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EARLY NEOLITHIC LITHIC INDUSTRIES (THE BANAT AND TRANSYLVANIA[1])

Abstract: Industria litică a neoliticului timpuriu in Romania pare să fie săraca şi puţin variată. Articolul îşi propune să demonstreze că în parte, aceasta se datorează nepublicării materialului litic cioplit sau şlefuit. In acelaşi timp, se propune o metodologie ‚nouă'- ‚*chaine operatoire*'- în abordarea industriei litice cioplite, se discută avantajele şi aplicaţiile analizei litice in contextul mai larg al arheologiei sitului. O trecere în revistă a materialului arheologic publicat până în prezent arată că preocupările, au cuprins mai degrabă determinarea surselor de materii prime, analiza tipologică şi mai puţin tehnicile de cioplire şi modul de utilizare al uneltelor, ceea ce ar aduce o abordare dinamică industriei litice. Se discută sursele de materii prime din zonă, tipologia, microlitismul, şi prin aceasta, eventualele contacte cu mezoliticul din zonă. Industria litică şlefuită pare la fel de slab reprezentată. Tipologia este neclară şi există tipuri de unelte care nu par a se încadra în definiţia ‚tradiţională' de ‚piatră şlefuită' dar nici în cea cioplită. Pentru aceasta am propus adoptarea unei definiţii din literatura de specialitate străină care lărgeşte acest concept. Numărul mare de aşezări ale neoliticului timpuriu din Transilvania ne îndreptăţeşte să credem - şi descoperirile recente din Ungaria si Slovacia ne confirmă acest lucru- că industria litică este mai bogată şi mai variată decat se credea dar că relaţiile sale cu mezoliticul rămân încă neclare.

Keywords: early neolithic, Starčevo-Criş culture, lithic industries, tools, sourcing of the raw materials.

There is no doubt that pottery is regarded as the most important archaeological artifact type in studying the Neolithic. But although ceramics may be considered as some kind of a ‚*fossile directeure*'[2] (Maxim 1999: 31) there are other artifact types that should not be neglected when looking into the life-style aspects of the Neolithic communities, such as the lithic or bone industries. They might exhibit neither fast changes in types nor great variation in 'styles' but this does not mean that they are not taking place. Perhaps, '*… the major change may have been a shift away from a reactive and adventitious production and refinement of tools on the spot as necessary, towards a productive but foresightful system of acquiring appropriate high-quality raw materials, shaping blade cores and perhaps even producing the majority of blades at a distance from the place and time of eventual use'* (Bailey 2000: 131).

Archaeology does not limit itself to describing past objects and cultures. It also tries to give answers to questions of a dynamic nature. Questions as: how do the early Starčevo-Criş lithic tools connect to the previous Mesolithic tradition and the following Middle Neolithic? Can we prove that the microlithic industry is the result of a Mesolithic-Neolithic contact? Does the availability of raw materials influence the chipping techniques and/or the typology of the tools? Is there a variability to be noted among the assemblages of contemporary Starčevo-Criş sites? Has the

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raw material changed during the Neolithic development in the same regions? And if so, why and how? What led to the adoption/invention of the ground stone tools – the introduction of farming as a major activity or the transition to a sedentary life with a strong hunting-gathering economy in its base?

This are just a few questions that could find an answer if more attention were granted to the lithic industry. The present paper suggests that it is time for a change in the methodology when studying lithic artifacts, to a methodology enabling us to see the tools in their dynamic lives, not only as a one time frozen type. It also argues for the introduction and use of consistent typologies in what the ground stone industry is concerned, for the complete publication of the lithic material (chipped or ground) no matter how poor it might seem, and while reviewing the Early Neolithic assemblages in Transylvania it briefly presents the wider applications the lithic analysis might provide.

1. Theoretical bases of the lithic analysis: concepts, techniques, methods

The *'chaine operatoire'* is one of the main tools in the lithic analysis It has been rarely employed in Romanian archaeology at its whole extent, although the benefits of choosing it as an analytical tool are many[3] and the concept itself is far from being new (Inizan et al. 1999; Sellet 1993; Collins 1973).

F.Sellet (1993: 106) described the *chaine operatoire* as *'a technological approach that seeks to reconstruct the organization of a technological system at a given archaeological site'* with a particular stress on revealing the dynamics of the lithic system and its role within the broader technology of a prehistoric grou

Part of the novelty of the concept is the fact that it integrates three separate levels of analysis: the objects themselves – tools and by–products, a series of gestures or technical sequences (the methods to produce tools) and the abstract level – the specific technical knowledge shared by all group members.

The *chaine operatoire* is made up of five subsystems: the raw material procurement, tool manufacture, tool use, maintenance and discard. **The raw material analysis** includes the determination of the type of raw materials, their quantitative and qualitative importance, the morphology under which they were introduced, the process under which they were introduced (indirect *vs.* direct procurement). **The tool manufacture** is seen as a series of steps (reduction sequences/stages). One or a series of end products, waste flakes or debris, bearing technical criteria, characterizes each of them. Based on its own characteristics each flake can be assigned to a reduction stage. There are three methods of looking at the tool manufacture: refitting[4], diacritical studies (studies of flaking sequences)[5], and experimentation. The ***refitting*** provides a dynamic view of the tool's life, helps to infer strategies of use and to validate existing typologies. It reveals the morphology of raw materials when introduced into the site– blanks, cores already, cores in exploitation and it shows the particular methods of reduction. The advantage of the ***flaking sequences*** is that it studies both flakes and cores, including waste flakes and resharpening flakes, as opposed to refitting where cores and bifaces are the primary sources of data. ***Experimentation*** provides better definition of relevant technological criteria for use in making inferences (Sellet 1993). **The use, maintenance and discard** deal with the successive transformations of a tool, the study of the type of blanks, the resharpening chips. The goal is not to reconstruct the function of each tool (done

by the use-wear studies) but rather to refine the data provided by traditional typological analysis. Tools are seen in dynamic transformation not merely as immutable types.

Analysis implementation implies determining the frequency of flake types, number of scars on platforms and dorsal surfaces, manufacturing tools, rejected broken tool portions. All this has their importance and place in the different steps of the reduction processes. The integration of these frequencies with their distributions across lithic types reveal how different materials were worked different, give an insight on the acquisition of the material types, show the effects of distance on particular material, on trade and exchange (Kooyman 2000: 147).

What is the difference between the *chaine operatoire* approach and the traditional one? *'Unlike the typological studies that have failed to consider stone tools as responsive to specific needs, it lets us see technological trajectories through the relationships of lithic subsystems, and thus outlines the choice of the prehistoric people. Though a chaine operatoire study requires taxonomy, this taxonomy does not have universally explanatory value. The type of classification needed in a chaine operatoire analysis is peculiar to each situation and answers specific analytical needs'* (Sellet 1993: 111).

Apart from the *chaine operatoire* there are of course other ways lithic industries could provide information on human communities. Styles and technologies are used to trace migrations and contacts (Kooyman 2000: 149).**Use wear and residue analysis** become more and more an archeologist's tool when it comes to determining function and having and revealing information on the economic and social life of a certain community. Out of the three varieties of use wear analysis, **microchipping** examines the small scars left from flakes that have been knocked off the edge of a tool during use,the **micropolish** studies the polish that the contact work material produces on a stone tool while **striations**/scratches result on the tool surface following the contact with worked material and small fragments of debris.

The analysis of ground tools should start by defining the concept[6]: J.L.Adams considers a ground tool as '*any stone item that is primarily manufactured through a mechanism of abrasion, polish or impaction or is itself used to grind, abrade, polish, or impact… many artifact are in the fuzzy set between the flaked and ground stone, including cores that were ground to prepare areas for efficient flake removal, and axes that were either ground or flaked to shape or resharpen'* (Adams 2002: 1).

Adams argues that several sources should be taken into account when studying ground stone industry: use-wear analysis that builds on experimentation and science of typology, classification techniques, descriptions based on excavations and ethnography, including ethnoarchaeology and experiments (Adams 2002: 9).

A complete ground stone analysis should include descriptions of the grinding technology, the technological analysis, artifact descriptions and the reduction stages. **Reduction stages for the ground industry** are analogous to the flaked industry,with five stages for certain types of ground stone e.g. adze manufacture: production of regularly shaped preforms from a blank, reduction to a point where final grinding and polishing could be undertaken, grinding, polishing, resharpening and repair stage.

One of the most interesting issues regarding the ground tools is determining the function. *'The most important lesson to be learnt from a technological approach is that form does not always define function, that many forms can serve the same function'* (Adams 2002: 9). This is a question for the use-wear analysis because design and form are not synonymous.

Classification is another interesting matter. Creating categories/types is one thing, analyzing the real items and deciding to which category it belongs is another. An item can be analyzed using more than one typology. Also, we permanently deal with a mixture of technological and form/function based typologies (Adams 2002: 12).

2. Wider applications of lithic analysis and questions that can be addressed based on the study of the lithic debitage

2.1 Determination of the site type and settlement patterns – including activities that occurred at a site, the types of materials worked with tools, the stages of tool manufacturing, the repairing and refitting of tools. Habitation sites tend to have a wider range of tools because of the large variety of activities taking place there. On the other hand, the specialized sites tend to provide tools reflecting specific activities (points for hunting, axes for clearing away surrounding areas, debitage, cortex flakes and broken pieces in the case of a workshop).

Inferences on the mobility can also be made based on the lithic assemblages. As raw material is not always available and mobile people can carry a limited amount of things with them, they need tools that can be resharpened many times or even re-worked (curation)[7].Expedient tools on the other hand, might give a measure of sedentism. Sedentary groups tend to use certain types of raw materials of well established sources, and as obtaining it is not a pressure, 'wasting' it on a one-time use tool is not a concern. For the mobile people, curation reduces the need of raw material. Such assemblages tend to display a wider range of raw materials, a reflection of the many sources visited (Kooyman 2000: 129).

2.2. Intra-site patterning. A careful recording of the location and scatter of the lithic pieces can give an idea of the activity areas on the site. Clustering of different lithic types may reflect the way activities are segregated, although a correspondence between morphological types and functions cannot be assumed (Cahen, Keeley, Van Noten 1979: 672). If lithic reduction takes place at the site one might expect to find a lot of debitage and microdebitage, but for the latter flotation is needed. Associated to use-wear studies, we can determine the type of activities taking place: bone working, wood working, hide scraping, etc (Koymann 2000: 133). Refitting (the vertical distribution of the refitted pieces) can also be employed to define activity areas and the location where the reduction took place as well as give indications on the degree of disturbance a site has undergone[8] (Dibble et al. 1997; Kooyman 2000: 135-136).

2.3. Sourcing of the raw materials. Apart from finding the actual source, sourcing also means determining the existing (or not) contacts between different groups/communities, the types of exchange and the ways of transporting the raw material (cores, blanks, etc).

One of the most used models is the ‚distance fall-off', when the amount of raw material decreases with the distance to the source. Most important factors are distance and weight of raw material found (quantifying the labor/effort needed to

carry it back to the site, whereas counts are relevant only for the finished tools). If there is a direct access to the source one might expect to find on the site complete cores. As distance increases the expected pieces would be preforms, blades, finished tools – but the type of the site should be taken into consideration as well.

The frequency of lithic types (percent of weight and types) for different categories of raw material in different sites would give an idea over the exploitation of the lithic types. Different frequencies for different reduction stages might suggest differences in the functions of the tools or in the duration of occupation of sites.

One of the main problems with the sources of raw materials is determining if the source was controlled or not. For more complex societies at times we see territorial markers. Source controlling is done for obtaining economic or social benefits. But such benefits could equally be obtained through more sophisticated labor saving technologies, standardization of form, specialization in the use of raw material resources, tools, techniques, space, labor (Kooyman 2000: 147). Craft specialization should be defined by specific structures/areas, localization of different stages of the production processes, minimizing the waste of raw material, the presence of dumps of debitage of essentially lithic type, etc. The presence of the same certain types in different sites, but with different frequencies could be a sign of social or economic differentiation.

3. The lithic industry of the Starčevo-Criş culture

Various theories were formulated about the origins and development of the Starčevo-Criş culture and the matter is far from being clear. The beginnings (for Romania) are linked to the research of D. Berciu (1940, 1954, 1975, 1958, 1959) at Verbiţa and its stratigraphy. During the same period, I.Nestor and its team (Nestor 1950: 204-214; 1951: 17-26) were conducting researches on Valea Jijiei in Moldavia and at Leţ in Transylvania (Nestor 1957: 59-63) trying to establish connections between the chronology of Starčevo-Criş, the linear pottery and Boian cultures. Also in the 1950-ies, M. Petrescu-Dâmboviţa, following his own excavations at Perieni attempted to connect the chronology of the Moldavian sites (Perieni, Valea Lupului, Traian, Glăvăneşti) to those in Transylvania, Hungary and Yugoslavia (Petrescu-Dâmboviţa 1958: 60, 65). But it is N. Vlassa who wrote the first synthetic study on the Starčevo-Criş culture in Transylvania (1958-1966), completed later on with the results from Gura Baciului (1968, 1971, 1972b, 1980).

Interested in the lithic industry and raw materials was also E.Comşa (1970, 1971a, 1976), but his works were rather general with no particular information on any site.

The first study that touched on the lithic Neolithic industry was Al.Păunescu's PhD dissertation, published in 1970, where the author followed a presumed 'evolution' of the chipping techniques from the Paleolithic to the Bronze Age. Unfortunately, Neolithic lithic artifacts were available only from 10 sites[9] (two from Transylvania and three from Banat) and equally sad, it still remains the only volume on the subject.

Since the '70-ies and '80-ies the number of actually excavated Starčevo-Criş sites in Transylvania has increased, but a lot more are merely identified. There are approx. 161 site locations, out of which only in 66 archaeological excavations (size of the excavated area vary largely) took place. In approx. 15 cases some information on the lithic materials was published.

For Banat, the beginning of the research during the 'historical' period is connected to the names of B. Milleker (1897, 1898, 1938, 1939), N. Gyula (1904, 1907, 1909, 1911). Later on, an impulse to the study of the Neolithic (and all prehistoric ages, in general) was given by the construction of the Iron Gates I and II power stations, reflected in the articles published by C. S. Nicolăescu-Plopşor and his collaborators: V. Boroneanţ (1968, 1970), M. Davidescu (1966), Comşa (1965, 1979), Gh. Lazarovici (1969, 1971, 1978, 1981), Al. Păunescu (1970, 1978), Roman (1974). Unfortunately, at least for the southern part of the Banat (although new data on Neolithic settlements was made public) the lithic information is still largely unavailable.

The raw materials. One of the frequent raw materials was flint, local or brought form distance. It was present in most sites, with colors varying from dark brown (sometimes translucide) to lighter shades ('honey-colored', at times spotted – the ‚dehydrated flint' (Lazarovici, Maxim 1995: 158), to a gray color, of poorer quality (Ciută 2000: 58-59). Some of artifacts retained parts of the cortex (percentages were never given so we cannot tell whether there were primary or secondary flakes and the place they hold in the chaine operatoire, and so if manufacture took place in situ or if they had been carried in).

A quiz raw material is the white-grayish, white-yellowish or white-reddish quartzite – Schela Cladovei (Davidescu 1966: 548; Păunescu 1978: 32) and Şeuşa, jud. Alba (Ciută 2000: 58), because of its poor qualities in tool manufacturing. The quartzite does not brake conchoidally but in an irregular fashion because of its crystalline structure. In most cases the implements obtained need further retouching. It appears to be quite common at Schela Cladovei, Şeuşa and Ocna Sibiului.

Then why use quartzite? Perhaps this raw material was so abundant that 'importing' other types was not an option (Ciută 2000: 58) noted the existence of quartzite boulders inside a house. This points out to the large availability and easy access to the source. Also expedient tools might have served the purpose, having been used a few times and then discarded. When needed, new ones were made on the spot. This also points to a lack of tool specialization. Also, possible existing 'workshops', were temporary and not specialized.

Other raw materials were the opal - Gura Baciului (Vlassa 1980: 693; Lazarovici, Maxim 1995; Maxim 1999), jasper - Cuina Turcului (Boroneanţ 1970: 408; Vlassa 1966), obsidian[10] - Banat -Cuina Turcului (Comşa 1969: 30), Ostrovul Golu (Roman and Boroneanţ 1974: 126), Crişana – Fughiu (Ignat 1979: 721), Sălaj - Zăuan (Lako 1978: 12), Transylvania - Gura Baciului (Vlassa 1959: 450; Lazarovici, Maxim 1995), Ţaga (Kalmar 1983), Leţ (Nestor 1957: 62), Şeuşa, (Ciută 2000: 59).

The sources for the raw material seemed to be – with a few exceptions – largely local: Rastolţu, Buciumi, and Şardu for grey chalcedonies, Zăuan, Seini for obsidian, Coldău – for cornean (Maxim 1999: 29).

The obsidian received by far the most attention. A study was undertook on the obsidian from Gura Baciului, Zalău, Seini, Rastolţu Mare, Buciumi (Maxim 1999: 52).The study indicated the presence of three types of obsidian, from three different sources: Melos (black with grey micro-bands), Călineşti-Oaş (black with a concentric texture) and one unknown source - grey semi-transparent (Maxim 1999: 53).

Several sources of obsidian, out of which at least one is of southern origin, would suggest the influence of external factors – especially if each site has varying amounts of material from different sources through time, so it is not only a matter of distance but other factors too, perhaps social ones.

Z. Maxim also talks about the changed qualities of obsidian when heat-treated but it is unclear if such a treatment took place in the studied sites.

The typology. Comşa was the first one that tried to put order in the Neolithic assemblages. As tool types he identified trapezes, *‚encoche´* blades and bladelets, side-scrapers on blades, rounded endscrapers, burins, drills. But there was no information regarding the inter-site type variability and there was no attempt to correlate the occurrence or frequency of occurrence to certain Starčevo-Criş ‚phases' (Comşa 1971a: 103, Fig.1).

At the other end of the pole stood Al. Păunescu, who obviously regarded the Neolithic lithics from the standpoint of a Paleolithic archaeologist . He identified within the chipped lithic industry of the Starčevo-Criş culture three main artifact classes: 1. the traditional implements, well known from the previous cultures and ages (denticulated, encoche, truncated or retouched tools, drills, scrapers and even burins. 2- the typically ‚Tardenoasian' implements[11] (the trapeze microliths); 3. *‚the implements specific to the Neolithic..., linked to the beginning of plant cultivation´* (Păunescu 1988: 49). Unfortunately there was no example of such a tool. At Cuina Turcului three stratigraphical horizons were determined, assigned to phases IIa, IIb and IIIa-b (Vl.Milojcic's periodization). The artifacts (1405 in number) were generally small in size (but not necessary microlithic). Al. Păunescu considered that the number of finished tools ‚typically Neolithic' (group III) was incredibly small, only 5,01% (Păunescu 1988: 17). He also noted a large presence of the microlithic tool types. The large number of flaked pieces and the presence of cores were suggestive of a local manufacturing of implements.

Gh. Lazarovici determined the same tool-types as Al. Păunescu for the Starčevo-Criş sites in Banat - Cuina Turcului, Ostrovul Golu (Lazarovici 1978: 30) and Transylvania: trapezes (used as 'teeth for knives and sickles' – group III in Al.Păunescu" classification[12]) with analogies at Valea Răii (Oltenia) and Târgşorul Vechi (Wallachia); a large number of blades with trapeze or triangular cross-section[13] with analogies at Perieni (Moldavia), a small number of crescents (only at Cuina Turcului), points - Schela Cladovei (Davidescu 1966: 548), endscrapers on blades, simple or retouched sidescrapers[14].

At Şeuşa, M. Ciută noted a rather varied assemblage, from the viewpoint of the raw material and of the chipping techniques (Ciută 2000: 58). Unfortunately, we don't know the total number of pieces. As main types were listed blades (complete or fragmented and not very numerous) with a triangular or trapeze section, flakes of various shapes or sizes. A *chaine operatoire* type of analysis should be able to tell us what types of flakes we are dealing with. Some of them preserved the cortex so they might have been produced on the spot. Refittings would be interesting to attempt, especially for the 150 quartzite pieces.

For the north-west of Transylvania, D.Ignat notes a scarcity of the lithic assemblages. The most frequent tool types are thin blades triangular in section, endscrapers, flakes and obsidian cores. (Ignat 2002: 73)

A typological analysis apparently exists for the sites at Ciumeşti, Gura Baciului, Livada, Iclod-La Doroaie, Moreşti, Leţ, Zăuan, Rastolţu Mare, Seini, Taga, Coldău,

Liubcova (Lazarovici, Maxim 1995; Maxim 1999: 52-54; Luca 1995, 1998) but none was completely published.

For the materials in Transylvania Z. Maxim determined that the main techniques were soft hammer and pressure flaking (Maxim 1999: 52) but these apply only for the obsidian. We still don't know if there was any cortex left on the flakes, if any cores were present. And as there is indication of pressure flaking – was any micro-debitage recovered?

Interesting in what the obsidian is concerned, is its clustering during the GB IIIb and Ib-IC (Maxim 1999: 52, Fig.58) seen as migration and diffusion phases as opposed to the GB IV and IIa-b seen as transition phases. The only objection is that counts were used for drafting the table. A combination of counts and weights would have been more accurate. If the weight increases during the migration phases, than it should also be studied in terms of sourcing. It would be interesting to know if the major component is of Melos origin (thus indicating maybe a social function of the obsidian, used to maintain connections with the original place (Sheppard 1993: 124-127).The amount should decrease in time as the ‚colonies' became more established. which seems to be the case. Also, a study of the finished tools and by-products is required, to see if they arrived as raw material or finished pieces.

Another remark concerns the phasing of the pottery that confirmed apparently by the seriation of the complexes based on the rock types (Maxim 1999: 52-53). A count of the implements and refitting would be good before drawing the final conclusions, as the situation may change if pieces refit. What if they are all part of the same core?

The microlithism and the Mesolithic –Neolithic contacts. Al. Păunescu supported the hypothesis (extremely likely) of a contact between the Mesolithic populations (still surviving in the isolated or peripheral areas) and the Neolithic ones. The latter adopted the Tardenoasian lithic manufacturing techniques'- and thus the microlithism, from the hunter-gatherers.

Gh. Lazarovici's explanation of microlithism looks for a more natural and straight forward: *'The microlithism of the lithic assemblages results… from the necessity of using such tools and not because of the contact with retarded groups'* (Lazarovici 1969: 74; 1978: 28-30). But he seems to be alone in supporting this point as view. M. Ciută (2002: 59) is also of the opinion of having Epi-Paleolithic and Tardenoasian traditions in the flakes, trapezes, triangular points and also in the techniques[15]. The presence of the quartzite might indicate some links to the Tardigravettian in the Iron Gates. To this might also point some of the lithic implements published by Z.Maxim from Transylvanian sites (Maxim 1999: 29) given their 'gravettian' types: La Gravette points, backed bladelets, encoches.

Unfortunately, the main drawback is that we know close to nothing about the Mesolithic groups in Transylvania and not as much as we would want about the ones in the Iron Gates. If for the latter there are more 14C dates, for Transylvania we only have the date from Ciumeşti (7320C ±60 BP (6230±90BC), OXCal V3.10 and from Gura Baciului (M6)- stage IV 6400±90BP (Maxim 1999: 130). Mesolithic site are just starting to be discovered in the SE Hungary, and the same as in Transylvania,the Mesolithic is recognized based only on the lithic industry. We know nothing about the size of the communities, the types of their settlements, the subsistence patterns, mobility etc. With this little information it is too early to develop on the subject of Mesolithic-Neolithic contacts, especially as for the

moment C14 dates for the Neolithic are also rare and point to a chronological gap between the two periods. This is not discarding the hypothesis altogether, just putting it aside until the moment comes when more data will be available.

Throughout the Neolithic assemblages was noted a large number of flakes compared to the total number of tools recovered. Should we find more tools? Not finding them might mean they were not discarded yet and that tools had a long use-life. What we find is only the last step in the ‚chaine operatoire', the very last function that the tool had to perform (Dibble, 1995[16]; Sellet 1993). H. Dibble (1995: 332) also remarked that ' *if very few tools are made overall (meaning that there is a high potential blanks available), then the degree of reduction exhibited in the assemblage as a whole will be very slight*.' But there may be tools exhibiting a high degree of utilization and we should be looking for them. The measure of tool reduction enables us to monitor the effects of intensity of occupation and raw material utilization. Measuring the length and widths of tools and of the blanks/flakes and comparing them might give an indicative of the extent of tool reduction on a site: '*average tool size (with a minimum size related to the need to grasp the tool) should always exceed the average size of the un-retouched pieces (whose minimum size is only a question of recovery techniques)*'(Dibble 1988: 193).

Another problem concerns the place the artifacts were found. More were noted inside the houses and less in the ‚cultural layer' (Ignat 1979b: 54-56). This would point to a lack of specialization and a rather ‚domestic' manufacturing of tools. But debitage and microdebitage studies are needed in order to look for a verdict in this and no microdebitage is available from the discussed sites.

Claims for at least two ‚workshops' were made – for Coldău and Costanda (Maxim 1999) but the information was not published. The assumption was presumably made on the large number of flakes recorded. It would be interesting to see the results of refitting.

Use-wear issues. According to M. Ciută, at Şeuşa at least two implements presented sickle gloss. It is unclear though whether the observation was made under the microscope or juts with the naked eye.

Some other blades or bladelets were reported to have had striations and breaks following use, most frequently from cutting (Ciută 2000: 58-59). But again, are this reports following use-wear analysis and if so, what was the methodology used? The two observations are too specific and too important to be taken lightly especially as it is hard to discern them from natural breaks occurring while the tools are buried in the ground, caused by trampling or even bagging or storing in boxes, using only the naked eye, a magnifying glass or even a microscope. SEM techniques could provide a more reliable answer to that.

The ground stone industry. Hard and soft rocks (Ciută 2000: 60) seem to have been both used in manufacturing the ground stone artifacts. Granite, granodiorate, serpentinite, basalt, nephrite and andesite were noted. Sources were determined around Baciu and Popeşti for limestone, Popeşti for andesite, quartzite along the Someşul Mic valley, amphibolites at Someşul Rece (Maxim 1999: 55).

The **axes** rank as the most frequent tool type: flat and trapeze shaped (Lazarovici 1978: 30) with analogies in Moldavia at Perieni, Pogărăşti and Glăvăneşti, Cuina Turcului and Ostrovul Golu, Beşenova (Roman and Boroneanţ 1974: 120; Lazarovici 1969: 9) with analogies at Bonţeşti, Pogărăşti, Budureasa but also in Yugoslavia. Their lack or scarce occurrence in certain horizons was

interpreted as indicative of early Starčevo phases (Ciută 2000: 60; Vlassa 1972: 11; Lazarovici, Maxim 1995: 159, 162).

Also an indicative of the early Starčevo-Criş horizons was considered the **Walzenbeil**, recovered at Gura Baciului (Lazarovici 1984: 75), Cuina Turcului II (Boroneanţ 1970: Fig.2/1), Moreşti (Vlassa 1966), Cipău and Inucu in Transilvania (Lazarovici 1984: 75) with analogies in Moldavia at Grumăzeşti (Marinescu-Bîlcu 1975: 502)

Less frequent were the **chisels** - Banat and Crişana (Lazarovici 1979: 30-31; 1984: 75; Ignat 1979: 721-722), **perforated axes** - Cuina Turcului (Păunescu 1978: 32), Beşenova (Lazarovici 1984: 75 - after Milleker 1934), Ostrovul Golu (Roman, Boroneanţ 1974: 120) with analogies in Oltenia at Valea Răii and Moldavia at Balş, Suceava (Ursulescu 1972: 72), **perforated mattocks** often in a fragmentary state Ostrovul Golu (Roman, Boroneanţ 1974: 120), Beşenova (Lazarovici 1978: 31), Cuina Turcului (Păunescu 1978: 32).

Various rocks bearing traces of use or partly worked were also identified on sites. Some were considered as **polishers** (Ciută 2000: 61; Vlassa 1972: 11, Fig.12/11), **crushers** and **hand grinders** - Şeuşa (Ciută 2000: 61), Gura Baciului (Vlassa 1966: 49), Cuina Turcului (Păunescu 1978: 32) , probably used to *‚crush seeds, break bones, crush pot sherds for the temper'* (Lazarovici 1984: 75). Their use was mostly inferred and the typology is very flexible. At times archeologists record them as *‚other lithic implements'* [17] (Maxim 1999: 55) or have a hard time fitting them somewhere between the flaked and ground industry (Ciută 2000). But as showed above, they all can be classified as ‚ground tools' once we all agree upon a definition.

As a whole, publications tend to agree upon a poverty of the ground stone types. Some of them appear to have been used until exhaustion. This sends us again to the concept of curation and its implications for the Neolithic communities. If the first Starčevo phases do not provide ground tools (Lazarovici 1993: 245; Maxim 1999: 55) and the next ones are of local origin, we can only assume that ground tools were not known during the first stages, otherwise people would have brought them with them as they did with other items. If they really did not exist, was it because they were not needed? We re-state one of the questions we started with: what led to the adoption/invention of the ground stone tools – the introduction of farming as a major activity or the transition to a sedentary life with a strong hunting-gathering economy in its base?

4. The lithic industry of the Linear pottery (East-Slovakian, Alföld) culture

Sites with linear pottery (east-Slovakian) are a lot less frequent and occurred only to the north-west of Transylvania. The most important one appears to be at **Ciumeşti Berea IX** (Comşa 1963; Păunescu 1963), and a few more sites were mentioned at **Turdaş, Petreşti, Cipău** (Vlassa 1959: 239-247), **Braşov - Lutărie** (Costea 1995: 26; Ciută 1997: 14),**Cluj Napoca** - **La Stăvilar** (Roska 1942: 133; Lazarovici 1983a: 4; RepCj 1992: 118-154), **Feldioara - Pe Dealul Cetăţii** (Roska 1942: 94; Ciută 1997: 13), **Târgu Mureş - La Cetate** (Roska 1942: 166-167; Lazăr 1995: 253-260). The sites were assigned to an early phase of the culture with analogies in Alföld[18] and oriental Slovakia at Barca III.

The raw material for the linear pottery sites is mostly the obsidian. Implements made of siliceous rocks or quartzite is rare.

Comşa considered that obsidian might exist in Transylvania in the volcanic massifs in the south-east (Perşani, Harghita), in Western Carpathians (around Cerbel, Valea Bradului, Săcărâmb, Techerău) or Maramureş (Seini, Racşa) (Comşa 1976: 246). Al. Păunescu thought the Ciumeşti obsidian came from the region of Tokay-Prešov (Păunescu 1988: 16) opinion supported also by Gh. Lazarovici and Z. Maxim (1995). It is interesting to see a shift from the use of obsidian to that of flint in the late sites of the linear pottery with musical note heads in Moldavia. Obsidian still occurred but in a much lower percentages - Glăvăneştii Vechi, Traian (Păunescu 1970: 39) while flint prevailed.

The main tool types are almost conspicuously similar to the Starčevo-Criş ones**.** The largest part of the implements is microlithic[19]. Among the most frequent types Comşa determined trapezes, blades, bladelets, rounded micro-endscrapers, micro-endscrapers on blade ends, spherical, pyramidal or an irregular shape cores (Comşa 1971: 103; Păunescu 1988: 16). The number of endscrapers appeared to be low (the same as in the case of the Starčevo-Criş) and burins were accidental. Retouched flakes were few (Păunescu 1988: 16).

Strangely enough, there is no indication of ground stone tools. What we should expect to find are small trapeze axes (for the proto-linear) and larger ones with the cutting edge arched or straight, during the middle linear hammer-axes and chisels, and over all, sand stone grinders. This is what pendant Slovakian sites had provided (Šiška 1993: 347). In Hungary Kalicz noted rather large polished axes, oval or semi-circular in sections (Kalicz 1991: 286) as well as perforated axes.

The lithic industry was reported poor and mainly on obsidian (Kalicz 1991: 286) in Hungary and predominantly on blades in Slovakia (Šiška 1993: 347). The use of obsidian seemed to vary with the region 68-99% for the sites in the oriental Slovakian plain and decreasing to 26-78% in the western Tisza region. Other reported raw materials were limestone, limnoquartzite, radiolarite.

But recent research has shown that ‚*the lithic industry of the Early Neolithic period in Hungary seems to be more rich and significant than hypothesized before'* (Biro 2002: 119). Excavations at Gélleháza-Városrét (1990-1996), of late stage Starčevo (spiraloid B) reported over 1200 stone implements. Also with horizons assigned to Starcevo-Cris, but a smaller number of pieces is the site at Vörs-Máriaaszony sziget. New linear pottery sites, rich in lithic material, were reported at Füzesabony-Gubakút and Szentgyöryvölgy-Pityerdomb, the latter with 379 implements. The study of this new material suggested that regional and style difference could be observed in the horizon of the early Neolithic, that workmanship and raw materials were outstanding and optimized but the Mesolithic roots are still to be found (Biro 2002: 129).

5. Conclusions

1. Although the Starčevo-Criş culture covered a relatively large area (almost the entire territory of Romania, with the exception of Dobrodja and south-eastern Wallachia) and although the pottery abounds in most sites, the lithics seem to be rather poor and unevenly distributed in various parts of the country. The Banat and Moldavia appear to hold sites with richer and more varied lithic assemblages (Cuina Turcului, Ostrovul Golu, Schela Cladovei, Trestiana, Glăvăneşti, Grumăzeşti,

etc.) while many in Transylvania are largely ‚depleted' of it[20]. Part of the explanation is, as we have seen, the lack publication. One can not compare what one has never seen. Saying all the time ‚it is not varied, it is poor' will not improve the situation. Poor as it is (if that is the case), we should be able to see and judge for ourselves.

2. The cause of the non-publications also lies on the approach to the lithic studies for the Neolithic period: was not considered relevant or ‚defining' for the cultural evolution and at times was neglected from the very moment of the excavation[21]. N. Ursulescu noted that *‚ideally the evolution (of a culture- n.a.' should be followed based on its general progress, but in fact only certain limited categories where the change is faster are taken into account...For the societies whose existence developed after the production of pottery, the latter become the a first rank typological and stylistical index, based on which the evolutionary moments of the respective are seen'* (Ursulescu 1972: 69). The problem of ignoring the rest of the artifact types goes way back in Neolithic archaeology....

3. In what the flaked industry is concerned, little work focused on how tools were made. More attention was given to the sourcing of the lithic materials – and this is a very useful first step to take (Lazarovici, Maxim 1995: 156-159; Maxim 1999: 52-55). As already noted by Bailey (2000: 124), even less attention was given *‚to the ways in which lithic tools were used and the distribution of events of manufacture, use or discard within a site or activity area'*. Occurrence of earlier types was regarded as ‚tradition' but a type-disappearance was never questioned nor explained. New types were inevitably seen as brought in by migrations.

At this point in time is obvious that the mere *‚typological characterization of whole lithic assemblages, while supremely important as a method of summarizing data and a means of communication among prehistorians provides a poor and confusing unit of analysis'* (Cahen, Keely, Van Noten 1979: 672).

4. Based on the typological and functional analysis of the chipped and ground stone industry we can try and determine more about the subsistence patterns of the respective communities. For the ground stone industry, manufacturing tools might presume chipping and retouching, or pecking, grinding in order to acquire the final shape, possibly adorning by incision (Antonovic 1998: 139). These techniques should be studied and discussed. Are there 'specialized' workshops, is there any evidence of lithic craft specialization at the Starčevo sites? These are issues that have been rarely if ever addressed.

The first thing that the analysis of ground industry might need is establishing an explicit typology for the Neolithic stone tools, using it consistently for all cultural aspects and adding new variants or new types when and if needed. Also we need distributions of tool types by cultural horizons on a site and comparisons between sites, distributions of raw materials by cultural phases (Maxim 1999), frequencies of tool types within a site and inter-site comparison (Antonovic 1998), frequencies of raw materials.

As for the functional analysis –we should continue to raise the question of use-wear – even if at a macroscopic level. What were the tools used for? D.Antonovic (in her analysis of the Serbian ground tools) expressed the opinion that *'the ground edge tools, which ubiquitously bear signs of wear originated during wood working'* and sees it possible that the stone tools were also used for bone cutting or splitting, milling of cereals and other grains, scraping hides and farming (more rarely) (Antonovic 1998: 140).

5. Once more lithic assemblages are known, a correlation of the pottery phases, lithics, bone industry and radiocarbon dates should be attempted. It is astonishing how few dates we have for the early Neolithic. Such attempts existed before (Al. Păunescu, Gh. Lazarovici) but the data was very poor and it happened many years ago.

Notes

1. The choice for this area was partly triggered by the fact that it holds some of the earliest Starčevo-Criş horizons, partly by the subject of my future PhD dissertation.
2. 'The genesis of the Neolithic is the result of the migration and diffusion of pottery from the Orient, through Anatolia, Cyclades and Thessaly during a pre-pottery or 'aceramic' horizon' (Maxim 1999: 27).
3. R. Dobrescu, PhD dissertation on the subject of Upper Paleolithic in the north-western Romania (reserved title), BAR, in press.
4. There are two kinds of refitting – fracture refitting (refitting of broken pieces) and debitage refitting (sequential refitting) (Tixier 1979).
5. Diacritical study imply 'count, orientation and classification of all flake removals visible on an artifact. Classification with help of all visible marks left, allows the reconstruction of removals and their chronology, recognition of a shift in manufacture operations' (Sellet 1993: 109). See also Inizan et all 1999. The main goal is the recognition of patterns in core reduction.
6. There seems to be a separation in the Romanian archaeological literature between polished tools and tools used for grinding, crushing or even polishing. The latter seem to be treated separately, because they are not really 'polished'. The point made is that 'polished' stone, in the general sense is just a term that incorporates more than just 'polished' artifact.
7. Curation is 'the ability of a tool to have an extended uselife because it can be resharpened, maintained, reworked, recycled or transported from one site to another. Tools lacking these features are called expedient tools' (Kooyman 2000: 131).
8. The stratigraphy of a site might look undisturbed, but defining refitting zones associated to zones that lack refitting (representing distinct occupations of the site) gives us one more control over the relative chronology.
9. The rock shelter from Cuina Turcului – Dubova and the sites from Schela Cladovei-Turnu Severin, Ostrovul Banului-Gura Văii, Valea Răii-Râmnicu Vâlcea, Trestiana, Balş, Glăvăneştii Vechi, Leţ-Varhegy, Ohaba-Ponor – Bordu Mare, Târgşoru Vechi (Păunescu 1970: 151-153).
10. Apparently the obsidian also was seen as an indicative of the chronology of the horizons, being very abundant in early ones (Ciută 2000: 59, 60).
11. A.Boroneanţ, 'The Tardenoisian,- a false problem', Studii de preistorie II, 2005: 17-46.
12. Gh.Lazarovici, supporting the hypothesis of a two wave neolithization (first proto-Sesklo and the second Starcevo-Cris) sees the lithic assemblages from Gura Baciului as the 'traditional tools brought in' (by the bearers of the respective cultures. This would seemingly be the typical Neolithic tools (Lazarovici, Maxim 1995; Maxim 1999).
13. Blades of various sizes were recorded in Banat (Davidescu 1966: 548; Comşa 1969: 30; Lazarovici 1979: 29), Crişana (Ignat 1978: 10), Sălaj (Lako 1978: 12), Transylvania (Vlassa 1966: 18).
14. Such finds occurred in Banat (Lazarovici 1979: 26), Crişana at Suplacul de Barcău (Ignat 1978: 10).
15. Although he does not specify what these techniques are.
16. ' …artifacts found in the archaeological record reflect only the last point in what could have been a long and continuous history of reworking. Their morphology therefore represents their state at the time they were discarded and not necessarily their original design' (Dibble 1988: 299-300).
17. In the same category go the 'stone figures' from Gura Baciului (humans or horses) and the stone heads from the same site with claimed analogies at Lepenski Vir and Donja Branjevina (Maxim 1999: 55).
18. Tiszadada, Herman Otto Cave , Polgar, Tikos, Demeterkut (Vlassa 1959: 242)
19. The same as in the case of the Starčevo-Criş lithics, microlithism and typological resemblances made Al.Păunescu suggest an assimilation of the Mesolithic groups by the linear pottery ones (Păunescu 1970: 39). Unfortunaley, again there are no radiocarbon dates and no ofurther information.

20. Even for Moldova, there are very rich sites in lithic assemblages but also sites were only pottery was seemingly reported. Out of the 151 locations mentioned by N. Ursulescu, only in 29 cases was noted the presence of lithic implements, in some cases mixed with "Tardenoasian' finds (Ursulescu 1984).
21. Al.Păunescu noted that the smaller pieces (the microlithis?) could have been overlooked during the excavationa. This is not difficult as flotation or wet sieveing is not widely spread on Romanian archaeological sites. (Păunescu 1970: 37, note 4).

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