Studia Antiqua et Archaeologica, IX, Iaşi, 2003

OBSERVATIONS ON THE CHALCOLITHIC POLISHED STONE TOOLS IN THE SUB-CARPATHIAN AREA OF MOLDAVIA

OVIDIU COTOI
(University of Galaţi)

Polished stone tools play a very important part in the process of restoring the economic and daily life aspects of the prehistoric communities. Their structure and development stage suggest both the technological level and the creative ability of the prehistoric communities in using certain types of raw materials (CUCOŞ, MURARU, 1985, 605) and also the interactions between them and the ecosystem. On the other hand, they can reveal the economic differences between contemporaneous settlements, but also between cultural phenomena on different chronological scales (CUCOŞ, MURARU, 1985, 605) pointing out the dynamics of the economic processes specific to a period or culture.

Until recently, the polished stone tools were dealt with in a distinct chapter of a monography that only confined to material description and typologies. Nowadays, the Romanian archaeologists take more interest in studying the lithic tools and attempt to surpass the descriptive stage and the futile inventories through interdisciplinary studies. Thus, new information regarding stone tools manufacturing, raw materials and their source area entered the scientific circuit. The new born theories deal with the prehistoric communities economy, but also with the intercommunitary contacts as a means to spread goods, ideas and innovations.

However, the lack of information in this field has not been covered yet, the study of stone tools still remains an extremely rich area that gives to the researcher the opportunity to foccus on less investigated aspects.

Observations on the Polished Stone Tools Typology

As shown in a previous study (COTOI, GRASU, 2000, 24, 53), one important feature of the polished stone tools is their marked traditionalism due to the adaptation and specialization in the operations they were meant for. Since the shapes of the tools perpetuate for a long time, without significant changes, the comparative–typological method does not yield the expected results regarding the evolution of these archaeological pieces. We might be tempted to believe that the “immobility” is typical of the polished stone tools that lack their own dynamics in time and space

that, typologically speaking, is true to a great extent. The changes are not formal or typological, affecting instead the internal structure of the lithic tools concerned and appear as percentage variations of the morpho-functional types, reflecting the adaptation to the ecosystem of the communities that created and vehiculated them. Taking into account the above-mentioned issues, we believe that a statistical approach is required in order to point out the dynamics of the quantitative proportions between the morpho-functional categories within batches placed on different chronological levels. Therefore, we analysed more batches of tools from Târpeşti belonging to the Precucuteni III and Cucuteni A phases (MARINESCU-BÎLCU, 1981, 28-29; 53-56), from Ghelăieşti-*Nedeia* (NIŢU, CUCOŞ, MONAH, 1972, 38-45; CUCOŞ, MURARU, 1985, 605-641) and Văleni by Piatra-Neamţ (CUCOŞ, 1981, 41-43), both belonging to the Cucuteni B phase. Also, we analysed some batches from Bodeşti-*Frumuşica* (MATASĂ, 1943, 85-87), Poduri-*Dealul Ghindaru*, Hlăpeşti-*Dealul Dactei* (CUCOŞ, MURARU, 1985, 41-43), Dobreni-*Dl. Mătăhuia* (DUMITROAIA, URSU, COTOI, NICOLA, 1999, 25-26; COTOI, 2000, 253-259) and Răuceşti-*Munteni*[1].

The above-mentioned batches are unequal numerically, slightly affecting the percentage values. Thus, the number of polished stone tools from Văleni is reduced, especially as we could not study the pieces from Hortensia Dumitrescu's excavations (DUMITRESCU, 1950, 47-51). This is also the situation in the case of batches from Hlăpeşti and Dobreni.

As regards the tools from Poduri we have not complete stratigraphical data yet, and for the pieces from Bodeşti – *Frumuşica* these data are completely missing, that makes them improper for a differentiated statistical analysis on chronological cultural phases. However, the percentages we got reflect a certain historical reality and they have a certain degree of repeatability at least in the sub-Carpathian stations. The synthesized data are shown in table 1.

[1] Due to the uncertain discovery conditions and to the inaccessible excavation documentation, we could not use the batch of tools from this site in our statistical analysis. Nevertheless, the batch from Răuceşti provides interesting information about the sources of raw materials used by the Cucutenian communities from here. In this respect, we can mention the presence of a very great number of marl and limestone elongated pebbles used as raw material for axes and adzes.

Settlement	Level	Adzes (%)	Axes (%)	Chisels (%)	Perforated axes (%)
Târpeşti	Precucuteni III	42.3	24.0	30	3.4
Târpeşti	Cucuteni A	53.0	15.0	29.1	2.8
Ghelăieşti	Cucuteni B	58.7	15.5	23.7	2.0
Văleni- P.N.	Cucuteni B	50.0	11.0	35.7	3.5

Table 1. Percentage of the typological classes within the batches from Târpeşti, Ghelăieşti şi Văleni – Piatra-Neamţ.

Adzes are the best represented functional category of all polished stone tools. Though, their percentage slightly increases in the Cucuteni A level from Târpeşti (53%) compared to the Precucuteni III level in the same site (42.3%). – fig. 1

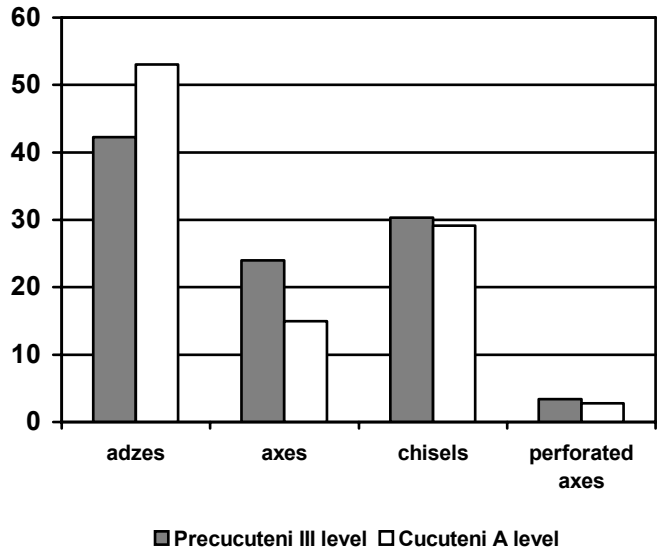

Fig. 1. Percentage variation of the polished stone tools in Târpeşti station.

During the Cucuteni B phase at Ghelăieşti and Văleni settlements, adzes represent 50% (fig. 2) respectively 58.7% (fig.3).

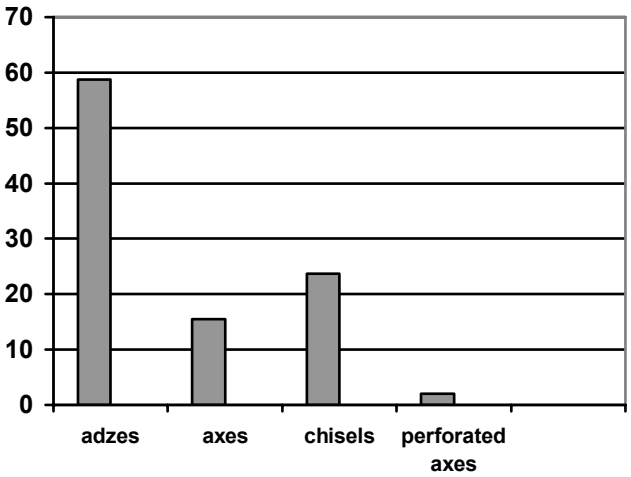

Fig. 2. The typological structure of the polished stone tools from Ghelăieşti.

The great number of unperforated axes (24%) in the Precucuteni III settlement from Târpeşti decreases considerably in the Cucuteni A phase (15%). In the Cucuteni B settlements the percentage is low, 15.5% at Ghelăieşti and about 11% at Văleni.

Chisels are well represented in all cultural phases. A slight percentage decrease can be seen at Târpeşti in the Cucuteni A level (29.1%) compared to the Precucuteni III level (30.2%). This percentage decrease is negligible if we take into account the number of tools from the Cucuteni A level that is much higher than in the Precucutenian level. The percentage of chisels in the Cucuteni B settlement from Ghelăieşti is lower, only 23.7% of the total number of pieces, but they represent almost 35.7 % at Văleni.

The number of perforated axes is extremely low and their percentage in the analysed batches is between 2% at Ghelăieşti and 3.6% at Văleni.

A few conclusions can be drawn regarding the structure of the polished stone industries belonging to the chalcolithic communities from the sub-Carpathian area of Moldavia. Firstly, there is the progressive decrease in the number of unperforated axes beginning with the Precucuteni III phase to the last phase of the Cucuteni culture and the increase in the number of adzes due to the changes in the forest area

exploited by the Precucuteni and Cucuteni communities (MONAH, MONAH 1997, 80).

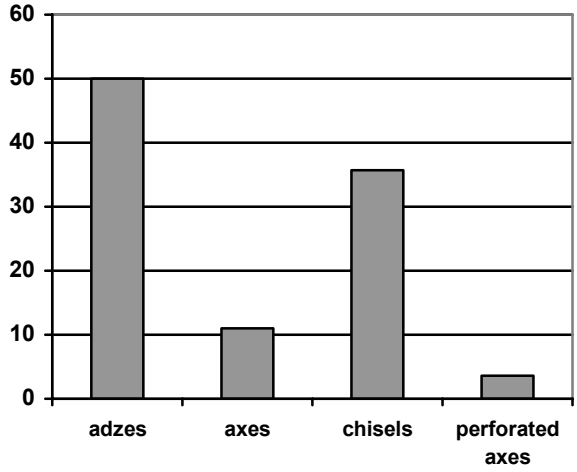

Fig. 3. The typological structure of the polished stone tools from Văleni.

The percentage of chisels keeps at a constant level during the chalcolithic as a result of their special utility in different domestic activities. The variation in the percentage of perforated tools is not substantial and their small number suggests a negligible share of these pieces within daily activities. Due to the complex finishing requiring advanced knowledge in stone working, long manufacturing time and some hardships in getting the raw materials, the perforated tools did not play an important part in the economic activities of the Precucuteni and Cucuteni communities, the unperforated tools forming the bulk of their tools inventory.

The Petrographical Structure

Petrographically, the analyst can easily notice the preference of the Precucuteni and Cucuteni communities for sedimentation rocks in the manufacturing of the polished stone cutting tools (BOGHIAN, 1995, 9). The petrographical analyses made by now revealed the existence of a wide range of such rocks together with a smaller quantity of magmatic (volcanic) and metamorphic rocks (MARINESCU-BÎLCU, CÂRCIUMARU,

MURARU, 1985, 643-684; CUCOŞ, MURARU, 1985, 147-159; BOGHIAN, 1995, 7-42).

Further on we intend to review the main petrographic varieties used by the Cucuteni communities in the sub-Carpathian area of Moldavia accompanied by a percentage-comparative analysis of their occurrence in the studied lithic inventories. The synthetical data are shown in table 2.

The brown bituminous marls represent the majority in almost all analysed batches. They appear in percentage of 94.8% at Târpeşti, 82% at Văleni and 73% at Bodeşti–*Frumuşica*. Lower percentages can be seen at Ghelăieşti, 59.5% and Poduri, 36.8%. In the latter the majority of pieces are made of different varieties of limestones (siderite limestones, Doamna limestones, Tazlău limestones etc.) coming from flysch or Mesozoic limestones from the crystalline-Mesozoic area of the Eastern Carpathians. The plenty of these limestones in the Berzunţ Mountain (COTOI, GRASU, 2000, 58) explains somehow the peculiar situation from Poduri. The outcrops can be found nearby the settlement and in the terrigenous sediments made of gravel and blocks from the terraces or the major streambed of the Tazlău river and its affluents crossing these formations.

In other sites, such as Târpeşti and Frumuşica, the number of limestones is reduced, while at Văleni, Hlăpeşti, Dobreni they are missing[2]. At Ghelăieşti the percentage of limestones is slightly higher representing about 6.7%.

The percentage of glauconite quartz sandstones (the so-called Audia sandstone) is different from one site to another. At Ghelăieşti this percentage is 11.8% and 9% at Văleni. In the settlements of Târpeşti, Bodeşti–*Frumuşica* and Poduri these sandstones were occasionally used in the manufacturing of polished stone tools, being used instead for lamellar and chipped tools. Also a great number of knappers and grinders are made of this rock.

However, the fact that the Cucutenians were not interested in using this rock is strange because of its special physical-mechanical properties. This could be explained by its great hardness which made it improper for finishing and cutting by polishing and by the great amount of brown marls easier to be processsed this way.

As shown in the synthetic table, the other types of sandstones (Kliwa sandstones, lithic sandstones, etc.) were accidentally used for making polished stone tools. Sandstones were especially used for querns (COTOI, 2000, 256) and for sharpening and polishing tools.

[2] The observations regarding the batch from Dobreni are provisional because the researches in this site are at the beginning.

The presence of lyddites (phtanites), black siliceous rocks with a high content of organic silica is reduced in all sites. At Ghelăieşti lyddites represent 5.9%, at Văleni 3% and at Poduri, Târpeşti and Bodeşti–*Frumuşica* the percentage decreases at 2.3%, 2.4, and 1.8% respectively. Cutting products (blades, bladelets, chips and nuclei) made of lyddite are extremely rare in the studied batches although their physical-mechanical properties (high hardness, conchoidal splitting, cutting edges) recommended them as the ideal alternative for the flint brought from long distances. However, in the rare occasions when the Cucutenians used this rock it was exclusively meant for polished stone tools due to its stratiform nature (lyddites appear under the form of milimetre or centimetre laminar interlayers) that facilitated the manufacturing of unperforated axes, adzes and chisels. The magmatic rocks are rarely used and the percentage varies in the studied batches: 12.6% at Bodeşti-*Frumuşica*, 6% at Văleni and Poduri, 4% at Târpeşti and just 0.7% at Ghelăieşti where a single piece was discovered, the boat-shape axe (CUCOŞ, MURARU, 1985, 618; CUCOŞ, 1999, 66; COTOI, GRASU, 2000, pl. 44/1a,b,c) made of black gabbro. Besides gabbros, that appear accidentally, basalt, andesite, basalt andesite, microdiorite, microgranodiorite were also used (Table 2).

PETROGRAPHICAL VARIETY	TÂRPEŞTI	FRUMUŞICA	GHELĂIEŞTI	HLĂPEŞTI	PODURI	VĂLENI – P -N.
SIDERITE		3.6				
MICROGRANODIORITE	0.2	1.8			0.3	
MICRODIORITE	1.2					
BASALT ANDESITE	1.4	5.4				3
ANDESITE		3.6			0.3	
GABBRO	0.2		0.7			
BASALT	1	3.6			3.3	3
CHLORITE QUARTZ CHIST	0.2				0.3	
JASPER	0.2					
TUFF	0.4	1.8	7.3		4.6	
MUSCOVITE LITHIC SANDSTONE					0.3	
UNDEFINED SANDSTONES			4.4			
SIDERITE LIMESTONES			3.7		20.4	
MESOZOIC LIMESTONES					0.6	
JASLO LIMESTONES	0.2					
FLYSCH LIMESTONES		1.8	1.5		23.3	
DOAMNA LIMESTONES	0.4		1.5		2	
KLIWA SANDSTONES		1.8	3.7		2.3	
GLAUCONITIC QUARTZ SANDSTONES	2	3.6	11.8		1	9
LYDDITE	2.4	1.8	5.9	17.2	2.3	3
MAB	90.4	71	59.5	81.8	36.8	82
SERPENTINE					0.3	

Table 2. The percentage of petrographical varieties present in the studied batches

The chlorite quartz schists, the jaspers and the Jaslo limestones were used by the Cucutenians only accidentally for making adzes or chisels.

A differentiated association of the functional types with certain petrographical varieties can be seen within the Cucutenian polished stone tools industry (on the whole this difference is more marked in the Cucuteni lithic industry). Unperforated axes and adzes are generally made of bituminous brown marls but also of hard rocks such as glauconitic quartz sandstones, lyddites and limestones. Magmatic rocks were accidentally used as raw material for adzes. Brown bituminous marls, flysch limestones, lyddites, and, extremely rare, jasper and glauconitic quartz sandstones were used for chisels. We should also mention one piece made of Jaslo limestone found at Târpeşti (COTOI, GRASU, 2000, pl. 45/1a,b).

As regards the perforated tools the situation is completely different. Hard magmatic rocks were preferred, while brown bituminous marls were rarely used.

We can conclude that on the whole the polished stone industries of the chalcolithic communities in the sub-Carpathian area of Moldavia present structural similitudes from a petrographical point of view no matter the cultural-chronological phases they belong to. Brown bituminous marls, limestones, lyddites, glauconitic quartz sandstones, basalts, basalt andesites, microdiorites etc. appear in different percentage in almost all settlements, the primary source being the Carpathian flysch and the neogene volcanites area in the Eastern Carpathians.

The same situation applies also in the case of the settlements in the Moldavia Tableland where these rocks are allochthonous because they cannot be found in the geological structure of the Moldavian Platform. However, the brown bituminous marls represent the majority, about 37.5% in the Precucuteni III settlement from Târgu-Frumos – *Baza Pătule* (Iaşi county), but there appear also lyddites, different varieties of flysch limestones, glauconitic quartz sandstone, Kliwa sandstone and four pieces made of magmatic rocks. The petrographical analysis of the materials from Cucuteni A settlement at Scânteia (Iaşi county) offers an almost identical image, the tools are made of bituminous marls, representing the majority, quartz sandstones, limestones, jaspers, siderites, lithic sandstones, glauconitic sandstones etc. (MANTU, ŞTIRBU, BUZGAR, 1995, 119). The tools made of siliceus sandstone and glauconitic sandstone can also found at Drăguşeni (MARINESCU-BÎLCU, BOLOMEY, 2000, 60). In these cases, the presence of tools made of these types of rocks can be

explained by the intercommunitary exchanges. Also, the possible sources of raw materials could be the Moldavia Valley (COTOI, GRASU, 2000, 77) and the Siret Valley (MANTU, ŞTIRBU, BUZGAR, 1995, 120) but this fact does not exclude the possibility of getting the raw materials through exchanges, especially when the settlements were placed at great distances from the above-mentioned river streams.

We believe that the petrographical analyses on other batches from the Precucuteni and Cucuteni settlements in the tableland area of Moldavia will confirm the observations we made regarding the above-mentioned stations. Thus the lithic industries of the chalcolithic communities in the area between the Carpathians and the Prut are relatively homogenous from a petrographical point of view suggesting that they shared a common experience and tradition in exploiting some rocks and making different kinds of tools.

The raw materials were usually found near settlement, the rocks came from the terrigenous sediments on the major streambeds and/or their terraces. The majority of pieces from Târpeşti, Ghelăieşti, Văleni, Poduri, Bodeşti–*Frumuşica*, Răuceşti are made of pebbles or slabs naturally polished by water. The exploiting of rocks directly from outcrops was rare and some slabs in the course of processing could be found only at Poduri (COTOI, GRASU, 2000, 68).

Observations on the Manufacturing of Polished Stone Tools

The processing of slabs involved different operations: blank cutting, polishing, sharpening and boring (in the case of perforated tools). Blank making was a very important operation that affected the quality of the end tool so it was necessary to have more or less complex knowledge regarding the cutting of stone depending on the petrographical material and the type of blank intended. The ethnological observations and the experiments we made revealed two different ways of manufacturing, concretized into two types of blanks used for the unperforated tools: parallel and transversal blanks (PETREQUIN, JEUNESSE, 1996, 34-35) each supposing techniques and operations with a different degree of complexity.

The parallel blanks were used for finished tools with the cutting edge parallel to the sedimentation plans of the rocks. The processing technique supposed the regularization of the long edges of the tool by perpendicular splitting (on the sedimentation plan) (PETREQUIN, JEUNESSE, 1996, 34). If the stone already had the desired size and shape, the cutting operation was no more necessary, passing directly to

sharpening by polishing. The making of transversal blanks supposed more complex techniques and advanced technological knowledge (PETREQUIN, JEUNESSE, 1996, 35)

Due to the peculiarities of the raw materials (marls, limestone, sandstone, lyddite) the Precucutenians and Cucutenians preferred the former method of processing that was easier and did not implied specialization. Moreover, this method allowed the craftsman to speculate the existence of siliceous accidents such as menilithic foils and laminas present in the marls and limestone. In such cases the cutting edge was made on the menilithic lamina to give it high wearing resistance. Such pieces were found at Târpeşti and Poduri. The number of pieces with the cutting edge disposed transversally on the sedimentation plans of the rock is reduced. Only a few prismatic chisels have this type of cutting edge and were made by sharpening one end of the naturally polished rock.

Polishing was the compulsory operation in order to achieve the end piece. It finished the surface of the end tool and also, it can be used for sharpening the tool. Sometimes, when the tool was big, the polishing was partial in order to enable a good shafting and the sharpening of the cutting edge. This operation was made using sandstone slabs or microconglomerates with different grading and abrading properties. We suppose that the so-called “querns” found in all east-Carpathian chalcolithic settlements were used for this purpose.

The complex operation of perforation was the last in the processing as suggested by the pieces in course of perforation from Târpeşti, Văleni, Ghelăieşti, Bodeşti–*Frumuşica*. Due to the great effort and time necessary for manufacturing the perforated tools did not play an important part in the economy of the east-Carpathian chalcolithic economy.

The Romanian archaelogical literature (DUMITRESCU, 1954; CUCOŞ, MURARU, 1985; SOROKIN, 1991; BOGHIAN, 1995; 1996a; BOGHIAN, 1996b) contains important arguments regarding this activity and the people that made it. Should this activity be considered an independent trade? And if the answer is affirmative another question arises: Where did the different processing operation take place? Were there special places intended for these operations within the settlements or outside them?

Based on the observations we made on the analysed batches we believe that the majority of polished stone tools were made as part of domestic activities. Our arguments are as follows:

- very low standardization of the majority of pieces in the lithic inventory due to a superficial processing reduced to the minimum number of technical operations;
- the use of medium hardness rocks, easy to process, in order to reduce the period of manufacturing to the maximum;
- the doubtful quality of the raw materials due to their origin in terrigenous sources; these materials are subjected to a continuos process of degrading, affecting their initial physical-mechanical properties, to premature wearing and lack of efficiency;
- the use of some simple techniques that did not suppose a high "savoire faire", so that each member of the community could make the pieces without a long previous experience.

Of course, we accept the idea that each community had its own individuals with special abilities in stone working but they should not be regarded as genuine craftsmen meeting regularly the social requirements and living exclusively from this occupation. We'd rather imagine the Precucutenian or the Cucutenian craftsman as a juncture artisan just meeting the communitary requirements, making that kind of tools that needed higher specialization and complex technical procedures. The perforated tools and the unperforated axes and adzes made of hard magmatic roks, minutely worked complying with a well-determined mental archetype, can be seen as a result of the work of such "à temps partiel" craftsmen.

Referring to the place where such activities took place we can assert that the entire processing was usually made within the settlement. This hypothesis is confirmed by the presence of slabs in course of processing as well as the great number of prefabs in the batches from Târpeşti, Ghelăieşti, Văleni, Răuceşti, Poduri. At Târpeşti, nearby the second settlement, a pile of yellowish-white stone (probably brown bituminous marls) was discovered and it was considered a deliberate stock of raw materials (MARINESCU-BÂLCU, 1962, 237). At Dobreni, we found chips of brown bituminous marls resulting from the finishing operations (COTOI, 2000, 262, table IV).

A few questions arise regarding the manufacturing of perforated axes. The lithic inventories we studied contain finished axes – most of them in a fragmentary state – some pieces in course of perforation and stone plugs. We have not found yet intermediary products that could offer more detailed information about the processing stages and place. We do not ignore the possibility that the prefabs meant for perforated axes

manufacturing made the object of intercommunitary exchanges at long distances.

Economic Activities and Environment Exploitation

The great number of polished stone tools discovered in the Precucuteni and Cucuteni settlements suggests that they were intensely used for wood exploitation and processing. Axes and adzes were complementary tools used for cutting, splitting and processing the tree trunks for dwellings, defence systems, furniture (MARKEVICI, 1981, 108-112) or as fire wood.

First of all they are essential tools for the neo-chalcolithic cultivators. Axes, adzes and the fire were the main means the cultivators not only from east-Carpathian area but also from the entire agricultural Europe used to stub the forests in order to create the necessary soil for plants growth. High quality wood for building was cut with axes and adzes. The remainings of wood and the bushes and forest plants were burnt thus obtaining the manure potash needed for the germination layer (CLARK, 1955, 146). The great quantity of ashes that appeared in the pollinic samples corresponding to the Precucuteni level at Târpeşti (MARINESCU-BÎLCU, CÂRCIUMARU, MURARU, 1985, 664) seems to confirm a similar practice at the chalcolithic east-Carpathian communities.

Axes and especially adzes could have many other uses: soil digging and breaking up, fighting or hunting weapons, meat carving, etc. They were simple tools, meant for diverse and complex operation, which explains their great success during the entire European neo-chalcolithic. The traseological analyses in the Tripolye area revealed the utilization of adzes for soil working (SOROKIN, 1991, 112) Although such analyses had not been made on the batches from Precucuteni and Cucuteni areas, we tend to believe that adzes were used as random digging tools. For example, in the Precucutenian level from Târpeşti, the cornel weed hooks were extremely rare (MARINESCU-BÎLCU, 1981, 29) and two pieces of this type were discovered in the Cucutenian settlement of Hăbăşeşti (DUMITRESCU, 1954, 252-253). In this circumstances the existent stone tools were used for soil fallowing, digging and breaking up.

Chisels also had multiple uses depending on their shape. The elongated, prismatic ones were used for carving and hollowing. The flat chisels were used (as suggested by the wearing traces and the polished surfaces in the cutting edge area) for wood flatting and polishing, but we do not exclude their usage for processing of leather and other materials (MARINESCU-BÎLCU, 1981, 55).

The structure of the polished stone tools inventory in a prehistorical settlement, corroborated with the palynological, archaeobotanical and archaeozoological information offer useful data regarding the ecosystem the prehistoric communities lived in and exploited. This is possible due to the necessary equilibrium between the environment and the tools for exploiting it with maximum efficiency. The changes in the ecosystem due to climate or anthropic factors lead to a loss of equilibrium that had to be restored through tools readaptation. The massive stone axe is very efficient in exploiting the primary forest fund (PETREQUIN, PETREQUIN, 1988, 72) unfailing from the inventory of the communities living in this environment. In the young forest or in shrub-covered area, the massive axe loses its efficiency so that the adze appears as an innovation better adapted to an environment with secondary vegetation resulting from previous stubbings (PETREQUIN, PETREQUIN, 1988, 72).

In a previous section of our study we showed that the percentage of axes in the Precucuteni III phase at Târpeşti is considerably higher than in the Cucuteni A phase. Their number goes on decreasing in the Cucuteni B phase as shown by the batches from Ghelăieşti and Văleni .

Based on the statistical situation presented we can suppose the existence of a large surface of primary forest at Târpeşti when the Precucuteni III community settled there. From that moment the forest surfaces would reduce gradually due to the systematic stubbing. The pollenic charts indicate a decrease of the tree pollen and an increase of the *Cerealia* pollen (MARINESCU-BÎLCU, CÂRCIUMARU, MURARU, 1985, 650-651, 664; fig. 10) for the Precucuteni III level. The changes in the pollinic spectrum coincide with the presence of axes in a higher percentage in the Precucuteni III level at Târpeşti.

During the next phases, Cucuteni A – Cucuteni B, due to massive deforestation and climate changes (MARINESCU-BÎLCU, CÂRCIUMARU, MURARU, 1985, 653, 665) the forest surfaces around settlements go on reducing. Thus there appear landscapes similar to forest steppe or park forests (HAIMOVICI, 1987, 166) and fallow lands on which the tree species tend to regenerate rapidly. These modifications in the lanscape around the settlements caused a readaptation of the lithic tools needed for an efficient exploitation of the new stock of wood.The readaptation will be represented by an increase in the number of adzes compared with the number of axes that gradually decreased to the Cucuteni final phase showing their reduced importance in the new ecosystem.

Polished Stone Tools in the Intercommunitary Exchanges

Finally, we should refer to the exchange relations between the chalcolithic communities in the sub-Carpathian area of Moldavia and/or between them and the populations in the bordering areas. We have to observe two possible exchange items: the petrographical varieties vehiculated as raw materials and the finished tools whose shape and manufacturing does not comply with the local chalcolithic traditions.

As we have already seen, the Precucuteni-Cucuteni populations in the sub-Carpathian area of Moldavia used local rocks that could be easily found in the vicinity of the settlements. At Văleni, the brown bituminous marls can be found just in the terrace where the settlement is placed and the lyddites and the glauconitic quartz sandstones are found in the Cernegura mountain and are brought to the surface by the affluents (Gliguţa and Jgheabul Mare) of the Doamna river (COTOI, GRASU, 2000, 76). At Târpeşti, the brown bituminous marls, the glauconitic quartz sandstones and the lyddites come from the western flysch sediments carried in the Quaternary sediments of the Topoliţa river terrace and major streambed that crosses not only the pericarpathian nappe but also the flysch of the Tarcău and Vrancea nappes (COTOI, GRASU, 2000, 76). The nearest source of brown bituminous marls, kliwa sandstones and some varieties of flysch limestones for the Cucutenian settlements from Bodeşti – *Frumuşica* and Dobreni can be found in the Quaternary gravel from the terraces and the major streambed of the Cracău river. Other types of rocks had to be brought from a certain distance so that they and the tools made of them were the object of the intercommunitary exchanges. The magmatic rocks, the Mesozoic limestones, the glauconitic quartz sandstones and the lyddites from Poduri had the nearest source in the superior basin of the Trotuş river and its affluents (Valea Rece, Răchitiş, Camânca, Bolovăniş etc.) (COTOI, GRASU, 2000, 76) and could be intermediated by the communities settled in the vicinity of the river. At Ghelăieşti , the lithic material of flysch came from the alluvial gravel and blocks of the Cracău streambed and the tuff could come from the bordering pericarpathian molasse (COTOI, GRASU, 2000, 77). The same situation appears at Hlăpeşti, but the Quaternary sediments from the Moldova Valley could be another possible source for the Cucuteni community from this place. Needless to say that the magmatic rocks from the above-mentioned settllements and also from Bodeşti–*Frumuşica* could not have other source than the intercommunitary exchanges because the nearby rivers do not cross volcanic formations.

Constant and intense exchanges of raw materials and end tools also took place with the Moldavian tableland regions. The flysch rocks (brown bituminous marls, glauconitic sandstones, lyddites, limestones, magmatic rocks, etc.) (for raw materials sources see also MARINESCU-BÎLCU, CÂRCIUMARU, MURARU, 1985, 654-663; BOGHIAN, 1995, 1996a, 1996b; MARINESCU-BÎLCU, BOLOMEY, 2000, 59-62) used for the polished tools were exchanged for the flint from the sediments on the Prut river bank. The exchanges could explain the presence of the polished stone tools made of such rocks in the settlements from the Moldovia Tableland. It is also true that other sources of raw materials could be the Moldova[3] and Siret Valleys (MANTU, ŞTIRBU, BUZGAR, 1995, 120) but this does not exclude the possibility of getting the raw material from exchanges, especially for the settlements placed at a distance from the above-mentioned river streams.

We have fewer elements to give us detailed information on the exchange relations with farther regions. However we should mention here that the boat-shape axe from Ghelăieşti is surely of foreign origin. Ştefan Cucoş explained its presence in the Cucutenian environment through the contacts with the north-eastern elements (CUCOŞ, MURARU, 1985, 618; CUCOŞ, 1999, 66) but he did not made more detailed references to its cultural affiliation.

In our opinion, based on the few information we have, the origin of this piece shoud be searched in the northern area of the *Trichterbecher* culture, the axe from Ghelăieşti can be typologically linked to the "K" group axes (*Knaufhammeräxte*) according to the classification of Milan Zápotocký (ZÁPOTOCKÝ, 1989, 95).

A possible analogy in the Cucuteni area could be a fragmentary piece (just the distal end) found in the Cucuteni A-B settlement from Traian–*Dealul Fântânilor*. If the cultural affiliation we suggest for the two pieces is correct, this would confirm the existence of some interferences between the two great cultural complexes since the A-B phase of the Cucuteni culture (DUMITRESCU, 1955, 918; MANTU, 1998, 149). This time we have not only the confirmation of certain cultural influences but also the existence of exchange relationships that facilitated the circulation of ideas and the assimilation of the material culture elements.

[3] At Ghelăieşti, in the major streambed of the Moldova river, about 5% of the Carpathian gravel has a bigger diameter than 8-10 cm, being a possible source of raw material for the polished stone tools (COCHIOR-MICLĂUŞ et al., 1996-1997).

REFERENCES

BOGHIAN Dumitru
1995 *Unele consideraţii asupra utililajului litic al complexului cultural Precucuteni-Cucuteni-Tripolie (I)*, CC, NS, 1(11), p. 7-42.
1996a *Unele consideraţii asupra utililajului litic al complexului cultural Precucuteni-Cucuteni-Tripolie (II)*, CC, NS, 2(12), p. 4-36.
1996b *Unele consideraţii asupra utilajului litic al comunităţilor Precucuteni-Cucuteni-Tripolie*, in *Cucuteni aujourd'hui*, Piatra Neamţ, p. 277-342.
CLARK J.G.D
1955 *L'Europe préhistorique. Les fondements de son economie*, Paris.
COCHIOR-MICLĂUŞ Crina, RĂDOANE Maria, ICHIM Ioniţă, RĂDOANE N., GRASU Constantin
1997 *Geostatistical Analysis of Gravel Shape and Roundness Indices in Moldova River*, AŞU-Iaşi, seria Geologie, XLII-XLIII.
COTOI Ovidiu
2000 *Lithic Tools in the Cucuteni Settlement of Dobreni- Mătăhuia Hill*, SAA, VII, p. 253-259.
COTOI O., GRASU Constantin
2000 *Uneltele din piatră şlefuită din eneoliticul Subcarpaţilor Moldovei,* Iaşi.
CUCOŞ Ştefan
1999 *Faza Cucuteni B în zona subcarpatică a Moldovei*, Piatra-Neamţ.
1981 *Săpăturile de la Văleni-Piatra-Neamţ (1974-1975)*, MemAnt, VI-VIII (1974-1976), p. 37-56.
CUCOŞ Şt., MURARIU Adrian
1985 *Studiu tipologic şi petrografic al uneltelor litice din câteva aşezări Cucuteni B*, MemAnt, IX-XI (1977-1979), p. 605-642.
DUMITRESCU Hortensia
1950 *Cercetări arheologice la Văleni (jud. Neamţ)*, SCIV, I, 2, p. 19-51.
1954 *Uneltele de producţie* in: Vl. Dumitrescu *et alii*, *Hăbăşeşti. Monografie arheologică*, Bucureşti, p. 224-273.
DUMITROAIA Gh., URSU Constantin-Emil, COTOI O., NICOLA Dorin
1999 *Căşăria-Dealul Mătăhuia, com. Dobreni, jud. Neamţ*, Cronica 1998, Vaslui, p. 25-26.
HAIMOVICI Sergiu
1987 *Quelques problèmes d'archéozoologie concernant la culture de Cucuteni,* in: *La civilisation de Cucuteni en contexte européen* (eds. M. Petrescu-Dîmboviţa *et alii*), Iaşi, p. 157-166.
MANTU Cornelia-Magda
1998 *Cultura Cucuteni. Evoluţie, Cronologie, Legături*, Piatra-Neamţ.
.MANTU Cornelia-Magda, ŞTIRBU Maria, BUZGAR Nicolae

1995 *Consideraţii privind uneltele din piatră, os şi corn din aşezarea cucuteniană de la Scânteia (campaniile 1985-1990)*, ArhMold, XVIII, p. 115-132.

MARINESCU-BÎLCU Silvia

1962 *Sondajul de la Târpeşti*, Materiale, VIII, p. 235-244.

1974 *Cultura Precucuteni pe teritoriul României*, Bucureşti.

1981 *Târpeşti. From Prehistory to History in Eastern Romania*, BAR-International Series, 107, Oxford.

MARINESCU-BÎLCU S., CÂRCIUMARU Marin, MURARU Adrian

1985 *Contrbuţii la ecologia locuirilor pre- şi protoistorice de la Târpeşti*, MemAnt, IX-XI (1977-1979), p. 643-684.

MARINESCU-BÎLCU S., BOLOMEY Alexandra

2000 *Drăguşeni. A Cucutenian Community*, Bucuresti.

MARKEVICI Vsevolod I.

1981 *Pozdnetripol'skie plemena Severnoj Moldavji*, Chişinău.

MATASĂ Constantin

1946 *Frumuşica. Village préhistorique à ceramique peinte dans la Moldavie du Nord, Roumanie*, Bucureşti.

MONAH Dan, MONAH Felicia

1997 *Cucuteni. The Last Great Chalcolithic Civilisation of Europe*, in: *Cucuteni. The Last Great Chalcolithic Civilisation of Europe* (eds. Gh. Dumitroaia, C.-M. Mantu), Athen, p. 17-95.

MURARU Adrian

1987 *Considérations sur la matériel litique utilisé par les tribus de Cucuteni*, in: *La civilisation de Cucuteni en contexte européen* (eds. M. Petrescu-Dîmboviţa *et alii*), Iaşi, p. 193-200.

NIŢU Anton, CUCOŞ Ştefan, MONAH Dan

1971 *Ghelăieşti (Piatra-Neamţ) I. Săpăturile din 1969 în aşezarea cucuteniană „Nedeia" – Ghelăieşti*, MemAnt, III, p.11-64.

PETREQUIN, Anne-Marie, PETREQUIN, Pierre

1988 *Le Néolithique des lacs. Prehistoire de lacs de Chalain et de Clairvaux (4000-2000 av. J.-C.)*, Paris.

PETREQUIN Pierre, JEUNESSE Christian (eds.)

1996 *La hache de pierre, carriéres vosgiennes et échanges de lames polies pendant le Néolithique (5400-2100 av. J.-C.)*, Paris.

SOROKIN Victor Ja.

1991 *Orudija truda i hozjaistvo plemen srednego Tripolija Dnestrovsko-Prutskogo meždureciîja*, Chişinău.

ZÁPOTOCKY Milan

1989 *Streitäxte der Trichterbecher-Kultur: ihre Typologie, Chronologie und Funktion*, Praehistorica, XV-XVI, I, Praha, p. 95-103.