

THE PALAEOLITHIC DISCOVERIES FROM MITOC - MALU GALBEN (ROMANIA). THE AURIGNACIAN I AND I INFERIOR LAYERS

BY

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Abstract:

The paper makes a presentation of the two oldest archaeological layers at the Upper Palaeolithic site of Mitoc – Malu Galben: the Aurignacian I and I inferior assemblages. The study provides a geographic and geologic characterization of the area, by pointing out that the main reason for the prehistoric human communities to install their encampments here was the availability of the rich flint resources. The pedo-sedimentary stratigraphy of the site is also presented along with the distribution of the archaeological layers in the sedimentary units and the established climatic cycles. Among the Aurignacian layers, the Aurignacian I (subunit 10b inferior – 11 superior) provided the richest archaeological material: flint workshops concentrated around hearths, faunal remains and hard animal tissue artefacts (Mladeč spearheads). The lithic typology is specific to the classical old Aurignacian (careinated endscrapers and burins, nosed endscrapers). The absolute chronology data indicate a first occupation of the site around 32.730 ± 220 BP (Aurignacian I inferior – subunit 12 b) and the 30.000 BP for the end of the Aurignacian I occupation. The final part of the text propounds a framing of the Aurignacian discoveries from Malu Galben in the context of the Early Upper Palaeolithic from Europe.

Keywords: *Early Upper Palaeolithic, Aurignacian, climatic cycles, technocomplexes, knapping workshops, combustion structures, paleo-environment, hard animal tissue artifacts.*

In an earlier number of this journal (XXVIII/2005) the first author of this paper stated his intention to publish, in an extended manner, the archaeological discoveries from the large Upper Palaeolithic site at Mitoc – *Malu Galben*. A first step was taken in 2005¹, when a detailed presentation of the site's geographic and geologic background was published. We intend to resume the publication of the Palaeolithic discoveries, although a monograph of the site has already been published². Thus, the present paper sets the archaeological background for a future study which will focus on the characteristics of the lithic technology specific to the Aurignacian I and I inferior layers.

LOCATION OF THE SITE. GENERAL CHARACTERISTICS

The large Palaeolithic site at Mitoc – *Malu Galben* is situated in northern Romania (Mitoc commune, Botoșani county), in the southern part of the Mitoc village (48° 5'50" North and 27° 1'35" East), on the left side of the Ghireni brook (about 400 m from its confluence with the Prut River) (Pl. I/1). The prehistoric human habitation was located on the colluvium of the Prut's fourth terrace, which is cut by the Ghireni brook. It must be said that the geomorphologic location of the site raised contradictory discussions³. Some experts consider that the site is located on the Prut's middle terrace (the fourth from the series established by Băcăuanu) while others think that the site is located in the colluvium of an older

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¹ CHIRICA, MIHĂILESCU 2005: 41-55.

² OTTE, CHIRICA, HAESAERTS: 2007.

³ BARBU 1965; BĂCĂUANU 1961; BĂCĂUANU 1968; BĂCĂUANU, CHIRICA 1987: 87-96; CHIRICA 2001: 35-41; HAESAERTS *et al.* 2004: 33-56.

terrace, eroded and nearly destroyed (currently non-existent), whose front, represented by a layer of gravel, can be seen at approximately 100 m upstream (towards the brook *Izvoru Mare*, a permanent source of drinking water, which nowadays supplies the entire locality)⁴. On the other side, P. Haesaerts considers that this site is situated in the Prut's second terrace, in a lower position than the Palaeolithic site at *Pârâu lui Istrati* (located about 4km south of Mitoc)⁵.

The fourth terrace seems to be the most extensive one from the epigenetic sector of the Prut terraces system. It has an absolute altitude of 125-130 m, a relative altitude of 35-40m, the thickness of the alluvium is 10-15 m, and it has a height of 50 m, being dated to the Quaternary⁶. Its geomorphologic configuration is specific to the geographical area of the Prut Valley: the top of the terrace is easily distinguishable, its upper part reaching widths of up to 1.56 km. It is located between Mitoc and Liveni, at Manoleasa-Prut, Ripiceni and downstream, up to Ștefănești. At Mitoc, the denudation substantially reduced the alluvium thickness, but a gravel layer can be seen on its upper side, including the banks of the tributaries of the Prut River such as is the case of *Pârâu lui Istrati*, where the average thickness of the sediments is of about 10 m. Its base rises to 35 m. In fact, there are different views on the altitude of this terrace from the epigenetic sector of the Middle Prut: Sevastos indicates the existence of a terrace with an altitude of 60-65 m, originating in the Riss glaciation⁷; N. N. Moroșan assigned the same age to a 35-40/35-50 m terrace⁸. N. Barbu considers that at *Malu Galben* there exists a terrace of 50-60m, carved in trolley and white bugloviens marls, overlaid by a terrace accumulation from the Riss glaciation⁹. V. Băcăuanu attributed the same age to a terrace of 50-70 m¹⁰, considering it as representing the fourth terraces, situated between *Malu Galben* and *Pârâu lui Istrati*¹¹.

The archaeological importance of this terrace resides in the fact that it is in its sediments where the Palaeolithic habitations at *Malu Galben* and *Pârâu lui Istrati* are located. Their location was most probably chosen by the Prehistoric communities due to the rich resources of raw materials, specifically the Cretaceous and/or buglovian flint, which can be found on the right side of the Prut River. Likewise, the archaeological importance of the first terrace of Prut is that Palaeolithic and Epipalaeolithic settlements are clustered in its sediments both on the right (as Ripiceni-Izvor)¹² and the left side of the Prut River (nowadays Republic of Moldova).

Geologically speaking, the terrace consists of alluvium (gravel, sand, sandstone, silicified marl, brown quartzite, loess) that has a thickness of over 10 m (as it was recorded at *Pârâu lui Istrati*)¹³. As for the Ghireni brook area, I. Simionescu identified the following stratigraphy: 1. blue loam; 2. thin levels of grey loam; 3. a compact layer of limestone; 4. thin layers of grey loam; 5. massive limestone cliffs; 6. oolitic limestone, whose presence demonstrates the existence of limestone blocks with *Serpula* (between the layers 3 and 4)¹⁴. We observed that between Mitoc (*Malu Galben*) and the *Pârâu lui Istrati* – Prut confluence there are massive blocks of limestone inter-laid by loam and sandstones with *Cerithium* sp, *Cardium* sp., resembling those at Crasnaleuca (the upper levels)¹⁵.

We want to restate one more time the fact that in the Mitoc area, the Prut Valley is characterized by the existence of rich and inexhaustible deposits of flint, of a good quality, used as a source of raw material by the Palaeolithic human communities¹⁶. All the studies on the geology and geomorphology of the epigenetic sector of the Prut Valley stress that here, at the base of the Prut's lower terrace, there are layers

⁴ BARBU 1965; BĂCĂUANU 1961; BĂCĂUANU 1968; BĂCĂUANU, CHIRICA 1987: 87-96; CHIRICA 2001: 35-41.

⁵ HAESAERTS *et al.* 2004: 40.

⁶ BĂCĂUANU 1968: 146-161.

⁷ SEVASTOS 1922: 401-420.

⁸ MOROȘAN 1938: 114, 140.

⁹ BARBU 1965: 205-208.

¹⁰ BĂCĂUANU 1968: 146-161.

¹¹ BĂCĂUANU, CHIRICA 1987: 89-94.

¹² CHIRICA, CHIRICA, BODI 2014: 34-52.

¹³ CHIRICA 2001: 17-18.

¹⁴ SIMIONESCU 1906.

¹⁵ CHIRICA 2001: 18.

¹⁶ CHIRICA, CHIRICA, BODI 2014: 19-33.

rich in flint, which can also be found in the alluvial sediments of the same river¹⁷. Thus, during some surveys in the Mitoc area, we also identified several places with flint supplies, such as those that are now behind the village church (Pl. I/2): on a length of over 1 km, flint deposits are located in a secondary position; the flint *rogns* have the appearance of water-rolled materials. Their colours vary from black, dark grey, blue, grey and white, black and blue or brown-yellowish, without excluding the varieties of colours caused by the secondary oxidation that gave the translucent appearance. Along with the huge amount of the above described *rogns*, we found many flint cobbles with cortex and also bearing traces of weathering. At *Cotu Mic* (Pl. II/1), located about 4 km north of the village, flint deposits seem to be in greater quantities. Here the fourth terrace is better preserved and the flint cobbles appear not to have been rolled, since they still have sharp edges; their predominant colour is brown, more or less similar to what is called, in general, the Pre-Balkan platform flint, but without its specific waxy-yellow colour. A large amount of flint was displaced from its original position on the slope and has fallen into the Prut River. In this area we discovered a mammoth molar, in a secondary position (Pl. II/2). In our opinion, the color variety of flint has led some geologists to regard it either as Cretaceous flint, or as Buglovian flint. Near the sites of *Malu Galben*, *Crasnaleuca*, *Cotu Miculinți* and *Miorcani* we also identified other large deposits of mainly grey and brown flint. The human communities exploited these inexhaustible sources of raw materials, suitable for knapping, during the Palaeolithic and Epipalaeolithic-Mesolithic eras. This abundance of raw material might explain the quasi-absence of the microliths from the final stages of the Upper Palaeolithic lithic assemblages in the middle Prut area, both in nowadays Romania and Republic of Moldova (the geographical area between the Prut and Dniester). We will also add that the human groups at Mitoc – *Malu Galben* could also have used the huge quantities of flint from the confluence of the Prut River has its with the Ghireni brook, those flint deposits being available at the surface as they were brought from upstream by the mechanical action of the water.

A SHORT HISTORY OF THE ARCHAEOLOGICAL INVESTIGATIONS AT *MALU GALBEN*

At the moment 14 Palaeolithic sites are known in the area of the Mitoc commune, which sites were discovered as a result of researches led by N. N. Zaharia and one of the authors of this paper¹⁸.

In his comprehensive paper¹⁹, N. N. Moroșan presented a brief note on the findings from *Malu Galben*; his information was also based on the previous discoveries made by Gr. Ștefănescu²⁰ and Ioan Simionescu²¹. Thus, Gr. Ștefănescu wrote that “La Metoc, la mai bine de două metre de la suprafață am găsit silexuri cioplite și prelucrate, indicele unei stațiuni preistorice” (translation: “At Mitoc, at a depth of more than two metres we found knapped and processed flints, which indicate a Prehistoric site”). The geologist I. Simionescu confirmed the findings of his predecessor, writing that these finds (flint pieces) „serveau oamenilor preistorici din acele locuri la facerea de arme și unelte casnice” (translation: “were used by the Prehistoric people of those places to produce weapons and domestic tools”).

In 1956 and 1957, C. S. Nicolăescu-Plopșor and N. N. Zaharia conducted a stratigraphic survey noting that they found habitations of Clactonian (flakes with a prominent bulb, a flat and oblique platform found at a depth of 12 m), Mousterian and Aurignacian characteristics²². The authors did not consider the existence of a Gravettian assemblage, although they found a fragment of a backed blade, of a type characteristic of any Gravettian techno-complex²³.

Since 1978, the systematic research was resumed by V. Chirica, first in collaboration with Keneth Honea (from Northern Illinois University, U.S.A) (1984 – 1988), then with Marcel Otte, Pierre Noiret

¹⁷ BĂCĂUANU 1961; BĂCĂUANU 1968; BĂCĂUANU, CHIRICA 1987: 87-96; CHIRICA 1989.

¹⁸ CHIRICA 2001: 5; PĂUNESCU, ȘADURSCHI, CHIRICA 1976: 188-194.

¹⁹ MOROȘAN 1938: 56-60.

²⁰ ȘTEFĂNESCU 1888: 20.

²¹ ȘIMIONESCU 1906: 41.

²² PLOPȘOR, ZAHARIA 1959a: 34-38; PLOPȘOR, ZAHARIA 1959b: 11-16.

²³ CHIRICA 2001.

(Université de Liège) and Paul Haesaerts (Institut Royal des Sciences Naturelles de Belgique, Bruxelles) in 1991-1995. A new phase of systematic investigations began in 2013 in collaboration with P. Noiret (Université de Liège) and Philip Nigst (University of Cambridge)²⁴.

Until now four Gravettian layers (IV-I) have been identified, which are overlapping three Aurignacian ones (III-I; the Aurignacian I layer is divided into Aurignacian I and I inferior, while the Aurignacian III is divided into Aurignacian III and III superior layer), the latter being located at the base of the sediment. We have not found remnants of older habitations than those of the Upper Palaeolithic²⁵.

THE STRATIGRAPHY OF THE SITE

The geologist and palaeolithician N. N. Moroşan was the first specialist that presented a succession of layers for *Malu Galben*. In 1938, he published the geological and archaeological stratigraphy of the site as follows²⁶: (original in French, our translation): “the section of geological formation in which the site *La Malu Galben* is located shows at the top:

- 0.30 m, and in some places even 0.85m of topsoil below which are:
- 5.20 m of typical light yellow loess;
- 0.10 m of fossil Upper Palaeolithic layer;
- 1 m of loess of a similar structure to that of the upper loess;
- 1.20 m sandy loess gradually passing in a sandy clay; 2-3 m of slightly sandy loam;
- About 1 m relatively small terrace gravel that forms the base of the section”.

On basis of their stratigraphic surveys of 1956 and 1957, C. S. Nicolăescu Plopşor and N. N. Zaharia established a stratigraphic sequence on a profile of approximately 13 to 14m in height²⁷. They pointed out that over the gravels and the sands located on the rock-support (consisting of water-rolled flint), there is a *buried* layer of dark-colour fossil soil, overlapped by a deposit of more or less parallel layers of bluish silty loams with yellow-reddish fossil soil lenses. They are overlaid by eolian loess deposits, uniform in terms of colour and grain, interspersed with layers deposited by the Prut floodwaters, of a less dark colour or with calcareous intercalations of a pseudo-michelian aspect. On their top are bands of sand alternating with brown loess soils and at their upper part the chernozem layer (the current green cover). They considered that the basis of the terrace at *Malu Galben* was carved in the Mindel-Riss interglacial, the bands of clays and fossil soils were deposited in the Riss-Würm interglacial and the subsequent deposits, including the human habitations, belong to the last Ice Age²⁸.

As a result of our collaboration of 1991-1998, P. Haesaerts established the sedimentary units and specific climatic episodes for the sediments at *Malu Galben*. These sedimentary units appear as follows (Pl. III-VI)²⁹:

- sedimentary unit 13 (in the centre of the site – thickness of about 1.20 m) is represented by a pale brown-light grey loam (subunit 13b), resting on top of limestone through a mixture of gravels: sand, limestone fragments and flint. At its upper side lies a greyish brown humiferous horizon (subunit 13a); this assemblage passes laterally in a hydromorphic loam with numerous grey lenses and iron hydroxides (at the base of the sediment);
- unit 12 has a thickness of about 1m and is a loam with numerous light grey tongues and iron hydroxides spots, whose linear base is characterized by the presence of gravel rich in limestone fragments and flints, which also appear in form of lenses in the lower part of the loam (subunit 12b). At the top, the hydromorphic loam has a grey-brown horizon, slightly humiferous and bioturbate with small concretions of manganese (subunit 12a);

²⁴ CHIRICA *et al.* 2014: 81-83, 347-351.

²⁵ CHIRICA, BORZIAC, CHETRARU 1996: 85-88; CHIRICA, BORZIAC 2009: 104-118; CHIRICA, BODI, 2011: 190-197; CHIRICA, CHIRICA, BODI 2014: 34-54.

²⁶ MOROŞAN 1938: 59

²⁷ PLOPŞOR, ZAHARIA 1959a: 34-38; PLOPŞOR, ZAHARIA 1959b: 11-19.

²⁸ PLOPŞOR, ZAHARIA 1959a: 34-38; PLOPŞOR, ZAHARIA 1959b: 11-19.

²⁹ HAESAERTS 2007: 17-21.

- unit 11 (thickness of about 1.20 m) is a grey stratified deposit consisting of thin (centimetres) yellowish brown sandy silt and light yellow silt sand mixed with thin lenses of grey silt and grey clayey silt, with an oblique disposition. At the top, the stratification fades and passes into a homogeneous deposit with a few sandy lenses;

- unit 10 (about 1.20 m thick) is represented by a sandy deposit, pale yellow-brown, which is homogenous and massive (called 10b) with grey spots and traces of roots. It also contains a humiferous horizon, dark grey, having a thickness of 15-20 cm (subunit 10a) with granular structure and many elements of bioturbation; its extreme limits are characterized by the presence of crotovinas;

- unit 9 (about 1m thick) is a yellow-brown clay deposit, homogeneous and uniform (massive) with small grey spots along crotovinas (subunit 9b). The clay deposit is superimposed by a grey-brown horizon, with many bioturbation elements (subunit 9b);

- unit 8 is represented by the homogeneous sandy loess called 8b, overlapped by humiferous soil 8a;

- unit 7 (thickness of about 1.30 m) consists of a yellow-light brown deposit (subunit 7b), almost identical to that from the subunits 9b and 8b, and a pale grey compact horizon, having a thickness of about 60 cm (subunit 7a), with numerous iron hydroxide spots unevenly scattered and traces of roots. From place to place, there are fine traces of iron hydroxides, which open at the top of the subunit 7a as a slope in the direction of the Prut;

- unit 6 (thickness of 0.90 m) is composed of yellowish brown bioturbated sandy silt with a fine granular, polyhedral structure, especially in the lower part, on a thickness of about 30 cm, representing the 6b subunit. Towards the top, the horizon goes to a pale yellow, solid and smooth deposit and a pale grey horizon rich in iron hydroxides along rootlets (subunit 6a);

- unit 5 (almost 0.80 m) is a deposit of yellow-pale ochre deposit, with a coarse sand lens; is characterized by numerous grey spots, some with carbonates (subunit 5b); at the top there are small concretions of manganese and iron hydroxides stains, set mostly on the old root length (subunit 5a).

- unit 4 has a thickness between 1 and 1.50 m and encompasses three subunits: the bottom is fine loess, yellow, slightly carbonated, which can reach a thickness of 1 m, with grey spots along trace roots (sub 4c). In the northwest corner of the archaeological excavation, the loess has a bioturbate humiferous horizon, grey-brown of over 30cm (subunit 4b), overlaid by about 20 cm pale grey loam with small brown tongues (subunit 4a). Laterally, the basis of horizon 4b is connected to another horizon, thick, with elongated grey-brown tongues, and which develops in contact with loess from 4c;

- units 3 and 2 (1 m and 0.80 m thick) are a sequence of two generations of sandy loams, yellow, carbonated (subunits 3b and 2b), including several layers of thin (centimetre) medium and coarse sand. On top are other grey horizons with small spots of iron hydroxide as a network of roots traces (sub-units 3a and 2a);

- unit 1 has a thickness between 1.50 and 2 m. It splits into a kind of semi-continuity with upper part of unit 2. Its lower part (1b subunit) is composed of several small parallel layers of sands, oblique or cross-stratified, with the presence of gravel. Towards the top, the sands are replaced by a grey sandy loam with spots of oxidation. Over the entire assembly there is a loess layer (subunit 1a), which makes the transition to the upper part of the entire profile, represented by what P. Haesaerts has called the sedimentary unit 0³⁰.

The Gravettian layers are affiliated to the upper sedimentary units (7-1), whereas the Aurignacian ones to the lower units (8-13).

THE INTERPRETATION

P. Haesaerts managed to develop a complex pedo-sedimentary sequence along the walls of the excavation field (which have a high of approximately 14 m) (Pl. IV-VI). Thus five climatic cycles and 13 sedimentary units were established (cycle V comprising units 13 and 12; cycle IV: units 11-7; cycle III: units 6-4; cycle II: units 3-2; cycle I: unit 1³¹) (Pl. V-VI).

³⁰ HAESAERTS 2007: 21.

³¹ HAESAERTS 2007: 30-32.

Corroborating the archaeological data with the pedo-climatic ones presented above, one can observe that:

- The Aurignacian III and III superior assemblages belong to units 8 and 9 of the climatic cycle IV;
- The Aurignacian II assemblage was attributed to the 10b superior subunit from the same climatic cycle IV;
- The Aurignacian I assemblage was placed in the 10b inferior and 11 superior subunits in the climatic cycle IV;
- The Aurignacian I inferior assemblage (scattered) belongs to units 11, 11 inferior and 12 of the climatic cycles IV and V³².

At Mitoc – *Malu Galben* all the Aurignacian assemblages and sedimentary units belong to the Middle-Pleniglacial age (Pl. V-VI)³³.

We must state the fact that the Gravettian assemblages present themselves in the form of real archaeological layers of habitation, located on the obliquity of geological strata, while the Aurignacian ones are just large complexes, situated on the slope of the geological strata, but without the continuity that can be observed in the case of the Gravettian ones. The permanence of human habitation can be seen through the existence of the flintknapping workshops and combustion structures located between the archaeological stratigraphic layers.

THE AURIGNACIAN ASSEMBLAGES

When referring to the technocomplexes at Mitoc-*Malu Galben* we will use the phrase *Paleolithic superior vechi* (Early Upper Palaeolithic) because the technical and typological components of the lithic assemblage permit its classification in the **classical old Aurignacian** of Europe, with all its meanings: Mladeč spearheads carenated burins and endscrapers, nosed endscrapers, etc.

At *Malu Galben*, in the Aurignacian I layer, which was investigated on a surface of 204 m², several large flintknapping workshops were discovered, within the perimeter of which was located at least one hearth (Tab. 1, 2). The hearths are mostly simple, but also some protected with sandstone or limestone slabs were also investigated. In total were identified 15 such archaeological concentrations. Each knapping place contained a large amount of lithic pieces, in various stages of knapping, including typical tools, but mainly a large number of debris.

The archaeological findings, lithic and faunal, below the Aurignacian I layer were assigned to the Aurignacian I inferior assemblages. These findings are located in the sedimentary unit 12a and 12b. We do not exclude the possibility that some older habitation remains might be found in the sedimentary subunits 13a and 13b, corresponding to the Hengelo climate oscillation, as is the case of the large Early Aurignacian sites in Europe.

The Aurignacian II layer was investigated over an area of about 148 m². In G/01-03 squares was discovered a large concentration of archaeological materials, containing many flint artefacts.

The Aurignacian III layer was investigated over an area of about 144 m². In this archaeological level many flintknapping places and combustion structures were identified. The archaeological findings situated above the Aurignacian III were included in what we called the Aurignacian III superior layer³⁴.

The Technological and Typological Components of the Aurignacian Assemblages

Since a detailed techno-typological presentation of the artefacts was already made elsewhere³⁵ we will resume here at a short enumeration:

- the Aurignacian I inferior lithic technocomplex comprises 1216 lithic pieces: 17 cores, 60 blades, 27 bladelets, 1175 flakes, 9 *chuttes de burin* and 20 tools: 8 endscrapers, 4 burins, 1 retouched blade, 1 splintered piece, 2 notched pieces, a denticulate piece and a retouched flake;
- the Aurignacian I lithic techno-complex, the richest from the Aurignacian ones, comprises 18.172

³² For further information on the cycles see HAESAERTS 2007: 31-32.

³³ HAESAERTS 2007: 28, Fig. 11.

³⁴ CHIRICA, BODI 2011: 192-193.

³⁵ OTTE *et al.* 2007: 85-117; NOIRET 2009: 53-67; CHIRICA, BODI 2011: 192-193.

pieces: 119 cores with one or two striking platforms, 1381 blank blades, 166 blank bladelets, 16009 unretouched flakes, 8 elements of core maintenance, 63 elements coming from core maintenance, 234 *chuttes de burin* and 200 formal tools: 55 endscrapers (from which 22 carenated short endscrapers, 2 nucleiform endscrapers, 12 nosed endscraper), 96 burins (48 of which are carenated), 1 double tool (endscraper-carenated burin), 4 retouched blades, 1 scraper, 8 notched pieces, 23 denticulate tools, 11 retouched flakes;

- the *Aurignacian II* lithic techno-complex is represented by 761 pieces: 26 cores, 85 unretouched blades, 618 unretouched flakes, 7 *chuttes de burin* and 25 tools: 12 endscrapers (only two carenated), 10 burins (from which three are dihedral and two carenated), 2 endscrapers, a denticulate tool;

- the *Aurignacian III* techno-complex contains 1031 lithic pieces: 59 cores, 255 unretouched blades, 680 unretouched flakes, a chute de burin and 36 tools: 25 endscrapers (seven carenated), 3 burins (two dihedral), 2 retouched blades, 2 scrapers, 2 retouched flakes, one endscraper-burin, 1 borer (*perçoir*);

- the *Aurignacian III superior* lithic techno-complex is the newest from the Aurignacian habitations and contains isolated finds: 284 lithic pieces from which 19 are cores, 142 unretouched blades, 96 unretouched flakes, 4 *chuttes de burin*, one *flanc* and 20 tools: 13 endscrapers (5 carenated), 1 endscraper-burin, 1 blade with a retouched oblique truncation, 2 denticulated blades, 1 scraper.

THE AURIGNACIAN I AND I INFERIOR LAYERS

The archaeological features

Except for the Aurignacian I inferior level, all the encampments at Mitoc - *Malu Galben* are characterized by numerous places where the local flint was knapped (for Aurignacian I see tab. 1) and combustion structures³⁶. The hearths (tab. 2) provided comfort to people, meaning heat, light during the night and the thermic preparation of food (demonstrated by the fact that within the perimeter of the hearths numerous fragments of calcined bones were found).

Thus, a characteristic of the Aurignacian I habitation is the presence of numerous flintknapping places (tab. 1), some of very large dimensions, some of which had hearths (tab. 2) in their perimeter.

The lithic assemblages discovered in the Aurignacian I inferior and I layers

The local flint is the main raw material of the lithic artefacts discovered at Mitoc - *Malu Galben*. But, as a consequence of the often movements of the population, at *Malu Galben* lithic pieces from other places were also brought. Thus, in the Aurignacian I layer a blade made of sandstone was found.

An overview of the lithic technology for the Aurignacian I and I inferior assemblages was already published under other circumstances³⁷, so here we will confine ourselves to a very short presentation. First we need to state the fact that, until now, no refitting was done for the collection so the reconstruction of the operational sequences is at the moment difficult to be detailed. The structure of the lithic industry from the two layers (cores and elements which can be related to their maintenance, flakes, both cortical: Pl. VIII/2 and non-cortical, blades from all reduction sequences: cortical, crested and *plein débitage*, the predominance of the blanks over the formal tools) is typical for an assemblage knapped on-site.

The cores discovered in the Aurignacian I inferior (n = 17) and Aurignacian I (n = 119) layers are mainly blade cores with one or two striking platforms³⁸. Some flake and flake-and-blade cores were also discovered. As already noticed for the Aurignacian I lithic collection³⁹, mainly flint blocks and also some thick flakes were transformed into cores. The core maintenance was made through the rejuvenation of the striking platform (by core tablet removals) and of the débitage surface (through *flancs*)⁴⁰. The débitage surface for blade extraction was prepared through crests (total or partial), but in some cases the natural

³⁶ CHIRICA 2001; CHIRICA 2007: 167-172.

³⁷ OTTE *et al.* 2007: 86-107, Fig. 1-11; NOIRET 2009: 62-65.

³⁸ OTTE *et al.* 2007: 86-107, Fig. 2, 3.1-2, 4.1-4; NOIRET 2009: 62-65.

³⁹ OTTE *et al.* 2007: 86-107; NOIRET 2009: 62-65.

⁴⁰ Although in the monograph of the site the core maintenance elements are presented only for the 1992-1995 excavation campaigns, in our recent re-evaluation of the lithic material we also identified some core rejuvenation tablets and *flancs*, which will be presented in a more detailed future study.

morphology of the flint blocs allowed the removal of blades without the need of creating crests (in these cases most of the blades are cortical). Some blades bear signs of the special preparation of the core elements before their knapping (Pl. VIII/7: a blade of a middle length, made from the so-called 'Dnister flint').

In both Aurignacian layers endscrapers made on flakes (both cortical and non-cortical) (Pl. VII/1-3), on blades (non-retouched and retouched) were discovered⁴¹. The carenated endscrapers are rare in the Aurignacian I inferior (one piece⁴²) but abound in the Aurignacian I, II and III technocomplexes. Although the nosed endscrapers lack in the I inferior assemblage they are part of the Aurignacian I (n = 14). Some items can hardly be assigned to one type since their morphology is not very strictly outlined (for example the items represented in Pl. VIII/5 – the piece made on a cortical flake might also be regarded as a piece with a large notch but also as an atypical endscraper).

The burins are very diverse and numerous in the Aurignacian I assemblage (Tab. 3); they were made on flakes (Pl. VII/7-9, VIII/4), blades (Pl. VII/6), or retouched truncation (Pl. VIII/1). Only four were discovered in the inferior layer⁴³ (Tab. 3). The scrapers discovered in the Aurignacian I layer are made on cortical flakes (Pl. VII/10; VIII/9⁴⁴). Retouched blades and flakes were discovered in both layers (Pl. VII/5, 11; VIII/3, 6, 8). The retouched flakes (both cortical and non-cortical) have retouches either on their dorsal or ventral side (Pl. VIII/3). A double tool (burin-carenated endscraper) is part of the Aurignacian I inferior technocomplex (Pl. VII/4).

For the archaeological material discovered in 1992-1995, one can have a better view on the general structure of the assemblages, depending on the sedimentary unit in which it was discovered. The *Aurignacian I inferior* technocomplex (1992-1995) comprises 3 cores, 30 blades, 16 bladelets, 656 flakes, 6 tablets, 2 *flancs*, 9 *chutes de burin*, 10 tools which were found as follows:

- in unit 11: 4 blades, 9 bladelets, 126 flakes (84.56%), 1 tablet (0.67%), 4 *chutes de burin* (2.68), 5 tools (3.35%);

- unit 11 inferior: 12 blades, 4 bladelets, 264 flakes, 2 tablets, 1 *flanc*, 4 *chutes de burin*, 2 tools; cores are absent;

- unit 12a: 3 cores, 13 blades, 3 bladelets, 251 flakes, 2 tablets;

- unit 12 b: 1 blade, 15 flakes, 1 tablet, 1 tool⁴⁵.

For the *Aurignacian I* layer (1992-1995 excavations) the assemblage is composed of 17 cores (0.3%), 288 blades and 132 bladelets (7.4%), 5194 flakes (91.2%), 41 tablets, 22 *flancs*, 192 *chutes de burin*, 46 tools (0.8%), which were discovered as follows:

- unit 10b inf.: 7 cores, 23 blades; 15 bladelets, 730 flakes, 10 *chutes de burin*, 9 tools (0.9% of the lithic assemblage is represented by cores, 4.8 % by blades and bladelets, 93.1% by flakes and just 1.1 % by tools⁴⁶);

- unit 11 sup.: 10 cores, 382 blades and bladelets, 4.464 flakes, 37 tools (0.2% is represented by cores, 7.8 % by blades and bladelets, 91.2% flakes and 0.8% by tools)⁴⁷.

When comparing the tools discovered in the two layers, between the Aurignacian I inferior and I some differences can be observed (tab. 3) as follows: 1/22 carenated endscrapers, 4/11 endscrapers on flakes, 2/48 carenated burins, 2/22 dihedral burins; 1/23 denticulate pieces, 1/11 retouched flake (in the monograph of the site⁴⁸ the table 20 wrongly presents 11 retouched flakes for the Aurignacian I inferior; the right numbers are found in the text describing the two assemblages⁴⁹).

The differences observed between the two layers can be explained, first, through the fact that the inferior layer is scattered, unlike the Aurignacian I. Secondly, at the moment of the Aurignacian I

⁴¹ OTTE *et al.* 2007: 103, Fig. 1.1; 106, Fig. 4.8-11.

⁴² OTTE *et al.* 2007: 103, Fig. 1.5.

⁴³ OTTE *et al.* 2007: 103, Fig. 1.5-7; 111-115, Fig. 8-12.

⁴⁴ In the monograph of the site, for the Aurignacian I is mentioned just one scraper.

⁴⁵ The numbers are taken from OTTE *et al.* 2007: 101, Tab. 19a.

⁴⁶ OTTE *et al.* 2007: 99, Tab. 16b.

⁴⁷ OTTE *et al.* 2007: 99, Tab. 16a.

⁴⁸ OTTE *et al.* 2007: 102, Tab 20.

⁴⁹ OTTE *et al.* 2007: 1001 for the I inferior layer, and p. 107 for the Aurignacian I assemblage.

occupation of the site, the communities coming here might have found better environmental conditions. We also have to consider the fact that in the upper Aurignacian units (Aurignacian II, III and III superior), though they were investigated on larger areas, we did not find such a large variety and quantity of lithic tools as in the Aurignacian I.

Also we do not exclude the possibility that these differences between the two tool assemblages might be related to the existence of two different *ethnic groups*.

As stated above, in a future study we will elaborate on the situation observed in each campaign of excavations, highlighting all concentrations of lithic material discovered in each square of the excavation and more on the blade production from the site.

Paleo-Environment Elements

The paleo-faunistic findings from the Aurignacian I and I inferior layers are rich and varied (Tab. 4). The faunal findings provided important information for the study of the climatic conditions existing at the time when those bones were abandoned. Thus, except for the horse and bison - species adaptable to any climate changes, the presence of remnants of reindeer and other cold climate species demonstrates the existence of a periglacial climate during the Aurignacian I and I inferior encampments.

On the charcoal samples and other paleobotanical remains, Fr. Damblon managed to identify the plant species that were present in the Aurignacian I and I inferior environment of *Malu Galben*. This range is extremely limited, referring only to *Picea* in the entire column from the bottom of the sediment, to which are added in almost insignificant amounts the *Poaceae* (one piece) and *Cyperaceae* (three pieces of roots and rhizomes) species, in the 11 superior unit⁵⁰.

In the rest of the stratigraphic column *Picea* dominates. Therefore, as quantity and as number of measurable elements (dimensions), there can be seen a massive presence of this species. Very rarely, in other stratigraphic subunits or in other levels (both Aurignacian and Gravettian), was determined the presence of other plant species such as *Alnus*, *Juniperus*, *Betula*, *Pinus*, etc⁵¹. We must point out that the determinations were made mainly on samples of charcoal from hearths, but, as suggested by the presence of the game animal species from Mitoc, the living vegetation had to be richer and much diverse.

The Artefacts Made of Hard Animal Tissue

In the Aurignacian I layer were found the only artefacts made from hard animal tissues from the whole Early Upper Palaeolithic from *Malu Galben*. A pointed object fragment (?) made from reindeer antler was discovered in 1990, in the F 3 square, at the depth of 10.80 m (unit 11 superior). It has a length of 8.3 cm and a 0.5 cm – 1.1 cm thickness; its section is slightly flattened. The artefact was slightly flattened by longitudinal grinding. It was found fractured at both ends⁵².

The second artefact is a Mladeč-type spearhead which was discovered fractured into four pieces. It was found in 1992, in the J 4 square, at a depth of 13.24 m (unit 10b inferior). It has a length of 10.8 cm and the thickness between 1.8 cm and 1.2 cm and an oval section. It was made by the same process as the previous artefact⁵³.

Absolute Chronology Dating

On the basis of the palaeo-botanical remains absolute chronology dating for the Aurignacian and Gravettian occupations at Mitoc – *Malu Galben* were made (Tab. 5)⁵⁴.

Thus the seven data obtained for the Aurignacian I and I inferior (Tab. 5) layers are coherent, suggesting that one of the earliest occupations of the site occurred about 32.730 ± 220 BP (dating for the 12 b unit – Aurignacian I inferior). Also, during the archaeological excavations we noticed the fact that the intense pedo-geologic processes affected some of the combustion structures from the oldest human habitations, mixing some of the material.

⁵⁰ DAMBLON 2007: 70-73.

⁵¹ DAMBLON 2007: 70-73.

⁵² CHIRICA, NOIRET 2007: 143, Fig. 1.1.

⁵³ CHIRICA, NOIRET 2007: 143, Fig. 1.2.

⁵⁴ DAMBLON, HAESAERTS, 2007: 56

DISCUSSIONS AND CONCLUSIONS

There is a consensus on the fact that the Aurignacian is the first archaeological culture of the anatomically modern humans, from the beginning of the Upper Palaeolithic, which spread throughout the entire Europe. Several chronological and territorial *facies* and archaeological cultures were delimited for the 40.000/39.000 BP (Moershoofd climate oscillation) – 25.000/24.000 BP (Tursac climate oscillation) time span, the earliest of which can be correlated with the transition from the Middle Palaeolithic to the Early Upper Palaeolithic⁵⁵. We will mention that for *Malu Galben*, around 27.000 BP Gravettian communities were already attested, demonstrating once again the partial contemporaneity of the Aurignacian - Gravettian in some parts of Europe.

Delimiting 13 European geographical areas for the beginning of the Upper Palaeolithic, Fr. Djindjian⁵⁶ placed Mitoc in region 8, Central-Eastern Europe: the Don, Dnieper, Dniester and Prut Basins⁵⁷; in the same region he also included the techno-complexes at Ripiceni-Izvor that have a different techno-typological character from the ones in *Malu Galben*. Djindjian mentions five chronological *facies* with several industries⁵⁸. When comparing the chronology of these *facies* with the data obtained for the finds from Mitoc (*I* and *I inferior*, *II*, *III* and *III superior* layers – see tab. 5 in this paper), the Aurignacian from Mitoc fits into his second and third chronological *facies* – Early Aurignacian (*I*) (35.000 – 31.000 BP: the first cold period from the recent Würm⁵⁹) and Recent Aurignacian (*II*) (31.000 – 30.000 BP in the d'Arcy temperate episode)⁶⁰. J. Kozłowski⁶¹ divided the beginning of the Upper Palaeolithic into an initial phase of the Upper Palaeolithic (comprising the Bachokirian, the Bohunician, the Uluzzial and the Châtelperronian), followed by a Proto-Aurignacian (the Fumanian), the typical Aurignacian (in which can be included the Aurignacian layers from *Malu Galben*) and the Epi-Aurignacian⁶².

We consider the finds from Mitoc as belonging to the Early Aurignacian, an opinion shared by others (with the amendment that the site is situated on the Prut River, in Romania, not in Moldova, on the Dniester as wrongly stated in some places⁶³).

When comparing the characteristics of the technocomplexes at *Malu Galben* with those of other Aurignacian sites in the territory between the Carpathian Mountains and the Prut River some differences can be seen⁶⁴. In a very complex and comprehensive study (for the '70s)⁶⁵ J. Hahn drew attention on the fact that the technocomplexes considered as Aurignacian at Ripiceni-Izvor, Ceahlău: Cetățica I, Podiș and Dârțu, Bistricioara-Lutărie, through their technological and typological characteristics, are specific, neither to the Aurignacian, nor to the Gravettian⁶⁶. The features of the lithic assemblages on the middle Bistrița terraces were recently reevaluated by A. Anghelinu and L. Niță, the two emphasising the fact that none of the sites provides true diagnostic elements for an Aurignacian attribution⁶⁷. Also, we will add that those habitation layers are not Gravettian either, since they lack the *fossils directeurs* for the Gravettian.

Since the differences between *Malu Galben* and the above-mentioned sites are significant, for a better coordination of the findings and for a clear distinction of the techno-typological features specific to each habitation level, we propound the following designations: *Aurignacian of a Ripiceni-Izvor type (for the*

⁵⁵ To this issue were dedicated special international colloquiums: FARIZY 1990; ZILHÃO, ERRICO 2003 and recently a special publication: OTTE 2010.

⁵⁶ DJINDJIAN 2010: 21-25.

⁵⁷ DJINDJIAN 2010: 21-25.

⁵⁸ DJINDJIAN 2010: 26-27.

⁵⁹ DJINDJIAN 2010: 27.

⁶⁰ DJINDJIAN 2010: 27.

⁶¹ KOZŁOWSKI 2010: 74.

⁶² KOZŁOWSKI 2010: 74.

⁶³ ZWYNS, FLAS 2010: 286.

⁶⁴ For a recent review of the Aurignacian in Romanian see ANGHELINU, NIȚĂ 2014: 172-192.

⁶⁵ HAHN 1970: 197-215.

⁶⁶ HAHN 1970: 210.

⁶⁷ ANGHELINU, NIȚĂ, 2014: 172-192; for the a more comprehensive presentation of the sites see NIȚĂ-BĂLĂȘESCU 2008: 129

Aurignacian Ia, Ib, IIa, IIb layers), *Aurignacian of a Bistricioara-Lutărie type* etc.

As for the lithic industries before the Aurignacian (the pre-Aurignacian from J. Kozłowski)⁶⁸, we identified such technological and typological technocomplexes in the space between Prut and Dniester Rivers which, as based on findings from Stâncă I-IV (levels I and II), Stâncă-Darabani, Osâpca, Șipot, Chișleanski-Iar, Iarova, Harasca, Anetovca I, Bobulești V), we denominated as pre-Aurignacian industries⁶⁹. For the end of this period, was nominated *the Brânzeni culture*⁷⁰, also named *the Ripiceni-Brânzeni culture*⁷¹ since there are some identities between the lithic assemblages from Ripiceni-Izvor, the Aurignacian (layers Ia, Ib, IIa, IIb) and those from Brânzeni.

The Aurignacian findings from Mitoc – *Malu Galben* do not fit through their technologic and typological features with those from Ripiceni and Brânzeni that contain many elements of an older tradition, namely from the Middle Palaeolithic: scrapers, bifacial tools, denticulate, notched pieces and the prevalence of the *Levallois* techniques⁷². These characteristics subscribe the latter two sites (as the one from Mitoc - *Valea Izvorului*) in the transition period from the Middle Palaeolithic to the Upper Palaeolithic in the Prut-Dniester space.

As for *Malu Galben* (I and I inferior layers), even if – over a period of thousands of years – there was a succession of several communities, which installed their encampments here, we can see that, in terms of technology and typology, the morphology of the short carenated endscrapers and burins remained the same. **Thus we can speak about a technologic facies specific to Aurignacian technocomplexes at *Malu Galben*.**

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⁶⁸ KOZŁOWSKI 2010: 75.

⁶⁹ BORZIAC, CHIRICA, VĂLEANU 2006: 190-212.

⁷⁰ BORZIAC, CHIRICA, VĂLEANU 2006: 213-252.

⁷¹ CHIRICA 1999: 164-167.

⁷² CHIRICA 1988: 11-18.

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- Pl. IV. Mitoc – *Malu Galben*. Lithostratigraphic sequence and position of the samples for sedimentology (sed.) and malacology (mol.). The graphic symbols are the same as in pl. III (*apud* HAESARTS 2007: 20, Fig. 6).
- Pl. V. Mitoc – *Malu Galben*. Distribution of the samples and of the ^{14}C data in the stratigraphic sequence of the site. The graphic symbols are the same as in pl. III (*apud* HAESARTS 2007: 28, Fig. 11).
- Pl. VI. Mitoc – *Malu Galben*. Lithostratigraphy, archaeological layers and paleoenvironment (P – periglacial with deep freeze or active permafrost; A – arctic; SA – subarctic; B- boreal; T - Temperate) of the stratigraphic sequence with the ^{14}C obtained for the site. The graphic symbols are the same as in pl. III (*apud* HAESARTS 2007: 29, Fig. 12).
- Pl. VII. Mitoc – *Malu Galben*. Lithic artefacts discovered in the Aurignacian I inferior (1, 4, 5) and Aurignacian I (2-3, 6-11) layers. 1-3 endscrapers on flakes, 4 burin- carenated endscrapper, 5, 11 retouched flakes and blades, 7-9 burins, 10 scraper (drawings by Romeo Ionescu).
- Pl. VIII. Mitoc – *Malu Galben*. Lithic artefacts discovered in the Aurignacian I layer. 1 burin on retouched truncation; 2 cortical flake; 3, 6, 8 retouched flakes; 4 burin; 5 atypical endscrapper; 6 retouched blade; 7 blade; 9 scraper (drawings by R. Ionescu).

Workshop number	Square	Depth (m)	Unit
59	H 7	9.65	10b inf.
60	B 7	10.10	11 sup.
61	F-G 8	10.25	11 sup.
62	G-J 8	10.35	11 sup.
63	G 4	10.70	10b inf./11 sup.
65	G 6	10.35	10b inf.
66	F-G 4-6	10.70-10.80	10b inf./11 sup.

Tab. 1. Mitoc – *Malu Galben*. Flintknapping workshops discovered in the Aurignacian I layer (*apud* CHIRICA 2007: 170-172, Tab. 1, 2).

Hearth no	Workshop	Square	Depth (m)	Unit
1	60	A-B 7	10.10	11 sup.
2	65	G6	10.35	10b inf.
3	-	G5	10.50	10b inf./11 sup.
4	-	B5	10.65	10b inf./11 sup.
5	-	D5	10.65	11 sup.
6	66	F-G 4-6	10.70-10.80	10b inf./11 sup.
7	66	F5	10.70	10b inf./11 sup.
8	-	G1	11.70	-
9	-	G1	12.05	-

Tab. 2. Mitoc – *Malu Galben*. Hearths discovered in the Aurignacian I layer.

Tool type	Aurignacian I inferior	Aurignacian I
Endscraper on flake	4	11
Endscraper on retouched flake	-	-
Endscraper on blade	2	6
Endscraper on retouched blade	1	2
Carenated endscraper	1	22
Nosed endscraper	-	14
Burin d'angle sur casure	-	4
Dihedral Burin	2	22
Burin on truncation	-	9
Transversal burin	-	3
Burin on notched piece	-	2
Polyhedral Burin	-	2
Carenated burin	2	48
Busked burin	-	3
Mixt Burin	-	3
Perçoir	-	-
Composite tool	1	-
Lame appointée	-	-
Truncated blade	-	-
Retouched blade	1	3
Aurignacian blade	-	-
Denticulate and notched blade	-	1
Scraper	2	1
Notched piece	2	8
Denticulate piece	1	23
Retouched flake	1	11
Others	1	1

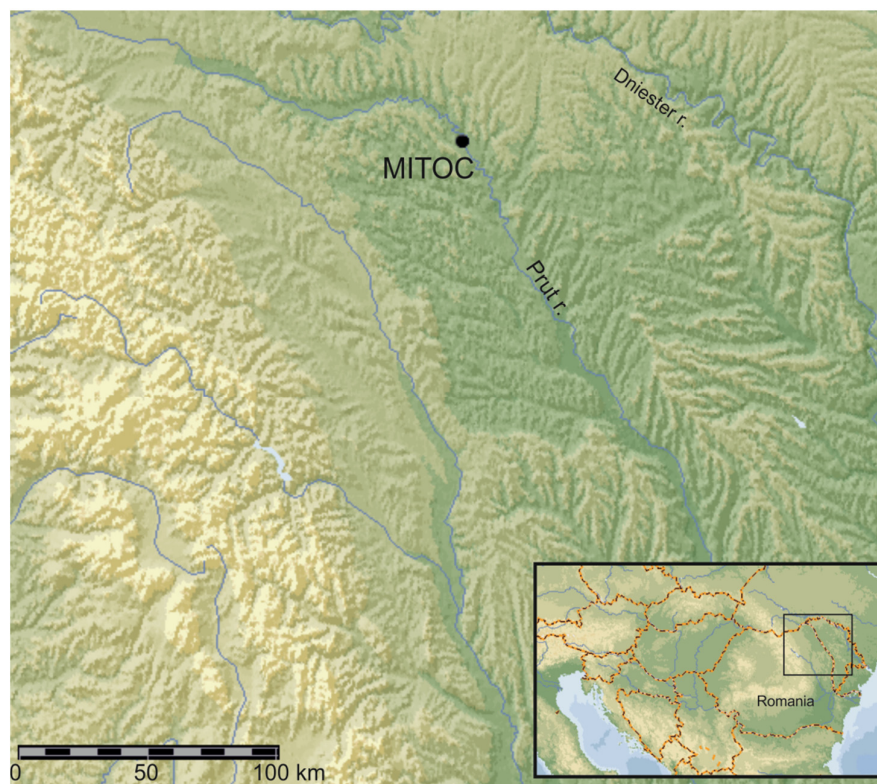
Table 3. Mitoc – *Malu Galben*. Tools discovered the Aurignacian I and I inferior assemblages (*apud* OTTE *et al.* 2007: 102, Tab. 20, with revisions).

Species	Unit	Level	No. of bone fragments
<i>Equus hydruntinus</i>	11 inf	Aurign. I inf.	3
<i>Equus</i>	12 b inf	Aurign. I inf	2
<i>Equus</i>	12 a	Aurign. I inf.	2
<i>Equus</i>	11 inf.	Aurign. I inf.	1
<i>Equus</i>	11	Aurign. I inf.	6
<i>Equus</i>	11 sup.	Aurign. I	17
<i>Equus</i>	10 b inf.	Aurign. I	31
<i>Bison</i>	12 b	Aurign. I inf.	1
<i>Bison</i>	12 a	Aurign. I inf.	1
<i>Bison</i>	11 inf.	Aurign. I inf.	7
<i>Bison</i>	11	Aurign. I inf.	12
<i>Bison</i>	11 sup.	Aurign. I	17
<i>Bison</i>	10 b inf.	Aurign. I	24
<i>Rangifer tarandus</i>	11 sup.	Aurign. I	4
<i>Rangifer tarandus</i>	10 b inf.	Aurign. I	5
<i>Megaceros giganteus</i>	11 sup.	Aurign. I	1
<i>Cervus</i> sp.	12 a	Aurign. I inf	1
<i>Coelodonta antiquitatis</i>	11 sup.	Aurign. I	1
<i>Elephas primigenius</i>	11	Aurign. I inf	1
<i>Elephas primigenius</i>	12b	Aurign. I inf	1
<i>Gulo gulo</i>	11 sup.	Aurign. I	1

Tab. 4. Mitoc – *Malu Galben*. The paleo-faunal remains discovered in the Aurignacian I and I inferior levels (*apud* LOPEZ-BAYON, GAUTIER 2007: 145-164).

Sample no/ material.	Lab.	Unit	Level	BP
61/charcoal	OxA-1646	10 b inf.	Aurignacian I	31.000 ± 900
62/charcoal	GrA-1648	10 b inf.	Aurignacian I	31.000 ± 330
64/charcoal	GrN-20443	11 sup.	Aurignacian I	30.240 + 470- 440
65/charcoal	GrN-20770	11 sup.	Aurignacian I	31.160 + 570- 530
66/charcoal	GrN-20442	11 inf.	Aurignacian I inf.	30.920 ± 390
67/charcoal	GrN-20444	12 a	Aurignacian I inf.	31.160 + 550 – 510
68/charcoal	GrA-1357	12 b	Aurignacian I inf.	32.730 ± 220

Tab. 5. Mitoc – *Malu Galben*. Absolute chronology for the Aurignacian I and I inferior (*apud* DAMBLON, HAESARTS 2007: 56, Tab. 1).



1



2

Pl. I. 1. The location of the Mitoc – *Malu Galben* site (map support Encarta); 2. Mitoc – *Behind the village Church*. Flint cobbles.

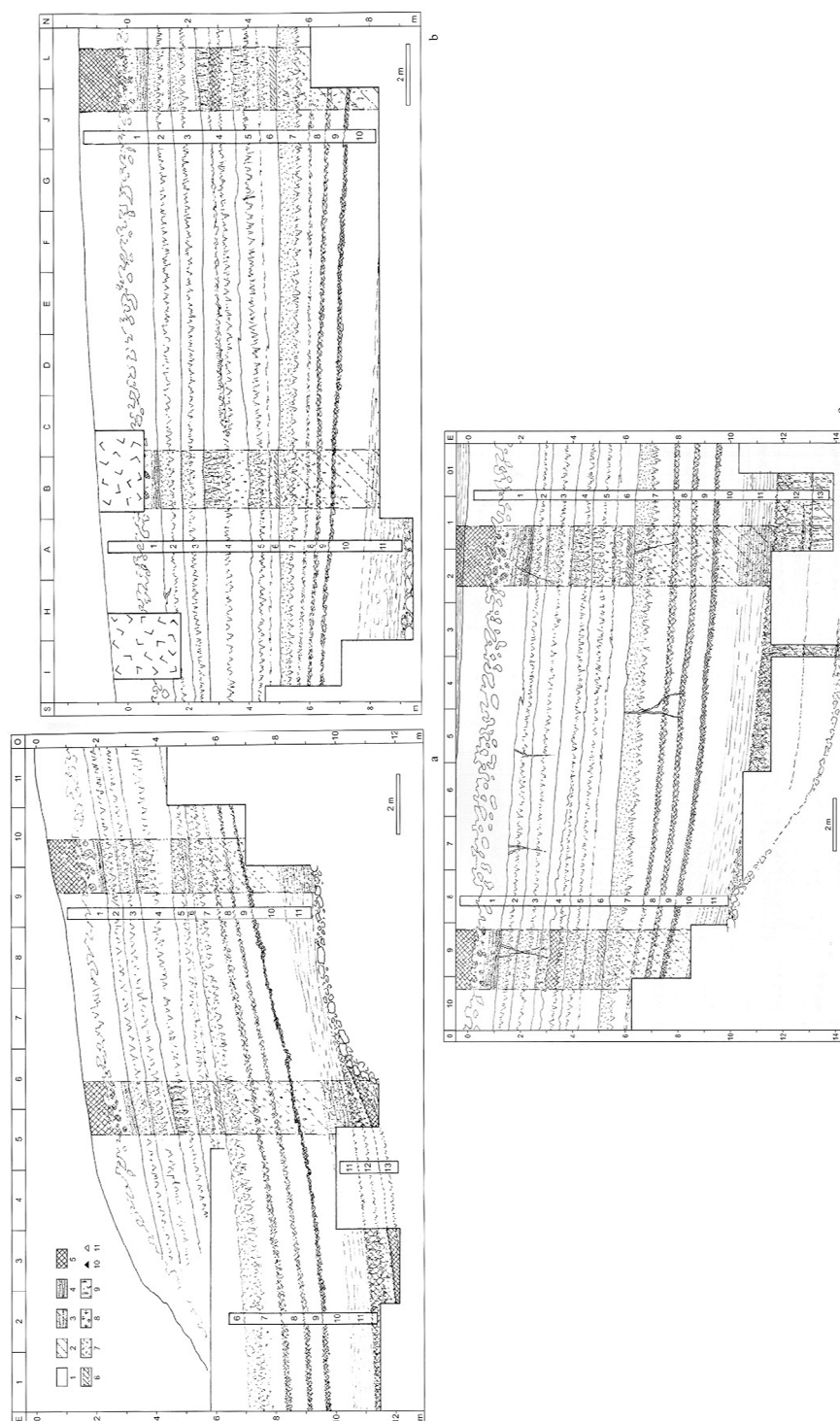


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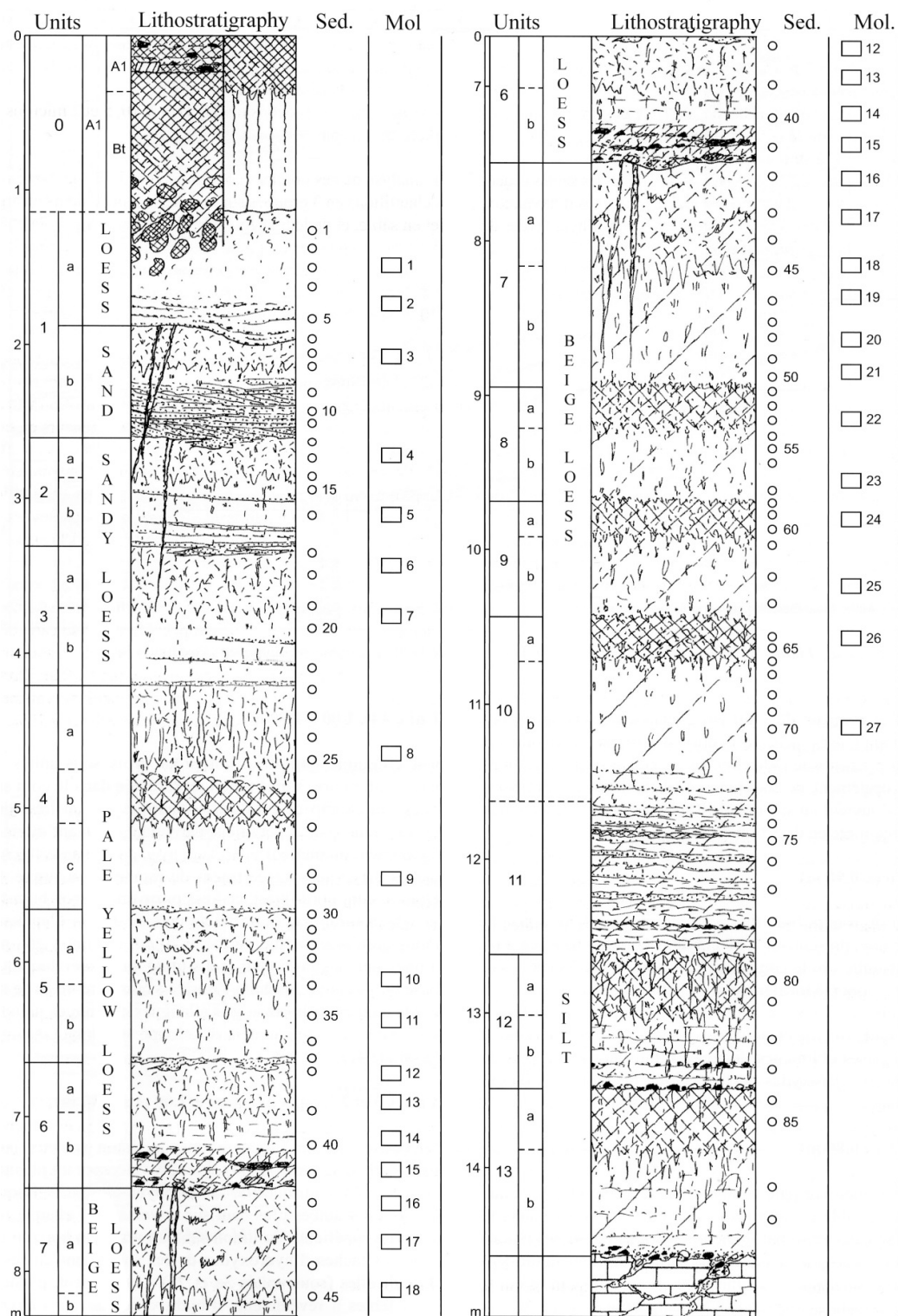


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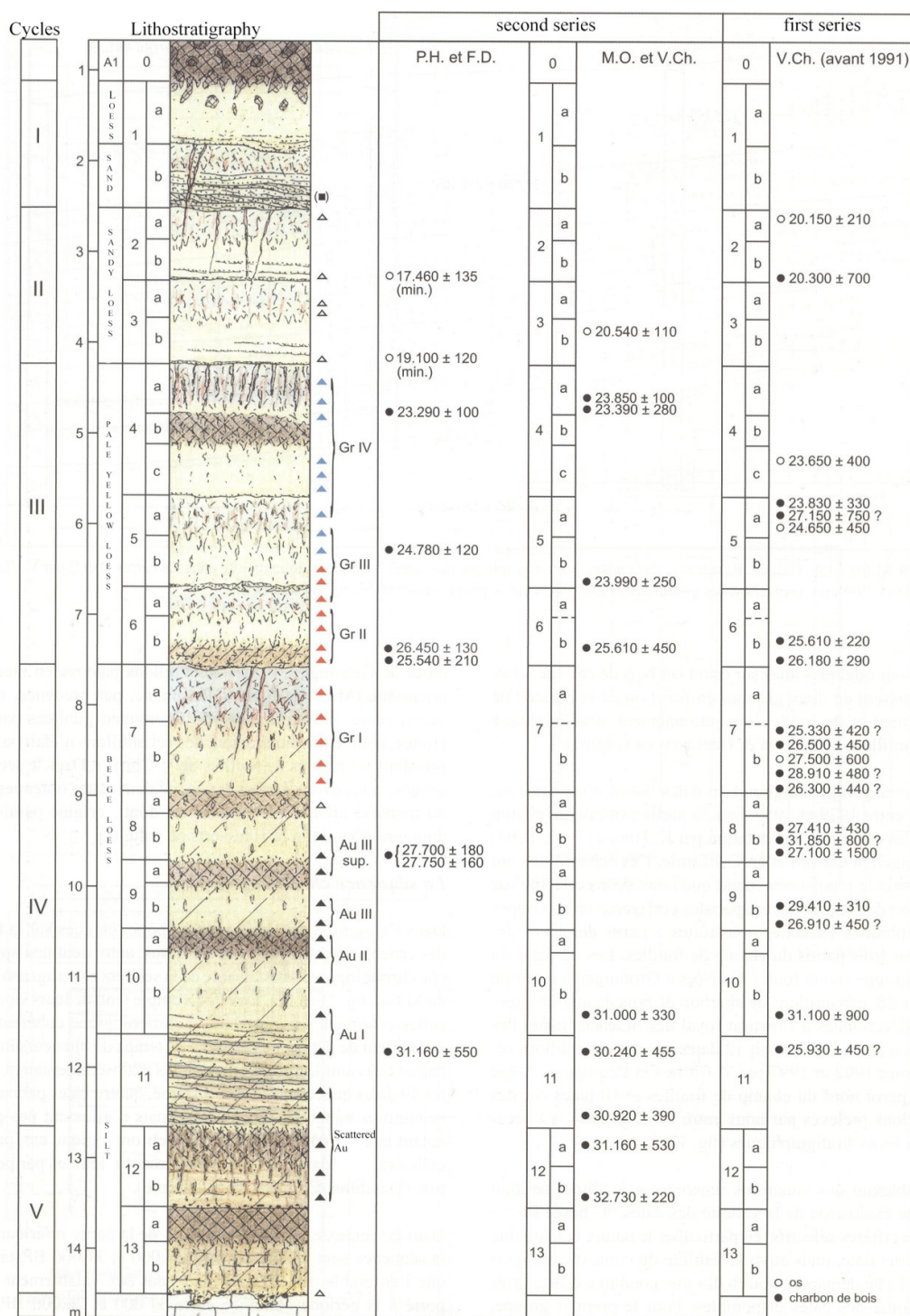
Pl. II. 1. Mitoc – Cotu Mic. Flint deposits; 2. Mitoc – Cotu Mic. Mammoth molar in a secondary position.

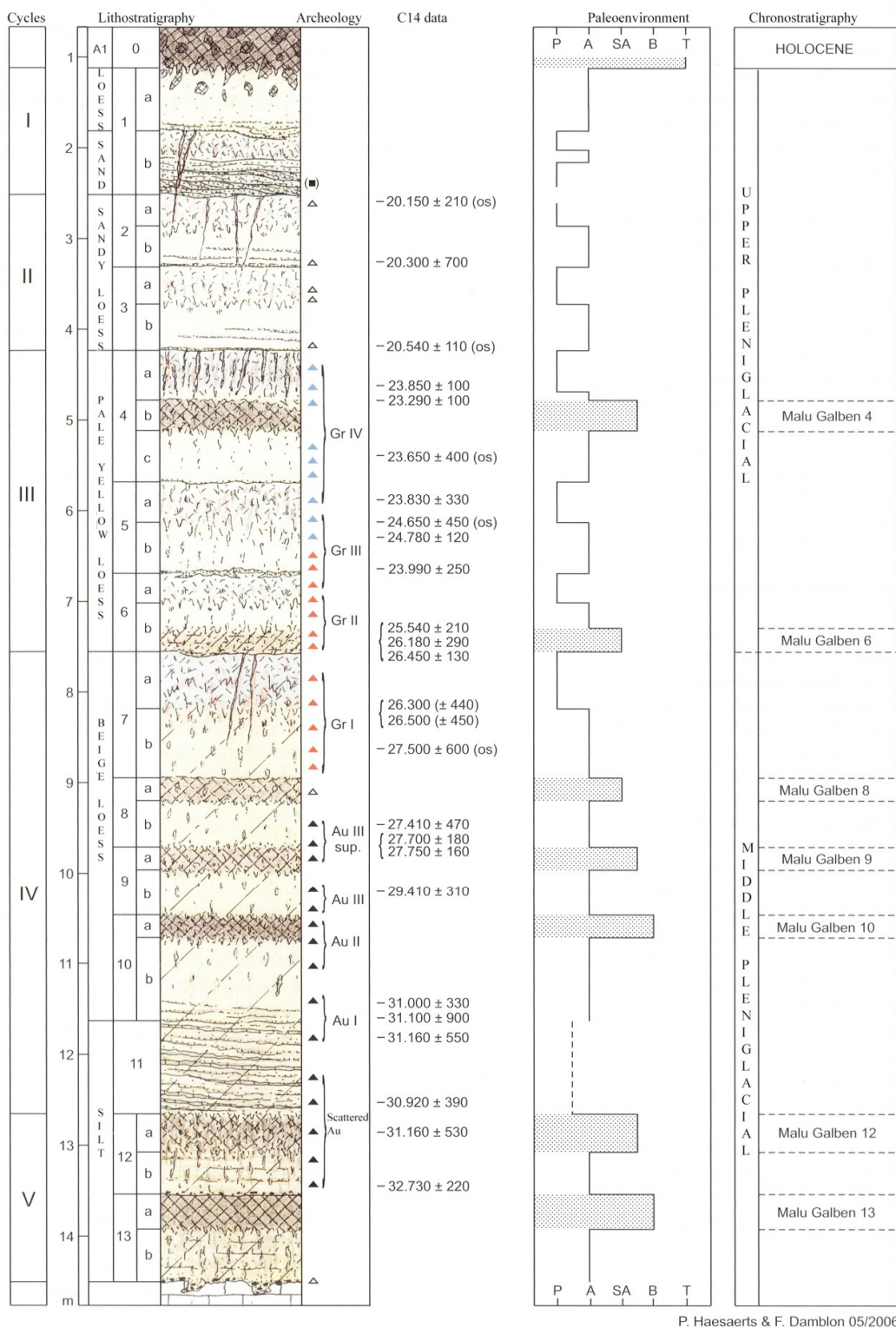


Pl. III. Mitoc – Malu Galben. The southern (a), western (b) and northern (c) profiles of the excavation field. The graphic symbols represent: 1 loess; 2 loessial loam; 3 sandy loam; 4 sand; 5 humiferous loam; 6 brown horizon; 7 light grey loam (Tundra-Gley soil); 8 ferrous hydroxides; 9 bioturbations; 10 artefacts; 11 scattered artefacts (atypical pieces) (*apud* HAESARTS 2007: 18-19, Fig. 5).

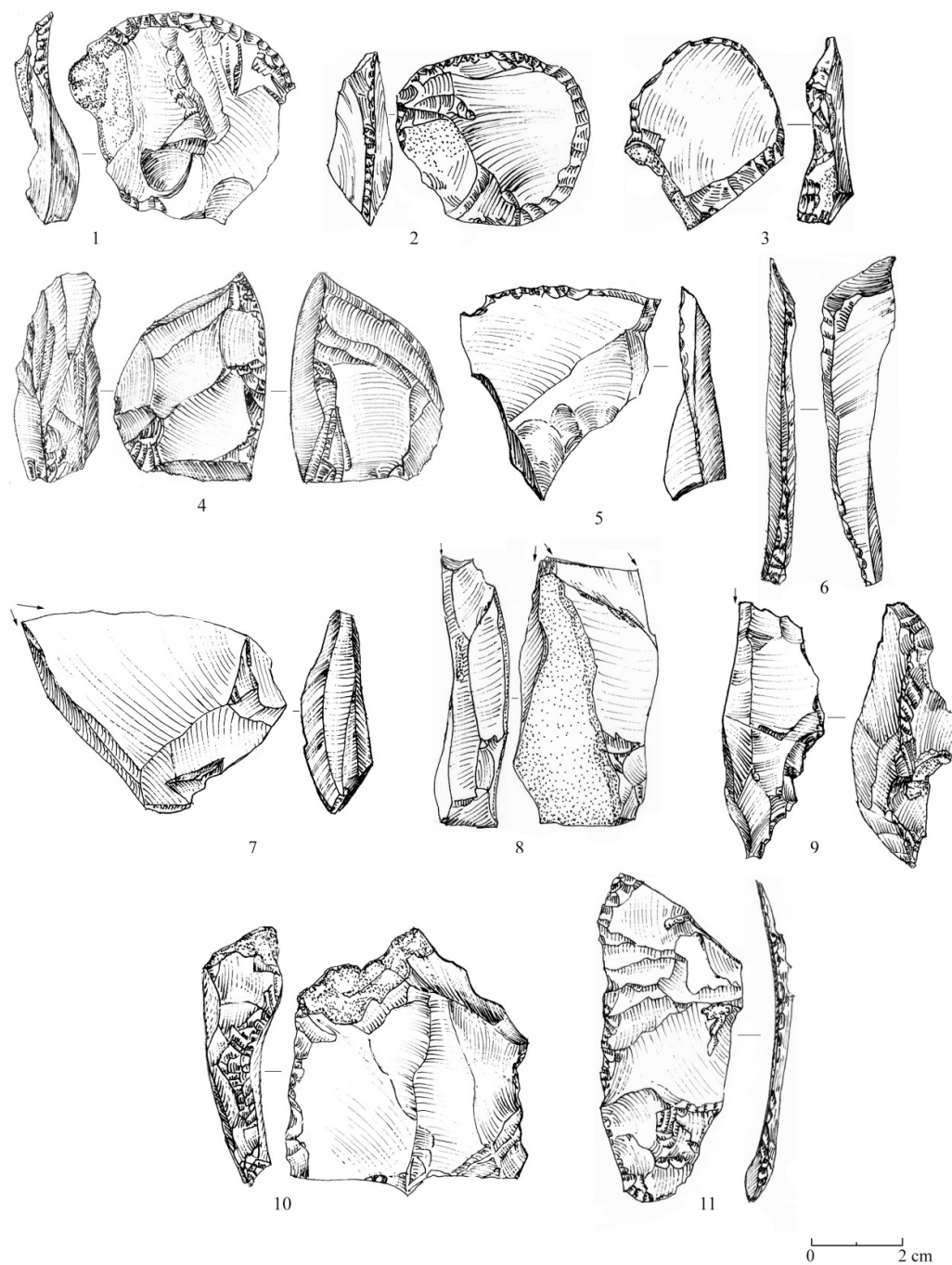


Pl. IV. Mitoc - Malu Galben. Lithostratigraphic sequence and position of the samples for sedimentology (sed.) and malacology (mol.). The graphic symbols are the same as in pl. III (*apud* HAESART'S 2007: 20, Fig. 6).

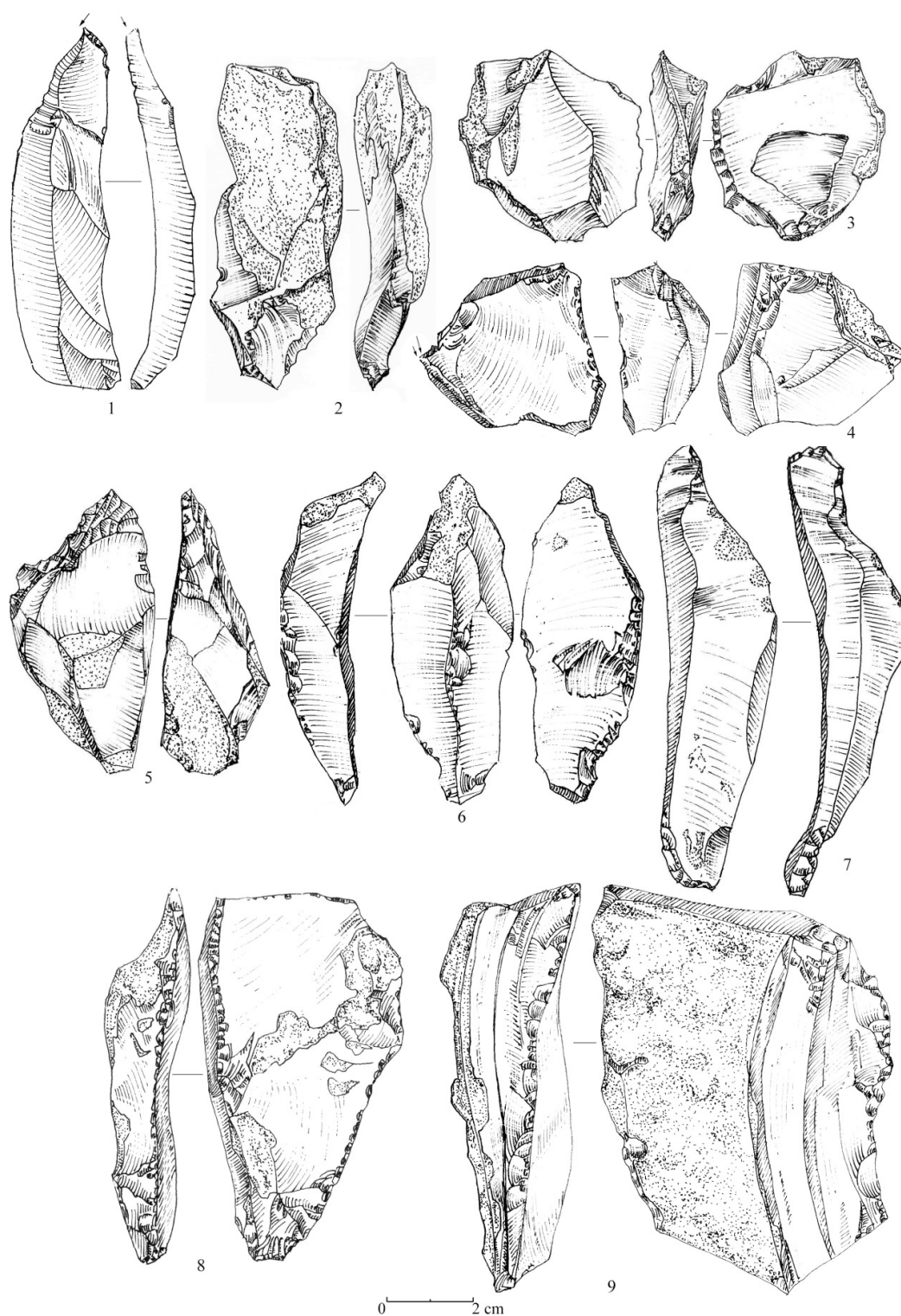




Pl. VI. Mitoc – Malu Galben. Lithostratigraphy, archaeological layers and paleoenvironment (P – periglacial with deep freeze or active permafrost; A – arctic; SA – subarctic; B- boreal; T - Temperate) of the stratigraphic sequence with the ^{14}C obtained for the site. The graphic symbols are the same as in pl. III (apud HAESARTS 2007: 29, Fig. 12).



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