillar. Similar ovens are known at the other Tripolye sites, while the most similar structure has been unearthed at Veselyi Kut²⁹.

The richest ceramic collection from Bodaki includes pottery made of clay bands. Like pottery from the other Tripolye sites of the same age (Nezvisko, Vladimirovka, Kudrintsy, Rakovets, Brynzeny VIII) it could be subdivided into table painted ware (75%) and kitchen ware (25%). The clay composition, careful surface treatment and decoration, high quality firing, etc. indicate developed pottery technology (fig. 12-13). Among the kitchen ware there are vessels with smoothed surface indicating some connections with the Lengyel-type cultures located further to west, and pots with admixture of pounded shells in clay typical for the eastern cultures³⁰.

²⁹ S.N. Bibikov, N.N. Shmaglii, *Tripilske poselennia bilia s. Grebeni*, in *Arheologia*, 16, 1964, p. 131-136; T.G. Movsha, *Goncharnie centri tripolskoi kulturi na Dnestre*, in *SA*, 3, 1971, p. 228-334; I.I. Zaec, *Tripolskoe poselenie na Ujnom Buge*, in *SA*, 4, 1974, p. 180-200; E.V. Tsvek, *Goncharnoe proizvodstvo plemen tripolskoi kulturi*, in *Remeslo epohi eneolita - bronzi na Ukraine*, Kiev, 1994, p. 78-81.

³⁰ T.G. Movsha, *O sviasiah plemen tripolskoi kulturi so stepnimi plemenami mednogo veka*, in *SA*, 2, 1961, p. 186-199; E.K. Chernish, *Eneolit Pravoberejnoi ...*, in *loc.cit.*, p. 166-350; I.V. Palaguta, *K probleme sviazei Tripolia-Kukuteni s kulturami eneolita stepnoi zoni Severnogo Prichernomorja*, in *RA*, 1, 1998, p. 5-15; E.V. Tsvek, *Tripolskaia kultura mejdurechia Jujnogo Buga i Dnepra (srednii etap)*, Avtoref. Ist. Nauk., Kiev, 1987; Eadem, *Nekotorie aspekti domostroitelstva u plemen vostochnotripolskoi kulturi*, in *Peterburgskaia trasologicheskaia shkola i izuchenie drevnih kultur*

The village yielded several implements for working with clay. These are bone stamps served for decoration of kitchen ware, smoothers from animal ribs and small river cobbles. The smoothers seem to be used for clay figurines manufacture. Among these feminine statuettes prevailed, both executed in realistic and schematic manners. Occasionally the latter are flat, with holes at shoulders and hips. The third type of statuettes is with voluminous simplified bodies. One of the statuettes is with traces of red paint. Apart from anthropomorphic figurines, there is a fragment of an animal statuette and three bird-like rattles. Two clay spindle whorls, one with dot decoration, witnessed the sewing.

Copper implements from Bodaki are represented by a heavily corroded small knife with curved back discovered in one of the semi-subterranean dwellings, and a chisel found at the surface of the site. The working edge and the back of the piece lack use wear, thus it seems that the chisel was a part of the destroyed hoard. The spectral investigation of both objects has been revealed that the copper was exported from the Balkans³¹. Other metal object reported from Bodaki is a fragment of a large wedge-shaped axe³². We lack any information on local metallurgy including tools served for copper ore treatment and metalworking.

Thus the tools studied indicate that in spite of the flintworking specialization of Bodaki, the village served as focal center to the whole spectrum of subsistence and domestic activities. Among main subsistence activities were agriculture, husbandry, hunting, fishing, supplemented by manufacture of tools and different goods such as stone, bone and antler working, sewing, pottery manufacture etc. Among the tools with the functions identified are sickle inserts, knives for cutting grass and reed, meat knives, hide scrapers, woodworking, boneworking and stone working implements. Thus we deal with the complete tool kit typical for the time span under study. Comparing these tools with those from the other Tripolye villages, one can see the difference rather in percentage of different tool classes than in presence / absence of particular functional tool types³³.

Evrazii, Sankt-Petersburg, 2003, p. 241-254; N.N. Skakun, E.G. Starkova, N.V. Rinduk, *Severozapadnie pamiatniki Tripolia i sosednie kulturi*, in *Konvergencia i divergencia v razvitii kultur eneolita - bronzi Vostochnoi Evrope*. TD, Sankt-Petersburg, 1995, p. 45-46; N.N. Skakun, E.G. Starkova, *op.cit.*, in *loc.cit.*, p. 132-139; E.G. Starkova, *Keramicheskii kompleks iz zemlianki 2 tripolskogo poselenia Bodaki*, in *Drevnie kulturi i tehnologii. Novii issledovania molodih arheologov Sankt-Peterburga*, Sankt-Petersburg, 1995, p. 27-33. Eadem, *Statistika i planigrafia tripolskogo poselenia Bodaki*, in *Poselenia: sreda, kultura, socium*, Sankt-Petersburg, 1998, p. 68-73; Eadem, *Nekotarie itogi issledovania keramicheskogo kompleksa tripolskogo poselenia Bodaki*, in *Tripilskii svit i iogo susidi. TD mijnar. Naukovo-praktichnoi konf.*, Zbaraj, 2001, p. 57-60; Eadem, *The Ceramic Assemblages of the Archaeological Contexts of Tripolye-Cucuteni Settlements*, in *9-th Annual Meeting of EAA. Final Programme and Abstracts*, Sankt Petersburg, 2003, p. 88.

³¹ D.A. Amosov, K.V. Bukin, N.E. Romanova, *Opit primenienia rentgenofluorestantsnogo analiza dlia izuchenia vechestvennogo sostava izdelii drevneishei metallurgii*, in *RGJ*, 13-14, 1999, p. 27-32.

³² N.V. Rindina, *Drevneishee metalloobrativauchee proizvodstvo Vostochnoi Evrope (po materialam tripolskoi kulturi)*, Avto-ref. Ist. Nauk., Moskva, 1971.

³³ G.F. Korobkova, *Lokalnie razlichia v ekonomike rannih zemledelchesko-skotovodcheskih obchestv*, in *Uspеhi sredneaziatskoi arheologii*, 1, Leningrad, 1972, p. 16-22; N.N. Skakun, *Opit rekonstrukcii hoziaistva ...*, Avto-ref.; I.I. Zaec, N.N. Skakun, *op.cit.*, in *loc.cit.*, p. 105-108; T.A. Popova, *Polivanov Iar*.

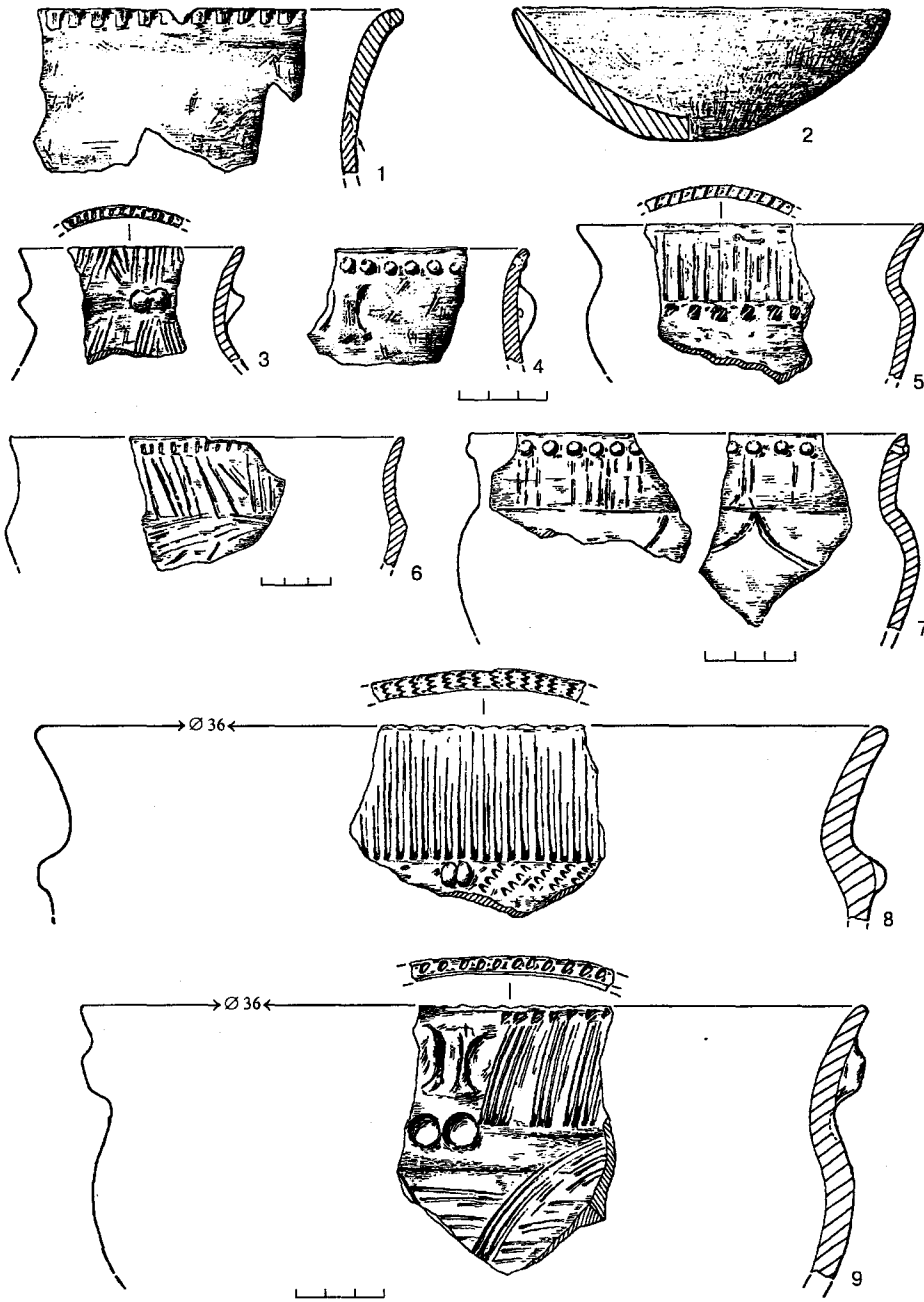


Fig. 13. Pottery from Bodaki.

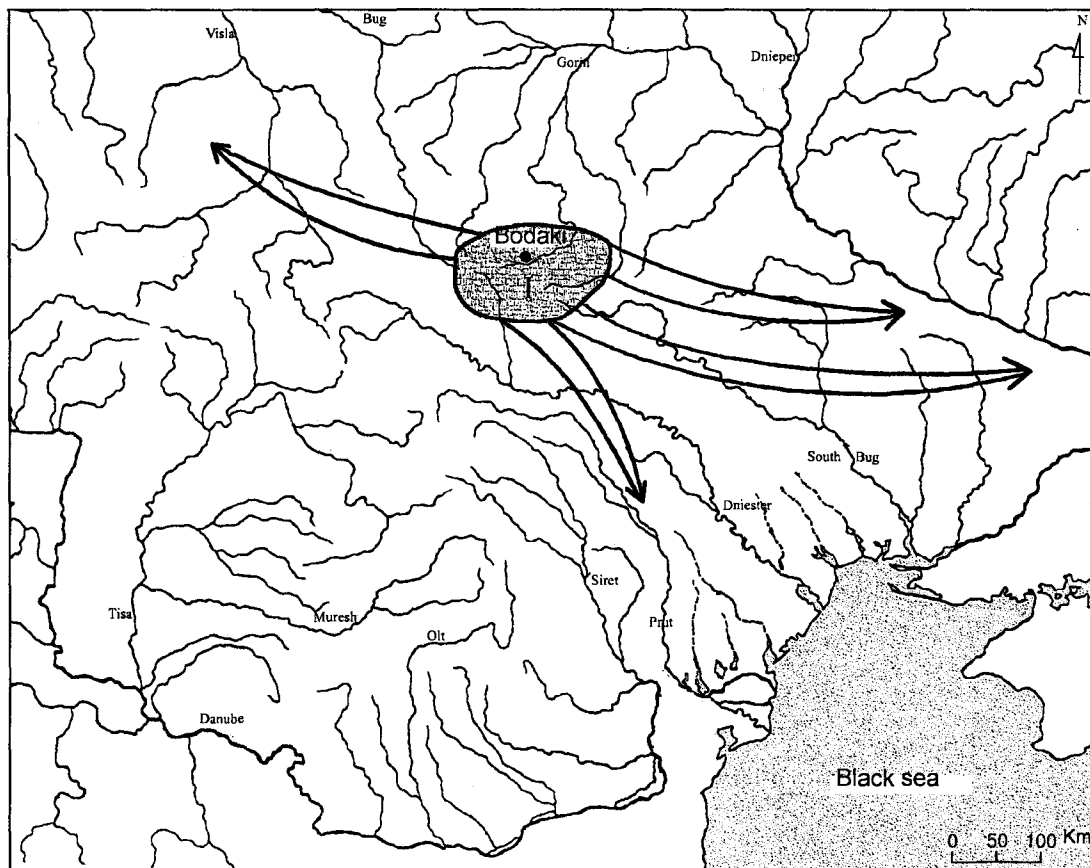


Fig. 14. The source of the Volyn flint located nearly the settlement of Bodaki.

Among the Tripolye settlements located at the Volyn highland Bodaki is not the unique site specialized in flintworking. Reconnaissance trips yielded more than 20 flintworking Eneolithic and Early Bronze age occurrences only in the western part of the area³⁴. The scarcity of the information available hampers to differentiate between workshops located nearby the raw material outcrops where flint was extracted in quarries or mines³⁵, from specialized habitation-workshops as Bodaki. In the last case the inhabitants specialized in flint extraction, processing and blade manufacture for trade, at the same time providing themselves by all things necessary for everyday life. The diversity of exported goods instead of raw material indicates that the Volyn area was among the largest Eneolithic flintworking centers in European scale (fig. 14). Many tool types identified at Bodaki have direct analogs both in raw materials used and shape among lithics from different areas of the Tripolye-Cucuteni Culture at Ukraine³⁶, Moldavia³⁷, Romania³⁸, as well as from contemporary sites of Poland, Hungary and Slovakia³⁹. Among these are elongated retouched knives, triangular arrowheads and dart heads with straight or slightly concave bases, and endscrapers. It is worth to note that morphologically similar tools made of different kind of flint, the Donetsk one, are typical for the early pastoral sites of the areas lying along the Azov and Black Seas. Artifacts from burials of Petro-Svistunovka, Lugansk, Chapli, Kainar and Dzhirguleshti⁴⁰ demonstrated sophisticated flintworking technology, which differs in some details from the technology used in Tripolye. This evidence along with magnificent flint artifacts from hoards⁴¹ witnessed the wide utilitarian and prestige use

³⁴ V.M. Konoplia, *Obrabotka kremnu naseleniam Zahidnoi Volini za dobi midi - rannioi bronzi*, in *Arheologia*, 37, 1982, p. 17-31, Idem, *Issledovania v Ivano-Frankovskoi oblasti*, in *AO 1985*, 1986, g. 187-189; Idem, *Kremneoborobne virobništvo poseleñnia tripil'skoi kulturi Listvin*, in *Volinopodolski arheologichni studii*, Lviv, 1998, p. 11-122; B.A. Vasilenko, *Vidobuvania i obrobka kremnu na Pravoberežji Verhnego Podnistrovia v eneolite*, in *Problemi istorii ta arheologii davniogo naselennia Ukrainkoï RSR*, Kiev, 1989, p. 38-39.

³⁵ S.N. Bibikov, *Drevnie kremnevie virobki v Srednem Podnestrovie*, in *AMNP*, Ser. A., Historia, XX (1-2), 1966.

³⁶ E.K. Chernish, *Tripolskie masterskie ...*, in *loc.cit.*, p. 60-66; I.I. Zaec, S.N. Rijov, *Poselenie tripolskoi kulturi na Ujnom Buge*, Kiev, 1992, p. 177; V.A. Kruts, A.G. Korvin-Piotrovskii, S.N. Rijov, *Tripolskoe poselenie-gigant Taliñki*, in *Issledovania 2001*, Kiev, 2001.

³⁷ V.I. Markevich, *op.cit.*; T.A. Popova, *Polivanov Iar*.

³⁸ Al. Păunescu, *Evoluția uneltelor și armelor de piatră cioplită descoperite pe teritoriul României*, București, 1970; D. Monah, F. Monah, *op.cit.*, in C.-M. Mantu, Gh. Dumitroaia, A. Tsaravopoulos (eds.), *op.cit.*, p. 15-95.

³⁹ B. Balcer, *Wytworczości narzedzi kremniennych w neolicie ziem Polski*, Wrocław; Warszawa; Krakow; Gdansk; Łódź, 1983; M. Kaczanowska, J. Kozłowski, S. Siska, *Neolithic and eneolithic stone industries from Saisske Michal'any, Eastern Slovakia*, Krakow, 1993.

⁴⁰ T.G. Movsha, G.F. Chebotarenko, *Eneoliticheskoe kurgannoe pogrebenie u st. Kainari v Moldavii*, in *KSIA*, 115, 1969, p. 23-29; V. Haheu, S. Kurchatov, *Cimitirul plan eneolitic de lângă satul Giurgulești*, in *RevArh*, 1, 1993, p. 101-115.

⁴¹ A.A. Formozov, *Kladi kremnevih orudii na territorii SSSR*, in *ArchRozh*, 10/5, 1958, p. 637-645, A.V. Kolesnik, V.F. Klimentko, *Eneoliticheskii klad kremnevih plastin iz Harkovchini*, in *Problemi arheologii Podneprov'ia*, 2, Dnepropetrovsk, 1998.

of lithic artifacts. Only insufficient investigation of lithic workshops hampers to characterize in detail the flintworking traditions of the area under study⁴².

The study of various manufacturing centers of the Eneolithic revealed that the flintworking activities in different parts of the Old World continued to develop and even achieved its culmination. Apart from the data from Ukraine mentioned above, the considerable progress in lithic technology (Eneolithic - Early Bronze Age) could be traced in Dobrudga, Bulgaria⁴³, southeastern Poland⁴⁴, Spienne at Belgium⁴⁵, Grand Pressigny in the southern France⁴⁶, and even in some areas of the Near East⁴⁷. It is worthwhile to mention that the most sophisticated pieces ever discovered in Europe are from Dobrudga, the earliest flintworking center among the above mentioned. In spite of regional difference in lithic technologies used some common traits could be identified in all areas, namely:

1. Extraction of large cobbles of chalk flint by mining;
2. Appearance of specialized workshops and habitation-workshops located nearby the lithic sources;
3. Manufacture of standard regular-sized long blades-preforms;
4. Professional craft specialization in blade manufacture oriented to supply local exchange networks and to export pieces to the other culture areas. In the last case the blades were used not only for utilitarian purposes, but also as prestige goods.

These data along with the discoveries of the craftsmen burials with cores and long blades among grave goods (Kainary, Dzhirguleshti) witnessed important advances in flintworking in the Eneolithic when lithic processing along with copper mining and metallurgy and pottery manufacture were transformed from household activities into developed specialized community crafts.

⁴² D.S. Tsveibel, *Drevneishie kremnevie virabotki u s. Shirokoe v Donbasse*, in *SA*, 1, 1970, p. 45-48.

⁴³ N.N. Skakun, *Kremneobrativauchee proizvodstvo ...*, in *loc.cit.*, p. 83-92; Eadem, *Novi dannii pro razvitok virobniictva ...*, in *loc.cit.*, p. 33-41; Eadem, *Orudia truda i hoziaistvo bolgarskoi (Aldeni) eneoliticheskoi kulturi*, in *SP*, 8, 1986, p. 91-107; Eadem, *Opit rekonstrukcii hoziaistva ...*, Avtoref.; Eadem, *Vivchannia eneolitichnogo ...*, in *loc.cit.*, p. 43.

⁴⁴ B. Balcer, *op.cit.*; A. Zakoscielna, *op.cit.*, in *loc.cit.*, p. 509-543.

⁴⁵ Verheyleweghen, 1953.

⁴⁶ N. Mallet, *op.cit.*, in *loc.cit.*; J.-C. Marquet, *op.cit.*

⁴⁷ J. Pelegrin, M. Otte, *Einige Bemerkungen zur Preparations und Ausbeutechnik der Kernstein aus Raum 29 Behm-Blance M. R.*, in *Hassek Hoyuk. Naturwissenschaftliche Untersuchungen und lithische Industrie*, Tübingen, 1992, p. 219-224; S. Rosen, *Lithics after the Stone Age*, Walnut Creek; London; New Delhi; Altamira, 1997.

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