Apprenticeship lithic debitage. Examples from a 27.3 ka cal BP Gravettian collection from Bistricioara-Lutărie III (Ceahlău Basin, NE Romania)

Loredana NIȚĂ*,
Cristina CORDOȘ**,
Mircea ANGHELINU*

Motto:
"By the time they achieved competence,
every flintknapper who ever lived
had probably already littered the landscape
with thousands of virtually indestructible
stone artifacts." (J.J. Shea 2006, p. 212)

Abstract: *The Upper Palaeolithic site from Bistricioara-Lutărie III (NE Romania) lies on Bistrița's 16-18 m terrace; archaeological investigations of the past three years revealed an intricate cultural sequence within a complex sedimentary matrix. The 27.3 ka cal BP Gravettian layer uncovered in test pits S 1 and S 3 offered few recognizable faunal remains, traces of a habitat structure and a peculiar lithic assemblage, with shouldered points and an almost exclusive use of at least three varieties of Cretaceous flint. The lithic assemblage is dominated by secondary debitage products, followed by flakes and laminar products. Among the retouched items, burins and backed bladelets prevail, alongside truncated and marginally retouched blades, while endscrapers and shouldered blades and bladelets are rather scarce. The lithic sample presented here includes 9 flakes, 7 crested blades and bladelets, 3 burins and 2 shouldered blades which are likely to have originated in novice-like lithic debitage attempts.*

Rezumat: *Situl aparținând paleoliticului superior de la Bistricioara-Lutărie III (NE României) se află pe terasa de 16-18 m a Bistriței; cercetările arheologice din ultimii trei ani au conturat o secvență culturală elaborată, inclusă într-o matrice sedimentară complexă. Nivelul gravettian cu o cronologie de 27,3 cal BP, evidențiat în secțiunile S 1 și S 3, include câteva resturi faunistice, urme al unei structuri de locuire și un ansamblu litic aparte, în care se remarcă piesele à cran și utilizarea aproape exclusivă a cel puțin trei varietăți de silex cretacic. Colecția litică este dominată de resturi de debitaj secundare, urmate de așchii și produse laminare. Piesele retușate sunt reprezentate, majoritar, de burins și lamele à dos, alături de care apar lame retușate marginal și lame cu troncatură, în timp ce lamele și lamelele cu amenajare tip cran sunt rare. Eșantionul litic prezentat este format din 9 așchii, 7 lame și lamele à crête, 3 burins și 2 lame cu amenajare tip cran, care par a reprezenta rezultatul unui proces de debitaj desfășurat de cioplitori începători.*

Keywords: *Bistrița Valley, Gravettian, lithic debitage, apprenticeship, novice knappers.*
Cuvinte cheie: *valea Bistriței, Gravettian, debitaj litic, noviciat, cioplitori începători.*

* "Valahia" University from Târgoviște, Lt. Stancu Ion, 35, 130105, Târgoviște, Dâmbovița; loredana_nita2003@yahoo.com, mircea_anghelinu@yahoo.com.
** Archaeological Institute, Codrescu, 6, 700479, Iași; elenacordos@gmail.com.

◈ Introduction

Apprenticeship can be more than knowledge acquisition, it could also mean the acquisition of an identity as member of a social group in which a specific type of skill gains recognition and value when shared (F. Sigaut 2009). The issue of archaeologically observable learning processes is certainly not a new one, having been under intensive debate ever since the last decades of the XXth century. Inquires on skill and craft learning among the prehistoric societies flourished alongside experimental endeavors, encompassing a wide range of technological domains, from lithic debitage, to ceramic production and artistic imagery, as well as most pre- and protohistoric timelines (E. Assaf *et alii* 2016; J. Cooney Williams, L. Janik 2018; A. Fischer 1990; J. Hildebrand 2012; K. Kamp *et alii* 1999; C.L.F. Knight 2017; Y. Perdaen, G. Noens 2011; F. Riede *et alii* 2018; D. Stapert 2007; L. Van Gelder 2015). Also, the topic benefitted largely from contributions within the fields of anthropology, psychology, biology, sociology and ethnography, with a special emphasis on children's economic, social and cultural role (J.E. Baxter 2006; N. Bird-David 2017; C.R. Ember, C.M. Cunnar 2015; P. Gärdenfors, A. Högberg 2017; K. Keith 2006; J. Kendal *et alii* 2009; M. Konner 2017; M. Langley 2018; G. Lillehammer 2018; A. Nowell 2016; G. Politis 2005).

Pre- and protohistoric archaeological literature in Romania largely ignored this research trend, with few exceptions (M. Anghelinu, L. Niță 2010; C. Cordoș 2018; O. Tutilă *et alii* 2016), mainly due to particular research models and backgrounds of the practitioners (M. Anghelinu 2018).

The Bistricioara-Lutărie III site was discovered in 2007 on Bistrița's 16-18 m terrace (Ceahlău Basin, NE Romania) and researched through several campaigns of sedimentological and radiometric sampling, as well as archaeological excavations (M. Anghelinu *et alii* 2016). The cultural layers identified belong to Epigravettian and Gravettian traditions. One of them is a Gravettian with shouldered points layer, which offered traces of a habitat structure and a faunal collection composed of poorly preserved remains of *Rangifer*, *Bos*/*Bison*, and *Lepus*/*Vulpes* individuals. The lithic assemblage of 1073 items (fig. 1/A-B) was discovered during the 2015 and 2018 excavation campaigns, in two of the four test pits (S 1 and S 3).

◈ Methodology

Given that stone tools are some of the best (and often the sole) preserved remains of hominin behavior, lithic analysis has the potential of defining patterns of social transmission of technical knowledge (J.J. Shea 2006). The issue of identifying levels of skill and ability in lithic debitage has at least one methodological advantage, namely the sequential nature of the *chaîne operatoire* approach (N. Finlay 2015), which pays particular attention to individual gestures. Also, different levels of skill can be traced in all technological stages, from raw material selection, to various instances of core maintenance and attempts at formal tool shaping. Assessing levels of lithic craft abilities requires the identification of features like stacked steps and hammer marks, as well as specific blanks and cores shapes, particular rejuvenation strategies and forms of breakage. Also, debitage with signs of unskilled reduction that would not persist into the final tool morphology or would be absent from exhausted cores' morphology could indicate the existence of active teaching and supervision (J.R. Ferguson, 2008).

Keeping in mind the fact that identifying limited skills in artifacts production can only be supported when there is evidence of skilled craft from the same context (C.L.F. Knight 2017), we selected a series of attributes suitable for recognizing the work of inexperienced

individuals (L. Grimm 2000; A. Högberg 2008; C.L.F. Knight 2017; N. Pigeot 1988; J.J. Shea 2006; D. Stapert 2007):

- crushing of the striking platform can be a sign of repeated strong attempts at continuing the debitage even beyond the point of an unusable/unsuitable core; limitations in motor skills and knowledge would lead to asymmetrical, small sized cores, with battered platforms and stacked step scars on the debitage surfaces, due to applying a wrong flaking angle or a striking point too far-off the edge of the core;
- battered debitage surfaces result from attempts at forcefully hitting protruding parts, in order to remove them, while repeatedly attempting to pursuit flaking in an inadequate area produces a succession of steps;
- reduction strategies often appear incompletely or inadequately conceptualised, resulting in removals ended prematurely in hinge or step fractures, thus producing blanks that cannot be turned into formal tools – consequently, most of the products issued from inexperiencedly conducted reduction sequences are likely to have been abandoned in spatially confined clusters;
- apprentice knappers' access to good quality raw material might be reduced or limited to reworking material abandoned by more proficient knappers.

Aside from trying to initiate and carry on a reduction sequence, formal tool use might also reveal novice endeavors. One such example is the presence of scrapers with spurs on the working edge, resulting from inappropriate rejuvenation attempts, or exhibiting longitudinal fractures along the midline, due to excessive force applied when scraping (S.B. Milne 2012).

Another indicator of active teaching pursuing is the presence of miniatures in the archaeological material (R.W. Park 2018). They are mostly non-functional and meant to familiarize children with important tools, in make believe scenarios of different activities; also, they are well-made replicas, contrasting with products issued from beginners' activities. Surely, identifying active teaching microlithization should exclude correlations with raw material shortages, increased mobility or other causes involved in adaptive microlithization (J.J. Shea 2006).

◈ The lithic sample

The Gravettian lithic sample discussed here includes 9 flakes, 7 crested blades and bladelets, 3 burins, and 2 shouldered blades presumably originating from inexperienced attempts at lithic debitage. All 21 items use Cretaceous flint, as was the case for most of the rest of the collection. Although locally available raw materials, like menilith, black schist, and sandstone were also employed in several of the main technological categories, it seems the inexperienced attempts at lithic debitage avoided them, probably because the learning process benefitted more from the use of a raw material of superior quality. Also, there is a strong possibility that during future excavation campaigns, other specialized areas of lithic debitage training will be unveiled, and the raw materials spectrum will change.

The 7 complete, 1 mesial and 1 distal flake are, in average, 34-44 mm long, 38-49 mm wide, and 8-12 mm thick, with 3-8 mm thick striking platforms. Most of the latter are flat, or partially crushed.

There are two secondary core tablets. One of them shows an irregular, deeply developed fracture, which destroyed the striking platform and the initiation of a large ventral removal from the bulb, while another snap bending fracture affected the distal extremity; the dorsal side shows the negative of one previously detached off-axis core tablet (fig. 2/4). The

other core tablet has a partially crushed striking platform and a damaged bulb, probably due to excessive use of force; the distal extremity, formed by transversally initiated removals, bears a small cortical area; the dorsal surface shows multiple negatives of failed flake-like hinged removals, initiated from an opposite striking platform (fig. 3/2).

The remaining flakes may exhibit overly developed compression rings and bulbs (fig. 2/1, 3/4) with crushed points of impact, completely or partially damaged by flake-like removals. In one case, the proximal extremity shows intensive battering from previous failed attempts at removing the blank, while both lateral sides seemed to have played the part of opposite striking platforms, as evidenced by the negatives of failed removals visible on the dorsal side (fig. 3/1). Some of the distal extremities seem to have been former striking platforms (fig. 2/3, 3/3, 3/5), with repeatedly battered edges. All of the flakes' dorsal sides show negatives of hinged flake-like or laminar removals, initiated from adjacent or opposite striking platforms.

There are three half-crested, 8-11 mm wide, 3-5 mm thick fragmented bladelets, with rectilinear, concave or twisted profiles, triangular or trapezoidal cross-sections and snap bending fractures (fig. 4/2-4); the sinuous dorsal crests and in one case, the entire left side, are covered in crushing marks and negatives of small failed removals.

The crested blades are 30-55 mm long, 14-24 mm wide and 4-9 mm thick (fig. 4/1, 4/5-7); the complete and proximal items have 3-4 mm thick striking platforms and in one case a damaged bulb. The fragmented items show negatives of snap and cone bending fractures. The twisted outline of the completely or partially shaped dorsal ridge was made through transversal, hinged and deep removals.

All three burins used 50-53 mm long mesial blades, with various width and thickness values, rectilinear profiles and trapezoidal or triangular cross-sections. The first one shows two opposed indefinite fractures; their negatives have been modified through two transversal removals, probably intended as a striking platform for burin spalls. The latter have left multiple hinged negatives on the right long side, initiated from the proximal extremity (fig. 5/1). The next burin exhibits one distal snap fracture, subsequently modified through several removals, possibly in the attempt of setting up a truncated surface, from which initiated two negatives of burin spalls, one hinged and another plunging all the way to the opposite extremity. Another massive ventral removal, with no visible point of initiation, probably originated from a failed attempt at detaching a burin spall (fig. 5/2). The third burin shows two opposite snap bending fractures; the right long side presents multiple negatives of hinged burin spalls, initiated from boh extremities (fig. 5/3).

As already stated, (A. Simonet 2012), inexperienced attempts at toolmaking lack a normative selection of the blanks; unlike those selected by experienced knappers, the latter lack correlation between tip orientation and the debitage axis, while the retouched area may fail in achieving a functional purpose. This is the case of the two shouldered blades identified. The first is a 27 mm long, 12 mm wide, 4 mm thick mesial blade, with concave profile, trapezoidal cross-section, and oblique/straight snap bending fractures; the proximal third of the left long edge is partially modified through abrupt, crossed, irregular retouch, with crushing marks covering its initiation area; if the intended final product was a shouldered point, the blade's arched profile and the irregular, winding retouched area seem rather poor choices (fig. 6/1). The second is a 55 mm long, 15 mm wide, 2 mm thick distal blade, with concave, slightly twisted profile, and triangular cross-section, fragmented by a snap bending fracture; the dorsal surface shows the negative of a removal initiated from a former, opposite striking platform; the right long side is partially modified through a shortly developed line of

direct, irregular retouch, seemingly intended for creating/imitating a shouldered point; actually, the blank choice – an arched, slightly twisted blade, with off-axis distal extremity, and the irregular, sinuous retouch testifies to limited knowledge and/or skills required for producing shouldered points (fig. 6/2).

◈ Discussion

The Gravettian collection available so far does not document lithic incipient debitage learning phases through cores, laminar products, or most of the tool types identified within the assemblage (i. e. endscrapers, truncated blades, and backed bladelets). Actually, the cores' category is also poorly represented within the entire collection, not only among the presumptive apprenticeship derived lithic products. The lithic sample presented here, although quite small, is mainly formed by debitage products more consistent with a phase of core maintenance and/or rejuvenation than with the stage of actual production of blanks. If this is not a result of an incompletely excavated site, it might point to a specific, learning instance of the preliminary debitage phases.

Unfortunately, the scarcity of faunal remains and the yet incomplete uncovering of the Gravettian cultural layer do not allow an accurate estimation of the duration and season of occupation; the presence of presumably apprenticeship derived lithic items points to a spectrum of age/gender classes within the community, one larger than expected for a mere hunting/provisioning camp, and more suitable for a residential unit. In the same time, the relatively limited spectrum of formal tools, including a very small number of endscrapers, points toward a functionally limited, logistically organized camp, targeting the acquisition and primary processing of game. So far, what could be defined as lithic products issued from the work of inexperienced knappers amount to less than 2% of the entire studied assemblage, which is considerably less than expected; their spatial distribution is not clearly defined, most of them being found among the main lithic concentration, while the raw material employed is the same as the one characterizing the rest of the assemblage. Actually, in the process of learning either through observation and imitation, or through scaffolding (*sensu* J.R. Ferguson 2008), waste and by-products from inexperienced knappers would likely outnumber those left behind by proficient knappers, while also exhibiting a greater level of variability (Shea 2006). To the present state of knowledge, a logistic camp of a limited duration but including youngsters/novices provides the most reasonable assessment for the functional nature of this particular archaeological accumulation. Also, most studies on lithic debitage learning noted the limited access of novice flintknappers to good quality raw material, as well as the existence of spatially defined areas of practicing, where debitage products were abandoned in place, showing that the purpose of the technical endeavor was more the action itself, than the use of the obtained items.

Nevertheless, these situations characterize ideal contexts, in which the original distribution of artefacts suffered minimal, if any, post-depositional displacements, and the entire occupation layer has been unveiled. While the first of these premises is missing from the Bistricioara-Lutărie III sequence, the second is likely attainable during future researches. Hopefully, the latter will provide a better technological understanding of the lithic assemblage, together with a clearer glimpse on the socially defined technological behavior.

◈ **Acknowledgments**

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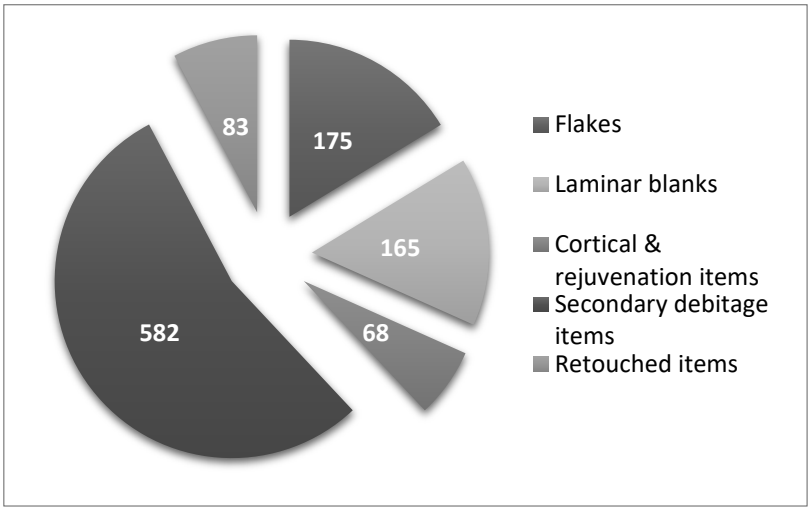
A



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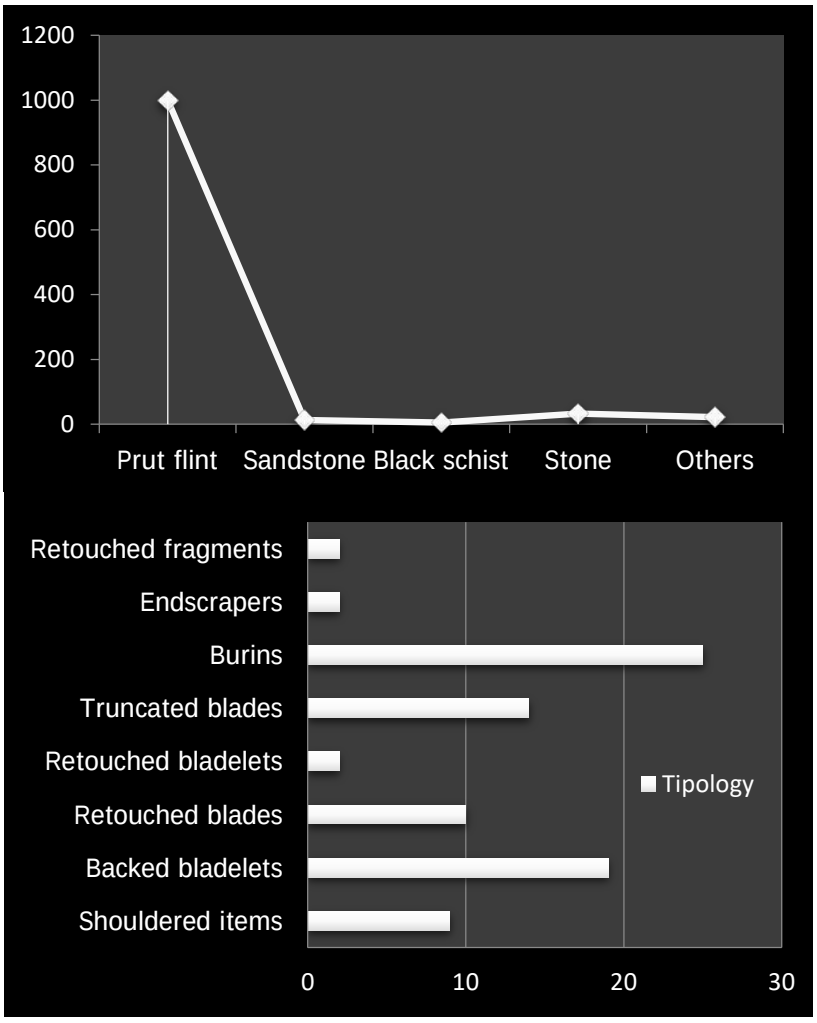

Fig. 1. Bistricioara-Lutărie III: A, B – technological and typological structure of the Gravettian lithic assemblage.
Bistricioara-Lutărie III: A, B – structura tehnologică și tipologică a ansamblului litic gravettian.

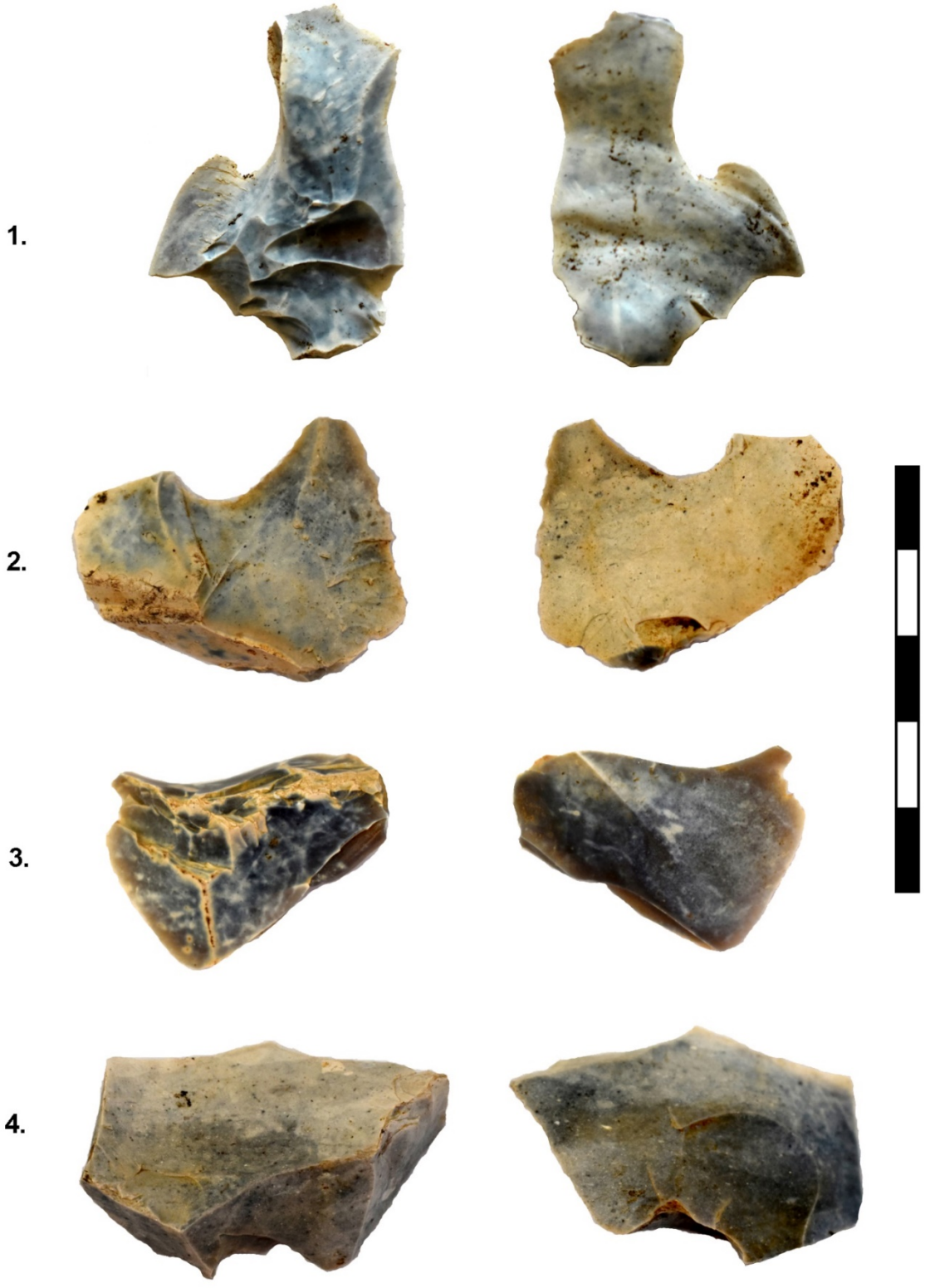

Fig. 2. Gravettian apprenticeship debitage: flakes.
Debitaj gravettian aparținând începătorilor: așchii.

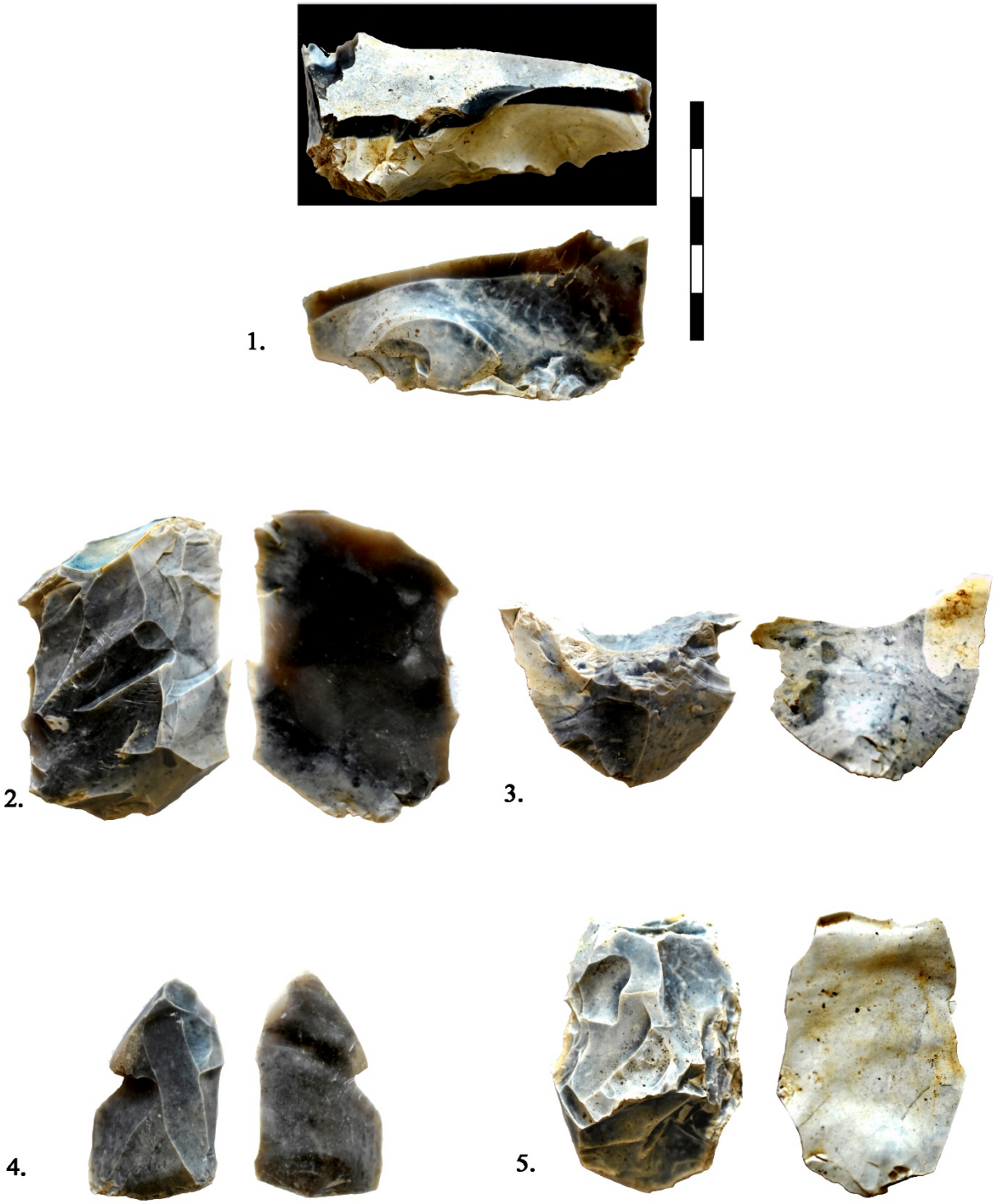

Fig. 3. Gravettian apprenticeship debitage: flakes.
Debitaj gravettian aparținând începătorilor: așchii.

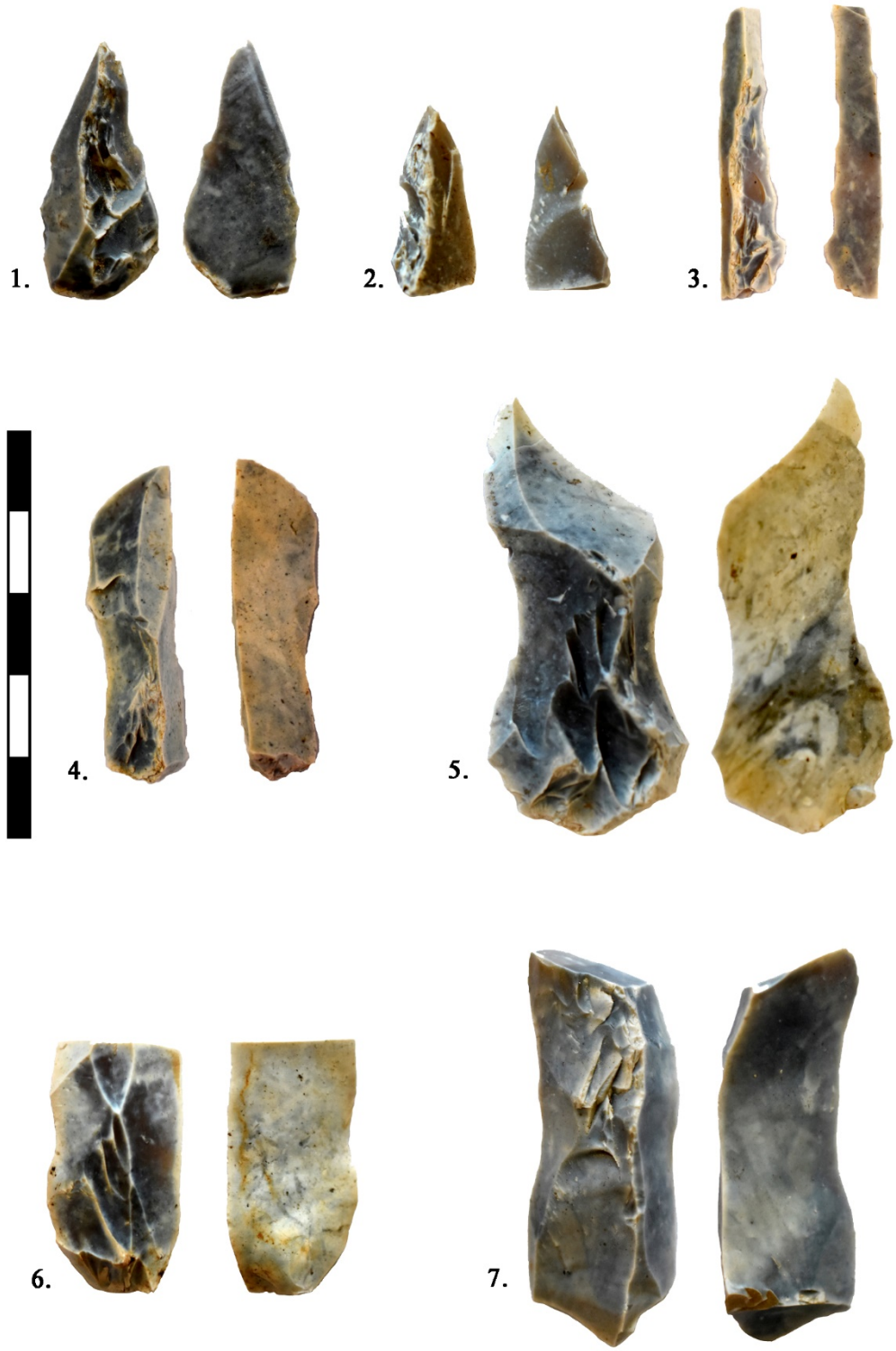

Fig. 4. Gravettian apprenticeship debitage: crested blades and bladelets.
Debitaj gravettian aparținînd începătorilor: lame și lamele *à crête*.

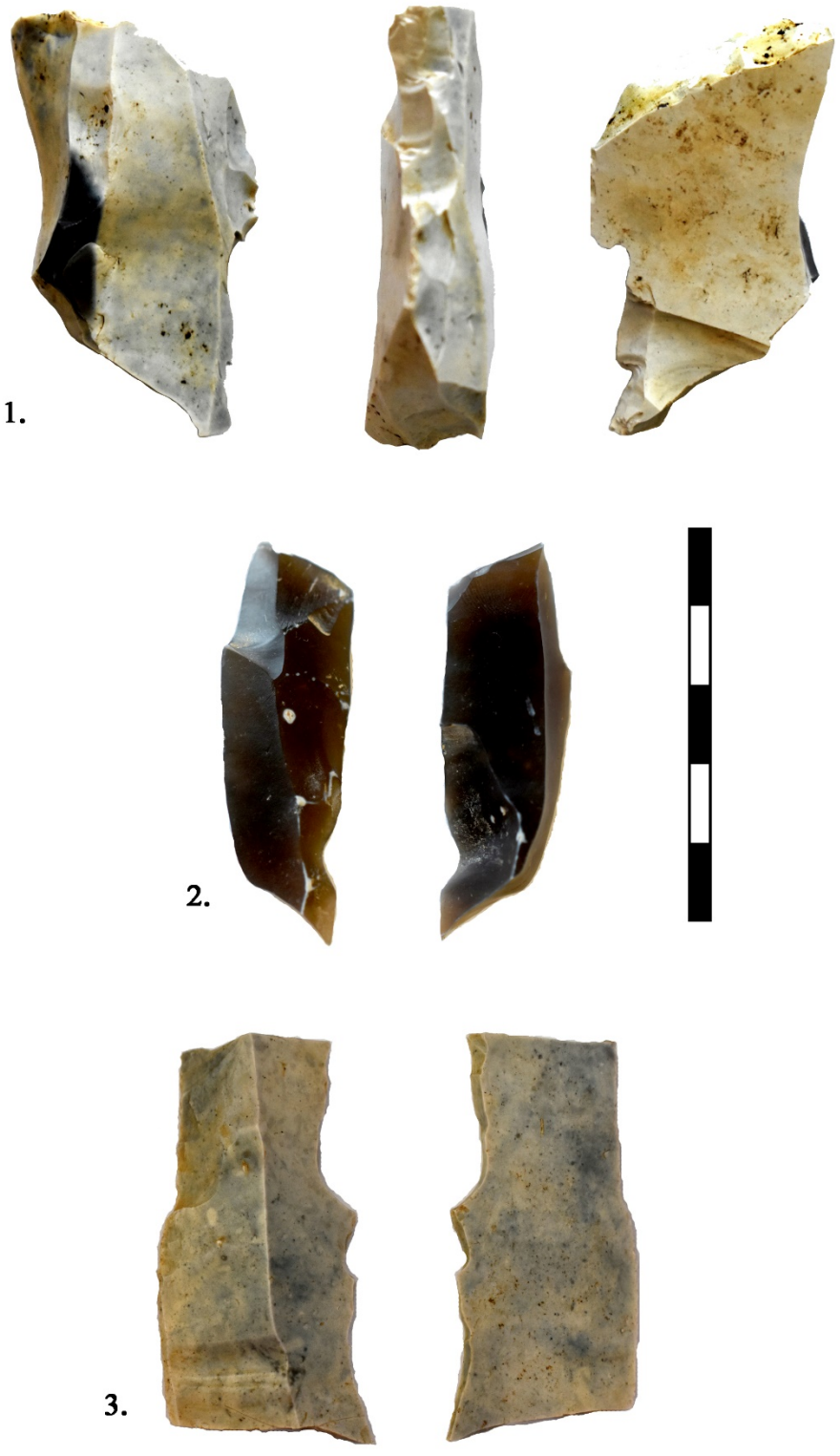

Fig. 5. Gravettian apprenticeship debitage: burins.
Debitaj gravettian aparținând începătorilor: *burine*.

Fig. 6. Gravettian apprenticeship debitage: shouldered blades.
Debitaj gravettian aparținând începătorilor: lame cu amenajare tip *cran*.