Crvena Stijena in Cultural and Ecological Context

Multidisciplinary Archaeological Research in Montenegro

edited by
Robert Whallon

Montenegrin Academy of Sciences and Arts
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Chapter 10

Excavations of Middle Paleolithic–Mesolithic Layers

Dušan Mihailović, Bojana Mihailović, Robert Whallon

Introduction

Investigations at Crvena Stijena received attentive publicity from the moment they were begun (in the middle of the 1950s) because at that time Paleolithic and Mesolithic sites were completely unknown, while sites whose deposits were deeper that 20 m have been rarely recorded anywhere up to today. Aware that Crvena Stijena represents a site whose importance goes beyond regional boundaries, the original excavators tried to publish the results of their investigations in a timely fashion (Benac and Brodar 1957; 1958; Brodar 1962; Basler ed. 1975). Unfortunately the reception of these discoveries by the international scientific community was lukewarm due to the fact that the final monograph (Basler ed. 1975) was published in a very small printing and because the results of these excavations were neither published comprehensively enough nor according to an appropriate methodology. Because of this, re-analysis of the results and materials of these earlier excavations were begun in the 1990s (Mihailović 1999, 2009), and in the middle of the 2000s new research was begun at the site (Baković et al. 2009). This new research quickly showed that understanding Crvena Stijena was not possible without a good grasp of the earlier recovered material.

In this contribution we will try to present the character of technological and behavioral changes in the Paleolithic and Mesolithic at Crvena Stijena on the basis of the available data and results of re-analyses of the archaeological material. We have attempted to identify technological trends in the Middle and Upper Paleolithic and the Mesolithic, and we define facies that appear in each period. We have decided to evaluate the integrity of the artifact assemblages on the basis of a general view of technological behavior, and not on the basis of statistical modeling (Culley, Popescu and Clark 2013). That is, we believe that attributes that are considered relevant for the reconstruction of techno-economic behavior (Riel-Salvatore and Barton 2004) and behavioral 'packages' (Tostevin 2012) in distant geographical regions can not be used for the evaluation of the integrity of assemblages from Crvena Stijena. Without that, we believe that techno-econoic behavior can not be reconstructed without a grasp of taphonomic processes and a reconstruction of human activities in the site. Because of this, we will turn to this question only in our concluding discussion, after which these aspects of our study will be presented.

Stratigraphy and Chronology of the Site

The stratigraphy of Crvena Stijena is characterized by the alternation of geological and anthropogenic horizons (Fig. 10.1), about whose nature and and chronology there has been much discussion. Sedimentological examinations have been carried out on two occasions. Brunnacker (1975) undertook granulometric analysis with the aim of reconstructing the mechanical and chemical factors in the disintegration of the bedrock, while Morley (2007; Chapter 7, this volume; Baković et al. 2009) made analyses of the fine sediment fraction, applying sedimentological, geochemical, remnant magnetism, and micromorphological analyses. Both researchers attempted to draw geochronological conclusions about the analyzed layers. Brunnacker placed layers XXXI-XXV in MIS 6, tied layers XVIII-XVII to oscillations within MIS5, and put layers XVI-XII in MIS 4-MIS 3. In his earlier work, Morley (2007; Baković et al. 2009) came to much the same conclusions as Brunnacker, but has revised some of his conclusions in the light of more recent analyses and dating. His conclusions are published in this

volume (Chapter 7), as are the newer absolute dates for Crvena Stijena (Mercier et al., Chapter 9, this volume).

An attempt was made to look at chronology from the paleontological aspect. Yet, even from the initial analyses it was evident that there was no agreement about the geochronological attribution of the deepest layers (XXVIII, XXIX, XXXI) in which was found fauna adapted to warm climate, among others *Dicerorhinus kirchbergensis*, *Leop-*

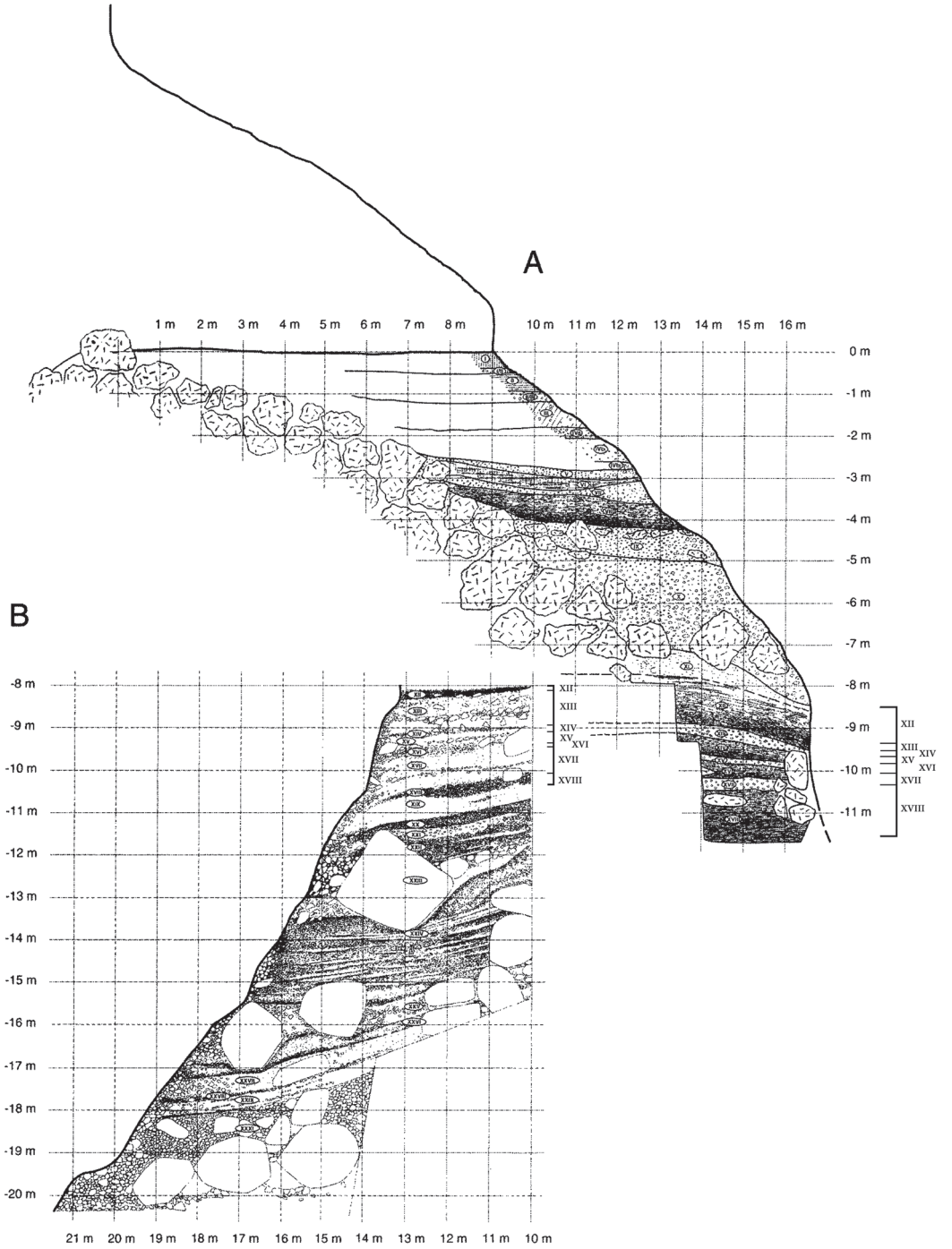

Fig. 10.1. Comparative display of the western profile of Brodar's excavation (A) and the eastern profile of Basler's excavation (B). (modified after Brodar, 2009:Fig. 35)

ardus pardus, *Megaceros giganteus*, *Dama dama*, *Capreolus capreoulus*, and *Testudo graeca*, which could agree with a placement in MIS 5e (Malez 1975) rather than MIS 6 (Basler 1975; Brunnacker 1975). Fauna from layer XXIV was related to the last interglacial (Basler 1975) although it did not contain the warm-climate species from the lower layers. New dates have resolved this problem (Mercier et al., this volume). It appears that layer XXIV perhaps falls chronologically in MIS 5a, which means that the warm-climate fauna from the deepest layers probably belongs to MIS 5e, while, judging by everything, layer XXV belongs to the very beginning of an early glaciation (MIS 5d?).

In the fauna from layers XXIII-XXII no important differences were seen, while the results of sedimentological analyses are different, but the chronology of these layers was impossible to determine until recently. New TL and ESR dates, though, have shown that layer XX falls at the beginning ot MIS 3 (before around 60,000 years), while layers XI and XII have been dated by ^{14}C to a period before 40-45,000 cal BP. This shows that all the layers between XIX-XIII in fact belong to MIS 3, which no one believed, given the frequent alterations in klastic sediments and the thickness of the deposits in this part of the sequence. The frequency of cold-climate, steppic and montane fauna is somewhat higher in layers XVIII, XVI, and XIV (*Coelodonta antiquitatis*, *Capra ibex*, *Rupicapra rupicapra*, *Marmota marmota*), while the structure of the fauna from layers XIII and XII is predominantly warm-climate, although there are remains of moose (*Alces alces*) in layer XIII, indicating somewhat colder conditions (Malez 1975). This offers the opportunity to observe climatic and ecological changes in the early phases of MIS 3 on a millennial scale, which we presume will be one of the main goals of future research. Results of detailed analysis by E. Morin of fauna from the more recent excavations are presented below in this volume.

Layer XI has been identified as the Campanian Ignimbrite (Y-5) tephra, date between 39-41,000 BP (Morley and Woodward 2011; Morley, this volume). Brunnacker concluded on the basis of his sedimentological analyses that layer X dated to the maximum of the last glaciations, layers IX–V to the late glacial, and layers IV–I to the Holocene (Brunnacker 1975). New dates have now solved the dilemmas raised by the analyses of the archaeological material (Mihailović 2009). They have shown that layer X probably relates to the beginning of the Last Glacial Maximum, layer VIII to the Bolling-Allerod oscillation, and layers VI-V to the beginning of the Holocene (Mercier et al., this volume). For the Mesolithiic layers, dates were available already a few years ago (Baković et al. 2009). In the excavations of 2005, Mesolithic layer 4, which probably correlates with layer IVb2, was dated to 9962–9704 cal BP (Beta-211505), while Mesolithic layer 2, which could link to layer IVb1, gave two virtually identical dates of 8521–8375 cal BP (Beta 211503) and 8539–8387 cal BP (Beta 211504) (Mercier et al., this volume). We will return to the chronology and correlations between layers below.

Materials and Method

The materials that we will present in this contribution differ substantially in quantity and the nature of their collection and thus offer different possibilities for analysis and interpretation. It is necessary to keep in mind that from the beginning of excavations at Crvena Stijena the fact that the researchers were trying to reach the bottom of the shelter decidedly influenced the way they collected materials. This was particularly the case for Basler who in only one season completely emptied the site of all Upper Paleolithic layers and in the following couple of years dug through fully ten meters of cultural layers. It is understandable that, because of this, documentation of the excavations is lacking and that relatively few finds were recovered.

However, the situation is somewhat different in terms of the reliability of the stratigraphy and the usefulness of the archaeological finds. Benac, Brodar, and Basler were careful to differentiate material by layers and there is thus not much question about the context of the finds, except for those already mentioned in the literature (for example the presence of steeply retouched tools in layer X which was at first assigned to the Aurignacian [Mihailović and Mihailović 2007]), and the fact that the stratigraphic layers in Crvena Stijena are well differentiated because of alternating stratification of geological and anthropogenic sediments made excavations easier. The stratigraphy which they defined has been confirmed in the course of the recent excavations thanks to "Basler's profile" in the deep, interior sondage, which has been preserved up to now just as it was left by him (Basler 1975).

Although the excavations were fast, and documentation is lacking, it can be seen from the labels on the bags of finds that the defined layers were removed in cuts that did not exceed 10 cm in depth. The sediments were not screened, but tiny finds were regularly collected, especially during Brodar's excavations of the interior sondages. The situation is different with Basler's excavations, where one must ask how it is possible that as a rule less than 100 artifacts were collected from massive charcoal layers, in contrast to Brodar who recovered over 3000 from the test pit in the base of sondage D.

In contrast to faunal remains which were not kept (a certain number are preserved in the Geological-Paleontological Department of the Natural History Museum in Zagreb), a good portion of the archaeological material from the excavations was saved. The Upper Paleolithic and Mesolithic materials is maintained in the Zavičajni Muzej in Nikšić and contains all, even the tiniest, artifacts. This is also the case for the Middle Paleolithic finds that Brodar collected during his 1955-1958 excavations. Unfortunately, when Basler's excavations are in question, only selectively collected material actually published in the 1975 monograph (Basler 1975) is found in the Nikšić museum. In these collections are found only cores and retouched tools, while unretouched artifacts are almost totally absent.

The approach that we have had to take to the analysis of the materials stems from these conditions. The material from the Mesolithic and Upper Paleolithic investigations as well as from Brodar's excavations could be completely analyzed (Table 10.1), but the selectively kept material from Basler's collections could be analyzed in detail only from the aspect of the occurrence of individual types of cores and retouched tools. The technological analysis of the Upper Paleolithic and Mesolithic materials is presented according to standard morphotechnological and morphometric criteria that allow a reconstruction of the reduction sequence (*chaîne opératoire*). For the analyses of the Middle Paleolithic materials we have used the criteria presented in Inizan et al. (1995), Lenoir and Turq (1995) and Boëda (1994), while we have tried to identify bipolar technique on the basis of Dibble and McPherron's (2007) observations.

The Middle Paleolithic Sequence

We consider layers that belong to different part of the Middle Paleolithic sequence separately because they are dated to different periods and belong to different sedimentary cycles. In the lower part of the sequence, we have placed layers XXXI-XXV which, by all evidence predate MIS 4 and belong to Morley's lithofacies 3 (Morley, this volume). We have associated the largely anthropogenic layers XXIV-XX which are dated to the boundary between MIS 5/MIS 4 with the middle part of the sequence. And we have put layers XVIII-XII, which cover the upper part of lithofacies 1, which falls in MIS 3, in the upper part of the sequence.

Table 10.1. General structure of Brodar's assemblages.

		XVIII	XVII	XVI	XV	XIV	XIII	XII
Cores	*n*	15	0	4	3	15	15	30
	%	2.6	0.0	3.6	8.6	4.3	8.7	3.2
Flakes	*n*	351	9	72	25	228	92	685
	%	60.4	64.3	64.3	71.4	64.8	53.5	73.4
Tools	*n*	180	5	35	7	101	58	158
	%	31.0	35.7	31.2	20%	28.7	33.7	16.9
Chunks	*n*	35	0	1	0	8	7	60
	%	6.0	0.0	0.9	0.0	2.3	4.0	6.4
Total	*n*	581	14	112	35	352	172	933
	%	100.0	100.0	100.0	100.0	100	100.0	99.9
+ Chips and small fragments		269	2	42	29	83	29	657

Layers XXXI-XXV (Figs. 10.2-10.4)

The lowest layers are of unequal thickness and show different intensities of occupation. Bones of animals from different biomes are found in these layers, including warm-climate rhinoceros (*Dicerorhinus kirchbergensis*), and different species of cervids (giant elk [*Megaceros*], fallow deer, roe deer), bovids (cattle, bison), equids (*Equus caballus*) and caprids (chamois, ibex). The fauna is most diverse in layer XXXI where there are the most finds, while in other layers fauna is not found in the same proportion to the number of artifacts. In layer XXX, in which many artifacts were found, no fauna is recorded, while in layer XXIX, in which there were scarcely any archaeological finds, many animal bones were found. Diverse fauna is noted for layer XXVIII, while in layers XXVII-XXV only one or two species were recorded.

In layers XXX-XXXI finds made on poor quality chert dominate. Artifacts of medium-quality chert make up 18-34%, while finds made from high quality raw material (chalcedony and opal) are totally absent (Table 10.2). Most frequent are Levallois cores (Fig.10.2: 1-3), discoidal cores (Fig. 10.2: 4) appear in virtually equal numbers, and cores on flakes, including Kombewa examples, as well as one typical core on a flake with a faceted truncation (*truncated-faceted piece*) were also found. Among unretouched artifacts, unretouched Levallois flakes, *débordant* flakes, and several thick blades and bladelets are recorded. In the assemblage of tools (Table 10.3),

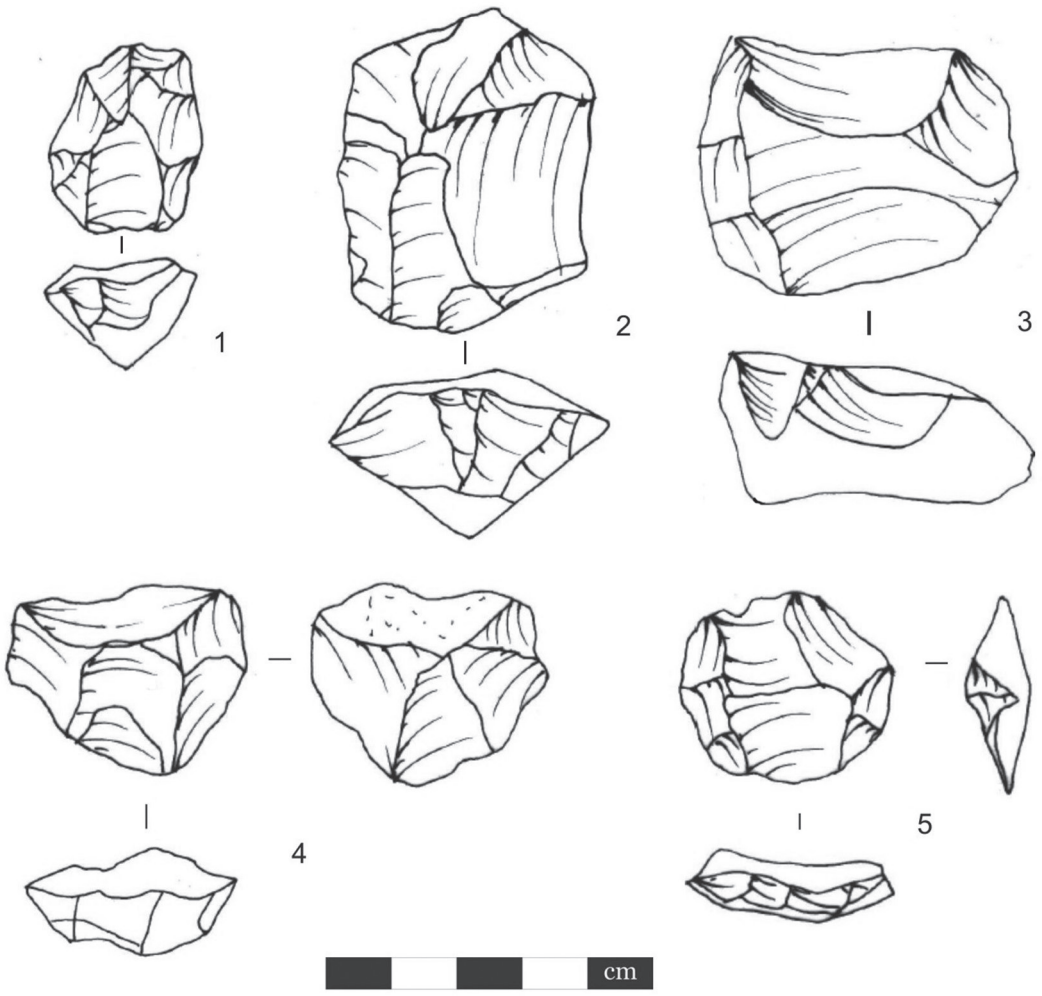

Fig. 10.2. Middle Paleolithic cores from Basler's collection. Layer XXXI (1-4), XXV (5). Levallois (1-3, 5), discoidal (4), Drawn by D. Mihailović.

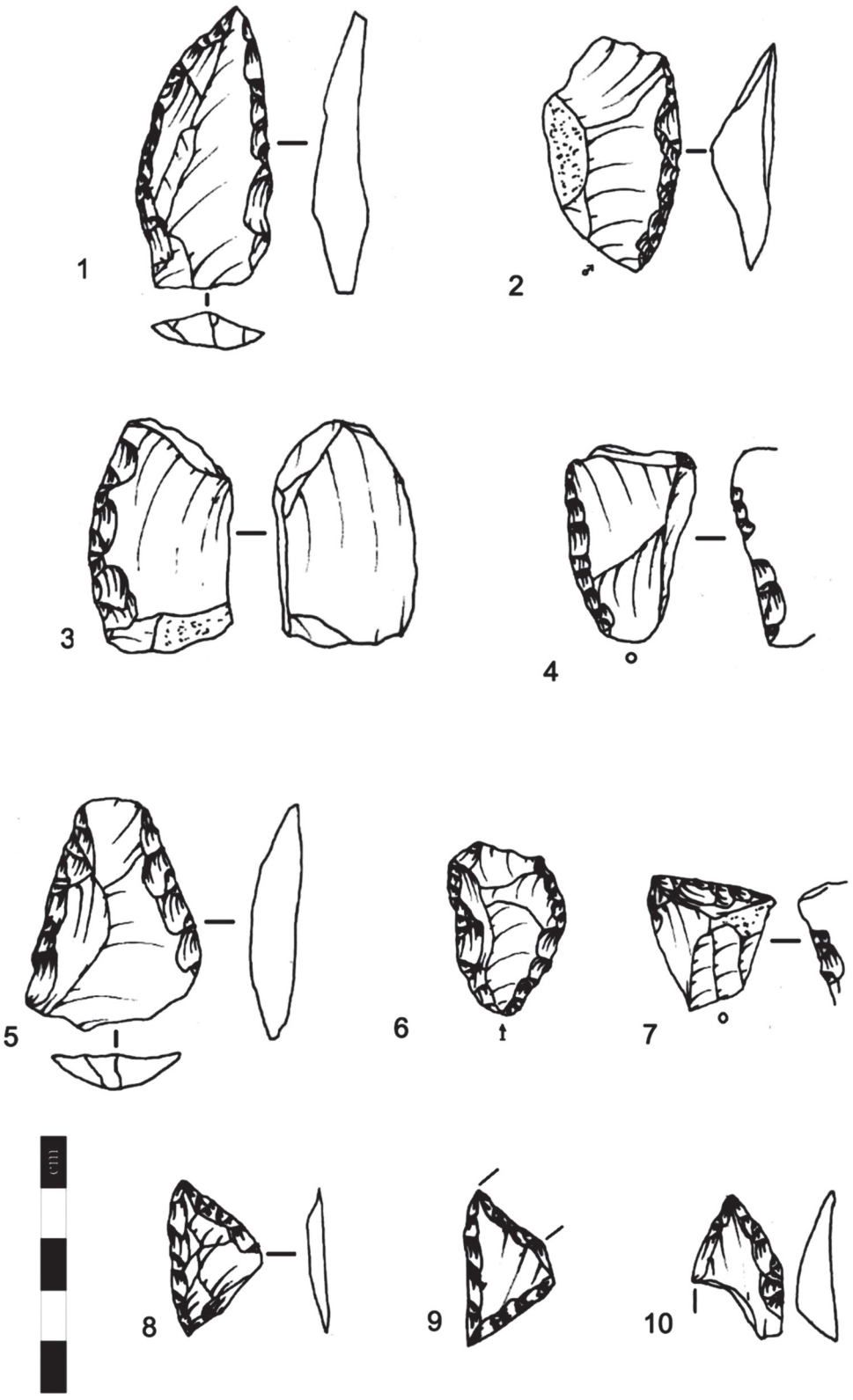

Fig. 10.3. Middle Paleolithic tools from Basler's collection. Layer XXXI (1-10). Mousterian point (1), sidescrapers (1-7), borers (8-10). Drawn by D. Mihailović.

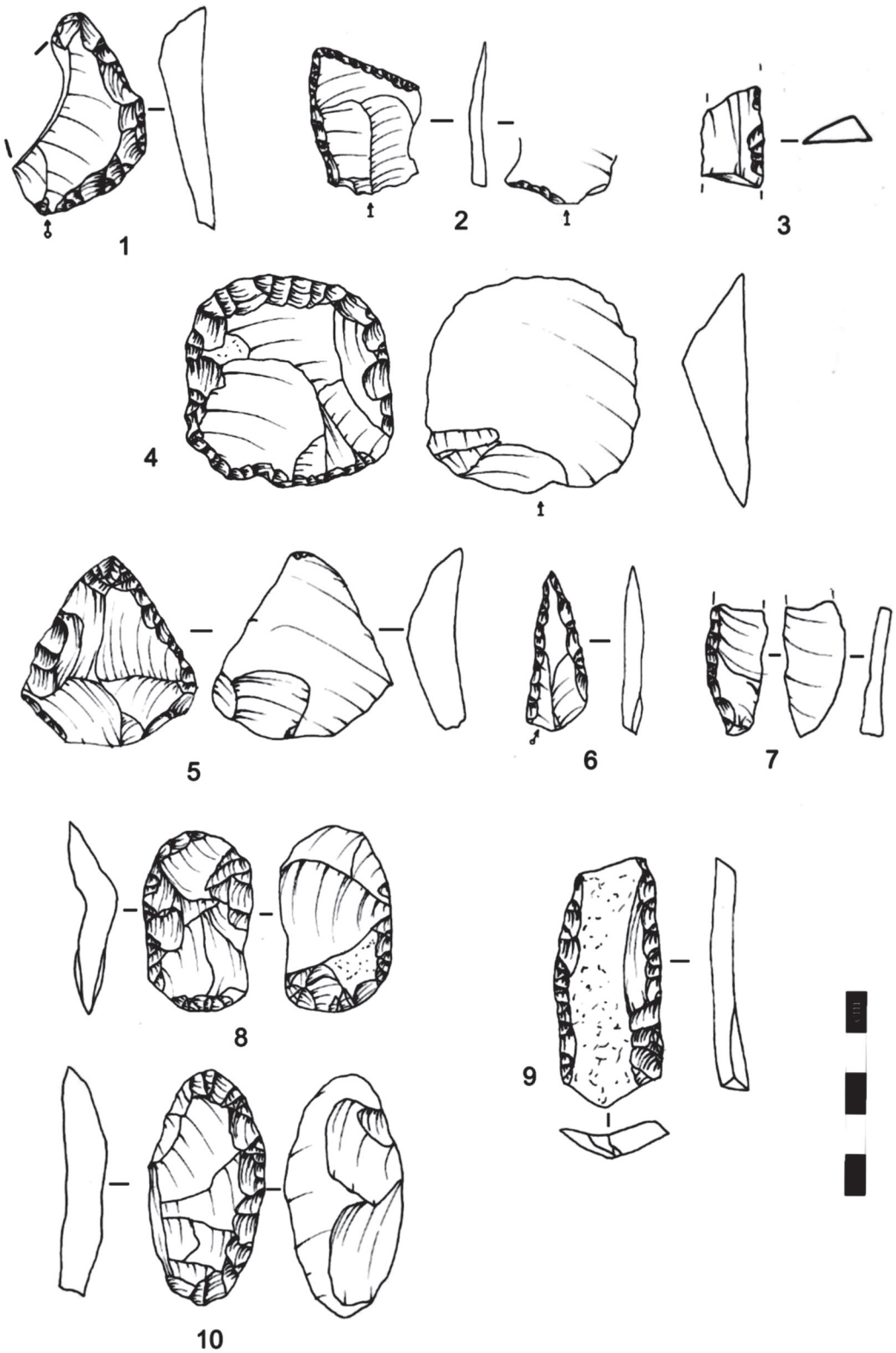

Fig. 10.4. Middle Paleolithic tools from Basler's collection. Layer XXX (1-3), Layer XXIX (4), Layer XXVII (5-7), Layer XXVI/XXVII (8), Layer XXV (9-10). Sidescrapers (1-2, 4-5, 8-10), borers (6), retouched blades (3, 7). Drawn by D. Mihailović.

Table 10.2. Raw-material structure: Basler's assemblages of cores, unretouched artifacts (from the group of *debordant* and Levallois flakes, pseudo-Levallois flakes and naturally-backed knives) from the layers XXXI-XX.

		XXXI	XXX	XXIX	XXVIII	XXVII	XXVI	XXV	XXIV	XXIII	XXII	XXI	XX
Chalcedony/Opal	*n*	0	1	0	0	0	0	0	4	0	3	0	3
	%	0.0	3.6					0.0	5.9		2.5		4.8
Flint and medium quality chert	*n*	24	10	0	1	1	1	2	23	3	44	2	32
	%	32.0	35.7					18.2	33.8		37.3	20.0	51.6
Low-quality chert and silicious rocks	*n*	51	17	6	2	3	0	8	35	2	62	6	23
	%	68.0	60.7					72.7	51.5		52.5	60.0	37.1
Indeterminate	*n*	0	0	0	0	0	0	1	6	0	9	2	4
	%	0.0	0.0					9.1	8.8		7.6	20.0	6.4
Total	*n*	75	28	6	3	4	1	11	68	5	118	10	62
	%	100.0	100.0					100.0	100.0		99.9	100.0	100.0

sidescrapers are dominant at 35-40%, but denticulated and notched pieces (around 15-30%), irregular scrapers (11-13%), and in layer XXXI percoirs (13%) are well represented. Lateral sidescrapers are most common in layer XXXI (Fig. 10.3: 2-6), transversal in layer XXX, although lateral-transversal and bilateral retouched examples are found in both layers (Table 10.4). Assymetric bilateral retouched borers with of a completely geometric shape are characteristic for layer XXXI (Fig. 10.3: 8, 9).

The assemblages from layers XXIX-XXV contain very few finds. Artifacts are made from the same raw materials. Levallois cores (preferential and centripetal), as well as one core on a burin-like flake (in layer XXIX), are represented. Among the tools lateral and transversal sidescrapers stand out. Oval, bifacially flaked sidescrapers occur: one was found at the contact between layers XXVI and XXVII (Fig. 10.4: 8) and a second one (with a partially flaked ventral surface) in layer XXV (Fig. 10.4: 10). In layer XXVII one elongated bilaterally retouched point, whch was classified as a borer, was found (Fig. 10.4: 6).

Layers XXIV-XIX (Figs. 10.5-10.7)

The middle part of the stratigraphic sequence begins with layer XXIV which is almost 3 m thick. This layer contains numerous fine layers of charcoal and ash, impregnated bones, and flaked artifacts. It was observed that at least three horizons appear in this layer (XXIVa-XXIVc) of which one (XXIVb) contains three levels, but materials were not separated stratigraphically during excavation (Basler 1975: 54–55). In layers XXIII and XXI, very few finds (5-10 pieces) were collected, while in layers XXII and XX there were numerous artifacts and remains of fauna. The largest amount of remains was found in layer XX, in which several hearths were found, including an irregular round hearth with a diameter of 120 cm, which was paved with rocks (Basler 1975: 47). Layer XIX in which no artifacts were found belongs to this part of the sequence.

The fauna is somewhat different from the fauna in the deeper layers. Steppic species (horse, wooly rhinoceros, tur) seem to be more frequesnt, but remains of red deer, giant elk (*Megaceros*), wild boar, roe deer, and ibex are somewhat present. Animals that used the shelter as a den are represented by brown bear and cave hyena. According

Table 10.3. Tools (Basler's assemblages).

		XXXI	XXX	XXIX	XXVIII	XXVII	XXVI	XXV	XXIV	XXIII	XXII	XXI	XX	XVIII	XVII	XVI	XV	XIV	XIII	XII
Retouched Levallois flakes	*n*	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	%	3.2	0.0						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mousterian points	*n*	1	0	0	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	1
	%	1.6	0.0						3.4	0.0	2.8	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	5.2
Debordant and pseudo-Levallois flakes and "knives"	*n*	1	0	0	0	0	0	0	0	0	5	0	2	2	1	1	0	1	0	0
	%	1.6	0.0						0.0	0.0	4.6	0.0	3.4	4.0	4.3	3.7	0.0	2.9	0.0	0.0
Sidescrapers	*n*	22	9	1	0	1	0	6	41	1	69	4	34	16	5	7	3	11	12	9
	%	35.5	39.1						69.5	10.0	63.9	40.0	58.6	32.0	21.7	25.9	23.1	31.4	30.8	47.4
Endscrapers	*n*	7	3	0	0	0	0	1	2	0	5	1	1	3	3	1	2	2	3	1
	%	11.3	13.0						3.4	0.0	4.6	10.0	1.7	6.0	13.0	3.7	15.4	5.7	7.7	5.2
Retouched blades	*n*	0	2	0	1	0	0	0	1	0	0	0	2	2	2	0	0	1	2	2
	%	0.0	8.7						1.7	0.0	0.0	0.0	3.4	4.0	8.7	0.0	0.0	2.9	5.1	10.5
Backed knives	*n*	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0	0
	%	0.0	0.0						1.7	10.0	0.9	0.0	3.4							
Retouched flakes	*n*	6	2	0	1	0	0	1	8	1	9	1	3	8	2	8	5	8	7	1
	%	9.7	8.7						13.5	10.0	8.3	10.0	5.2	16.0	8.7	29.6	38.4	22.8	17.9	5.2
Notched and denticulated tools	*n*	9	7	3	1	1	0	0	3	2	11	3	3	10	8	6	1	6	7	1
	%	14.5	30.4						5.1	20.0	10.2	30.0	5.2	20.0	34.8	22.2	7.7	17.1	17.9	5.2
Raclettes	*n*	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	1	4	1	0
	%	0.0	0.0						0.0	0.0	0.0	0.0	1.7	4.0	0.0	3.7	7.7	11.4	2.6	0.0
Splintered pieces	*n*	1	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0
	%	1.6	0.0						0.0	0.0	1.9	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0
Truncated pieces	*n*	4	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	1	1	0
	%	6.5	0.0						0.0	0.0	0.9	0.0	0.0	2.0	0.0	3.7	0.0	2.9	2.6	0.0
Burins	*n*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	%	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	5.2
Perforators	*n*	8	0	0	0	1	0	0	1	5	2	1	8	3	2	1	0	1	2	3
	%	12.9	0.0						1.7	50.0	1.9	10.0	13.8	6.0	8.7	3.7	0.0	2.9	5.1	15.8
Combined tools	*n*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	%	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0
Tool fragments	*n*	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	2	0
	%	1.6	0.0						0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	7.7	0.0	5.1	0.0
Total	*n*	62	23	4	3	4	0	9	59	10	108	10	58	50	23	27	13	35	39	19
	%	100	99.9						100	100.0	100	100.0	99.8	100.0	99.9	99.9	100.0	100.0	100.0	99.7

Table 10.4. Side-scraper types (Basler's assemblages)..

		XXXI	XXX	XXIX	XXVIII	XXVII	XXVI	XXV	XXIV	XXIII	XXII	XXI	XX
Lateral	*n*	14	2	0	0	0	0	3	26	1	42	1	22
Bilateral	*n*	1	2	1	0	1	0	1	3	0	3	0	2
Transversal	*n*	4	3	0	0	0	0	2	7	0	17	2	7
Latero-trans-versal	*n*	4	2	0	0	0	0	0	5	0	5	1	3
Bifacial	*n*	0	0	0	0	0	0	0	0	0	1	0	0
Total	*n*	22	9	1	0	1	0	6	41	1	68	4	34
Quina	*n*	0	0	0	0	0	0	1	2	0	14	0	7

to Basler (1975), the greatest number of faunal remains from layer XX belong to horse (*Equus caballus*).

Certain changes are also seen in the structure of the stone tool industries. Raw materials are more diverse, the frequency of opal and chalcedony is slightly greater, but the proportion of medium quality chert is notably higher, at least in the case of layer XX (Table 10.2). There are no important changes in the repertoire of cores (discoidal, Levallois) or the products of flaking, although in layer XX naturally backed flakes and pseudo-Levallois points used as the bases for making tools are somewhat more numerous. The dimensions of unretouched flakes in layer XXII fall below 30 mm, approaching the values observed in the upper part of the Middle Paleolithic sequence (Table 10.5).

Changes in the structure of the tool industry are more marked (Table 10.3). In all the assemblages mentioned, sidescrapers occur at around 60-70% and other tool types are notably less frequent. Only layer XX is an exception, in which borers make up 13.8%, which was the reason that Basler assigned this assemblage to a "Mousterian with triangular points". Backed tools are found in virtually all layers. The greatest variability is found in sidescrapers: although laterally retouched examples are the most frequent in all layers, all other types also appear (bilateral, lateral-transversal, etc.). Transversal sidescrapers are most frequent in layers XXII and XX, and many of them are made with Quina or semi-Quina retouch, which appears already in layer XXIV (Table 10.4). Many sidescrapers are ventrally thinned and in layer XXIV dorsal thinning is also found. However, there are no bifacially retouched examples.

Layers XVIII-XII (Figs. 10.8-10.11)

In layer XVIII Basler recovered only 89 artifacts, and Brodar 850, although it is possible that in the 1958 excavations Brodar incorporated layers XIX and XX into this layer (Mihailović and Whallon 2017). Relatively few artifacts were found in layers XVII and XV, while finds from layers XIV-XII, at least in Brodar's collection, are notably more numerous (all together around 2000 pieces). This shows that the intensity of occupation in this period was not low, as was assumed (Basler 1975), but, rather, relatively high, which new excavations have confirmed.

Table 10.5. Average length in mm of unretouched flakes and tools on flakes (Basler's assemblages).

	XXXI	XXX	XXIX	XXVIII	XXVII	XXVI	XXV	XXIV	XXIII	XXII	XXI	XX
Unretouched flakes	24.0	32.0						33.3		29.0		25.7
Retouched flakes	49.5	43			48.5		51.3	40.3		39.5		35.4

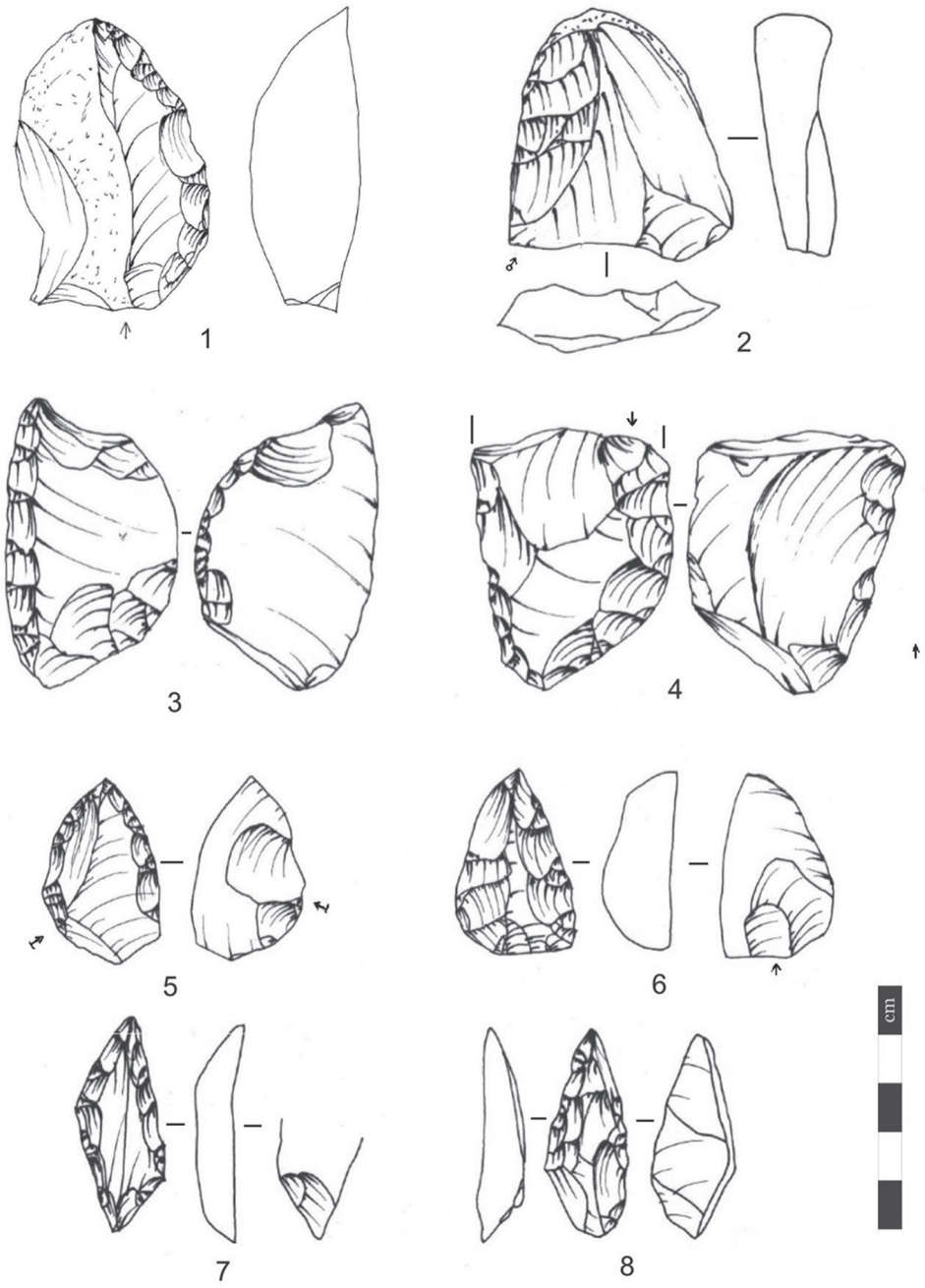

Fig. 10.5. Middle Paleolithic tools from Basler's collection. Layer XXIV (1-8). Sidescrapers (1-6), borer (7), point (8). Drawn by D. Mihailović.

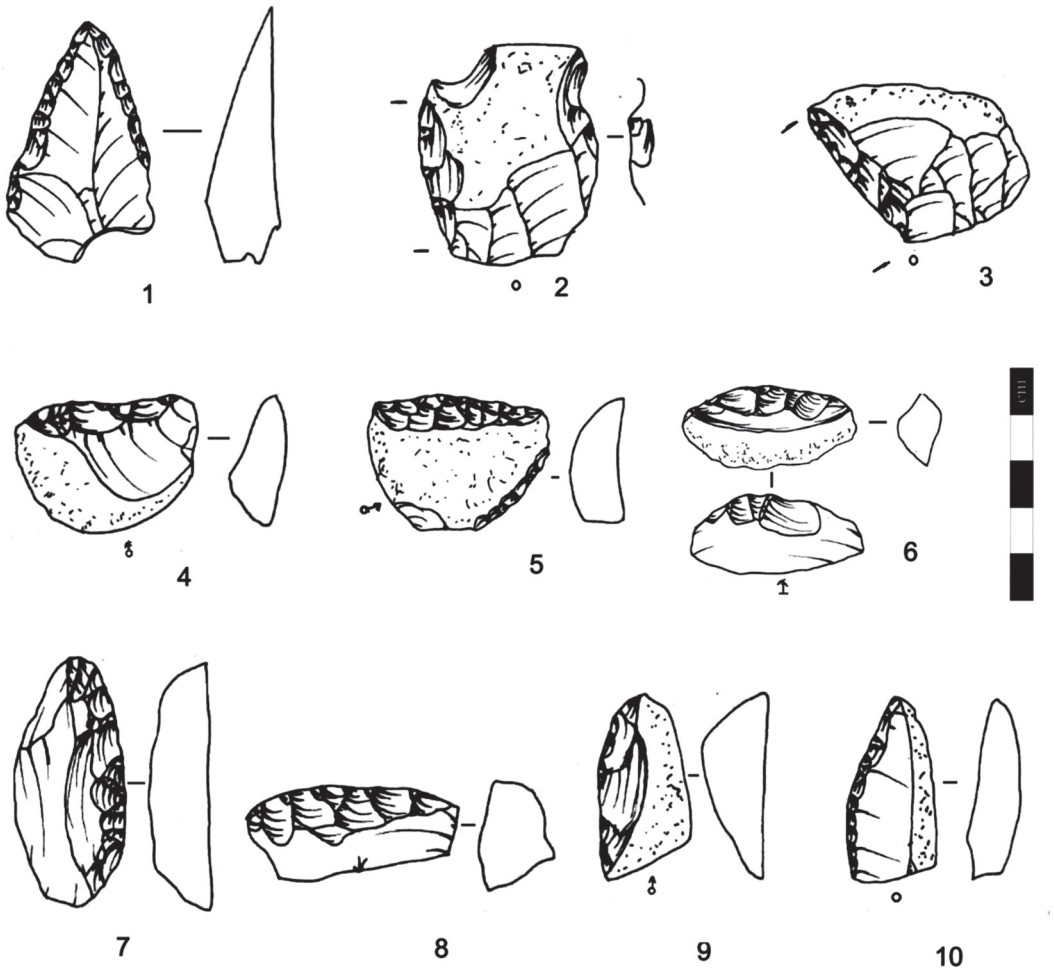

Fig. 10.6. Middle Paleolithic tools from Basler's collection. Layer XXII (1-10). Mousterian point (1), sidescrapers (2-9), backed knive (10). Drawn by D. Mihailović.

Faunal remains independently testify to the intensity of occupation. They are quite diverse in layer XVIII (horse, red deer, tur, ibex, chamois), in layers XVI-XIV were found remains of up to three species (in layer XVI wooly rhinoceros, in layer XV marmot, red deer, and ibex, and in layer XIV red deer), and in layers XIII and XII numerous remains of bovids, cervids, caprines, and suidae were noted (Malez 1975).

The make-up of raw materials is almost identical to that of assemblages from lower layers (Table 10.6). Cores are generally found in small percentages, except in the assemblages from layers XIII and XV in which they reach as high as 9%. The proportions of flakes range around 60-75%, except in layer XIII where they form 53%. Tools occur in relatively high percentages (around 30%), except in layer XII where they represent only 17%. In spite of that, the greatest proportion of large débitage is found in this layer, and chips and tiny fragments are also numerous (Table 10.1).

In terms of flaking technology, several methods can be identified: Levallois, discoidal, Kombewa, and both unipolar and bipolar methods (Mihailović and Whallon 2017). The Levallois method is present in all layers, perhaps somewhat more in layers XII and XIV, in which cores of this type represent about 50%. Within this method, preferential, recurrent, and centripetal flaking techniques can be identified. Most common are centripetal and preferential cores (and the products that can be related to these flaking techniques), while flakes from the recurrent flaking technique are virtually

Table 10.6. Raw-material structure: Brodar's assemblages from the layers XVIII-XII (all categories, without chips and small fragments).

		XVIII	XVII	XVI	XV	XIV	XIII	XII
Chalcedony/Opal	*n*	19	2	4	1	8	5	25
	%	3.3	14.3	3.6	2.8	2.3	2.9	2.6
Flint and medium quality chert	*n*	179	8	42	6	103	34	318
	%	30.1	57.1	37.5	17.1	29.3	19.8	34.1
Low-quality chert and silicious rocks	*n*	336	3	58	26	225	127	481
	%	57.8	21.4	51.8	74.2	63.9	73.8	51.6
Indeterminate	*n*	47	1	8	2	10	6	109
	%	8.1	7.1	7.1	5.7	2.8	3.5	11.7
Total	*n*	581	14	112	35	352	172	933
	%	100.0	99.9	100.0	99.8	99.9	100.0	100.0

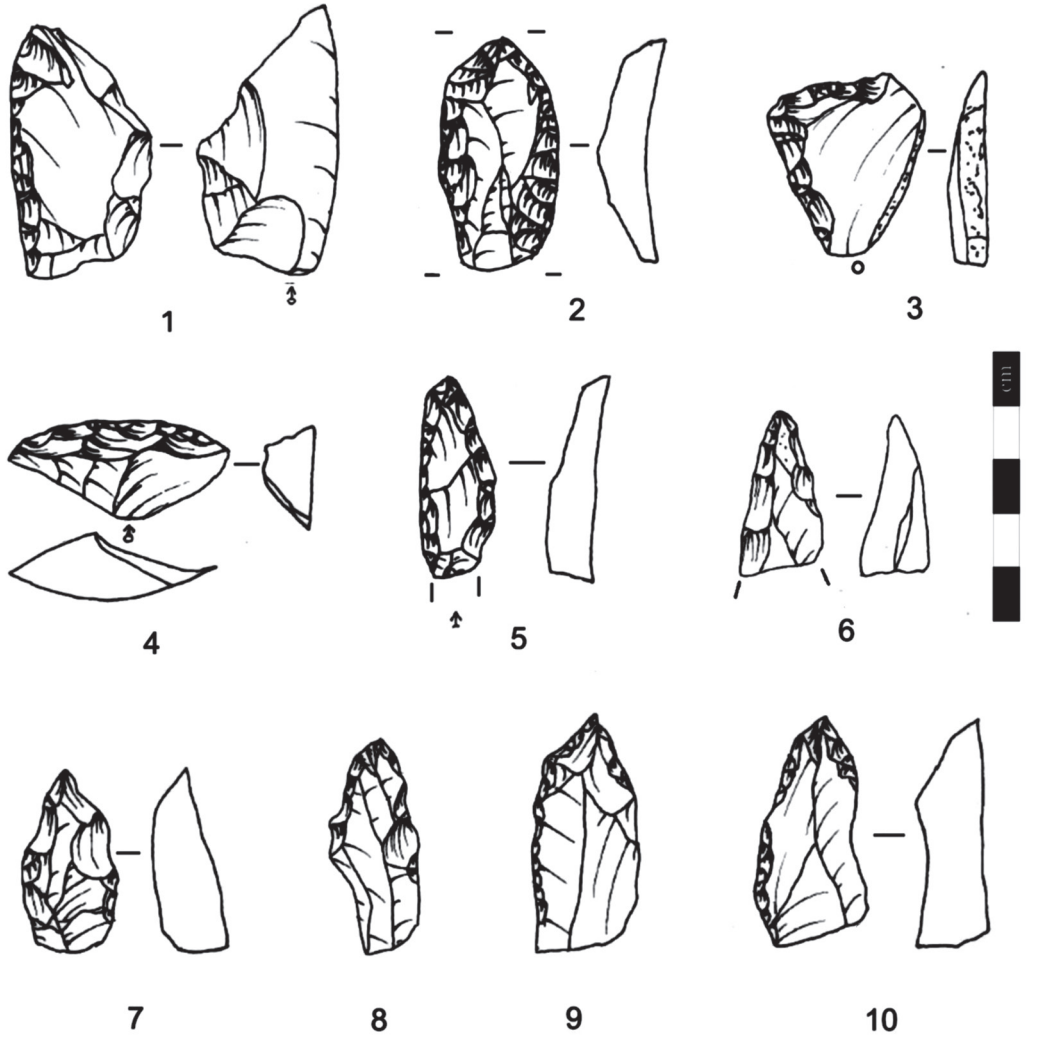

Fig. 10.7. Middle Paleolithic tools from Basler's collection. Layer XX (1-10). Sidescrapers (1-4), borers (5-10). Drawn by D. Mihailović.

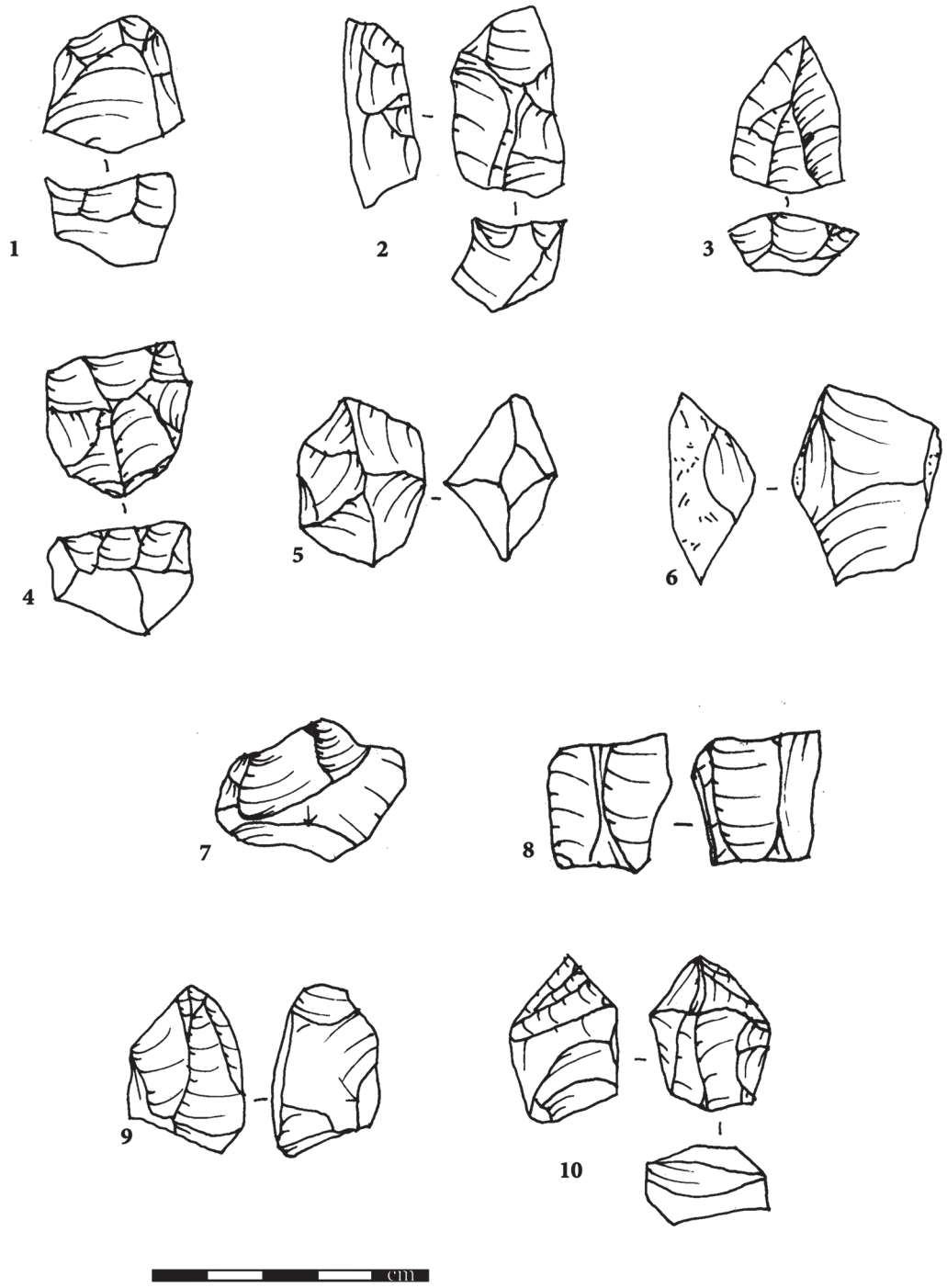

Fig. 10.8. Middle Paleolithic cores from Brodar's collection. Layer XVIII (2), XVI (1, 9), XV (3), XIV (4, 10), XII (5-8). Levallois (1-4), discoidal (5), bipolar (6), Kombewa (7), bidirectional (8), burin-like for bladelets (9-10). Drawn by D. Mihailović.

absent. Numerous flakes with centripetally oriented negative scars and faceted platforms bear witness to the use of the centripetal method, but flakes of éclat débordant type occur in all layers at between 10-20%. Besides these cores, there are cores on flakes (including Kombewa cores),

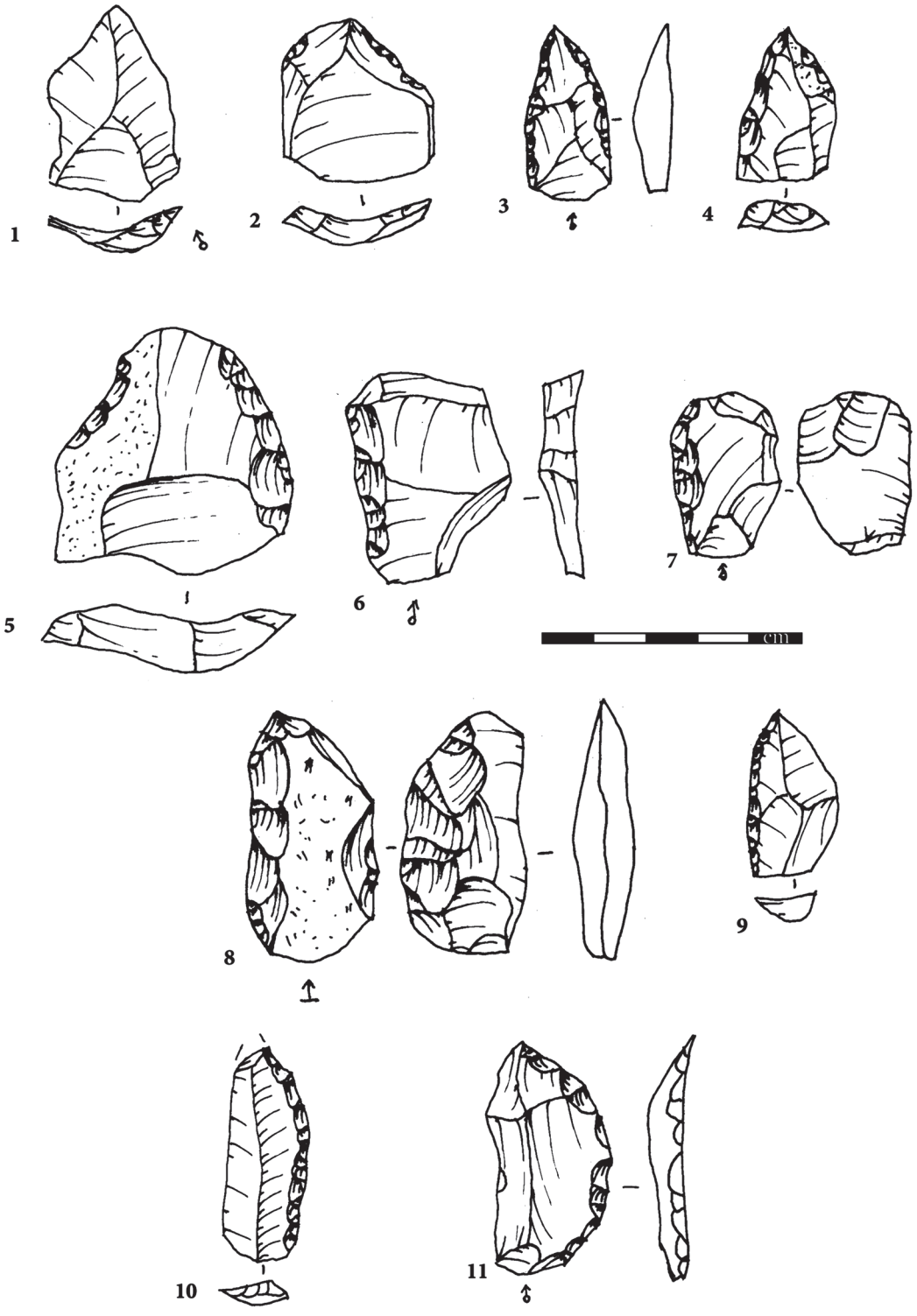

Fig. 10.9. Unretouched Middle Paleolithic artifacts and tools from Basler's collection. Layer XVIII (1, 9), XVII (5, 10), XVI (6), XV (11), XIV (2, 3, 7), XIII (4), XII (8). Levallois flakes (1, 2), Mousterian points (3, 4), sidescrapers (5-8), backed pieces (9-11). Drawn by D. Mihailović.

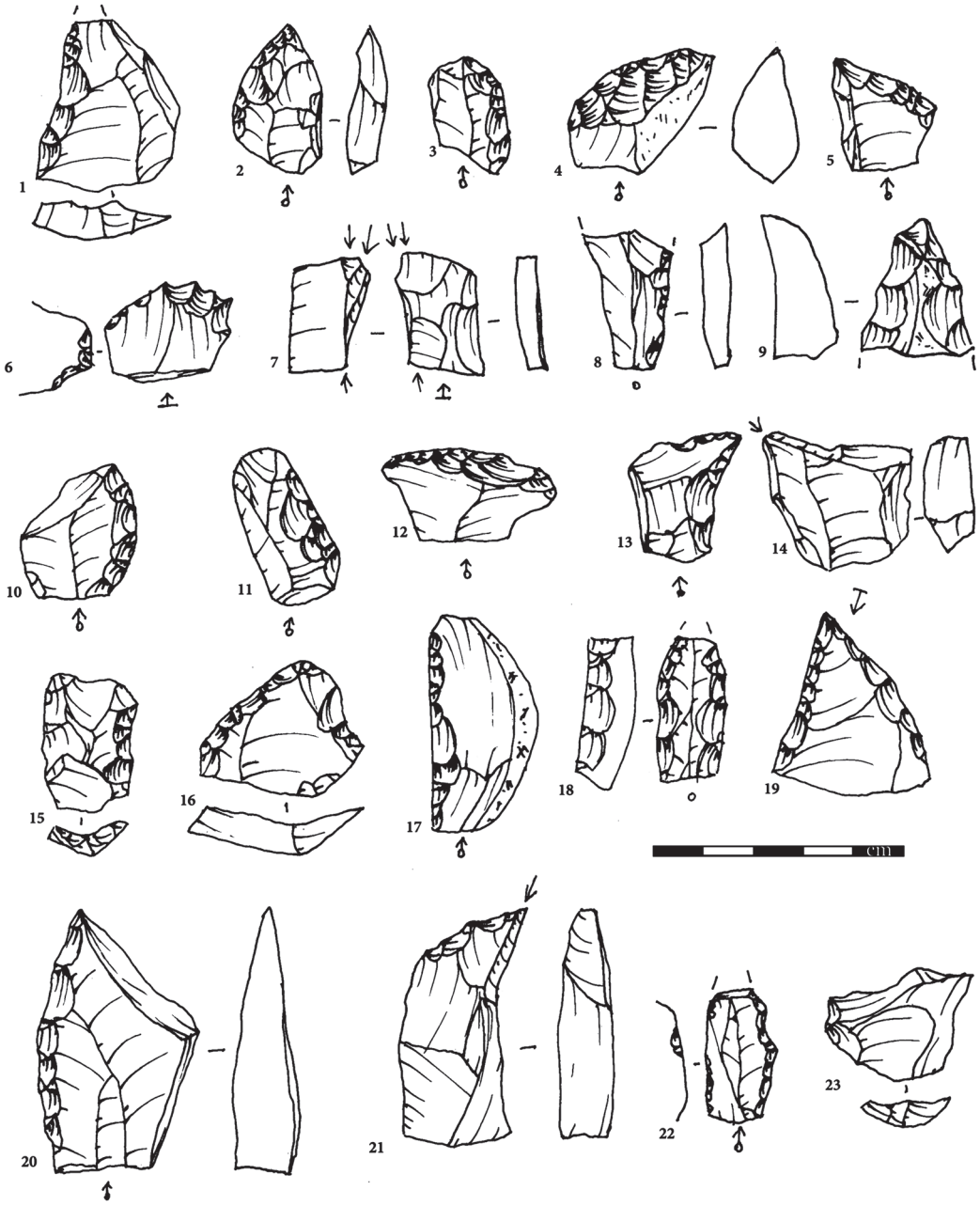

Fig. 10.10. Middle Paleolithic tools from Brodar's collection. Layer XVIII (1-19), layer XVII (20-23). Sidescrapers (1-5, 10-13, 15-17, 20), denticulate tool (6), burins (7, 14, 21), retouched blade (8), endscraper (9), retouched Levallois flake (23), points (18-19), backed piece (22).Drawn by D. Mihailović.

as well as unipolar and bipolar cores for the flaking of bladelets and elongated flakes in these upper layers. A small number of typologically undifferenciated carinated burins with a series of elongated negative scars on their edges also can be placed among the cores (Fig. 10.8: 9-10).

A high degree of utilization of the cores led to the microlithization of the artifacts (Table 10.7). In Brodar's sample, in most assemblagess the dimensions of unretouched flakes varies between 20-25 mm, while retouched tools are on the average larger (24-28 mm), especially in Basler's

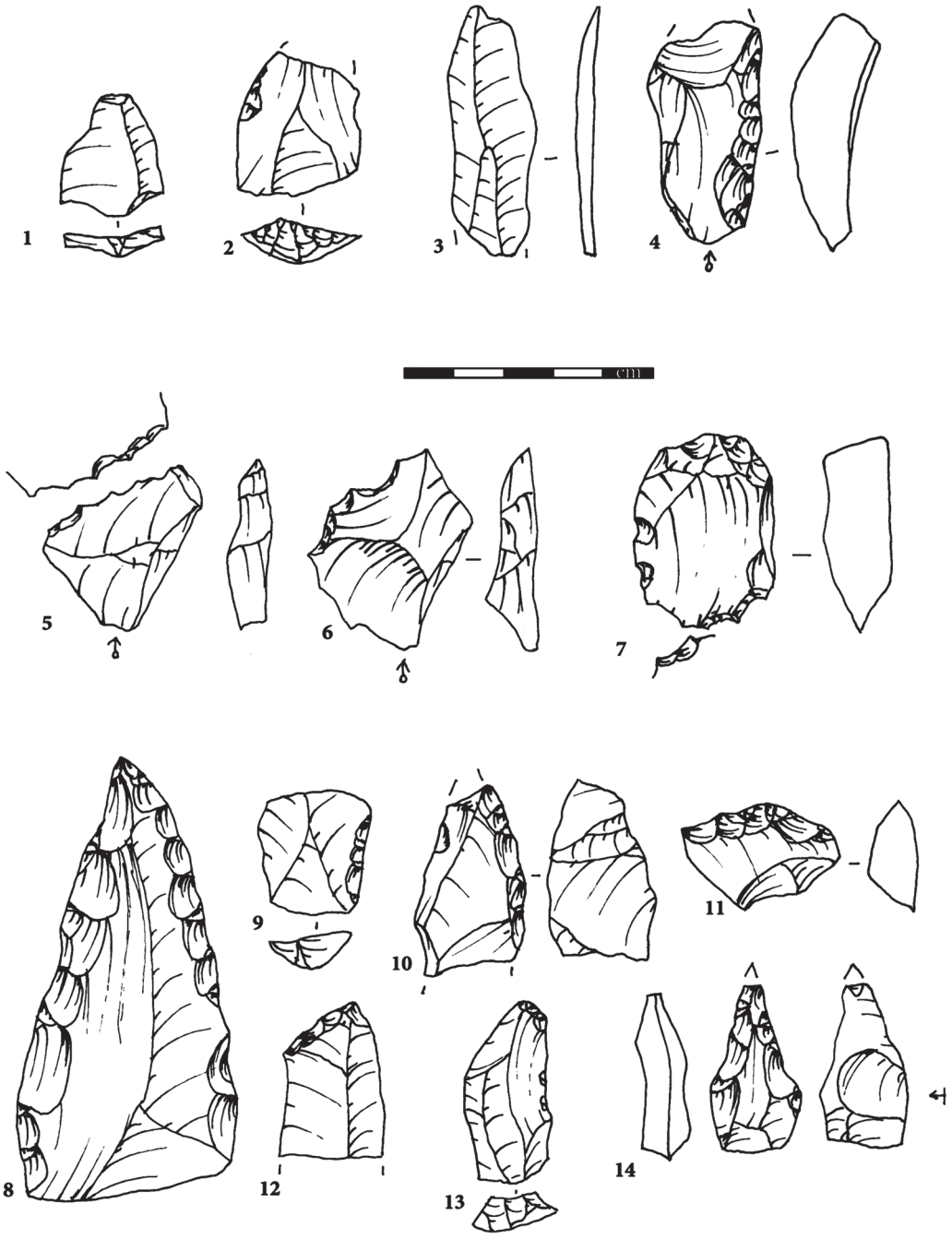

Fig. 10.11. Unretouched Middle Paleolithic artifacts and tools from Brodar's collection. Layer XVI (1-4), XIII (5-7), XII (8-14). Levallois flakes (1-2), blade (3), sidescrapers (4, 9-11), "denticulate" pieces (5-7), Mousterian point (8), truncations (12, 13), borer (14). Drawn by D. Mihailović. Fig. 10.11. Unretouched Middle Paleolithic artifacts and tools from Brodar's collection. Layer XVI (1-4), XIII (5-7), XII (8-14). Levallois flakes (1-2), blade (3), sidescrapers (4, 9-11), "denticulate" pieces (5-7), Mousterian point (8), truncations (12, 13), borer (14). Drawn by D. Mihailović.

Table 10.7. Average length in mm of unretouched flakes and tools on flakes (Brodar's assemblages).

	XVIII	XVII	XVI	XV	XIV	XIII	XII
Unretouched flakes	22.6	33.8	21.3	20.5	23.6	24.4	22.4
Retouched flakes	24.5	51.0	27.0	24.7	27.4	28.6	24.0

collection (25-34.2 mm). This shows that somewhat larger flakes were chosen for making tools. Although the artifacts from the upper layers are on the average somewhat smaller than those from the deepest layers, no clear trend towards microlithization was observed in layers XVIII-XII.

Sidescrapers dominate in the structure of the tool assemblage (Tables 6, 8), but they are less frequent than in the middle parts of the sequence. In Brodar's collection they occur at around 30-40% and are most numerous in layer XVIII, in which they form 37.2%. In layers XIII and XII, their frequency falls to 17.2% and 28.5% respectively, while the frequency of undifferenciated tools on flakes (denticulated and notched tools, retouched flakes) climbs to 35-45%. Borers in both collections occur more frequently in the upper layers, that is, in layer XII (10-15%), and the situation is similar for raclettes (XIII-XV).

Sidescrapers are made most commonly on small and short Levallois and *débordant* flakes. Lateral examples dominate in all layers, while transversal and convergent sidescrapers are somewhat more numerous in layer XVIII where examples with Quina and semi-Quina retouch are noted. Two almost identical bifacial sidescrapers were found in layer XII: one side is convex, the other straight, while their ventral surfaces are more than 50% covered with facial retouch (Fig. 10.9: 8). Among other types of tools, Mousterian points of small dimension, backed knives on cortical and débordant flakes (whose frequencies are in the range of 5-10%), and tools of Upper Paleolithic type should be mentioned. Steeply retouched tools are found in almost all layers. In layer XVII one point with a curved back and in layer XV a curved back point similar to a segment but of larger dimensions were found (Fig. 10.9: 10, 11). Retouched blades are few in number, but most common in layer XVIII in which seven were found. Scrapers and burins are not standardized and are found in the upper layers (XIV-XII).

New Excavations of Middle Paleolithic Layers (2008, 2012, and 2015 Excavations)

Before we present the new material from Middle Paleolithic layers, we must briefly turn to the stratigraphy and the context of the finds. In the course of the 2008 excavations which covered squares near the entrance to the shelter (O-S 96-93), two layers were seen underneath the tephra: layer M1 with somewhat darker sediment and layer M2 which was made up of somewhat lighter sediment. These layers could not be directly linked to the layers M1 and M2 in the extension of the excavation area (in squares O-V 88-93) because of the large stones that lay in between. This is the reason why we will present the artifacts from these two zones separately. On the other hand, during the 2012 excavations which were made in interior squares (O-V 88-93), on the edge of Basler's deep sondage, it was established that in layers M2-M5 there were many levels and zones (Mihailović, Mihailović and Borovinić, this volume), whose stratigraphic positions are still not completely clear. Because of that, and also because of the fact that investigations over this surface are not yet complete, we will present characteristic finds by layer and not by level.

Exterior Squares (O-S 93-96)

In layer M1 from the 2008 excavations (M1/08) were found one lateral straight sidescraper on a thick flake (Fig. 10.12: 1) and one piece of waste, while in layer M2 from that same year (M2/08) were noted: a core with facetted platform on a thick flake which is reminiscent of a carinated scraper, two atypical Levallois flakes with unprepared platforms, of which one (on a secondary Kombewa flake) was partially retouched with steep and deep retouch (Fig. 10.12: 2), followed by an angle burin on a fragment of a

Table 10.8. Tools (Brodar's assemblages).

		XVIII	XVII	XVI	XV	XIV	XIII	XII
Retouched Levallois flakes	*n*	0	0	1	1	2	0	1
	%	0.0		2.8		2.0	0.0	0.6
Mousterian points	*n*	0	0	0	0	1	0	1
	%	0.0		0.0		1.0	0.0	0.6
Debordant and pseudo-Levallois flakes and "knives"	*n*	17	0	1	0	6	6	8
	%	9.4		2.8		5.9	10.3	5.1
Sidescrapers	*n*	67	1	11	1	34	10	45
	%	37.2		31.4		33.7	17.2	28.5
Endscrapers	*n*	11	0	1	0	7	3	8
	%	6.1		2.8		6.9	5.2	5.1
Retouched blades	*n*	7	0	1	0	1	2	3
	%	3.9		2.8		1.0	3.4	1.9
Retouched flakes	*n*	27	0	6	0	10	12	34
	%	15.0		17.1		9.9	20.7	21.5
Notched and denticulated tools	*n*	19	2	4	1	15	14	22
	%	10.5		11.4		14.8	24.1	13.9
Raclettes	*n*	4	0	1	2	6	6	3
	%	2.2		2.8		5.9	10.3	1.9
Splintered pieces	*n*	15	0	1	0	5	0	1
	%	8.3		2.8		4.9	0.0	0.6
Truncated pieces	*n*	0	0	3	0	4	1	3
	%	0.0		8.6		4.0	1.7	1.9
Burins	*n*	5	1	0	0	2	1	5
	%	2.8		0.0		2.0	1.7	3.2
Perforators	*n*	4	0	2	1	5	2	13
	%	2.2		5.7		4.9	3.4	8.2
Combined tools	*n*	1	0	0	0	0	0	2
	%	0.6		0.0		0.0	0.0	1.3
Tool fragments	*n*	3	1	3	1	3	1	9
	%	1.7		8.6		3.0	1.7	5.7
Total	*n*	180	5	35	7	101	58	158
	%	99.9		99.6		99.9	99.7	100.0

sidescraper (Fig. 10.12: 3), a proximal fragment of a blade retouched on one edge with alternating semi-steep retouch (Fig. 10.12: 4), two broken semi-steeply retouched flakes and one shallow retouched flake. Beside these artifacts, this level contained two complete and two broken flakes, three tiny fragments of flakes, and one chip.

Interior Squares (O-V 88-93)

Layer M1

In layer M1 were found: a core on a flake with a wide, faceted platform (Fig. 10.12: 5), a bipolar core on a flake with a partially prepared platform (Fig. 10.12: 6), a burin-like core on a small fragment of a flake, a piece of waste and a fragment of a flake. In terms of retouched tools, an asymmetric bilateral-transverse "*déjéte*" sidescraper (Fig. 10.12: 7), a retouched, naturally backed flake, and an ordinary retouched flake were found.

Layer M2

In 2012 a hearth was found in layer M2, level M2c, in square R90. This hearth was excavated in detail, but only a single artifact was found in it: a

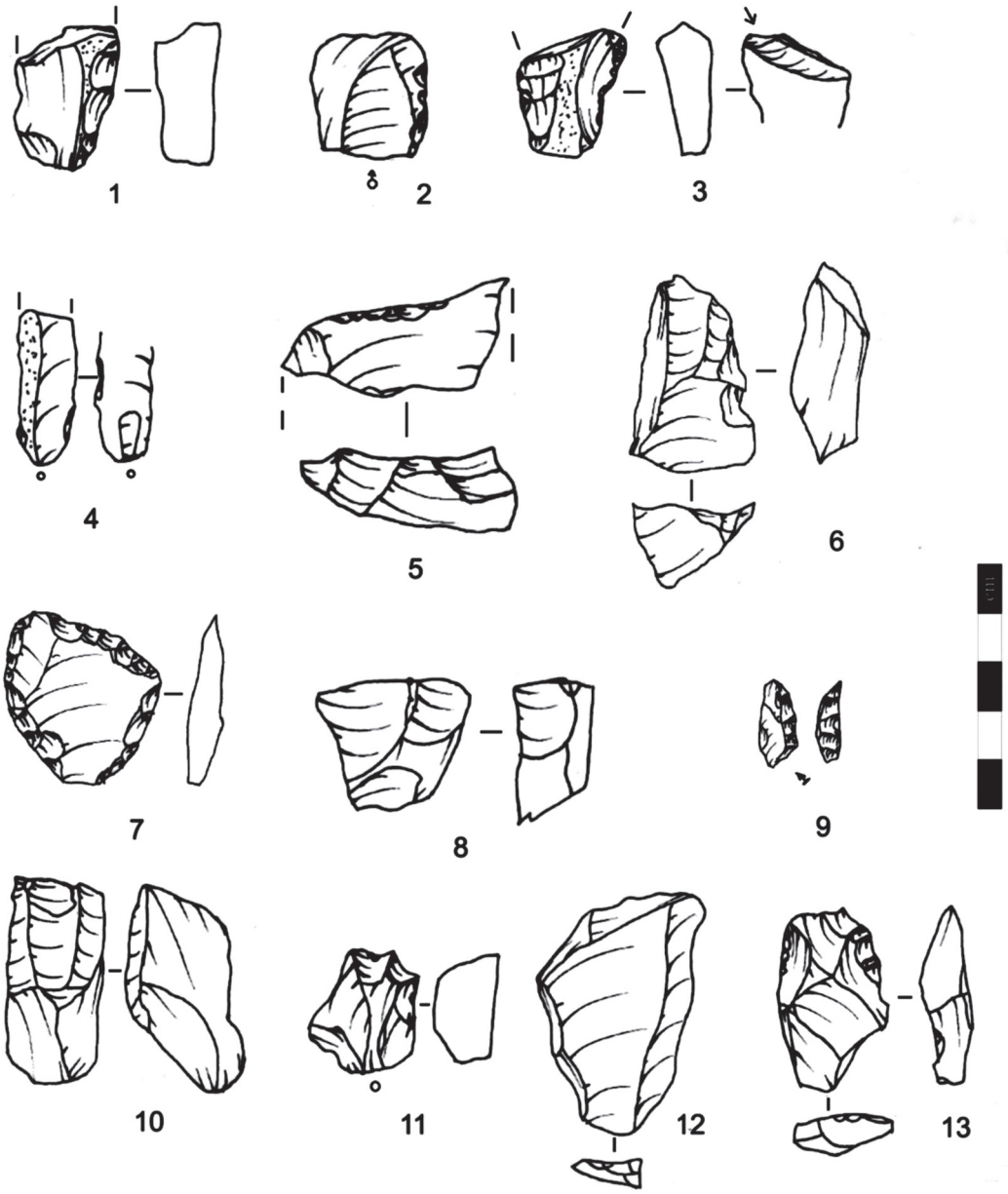

Fig. 10.12. Artifacts from Middle Paleolithic layers (2008, 2012, and 2015 excavations). Sidescrapers (1, 7, 13), cores (5, 6, 8, 10), retouched Levallois flake (2), burin (3), retouched blade (4), segment (9), denticulated endscraper (11), unretouched Levallois flake (12). Drawn by D. Mihailović.

bipolar core on a tablet-like piece of raw material (Fig. 10.12: 8). On the same level in the western part of the shelter (in square G87c) one steeply retouched segment was found (Fig. 10.12: 9). At the contact between layers M1 and M2 were found: a unipolar, burin-like core on a thick flake (Fig. 10.12: 10), a secondary Kombewa flake with a natural (cortical) back, and a carinated denticulated scraper (Fig. 10.12: 11). At the contact between M2 and M3 were found: a Levallois flake of *recurrent* type (Fig. 10.12: 12, a distal fragment of a wide, irregular blade, a partial scraper on a flake of éclat débordant type (Fig. 10.12: 13), and a flake with a partially retouched back.

Layer M3

Layer M3 was excavated in 2012 (during the 2012 excavations, this layer was designated as

M2c2) and 2015, and in it were found a burin-like core for bladelets made on a flake fragment (Fig. 10.13: 1), one completely exhausted core with multi-directional scars made on a very small flake, an unretouched Levallois flake of *recurrent* type (Fig. 10.13: 2), a partial convergent sides-craper on a flake (Fig. 10.13: 3), one unretouched flake, and a chip. At the level, in the area along the eastern wall of the shelter, in a layer that could not be completely precisely defined, was found a small discoidal core on a flake.

Layer M4

A very few finds come from thin levels with charcoal which belong to layer M4. In question are a bilateral semi-steeply retouched blade (Fig. 10.13: 4), an unretouched flake, and a chip. Judging by the negative scars on the dorsal side, the blade was flaked from a single-platform core, perhaps of volumetric type.

Layer M5

This layer was investigated over a very small area. No cores have yet been found from this layer, but the following unretouched artifacts have been recovered: a proximal fragment of a Levallois flake with a facetted platform (Fig. 10.13: 5), one whole and two broken ordinary flakes, and a fragment of a wide blade (Fig. 10.13: 6). In terms of retouched artifacts, only one pointed scraper on a somewhat larger flake (Fig. 10.13: 7), a retouched flake, and a fragment of a obliquely truncated tool or borer (Fig. 10.13: 8).

Almost all artifacts from Middle Paleolithic layers were made on poor quality gray and gray-beige chert. Finds of good quality raw material are few and can be counted on the fingers of one hand. In question are the angle burin from layer M2/08 (good quality gray flint) and the Levallois flake from layer M2/M3 (red jasper), while a small flake of white flint which was found in layer M2/08 probably filtered down from layer X.

Transition/Division

The Middle Paleolithic layers at Crvena Stijena are separated from the Upper Paleolithic layers by the tephra layer (XI), which is unevenly deposited over the floor of the shelter. This layer is rather disturbed because of rockfall which probably immediately followed the eruption, and finds in it are few and not sufficiently diagnostic to assign it to either the Middle or the Upper Paleolithic.

The Upper Paleolithic-Epipaleolithic Layers

On the basis of the available data and stratigraphic information, the upper layers of Crvena Stijena can be divided into two complexes. The clayey layer X falls in the lower complex, while the clastic deposits of layers IX-V belong to the upper one. We have decided to consider the Upper Paleolithic from layers IX-VIII together with the finds from layers VII-V, although layers VI and V (judging by absolute dates, see Mercier et al., Chapter 9, this volume) fall in the Holocene. The reason for this decision lies in the fact that all the way through this sequence the technological changes at the transition from the Pleistocene to the Holocene can be best followed.

Basler (1975b) defined the lithic industries of layers IX-VIII in Crvena Stijena as a "local development on an Aurignacian basis" and those of layers VII-V as "late Upper Paleolithic (Epipaleolithic)". However, Mihailović (2009) more recently has thoroughly studied and published in detail the Upper Paleolithic and Mesolithic industries from Crvena Stijena in complete detail. He attributes layer IX to a transitional industry between the early and late phases of the Epigravettian, and layer VIII definitely to the late phase of the Epigravettian. In his estimation, layers VII-V at Crvena Stijena are possibly of Holocene date and therefore to be attributed to the earliest Mesolithic. Considering only the likely Epipaleolithic (Epigravettian) industries of layers IX-VIII, comparisons with other sites from the Balkans and as far away as Italy (Mihailović 2009: 92-102) reveal a complex and sometimes confusing pattern of similarities and differences that suggest some cultural connections but also many local distinctions.

Part of the difficulty in clearly characterizing the industries from Crvena Stijena and relating them to other important industries in southeastern Europe comes from the relatively small sample sizes available for study from Crvena Stijena. For several of the Epipaleolithic layers retouched tools all together number well less than 100, and in some cases are only a handful, well less than 50, with no typologically distinctive or diagnostic tools (Mihailovic 2009: 43-65). At such small sample

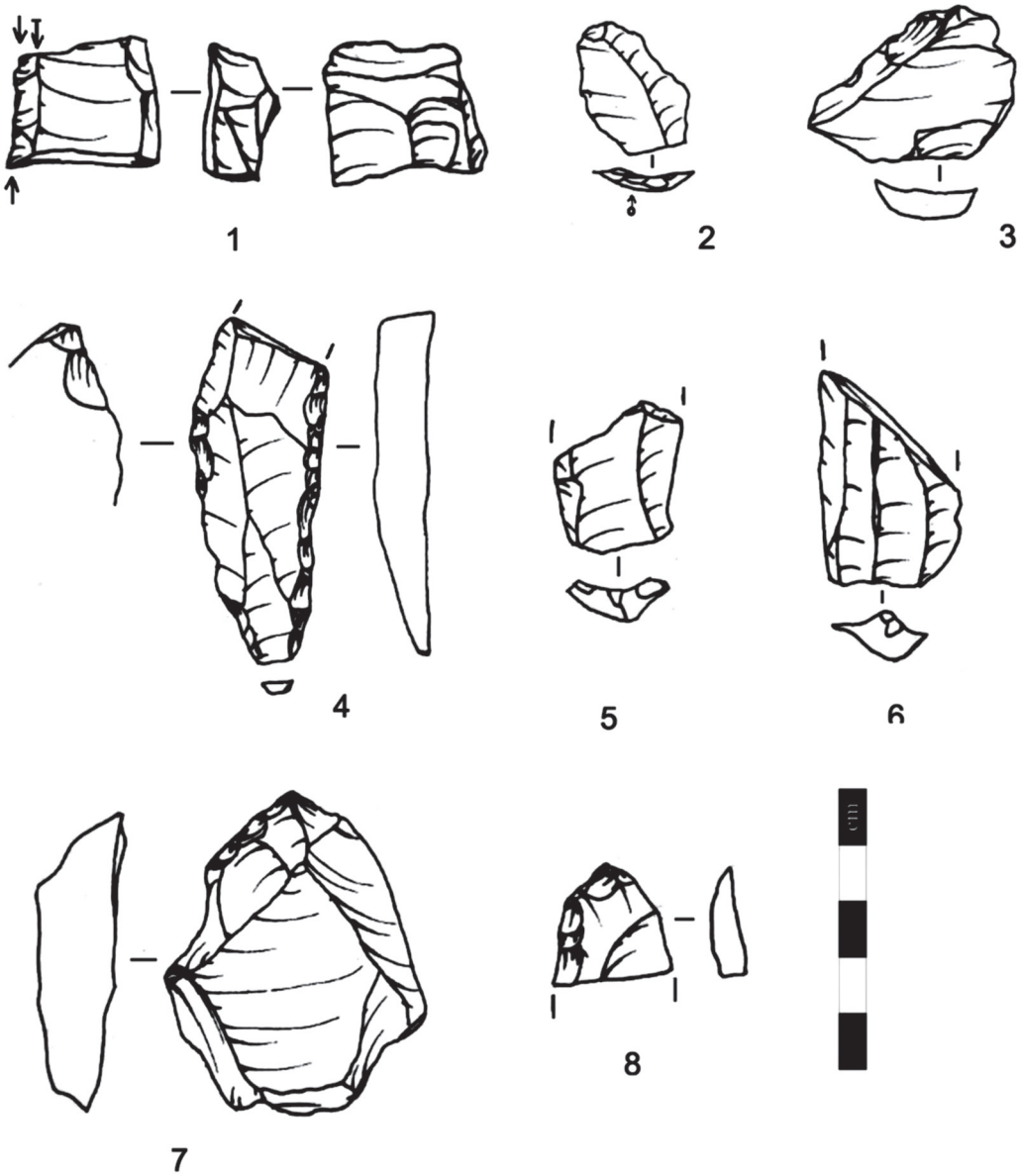

Fig. 10.13. Artifacts from Middle Paleolithic layers (2008, 2012, and 2015 excavations). Burin-like core for bladelets (1), unretouched Levallois flakes (2, 5), sidescrapers (3, 7), retouched blade (4), unretouched blade (6), truncated tool (8). Drawn by D. Mihailović

sizes, the difference of even one or two artifacts of a particular type can produce substantial variations in percentages of occurrence for all types. It is therefore inadvisable to use anything more precise than a gross characterization of relative frequencies to characterize or to compare assemblages.

Furthermore, it is risky to use small differences in relative frequencies of artifact types to definitively distinguish cultural similarities and differences among Paleolithic-Mesolithic sites, especially when differential spatial distributions of these types between different areas of the sites in question are not clearly controlled. Such differential distributions within rockshelter sites, between, for example, the interior vs. the front (Whallon 2007a) or center vs. periphery (Mihailović 2004), have been observed and can sometimes be extremely strong. Comparing assemblages excavated from such different site

areas can easily produce dramatic assemblage differences that reflect site structures and not cultural similarities and differences.

Given these caveats, we can still see some obvious technological and typological trends and comparisons with other sites as characteristic and indicative. These trends and comparisons allow Crvena Stijena to be placed relatively confidently within both the chronological framework of Epipaleolithic lithic technology and typology and the regional organization of Epipaleolithic hunter-gatherer societies in southeastern Europe. Broadly viewed, many of the relatively well established chronological developments known for the late Upper Paleolitic-Epipaleolithic of the Balkans and circum-Adriatic region can be seen, if sometimes only roughly, at Crvena Stijena.

Layer X (Fig. 10.14: 1-2, 4-5, Figs. 10.15-10.16)

This layer is divided into four horizons (Xd-Xa) in which were found all together 199 artifacts (Benac and Brodar 1958; Mihailović and Mihailović 2007; Mihailović 2009). Among the large fauna occur: red deer, tur or bison, ibex, roe deer, and wild boar, while alpine or mountain hare (*Lepus timidus*), snow vole (*Microtus nivalis*), marmot (*Marmota marmota*) and other rodent species are found in the small fauna (Rakovec 1958; Malez 1975).

In comparison to the assemblages from layers IX-V, the raw materials from layer X are of somewhat better quality, and among them occurs high quality white flint, which was used only in this period (Table 10.9). In the general structure of basic artifact categories (Table 10.10), retouched tools (31.6%) and blades (16.1%) are somewhat more frequent, while the proportion of flakes is relatively low (37.7%). Among the cores, there are single-platform cores for blades and bladelets, two-platform cores, multi-directional cores, and bipolar cores. In the composition of tools, burins are almost equal to scrapers in frequency (15.6% against 17.2%), retouched blades and denticulated tools are somewhat more poorly represented (12.5% against 15.6%), while backed tools occur at 7.8%.

The tools from layer X are not too diverse (Table 10.11). In horizon Xd were found a dihedral burin on a thick flake, a macrolithic scraper on a thick flake, and a semi-steep retouched blade (Fig. 10.15: 1-5). In horizon Xc were different types of burins (angle, on truncation, on a retouched truncation), and bladelets and points retouched with semi-steep and steep marginal retouch (Fig. 10.15: 6-17). In horizon Xb there were no characteristic artifacts (Fig. 10.16: 1-5), but in horizon Xa were two scrapers on semi-steeply retouched blades, a bilaterally semi-steeply retouched blade, and a steeply retouched point (Fig. 10.16: 6-14, 17, 18). In the material from the 1956 excavations (Fig. 10.16: 15, 16, 19–22) three carinated burins with multiple negative scars, as well as one atypical, steeply retouched artifact were recovered near the bottom of the trench in sondage D-C (in a "rocky-clayey layer").

Three bone points come from horizon Xa. One of these is made on a longitudinally broken fragment of a ruminant bone. Only the angled and polished tip of another has been preserved, while the third was made on the root of an animal tooth (Mihailović 1998).

Artifacts from Upper Paleolithic Layers (2008 excavations)

A few Upper Paleolithic artifacts were found during the new excavations, only in layer X in the area along the eastern wall of the shelter. Only three were found in reliable context: a lateral burin on an irregular blade in square U90d (Fig. 10.17: 1), and a medial fragment of a wide blade and a retouched flake in square T90c (Fig. 10.17: 2, 3). At the contact between the tephra (layer XI) and layer M1 as well were found two artifacts: a proximal fragment of a narrow blade which was partially retouched with inverse semi-steep retouch and which showed bidirectional negative scars on the dorsal side (Fig. 10.17: 4), and a distal fragment of a typical rejuvenation blade (Fig. 10.17: 5). It can be assumed that both of these artifacts fell through the tephra from layer X because three out of five of the artifacts just discussed were made from white flint, which was known earlier to appear only in layer X (Pamić 1975; Mihailović 2009). The rejuvenation flake was made from gray flint and the retouched flake from black flint.

Layers IX-V (Fig. 14: 3, 6-11; Figs. 10.18-10.27)

Many more flaked artifacts (in general over 800 per layer) were recovered from layers IX-V, except from layers VII and VI where somewhat

fewer were found. In the fauna were found red deer, Arctic hare, lynx , cattle or bison, ibex, roe deer, and wild boar. In layer VII, the majority of bones belong to red deer, but marmot is also found (Rakovec 1958; Malez 1975). In layer VI were found only red deer, wild boar, Arctic hare, and snail shells. It should be noted that in layer VI a large number of shells of land snails

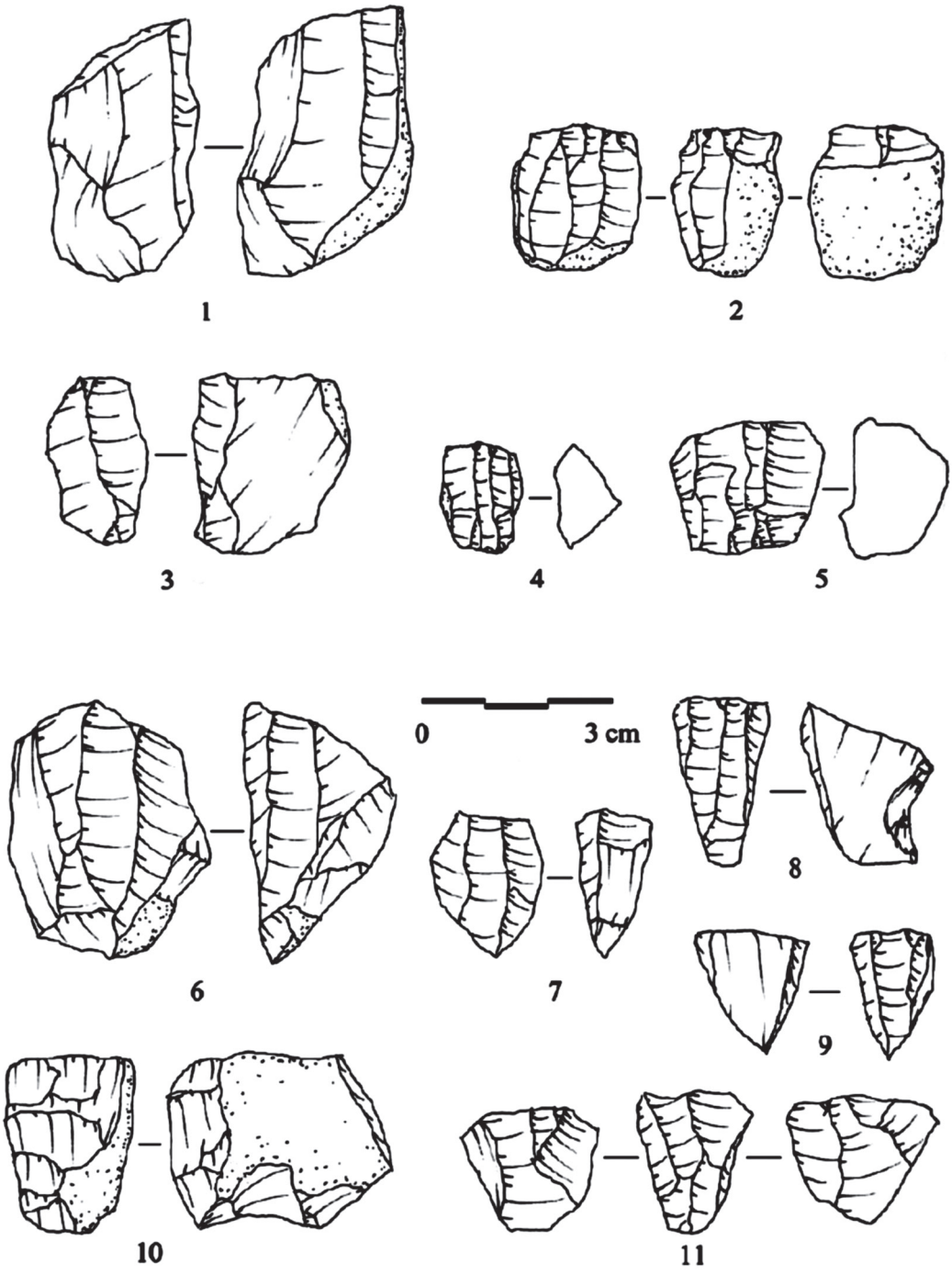

Fig. 10.14. Upper Paleolithic-Epipaleolithic cores from horizons Xd (1), Xb (2), Xa (4, 5), „stratum VII“ (3, 9) and layer IX (6–8, 10, 11). Drawn by D. Mihailović.

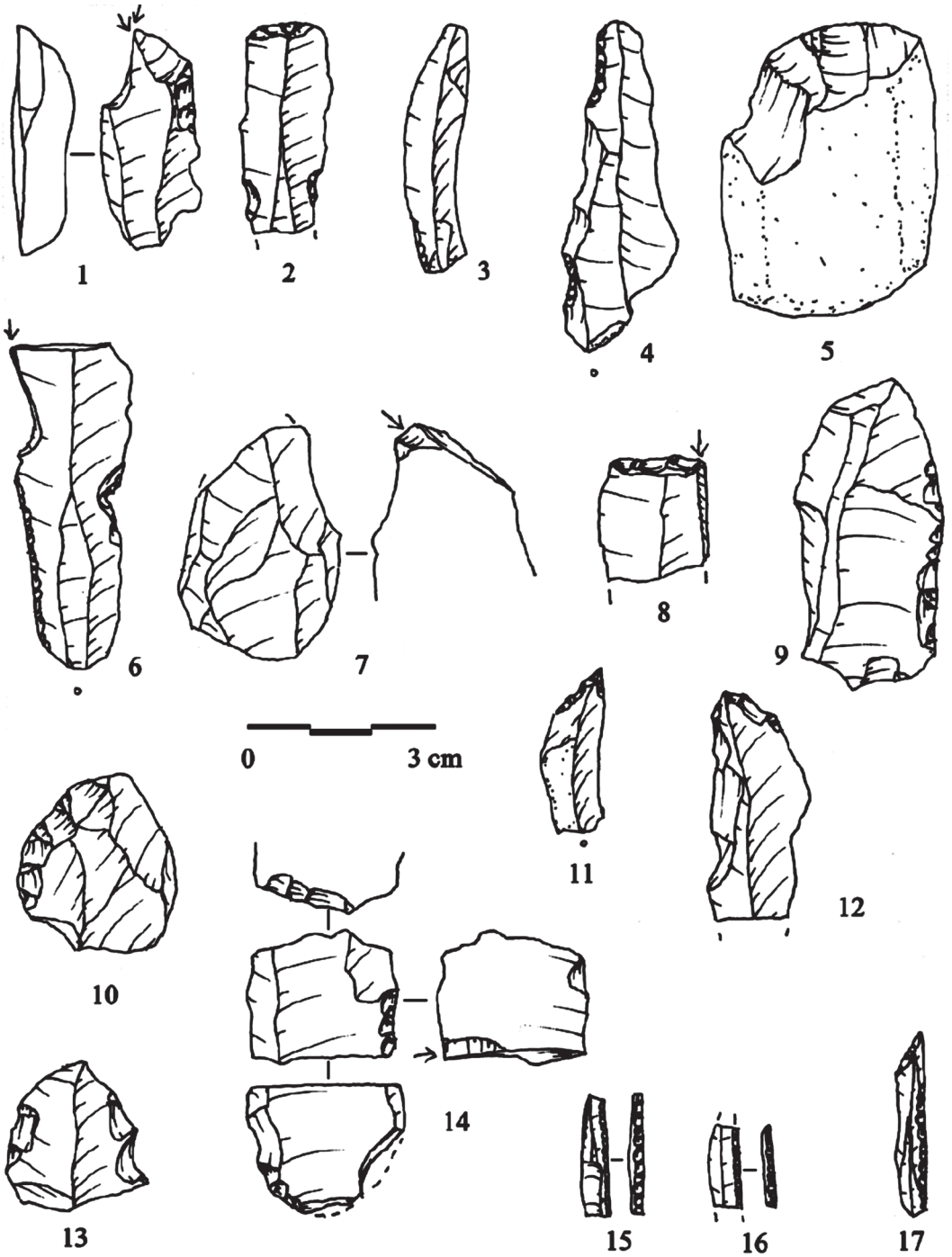

Fig. 10.15. Tools from horizons Xd (1–5) and Xc (6–17). Burins (1, 6-8, 14), endscrapers (2, 5), retouched blades (3-4), sidescrapers (9-10), borers (11-12) denticulated tool (13), backed bladelets and points (15-17). Drawn by D. Mihailović.

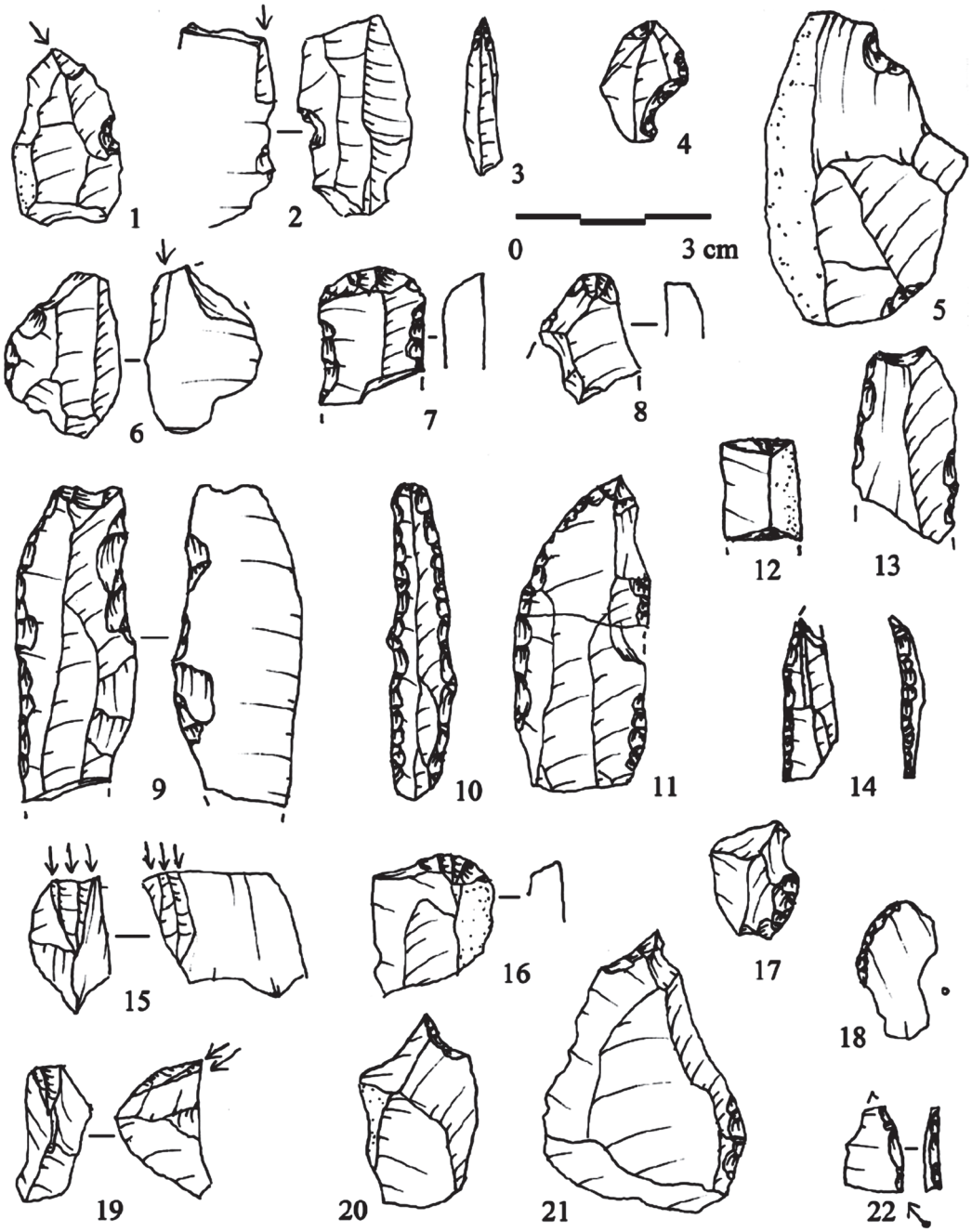

Fig. 10.16. Upper Paleolithic-Epipaleolithic tools from horizons Xb (1–5), Xa (6–14, 17, 18) and „stratum VII“ (15, 16, 19–22). Burins (1. 2, 6, 15, 19), borers (3, 20, 21), endscrapers (4, 7-10, 16), notched tool (5), point (11), truncations (12, 13), backed tools (14, 22), sidescraper (17), raclette (18). Drawn by D. Mihailović.

Table 10.9. Structure of raw materials used in artifact manufacture: C – chalcedony, T – translucent flint, J – jasper, M – matte flint, R – beige–brown and gray chert, O – other kinds of high quality flint, I – indeterminate and burnt (without flakes less than 15 mm long and small undeterminable blade and flake fragments).

Layer		X (199)	IX (853)	VIII (1085)	VII (360)	VI (625)	V (2418)	IVb2 (759)	IVb1 (840)	IVa (516)
C	n.	15	101	149	48	63	128	70	203	108
	%	7.5	11.8	13.7	13.3	10.1	5.3	9.2	24.2	20.9
T	n.	48	91	95	63	79	137	24	217	130
	%	24.1	10.7	8.7	17.5	12.6	5.7	3.2	25.8	25.2
J	n.	58	168	163	53	73	206	74	53	34
	%	29.1	19.7	15.0	14.7	11.7	8.5	9.7	6.3	6.6
M	n.	0	3	49	12	37	170	48	27	34
	%	0.0	0.3	4.5	3.3	5.9	7.0	6.3	3.2	6.6
R	n.	21	360	456	164	272	1340	355	262	118
	%	11.0	42.2	42.0	45.5	43.5	55.4	46.8	31.2	22.9
O	n.	29	6	5	0	1	0	1	3	3
	%	14.6	0.7	0.5	0.0	0.2	0.0	0.1	0.3	0.6
I	n.	28	124	168	20	100	437	187	75	82
	%	14.1	14.5	15.5	5.5	16.0	18.1	24.6	8.9	15.9

(*Helix pomatia* L., but see Ćulafić, Chapter 16, this volume) (Benac and Brodar 1958). The most artifacts were found in layer V, and numerous faunal remains (red deer, wild boar, Arctic hare), perhaps because this layer was excavated over an area of fully 40 m^2.

Among the finds, most common are artifacts of poor quality gray and brown chert which was probably obtained in the immediate vicinity of the site (Table 10.9). Black flint, which perhaps comes from a greater distance is somewhat present in layers IX-VIII. The proportion of artifacts of poor quality gray-beige and matte chert increases as the proportion of artifacts of jasper and transparent flint falls. The pattern of artifacts in layers IX-V is characterized by a high percentage of flakes (56.9-74.5%) and débitage (in general between 5-10%), a relatively small presence of cores (3.6-5.1%) and blades (no more than 16.1%), while the frequency of tools falls to 9-10% (Table 10.10). In all layers single-platform cores are prevalent, multi-directional cores are characteristic of layer VIII, and in the upper layers (VII-V) the frequency of bipolar and irregular cores reaches its maximum (all together almost 50%), although cores for microblades are observed.

Scrapers dominate in all assemblages (15.2-32.7%), and burins are frequent only in layer VIII (over 10.7%) (Table 10.11). Denticulated and notched pieces are most common in layers VII-VI (together 27-29%), backed tools in layer VIII (all together 18.4%). Geometrics (segments and triangles) appear only in layers IX and VIII. Short scrapers on very small flakes (less than 2.5 cm) predominate from layer IX, and this layer as well as VIII, shows the presence of ventrally thinned examples (even 21% in layer IX). Circular scrapers are found in layers IX, VI, and V.

The variability of steeply retouched tools is not too marked. Steeply retouched points of larger dimensions (one shouldered and one curved backed) are found only in layer IX (Fig. 10.20: 26-27), but, above all, short, steeply retouched points with their tips on the axis of the the tool and strongly curved back backed points are characteristic for this layer, as for layer VIII. The most striking tendency is the increasing frequency of denticulated points and bladelets with curved backs as compared to examples with straight backs. In layer IX, their frequencies is amost equal (2:3), while in layer VIII curved back points are significantly more frequent (5:16). The total proportion of backed tools in layers VII and VI falls sharply (to 9% and then to 1.7%), while in layer V they are no longer even present.

Table 10.10. General structure of the retouched tool categories and main indices.

Layer		X (64)	IX (116)	VIII (168)	VII (33)	VI (59)	V (245)	IVb2 (37)	IVb1 (120)	IVa (100)
Burins	n	10	6	18	0	2	7	2	8	6
	%	15.6	5.2	10.7	0.0	3.4	2.8	5.4	6.7	6.0
Endscrapers	n	11	38	25	6	9	72	9	33	26
	%	17.2	32.7	14.9	18.2	15.2	29.4	24.3	27.5	26.0
Retouched blades	n	8	9	6	5	2	18	1	5	2
	%	12.5	7.7	3.6	15.2	3.4	7.3	2.7	4.2	2.0
Sidescrapers	n	3	9	13	2	7	12	3	3	5
	%	4.7	7.7	7.7	6.1	11.9	4.9	8.1	2.5	5.0
Retouched flakes	n	2	3	15	1	10	50	2	4	14
	%	3.1	2.6	8.9	3.0	16.9	20.4	5.4	3.3	14.0
Raclettes	n	3	3	4	1	0	5	1	1	1
	%	4.7	2.6	2.4	3.0	0.0	2.0	2.7	0.8	1.0
Perforators	n	5	9	12	5	4	7	0	6	3
	%	7.8	7.7	7.1	15.2	6.8	2.8	0.0	5.0	3.0
Denticulated tools	n	2	6	9	4	6	26	3	6	4
	%	3.1	5.2	5.3	12.1	10.2	10.6	8.1	5.0	4.0
Notched tools	n	8	11	17	5	11	19	9	26	17
	%	12.5	9.5	10.1	15.2	18.6	7.7	24.3	21.7	17.0
Splintered pieces	n	0	6	5	0	3	11	4	3	4
	%	0.0	5.2	3.0	0.0	5.1	4.5	10.8	2.5	4.0
Truncations	n	5	6	3	1	2	11	3	19	15
	%	7.8	5.2	1.8	3.0	3.4	4.5	8.1	15.8	15.0
Backed points and blades/bladelets	n	3	6	21	0	0	0	0	0	0
	%	4.7	5.2	12.5	0.0	0.0	0.0	0.0	0.0	0.0
Backed tool fragments	n	2	0	4	2	0	0	0	0	0
	%	3.1	0.0	2.4	6.1	0.0	0.0	0.0	0.0	0.0
Backed truncations	n	0	2	4	1	1	0	0	0	0
	%	0.0	1.7	2.4	3.0	1.7	0.0	0.0	0.0	0.0
Segments	n	0	1	3	0	0	0	0	0	0
	%	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Triangles	n	0	0	4	0	0	0	0	0	0
	%	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
Trapezes	n	0	0	0	0	0	0	0	4	1
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.0
Atypical geometrics	n	0	1	1	0	0	0	0	1	0
	%	0.0	0.9	0.6	0.0	0.0	0.0	0.0	0.8	0.0
Combined tools	n	1	0	0	0	1	2	0	0	1
	%	1.6	0.0	0.0	0.0	1.7	0.8	0.0	0.0	1.0
Tool fragments	n	1	0	4	0	1	5	0	1	1
	%	1.6	0.0	2.4	0.0	1.7	2.0	0.0	0.8	1.0
endscrapers/burins			1.0	6.3	1.4	6:0	4.5	10.3	4.5	4.1	4.3
endscr+bur/"substratum"			0.8	1.1	0.9	0.3	0.4	1.0	0.6	1.0	1.1
backed tools (%)			7.8	6.9	18.4	9.0	1.7	0.0	0.0	0.0	0.0
geometrics (%)			0.0	0.9	4.8	0.0	0.0	0.0	0.0	4.2	1.0
straight backed/arched points and bladelets			4:0	3:2	5:16	0:1	0:0	0:0	0:0	0:0	0:0
endscr. long/short (n.)			3:7	2:36	4:21	0:6	1:8	8:64	0:9	5:28	0:26
simple burins (n.)			5	0	7	0	0	4	0	4	1
burins on snap (n.)			3	3	5	0	1	1	2	1	2
burins on truncation and on retouched edge (n.)			1	2	0	0	0	1	0	3	2
dihedral burins (n.)			1	0	4	0	0	1	0	0	1
combined burins			0	1	2	0	0	0	0	0	0

Table 10.11. General structure of the chipped stone assemblages: A – cores. B – rejuvenation blades and flakes, C – chunks, D – flakes, E – blades, F – retouched tools, G – products of the secondary tools modification (without flakes less than 15 mm long and small undeterminable blade and flake fragments).

Layer		X (199)	IX (853)	VIII (1085)	VII (360)	VI (625)	V (2418)	IVb2 (759)	IVb1 (840)	IVa (516)
A	n.	11	37	57	13	26	124	21	60	30
	%	5.5	4.3	5.2	3.6	4.2	5.1	2.8	7.1	5.8
B	n.	8	19	22	6	5	7	10	1	1
	%	4.0	2.2	2.0	1.7	0.8	0.3	1.3	0.1	0.2
C	n.	9	80	97	18	31	83	68	42	10
	%	4.5	9.4	8.9	5.0	5.0	3.4	8.9	5.0	1.9
D	n.	75	499	618	231	442	1801	543	416	269
	%	37.7	58.5	56.9	64.2	70.7	74.5	71.5	49.5	52.1
E	n.	32	98	119	57	61	158	81	198	106
	%	16.1	11.5	11.0	15.8	9.8	6.5	10.7	23.6	20.5
F	n.	63	117	170	33	59	245	36	123	100
	%	31.6	13.7	15.7	9.2	9.4	10.1	4.7	14.6	19.4
G	n.	1	3	2	2	1	0	0	0	0.0
	%	0.5	0.3	0.2	0.5	0.2	0.0	0.0	0.0	

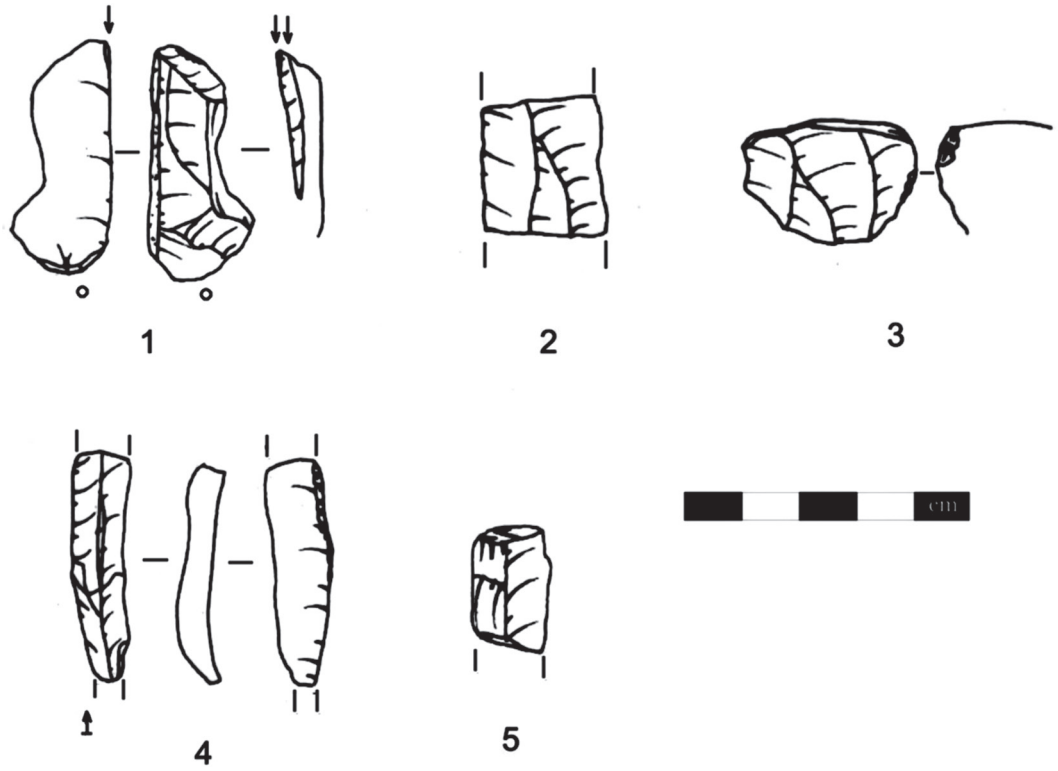

Fig. 10.17. Artifacts from Upper Paleolithic layers (2008 excavations). Burin (1), unretouched blade (2), retouched flake (3), retouched blade (4), rejuvenation blade (5). Drawn by D. Mihailović.

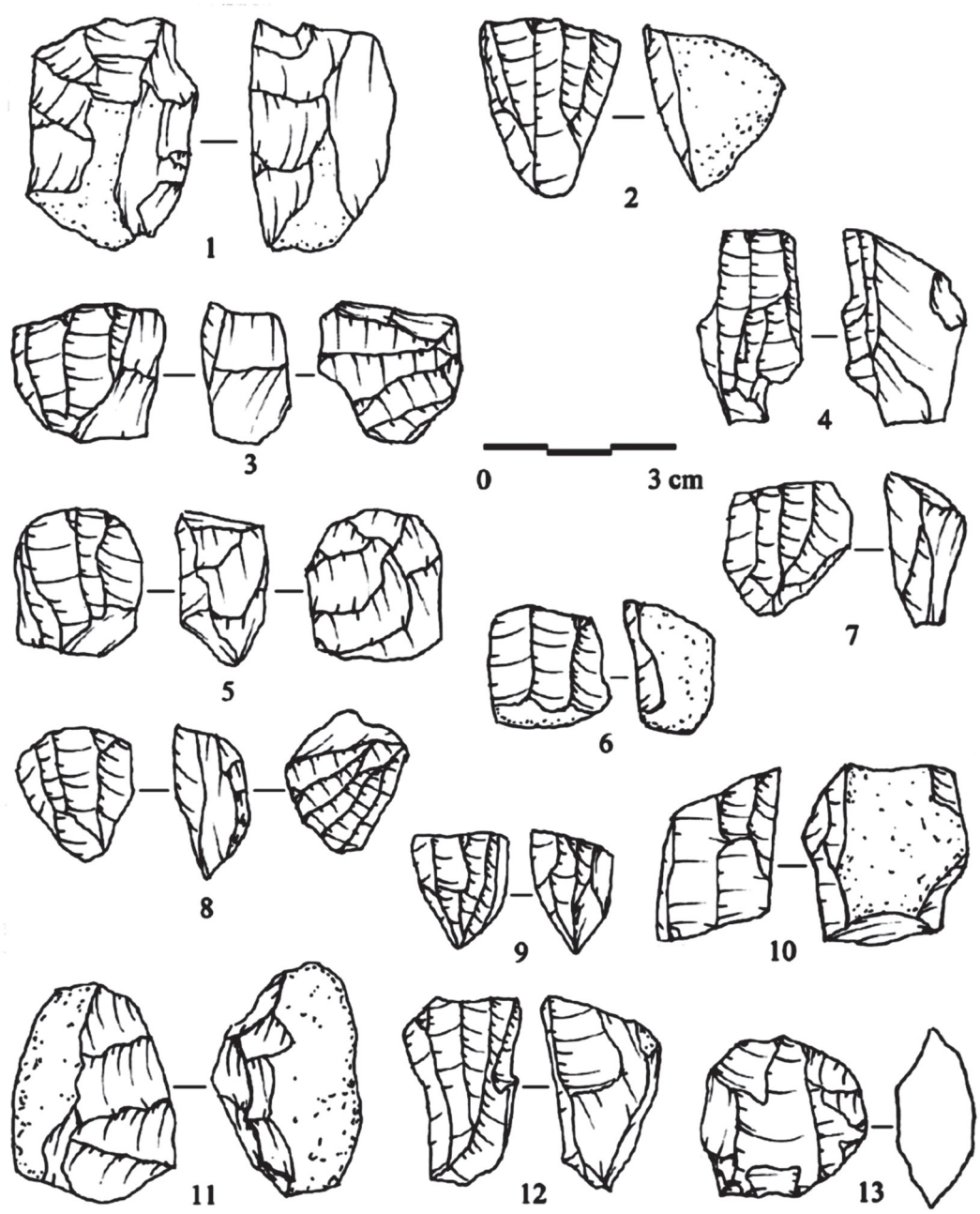

Fig. 10.18. Upper Paleolithic-Epipaleolithic cores from layers VIII (1–8, 10, 13) and VII (9, 11, 12). Drawn by D. Mihailović.

A few bone tools are also found. In the Upper Paleolithic and Early Mesolithic layers of Crvena Stijena (Mihailović 1998). In layer IX only one long awl with ellipsoid cross.section and polished tip was found. A projectile with a diagonal base, one awl and two fragmented points come from layer VIII. In layers VII-VI most common are points and awls made on longitudinally broken bones. In layer V one awl and and two projectiles were found, among which one had a diagonal base.

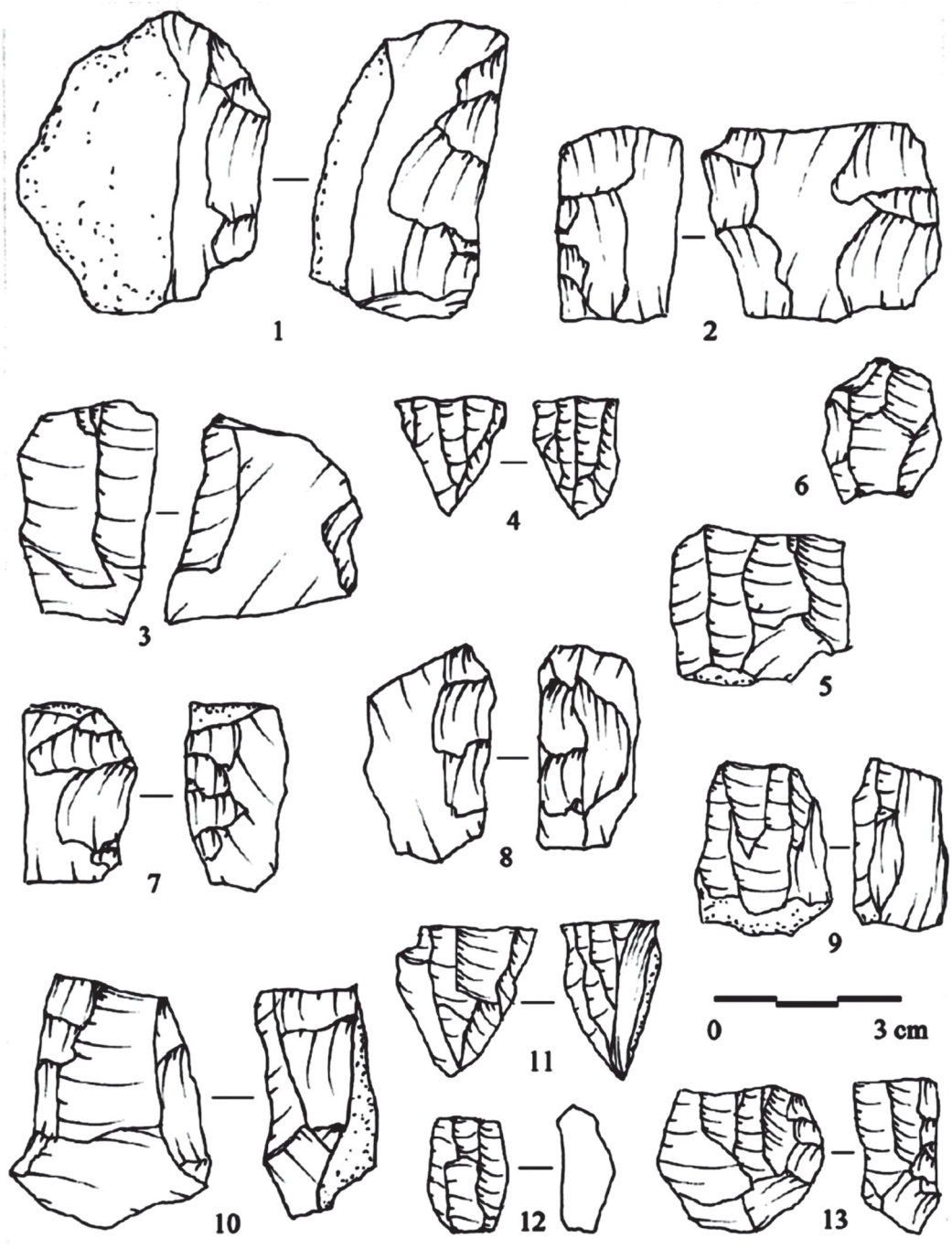

Fig. 10.19. Epipaleolithic-Mesolithic cores from layers VI (1–6) and V (7–12). Drawn by D. Mihailović.

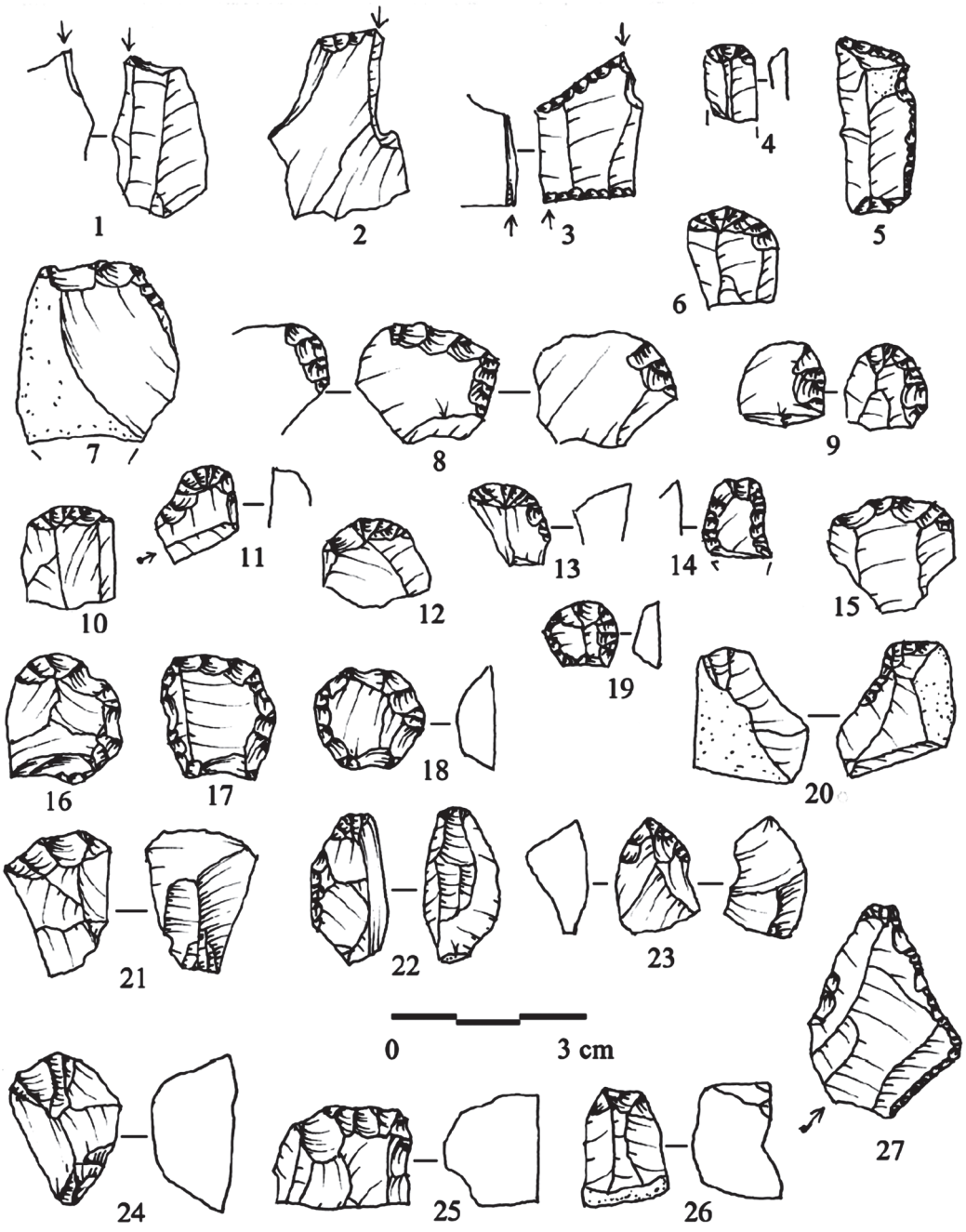

Fig. 10.20. Upper Paleolithic-Epipaleolithic tools from layer IX (1-27). Burins (1-3), endscrapers (4-27). Drawn by D. Mihailović.

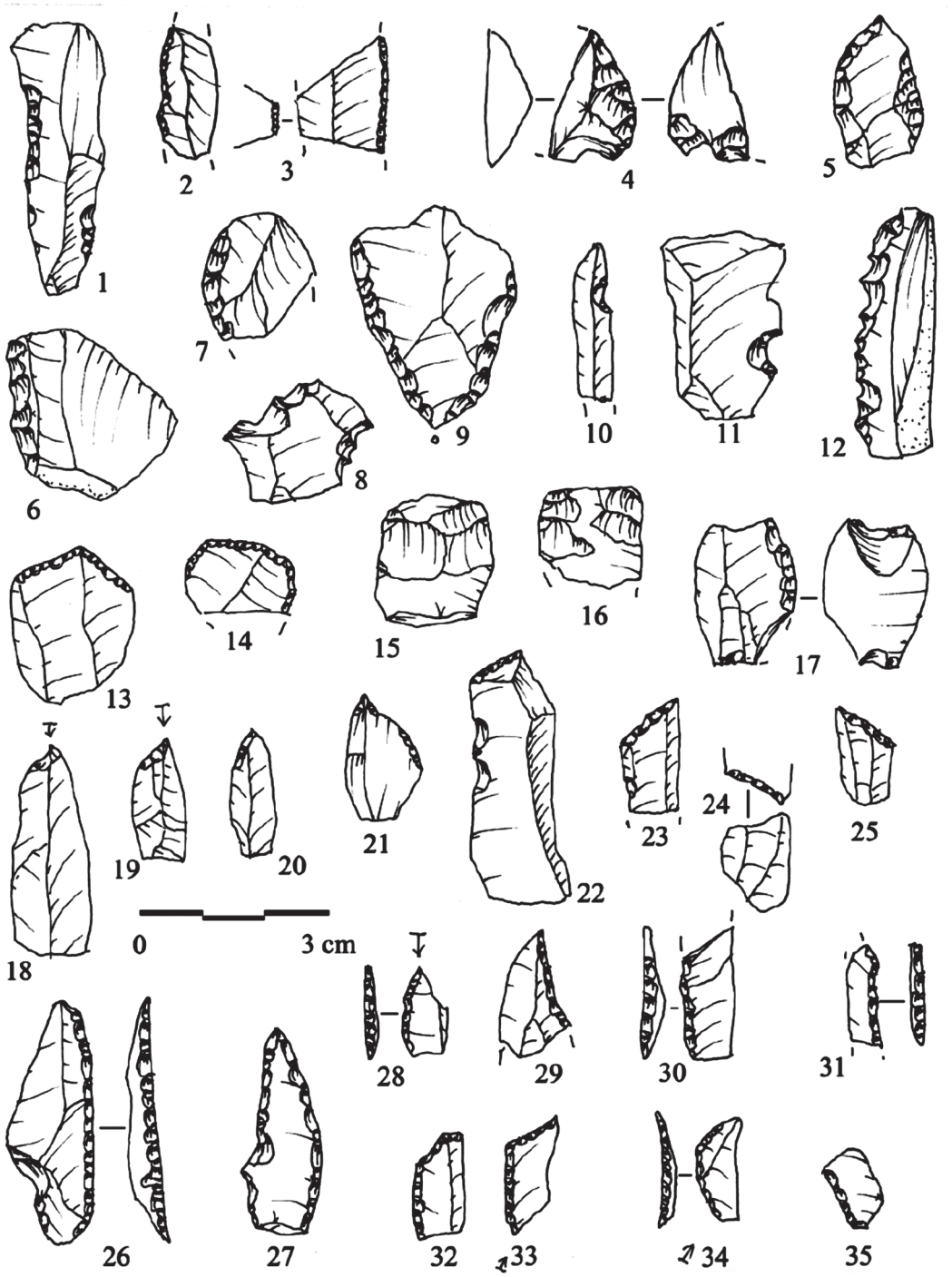

Fig. 10.21. Upper Paleolithic-Epipaleolithic tools from layer IX (1-35). Retouched blades (1-3), sidescrapers (4-7, 9), notched pieces (10, 11), denticulated pieces (8, 12), raclettes (13, 14), splintered pieces (15-17), borers (18-21), truncations (22-25), shouldered and backed points on blades (26-27), backed points and bladelets (28-31), truncated backed bladelets (32-33), geometrics (34, 35). Drawn by D. Mihailović.

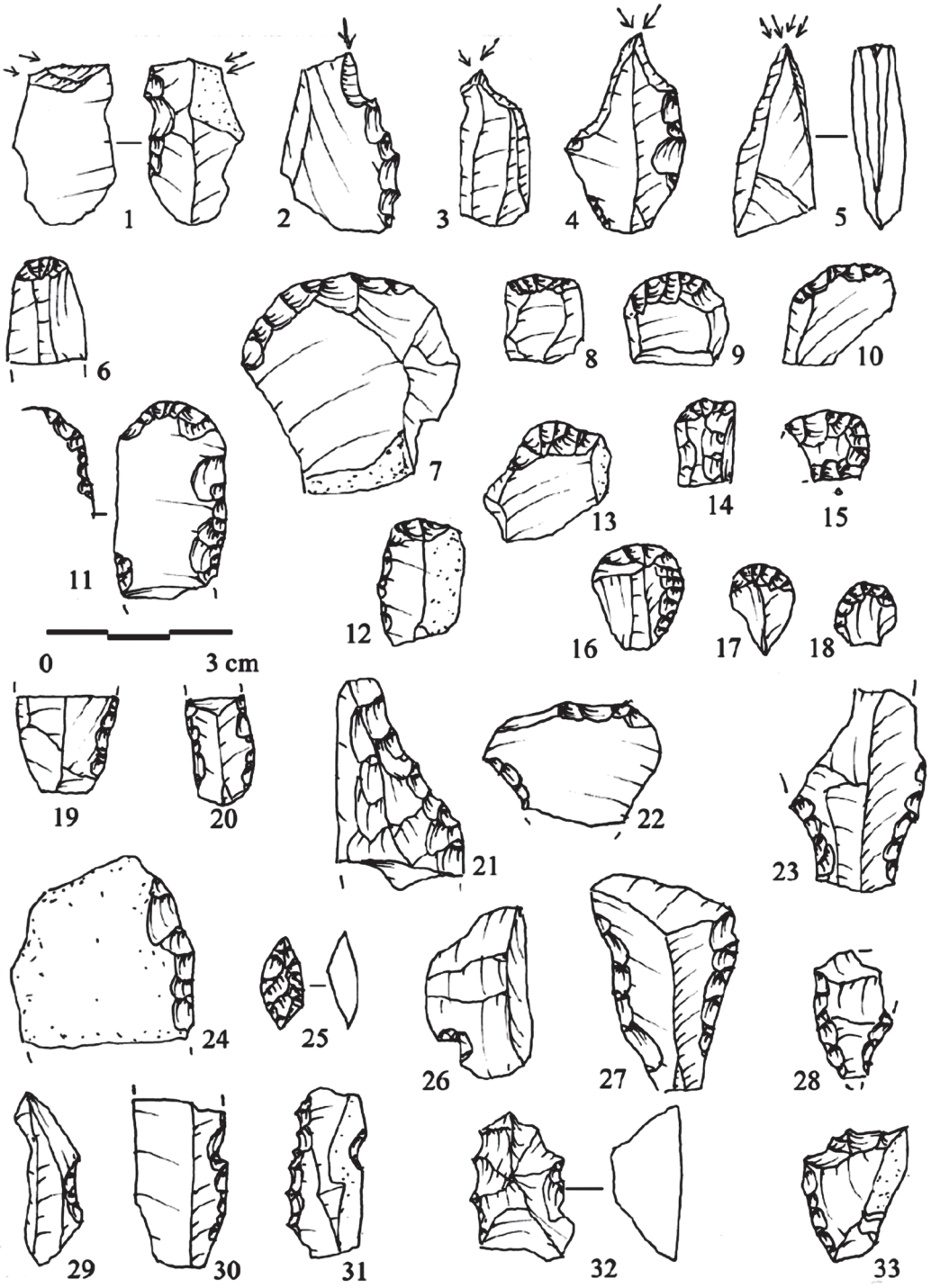

Fig. 10.22. Upper Paleolithic-Epipaleolithic tools from layer VIII (1-33). Burins (1-5), endscrapers (6-18), retouched blades (19, 20), sidescraper (21-24, 27-28), facially retouched point (25), notched pieces (26, 28, 29), denticulated pieces (30-33). Drawn by D. Mihailović.

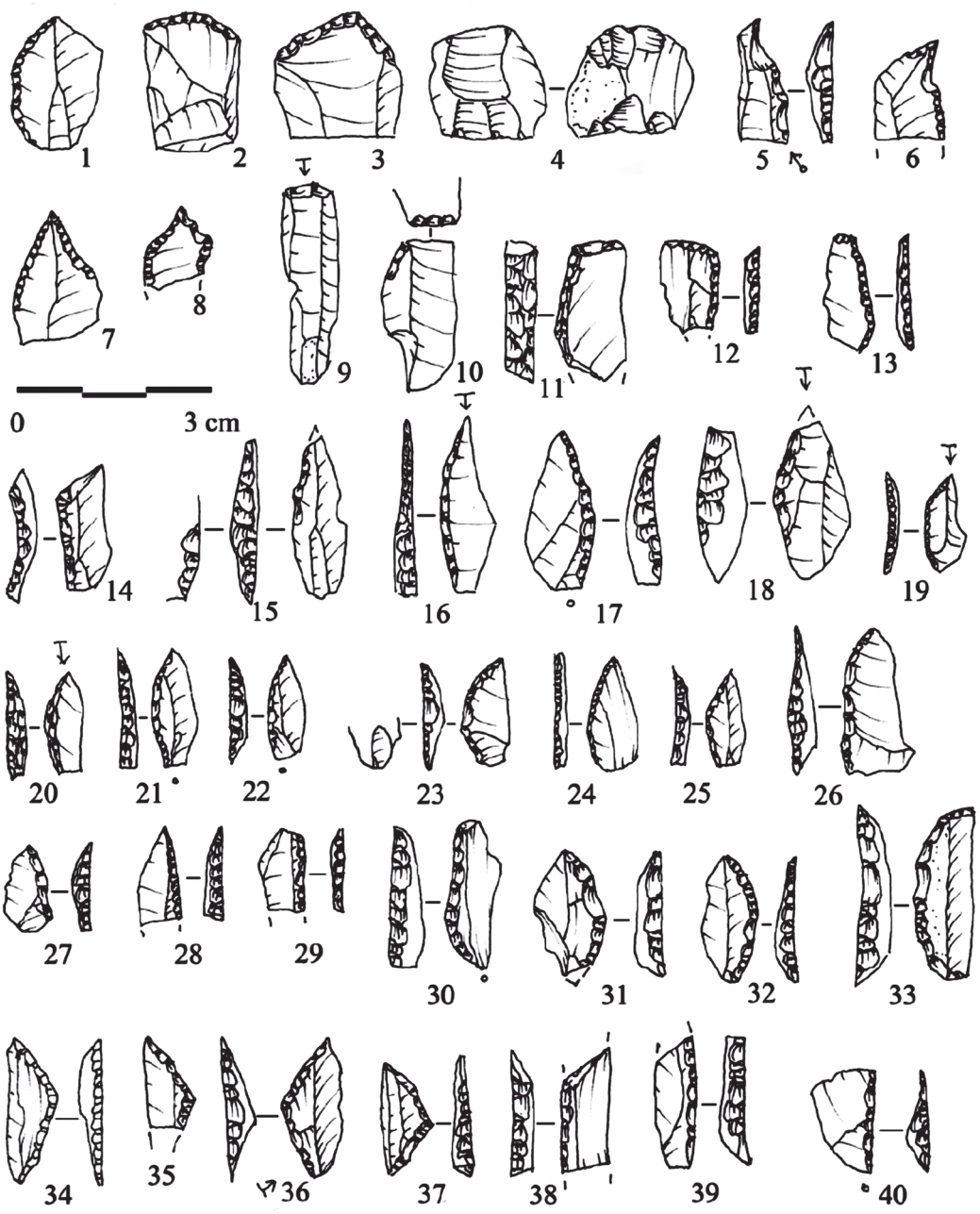

Fig. 10.23. Upper Paleolithic-Epipaleolithic tools from layer VIII (1-40). Raclettes (1-3), splintered piece (4), borers (5-8), truncations (9, 10), truncated backed pieces (11-14), backed tools (15-30, 38-40), geometrics (31-37), Drawn by D. Mihailović.

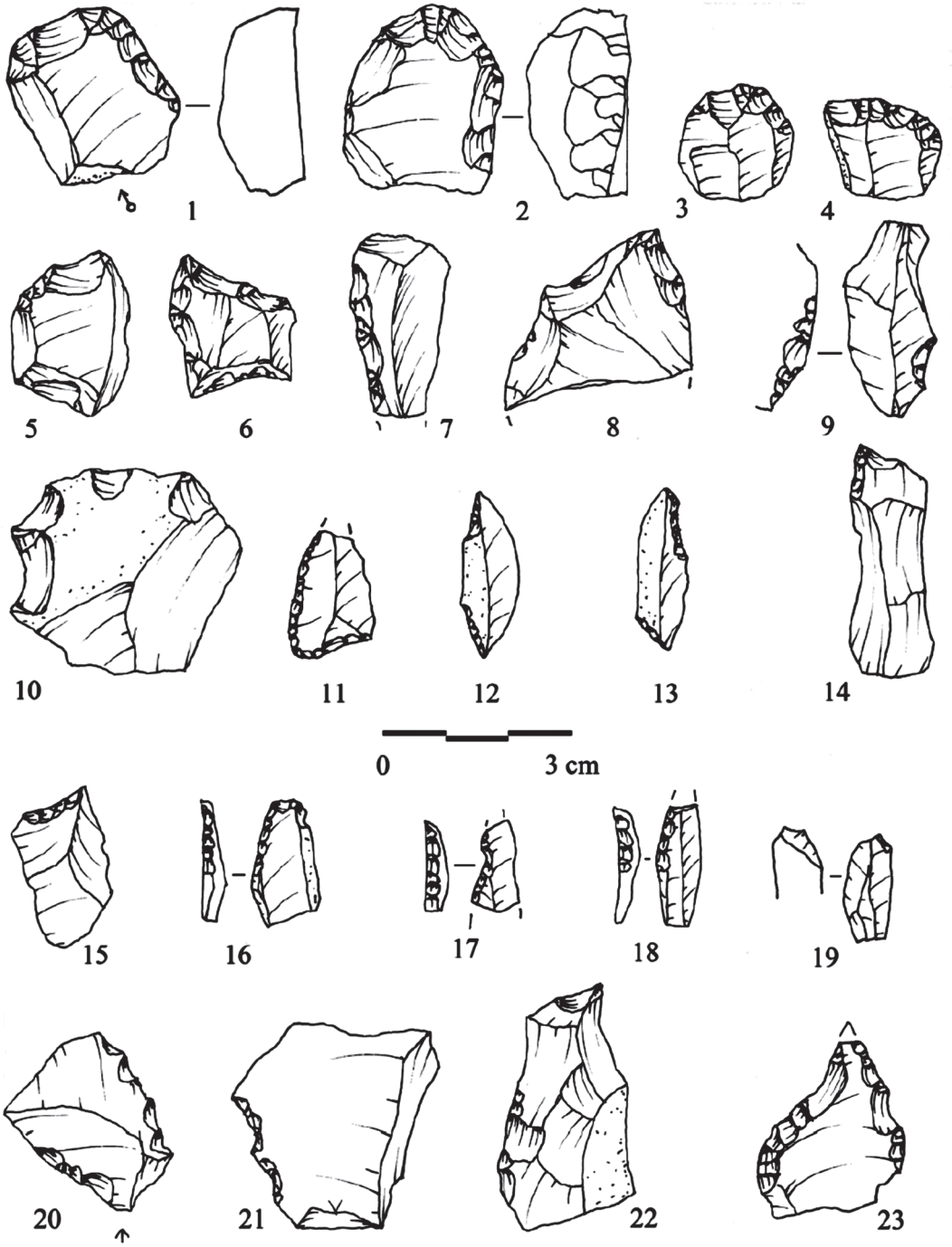

Fig. 10.24. Upper Paleolithic-Epipaleolithic tools from layer VII (1-23). Endscrapers (1-6), sidescrapers and points (7, 8), retouched blade (9), denticulated piece (10), raclette (11), borers (12-15, 22, 23), truncated backed tool (16), backed bladelets (17-18), proximal micro-burin (19), denticulated pieces (20, 21). Drawn by D. Mihailović.

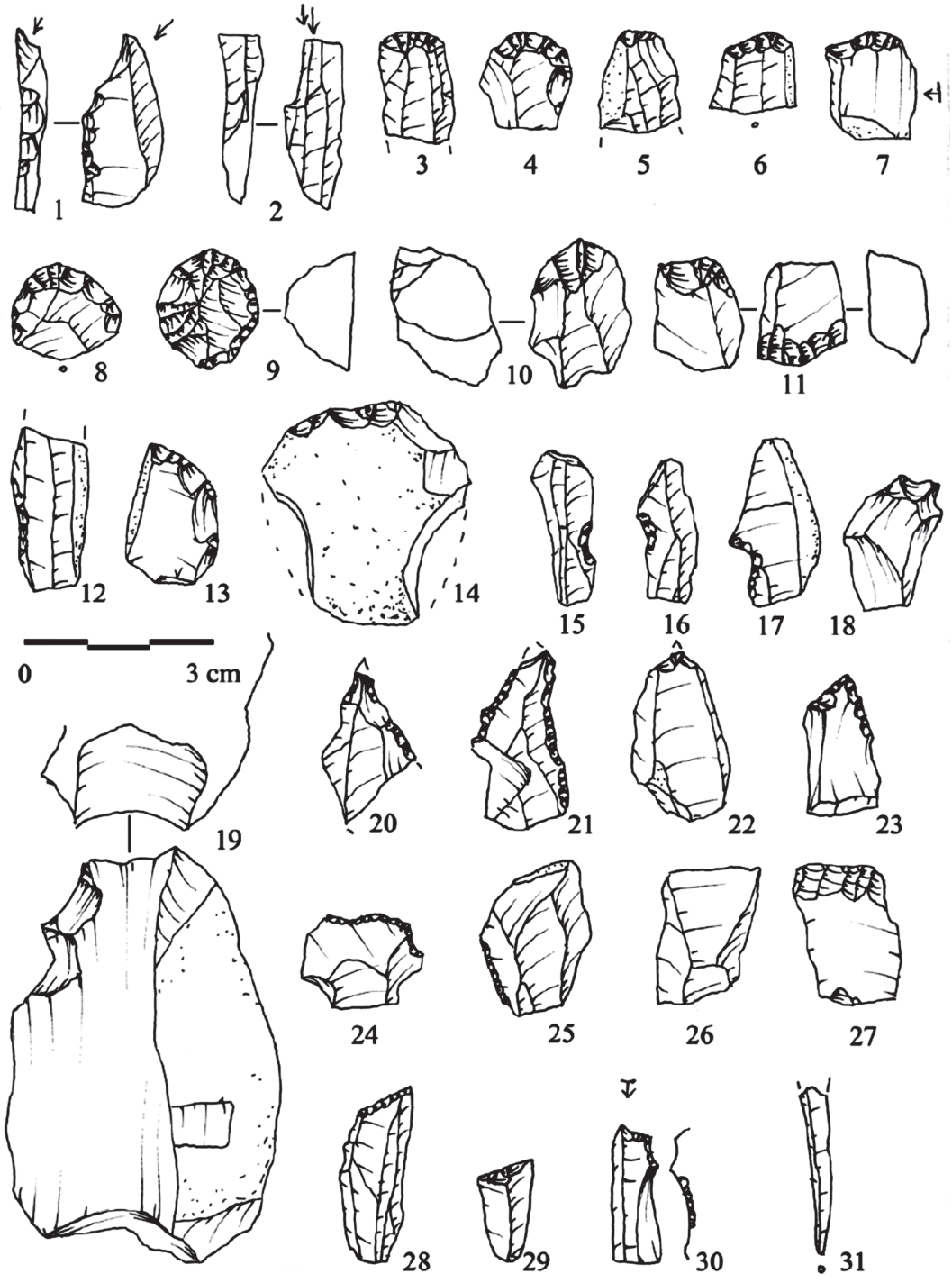

Fig. 10.25. Epipaleolithic-Mesolithic tools from layer VI (1-31). Burins (1, 2), endscrapers (3-11), retouched blade (12), sidescrapers (13, 14), notched pieces (15-17), denticulated tool (18, 19), borers (20-23), raclettes (24, 25), splintered piece (26-27), truncations (28, 29), truncated backed bladelet (30), burin spall (31). Drawn by D. Mihailović.

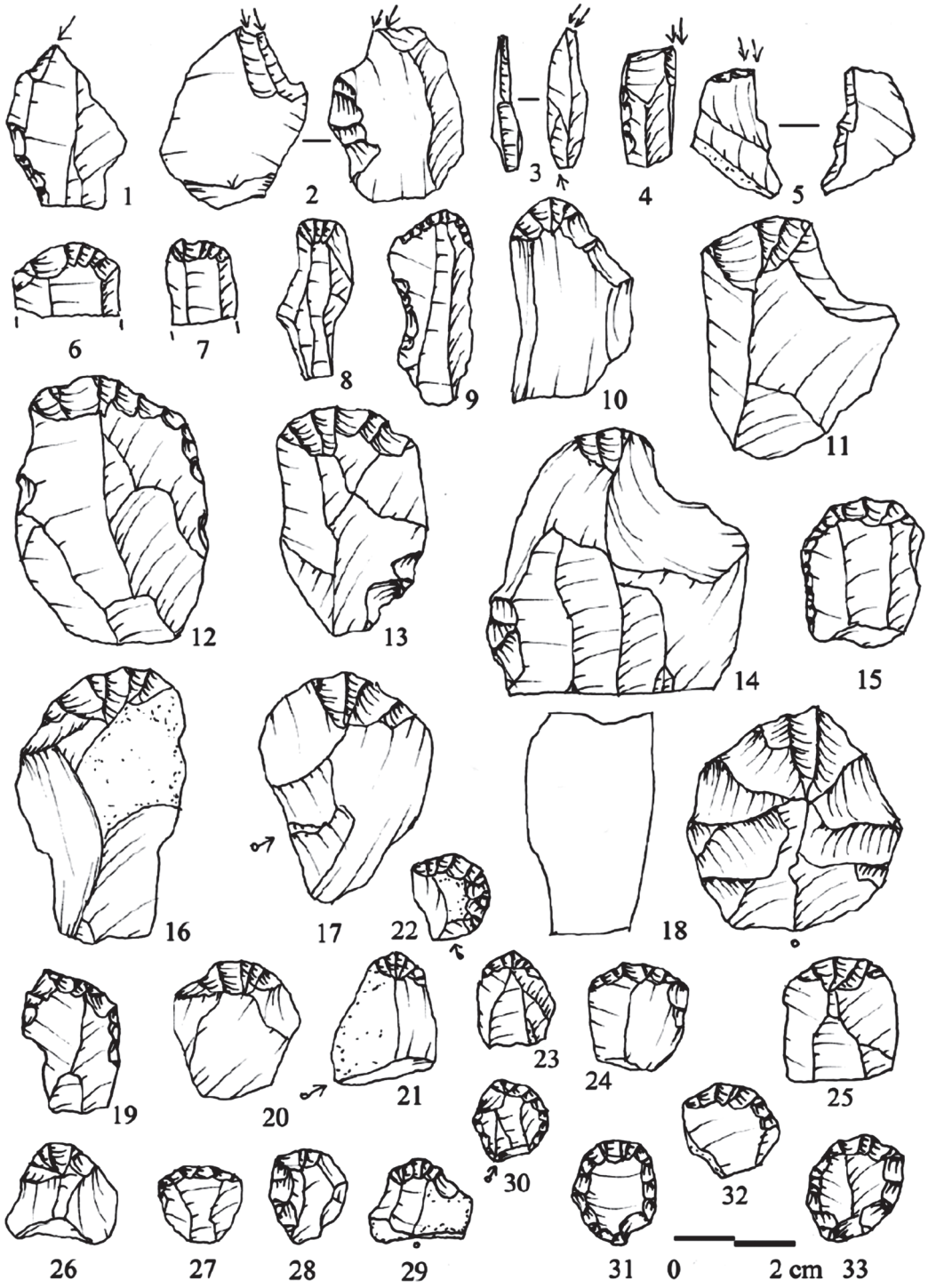

Fig. 10.26. Epipaleolithic-Mesolithic tools from layer V (1-33). Burins (1-5), endscrapers (6-33). Drawn by D. Mihailović.

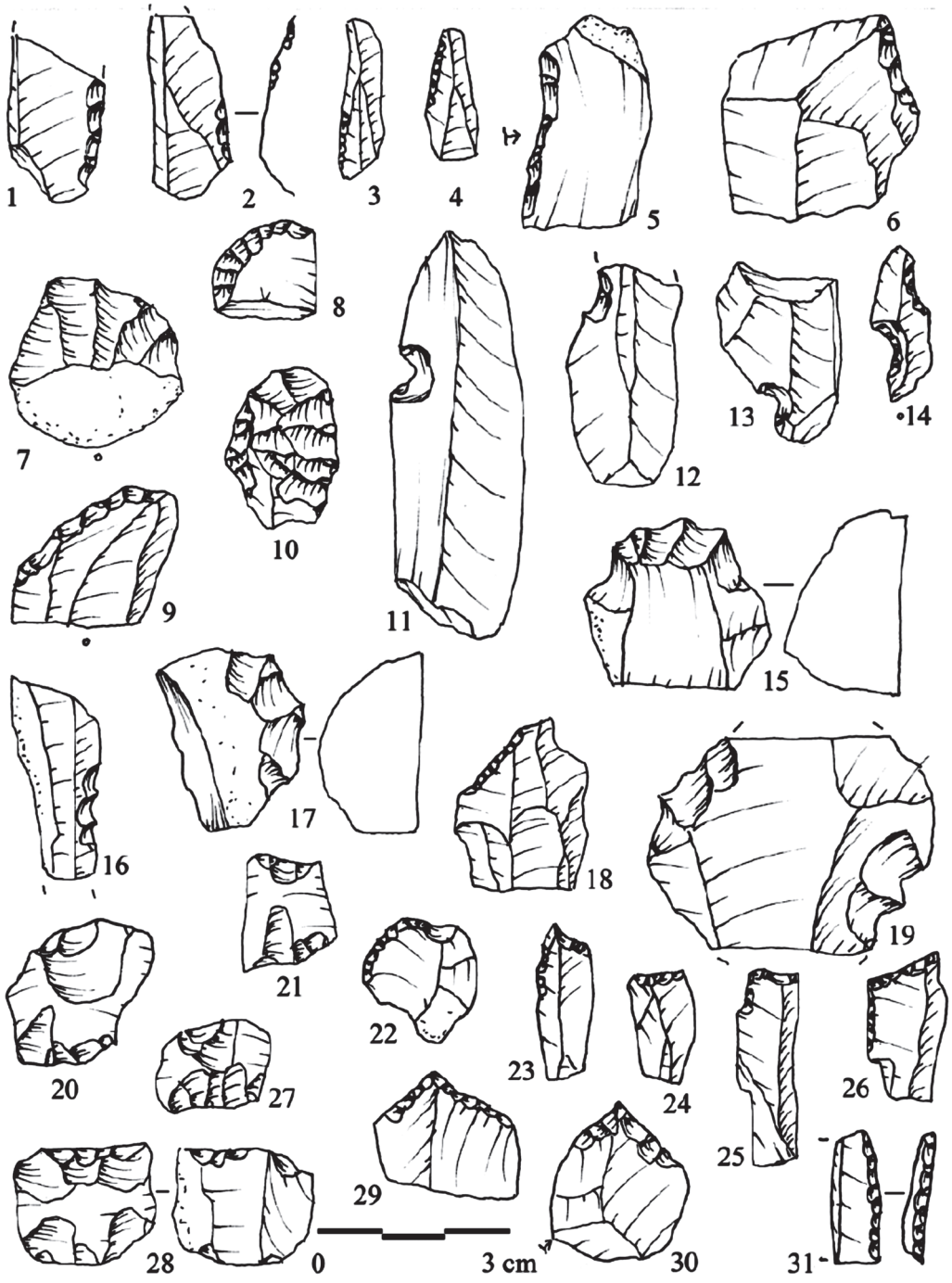

Fig. 10.27. Epipaleolithic-Mesolithic tools from layer V (1-31). Retouched blades (1-4), sidescrapers (5-10), notched pieces (11-14), denticulated pieces (15-17, 19), retouched flake (18), raclettes (22, 29), splintered pieces (20, 21, 27, 28), borers (23, 30), trucations (24, 25), truncated backed piece (26), tool fragment (31). Drawn by D. Mihailović.

Summary of Major Upper Paleolithic-Epipaleolithic Trends

Backed tools begin during the late Upper Paleolithic, straight-backed at first, then becoming dominantly curved-backed, and finally diminishing and vanishing (Montet-White & Kozłowski 1983). This trajectory can be followed at Crvena Stijena as well (Mihailović 2004, Benac & Brodar 1958: 59, plates XXV-XXVIII), with backed tools first appearing part way through layer X (in Xc) with straight backs, gradually becoming more numerous to a maximum in layer VIII, where the majority have curved backs, and then disappearing by layer VI (although Mihailović puts the last backed tools in layer VII, while Benac & Brodar list two from layer VI). At the same time there is increasing technological trend towards microlithization, with the proportion of blades declining as that of bladelets increases from layer IX on up to layer V (Benac & Brodar 1958: 58). However, flakes always outnumber blades and bladelets, and the ratio of flakes to blades increases through the late Upper Paleolithic-Epipaleolithic sequence, dropping again sharply only with the beginning of the late Mesolithic (in layer IV, Mihailović 2004: 32).

While backed tools increase in frequency and then decline, scrapers show a continuous increase. This was noted by Brodar (Benac & Brodar 1958: 58) as particularly interesting, describing scrapers as hardly existing in layer X, beginning to be important in layer IX, and becoming very frequent in layers above that on up to layer V, where he describes them as so abundant that they are the most characteristic tools of that layer. Scraper morphology also evolves through this sequence, beginning in layer X with a diversity of forms, largely of various typical Upper Paleolithic types, including end-of blade scrapers, a nosed scraper, and carinated scrapers. These scrapers rapidly give way to greater and greater frequencies of smaller "thumbnail" and circular scrapers on flakes (see plates in Benac & Brodar 1958 and Mihailović 2004), although endscrapers do not ever disappear as a regularly occurring tool type. The strong increase in frequency of small "thumbnail" and circular scrapers through the Epigravettian is also clearly documented at Badanj (Whallon 1999).

Other tool types occur in quite varying proportions through layers IX-V at Crvena Stijena, but none exhibit strong or clear chronological patterns. Certain overall presences and absences, however, are worth noting. In particular, the total absence of microburins is of note, not for any chronological meaning, but in terms of comparisons with Epipaleolithic sites from other areas in the circum-Adriatic region. The regular appearance of splintered pieces, although in very small numbers, is again not of chronological importance, but may be another indicator of possible regional relations between Crvena Stijena and other sites.

In making such regional comparisons, it is worth stressing again the two cautions made above: first, that relative frequencies and even presences/absences are not to be trusted too strongly when they are based on small assemblages, and second, that proportions of any technological or tool types from a site are often highly, perhaps even always, dependent on the part of the site excavated, given differential distributions among work or activity areas in these hunter-gatherer camps. It is particularly dangerous or misleading to try to make very direct links between any individual layers from one site to another. We can point to the nearby site of Badanj, geographically the closest Epipaleolithic site to Crvena Stijena, where, even with assemblages well over an order of magnitude larger than those from Crvena Stijena, percentage occurrences of all technological and tool types fluctuate dramatically from layer to layer (Whallon 1999: 336-337), although overall, general trends are marked and easily detectable.

Nonetheless, some general comparisons are worthwhile. While the major chronological trends outlined above are more or less universal for the Epipaleolithic of this part of Europe, some of the more minor elements of the assemblages from Crvena Stijena lead us, as well as other scholars, to a few rough conclusions. The first among these is that the small Epipaleolithic hunter-gatherer groups in southeastern Europe, and especially those living around the Adriatic Sea, must have been in regular and frequent contact with each other. This is the only reasonable way to explain the broad similarities in both technology and chronological changes in tool typology over this whole region. The second is that many of the more detailed, specific similarities and differences drawn between individual sites and layers are probably in large part, if not random

occurrences due to the effects mentioned above, probably the result of similarities and differences in economic pursuits and other activities carried out at these sites.

One specific, if not major, technological characteristic stands out, however, and that is the virtual absence of the microburin technique for tool manufacture at Crvena Stijena. The microburin technique is widespread in almost all Epipaleolithic lithic technology, and over most of Europe. Crvena Stijena is not alone in lacking this technology, though. It shares this unusual characteristic with the other Epipaleolithic sites in Montenegro (only a single microburin was recovered at Trebački krš [Đuričić 1996: 86]), and the microburin technique is similarly absent from sites to the west along the Dalmatian coast until one reaches Istria. At Badanj, a single probable microburin was recovered among a total of 8159 artifacts (Whallon 1999:Table 31.3), and microburins have not been found at Kopačina nor are they mentioned for Vela Spila (Vukosavljević et al. 2011: 44-45). At Vlakno, like Badanj, a single, possibly accidental, microburin was found out of 1749 technological pieces (Vukosavljević, Perhoč & Altherr 2014: 49:Table 18). Microburins are common in the Epipaleolithic sites elsewhere around the Adriatic, from Istria, e.g., Vešanska Pećina, Pupćina Pećina, Nugljanska Pećina (Vukosavljević et al. 2011: 44) on around to Romanellian sites in Italy (Bietti 1979: 343). In the other direction, the microburin technique is not recorded in the early Epigravettian industry at Blazi Cave in Albania (Hauck et al. 2017), but it appears again commonly at some, but not all, sites in Epirus, Greece (at Boila and Kastritsa but not Asprochaliko, Mihailović 2004: 94-95).

Based on this technological characteristic, Mihailović (2009: 103) recognized three major regions along the eastern side of the Adriatic and Ionian/Aegean Seas: a north Adriatic zone where the microburin technique was used and where backed tools were common, a south Adriatic zone where the microburin technique was not used and backed tools were much less common (this included Crvena Stijena and other sites in Montenegro), and the Ionian-Aegean area which was less distinctively defined and where there was greater diversity in microlithic forms.

One might take the relatively well marked technological characteristic of the sites where the microburin technique is known to have not been used in tool production as an indication that they all belonged to Epipaleolithic groups which shared strong cultural connections, it could be hypothesized that we have here evidence for an Epipaleolithic maximal band whose territory can be approximately delineated by a heuristic model of hexagonal areas as discussed in Whallon (1999). Adjusting this first attempt at modeling Epipaleolithic social territories along the Adriatic-Ionian coasts in the light of more recent data, allows us to sketch out a series of five hunter-gatherer maximal band territories running from the head of the Adriatic down to Epirus and northwestern Greece (Fig. 10.28). The first of these hypothetical territories encompasses the Epipaleolithic sites in Istria discussed above, where the microburin technique was used as a part of the microlithic technology. Similar technologies are also found along the Italian Adriatic coast all the way to Puglia and the Romanellian sites there. At the other end of this sequence of territories is one in and around Epirus, where the diversity of variation in technology and tool typology indicates a lack of cultural homogeneity, suggesting perhaps that this may have been a border area between culture areas, where there was mixing of populations and cultural traditions. In the middle are three territories, all of which are characterized by the absence of the microburin technique in Epipaleolithic lithic technology. Crvena Stijena would have been part of the middle one of these three hypothetical maximal bands.

The Late Mesolithic Sequence

Horizons IVb2-IVa (Figs. 10.29-10.32)

Layer IV was divided into three horizons in which a large number of flint artifacts and bone and antler tools were found. The richest finds were from horizon IVb1, which contained a large number of hearths and funal remains. Among the fauna, the most frequent were remains of red deer, wild boar, and roe deer, but a large quantity of shells of the snail *Helix pomatia* and other snails were also found. A certain consternation was caused by Malez's announcement that domesticated cattle (*Bos taurus brachiceros*) and goat (*Capra hircus*) were found in layer IV (Malez 1975), given that Benac was explicit in his position that there was no evidence that could indicate herding and agriculture (Benac and Brodar 1958). We assume that

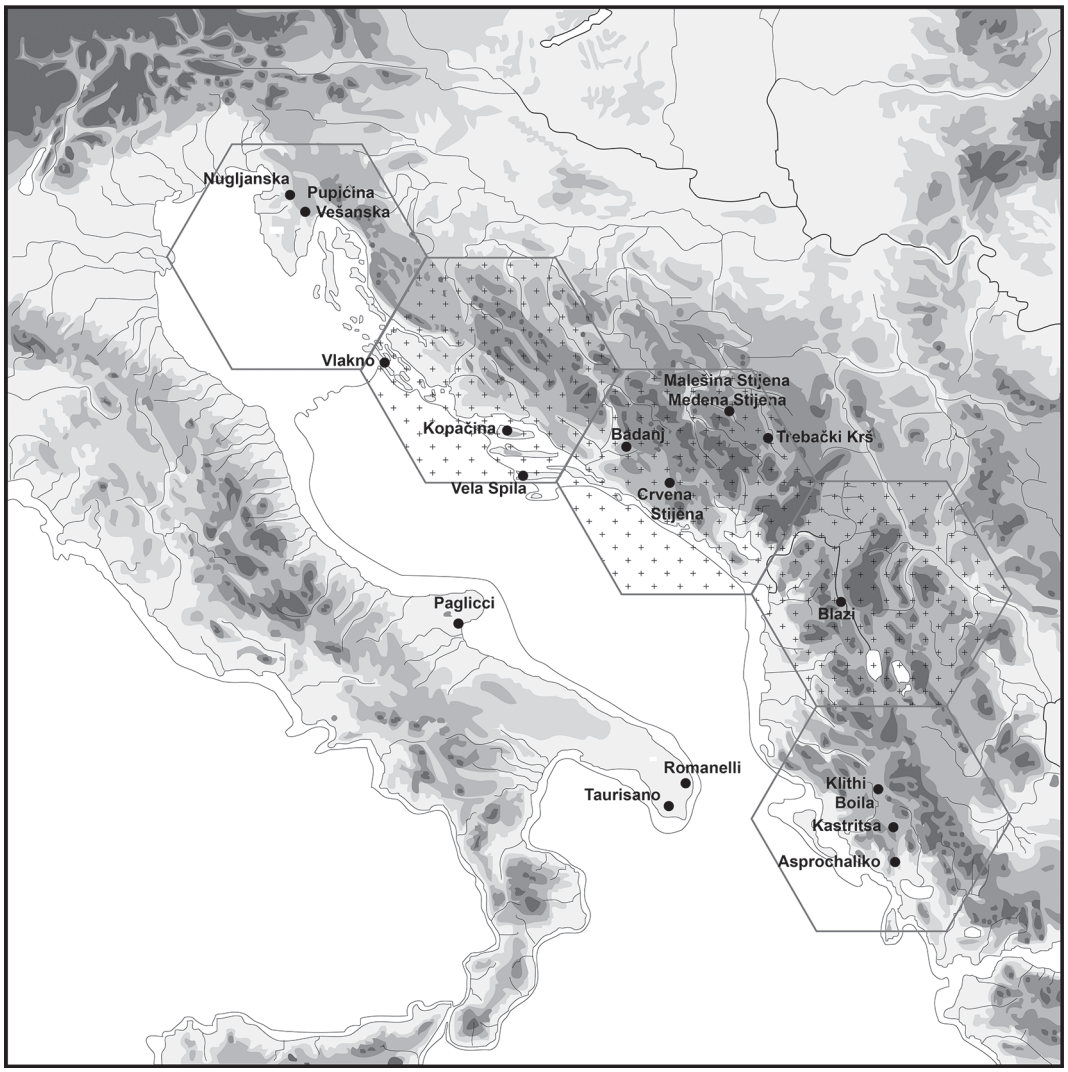

Fig. 10.28. Hypothetical social territories of hunter-gatherer maximal bands in the later Epipaleolithic along the eastern coasts of the Adriatic, Ionian, and Aegean Seas. The three middle, stippled territories encompass sites where microburin technique is clearly absent from lithic technology.

intrusive finds are in question here, given that a small number of fragments of *Impresso* ceramics were found in the layer.

In horizon IVb2 poor quality chert continues to predominate, but in horizons IVb1-IVa the total occurrence of very high quality opaloid flint and chalcedony rises to over 50% (Table 10.9). Similar tendencies are recorded in the structure of the artifacts. In horizon IVb2, similarly to the Early Mesolithic layers, the proportion of tools is low (4.7%) and that of débitage high (even 8.9%), while in horizons IVb1 and Iva the proportions of tools (15-20%) and or bladelets (20-24%) rises again, while the proportion of flakes falls by all of 20%, that is to close to 50% (Table 10.10). This is the consequence of the appearance of microblade technology in layer IVb1, which manifests itself in the appearance of regular cores for microblades (single platform and multi-directional) which were probably pressure flaked.

Regular bladelets with triangular or trapezoidal cross-section and faceted platforms were flaked from these cores. The strategy for exploiting these cores bas based on changing orientation during flaking, in other words using the side and back faces of the core and not rejuvenating the face of the core from which the initial removals were made.

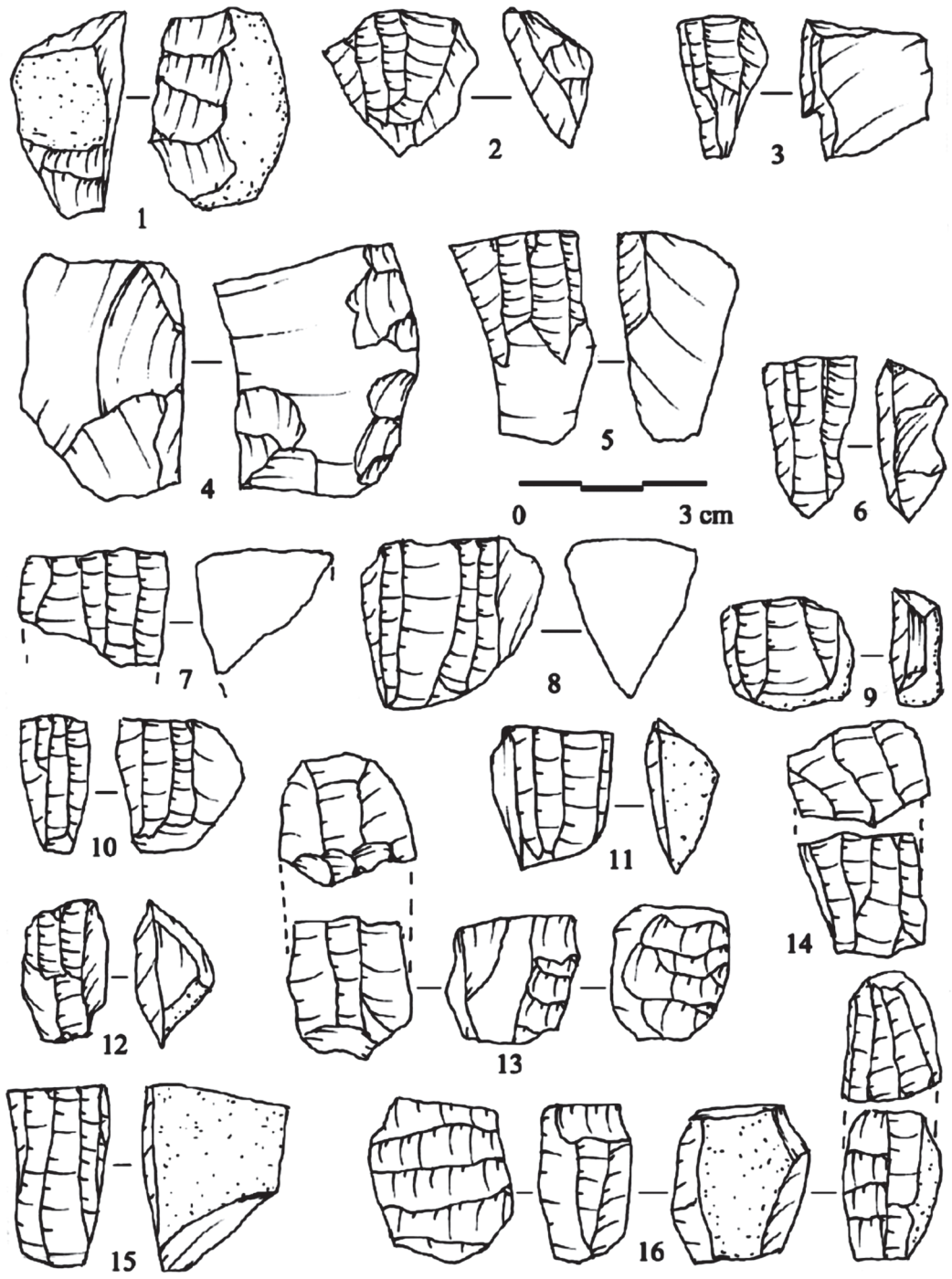

Fig. 10.29 Mesolithic cores from horizons IVb2 (1–3), IVb1 (4–10, 12) and IVa (11, 13–16). Drawn by D. Mihailović.

Scrapers (as a rule short, on small flakes) dominate the tool assemblage, but in horizon IVb1 there is an increase in the appearance of tools made on bladelets: tools with retouched truncations and denticulated tools with unilateral or bilateral notches (Table 10.11).Of geometric tools, only trapezes not made with the micro-burin technique are found in horizons IVb1 and IVa. Typical trapezes are found only in horizon IVb1 (Fig. 10.31: 46-50), while in horizon IVa

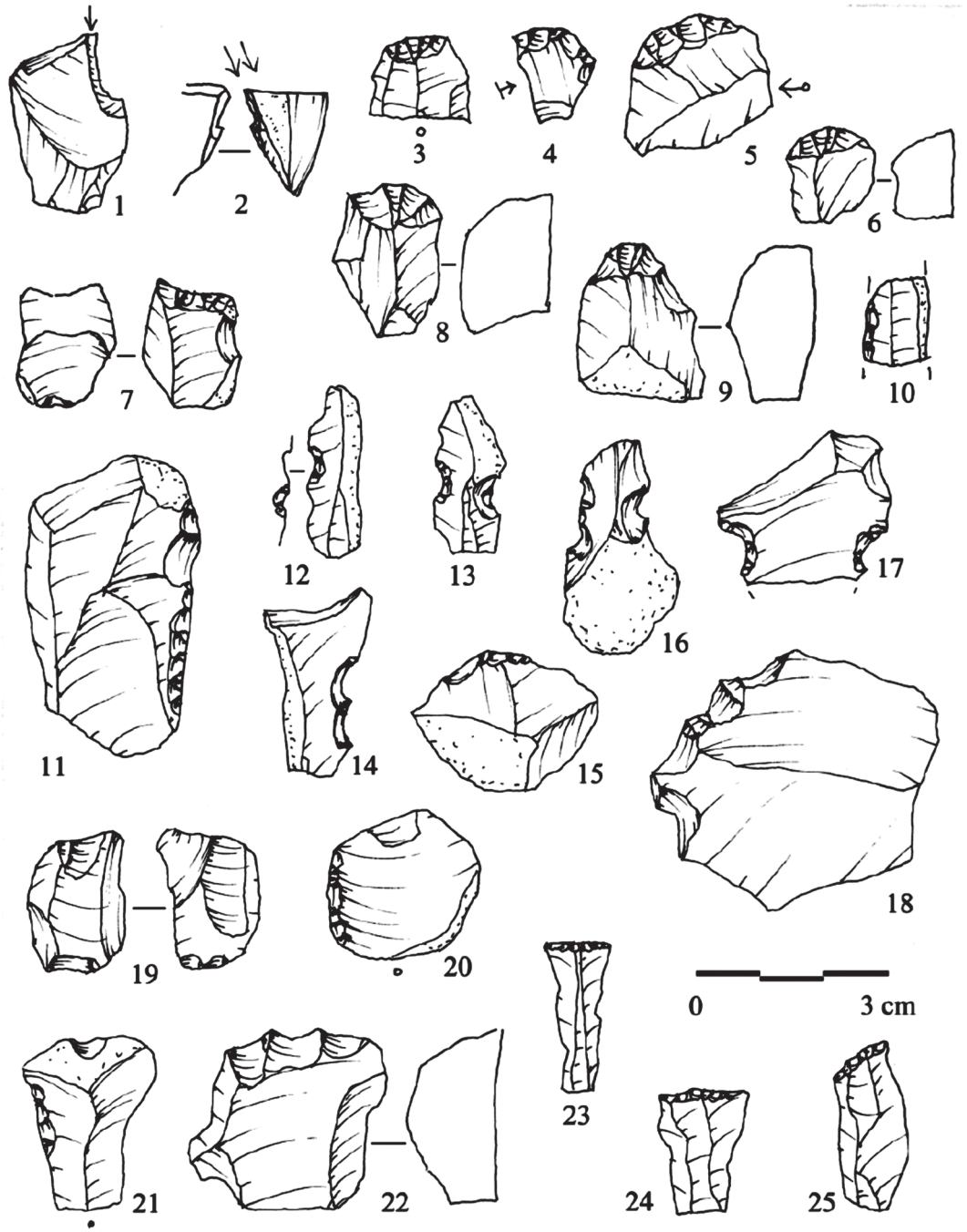

Fig. 10.30. Mesolithic tools from horizon IVb2 (1-25). Burins (1, 2), endscrapers (3-9), retouched blade (10), sidescraper (11), notched blades (12, 13), retouched flakes (15, 21), denticulated pieces (14, 18, 22), splintered piece (19), raclette (20), truncations (23-25). Drawn by D. Mihailović.

one example was found, made on a broad blade (Fig. 10.31: 40).

Many bone and antler tools were recovered from the Mesolithic layers (Mihailović 1998). They are especially numerous in horizon IVb1, in which were found many projectiles with a length of up to 10 cm and a width of 4-7 mm, with a long, diagonal base. The tips are as a rule round and the bases have a plano-convex cross-section. On one projectile were seen parallel grooves, and

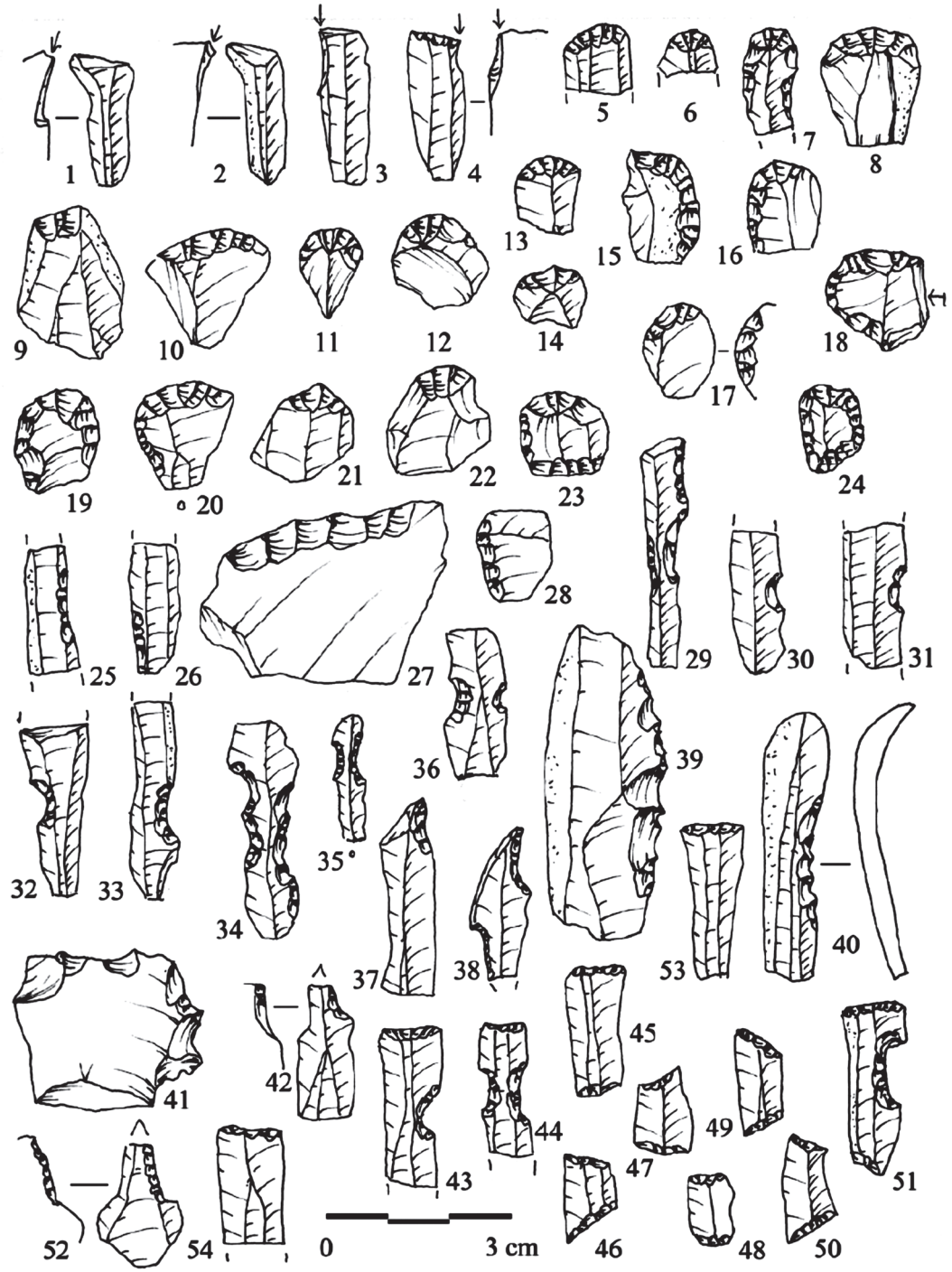

Fig. 10.31. Mesolithic tools from horizon IVb1 (1-54). Burins (1-4), endscrapers (5-24), retouched blades and bladelets (25-26), sidescrapers (27, 28), notched pieces (29-36), denticulated pieces (39-41), borers (37, 38, 42, 52), truncations (43-45, 48, 51, 53, 54), geometrics (46, 47, 49, 50). Drawn by D. Mihailović.

one point has a large number of parallel cuts and a criss-cross ornamentation. In the same horizon there was a large number of tools made from red deer antler, with or without perforations. Among those without perforation occur adzes with diagonally cut working edges and straight transversal

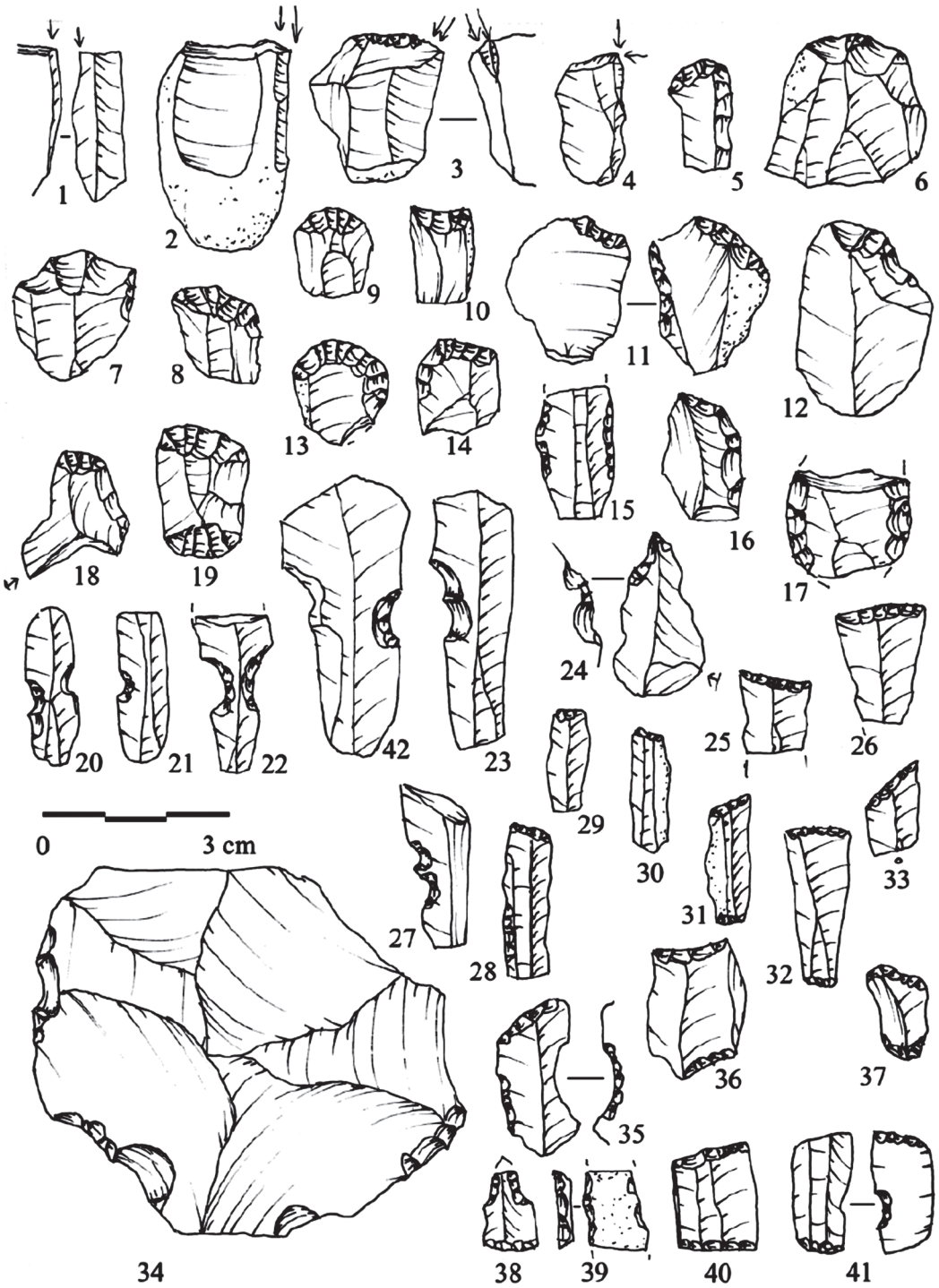

Fig. 10.32. Mesolithic tools from horizon IVa (1-41). Burins (1-4), endscrapers (5-14, 18, 19), side-scrapers (16, 17), notched tools (20-23, 42), denticulated tool (34), borer (24), truncations (25, 28, 29, 30-33, 35, 36, 37, 41), combined tool (38), geometrics (40), tool fragment (39). Drawn by D. Mihailović.

cut bases and adzes with tips polished on both the bottom and top sides. Perforated tools have the hole in the middle and the working edge shaped by cuts from both sides.

Contributions from New Excavations

Up to now several thousand artifacts have been recovered from Paleolithic and Mesolithic layers in Crvena Stijena (Benac and Brodar 1958; Basler 1975), which have for the most part been analyzed and published following re-study of this material (Mihailović 2009; Mihailović and Whallon 2017). Still, the question of the validity of the analyzed samples has always been present given that these investigations were published over half a century ago and that the sediment was not screened during the excavations. When excavations were taken up again more recently (2004-2015), one of the research priorities was to recover artifacts from sure stratigraphic contexts and to analyze them in such a way as to make possible a detailed picture of the lithic technology of the groups that inhabited Crvena Stijena at different periods. Since the new investigations have been until recently oriented largely towards the removal of massive amounts of sterile deposits at the entrance to the site and the investigation of the Middle Paleolithic layers has just begun (Whallon, Chapter 6, this volume; Mihailović, Mihailović and Borovinić, Chapter 8, this volume), we do not yet have enough data to be able to provide final answers in this respect. We believe, however, that we already now have enough information available to evaluate the validity of the results of earlier analyses.

Artifacts from Mesolithic Layers (excavated in 2005)

Over 3000 artifacts were recovered from the entrance to the shelter without precise stratigraphic context, many of which could come from either the Epipaleolithic or Mesolithic (Baković et al. 2009). Among them were noted numerous scrapers on very small flakes, including microlithic thumbnail scrapers and circular scrapers from 7-15 mm in diameter. Long, narrow lamelles with denticulated edges or notches were relatively numerous, and geometric microliths: segments and trapezes in whose manufacture the microburin technique was not used.

In the course of the 2005 excavations, after cleaning off backdirt from entrance area and taking down the supporting wall of the top terrace on the western side of the shelter, it was observed that a whole packet of Holocene layers had been preserved in a shallow depression in squares E-G 97-98 (Chapter 6, Figs. 6.11-6.12, this volume). These layers were then excavated, and it was seen that they exhibited intensive traces of burning, including true hearths, and contained artifacts and fauna that could belong to the Mesolithic. The results of radiocarbon dating confirmed this cultural attribution: layer 4 was dated to the end of the 11th/beginning of the 10th millennium cal BP, and layer 2 to the middle of the 9th millennium cal BP.

Layer 2

In layer 2, 34 artifacts were found, among which the most common were blades. Cores were encountered in a surprisingly large number (6), and five flakes and tools were noted, as well as one product of secondary modification (microburin). The majority of the artifacts are made on good quality gray and beige flint. Among the cores, there was one of gray flint that was intended for the production of blades (Fig. 10.33: 1), while among the blades were also found bladelets with regular (triangular and trapezoidal) cross-sections (Fig. 10.33: 2-4). Also, two retouched blades were found (Fig. 10.33: 5), one blade with bilateral notches (Fig. 10.33: 6), one fragmentary scraper on a flake (Fig. 10.33: 7), and one raclette (Fig. 10.33: 8). In this layer there was one typical microburin: a proximal fragment of a chalcedony bladelet broken at the place where there was a shallow, semi-steeply retouched notch (Fig. 10.33: 9).

Layer 4

Only 14 finds were recovered from layer 4, for the most part of poor quality chert. One core, two blades, seven flakes, three tools, and one chip were found. Among the tools were two lateral burins – one ordinary and one on the truncation of a retouched flake (Fig. 10.33: 15, 16), a nosed scraper with a slightly separate tip (Fig. 10.33: 17), and a straight, steeply retouched truncation on a distal microburin (Fig. 10.33: 18).

Concluding Observations

In the long sequence at Crvena Stijena six technological complexes can be identified that closely correlate with the main climatic phases and which can be related to a greater or lesser degree to concrete forms of techno-economic behavior. These complexes are separated by assemblages of a transitional nature (XXIV, XVIII, VII, IVb2) that can not be easily categorized

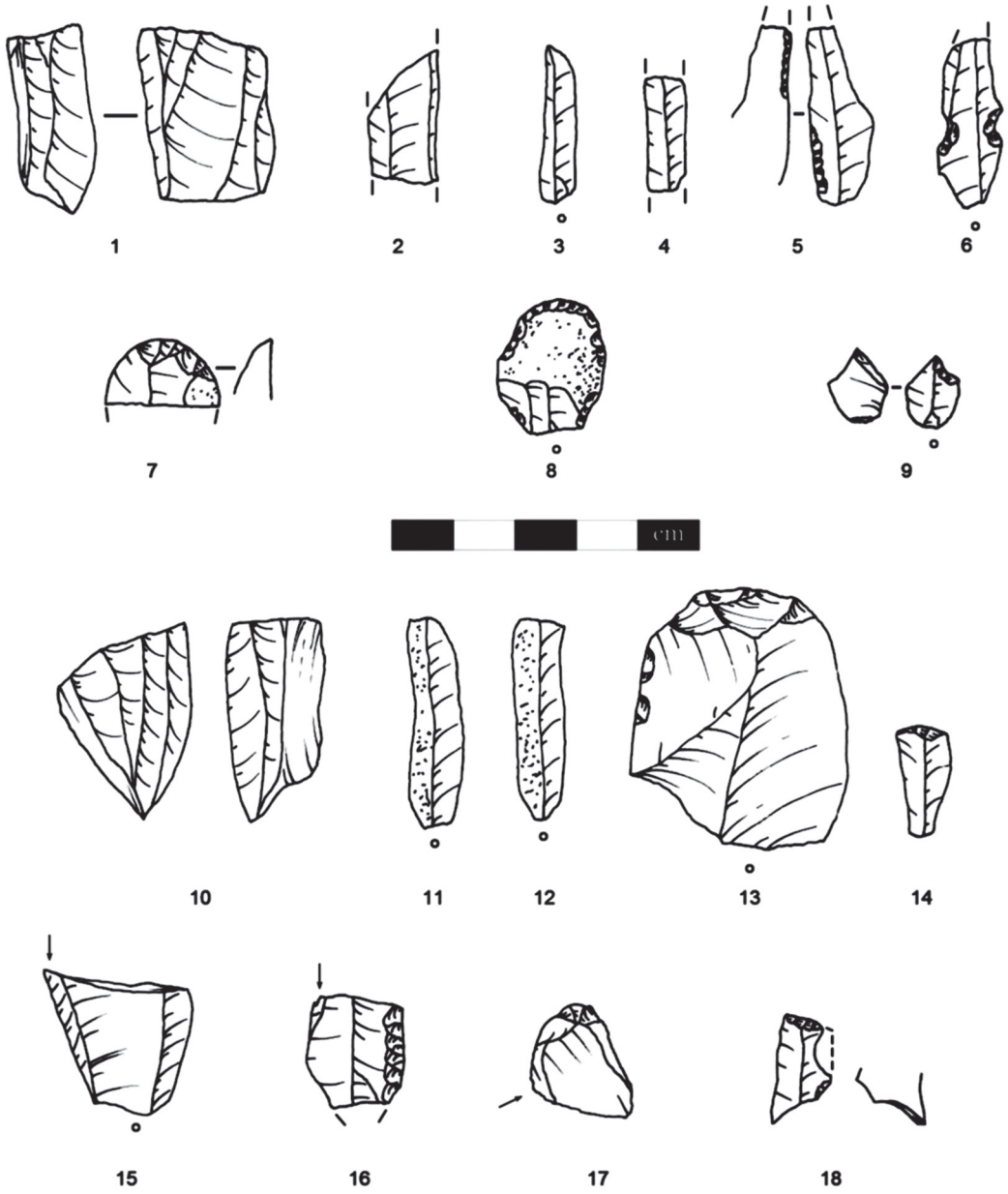

Fig. 10.33. Artifacts from Mesolithic layers 2 (1-9) and 4 (10-18) excavated in 2005. Cores (1, 10), unretouched blades and bladelets (2-4, 11, 12), retouched blade (5), notched blade (6), endscrapers (7, 13, 17), raclette (8), truncated bladelet (14), burins (15-16), microburins (9, 18). Drawn by D. Mihailović

given that elements from both earlier and later periods appear in them.

1) Typical Mousterian of Crvena Stijena type

The earlier excavators attributed the industry of the deepest layers reached at Crvena Stijena to a Premousterian (XXXI-XXIX), Protomousterian (XXVIII-XXV), and the Mousterian proper (XXIV-XXIII), but specialists who dealt with this material later on called the assemblages from layers XXVII-XXIV Typical Mousterian of Crvena Stijena type, stressing its similarities to Karain and the Zagros type Mousterian (Kozłowski 1992; 2002; Otte et al. 1998). Relying on the

published data and illustrations, they concluded that in these layers at Crvena Stijena Levallois *recurrent* technology was present, that sidescrapers were numerous, that tools were frequently thinned, and that the assemblages had a Charentian character. Re-analysis has shown, however, that it is necessary to re-evaulate these conclusions at least insofar as it turns out that there are no elements that show the regular application of the *recurrent* method, that sidescrapers dominate only in layer XXIV and that it is really only in this layer that any Charentian elements appear (seven transversal sidescrapers, of which only two have Quina retouch). We share the opinion that the assemblages from the lower levels of Crvena Stijena have affinities with Asia Minor, but we believe that there is not yet enough proof of direct cultural ties between the Balkans and Anatolia in the early phases of the Middle Paleolithic (MIS 6-4).

The quantity of finds from layers XXXI-XXIV point to the fact that the intensity of occupation of the shelter changed, but that the mobility of the groups was not too strongly marked (artifacts were made only on local raw materials). During the time when layer XXIV was being formed, however, the situation changed significantly. The shelter then became a base camp or a camp where specific activities were carried out (related to the burning of enormous quantities of wood) whose character is not yet possible to determine.

2) "Pontinian"/Charentian

The assemblages from layers XXII, XXI, and XVIII were at first attributed to the Pontinian (Basler 1975), which no one later brought into question. After analysis of this material, however, we have come to believe that only the finds from layers XXII and XX can be confidently assigned to this complex, and that although there are Pontinian-Charentian elements present in layer XVIII, they are less common than elements characteristic of the upper part of the Middle Palelithic sequence. Contrary to that, in layer XX elements distinctive of the upper layers occur, but Charentian-Pontinian elements are dominant.

It has already been mentioned that layers XXII and XX are characterized by the increased frequency of sidescrapers and Charentian (Quina) elements. In these assemblages transversal sidescrapers make up 20-25% of the total number of sidescrapers (up to 30% if one includes lateral-transversal examples), and Quina or semi-Quina retouch occurs on 20% of the examples in both layers. The degree of tool reduction is not great and is reflected more in their narrowing and shortening than in the degree of edge reduction, although typical Quina examples on thick flakes with 3-4 series of negative retouch on their edges (Bourgignon 1997; Lemorini et al. 2015) are noted. Naturally backed flakes and *déjété* flakes, sometimes with a *talon-dos* back were used in their manufacture. Pontinian technique is not found, while bipolar flaking is seen on a small number of cores.

For the reasons mentioned, in spite of the illusory similarities with the Pontinian (small dimensions of the artifacts, low degree of reduction), we would be more inclined to link the industry from layers XXII and XX to the Charentian, even more so because these layers correspond chronologically with the Quina Mousterian in Western Europe. The Charentian at Crvena Stijena, as at the majority of sites in Western Europe, belongs to MIS 4 and can be related to the mobility of the groups and the hunting of horse and reindeer (Morin et al. 2014), for which indications exist at Crvena Stijena. Direct parallels, however, can not be drawn, given that the degree of reduction of scrapers at Crvena Stijena is significantly less and that Levallois elements appear in the material. With that, these assemblages should be related to the Charentian sensu lato, which is confirmed at other Middle Paleolithic sites in the Balkans (Mihailović 2014).

3) "Micromousterian"/Late Mousterian

There has been much discussion about the cultural affiliations of the industry from layers XVIII-XII. Brodar identified these finds as Micromousterian (Benac and Brodar 1956; 1958), and Basler as Pontinian (layer XVIII), Denticulate Mousterian (layer XIII), and Mousterian (XVII-XIV) (Basler 1975). In the monograph, however, Basler did not at all consider Brodar's analyses, which provoked doubts about the placing of these industries into individual facies (Ivanova 1979; Papaconstantinou 1989). Newer research has shown that Brodar's initial observations about the microlithic character of the industry and the occurrence of denticulated artifact were in fact accurate (Mihailović and Whallon 2017).

Industries from the region of the western Mediterranean that belong to MIS 3, and in which Levallois components are not so marked, are assigned to different Mousterian facies: Typical-Discoidal, Late-Final, and Denticulate Mousterian (Jaubert et al. 2011). Leaving aside the differences among sites, it is necessary to highlight the fact that discoidal technology and unstandardized (often denticulated) tools on flakes of small dimensions predominate in these assemblages, which is confirmed at Crvena Stijena as at other sites in the region. We believe, however, that this is not so much a cultural as a behavioral phenomenon that could indicate less mobility of the groups and a greater intensity of using ad hoc tools for immediate use. Such behavior could be related to an environment with diverse and unpredictable rsources, which did not make using specialized tools appropriate, but this assumption remains to be tested.

New research has shown also that Upper Paleolithic and Uluzzian elements undoubtedly show up in the late Middle Paleolithic of the Adriatic-Ionian zone and in Crvena Stijena as well. These are manifested in the appearance of laminar and lamellar technology, the flaking of bipolar cores, and the emergence of steeply retouched tools, including curved back points and segments. In the cave of Fumane and at Crvena Stijena these elements emerge already in earlier periods (Peresani et al. 2016; Mihailović and Whallon 2017), which raises the question whether their frequent occurrence in the final Mousterian is a consequence of local development of cultural interaction with the bearers of an Upper Paleolithic techno-complex. For now, however, there are no proofs that the bearers of the Proto-Aurignacian and Aurignacian were present in the Adriatic-Ionian region in the period immediately prior to the Campanian Ignimbrite eruption.

4) Gravettian/Epigravettian

The finds from layer X were at first attributed to the Aurignacian only to have it later shown that there are no characteristic Aurignacian artifacts among them and that the industry is dominated by Gravettian and Epigravettian elements (Benac and Brodar 1958; Basler 1975; Mihailović 1999; 2009; Mihailović and Mihailović 2007). Without excluding the possibility that the Aurignacian actually exists in the lowest horizon of layer X, it is now, however quite clear that the upper part of this layer should be identified as Gravettian from the beginning of the last glacial maximum. The absolute dates (Mercier et al., this volume), biostratigraphic indicators, and the presence of steeply retouched bladelets and points all point to this.

The assemblage from layer IX probably belongs to the Epigravettian, given that short and thumbnail scrapers and geometric elements already appear in it, while layer VIII belongs to the final Epigravettian of the Bolling-Allerod oscillation both technologically and according to the dates obtained for it (Mercier et al., this volume)

For this period microlithization and marked variability of scrapers and geometric tools, as well as an increased frequency of curved back backed points are characteristic. Investigations up to now have demonstrated that industries of this type appear over the entire region of the Adriatic Basin and the adjacent Dinaric hinterland. Deeper inland in the Balkan Peninsula, they have been confirmed for now in the cave of Zala in Croatia (Karavanić et al. 2015), Pećina pod Lipom in Bosnia and Herzegovina (Kujundžić-Vejzagić 2001), and in Mališina Stijena and Medena Stijena in northern Montenegro (Radovanović 1986; Mihailović 1996).

At the moment it seems that mobility and the forms of settlement largely influenced the variability of the industries. The small number and limited repertoire of finds from the site at the maximum of the last glaciations testifies to only temporary occupation in this period of montane-Alpine climate, probably during the summer or in warmer climatic oscillations. On the other hand, the quantity and diversity of finds from the site in the Bolling-Allerod oscillation shows that there was an intensification of occupation of the montane-Alpine zone at this time (Mihailović 2007). Social factors could have influenced cultural regionalization in the northern Adriatic region (Whallon 2007b) about which we will speak again below.

5) Holocene Epigravettian

Early Mesolithic industries at Crvena Stijena, and at other sites in the Balkans, have never been given any separate name other than that it has been observed several times that they could

fall into the Holocene Epigravettian (Kozłowski 2009; Mihailović 2009). For a long time it was not known whether the assemblages from layers VII-V belonged to the Pleistocene or the Holocene, but new dates have solved this question in so far as they have shown that layer VI, and thus with this layer V, undoubtedly fall in the later period. Beyond that, the date obtained for layer 2 in the sodage opened in 2005 indicates that the possibility exists that horizon IVb2 belongs to the Early Mesolithic, which the material found in this horizon also suggests.

The Early Mesolithic at Crvena Stijena is very specific and recognizable in regional perspective. The Epigravettian elements are poorly represented and a certain technological impoverishment can be seen in the technology. That is, in the majority of the industries from this period, and similarly at Crvena Stijena, most commonly tools were made on irregular flakes of poor quality raw material (Mihailović 2001). At the time when these industries were identified as Epipaleolithic, i.e., the early Mesolithic, it was pointed out that this phenomenon should not be related to cultural isolation from other Mesolithic groups, but rather to technological adaptatioin to changes in the the living environment at the beginning of the Holocene. It was proposed that the decline in the quality of raw material could have been the result of a decrease in group mobility, and that technological changes and changes in tool repertoire could have been the result of changes in the strategies of resource procurement (Mihailović 2001). We are here talking about specialized flaked stone tools (hunting projectiles) no longer having a decisive role in resource procurement, but instead multi-purpose flake tools. The fact that changes in the way of life might have influenced the disintegration of cultural and social forms known from the previous period certainly could also have influenced changes in technology and the way of making tools.

6) Local Castelnovian

As has already been mentioned, at the time that Benac made his first interpretation of the Mesolithic layers at Crvena Stijena, the Mesolithic was all together unknown in southestern Europe, so it is completely understandable that he found the closest analogies in the North African Capsian. Later, Basler (1975) agreed with this observation. However, not long after that, finds from the nearby cave of Odmut were assigned a specific designation (Para-Castelnovian or industry of Odmut type) which seen to be related to the Castelnovian of Italy and the western Mediterranean (Kozłowski et al. 1995; Radovanović 1996).

In the industry from layer IV of Crvena Stijena, all the elements typical of the Castelnovian technocomplex appear, as well as the technology of flaking (Fontana 2015) and of tool retouching. Two components can be observed: short and thumbnail scrapers and a lamellar component with characteristic denticulated retouched bladelets and notched bladelets. The difference with industries from sites in the northern Adriatic area and the Appenine peninsula are reflected in the fact that the microburin technique is not found at Crvena Stijena (Mihailović 2009). Because of that, the trapezes at Crvena Stijena, as at other sites in Montenegro, are made on simply broken blade segments, and not with the help of applying this technique.

In the Mesolithic at Crvena Stijena, bone and antler tools are numerous, which is rare elsewhere in the middle and northern Adriatic regions. A large quantity of snail shells was also noted. In this period, too, behavioral components influenced the variability of the industries, but it is quite obvious that innovations seen in them are the result of cultural transmission from neighboring areas. For now, the question remains open how the transition from the Mesolithic to the Neolithic played out, given that elements of continuity can clearly be seen in the material from the Mesolithic and Neolithic layers at Crvena Stijena, in contrast to sites in the northern Adriatic (Biagi et al. 1993). Crvena Stijena occupied also in the Neolithic period, when hunting and gathering obviously still played an important role for some time.

Conclusion

As can be seen from the above, the earlier excavations and research at Crvena Stijena raised questions that go beyond the consideration of individual, separate archaeological periods. In most cases, though, one comes back to the same, central questions: the question of the influence of climatic and ecological factors on changes in material culture, the question of cultural transmission and continuity, and the question of the relationships between techno-economic forms and the forms

of subsistence economy and settlement systems. It remains an open question to what degree the phenomena noted at Crvena Stijena represent specifically local developments or how much they can be related to phenomena in the broader areas of Southeastern Europe, or, even further, in Western Europe or Southwest Asia. Obviously it is difficult to obtain answers to many of these questions on the basis of the earlier excavations. That was the reason for undertaking new multi-disciplinary research from 2004 onward, research which is continuing and whose results so far have been incorporated in this broad review.

Although the finds made during the more recent excavations are very few in number, they have contributed to solutions of problem that have been posed over several decennia (Mihailović 2009; Mihailović and Whallon, this volume). For the Mesolithic layers, it was not known for years even whether they contained trapezes, let alone what the nature of the Mesolithic industry was. Now, however, it is clear that the finds from layer IVb1 belong to a local Castelnovian from the middle of the 9th millennium cal BP in which there are not only typical Castelnovian elements (denticulated and notched pieces made on pressure-flaked blades) but undoubtedly also Epigravettian elements (Mihailović 2009). It should also be mentioned that in at least one of these layers there have been found products of the microburin technique which had not been documented previously. This means that this technique was known to the Mesolithic groups groups that occupied Crvena Stijena even though it was not used frequently. The dating of Mesolithic layer 4, which from its stratigraphic position probably corresponds to the IVb2 horizon of the earlier excavations, represents a surprise in that this horizon was thought to be somewhat later chronologically. The many microlithic and circular scrapers attest to the high degree of "Romanelliazation" of the Epipaleolithic and Mesolithic industries at Crvena Stijena, although they were unfortunately found out of stratigraphic context (Baković et al. 2009).

A second question on which much light has been cast is the question of the finds from layer X which were originally assigned to the Aurignacian (Benac and Brodar 1958). This attribution was later questioned (Mihailović 1998; Mihailović and Mihailović 2007), which provoked a strong reaction (Brodar 2009). It has now been shown however that this layer is of Gravettian age (Mercier et al., this volume), and the finds confirm this. In the group of finds from along the eastern wall of the shelter, made from white flint (which occurs only in this layer) there are no diagnostic Aurignacian artifacts, while the narrow blades with bi-directional negative scars found in the tephra (which could have fallen into the tephra only from layer X) have a marked Gravettian aspect. To summarize, the existence of an Aurignacian layer at Crvena Stijena still can not be completely ruled out, but for now there is no proof at all, and not even any indications, that such a layer appears at this site.

Thirdly, it must be noted that the result of the analysis of Middle Paleolithic artifacts for the moment reinforce conclusions reached from the re-analysis of the older material from this site (Mihailović and Whallon 2017). It appears that typical Levallois artifacts are somewhat more frequent in the middle part of the sequence (including layer M5 which perhaps correlates with layer XVII), while dominant in the upper layers M3 and M2 (analogous to layers XIII-XII) are artifacts made from flaking ad hoc cores on flakes (sometimes Kombewa), often with facetted platforms that are strongly reminiscent of the Asprochaliko method (Papaconstantinou 1989). The absence of typical Mousterian and of denticulated tools, along with the appearance of Upper Paleolithic elements (blades and burin-like cores for bladelets), including the segment, give the assemblage from layer M1 a completely Uluzzian-like character, which was already shown following the re-analysis of the earlier collections (Mihailović and Whallon 2017). All of this points to a complex scenario of the transition from the Middle to the Upper Paleolithic, not only at Crvena Stijena but in the entire Adriatic-Ionian region.

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