Studies

ANCIENT HISTORY

CHISELS OF POLISHED STONE IN THE NEOLITHIC OF NORTH-WEST ROMANIA[1]

Mihai Dunca
independent researcher
mihaidunca2013@gmail.com

Abstract: Chisels occupy a small part of the studies concerning polished stone tools. Havying an area (the north-west of Romania) but especially two sites – Porț and Pericei- that produced a vast quantity of polished lithics, with a clear predominance of chisels, we were able to make some general observations regarding what is different about them related to other polished tools. Two main aspects were followed: ways of stone working adapted to produce chisels and the chronological value of their typology. Regarding the first issue, cores were prepared by polishing a narrow stripe indicating the part that had to be sawed for obtaining a chisel's preform. Pecking was used afterwards in different proportions, depending on the shape of the chisel. Seriation of the sites based on chisel's typology illustrate a general evolution that is marked by local preferences.
Keywords: *stone chiesel, sawing, pecking, seriation, typology, Porț - Corău, Pericei - Keller tag.*

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Usually chisels receive less attention than axes and adzes in studies regarding polished or ground stone industry. At the moment we can only mention one study[2] centred on them, regarding the Iberic Peninsula, but it refers mainly to the long chisels. The few synthesis about polished stone tools from various parts of Romania define general characteristics[3] and ways of use of the neolithic chisels. Here we must point out the studies regarding the nort-west neolithic, written by D. Ignat where a typology is given for the chisels[4] along with other polished and ground stone tools. Separating chisels from adzes is easy because the last ones have an asymmetric cutting edge, but harder when it comes to axes. The clearest way would be observing the hafting but that rarely can happen. Chisels should have a short handle that comes in the extension of the tool[5]. They are rather thin, flat and not too large in size[6].

GEOGRAPHICAL AND CHRONOLOGICAL FRAME

From the area under study (Fig. 1), five sites have been selected, from which four have unpublished lithic material: Zăuan- *Dâmbul Cimitirului*, Porț- *Corău*, Pericei- *Keller tag*, Bocșa- *Pietriș*. The polished stone artifacts from Tășad- *Dealul Cetățuia* are published and it is the only site placed outside the

[1] This paper was presented at the International Colloquium *Raw materials and lithic artefacts from Prehistory to Middle Ages in Europe*, Piatra Neamț, 23-25 october 2018.
[2] FÁBREGAS VALCARCE/ DE LOMBERA HERMIDA/ RODRÍGUEZ RELLÁN 2012.
[3] COMȘA 1972, 256; COTOI/ GRASU 2000, 30-31.
[4] IGNAT 1981-1982; IGNAT 1998, 35-36.
[5] COMȘA 1972, 256; PÉTREQUIN/ PÉTREQUIN 2000, 29, fig. 10.
[6] DUNCA 2016, 88.

Silvania Depression wich includes the Șimleu Depression, were the sites of Porț and Pericei are located, and the Zalău Depression were the site of Bocșa lies. The most important of the mentioned sites is the one from Porț. It represents the continuation of the Suplacu de Barcău- *Corău* site (Bihor county) on the territory of Sălaj county. The site was used as a reference point for the late neolithic, by creating a cultural group[7]. Cultural frame has been redefined several times and a synthesis of that aspect we find in a study[8] of S. Băcueț Crișan. The autor prefers to name the discoveries from Porț and from similar habitations as Suplac type[9]. Three chronological phases were established, the first one evolving from Vinča C1-C2 interval[10]. The site from Pericei is of Suplac type also, with ceramic similar to the one from the second phase[11] at Porț (Suplac II). Bocșa belongs to the Herpály culture, phases II-III[12] which makes it also contemporary with Suplac II phase. Considering the description of the pottery[13] the same equalisation can be done for the site of Tășad. Finally, the site of Zăuan is dated in the early neolithic, between Starčevo IIIB/IVA- Starčevo IVB[14]. No absolute data is given for any of the sites but according to the relative chronology we can place the late neolithic sites in the first half of the fifth millenium B.C. and the site of Zăuan in the first half of the sixth millenium B.C.

CHARACTERISTICS OF THE POLISHED STONE INDUSTRY AND THE MANUFACTURE OF THE CHISELS

The order in which the sites were presented is the one given by their polished stone industry development. More than 1600 pieces of ground stone were colected from Porț, adding to the 500 from Suplac[15], making the site one of the richest in this category of findings from all Europe, comparable with the sites of Makriyalos[16] and Rivanazzano[17]. Chisels, including the fragments and the unfinished ones count 660 pieces, representing 40% of the ground stone artifacts. The raw material used[18] for chisels consisted first of all in rough stones like slate and grey limestone, followed by the very rough ones like black quartzite and amphibolite and rarely by soft rocks -limestones. The site of Pericei has only 73 ground stone pieces but the surface excavated is smaller. It had a similar economic orientation towards producing polished stone tools in large amount like Porț considering the pebble agglomerations discovered. Chisels represent 41% of the ground stone artefacts. The other sites do not indicate a high degree of development in the polished stone production. Chisels still represent the largest category at Bocșa and Zăuan (34%, respectively 28%) but not at Tășad where axes are in a higher number (but fragmentary most of them, unlike the chisels). For this site we must add that imports from Suplac/Porț are supossed because the polished stone tools have the same lithic source like the first and no raw material with working traces has been found at Tășad[19].

We are using here the typology previously published for the site of Porț. Chisels were clasified[20] into types by shape and into variants by the long profile (Fig. 2; Fig. 8/7-10). Four shapes could be asigned for chisels: rectangular (D1), elongated (D2), trapezoidal (D3) and oval (D4). The same types appear in the others sites but some different variants also: D2f = elongated type with rounded profile (at Zăuan) and D3e = trapezoidal type with rounded profile (at Bocșa).

The general operational chaine established for Porț[21] can be used for all the chisels analyzed in this paper. The raw material was splited in cores using the percussion but there is evidence of thermal shock, considering the burning traces discovered in the area of some of the pebble agglomeration[22]. Using sawing or pecking, preforms (fragments of similar dimensions and shape as the stone tools) were obtained. Grinding combined with pecking had the role of giving the expected shape. Processing the chisels can be noticed starting with this early phases. The cores obtained by breacking the raw material were prepared for obtaining preforms suitable for chisel manufacture by polishing narrow stripes along their surface (Table 1; Fig. 3, Fig. 7/1-3). Sawing was done along this strips resulting the preform. The combination of polished strips and sawing marks (Fig. 3/4,6) encountered on cores can be linked with the preforms having a well polished profile and sawing marks on one or both faces (Fig. 4/1-2; Fig. 7/4-5). Etnoarcheological studies[23] as well as the experimental archeology[24] ones indicate as tools for sawing either a wooden plaque or a stone slab. For the neolithic alpine area, many stone slabs with traces of use on their cutting edge[25] were found. We consider that this type of tool was suitable for obtaining the chisel's preforms. Two pieces of stone slab discovered at Porț (Fig. 6/5) have wear marks that indicate an almost perpendicular position on the cores[26]. Where only sawing is present, especially at a narrow end of the preform (Fig. 4/3), it is possible that the operation was done with a wooden plaque or other tool by creating a groove. In Table 1 we see that only at Porț and Bocșa cores associated with chisels production and sawing were found. Observations in New Guinee show that sawing can be a cultural choice[27], the same type of rocks were exploited only by percussion in some tribes. Pecking was another operation applied rarely on cores (Fig. 3/5) and more often on preforms (Fig. 4/4-6). In the first case it can be asign to the separation of the preform, while in the second it may be posterior to sawing, belonging to the process of transforming the preform into chisel. The same explanation can be given for the high number of preforms that only show traces of polishing (Fig. 4/8). We can observe that almost all the preforms from Pericei, Bocșa and Zăuan show pecking but no sawing

[7] IGNAT 1998, 21.
[8] BĂCUEȚ CRIȘAN 2013.
[9] BĂCUEȚ CRIȘAN/ POP 2014, 35-36.
[10] BĂCUEȚ CRIȘAN 2013, 17.
[11] BĂCUEȚ CRIȘAN 2008, 51.
[12] BĂCUEȚ CRIȘAN 2008, 54-56.
[13] IGNAT 1987, 11.
[14] BĂCUEȚ CRIȘAN 2008a, 67.
[15] IGNAT 1998, 237-255.
[16] TSORAKI 2011, 231.
[17] D' AMICO/ STARNINI 2012, 17.
[18] IGNAT 1981-1982, 14
[19] IGNAT 1987, 10-11.
[20] DUNCA 2016, 88-89.
[21] DUNCA 2015.
[22] DUNCA 2016a, Pl.1.
[23] PÉTREQUIN/ PÉTREQUIN 2011, 337.
[24] PÉTREQUIN *et alii* 2012, 275.
[25] CROUTSCH 2012, 107-113.
[26] DUNCA 2015, pl. VIII/3.
[27] PÉTREQUIN/ PÉTREQUIN 2011, 337.

Matrix of seriated data																							
	D2f	D3b	D2c	D3e	D4c	D4	D3c	D3	D2e	D3a	D2	D1b	D4a	D4b	D4d	D1	D1c	D2b	D2a	D3d	D1a	D2d	
Zăuan	1.00	2.00	1.00			1.00		1.00															-8.77
Bocșa		1.00		1.00	1.00	4.00		2.00			1.00								1.00				-0.93
Pericei					1.00	4.00		7.00		1.00	2.00					6.00				1.00			-0.40
Suplac III-Porț		1.00			1.00	17.00	1.00	38.00	1.00	2.00	10.00		1.00			35.00			3.00	1.00	2.00		-0.38
Suplac II-Porț		1.00	1.00		1.00	22.00		99.00	1.00	3.00	26.00	1.00		1.00	1.00	#####	1.00	1.00	4.00	4.00	7.00	3.00	-0.26
Suplac I-Porț			1.00			3.00		9.00			3.00		1.00			22.00	1.00	1.00	1.00	3.00	3.00		-0.02
Tășad								1.00			1.00					5.00			2.00	4.00	6.00	5.00	1.58
	#####	-6.42	-4.73	-2.71	-0.82	-0.57	-0.31	-0.17	-0.16	-0.16	-0.06	-0.02	-0.02	-0.02	-0.02	0.06	0.14	0.14	0.36	1.26	1.36	2.87	

marks. The orientation of stone processing towards chisels is indicated also by the high percentages of their preforms among the ones belonging to other categories: 66% at Porț and 50% at Pericei.

Preforms were worked further by polishing and pecking (Fig. 5; Fig. 8).

Based on their characteristics, mainly the sharpening of the cutting edge and the symmetry, the unfinished chisels can be divided in two working stages: initial and advanced[28]. The initial stage includes chisels with a pronounced asymmetry (this is why some of the samples can't be framed to a type), often a more superficial sharpening of the cutting edge and generally an abrasive surface. If polishing is a general trait, pecking doesn't appear in all cases (Tab. 3). Etnoarcheological observations[29] and experimental archaeology[30] show that polishing and pecking were combined in order to reach the desired shape and dimensions. In Table 3 we see different percentages of pecking depending on the type and stage of manufacture with a clearly higher incidence for the initial stage. That means that after a rough reconfiguration, chisels were slowly given the wanted shape mostly by polishing. The advanced stage includes chisels with a moderate asymmetry, a better contoured cutting edge, still not sharpened in most cases and a lower abrasion of the surface. Pecking marks appear in the advanced working stage also. The trapezoidal (D3) and oval (D4) types have more often pecking marks, the last one more than it presented on the samples of its initial stage. The explanation consists in the difficulty to reach their shape, as the preforms are closer to rectangular one (D1). The observation fits the chisels from Porț but not the ones from Pericei where the D1 type in advance stage has more pecking traces than the initial one. It could be the result of abandoning the pieces before polishing could have wiped the pecking marks. Another explanation can be given if we consider sawing. Traces of this method rarely appear after the cutting edge is outlined (Fig. 6/1-3) and they may be the result of the previous stage and action- sawing the preform- not removed yet by polishing but more likely, since their surface has some polish, they represent a new sawing having the same role as pecking, that is speeding the manufacture. The advanced working stage chisel from Porț with an incision on the contour (Fig. 6/1) shows the preparation of sawing. We see (Tab. 3) a higher incidence of sawing at Pericei in the initial stage combined with a frequent pecking in both stages. A possible explanation is that preforms from Pericei did not fit so well the shape and dimensions of the final product. To conclude with chisel's processing, we must mention the perforation encountered only on a rectangular chisel from Porț (Fig. 6/4; Fig. 8/6), unaccomplished, probably an attempt to fix better the handle. A last remark on the processing stages can be made for the chisels of Porț and Pericei. Considering all three- final, advance, initial-, we have in that order the following percentages: 9%, 32%, 52% for Porț and 4%, 40%, 56% for Pericei. That indicates a production for exchange in a higher degree at Pericei.

CORRESPONDENCE ANALYSIS

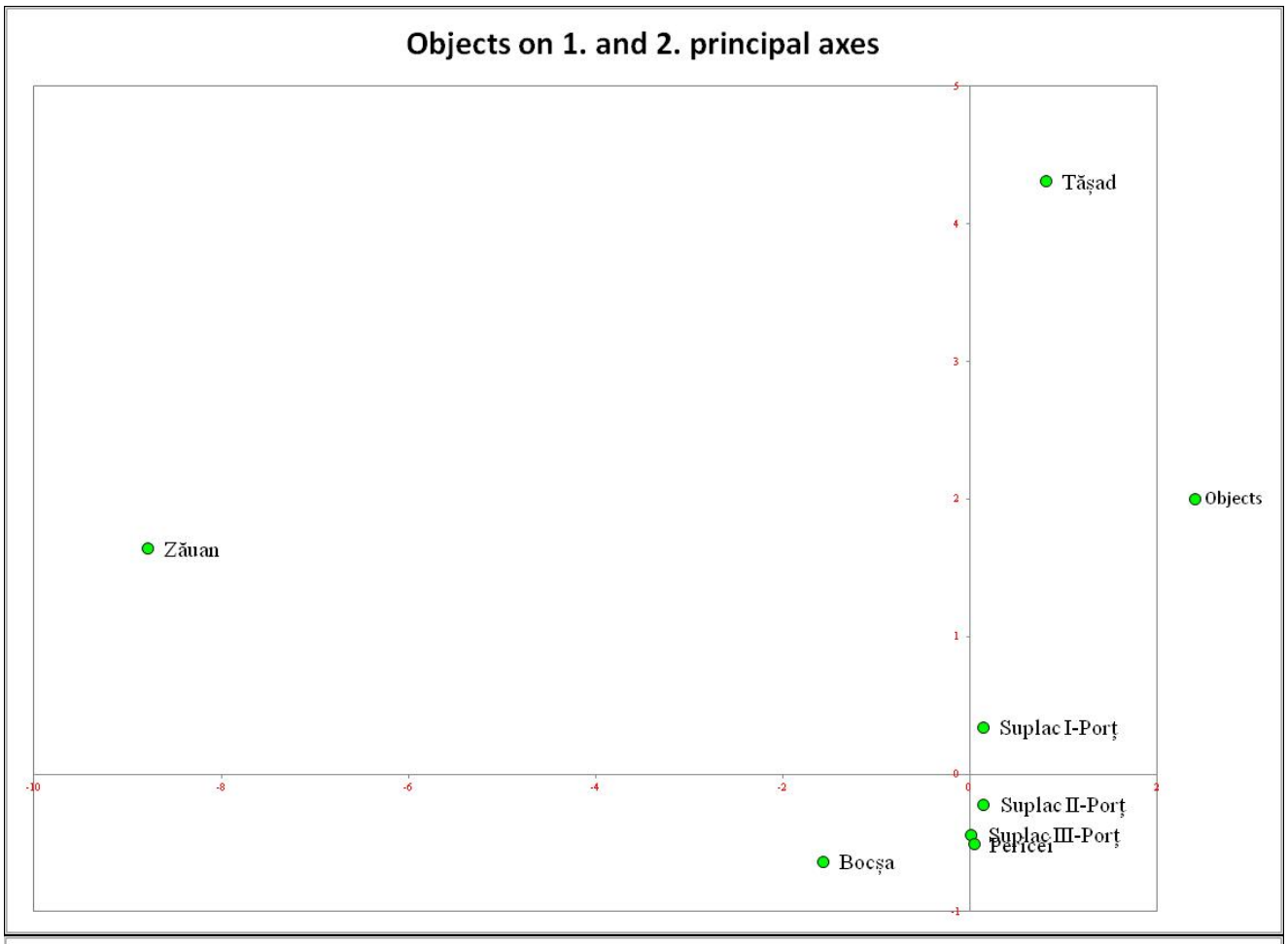
The site of Porț was used as a reference point for the other ones, especially for the late neolithic sites, all contemporary to Suplac II phase of Porț. By this seriation we wanted to see if there is a chronological evolution of the chisels or a local variation. The unfinished pieces were included also if they could be framed to a type (noted only with the type's initial and number), their proportion being high in most cases.

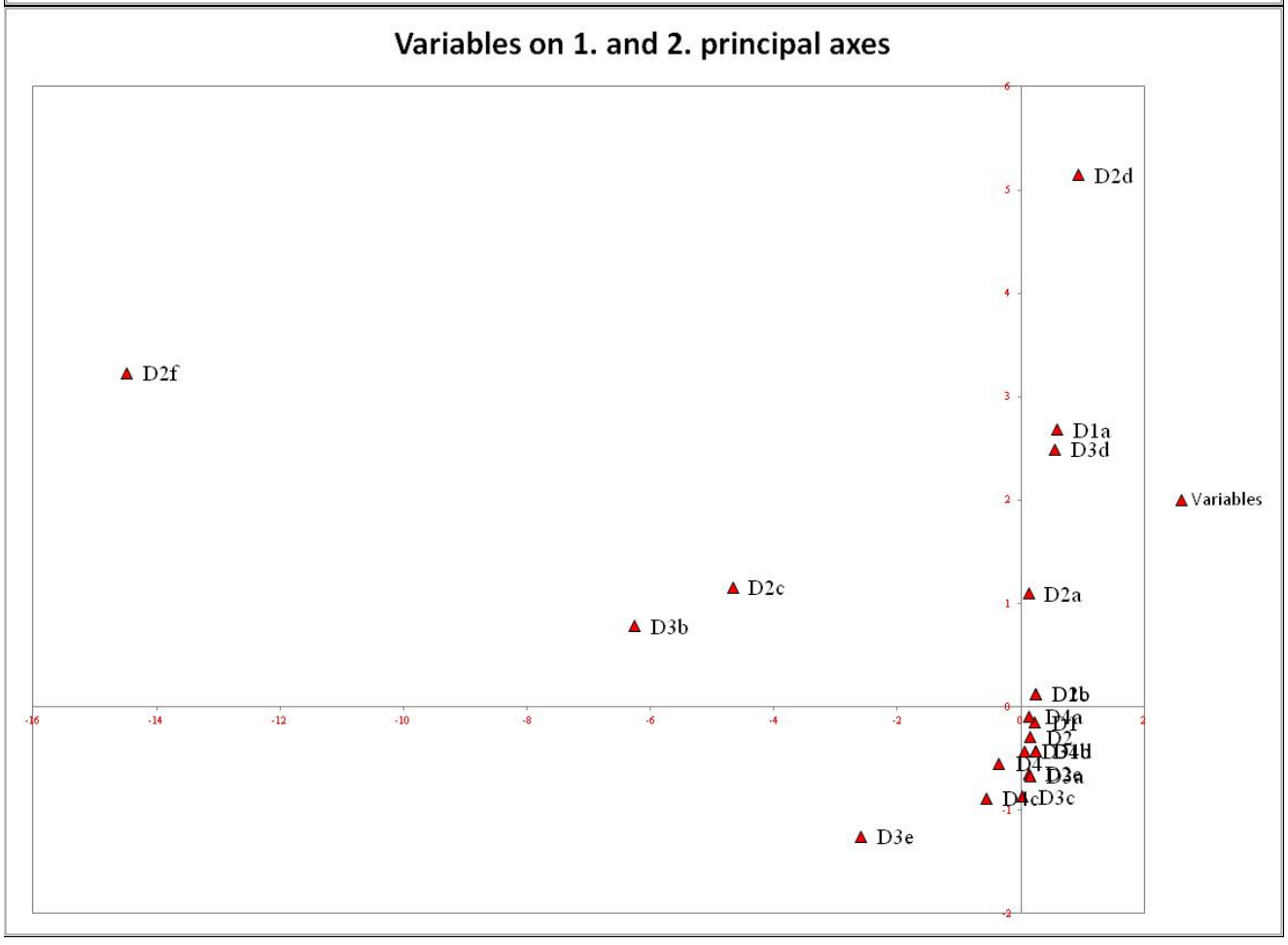
We start with *the matrix of seriated data*. The three phases from Porț are in the middle of the table due to their high number of chisels and a similar proportion of the unfinished ones for each phase. The site of Tășad is placed next to Suplac I phase due to the higher proportion of D1 type. Starting with the second phase, Suplac II, there is an increase of the D3 type that ends up being the dominant type of chisel in Suplac III. There is a significant higher occurrence in this last phase for D4 type. Those are the characteristics of the Pericei's chisel assembly, being the reason for placing this site next to Suplac III phase. The prevail of the D4 type at Bocșa and the lack of D1 type gives it a higher correspondence with Pericei. Finally, the low number of chisels from Zăuan, especially the unfinished one, places him at the end of the matrix, next to Bocșa, another site were less unfinished chisels were found.

The objects chart illustrates better the correspondence betwen phases and sites. We obseve a groupe composed from Suplac I-III, Pericei and Bocșa, all of those having more unfinished chisels in both working stages than Tășad (where they are almost absent) and Zăuan. Also the general typology is similar enough to ensure the highest correspondence.

The chart containing *the variables* (chisel types) illustrates the predominant types of chisel in the right low corner. They correspond to Suplac II-III, Pericei and Bocșa group from the other chart. Outside of the main group we find only variants represented in low number having from that reason a low correspondence with others. A bit different is the situation for D3d and D1a variants that are grouped separately. They represent the main (considering

[28] DUNCA 2015, 41.
[29] PÉTREQUIN/ PÉTREQUIN 2011, 338, fig. 4.
[30] PÉTREQUIN *et alii* 2012, 275.


Objects on 1. and 2. principal axes
Tășad
Objects
Zăuan
Suplac I-Porț
Suplac II-Porț
Suplac III-Porț
Pericei
Bocșa


Variables on 1. and 2. principal axes
D2d
D2f
D1a
D3d
Variables
D2c
D2a
D3b
D3e
D3c

the frequence) variant of their corresponding types, well represented in Suplac I-II and Tășad. For Porț in general their contribution is still low since most chisels belonging to the main types (D1 and D3) are unfinished so unframed to a variant.

To conclude with the correspondence analysis, it is clear the there was no strict evolution of chisel's typology in time. Sites contemporary with Suplac II phase have a similar orientation towards producing chisels as Suplac III or Suplac I. Even if we refer to Zăuan, early neolithic chisels still have the same main shapes (except D1) and the most important difference would be a more superficial processing, the smoothing and fine polish of the surfaces is almost absent. Considering the two sites with high percentage of unfinished chisels (Porț and Pericei) we argue that the shift from D1 (rectangular) chisels to D3 (trapezoidal) ones along with the increased frequency of the D4 (oval) chisels in Suplac III phase at Porț may have been influenced by Pericei's working traditions. From a practical point of view, this shift had to be motivated by the possibility of better fixing the chisel into the handle.

From the functionality perspective, chisels are asigned to a fine woodworking. Recurrence of the shapes indicates specific activities as we have stated but the variety of profiles could be connected more to skill and preference than functionality[31]. Wood was probably not the only material processed with chisels as an item with red ocher traces indicates (Fig. 8/9).

CONCLUSSIONS

It seems that for the late neolithic of north-west Romania, the chisel was the main tool used, at least in the Șimleu Depression. Small scale discoveries, including isolated but datable pieces from Crișana[32] confirm this conclusion. For the early neolithic is harder to say the same, polished stone tools are rare in this region[33], and in general. The example of Zăuan may indicate an orientation trough chisel manufacture. Studies on other areas showed the relation between the changing proportion of each polished tool category and the environmental changes. During the pre-pottery neolithic of Levant[34] axes were more often used because more forest clearing had to be done, while in pottery neolithic and chalcolihtic adzes became more important. In the Subcarpathian area the same evolution takes place in eneolithic phases, but chisels don't play an important role there neither[35]. We do not have polen analysis for the neolithic sites of north-west of Romania but we can assume that land clearing didn't had a high amplitude and woodworking concerned more cutting and carving. Studying the dispersion of chisels and their associated preforms and cores at Porț, we can presume that some craftsmen were only processing chisels and state that most part of polished stone tools specialisation (comprised as producing for more than domestic needs) concerns chisels.

Finally, we must explain why two close settlements, Suplac/Porț-*Corău* and Pericei-*Keller Tag*, were both specialized in chisel processing while this category of tool is not the main one in most sites, not even at Tășad where imports from Suplac/Porț have occurred. Chisels are smaller and thinner than axes and adzes, therefore they demand more skill and careful processing, two qualities that members of communities close to resources could develop. At least in case of Suplac/Porț they have adapted sawing to obtaining preforms for chisels by polishing the future profile and sawing along it. Pecking performed on chisels was also more difficult than on axes, the risk of breaking being higher. Statistics (Tab.3) indicate the prevail of the chisels in initial working stage. With few exceptions, they do not indicate a reboot, thus we state that exchange was done with unfinished chisels wich only needed an extra polishing and sharpening of the edge to be functional.

31 DUNCA 2016, 91
32 IGNAT 1990, 14-16
33 IGNAT 1990, 14
34 YERKES/ BARKAI 2013, 225-230
35 COTOI/ GRASU 2000, 54-55

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Table 1. Cores with working traces connected to chisels.

Traces of working	Porț	Bocșa
polished strip	19	
polished strip & sawing	8	
2 polished strips	6	
2 polished strips & sawing	3	
3 polished strips		1
2 polished strips & pecking	2	

Table 2. Preforms for chisels

Traces of working	Porț	Pericei	Bocșa	Zăuan
polished profile & sawing	38			
sawing	17			
sawing & pecking	16			
pecking	62	3	2	2
polishing	114		2	

Table 3. Chisels in working process. in.= initial stage of processing; adv.= advanced stage of processing

site	type-stage of processing	pecking	sawing	perforation
Porț	D1-in.	21 (=24%)		
	D1- adv.	7 (=7%)	1 (=1%)	1 (=1%)
	D2- in.	2 (= 11%)		
	D2- adv.	2 (=9%)		
	D3- in.	11 (=19%)	2 (=3%)	
	D3- adv.	15 (=16%)		
	D4- in.	6 (=16%)		
	D4- adv.	8 (=31%)		
	unframed	46 (=32%)	4 (=3%)	
Pericei	D1-in.	1 (=33%)	2 (=33%)	
	D1- adv.	2 (=66%)		
	D2- in.			
	D2- adv.			
	D3- in.	1 (=25%)	1 (=25%)	
	D3- adv.	1 (=25%)		
	D4- in.	1 (=100%)		
	D4- adv.	1 (=100%)		
	unframed	4 (=80%)		

Bocşa	D2- in.	
	D2- adv.	
	D3- in.	
	D3- adv.	1 (=50%)
	D4- in.	
	D4- adv.	
	unframed	1 (=100%)
Zăuan	D3-in	1 (=100%)
	D4-in	1 (=100%)
	unframed	1 (=50%)

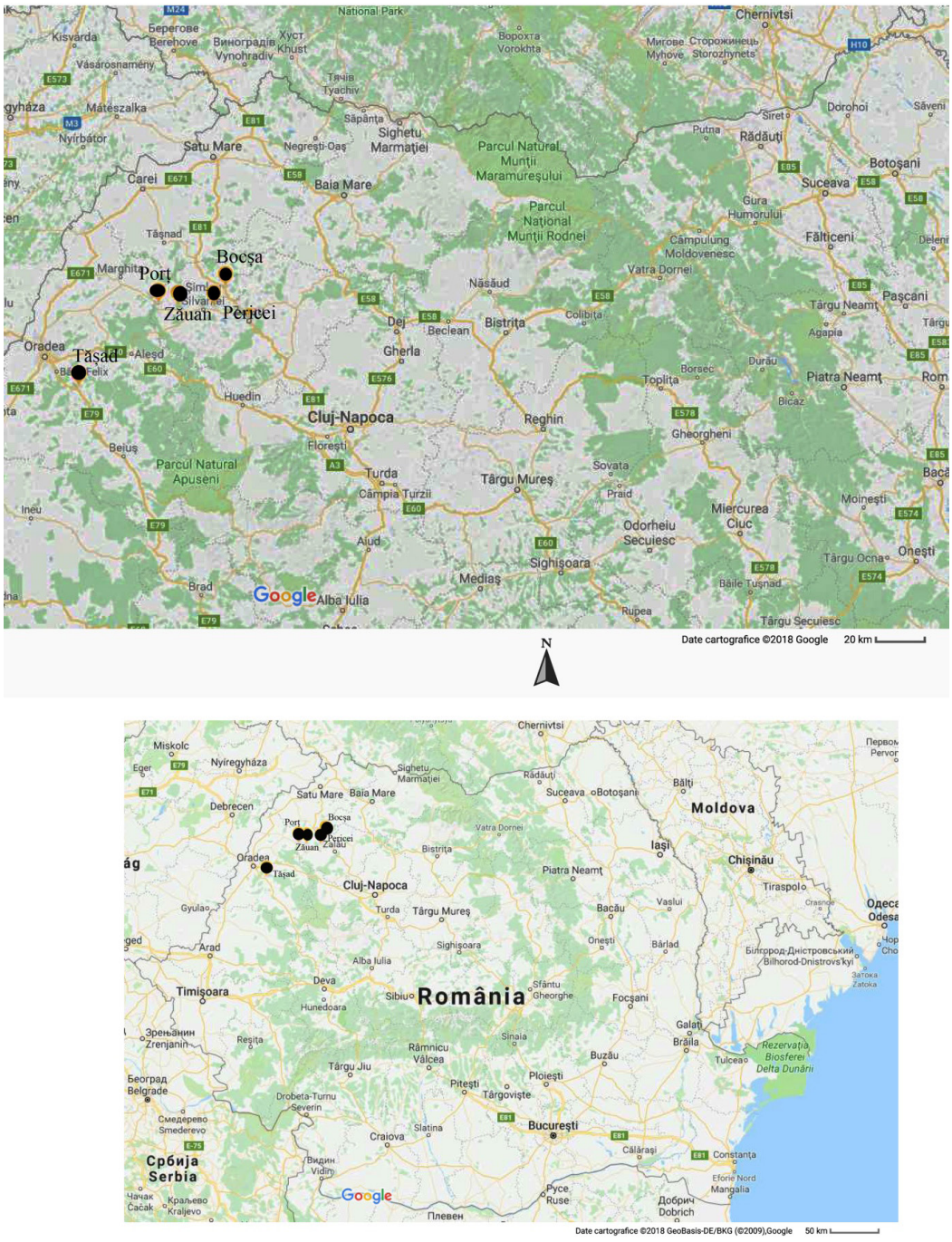

Figure 1. Location of the sites discussed in this study

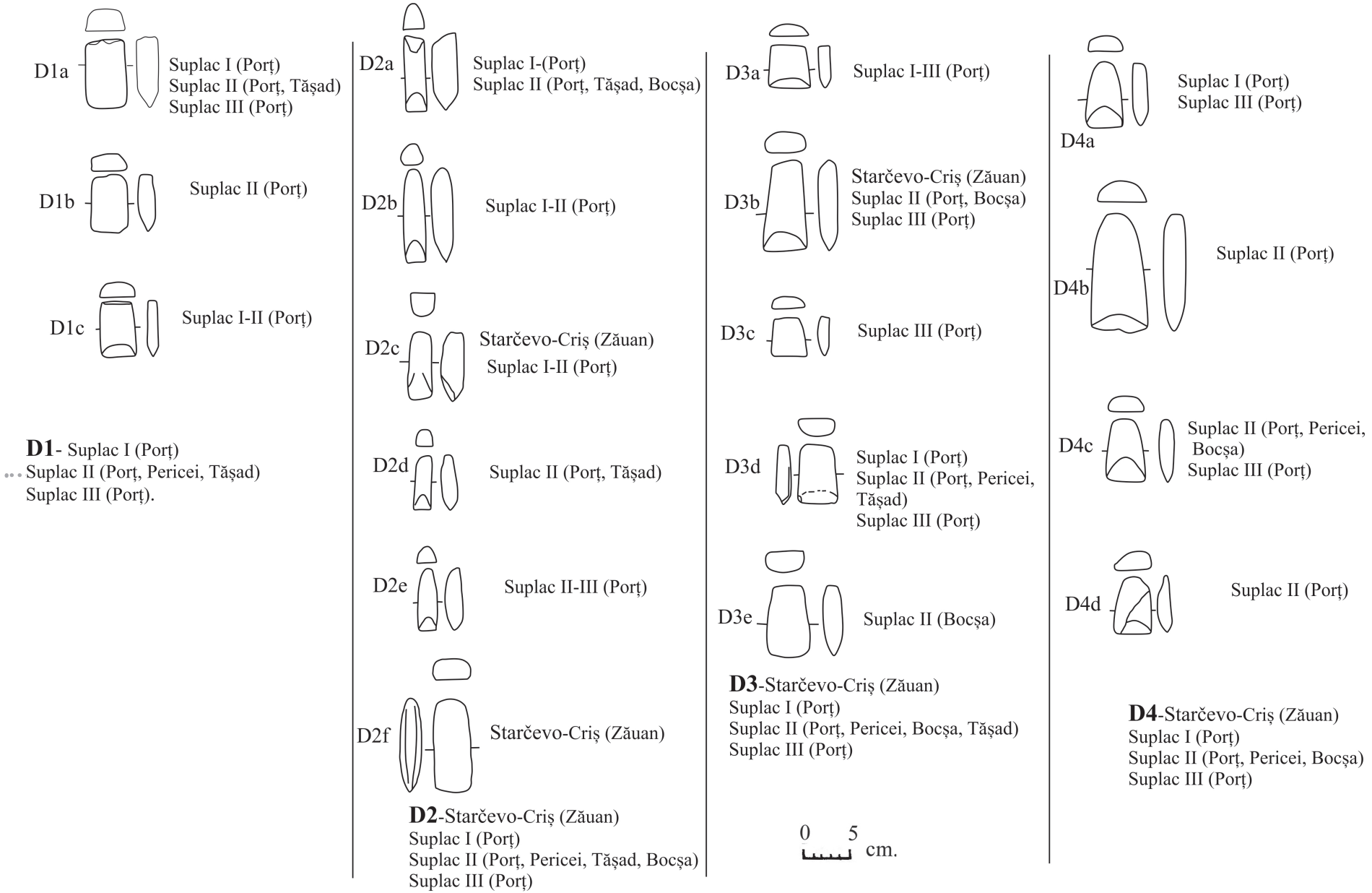

Figure 2. Chronological evolution and local variation within the typological frame

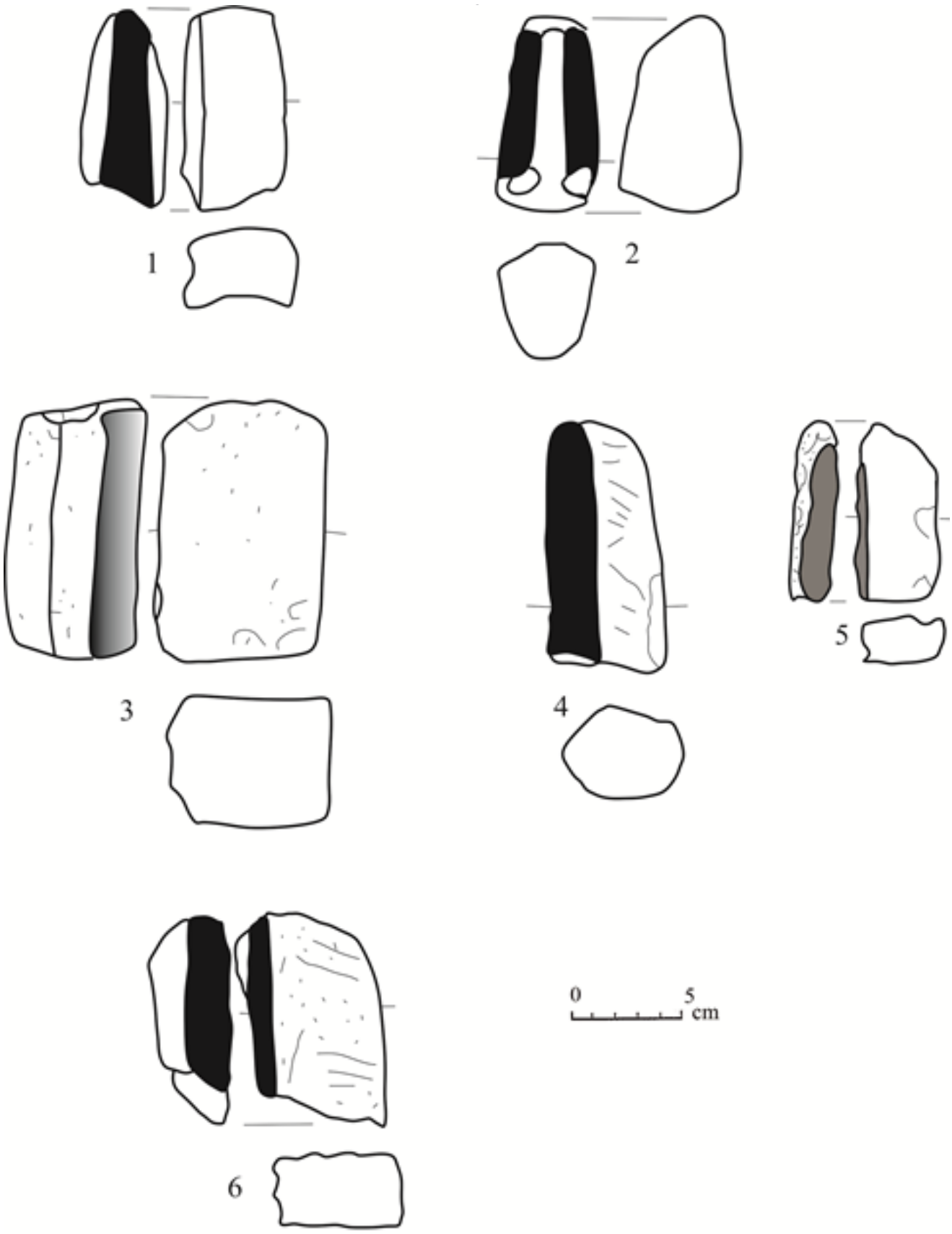

Figure 3. Cores illustrating: polished stripes: 1, 2 (Porț), 3 (Bocșa); polished stripe and sawing: 4, 6 (Porț); polished stripe and pecking: 5 (Porț)

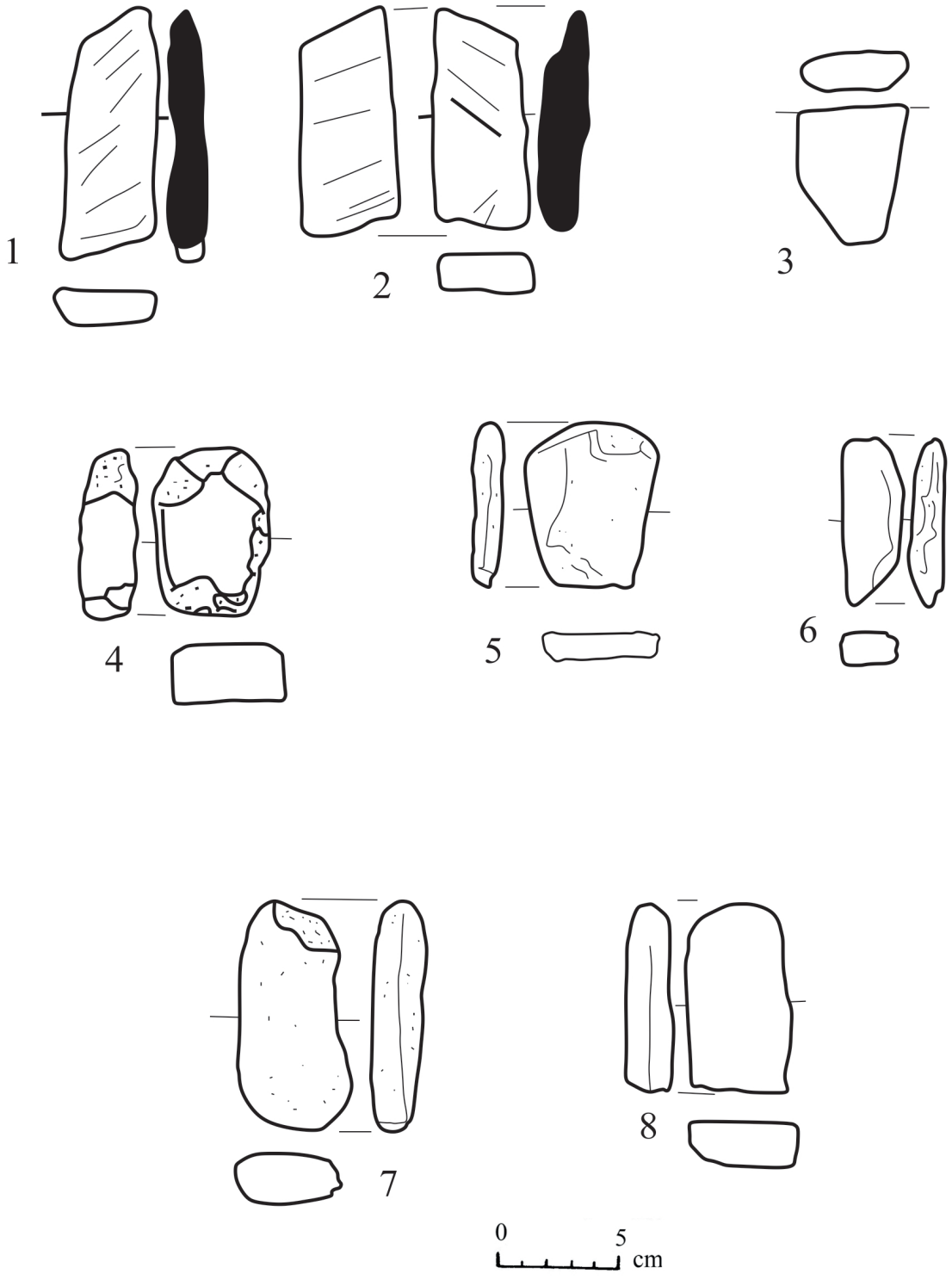

Figure 4. Preform for chisels: 1-3- with sawing traces (Porț); with pecking traces: 4 (Porț), 5 (Pericei), 6 (Bocșa), 7 (Zăuan); 8 polished (Porț)

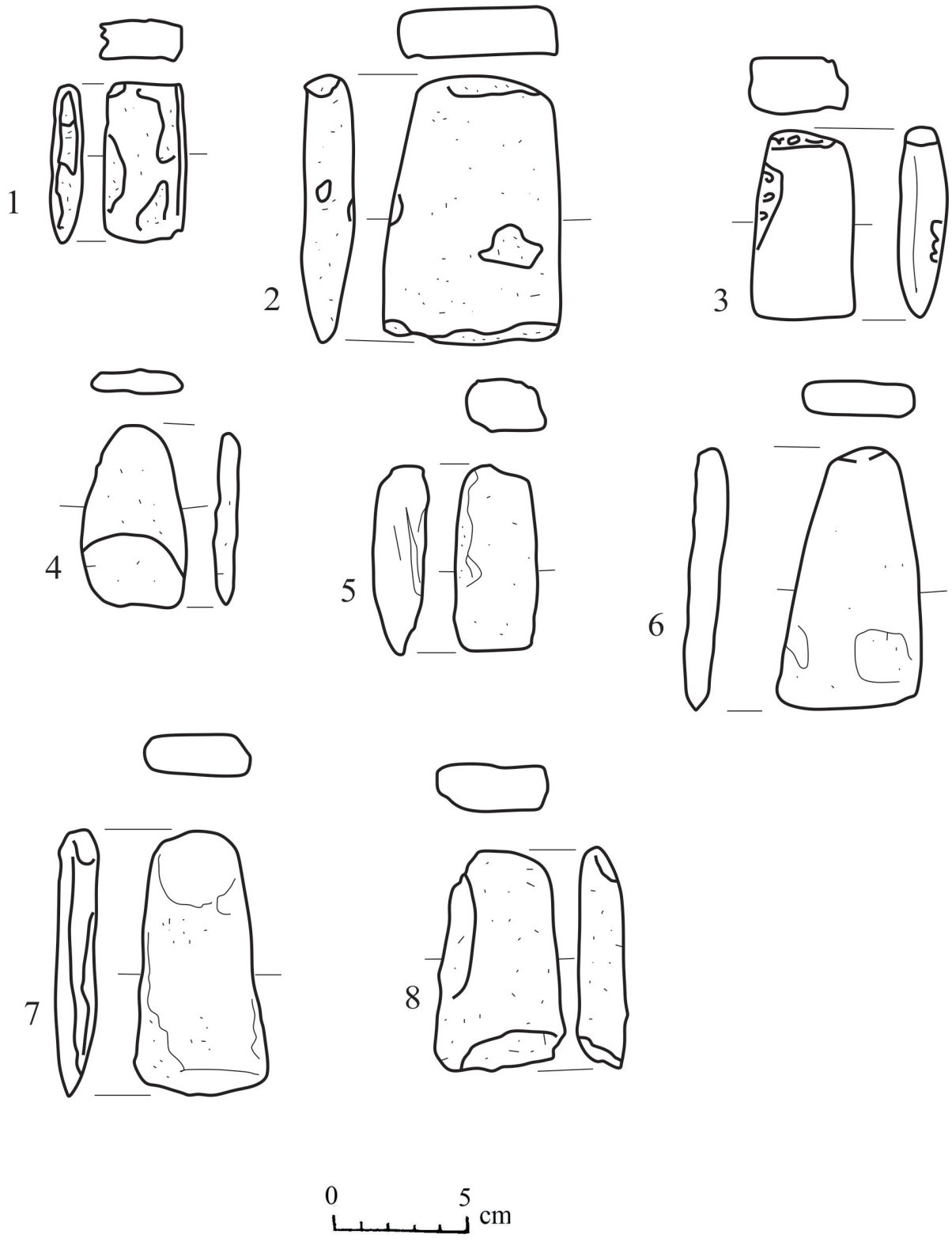

Figure 5. Chisels with pecking traces: 1-D1, initial stage (Porț), 2- D3, initial stage (Porț), 3- D3, advanced stage (Porț), 4- D4, advanced stage (Porț), 5- D1- advanced stage (Pericei), 6- D3, initial stage (Pericei), 7- D4, advanced stage (Pericei), 8- D3, initial stage (Zăuan).

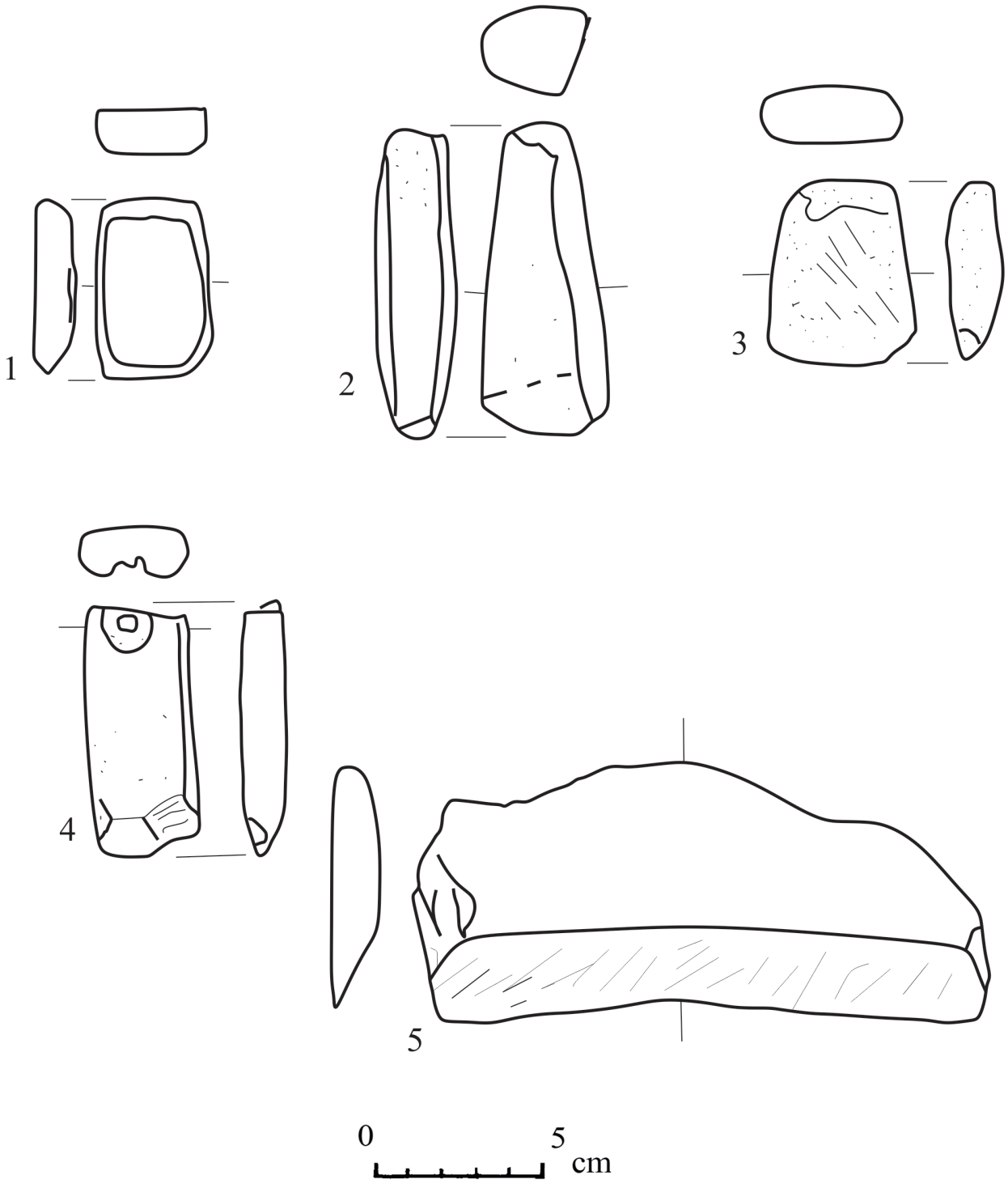

Figure 6. Chisels with sawing traces: 1-D1, advanced stage (Porț), 2- D3, initial stage (Porț), 3- D3, initial stage (Pericei). Chisel with perforation- 4. (Porț). Stone slab for sawing- 5 (Porț)

Figure 7. Cores: 1-3 (Porț). Preformes with sawing traces: 4-5 (Porț). Preform with pecking traces- 6 (Pericei)

Figure 8. Chisels in initial working stage: 1 (Porț), 2 (Zăuan), 3 (Pericei).
Chisels in advanced working stage: 4, 6 (Porț), 5 (Pericei).
Finished chisels from Porț: 7 (D1a type), 8 (D2b type), 9 (D3d type), 10 (D4c type).