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MARIA BITIRI

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Key words: *Vârghiș Gorges, karst, lithic analysis, archaeozoology, chronology, Palaeolithic*
Abstract: *The Vârghiș Gorges karst system (Perșani Mountains, Eastern Carpathians) constituted a point of interest for speleologists, paleontologists and archaeologists since the second half of the 19th century. Their efforts succeeded in highlighting the notable archaeological potential of the area, although the actual research results were not always thoroughly reported. Since 2014, our team reunited specialists from 10 different institutions and various fields of research and initiated archaeological excavations, coupled with achaeozoological, sedimentological and chronometric investigations, in several caves within the Vârghiș Gorges. As the paper below will show, although the results obtained so far are definitively informative, further investigation are clearly needed, in order to accurately clarify aspects pertaining to the intricate cultural and chronological framework.*

Cuvinte-cheie: *Cheile Vârghișului, karst, analiză litică, arheozoologie, cronologie, paleolitic*
Rezumat: *Sistemul carstic din Cheile Vârghișului (Munții Perșani, Carpații Orientali) a reprezentat un punct de interes pentru speologi, paleontologi și arheologi încă din a doua jumătate a secolului XIX. Demersurile acestora au evidențiat remarcabilul potențial arheologic al zonei, chiar dacă rezultatele investigațiilor propriu-zise nu au fost întotdeauna prezentate exhaustiv. Începând cu anul 2014, am alcătuit o echipă de specialiști din zece instituții de cercetare și variate domenii de specialitate și am inițiat săpături arheologice, însoțite de cercetări arheozoologice, sedimentologice și cronometrice, în câteva peșteri din Cheile Vârghișului. Așa cum reiese din observațiile prezentate, deși rezultatele obținute până în prezent oferă informații noi, cercetări viitoare sunt necesare pentru o mai bună înțelegere a complexității cadrului cronologic și cultural.*

During the second half of the 20th century, archaeological researches in the Romanian karst system, especially in the Southern Carpathians, involved interdisciplinary studies and radiocarbon sampling[1]; in most of the Palaeolithic sites, the sedimentary matrix was almost completely exhausted, while the reported sampling often lacked a secure archaeological context. Ongoing archaeological researches in Vârghiș Gorges caves (Perșani Mountains, Eastern Carpathians) are meant to bring new information about the Palaeolithic human communities in the area.

[1] Păunescu 2000.

1. GEOGRAPHICAL SETTING

Vârghiș Gorges are placed in the northern, plateau-like, part of Perșani Mountains (Eastern Carpathians)[2] at less than 800 m altitude, where the Vârghiș, the right tributary of the Cormoș River, created an impressive karst system. The 124 caves belong to four altitude levels of 5 m, 20 m, 40 m, and 70–120 m[3], respectively. The Vârghiș highly eroded the Triassic (Anisian) - Jurassic (Callovian) limestone massif for 3.5 km; the karst system formed during the Quaternary, beginning with the Middle Pleistocene. Nowadays, the active karst level has several permanently or temporary flooded galleries.

The easily visible Abri 122/1200 rock shelter and its small cave are located on the right slope of the Vârghiș Gorges, 625 m a.s.l. and about 30 m above the present-day thalweg. The E–SE opening ensures consistent sunlight for most of the day.

Mare Cave is located on the left slope of the Vârghiș Gorges, 18 m above the thalweg. Its halls and galleries sum up to 1.100 m; the portal is arched, 12 m wide and 6 m tall. In the main hall, the sedimentary package is slightly sloped, while in the hall immediately to the left, it becomes horizontal.

Gabor Cave (Cave no. 20) opens on the right bank of the Vârghiș, 77 m above the riverbed. The N–NE oriented arch-like entrance is 8 m wide, while the main gallery is 8–9 m wide, 4–12 m high and 42 m long.

Cave no. 33 is close to Abri 122, on the same right bank, 30 m above the riverbed. The tunnel-like cave has two openings: the one near Abri 122 is hardly accessible, while the N–NV oriented main one is 6 m wide, 3 m high, with a small terrace (Fig. 1: A, B).

Ursului Cave is located on the right slope of the Vârghiș Gorges, 107 m above the thalweg, at the base of a 6–7 m high stone wall, with three E–NE and N oriented openings. The horizontal main hall is 30 m long and 20 m wide.

2. PREVIOUS RESEARCH

Ever since the 19th century, speleologists, paleontologists and archaeologists were drawn to the exploration of the Vârghiș Gorges karst area. The first archaeological excavations were conducted by J. Teutsch in Mare Cave and Cave no. 10. Later on, F. Haáz and K. Jodál located, mapped and named 40 caves in the area, while also surveying for archaeological materials and reporting about illicit excavations by treasure hunters[4]. In Ursului Cave, a few test pits revealed flint artefacts[5]. Further researches, albeit never fully described in publications, were conducted during 1941–1953[6]. The first monograph pape[7] presented morphological evaluations for 65 caves, as well as paleontological and archaeological results. Archaeological surveys in the area continued[8], some of them involving researchers from the history museums in Tg. Mureș and Harghita County, culminating with the activity of the late speleologist I. Dénes. Between 1989–1990 and 1995–1996, he conducted archaeological excavations in Abri 122/1200; the results were recently reassessed and published[9]. Aside from identifying new caves and signaling the presence of archaeological materials[10], he kept rigorous excavation logs, describing the layout of the caves, position of trenches, stratigraphic sequences and artefact records and drawings[11].

3. RECENT RESEARCH

Beginning with 2014, our reassessment of the archaeological potential of the Vârghiș Gorges karst included Cave no. 33, Abri 122/1200 (Fig. 1: A–C), Mare Cave (Fig. 2), Cave no. 36 (Fig. 3), Ursului Cave (Fig. 4), Calului Cave (Fig. 5), and Gabor Cave (Fig. 6).

In Cave no. 36 and Ursului, the stratigraphic matrix lacks Palaeolithic archaeological artefacts; instead, aside from the faunal remains, it preserves volcanic ash accumulations resulted from the eruptive processes of the Ciomadu

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[2] Orghidan, Dumitrescu 1963, p. 75–76.
[3] Dénes 2003, p. 8.
[4] Haáz, Jodál 1941, p. 376.
[5] Mottl 1943, p. 469; Jungbert 1979, p. 408; Păunescu 2001, p. 397.
[6] Mottl 1943; Székely 1953.
[7] Orghidan, Dumitrescu 1963.
[8] János 1981.
[9] Cosac *et alii* 2018, 2019.
[10] Dénes, Szabo, 1998, 2000.
[11] Cosac *et alii*, 2019.

volcano[12]. In Calului Cave, the stratigraphic profile shows sand layers interposed by highly rolled gravel layers, attesting to intermittent torrent-like sedimentation processes, and, consequently, to less than favorable conditions for human occupation. Caves Mare, no. 33 and Gabor yielded relatively small collections of well-preserved lithic and faunal material; Abri 122/1200 provided the richest, so far, archaeological and faunal collection. Also, researches in Abri 122/1200, Gabor and Mare Cave had chronometric sampling as one of the main objectives.

3.1. THE LITHIC MATERIAL

Cave no. 33

The small lithic assemblage (Fig. 7, Table 2) is mostly formed by quartzite and basalt unretouched flakes. Complete items are 35–54 mm long, 25–49 mm wide (exceptionally, 83 mm) and 9–17 mm thick; occasionally, measurements of fragmented proximal and distal items indicated length and width values in the same range or slightly higher, pointing towards the exploitation of several larger cores. For the complete and proximal items, flat platforms width varies between 3 and 10 mm, with isolated occurrences of thicker ones, one dihedral and one faceted (13 mm and 20 mm, respectively). Hard-hammer percussion scars are present. Unidirectional dorsal negatives and perpendicular or oblique fractures are common. The only two cores in the collection are either heavily fragmented (quartzite) or having large cortical weathered surfaces (basalt, Fig. 7: 6), one striking platform and only few observable flake-like detachments. There are only three quartzite retouched distal flakes, probably former transverse and lateral scrapers, with partially/discontinuously applied direct retouch. Several lydite, argillite and radiolarite items, mostly flakes and one exceptionally large cortical secondary blade (Fig. 7: 3) are also present.

Gabor Cave

The lithic collection from Gabor Cave (Fig. 8, Table 3) is also small and represented by quartzite and basalt mostly fragmented flakes - 28–52 mm long, 24–46 mm wide and 8–14 mm thick (exceptionally, 25 mm) - several of them cortical. Platform thickness varies between 5–9 mm (flat) and 14 mm (cortical, indeterminate); hard-hammer percussion marks are also present. Perpendicular and longitudinal fractures are common; occasionally, minor flake-like accidental removals affect the ventral surfaces. Flakes exhibit unidirectional dorsal negatives, apart for one case of convergent multidirectional ones (Fig. 8: 5). The three quartzite core fragments exhibit partially visible negatives of presumed flakes. One lateral and two transversal basalt and menilite (?) scrapers (Fig. 8: 4) are the only retouched items identified. Lydite, argillite, flint and jasper are represented by 1 to 3 unretouched flakes or cortical secondary flakes each.

Mare Cave

Excavations in Mare Cave provided a more generous lithic assemblage (Fig. 9, Table 1), highly similar in raw material and type of debitage product choice. Quartzite and basalt flakes and cortical products are the most numerous, followed by diorite/andesite products. Complete flakes range between 44–61 mm long, 28–42 mm wide and 7–15 mm thick, with flat (7–11 mm) or cortical (15 mm) thick platforms, hard-hammer percussion marks and uni-, bi- or multidirectional dorsal negatives. Several fragmented laminar products with rectilinear profiles, flat/dihedral platforms and unidirectional dorsal negatives are also present. Fragmented cores exhibit single striking platforms and debitage surfaces with residual cortical area and flake-like negatives. One quartzite piece could be defined as a Kombewa core-flake[13] (Fig. 9: 6), while the single lydite core shows multiple, interchangeable debitage surfaces and striking platforms (Fig. 9: 7). As primary and secondary cortical products are fragmented, their size is not an indicator for the size of the exploited blocks/pebbles. Formal tools include partially or continuously retouched quartzite, basalt, andesite and jasper fragmented flakes, probably former lateral or convergent scrapers, and one basalt bilaterally retouched blade (Fig. 9: 5).

Abri 122/1200

The lithic collection from Abri 122/1200 (Fig. 10–14, Table 4) includes little over 1000 items mainly made of quartzite (49.78%), basalt (29.03%) and lydite/argillite (13.32%)[14]. Within these three main raw material types,

[12] Lahitte *et alii* 2019; Karátson *et alii* 2019.
[13] Tixier, Turq 1999; Assaf *et alii* 2015.
[14] Percentages are calculated based on essential counts, i.e. indeterminate items and *cassons* aside.

debitage products are differently represented: quartzite cores and cortical products are more numerous than similar products in all the other raw materials categories combined, while in the formal tools group, quartzite products are among the fewest. Jasper, radiolarite, flint and chalcedony secondary debitage products are rather infrequent, attesting to a minimum of *in situ* processing. Retouched and bifacial products, although in small percentage (5.04%), are mostly grouped within the basalt and lydite/argillite raw material categories.

Quartzite cores are frequently represented by fragmented items, with frontal debitage surfaces, occasionally heavily battered, one or two adjacent identifiable striking platforms and flake-like negatives. Two globular fragments, 26–30 mm long, 34–36 mm wide and 20–32 mm thick, probably former Levallois cores, exhibit radial flake detachments (Fig. 10: 4). One of the two flake-cores, resembling Kombewa types (Fig. 10: 3), is a large primary flake, 73 mm long, 80 mm wide and 29 mm thick, with 24 mm wide platform; the left side of the piece was turned into a striking platform for two flake-like negatives visible on the ventral side. Basalt and lydite cores are either fragmented, with incomplete debitage surfaces, or pyramidal items (Fig. 10: 5), with one striking platform and extended debitage surfaces.

Cortical products are quartzite flakes and laminar flakes, and basalt and lydite flakes and blades, most of them fragmented. Complete primary and secondary products are 31–48/52–89 mm long (exceptionally, 94 mm), 29–37/48–53 mm wide (exceptionally, 84 mm) and 10–14/16–21 mm thick. Several of the proximal or distal secondary flakes fall in the same size groups, thus pointing at even larger obtained products, prior to fragmentation. Platform thickness varies between 3 and 6 mm for basalt and lydite products, or between 8 and 12 mm (exceptionally, 22 mm) for quartzite products, irrespectively of the type (cortical, linear or flat).

Irrespectively of the raw material type, fragmented flakes are the most numerous, exhibiting perpendicular, oblique or longitudinal fractures. Length values of complete flakes form several clusters for each of the dominant raw materials: 26–36 mm and 42–58 mm for quartzite, 18–30 mm and 37–45 mm for basalt, 19–34 mm for lydite/argillite. Basalt and lydite/argillite flakes also exhibit off-chart length values of 52–60 mm. Width and thickness values are more homogenous, ranging between 15 and 30/34–41 mm and 5–10/14–18 mm correspondingly. Platform thickness varies considerably, from 12 mm (faceted and indeterminate) to 3–7/9–13 mm (exceptionally, 18 mm) (flat and dihedral). Hard-hammer percussion marks are common. Most of the dorsal surfaces exhibit unidirectional negatives, while bidirectional and convergent multidirectional negatives are quite rare (Fig. 11, 12). Laminar products are a minority (6.45%) among the debitage products, showing rectilinear or twisted profiles, unidirectional dorsal negatives, triangular, rarely trapezoidal cross-sections, 3–9 mm thick flat or dihedral platforms and hard-hammer percussion marks.

Unlike the general debitage products category, the formal tools group (Fig. 13, 14) is almost equally divided between flakes and blades. Typological clusters can be subdivided as follows:

(**1**) partially retouched blanks (no = 11) are flakes and blades of various size, with flat or faceted, 8–11 mm thick platforms and one, rarely both lateral edges partially modified through direct or invers semi-steep retouch;

(**2**) lateral sidescrapers (no = 8) on complete and proximal massive flakes, blades, and one core tablet (46–67/98 mm long, 27–45/69 mm wide, 6–12 mm thick) with 6–12 mm thick platforms and one lateral long edge modified through continuous, direct semi-steep or marginal retouch; one proximal lydite blade exhibits bilateral retouch and a distal fracture that could have interrupted the convergence of the two long edges (convergent scraper/point?);

(**3**) notches/denticulate (no = 7) are fragmented flakes and blades, with 10–13 mm thick platforms, showing directly or inversely retouched lateral, slightly concave areas, either isolated, or forming a line on one of the long edges, while the other long edge is often directly retouched;

(**4**) bifacial products (no = 10). Quartzite, basalt and flint bifacial products on blades and laminar flakes (Fig. 14) represent 27.7% of the formal tools group. Unfinished or incompletely rejuvenated items (Fig. 14: 1–3) exhibit hinged flake-like negatives, fractures, residual cortical surfaces, slightly asymmetrical long edges and irregular direct and inverse retouch. Values of length (48–57/82–112 mm), width (20–32 mm) and thickness (7–14/26 mm) vary considerably, probably as a consequence of different degrees of rejuvenation, with maximum width located in the median area, and length to width ratio of 1:2/1:3[15]. Flat, extended retouch, applied mostly through hard-hammer percussion, creates plan-convex or slightly biconvex profiles.

[15] Characteristics defining willow/laurel leafpoints (Sirakova 2009).

3.2. THE FAUNA

Abri 122/1200

Given the larger extent of recent excavations carried out in Abri 122/1200, the faunal remains found here are the best known from all Palaeolithic sites of the Vârghiș Gorges. A total number of 1250 bone specimens coming from medium and large mammals, three unidentified bird bones, and three gastropod shell fragments were available for this study. However, the only complete remains found are teeth and elements of the distal limbs (carpals, tarsals, metapodials, and phalanges), most material (921 specimens) being recovered as fragments. This high degree of fragmentation is even more obvious when considering the size of the resulting fragments: 584 fragments (63%) fit in the 1–3 cm interval, 301 specimens (32.7%) fit in the 3–6 cm interval, only 30 fragments (3.3%) being larger than 6 cm. This high degree of fragmentation makes anatomic identification of skeletal parts, and taxonomic assessment difficult in most cases. Therefore, most mammal bone fragments could only be assigned to two generic groups: large mammals (359 specimens) and middle-sized mammals (250 specimens). The remaining material (447 specimens) was assigned to several taxa, discussed below, the relative abundance (based on the total number of identified specimens) being also represented in Fig. 15.

Most identifiable mammal remains were assigned to middle-sized ruminants. Although other taxa, such as the roe deer (*Capreolus capreolus*), might also be present, most fragments in this category were positively assigned to the ibex (*Capra ibex*), a bovid well-adapted to mountainous terrain. Teeth (Fig. 16 a–b), distal limb elements, and long bone epiphyses make up most of the 189 specimens assigned to the ibex, making it the most abundant mammal at the site, with 42.28% of the total. The smaller size of the ibex, when compared to the other herbivores found at the site, make it the easiest transportable prey item, either by human hunters or carnivores. In some cases, it was found that accumulation of ibex bones in cave sites was made by even some of the smaller carnivores, such as leopards[16].
Larger herbivore remains were also found at the site, mostly belonging to large bovids. Unfortunately, due to the fragmentary state of the material, the exact bovid taxon to which the material belonged cannot be ascertained, but it most probably belonged to the aurochs (*Bos primigenius*) or the steppe bison (*Bison priscus*), the most widespread large bovids in the Late Pleistocene of the region. As with the middle-sized bovids, the larger members of the family are represented by fragments of dentition (Fig. 16 c), and distal limb elements, totaling 87 remains (19.46%).

Horse (*Equus* sp.) remains, consisting of five tooth fragments (Fig. 16 d), are relatively rare, making up only 1.12% of the mammal specimens. Other herbivores found in small numbers are the large cervids, with three bone fragments that might have belonged to red deer (*Cervus elaphus*), and boar (*Sus scrofa*), represented by a single metapodial fragment.

The discovery of thick (around 2 cm), albeit highly fragmented, bone fragments at the site, led to the conclusion that some other mammal is present, in the size range of rhinocerotids or proboscideans. This assumption was confirmed by the discovery of rhinocerotid tooth fragments (Fig. 16 e), all bone fragments too thick to belong to the herbivores listed above, or the carnivores that will follow, being assigned to the woolly rhinoceros (*Coelodonta antiquitatis*). The presence of such a large mammal, not able to move across steep terrain, implies it was brought to the site as prey. Large carnivores, such as cave hyenas (*Crocuta crocuta spelaea*) are known to have scavenged and accumulated woolly rhinoceros bones[17] (e.g. Diedrich 2012), but, since no hyena remains were found so far, it is more likely that human hunters transported the woolly rhinoceros remains to the rock shelter.

Only two elements, one fourth upper premolar fragment (Fig. 16 f) and a caudal vertebra, document the presence of a cave lion (*Panthera leo spelaea*) at the Abri 122 Palaeolithic site. This occurrence is not unusual, since large felids such as lions and leopards used caves to prey during the Late Pleistocene[18].

The most abundant carnivoran remains found at Abri 122 are those of ursids, mostly represented by complete or fragmentary teeth (Fig. 16 g–h). A fifth of the found specimens were assigned to bears (20.58%), most fitting the larger size of the cave bear (*Ursus spelaeus)*, but a few smaller teeth could have belonged to the brown bear (*Ursus arctos*). Although both ursids commonly used caves for shelter, none are known to have acted as an active bone accumulator in Late Pleistocene sites; more so, recent isotopic investigations showed plant parts represented quite a large part of cave bear diet[19].

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[16] e.g. Sauqué *et alii* 2014.
[17] e.g. Diedrich 2012.
[18] Robu 2016; Robu *et alii* 2016; Mirea *et alii* 2021.
[19] e.g. Naito *et alii* 2020.

Middle-sized carnivorans were also present at the site, wolf (*Canis lupus*) remains, represented by jaw fragments (Fig. 16 i), metapodials, vertebrae, and long bone fragments, making up for 4.03% of the mammal remains. A single tooth fragment was assigned to a fox (*Vulpes* sp.).

Screen washing of the fine sediment from the site also led to the discovery of a diverse microvertebrate fauna, including small mammals, such as the European water vole (*Arvicola amphibius*), the European snow vole (*Chionomys nivalis*), the European hamster (*Cricetus cricetus*), the steppe lemming (*Lagurus lagurus*), the gray dwarf hamster (*Cricetulus migratorius*), the common vole (*Microtus arvalis*), the bank vole (*Clethrionomys glareolus*), the narrow-headed vole (*Microtus gregalis*), and the common shrew (*Sorex araneus*). Other small vertebrate remains found at the site were assigned to the tree frog (*Hyla arborea* or *Hyla orientalis*), a brown frog (similar to the modern *Rana temporaria*), a marsh frog (*Pelophylax* sp.), two types of snake (belonging to the genera *Natrix* and *Zamenis*), and two kinds of lizards (*Lacerta agilis* and *Lacerta viridis*). This diverse small vertebrate assemblage supports the existence of a temperate climate in the area, colder than the present one.

Gabor Cave

The test pits recently excavated in Gabor Cave also yielded faunal remains, albeit not as numerous as in the other sites investigated so far. A total number of 222 elements were found, most of which are highly fragmented (44.61% of the elements measure between 1 and 3 cm, and 48.53% fit between 3 and 6 cm). The rare complete elements and the larger fragments (59 specimens) could be assigned to four large and middle-sized mammals (Fig. 17).

Ibex (*Capra ibex*) remains represent 29.63% of the identifiable mammal remains, consisting mainly in fragments of long bones (humerus – Fig. 18 a, metapodials, radius, femur), and rare fragments of the axial skeleton (vertebrae) or girdle bones (coxal and scapular fragments).

A few specimens (12.96% of the total) were assigned to large bovids from the size class of aurochs/steppe bison (*Bos/Bison*), being represented by fragments of dentition (Fig. 18 b), limb bone, and girdle fragments.

Boar (*Sus scrofa*) dental elements (Fig. 18 c) are also present, representing 5.56% of the elements.

Most skeletal remains found at the site (51.85%) are positively assigned to ursids, almost all in the size range of the cave bear (*Ursus spelaeus*), including mostly teeth (Fig. 18 d–e), but also a few fragments of distal limbs and vertebrae.

A few indeterminate bird bones (5 specimens), and a fragment of a unionid bivalve shell were also found during recent excavations. None of the faunal remains show signs of human interaction, but several bear marks of carnivore bites and carnivore gnawing. The existing information suggests most herbivore elements were accumulated by carnivores, the cave functioning as carnivore den.

Incipient screen washing of sediment from Gabor Cave revealed small vertebrates are also present, including rodent and insectivore mammals, brown frogs, lacertid lizards, and natricid snakes. The taxonomic assessment of microvertebrate material is still in progress and will be detailed in a future paper.

Ursului Cave

Late Pleistocene fossil vertebrate specimens were reported from Ursului Cave during the first intensive mapping of the karstic features from the Vârghiș Gorges, and include material assigned to *Sus scrofa*, *Bos taurus*, *Equus caballus*, *Alces alces*, *Cervus elaphus*, *Rangifer tarandus*, *Rupicapra rupicapra*, *Capra ibex*, *Aegoceros severtzowi*, *Ursus spelaeus*, *Vulpes vulpes*, *Canis lupus*, *Lagopus mutus*, not figured or described in detail[20]. Recent excavations also yielded faunal material, also highly fragmented (out of 553 specimens, 53.5% are 1–3 cm large, and 37.4% are 3–6 cm large). It is notable, however, that larger bone fragments also occur, albeit in smaller number (7.4%), but the percentage of bone fragments 6–10 cm long is notably larger than in the other sites in the Vârghiș Gorges. A number of 128 specimens could be identified, being assigned to six different taxa (Fig. 19).

Ibex (*Capra ibex*) remains represent a third of all identifiable specimens (32.81%), mostly consisting in teeth (Fig. 20 a) and various fragmentary limb bones.

Large bovids from the size range of aurochs and steppe bisons (*Bos/Bison*) are present in small number (3.91% of the total), being represented by small fragments of horncores, vertebrae and scapulae.

Boar (*Sus scrofa*) remains are also present in a small percentage (3.91%), represented by dental elements (Fig. 20 b) and distal limb elements (phalanges, astragal).

A single metapodial fragment documents the presence of a horse (*Equus* sp.) at the site. Wolf (*Canis lupus*) remains consisting in distal limb elements are also present, in small number (3.91%).

[20] Orghidan, Dumitrescu 1963.

The fossil assemblage from Ursului Cave is clearly dominated by bear remains (54.69% of the total number of identified specimens), most of them fitting the size range of the cave bear (*Ursus spelaeus*). Fossil bear remains belong to a wide array of anatomic regions: dental elements are dominant (Fig. 20 c–d), but vertebral fragments, metapodials, phalanges, and fragments of long limb bones are also present.

The relative abundance of the taxa present in Ursului Cave is similar to the one seen in Gabor Cave, with cave bear remains dominating the assemblage, and ibex remains representing around a third of the assemblage. The bear elements, belonging to various anatomic regions, the presence of tooth marks on bones (albeit in small quantity), and the presence of juvenile individuals (e.g. bear cub lacteal canines, Fig. 20 e) all suggest the site mainly functioned as shelter for cave bears, without excluding episodic use by human hunters or other carnivorans, which might have contributed as bone accumulators.

3.3. CHRONOLOGY

Radiocarbon, OSL and IRSL results are summarized in Tables 5, 6. For radiocarbon dating, charcoal and bone samples from Abri122/1200 were processed at the Hertelendi Laboratory in Debrecen, Hungary[21], while Mare Cave and Gabor Cave samples were analyzed at "Horia Hulubei" National Institute for Research and Development in Physics and Nuclear Engineering in Bucharest. Results show rather confusing time-spans, ranging from infinite ages/ages close to the upper limit of the method, to considerably younger estimations of 11–20 ka. Low collagen yield in bone samples, laboratory pretreatment issues or contaminations of scattered charcoal samples are to be considered.

Treatment and results of the luminescence samples in the lower half of the Abri 122/1200 profile (250–260 cm) were detailed elsewhere[22] and will be only briefly mentioned here. Both OSL ages (106 ± 11 ka and 141 ± 12 ka respectively) were obtained on fine-grains quartz; for the first one, the IRSL fading-corrected age of 99 ± 17 was based on polymineral fine grains, while for the second one, the fading-corrected ages based on K-feldspar coarse grains (173 ± 41 ka) and polymineral fine grains (174 ± 37 ka) are quite close. Four other OSL samples were recently collected from the NW profile in Abri 122/1200, for which the dating approach is still ongoing. The samples belong to 207–212 cm, 223–230 cm, 256–262 cm and 351–357 cm depth intervals. Except for the last one, the other three intervals cover major faunal and lithic material accumulations.

3.4. DISCUSSION

In Abri 122/1200, Gabor Cave and Cave no. 33, the vertical and horizontal scatter of lithic materials within the sedimentary package shows neither distinct accumulations of multiple pieces, nor a marked differentiation according to raw material or specific type of lithic product. Two cases of refitting broken artefacts from the Abri 122/1200 collection involve two fragments of a blade (Fig. 12: 5) and two fragments of a flake (Fig. 12: 3) discovered roughly 10 cm and 60 cm vertically apart, respectively. Most of the assemblage in Mare Cave is also scattered throughout the stratigraphical sequence, except for a small accumulation of mainly quartzite and basalt flakes within a 10 cm interval in the middle of the deposit. The four lithic collections presented share a dominance of locally available quartzite, basalt and lydite as the main raw materials employed, the infrequent, feebly hinted use of centripetal Levallois and Kombewa technologies, a prevalence of flakes as the most frequent debitage products or modified blanks, with only slight attempts at laminar production, using highly homogenous and usually isolated raw materials, as well as the frequency of scrapers and partially retouched flakes within the formal tools category. The Abri 122/1200 lithic collection stands apart, as it includes a unique combinations of partially retouched flakes, scrapers, notched/denticulated flakes and blades, and bifacial products.

The information presented above, including more material yielded by recent excavations, led to a much better understanding of the faunal assemblage from the area. By increasing the sample and employing new methods in search of faunal remains (such as screen washing for small vertebrates), the taxonomic list was significantly improved, and the information regarding relative abundance of taxa is more reliable than previous assessments, based on less material[23]. Most of the large herbivore remains (bisons or aurochs, horses, and woolly rhinoceroses) in Abri 122/1200 could not have reached the site on their own, as they do not naturally use caves or rock shelters or are ill-equipped for moving across steep slopes. Therefore, the most probable scenario is that Palaeolithic hunters

[21] Major *et alii* 2019a, 2019b; Molnár *et alii* 2013a, 2013b.

[22] Veres et alii 2018.

[23] Cosac *et alii* 2018, 2019.

brought the remains of large herbivores to the site. This scenario is also supported by the presence of a large bovid tibia showing clear cut marks, a direct evidence of human-animal interaction[24].

Inconclusive radiocarbon results, as well as reduced, less informative archaeological collections of faunal and lithic material impose further investigations in the Vârghiș Gorges karst area, for a convincingly outlined cultural and chronological framework.

ACKNOWLEDGMENTS

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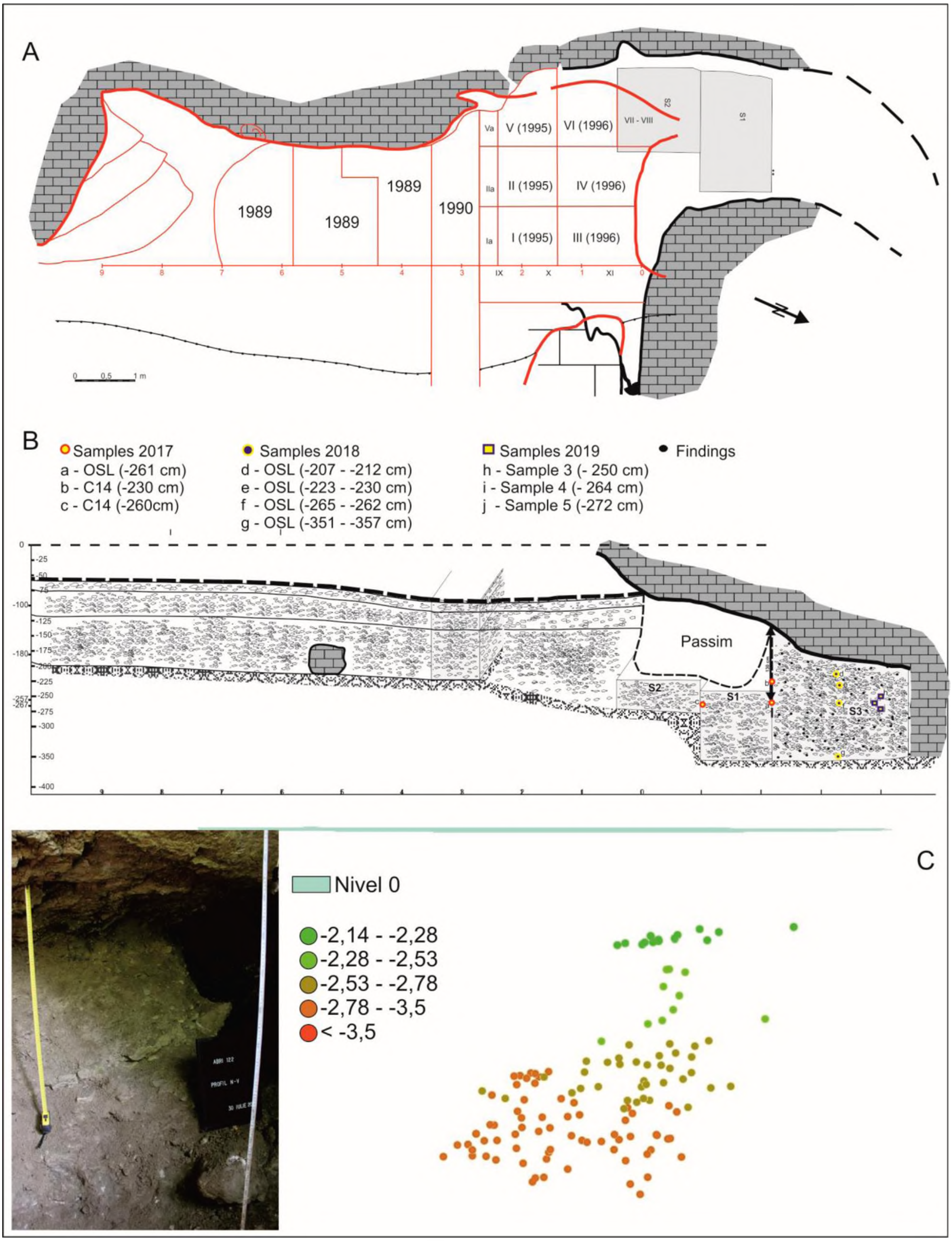

Figure 1 – Abri 122/1200. A: general layout (in red, I. Dénes' trenches); B: stratigraphic profile and chronometric sampling; C: artefact density, total station recording.

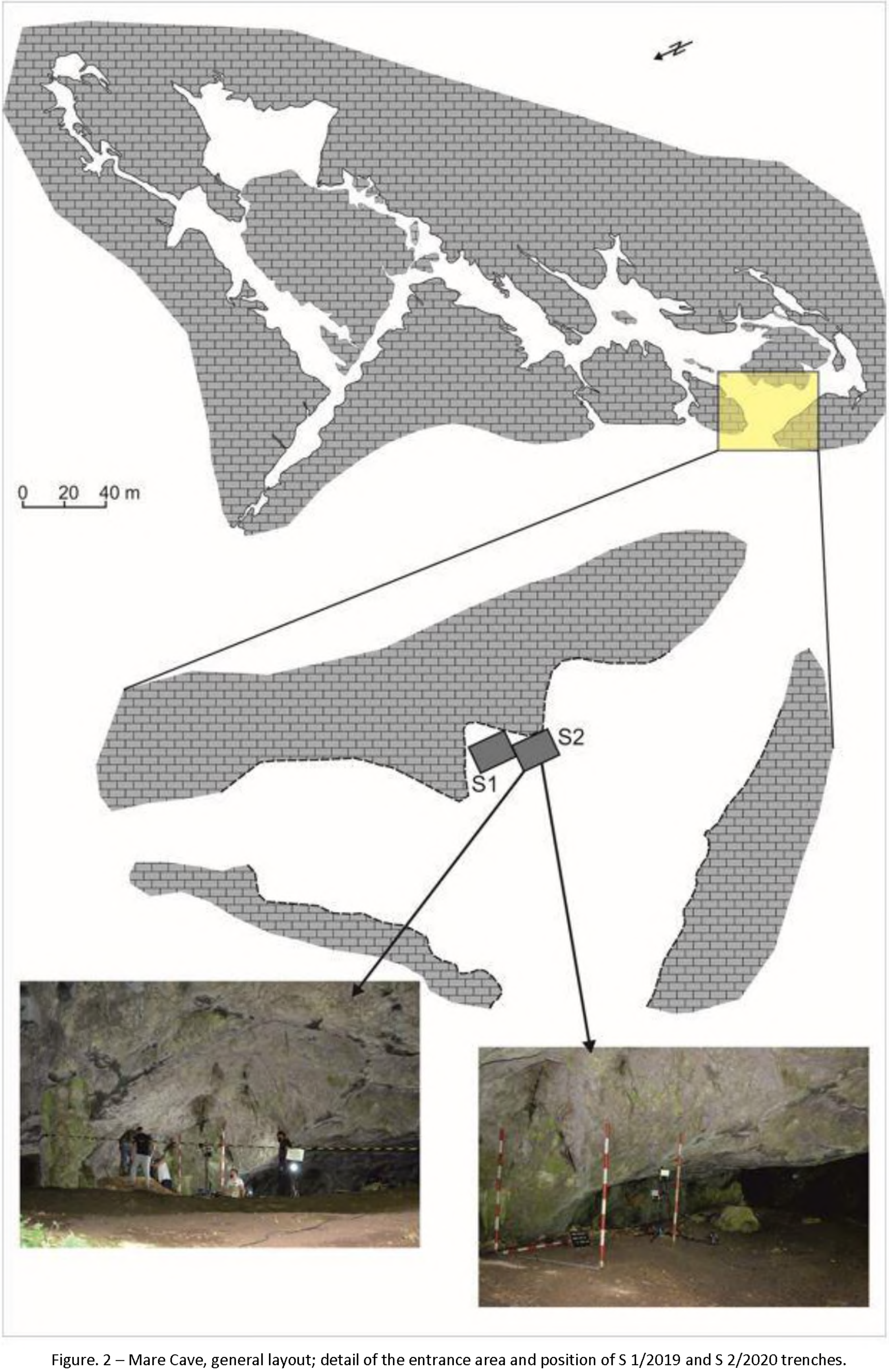

Figure. 2 – Mare Cave, general layout; detail of the entrance area and position of S 1/2019 and S 2/2020 trenches.

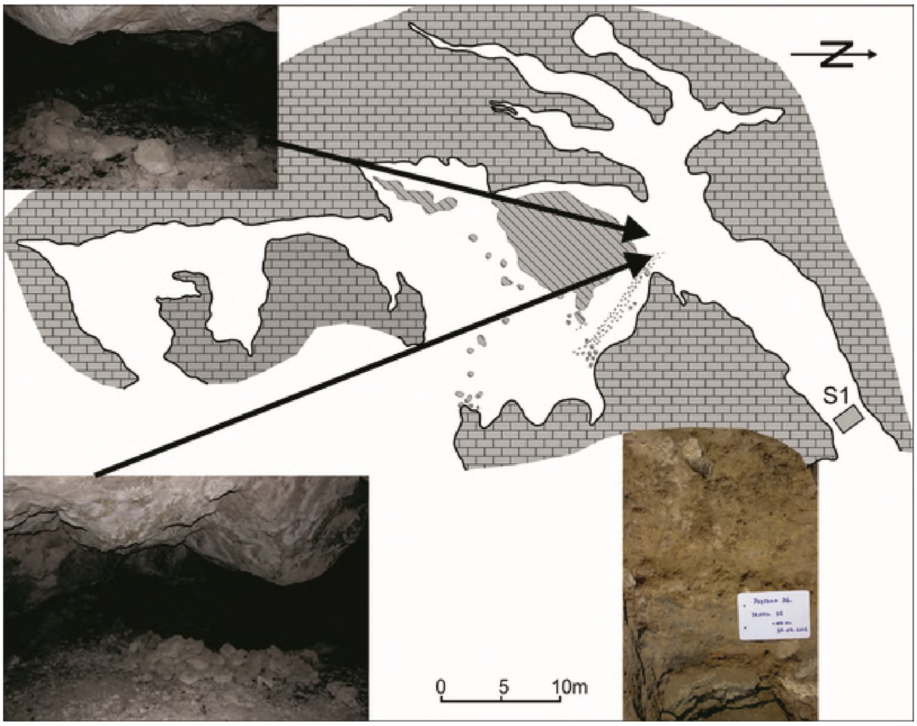

Figure 3 – No. 36 Cave, general layout; position of S 1/2018 trench and artificial structures.

Figure 4 – Ursului Cave, general layout, position of S 1/2015 trench and the southern profile with volcanic ash accumulation.

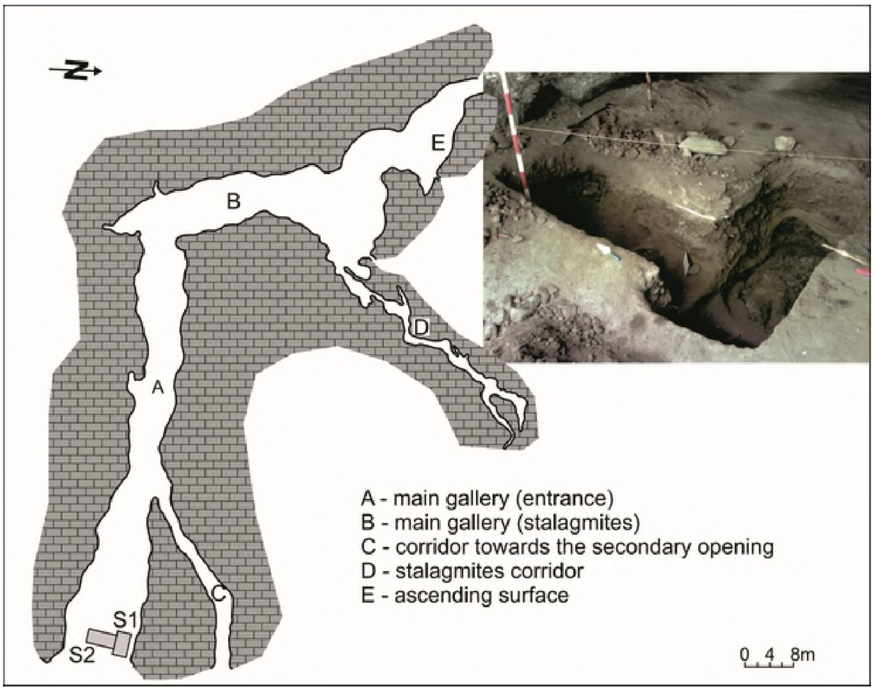

Figure. 5 – Calului Cave, general layout, position of S 1–S 2/2014 trenches.

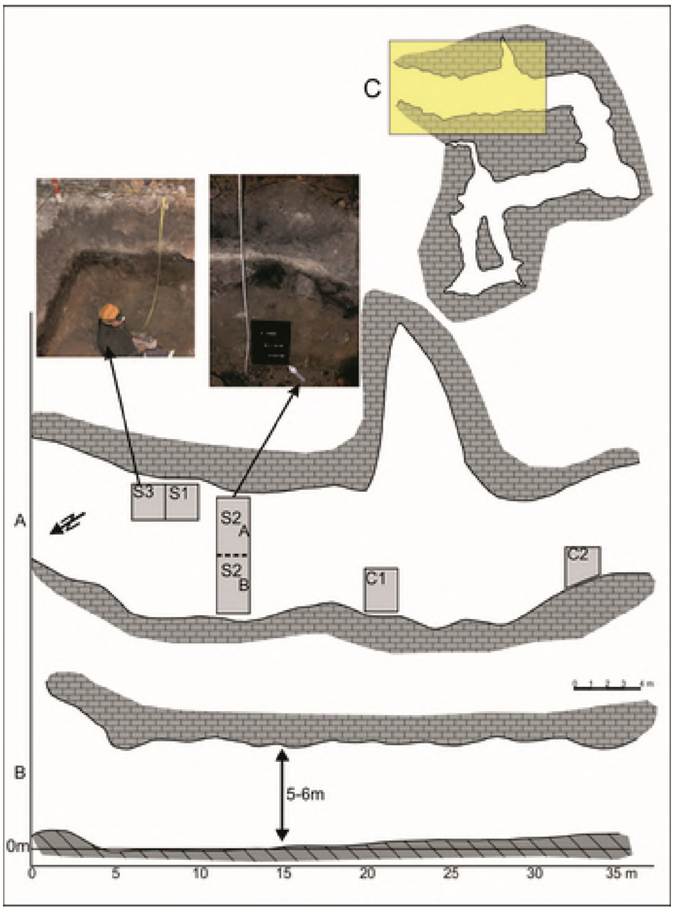

Figure 6 – Gabor Cave. A: entrance layout, position of 2017–2019 trenches; B: entrance vertical profile; C: general layout and entrance area.

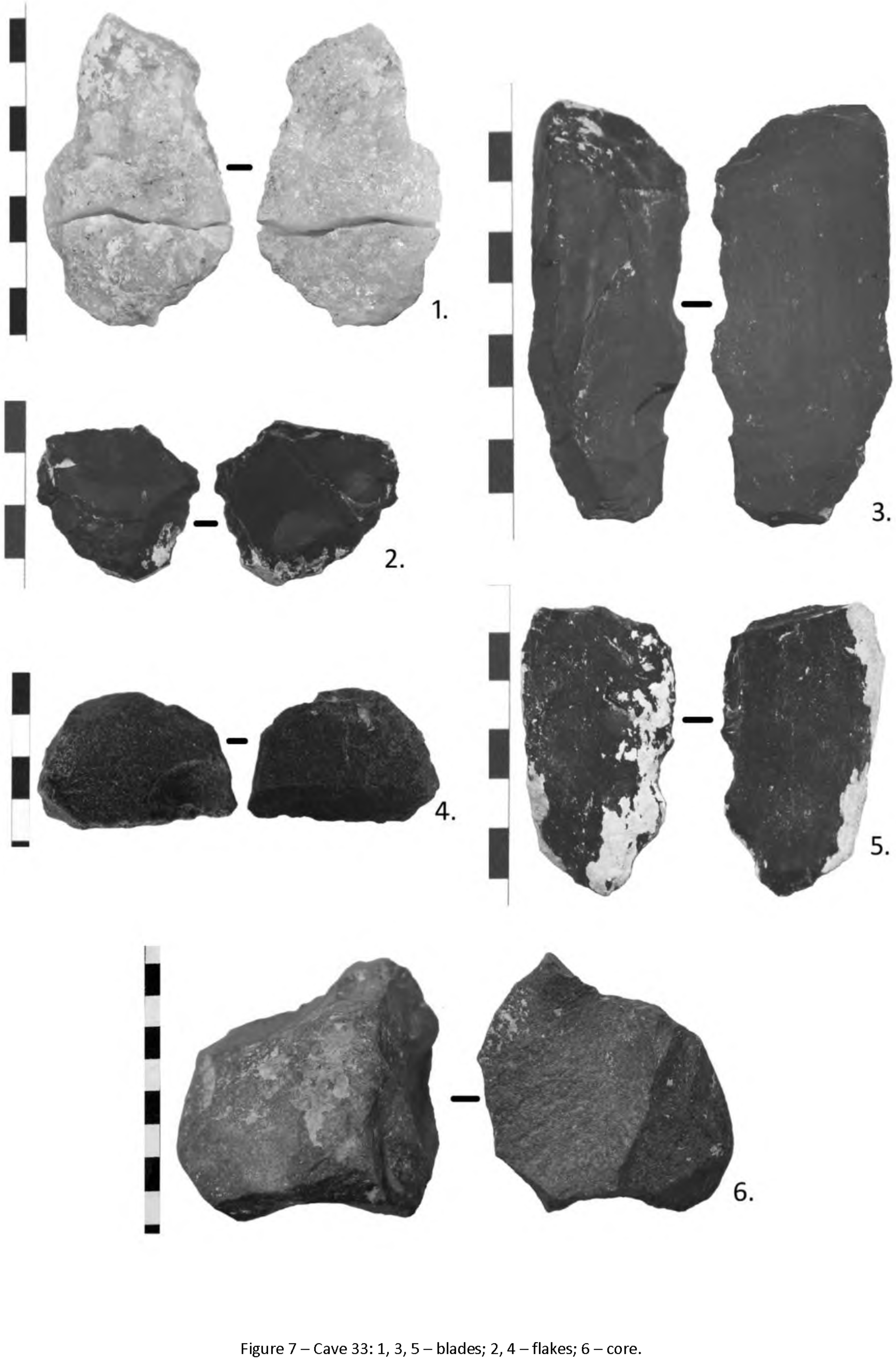

Figure 7 – Cave 33: 1, 3, 5 – blades; 2, 4 – flakes; 6 – core.

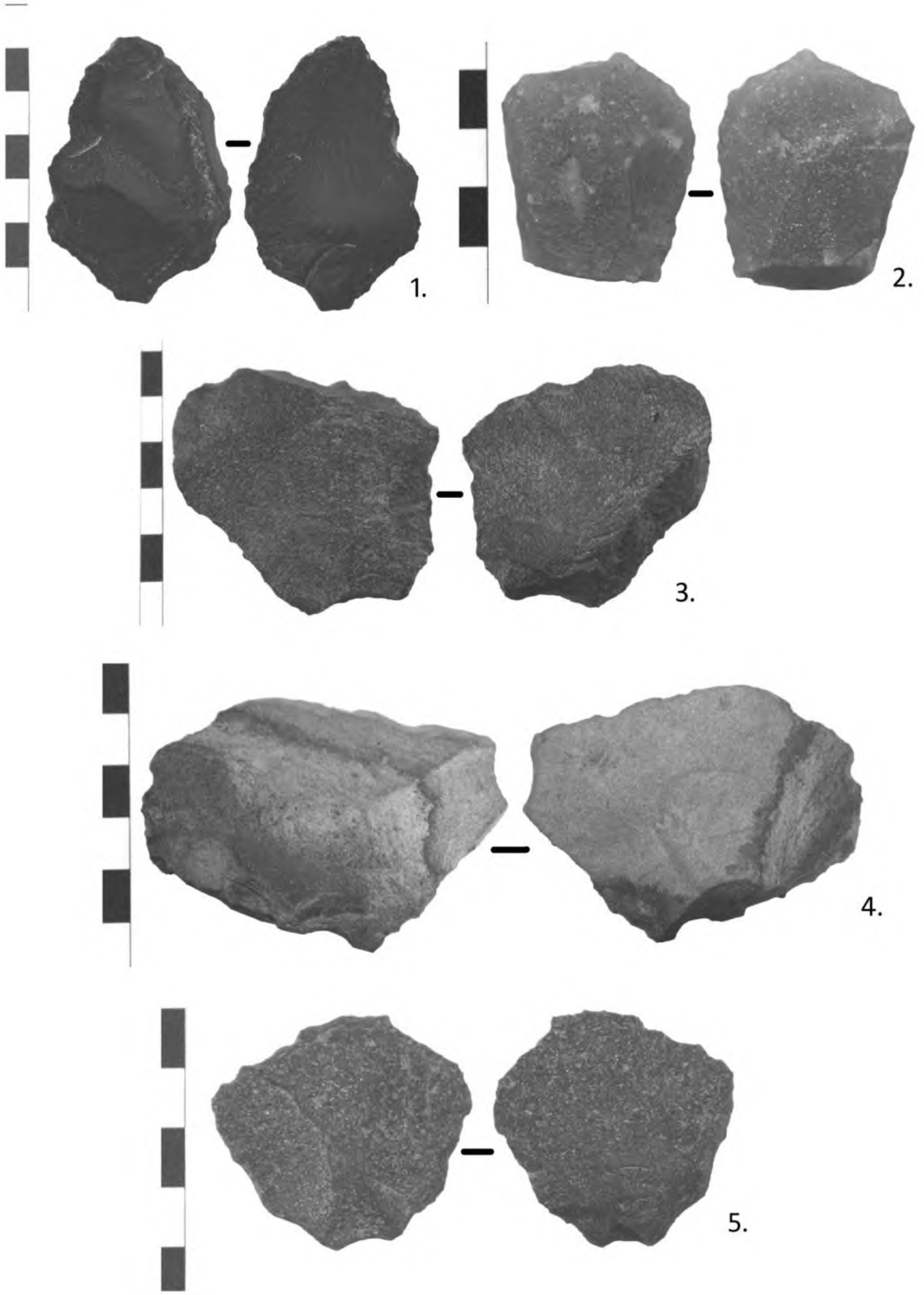

Figure 8 – Gabor Cave: 1, 2, 5 – flakes; 3, 4 - scrapers.

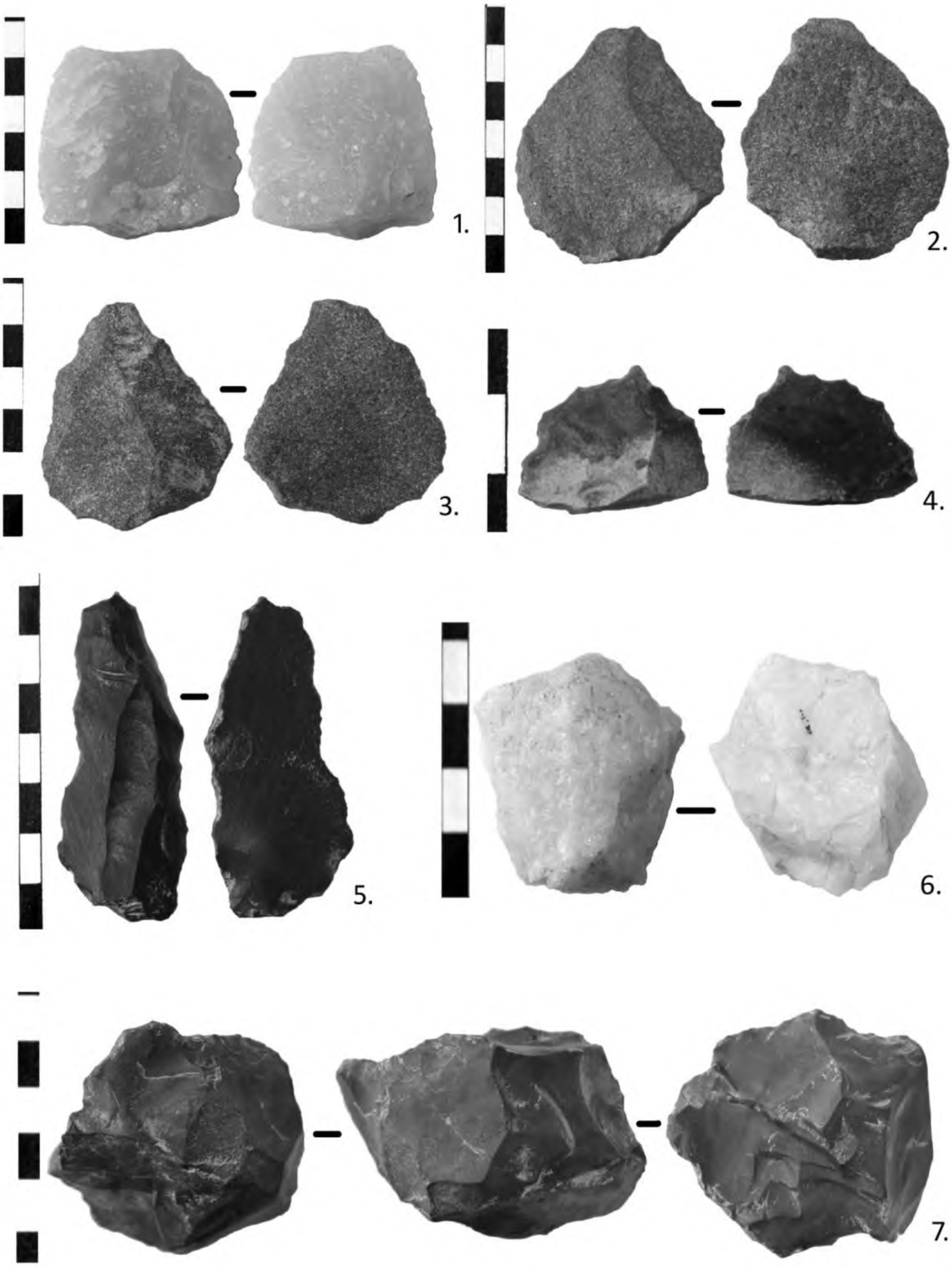

Figure 9 – Mare Cave: 1, 3 – flakes; 2 – cortical flake; 4 – retouched flake; 5 – retouched blade; 6 – Kombewa core-flake; 7 – core.

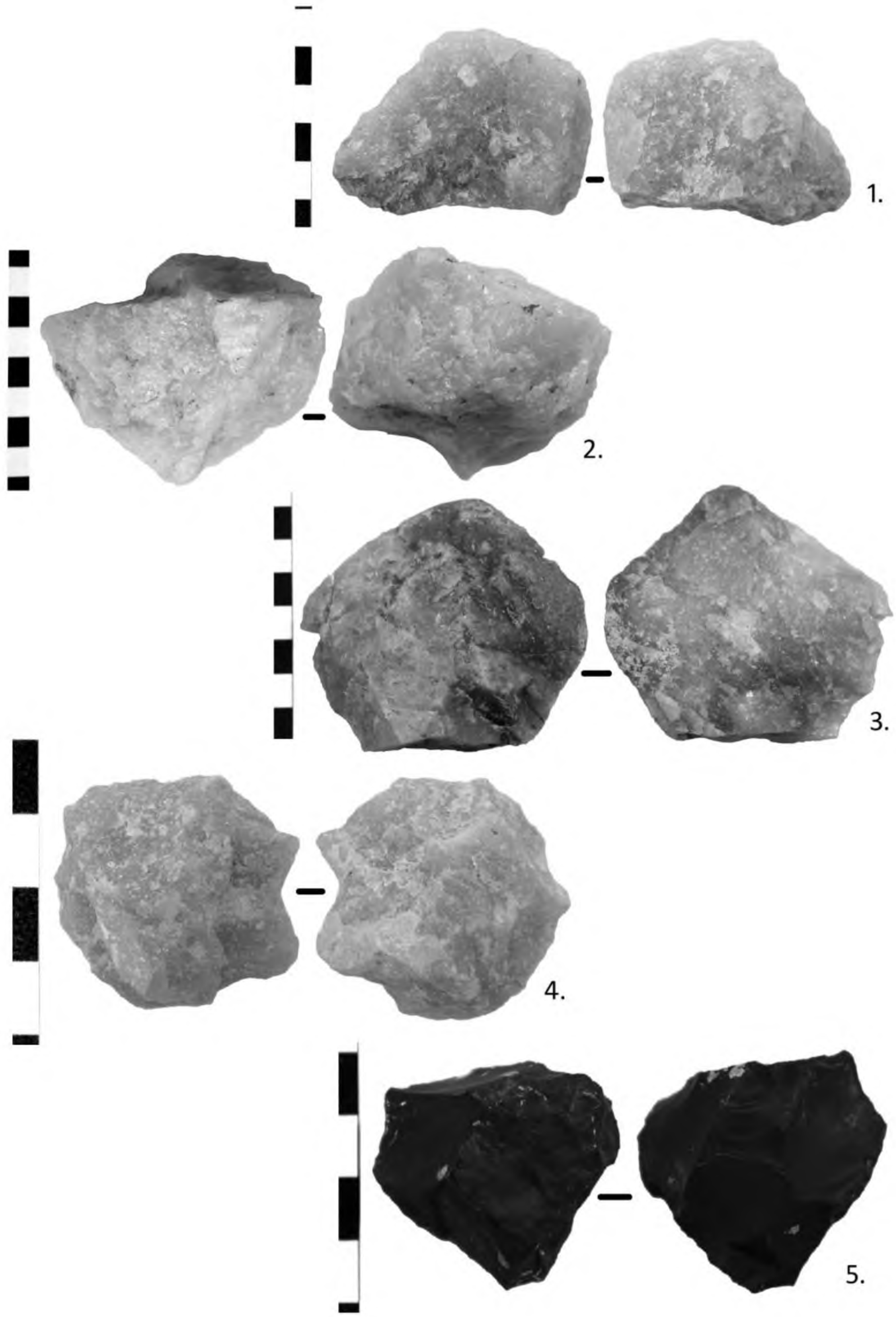

Figure 10 – Abri 122/1200: 1, 3 – Kombewa core-flakes; 2 – core fragment; 4 – Levallois core; 5 – pyramidal core.

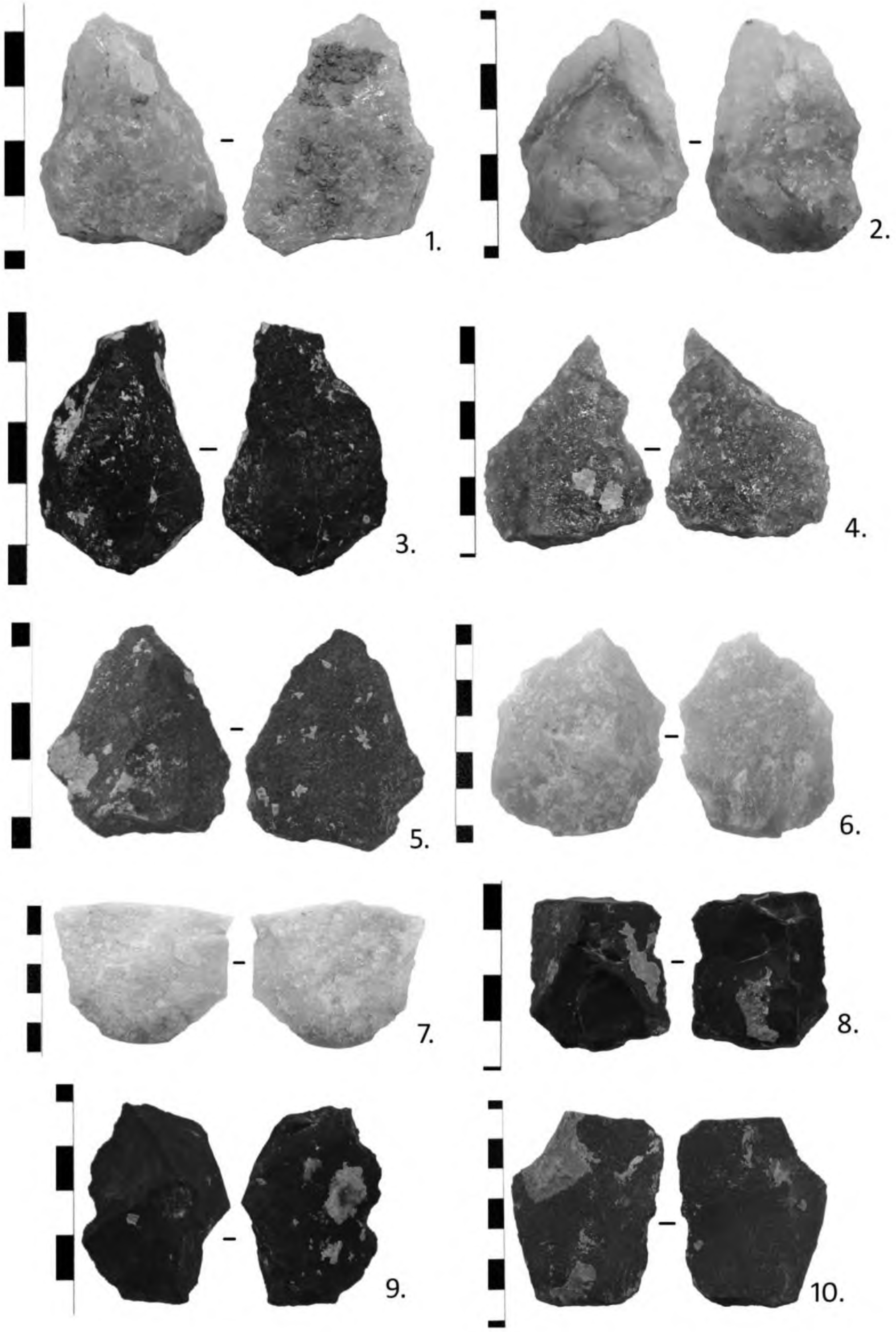

Figure 11 – Abri 122/1200: 1–10 – flakes.

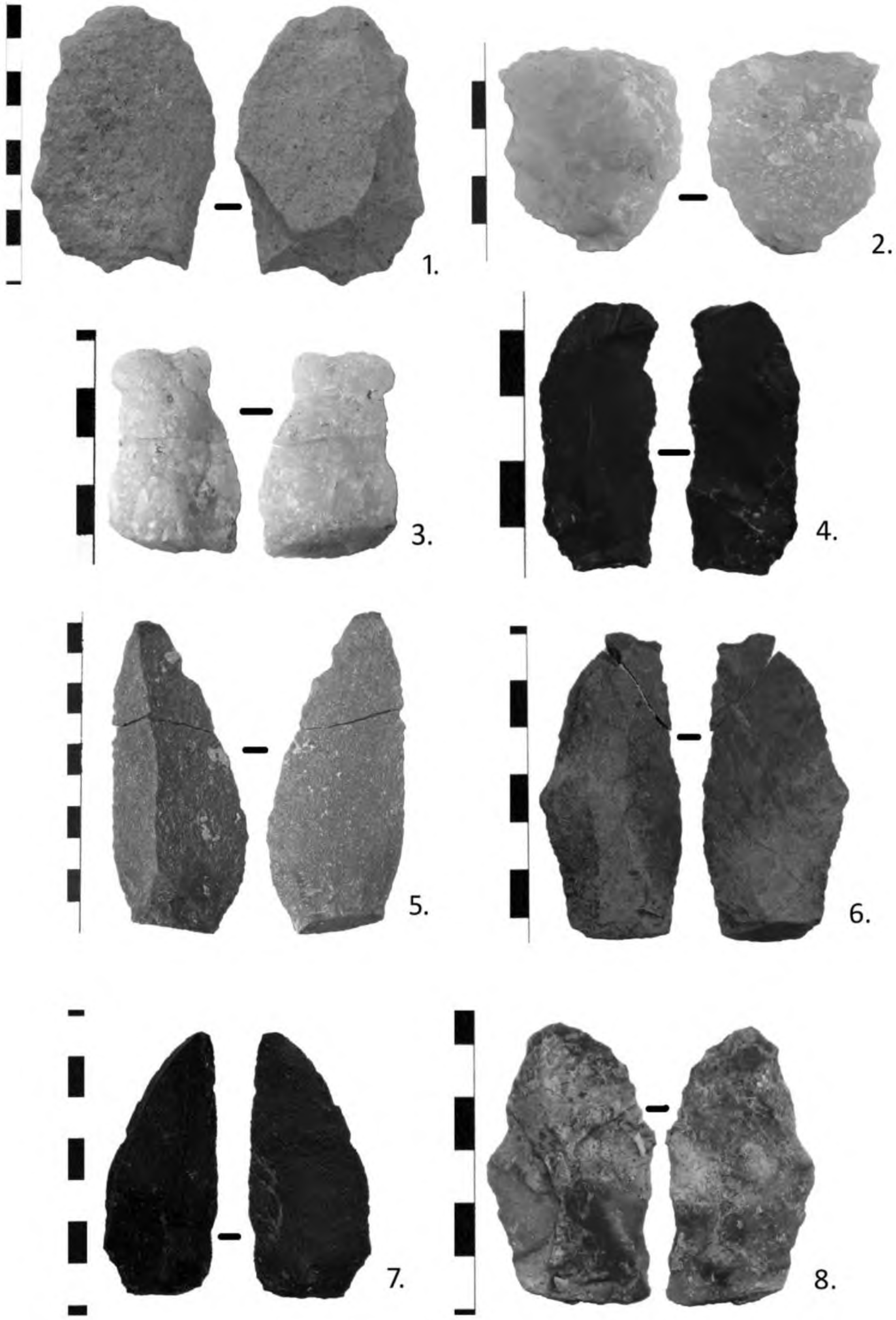

Figure 12 – Abri 122/1200: 1–8 – laminar flakes, blades.

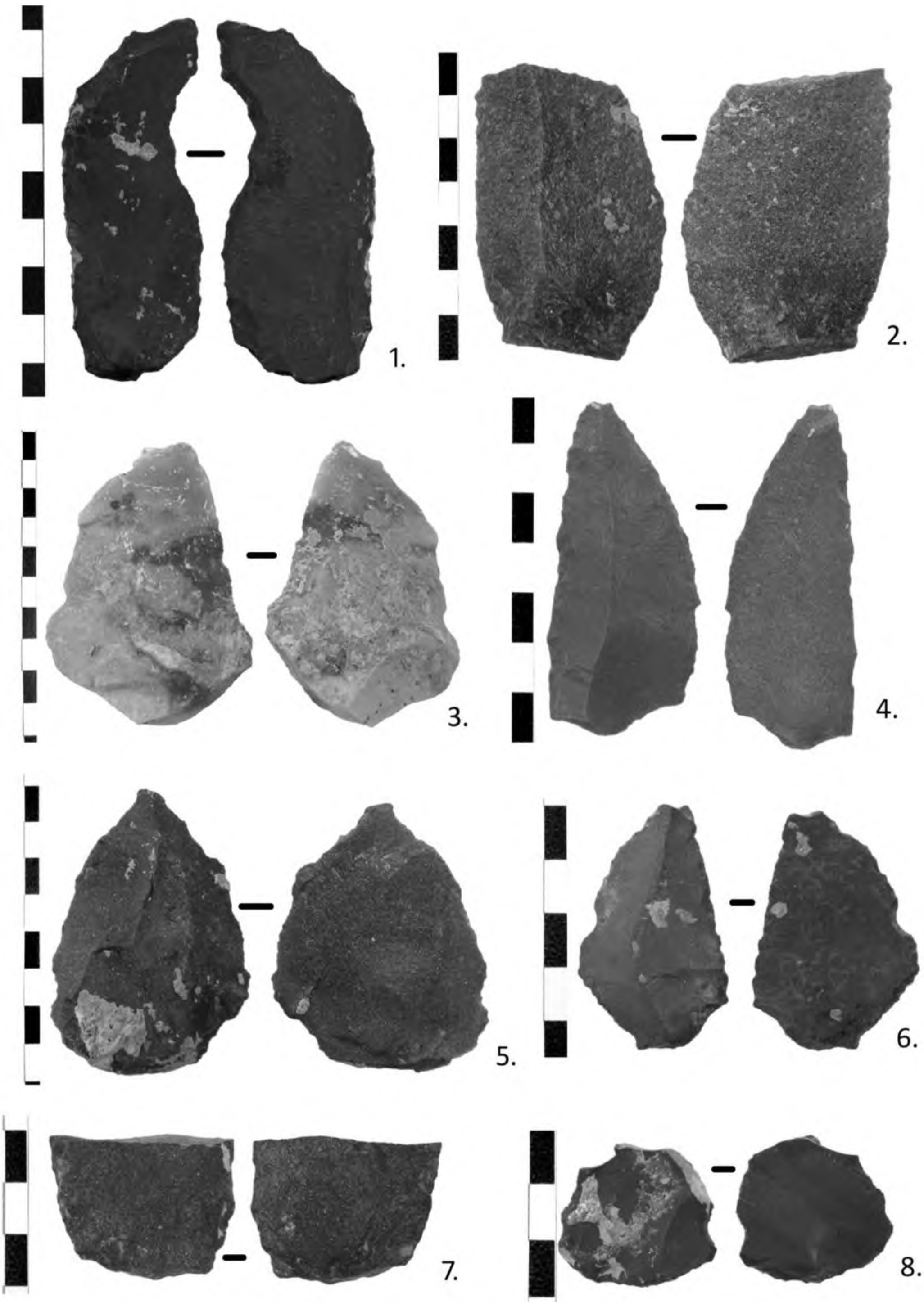

Figure 13 – Abri 122/1200: 1–8 – retouched products.

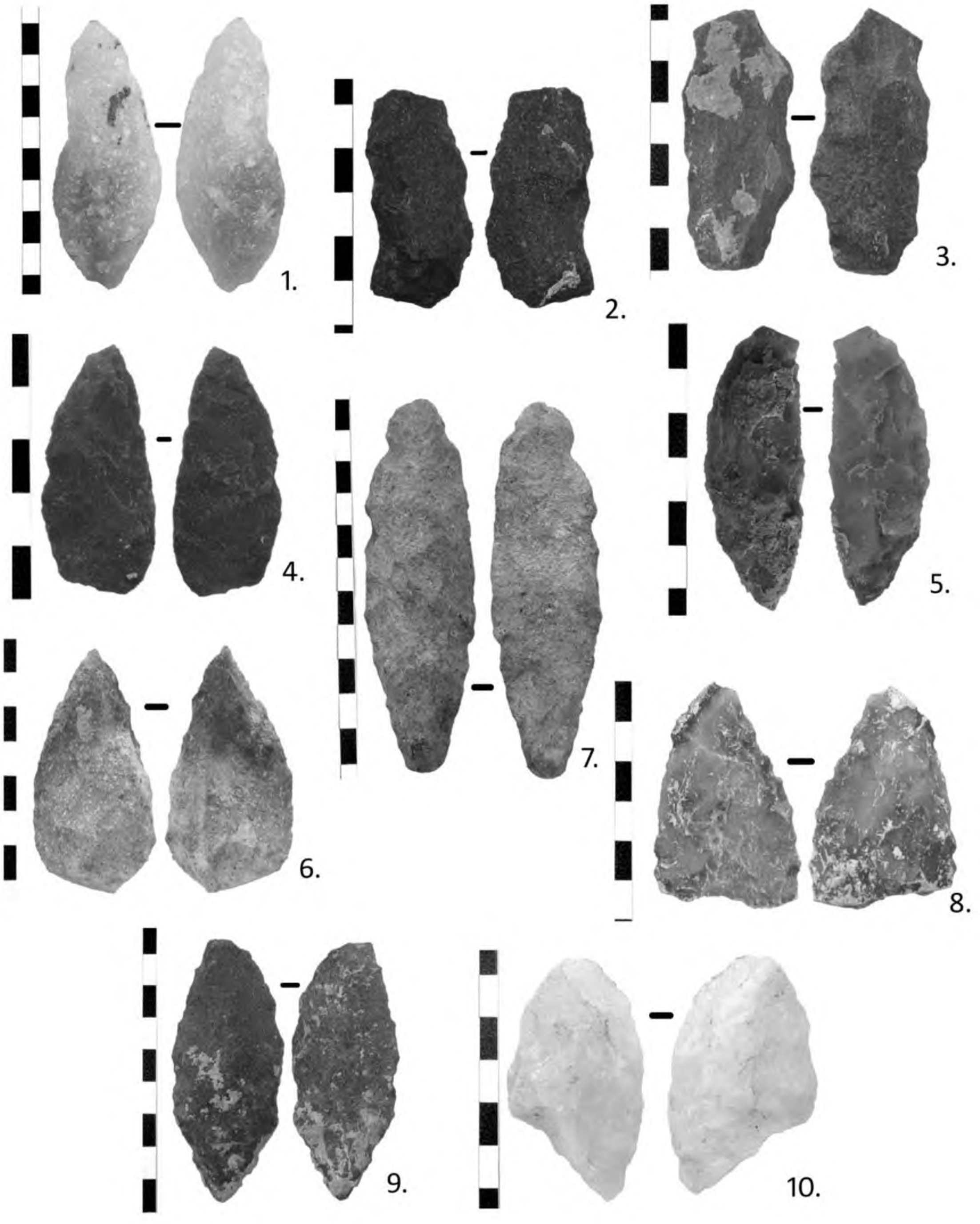

Figure 14 – Abri 122/1200: 1–10 – bifacial items (1–3: *ebauches*; 4–10: finished products).

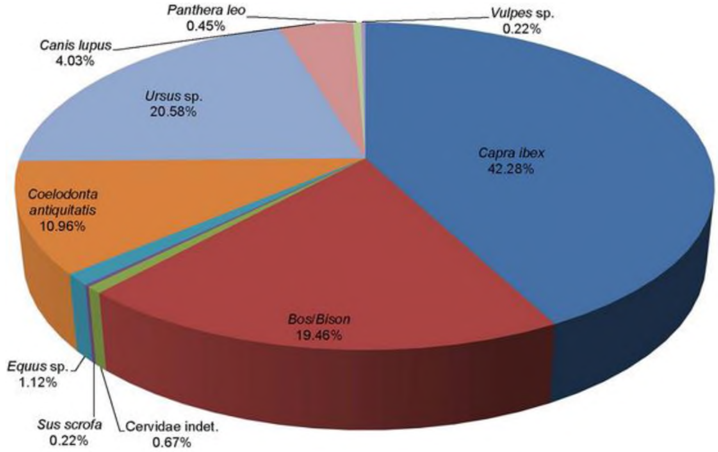

Figure 15 – Taxonomic relative abundance of mammal remains from Abri 122/1200, based on the number of identified specimens.

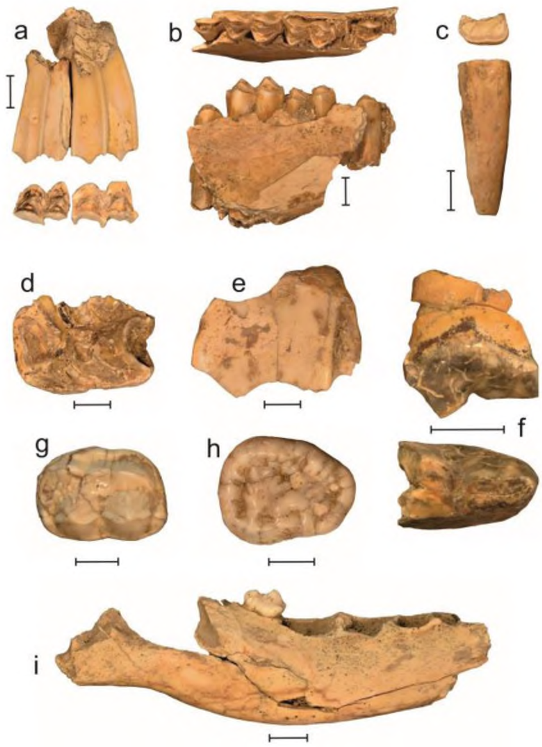

Figure 16 – Mammal remains from Abri 122/1200: ibex upper (a) and lower (b) dentition; large bovid (aurochs/steppe bison) lower incisor (c); horse upper tooth fragment (d); woolly rhinoceros upper molar enamel fragment (e); cave lion upper fourth premolar fragment (f); cave bear upper first molar (g) and lower third molar (h); wolf mandible fragment bearing lower second molar (i). All scale bars equal 1 cm.

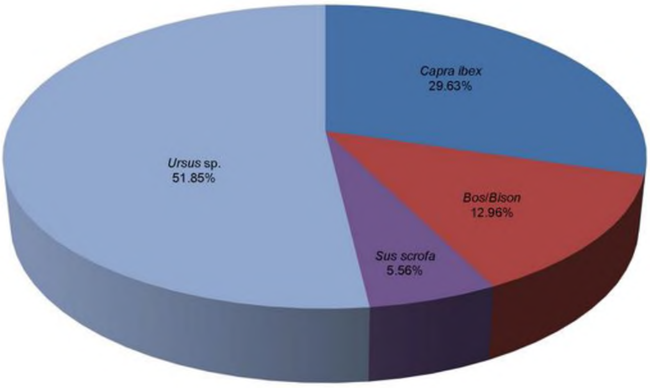

Figure 17 - Taxonomic relative abundance of mammal remains from Gabor Cave, based on the number of identified specimens.

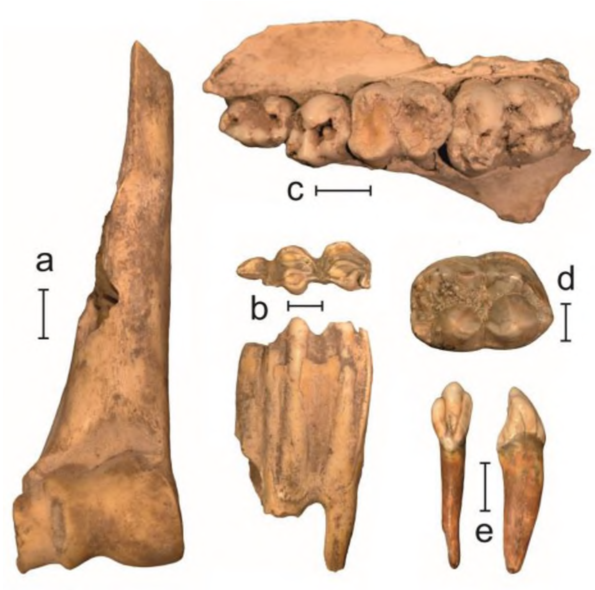

Figure 18 – Mammal remains from Gabor Cave: ibex distal humerus (a); large bovid (aurochs/steppe bison) lower molar (b); boar maxillary bone fragment bearing upper dentition (c); cave bear upper first molar (d) and lower second incisor (e). All scale bars equal 1 cm.

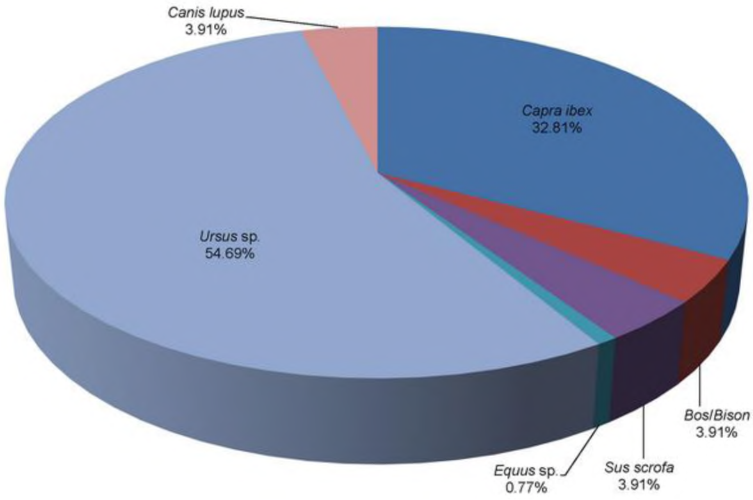

Figure 19 – Taxonomic relative abundance of mammal remains from Ursului Cave, based on the number of identified specimens.

Figure 20 – Mammal remains from Ursului Cave: ibex lower molar (a); boar maxillary bone fragment bearing upper dentition (b); cave bear lower first molar (c) and upper first molar (d); bear cub lacteal canine (e). All scale bars equal 1 cm.

TABLES

Raw material	Indet/ *cassons*	Cores	Cortical products	Rejuvenation products	Blanks		Retouched products	Bifacial products	Total
					Flakes	Laminar products			
Quartzite	22/12	6	3	-	25	-	1	-	69
Basalt	6/2	1	5	-	21	1	3	-	39
Diorite, andesite	-/1	-	3	1	15	1	1	-	22
Lydite, argillite	-/1	2	-	-	2	1	1	-	7
Jasper, radiolarite	-	-	-	-	1	-	1	-	2
Flint, chalcedony	-/1	-	-	-	1	2	-	-	4
Indet	14/-	-	-	-	-	-	-	-	14
Total	42/17	9	11	1	65	5	7	-	157

Table 1 – Mare Cave: the knapped lithic assemblage of the 2019–2020 campaigns.

Raw material	Indet/ *cassons*	Cores	Cortical products	Rejuvenation products	Blanks		Retouched products	Bifacial products	Total
					Flakes	Laminar products			
Quartzite	2/1	1	-	-	13	-	3	-	20
Basalt	1/-	1	2	-	9	-	-	-	13
Diorite, andesite	-	-	-	-	-	-	-	-	-
Lydite, argillite	-	-	1	-	6	-	-	-	7
Jasper, radiolarite	--	-	-	-	1	-	-	-	1
Flint, chalcedony	-	-	-	-	-	-	-	-	-
Indet	1/-	-	-	-	-	-	-	-	1
Total	4/1	2	3	-	29	-	3	-	42

Table 2 – Cave no. 33: the knapped lithic assemblage of the 2016–2017 campaigns.

Raw material	Indet/ *cassons*	Cores	Cortical products	Rejuvenation products	Blanks		Retouched products	Bifacial products	Total
					Flakes	Laminar products			
Quartzite	3/1	3	1	-	6	-	-	-	14
Basalt	4/-	-	1	-	4	-	2	-	11
Diorite, andesite	3/-	-	-	-	1	-	-	-	4
Lydite, argillite	3/-	-	2	-	-	-	-	-	5
Jasper, radiolarite	1/-	-	-	-	1	-	-	-	2
Flint, chalcedony	1/-	-	1	-	2	-	-	-	4
Menilite	-	-	-	-	-	-	1	-	1
Indet	-	-	-	-	-	-	-	-	-
Total	15/1	3	5	-	14	-	3	-	41

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Table 3 – Gabor Cave: the knapped lithic assemblage of the 2016–2019 campaigns.

Raw material	Indet/ *cassons*	Cores	Cortical products	Rejuvenation products	Blanks		Retouched products	Bifacial products	Total
					Flakes	Laminar products			
Quartzite	99/25	17	42	-	273	17	3	3	479
Basalt	83/4	4	4	1	171	13	8	6	294
Lydite, argillite	42/7	7	3	1	68	7	9	-	144
Diorite, andesite	4/-	-	-	-	6	1	-	-	11
Jasper, radiolarite	5/-	2	-	-	14	2	4	-	27
Flint, chalcedony	3/-	1	2	-	7	4	2	1	20
Indet	60/1	-	-	-	10	-	-	-	71
Total	296/37	31	51	2	549	44	26	10	1046

Table 4 – Abri 122/1200: the knapped lithic assemblage of the 2014–2020 campaigns.

Site	Sample depth (in cm)	Sample ID, material	Age (uncal BP)	Age (cal BC)
Gabor Cave	90-100	RoAMS 1010.97, bone	43,547 ± 1316	47,800-43,051
Mare Cave	96	RoAMS 1546.97, bone	49,376 ± 1308	? -47,985
	119	RoAMS 1548.97, bone	59,654 ± 5478	-
	150	RoAMS 1549.97, bone	56,699 ± 3069	-
	140-150	RoAMS 1550.97, bone	44,487 ± 715	46,467-43,562
	170	RoAMS 1551.97, bone	57,297 ± 3051	-
Abri 122/1200	100	DeA-23688, bone	>41,000	
	110	DeA-23689, bone	>41,000	
	207-217	DeA-7471, charcoal	17,461 ± 154	20,867-21,322
	227-237	DeA-8904, bone collagen (*Bison*)	>42,200	
	250	DeA-24660, charcoal	13,503 ± 74	14,590–14,070
	260	DeA-5868, tooth collagen (*Ursus sp*)	>43,400	
		DeA-5957, charcoal	38,900 ± 1100	42,024-43,697
	264	DeA-24661, charcoal	16,167 ± 90	17,840–17,270
		DeA-24856, charcoal	22,696 ± 277	25,570–24,380
	272	DeA-24663, charcoal	11,338 ± 48	11,340–11,130
		DeA-24179, charcoal	11,580 ± 232	12,030–11,040

Table 5 – Vârghiş Gorges, radiocarbon AMS results[25]

Sample depth (in cm)	Sample ID	Age (ka)	Fading corrected age
250	BT 1416 IRSL (PM)	71 ± 7	99 ± 17
	BT 1416 OSL	106 ± 11	-
260	BT 1415 IRSL (PM)	124 ± 16	174 ± 37
	BT 1415 IRSL (FS)	123 ± 21	173 ± 41
	BT 1415 OSL	141 ± 12	-

Table 6 – Abri 122/1200, OSL/IRSL results[26].

[25] Veres et *alii* 2018 (IntCal 13 calibration dataset, Reimer et *alii* 2013; Calib 7.0.4, www.calib.org).
[26] Veres *et alii* 2018.