

**40 Years of Excavations at Mitoc–Malu Galben (Romania): changing fieldwork
methodologies and implications for the comparability of archaeological assemblages**

**40 ans de fouilles à Mitoc-Malu Galben (Roumanie) : évolution des méthodes de fouilles et
implications pour la comparabilité des ensembles archéologiques**

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32 **Mots-clés**

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34 fouilles

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36 **Keywords**

37 Upper Palaeolithic / Gravettian / Aurignacian / Fieldwork methodology / Excavation history

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39 **Résumé**

40 Mitoc-Malu Galben (Roumanie) est un site-clé du Paléolithique supérieur en Europe

41 orientale. Il est doté d'une séquence stratigraphique de près de 14m de puissance incluant

42 de nombreux paléosols et plusieurs niveaux archéologiques du Paléolithique supérieur.

43 Entre 1978 et 1990, des fouilles extensives ont livré de riches vestiges d'ateliers de débitage

44 aurignaciens et gravettiens. De 1992 à 1995, une collaboration internationale a permis de

45 mieux définir la position stratigraphique de ces vestiges, leur âge et leurs caractéristiques

46 typologiques. Depuis 2013, notre équipe a mené de nouveaux travaux de terrain focalisés

47 sur l'étude interdisciplinaire des processus de formation du site et sur une étude

48 technologique détaillée des artefacts lithiques. Les différentes phases de fouilles que le site a

connues ont mis en œuvre des méthodologies parfois très différentes. Nous étudions ici l'impact de ces changements méthodologiques dans la fouille sur la comparabilité des ensembles identifiés, en analysant la fréquence des lamelles au sein des supports allongés ainsi que la distribution de la longueur des supports allongés. Notre étude préliminaire permet de suggérer que certains ensembles semblent avoir été influencés par les méthodologies de fouilles lors de ces différentes phases du travail de terrain, mais d'autres analyses sont nécessaires pour comprendre précisément comment ces ensembles ont été biaisés.

Abstract

Mitoc–Malu Galben (Romania) is one of the key-sites for the Upper Palaeolithic in Eastern Europe, with abundant Upper Palaeolithic archaeological layers embedded in a ~14 meters long loess-palaeosol sequence. The excavations in 1978–1990 yielded rich remains of Aurignacian and Gravettian workshops. From 1992 to 1995, an international collaboration helped better define their stratigraphical position, age, and typological characteristics. Since 2013, our team has conducted new fieldwork focusing on interdisciplinary study of site formation processes and a detailed technological study of the lithic artefacts. These different excavation phases have employed quite substantially different fieldwork methodologies. Here, we explore the impact of the changing excavation methodologies on the comparability of the generated assemblages by analyzing the frequency of bladelets among the elongated blanks as well as the length distribution of elongated blanks. Our preliminary study allows us to suggest that some of the assemblages seem to be influenced by the fieldwork methodology employed by each excavation phase, but more studies are needed to start to understand how the assemblages are biased.

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75 **1 Introduction**

76 Most larger archaeological sites have been excavated over a long time period, in most cases
77 probably repeated fieldwork campaigns over time, resulting in extensive archaeological
78 collections produced using a range of different fieldwork methodologies, which, in turn,
79 raises potential issues regarding their comparability. Excellent examples are iconic sites like
80 La Ferrassie (France; e.g., Dibble et al., 2018), Willendorf II (Austria; e.g., Antl-Weiser, 2008;
81 Nigst et al., 2014, the Pavlov-Dolni Vestonice sites (Czech Republic; e.g., Svoboda et al.,
82 1996), and the Kostenki-Borshevo sites (Russia; e.g., Sinitsyn, 2015), to mention a few
83 European Palaeolithic sites. However, this problem is neither limited to European sites nor
84 to Palaeolithic sites.

85 Any excavation destroys the site under study and archaeologists aim at recovery of as much
86 information – comprising both samples and contextual data - as possible. However,
87 archaeologists also have to decide what information to save and, hence, document and
88 record – and no excavation saves all information. Over time more and more details are
89 documented and saved, because fieldwork methodologies changed quite substantially – in
90 most cases we can probably say improved significantly. As a result, more samples have been
91 collected and more contextual information has been recorded over time.

92 Besides the fact that the evolving fieldwork methodologies resulted in more information
93 being collected, we also have to note that what is recorded often depends on the research
94 questions and goals of the excavation project. While we nowadays are often interested in
95 hominin behaviours in their ecological context, older excavations might have been mainly
96 concerned with a classification of the assemblages in a culture-historical framework, which

would automatically have led to a low interest in anything but so-called diagnostic artifacts (although the viewpoint of what is diagnostic might also have changed over time).

Any fieldwork methodology biases assemblages created through excavation by archaeologists and we have to stress the point that changing fieldwork methodologies at the same site through time or between sites at the same time might significantly bias the generated collections and in general the information available. This, in turn, potentially affects comparability of old and newly excavated assemblages at the same site, from the same stratigraphic unit (or from corresponding stratigraphic units, as stratigraphic units also often change with fieldwork methodologies). Needless to say, that this also potentially affects the comparability of assemblages excavated at different sites.

The fact that changing fieldwork methodologies might quite substantially affect the dominating character or taxonomic classification of an assemblage as well as the comparability of old and newly excavated assemblages, is rarely addressed in a systematic manner (but see, e.g., Dibble et al., 2005; 2009; 2018; Winder, 1997). Most recently, the size of objects (measured by maximum dimension or weight), presence/absence of retouch on lithics, lithic artefact completeness, patterns in presence/absence of tool types (retouched types of lithic artefacts) and other lithic objects (e.g., Levallois products), have been used to assess comparability and excavation bias between old and newly collected assemblages (e.g., Dibble et al., 2018).

In this study we undertake a first step in exploring potential excavation bias routed in changing fieldwork methodologies and its effect on comparability of old and newly excavated assemblages at the Upper Palaeolithic open-air site Mitoc-Malu Galben in north-eastern Romania. The site is characterised by a long loess-paleosol succession with a rather high palaeoclimatic resolution and abundant archaeological remains attributed to the

Aurignacian and Gravettian (Haesaerts, 1993; Otte et al., 2007; Noiret, 2009; Noiret et al., 2016; Nigst et al., accepted). It has a long research and excavation history – albeit shorter than some other sites like La Ferrassie (e.g., Dibble et al., 2018) or Willendorf II (e.g., Antl-Weiser, 2008; Nigst et al., 2018) – and differing fieldwork methodologies have been employed over the past 40 years with three major excavation phases. Specifically, the goals of this study are: (i) To present an overview of fieldwork methodologies and how they changed through time, and (ii) to explore whether we can detect any significant differences between assemblages of the three main excavation phases that can be attributed to changing fieldwork methodologies. Here we focus on elongated blanks, i.e. blades and bladelets, and especially on the potential underrepresentation of small elongated blanks (bladelets). To do so, we will below first put Mitoc-Malu Galben and the changing fieldwork methodologies in the context of the goals of the projects/excavations of the three main excavation phases. Hence, we review the excavation/fieldwork history at the site before comparing six samples from the excavation phases (two per phase) to test for potential differences between the excavation phases in regard of collection of bladelets.

2 Mitoc-Malu Galben: site location, history of fieldwork, and cultural sequence

2.1 Site location and overview

Mitoc-Malu Galben (48° 05' 52" N, 27° 01' 23" E) is located on the southern fringes of the village of Mitoc, Botoşani county, northeastern Romania, about 120 km north of Iaşi (Figure 1). It is one of numerous Palaeolithic sites in the area of the village of Mitoc. The site is situated on the right bank of the Prut river valley. Precisely, the site is located along the Ghireni stream, about 450 m from its confluence with the Prut river (Figure 2).

144 The exposed part of the site is about 30 by 30 m wide and more than 14 m deep; the
145 extension beyond the excavation pit is not known. The sequence is a loess-paleosol
146 succession, which is more than 14 m deep and currently divided in 13 lithostratigraphic units
147 (Figure 3). Each stratigraphic unit (SU) represents a sedimentation phase usually associated
148 with a stabilization phase marked by pedogenesis (Haesaerts, 2007). The pedogeneses are
149 represented by either humic soils (forming under subarctic to boreal conditions) or tundra
150 gleys (forming under periglacial conditions). SU 13 to 7 in the lower half of the sequence
151 consist of mainly silty deposits but it should be noted that SU 13 to 11 also contain colluvial
152 deposits. The upper half of the sequence with SU 6 to 1 is characterised by aeolian input. In
153 general, we can note that the palaeoenvironmental resolution of the sequence is rather high
154 (for details see Haesaerts, 2007; Haesaerts et al., 2003, 2010a). The chronostratigraphy of
155 the sequence is based on the litho-/pedostratigraphic record, its climatic signal, and more
156 than 40 radiocarbon dates (Haesaerts, 2007; Haesaerts et al., 2003; 2010a).

157 In this sequence, a large number of archaeological occurrences has been documented and
158 attributed to the Aurignacian and Gravettian (see Otte et al., 2007 for a summary of the old
159 excavations; for the 2013-2016 excavations see Nigst et al., accepted). These archaeological
160 occurrences were merged by the 1978-1990 and 1992-1995 excavations into packages of
161 'archaeological levels', including five 'levels' in SU 12b to 8b classified as Aurignacian (from
162 bottom to top: 'dispersed Aurignacian', 'Aurignacian I', 'Aurignacian II', 'Aurignacian III', and
163 'Aurignacian III upper') and four 'levels' in SU 7b to 4a attributed to the Gravettian (from
164 bottom to top: 'Gravettian I', 'Gravettian II', 'Gravettian III', and 'Gravettian IV'). Our 2013-
165 2016 fieldwork (Nigst et al., accepted) did not use those 'levels' but assigned all
166 archaeological objects found in one stratigraphic unit to one assemblage, except when there
167 are clearly separate archaeological horizons within the same stratigraphic unit.

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169 **2.2 History of excavations**

170 Mitoc-Malu Galben has a long research history, starting in the nineteenth century. In 1885,
171 the geologist G. Ștefănescu discovered the first Palaeolithic artefacts in the Mitoc area
172 (Ștefănescu, 1888; Chirica, 2001; Chirica, 2007a). Later, in 1898, I. Simionescu collected
173 Palaeolithic archaeological material there as well (Simionescu, 1906). More work was
174 conducted in the 1920s by N. N. Moroșan, who identified four sites near the village of Mitoc,
175 including the site Mitoc-Malu Galben (Moroșan, 1938). He describes it as located “on Ghireni
176 stream, a few hundred meters from where it empties into the Prut” (Moroșan, 1938: 56). In
177 the same paper it is specified that the site is positioned 400 m from the Prut and that the
178 oldest deposit at the site are “gravel [...] belonging to the lower Prut terrace” (Moroșan,
179 1938: 59). Moroșan identified only one Upper Palaeolithic industry at the site and states that
180 it “may well belong to the Magdalenian era” (Moroșan, 1938: 60). In 1956-1957, C. S.
181 Nicolăescu-Plopșor and N. Zaharia conducted fieldwork at Mitoc-Malu Galben (Nicolăescu-
182 Plopșor and Zaharia, 1959; Chirica, 2001), but it remains unknown whether the area
183 explored at this time correspond very precisely to the site currently excavated. They
184 identified several assemblages at different depths, relating to the Lower Palaeolithic, the
185 Mousterian, and the Aurignacian (Chirica, 1975; 2001), but the discovered materials were
186 not kept.

187 In the context of (re-)investigating and (re-)assessing sites from the area, V. Chirica (Institute
188 of Archaeology, Iași Branch of the Romanian Academy of Sciences) started fieldwork in 1978
189 at the location known today as Malu Galben (Chirica, 1975, 1989, 2001). Until 1990, the
190 excavations were carried out each year by V. Chirica with the help of village workers. During
191 that phase of the excavations, they exposed the current ~25 x ~25 m pit, which still

constitutes the site (Figures 4 and 5). This work has enabled the attribution of lithic remains to eight main 'levels', four of which were attributed to the Gravettian while four were classified as Aurignacian, corresponding – in the mind of the excavator – to remains of 'dwellings' (Chirica, 2007b). In the 1980's, V. Chirica collaborated with K. Honea (University of Illinois) to build a radiocarbon chronology, resulting in the first radiocarbon dates for the site (Honea, 1987; 1994).

From 1991 onwards, V. Chirica started a collaboration with a Belgian team, consisting of researchers from the Royal Belgian Institute of Natural Sciences (P. Haesaerts and F. Damblon) and the University of Liège (M. Otte, P. Noiret, I. López Bayón, and V. Ancion). This collaboration resulted in geological and stratigraphic fieldwork and archaeological excavations between 1992 and 1995 (Haesaerts et al. 1993; Otte et al. 2007). The main aim of the 1992 to 1995 fieldwork was to conduct control excavations to expose and sample the entire sequence. The position of the archaeological remains in relation to stratigraphy was clarified thanks to stratigraphic sections and observation of the position of the lithic artefacts and faunal remains during excavations.

Following the end of the 1992 to 1995 fieldwork, the site was visited by V. Chirica and P. Haesaerts in the late 1990s and during the 2000s several times for brief fieldwork seasons. During those visits no major excavation was carried out there, only limited geological work on existing sections/trenches. In 2011, V. Chirica and P. Haesaerts carried out limited fieldwork at the site with the help of P.R. Nigst. During this brief fieldwork season, they sampled a major part of the sequence in several trenches. It was also during this fieldwork and a site visit by V. Chirica and P. Noiret in 2012 that collapsing archaeological deposits along the northern section were observed and the need for future fieldwork to secure those areas was identified.

In order to secure areas of the site prone to erosion/collapsing sections and to generate more detailed information on site formation processes and lithic technology, new excavations – as a collaboration between V. Chirica and P. Noiret (University of Liège), P. Nigst (University of Cambridge/University of Vienna), and P. Haesaerts (Royal Belgian Institute of Natural Sciences) – were initiated. From 2013 to 2016, limited excavations were carried out at various locations on the site (Chirica et al., 2014, 2015, 2016, 2017; Noiret et al., 2016; Nigst et al., in press, accepted). In total 22 trenches comprising of seven trenches for archaeological excavations and 15 trenches for geological/stratigraphic work were excavated (Figure 6). Our new fieldwork focused on: (i) precise positioning of all excavated material in the stratigraphy, (ii) documentation of the position and orientation of the archaeological remains through piece-plotting with total stations, (iii) systematic wet-sieving of all excavated sediment, (iv) an interdisciplinary study of site formation processes, and (v) a detailed study of the lithic technology. An additional aim was also to acquire materials allowing specifically to address the Aurignacian to Gravettian transition issue at different scales.

2.3 Overview of the cultural succession at Mitoc-Malu Galben

The sequence of Mitoc-Malu Galben starts around 32,000 uncal. BP with assemblages attributed to the Aurignacian technocomplex. Especially the ‘Aurignacian I’ level has provided abundant materials and show typical features of the Aurignacian. Its typological composition is notably characterized by carinated burins (including a few *busqués* burins), more numerous than carinated endscrapers (Noiret, 2005). Both represent bladelet cores, as supported by use-wear analysis (Jardon Giner, 2007) and technological studies (Libois et al., 2019). Some main and by-products, including some twisted bladelets, confirm bladelet

240 production on carinated burin and carinated endscapers as cores. Unfortunately, the lack of
241 sieving between 1978 and 1995 has restrained their total number, and none of the few
242 recovered ones is retouched. A less formal bladelet production is represented by small
243 prismatic bladelet cores, often using thick flakes as cores. Blade production is demonstrated
244 by a number of cores, even if this part of the lithic production has not yet been studied in
245 detail. During the 2013-2016 excavations, no further typo-technological data could be
246 obtained, as recovered lithic materials consisted mainly of flakes, cortical flakes and shatter.
247 Keeping in mind that the collection from 1978-1990 excavations is biased because the
248 excavator only retained a selection of the excavated material, the lithic materials related to
249 this 'level' confirm the presence of a typical Aurignacian, from a lithic typo-technological
250 point of view, with a chronostratigraphic position below Malu-Galben Interstadial 10, which
251 is correlated with Greenland Interstadial 6, hence suggesting an age prior to 29,000 uncal. BP
252 / 33,800 cal. BP.

253 The 'Aurignacian II' level is less well documented. The toolkit composition is similar to the
254 one of the underlying 'Aurignacian I', the main difference is a lower count of carinated
255 burins. The 'Aurignacian III' and 'III upper' stand as the uppermost and latest Aurignacian
256 'levels' in the sequence. Associated ¹⁴C dates are rather late (~29,400 uncal. BP for level
257 'Aurignacian III', and ~27,700 uncal. BP for level 'Aurignacian III upper'). Materials from both
258 'levels' were mostly discovered during the 1978-1990 excavations (but also during our 2013-
259 2016 excavations, see Nigst et al., accepted), and are typologically characterized by the
260 presence of various carinated pieces, however under-documented in previous studies. The
261 blade production is represented by cores, blades and waste products from Chirica's
262 excavations, while the bladelet production is almost strictly limited to a few preserved cores,
263 including the carinated 'tools'. Bladelets, as usual, were not found due to the lack of sieving.

264 The only exception lies in a specific assemblage from the 'Aurignacian III' level, which
265 demonstrates bladelet production, including twisted specimens, from small prismatic
266 bladelets cores and carinated 'tools' (endscrapers and burins) (Libois et al., 2019). Recent
267 fieldwork led to the discovery of a cluster of lithics in the 'Aurignacian III upper' level in the
268 southern part of the site, documenting the presence of lithic artefacts in SUs 9a and 8b. The
269 presence of some bladelets in this cluster demonstrates their production (Branscombe,
270 2016), however, the production mode is unclear, maybe corresponding to carinated 'tools',
271 even though none was recovered in the 2013-2016 excavations. In brief, if level 'Aurignacian
272 III' is attributed to the Aurignacian, the attribution of level 'Aurignacian III upper' stays
273 ambiguous. However, its chronostratigraphic position is secure, allowing for further
274 investigation in a controlled context.

275 The 'Gravettian I' is pretty well documented from the 1978-1995 excavations. Blade
276 production is evident through elongated and regular blades and a few cores. The production
277 is mostly unipolar, sometimes bipolar. The bladelet production seems to be similar to the
278 blade production, but preserved blanks are rare. The tools are not numerous but include at
279 least one Gravette point and one microgravette point. ¹⁴C dates range from 27,500 to 26,500
280 uncal. BP. The most recent materials from our 2013-2016 excavations amount to ~600
281 lithics, including mainly flakes of various dimensions, three cores and no tools. This small
282 assemblage shows the different steps of knapping, *i.e.* cortex removal, core shaping and
283 blank production of, at least, blades and probably also bladelets.

284 The 'Gravettian II' spans from 26,500 to 25,500 uncal. BP. In the 2013-2016 excavation
285 materials, ~1500 lithic were recovered, with again mainly flakes, no tools, 10% blades and
286 5% bladelets, and nine cores. Technological characteristics are similar to the old excavations'
287 collection, with the bladelet component better represented thanks to wet-sieving. Detailed

data is available for new excavations (Nigst et al., accepted), as well as for the old collections (Libois, 2017; Libois et al., 2017).

Our new fieldwork recovered only a very small number of lithics attributed to the 'Gravettian III' and 'Gravettian IV' levels, hence most information is based on the 1978-1990 and 1992-1995 excavations. Blade and probably bladelet productions are evident, even if not studied from a technological point of view. A shift toward lighter products, and an increased number of backed pieces have been noticed in the 'Gravettian IV' level. Some shouldered points also allow comparisons with the so-called Willendorf-Kostenki shouldered point horizon (Kozłowski, 1998; Grigor'ev, 1993), also documented along the Dniester at Molodova V, Layer 7 (Chernysh, 1987).

3 Evolution of Fieldwork Methodology

Throughout the three major phases of fieldwork at Mitoc-Malu Galben (i.e., 1978-1990, 1992-1995, and 2013-2016), fieldwork methodology has evolved along a trend of increasing concern for accuracy and precision in the recording of the archaeological objects and collected samples as well as the stratigraphic sequence. Below we explain the approaches and techniques used in the three main phases of fieldwork at the site.

3.1 Chirica's excavations between 1978 and 1990

The excavation methods followed by Chirica starting from 1978 are quite representative of Romanian Palaeolithic fieldwork and research previous to the third millennium (see, e.g., Anghelinu, 2018). At Mitoc-Malu Galben a 2 x 2m grid, labelled using numbers (running west-east) and letters (running south-north, but not ordered alphabetically), was employed by Chirica. In addition to the use of this grid, the depth was recorded, using the first

312 excavated terrace – which stood untouched and horizontal – as an altimetric reference
313 (Chirica, 2007a; Haesaerts, 2007). Consequently, this system allowed to position discoveries
314 on X, Y and Z axes. Unfortunately, not all finds were manually recorded in this grid system in
315 this way; only clusters of lithic artefacts worthy to be noted were positioned on the grid,
316 each one associated to only one single depth measurement for the whole cluster, whatever
317 its size. Figure 7 illustrates such a cluster covering nearly an area of 12m², contextual
318 information of this kind of artefacts concentration is limited: only the square(s), one depth
319 relative to the reference height, and year of excavation were recorded.

320 In this fieldwork period, excavated materials also went through a sorting process: only a
321 selection of tools, cores, ‘fine’ blades and sometimes a few flakes was retained, to the
322 detriment of all the chunks and small lithics – except for the last year of excavations (i.e.
323 1990), during which most of the materials were collected and retained (Otte and Chirica,
324 1993). It looks like the clusters of lithic artefacts might be related to knapping activities at
325 the site resulting in abundant cortical flakes, flakes, shutter, etc., which were in the past
326 often considered ‘knapping waste’, and a proportionally extremely low number of formal
327 tool types is characteristic for the site (e.g., Otte et al., 2007). It’s also worth noting that the
328 excavations were carried out without wet- or dry-sieving of the excavated sediment.

329 Consequently, despite the discovery of dozens – maybe hundreds – of thousands of
330 individual artefacts, only a few thousands are still preserved in the collection, which is
331 nowadays housed at the Institute of Archaeology (Iași Branch of the Romanian Academy of
332 Sciences, Iași, Romania). This selection is the result of both ‘efficient’ fieldwork methods and
333 assessment concerns. Chirica’s main concern over the years was the cultural classification of
334 every ‘level’ from a chronological and chronocultural viewpoint. The search for index fossils -

quite scarce throughout the sequence - likely to solve such issues favored the expedient excavation process undertaken at Mitoc-Malu Galben between 1978 and 1990.

3.2 Fieldwork between 1992 and 1995

The 1992-1995 fieldwork aimed at controlling and clarifying Mitoc-Malu Galben's stratigraphy. Especially, the geology and stratigraphy remained entirely uninvestigated so far, while the archaeological sequence was partly unclear. Excavations were carried out following the same grid as used by Chirica between 1978 and 1990, but with a new height reference, similar to the one used by P. Haesaerts for stratigraphic studies (Haesaerts, 1993, 2007). Unlike previous excavations, piece-plotting of all discoveries was manually performed. As chronology remained the main issue, excavators did not focus on small-sized artefacts, and sediments were not sieved. The attributions of Chirica's 'levels' were confirmed and even detailed; another minor contribution is the addition of some low density ('scattered' or 'dispersed') assemblages at the bottom and the top of the sequence ('Dispersed Gravettian' and 'Dispersed Aurignacian'), as well as the distinction between the 'Aurignacian III' and 'Aurignacian III upper' levels.

The stratigraphy was studied by P. Haesaerts (1993, 2007), who identified 13 lithostratigraphic units within the sequence, each corresponding to a sedimentary cycle ending in pedogenesis (either humiferous horizons or tundra gleys) (Figure 3). Moreover, new charcoal samples were dated, and all samples and dates from previous excavations were critically analysed, in order to obtain a clear overview of Mitoc-Malu Galben's absolute chronology (Damblon and Haesaerts, 2007; Haesaerts, 2007). During fieldwork, the combination of both geological and archaeological investigations led to an understanding of how the archaeological materials follow the sediments' double slope towards the East/Prut

river, as well as towards the South/Ghireni stream. Contrarily to Chirica's confidence on depth for the assessment of workshops, it is evident that the position and chronology of the archaeological materials cannot be assessed without its relation to the stratigraphic context, especially as the site extends over a large area and the deposits are sloping.

This work then led to a major reassessment of the excavated materials so far. The three major sections studied by P. Haesaerts – North, West and South – allowed to approximately reconstruct the position of lithostratigraphic units in the central excavated area. Therefore, 'levels' could be repositioned following the geological units and materials could also be reattributed to those units, as their 3D positions were known (see Haesaerts, 2007, for more information). The labels given by Chirica (e.g. 'Gravettian IV', 'Aurignacian I', etc.) were then interpreted differently, as it has become unclear whether they refer to an actual stratigraphic position or not; Chirica had used these labels to group some concentrations of workshops, but thanks to the 1992-1995 fieldwork, their distribution appeared to be less discontinuous than claimed by the excavator. Consequently, those labels are still used, but now strictly considered as phases of lithic artefact occurrences within the sequence, useful for a general understanding of the sites' sequence from a chronocultural perspective.

In short, the 1992-1995 fieldwork made it possible to specify the stratigraphic position of the various assemblages of lithic (and faunal) artefacts excavated at Mitoc-Malu Galben. The attribution to the Aurignacian and Gravettian technocomplexes is mostly based on tools, originating from both Chirica's 1978-1990 and the 1992-1995 fieldwork. Therefore, as the approach focused mainly on typological grouping, the technological aspects of Mitoc-Malu Galben's assemblages were not clearly addressed by the studies until 1995.

3.3 Recent fieldwork between 2013 and 2016

In order to investigate among others site formation processes and lithic technology, new excavations were initiated in 2013. In this most recent fieldwork phase, we applied state-of-the-art excavation and documentation methodologies, including piece-plotting of all artefacts and samples with a total station and wet-sieving of all excavated sediments (Nigst et al., accepted; see also Nigst et al., 2014). When it comes to location and context of the archaeological objects, we focused on precision with regard of measurement variation and accuracy with regard of the archaeological objects' position relative to lithostratigraphic boundaries in order to maximise (micro)stratigraphic context (e.g., Braun et al. 2019; de la Torre et al. 2018; Machado et al. 2013; Nigst et al. 2014) and allow quantitative assessment of site formation processes through fabric analysis (e.g., McPherron 2005; 2018). The excavations were carried out both horizontally and vertically, on limited surfaces, always close to sections providing a secure stratigraphic framework; all excavated materials are thus attributed to a stratigraphic unit during the excavation. A detailed description of the excavation and recording process is beyond the scope of this paper and can be found in Nigst et al. (accepted; see also Nigst et al., 2014). Even though no excavation was carried out at Mitoc-Malu Galben since 1995, we were able to use the same grid and 3D reference system, including the exact same reference height, in our excavations since 2013 ensuring continuity with the previous excavations (Nigst et al., accepted). Based on fieldnotes and drawings of the two previous fieldwork phases and data from our new fieldwork, a database and GIS were built to assess artefact occurrences with reference to stratigraphic units, as well as their spatial distribution.

Assemblages excavated between 2013 and 2016 correspond either to the densest artefact accumulations of the Gravettian ('Gravettian II') and Aurignacian ('Aurignacian I') on the site.

Sedimentary units linked to the end of the Aurignacian and/or the beginning of the Gravettian ('Aurignacian III upper' and 'Gravettian I') also yielded smaller assemblages. Concerning site formation processes, new data could be obtained from small lithic fraction analysis (Murphree, 2017). Differential preservation of assemblages could be observed. For instance, materials from the 'Aurignacian I' level excavated in 2014, located on a fairly marked slope, show a lithic particle size distribution congruent with residualisation from runoff (following the definition and data after Lenoble, 2005, see also Bertran et al., 2012). More than 6000 lithic artefacts and a few faunal remains were recovered across various stratigraphic units were recovered during our fieldwork since 2013. The assemblages excavated are differently sized and provide diverse new data. Detailed information on Gravettian samples can be found in Nigst et al. (accepted).

4 Comparisons between excavation phases

The use of state-of-the-art excavation methods has increased completeness of recovered lithic samples (especially with regard of the smaller fractions). As consequence we expect the newer excavated lithic artefact samples to likely reveal parts of the lithic reduction process – especially concerning the production of bladelets – that is not (or hardly) detectable in the assemblages of the earlier excavations due to their bias against small remains. In order to test whether the assemblages produced by different excavation phases at Mitoc-Malu Galben show statistically different recovery of small elongated blanks, i.e. bladelets, we compare six samples of blades and bladelets, two for each of the three periods of excavation. Samples 1 (Figure 8) and 2 originate from excavations in 1984, samples 3 (Figure 9) and 4 (Figure 10) were excavated in 1992, and samples 5 (Figure 11) and 6 (Figure 12) stem from our recent excavations between 2013 and 2016 (Table 1).

430 Samples 1 and 2 originate from squares D1 and E1 and their spatial extent is unknown, but
431 their maximum spatial extent cannot exceed 4 m², because squares at Mitoc-Malu Galben
432 are 2 x 2 m. We know that both sample 1 and 2 are probably affected by selective collection
433 of lithics by the excavator as mentioned above. Sediments associated to samples 3 and 4
434 were not sieved, but larger materials were collected. Samples 5 and 6 originate from
435 excavations that employ piece-plotting to all object of 10 mm or larger. Excavated sediments
436 associated to samples 5 and 6 were wet-sieved, but frequencies presented here do not
437 include materials recovered from wet-sieving as the sieving material analysis is in progress.
438 All samples include complete and fragmented lithics.

439

440 Table 2 shows absolute and relative frequencies of elongated blanks (blades and bladelets)
441 of the six samples, and Table 3 presents descriptive statistics for the lengths of these blanks.
442 A major difference lies between samples 1 and 2 and the other samples, as samples 1 and 2
443 are substantially smaller than samples 3 to 6, and - according to our information - sorted by
444 the excavator. In addition to their low counts, minimal length measurements of blanks,
445 31.20 mm and 31.83 mm respectively, are substantially larger than in the other samples.
446 Samples 3 to 6 show substantially higher absolute frequencies of blades and bladelets than
447 samples 1 and 2, even though samples 3 to 6 do not include lithics recovered from sieving. In
448 light of the sorting in samples 1 and 2, further comparisons between these samples and
449 samples 3 to 6 are difficult to interpret. This is something that needs to be addressed when
450 undertaking detailed comparisons between assemblages originating from the 1978-1990 and
451 later excavations.

452 We first looked at the three excavation phases by merging samples of the same excavation
453 phase (Table 4). A Chi-square test showed significant difference ($\chi^2 = 9.3943$, df = 2, p =

0.009121). Post-hoc comparisons using *fdr* correction of the *p*-value revealed significant difference between the 1992-1995 and 2013-2016 samples (*adj. p* < 0.05). None of the other comparisons was significant.

While we know that samples 1 and 2 are biased (see discussion above), we were interested if there exist significant differences between the collections generated by the 1992-1995 and 2013-2016 excavations. Hence, we focus our analysis at sample level on samples 3 to 6 here.

We note that relative frequencies of blades and bladelets appear different between both samples of the 1992-1995 excavations (with proportions of bladelets are below 25%) and both samples of the 2013-2016 excavations (with proportions of bladelets more than 32%) (Table 2). However, a Chi-square test showed no significant difference ($\chi^2 = 7.6145$, *df* = 3, *p* = 0.05469).

We also tested whether cultural classification might have an influence on relative bladelet frequency (Table 5). A Chi-square test with Monte Carlo simulation of the *p*-value (100,000 replicates) showed no significant difference ($\chi^2 = 4.6527$, *p* = 0.1981), demonstrating that cultural classification did not affect bladelet frequency. It is important to note here that we do not want to test if length is driven by cultural classification in general has an influence on bladelet frequency, but rather test whether our comparison is biased as cultural classification of our samples is influencing/driving bladelet frequency.

In sum, our analysis of the frequencies of blades and bladelets suggest that overall there are differences based on excavation bias (esp. 1978-1990 excavation), and our analysis also showed differences in bladelet frequency between the 1992-1995 and 2013-2016 collections. Interestingly, on sample level our analysis did not show any statistically significant differences. However, we have to note here that our analysis does not include the

wet-sieving materials of the 2013-2016 excavations. Including them in the future will require us to revisit the statements made above.

We also used the mean length of elongated blanks (blades and bladelets) (Table 3) to test whether there are differences in size of lithics between excavation phases and samples 1 to 6. As a first step and in order to investigate whether there is significant variation between excavation phases, we merged each two samples from the same excavation phase into one larger sample resulting in three samples (Table 6) and studied variation between excavation phases using an ANOVA of the length of elongated blanks (Figure 13). It yielded statistically significant variation among excavation phases ($F(2,474) = 13.48$, $p = 2.03 \cdot 10^{-6}$). A post hoc Tukey HSD test showed that the comparison of the phases 1978-1990 and 2013-2016 as well as 1992-1995 and 2013-2016 differed significantly at $p < 0.05$. The comparison of the phases 1978-1990 and 1992-1995 was not significantly different. This allows us to suggest that excavation phase impacts mean length of elongated blanks and that earlier assemblages are biased against small elongated blanks.

However, if we look at our individual samples (Table 3), we see a complex pattern of variation (Figure 14). An ANOVA of the length of elongated blanks yielded a statistically significant variation among samples 1 to 6 ($F(5,471) = 7.355$, $p = 1.18 \cdot 10^{-6}$). A post hoc Tukey HSB test showed that samples 2 and 5, samples 3 and 5, samples 3 and 6, and samples 4 and 5 differed significantly at $p < 0.05$. The other sample pairs were not significantly different. It should be noted that samples 1 and 2 have very low samples sizes compared to samples 3 to 6, which might account for the fact that the analysis shows no statistically significant difference between sample 1 and samples 3 to 6. If we exclude samples 1 and 2 due to their low samples size and focus our analysis on samples 3 to 6 only, we see a similar pattern. An

ANOVA of the length of elongated blanks yielded a statistically significant variation among samples 3 to 6 ($F(3,451) = 10.38$, $p = 1.29 \cdot 10^{-6}$). A post hoc Tukey HSD test showed that samples 3 and 5, samples 3 and 6, and samples 4 and 5 differed significantly at $p < 0.05$, while the other sample pairs were not significantly different.

The pattern that emerges from the above analysis suggests that excavation phase of the sample might be a driver (the earlier excavated samples are larger on average [when the difference is statistically significant]). Interestingly, statistically significant difference could also be observed between samples that belong to the same stratigraphic unit (e.g., samples 3 and 5) but different excavation phases, supporting the observation that excavation phase might have an influence on the size distribution of elongated blanks. However, excavation phase is probably not the only driving factor, because not all tests from different excavation phases appear to be statistically significantly different (e.g., samples 4 and 6). In this context it should be mentioned that sample 5 is the most peculiar one as its mean length of elongated blanks is small (29.60 mm, $sd = 14.15$ mm) and differs significantly from that of samples 2, 3, and 4. Sample 5 shows a substantially higher percentage of bladelets among elongated blanks (38.10%, Table 3), and it, hence, comes as no surprise that its mean elongated blank length is shorter than for the other samples. The percentage bladelets can – of course – be related to excavation phase, but very well could also be driven by other factors like function of the assemblage as well as sampling different areas of a camp site and assuming spatial structuring of activities and their refuse. It should also be mentioned that in principle also postdepositional processes could be responsible for higher or lower percentages of small elongated items.

We also tested whether there is variation between samples based on their attribution to a ‘level’ at Mitoc-Malu Galben (Table 7, Figure 15), which we can view as an attribution to a

certain phase of the Aurignacian or Gravettian technocomplexes. An ANOVA of the length of elongated blanks yielded no statistically significant variation among levels ($F(3,473) = 2.531$, $p = 0.0565$), suggesting no influence of the cultural attribution on the size distribution of elongated blanks of our Mitoc-Malu Galben samples.

In brief, we cannot rule out that the size-distribution of the elongated lithic blanks is biased depending on their period of excavation, but we also observe that a substantially larger percentage of bladelets among elongated blanks leads to a smaller mean length of elongated blanks and, hence, contributes to differences in size distribution. Hence, underrepresentation of bladelets which might be driven by a number of factors including excavation phase. However, we have to note that the 2013-2016 excavations samples used here do not include the small fraction from wet-sieving, which might change our assessment once that data are available.

5 Concluding remarks and perspectives

In this study we presented the evolution of fieldwork methodologies at Mitoc-Malu Gaben during roughly the past five decades and a first analysis of potential excavation bias related to these changes in fieldwork methods in selected assemblages. We did the latter by looking at a small subset of the overall lithic assemblages, the elongated blanks, i.e. blades and bladelets, because we would assume that excavation bias would lead to an underrepresentation of small elements (including bladelets).

In the 40 years of excavation history over the past five decades at Mitoc-Malu Galben the employed fieldwork methods changed quite substantially, both in sync with general trends in Palaeolithic excavation methods but also in particular with the goals of the main fieldwork phases (1987-1990, 1992-1995, and 2013-2016), which shifted from taxonomic classification

549 in a historical-cultural framework (1978-1990), to stratigraphic studies and controlling the
550 chronology of the sequence (1992-1995), and, finally, to study of the site formation
551 processes and technological studies of especially also the bladelet production modes (2013-
552 2016).

553 Our analysis of the percentage of bladelets among the elongated pieces as well as the length
554 distribution of elongated pieces suggests that there seems to be some bias that might
555 indicate underrepresentation of small elongated blanks (bladelets) in some of the older
556 assemblages. However, this is not true for all assemblages and we have to entertain the
557 possibility that other factors than excavation phase might also drive differences between the
558 specific assemblages in our sample.

559 We, further, should note that we assume that our findings with regard of elongated blanks
560 can be extended to all lithic artefacts regardless whether they are blanks, cores, shatter, etc.
561 as we think that excavation bias against small objects would not differentiate between
562 elongated banks and other lithics, or - if at all - might be less in elongated blanks because
563 blades were in many older excavations often considered 'special' compared to flakes. Future
564 studies at Mitoc-Malu Galben - including a new assessment of the site formation processes
565 affecting the samples excavated between 2013 and 2016 - will have to test whether we can
566 identify the same patterns among other lithic artefacts but also whether we can identify
567 them among elongated blanks of other samples at the site.

568 If our preliminary findings can be confirmed in our future studies at Mitoc-Malu Galben, this
569 will have implications for the comparability of assemblages and especially for comparisons
570 between assemblages of different excavation phases. The influence of excavation
571 methodology on assemblages and their interpretation and comparability with newly
572 collected assemblages has been discussed by a number of studies at Palaeolithic sites (e.g.,

Dibble et al., 2005, 2009, 2018; Winder 1997). Similar work has also been done on variously collected Palaeolithic materials (e.g., Harris et al. 2019). All excavations – past and present - are biased in the one or other way. Here we showed for Mitoc-Malu Galben that the assemblages seem to be biased by the excavation phase. Through such studies and our ongoing work on site formation processes we can start to understand how the assemblages are biased, which is key if we want to use earlier excavated assemblages in comparative studies.

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808 **Figures**



809
810 **Figure 1**



812
813 **Figure 2**

Figure 1: Lithostratigraphic column of the P. Haaszaarts, 2017.

The column shows 14 meters of stratigraphy with various lithologies and fossil zones. Key features include:

- Lithostratigraphy:** 14m scale, 1m intervals, lithology symbols (1-16).
- Temperature (°C):** 20.2, 20.3, 20.5, 23.3, 23.4, 23.8, 24.8, (24.0), 25.5, 25.6, 26.2, 26.5, 27.4, 27.7, 27.8, (29.9), 31.2, 31.2, 32.7.
- Arch.:** Grav. IV, Grav. III, Grav. II, Grav. I, Aur. III upper, Aur. III, Aur. II, Aur. I, disp. Aur.
- Environment:** P, A, SA, B.
- Interst.:** MG 4, MG 5, MG 6, MG 8, MG 9, MG 10, MG 11, MG 12, MG 13.
- Org. Mat.:** 1, 2, 3%.

Graphic symbols:

- 1: Yellow, 2: Yellow with dots, 3: Yellow with horizontal lines, 4: Yellow with vertical lines, 5: Yellow with diagonal lines.
- 6: Yellow with cross-hatch, 7: Yellow with wavy lines, 8: Yellow with small circles, 9: Yellow with large circles, 10: Yellow with small squares, 11: Yellow with large squares, 12: Yellow with small triangles, 13: Yellow with large triangles, 14: Yellow with small diamonds, 15: Yellow with large diamonds, 16: Yellow with small stars.

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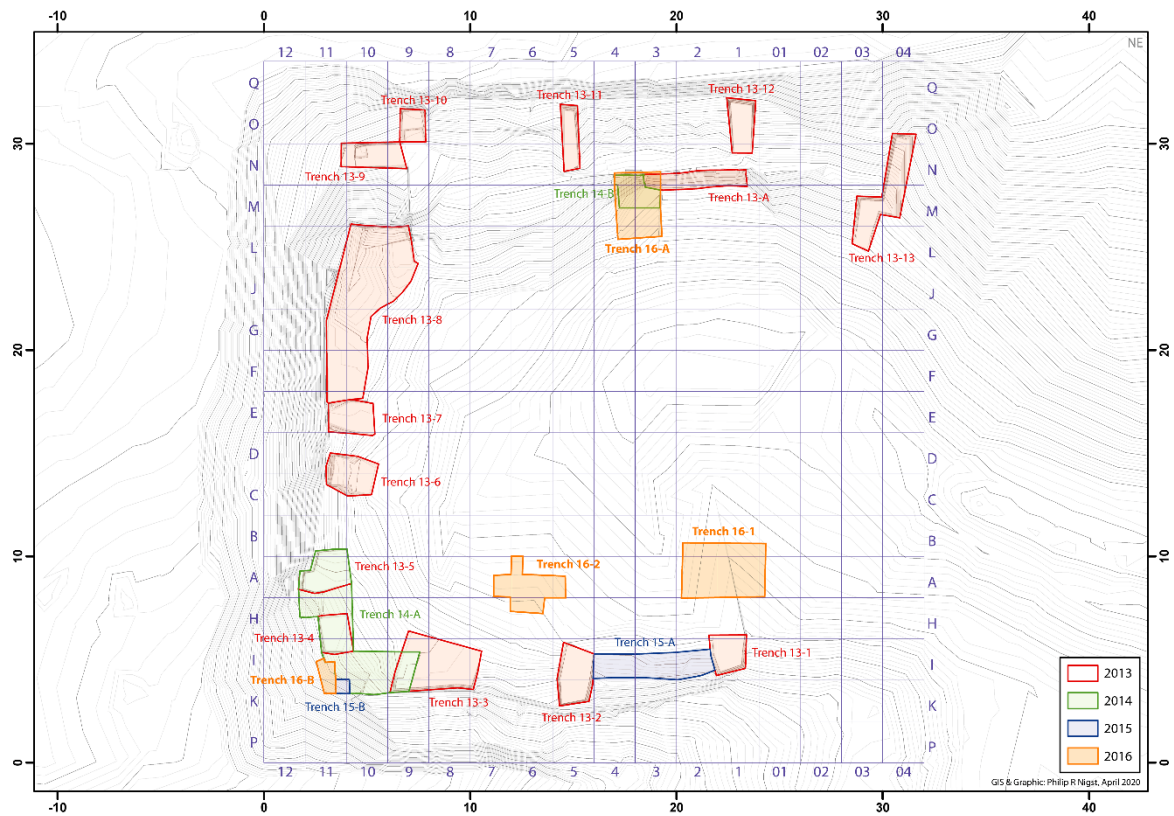
819 Figure 4



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821 Figure 5

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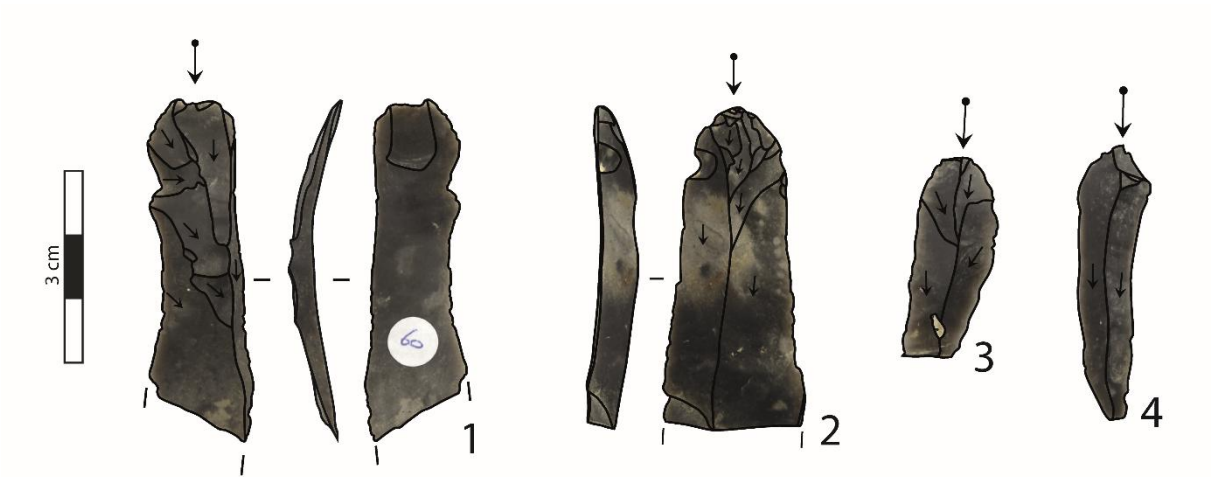
824 Figure 6

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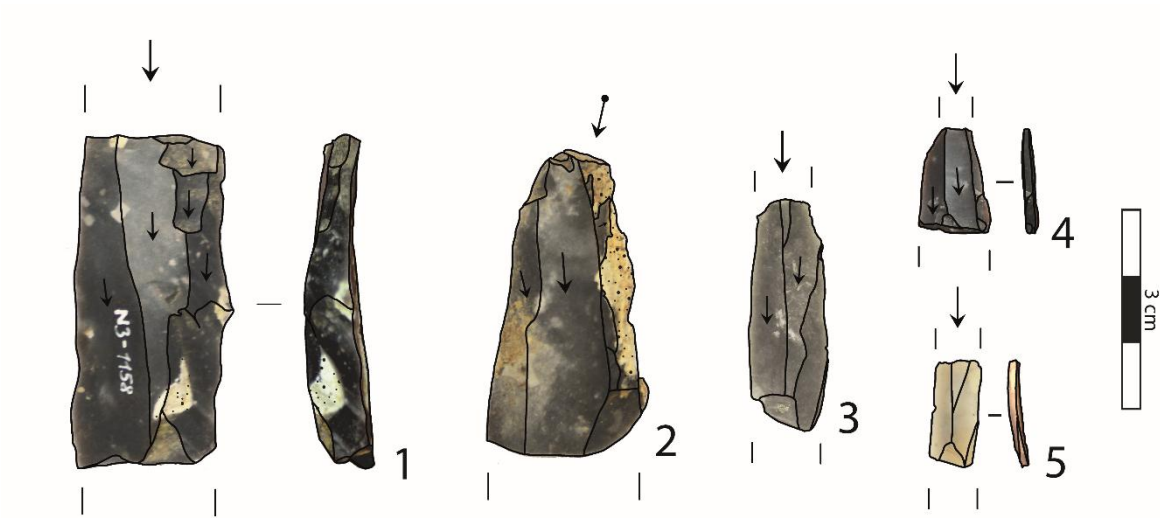
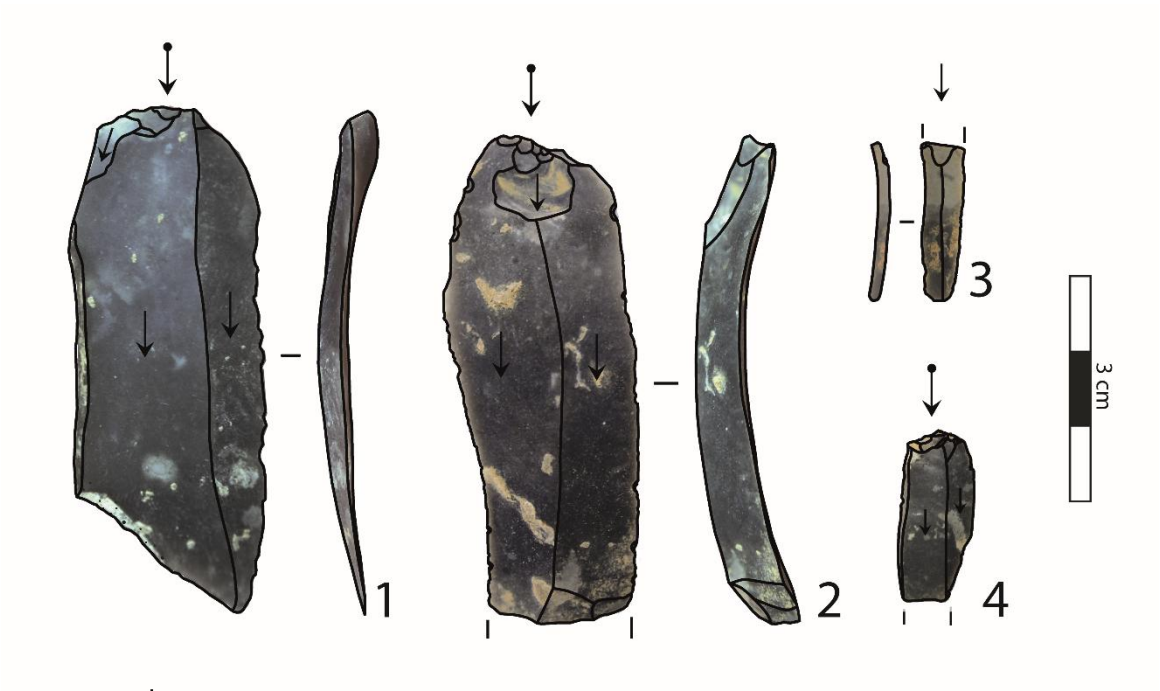
827 Figure 7



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833 Figure 9



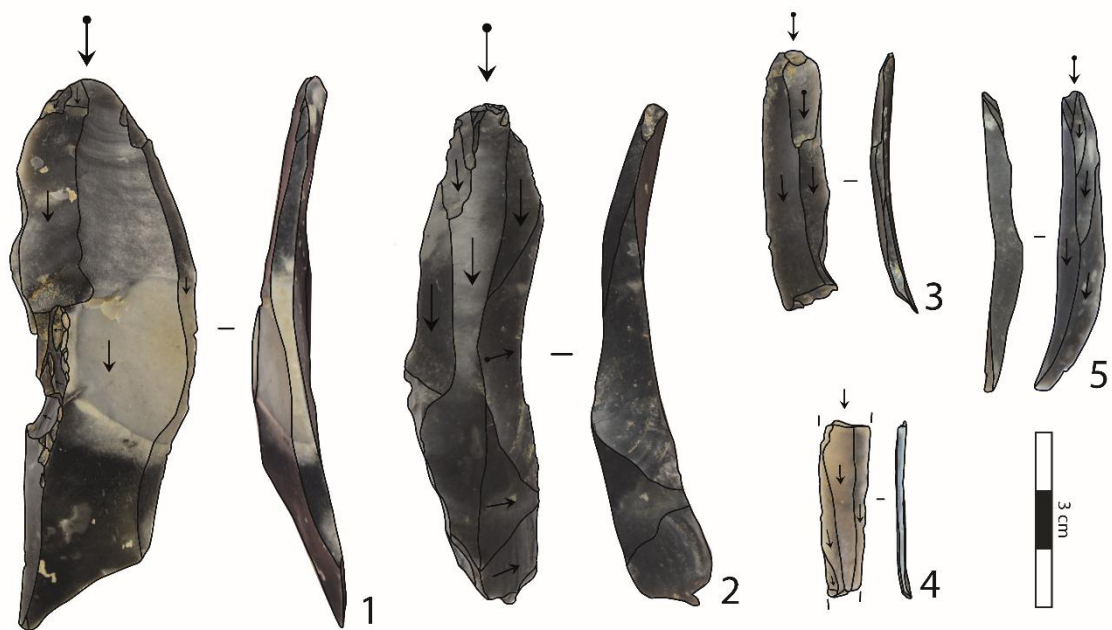


Figure 12



Figure 13

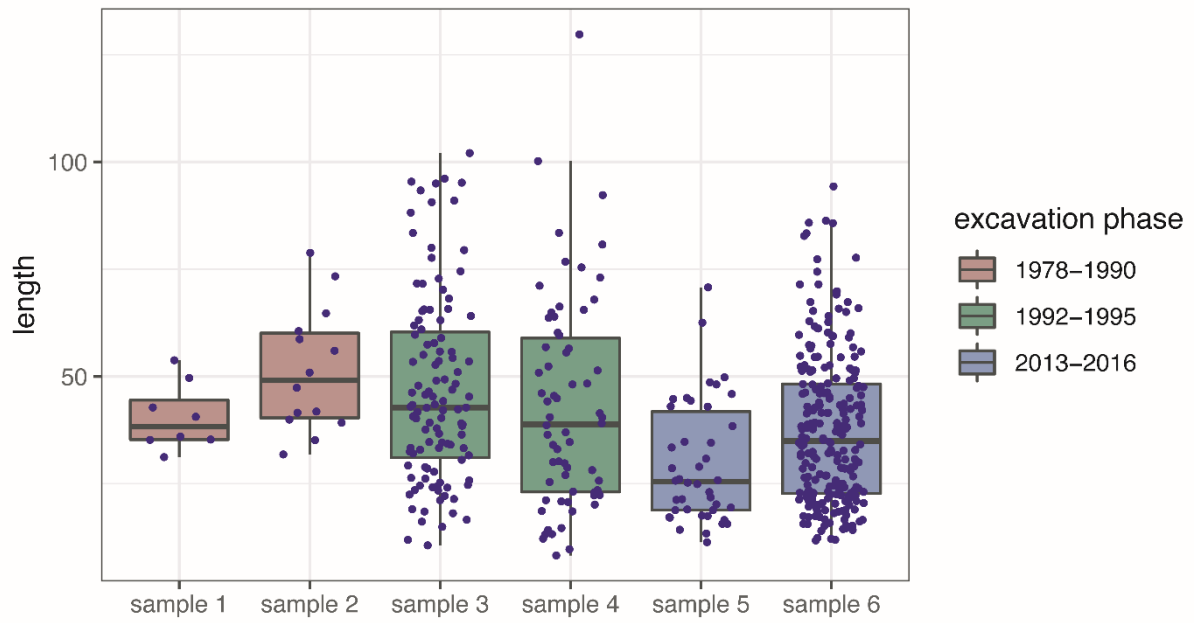


Figure 14

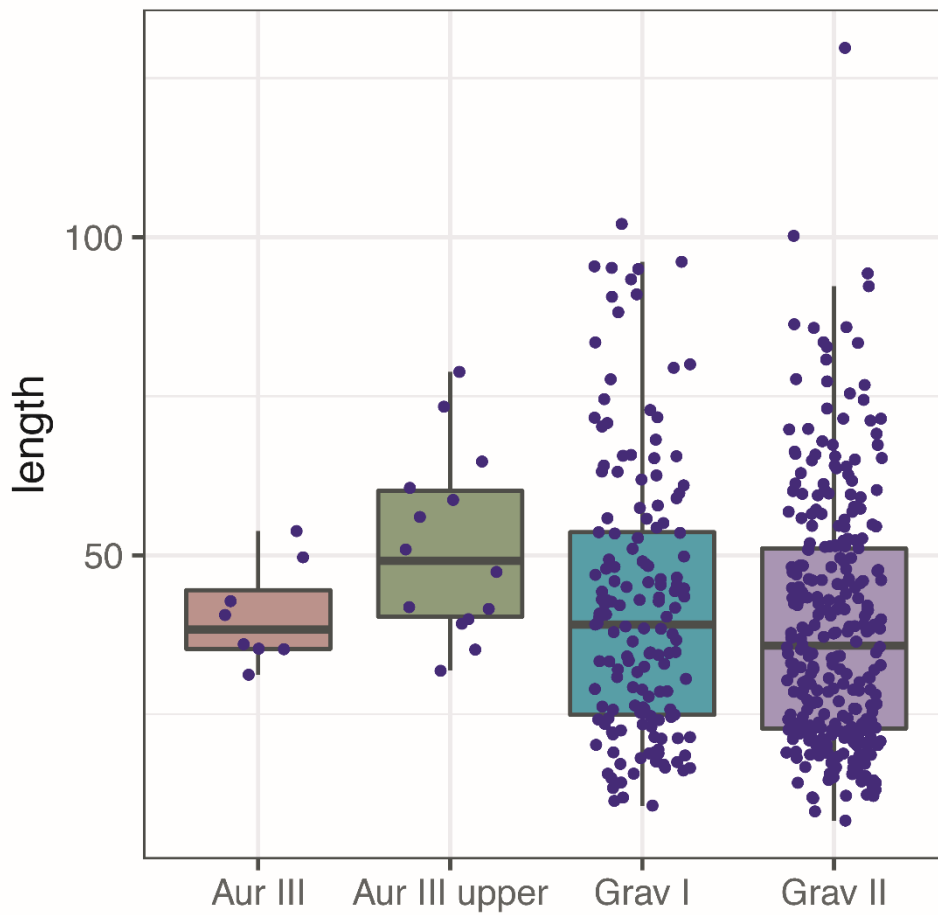


Figure 15

Figure captions

Figure 1: Map showing the location of Mitoc-Malu Galben. Graphic: Philip R Nigst. Basemap and rivers: HYDRO1K dataset from U.S. Geological Survey Earth Resources Observation and Science (EROS) Center, doi: 10.5066/F77P8WN0.

Figure 2: Mitoc-Malu Galben: Site location in the Ghireni ravine, close to the main Prut river valley. Graphic: Philip R Nigst. Image from Google Maps [accessed 29 April 2020: <https://www.google.com/maps/place/Mitoc,+Romania/@48.0957495,27.0224763,1151m/data=!3m1!1e3!4m5!3m4!1s0x473362017c791181:0x1957b68eea174124!8m2!3d48.1009863!4d26.9890442>].

Figure 3: Mitoc-Malu Galben: Stratigraphic sequence, radiocarbon dates (in ka uncal BP), occurrence of archaeological assemblages, environmental reconstruction, interstadials, organic matter content. Graphic symbols: 1) loess; 2) loam; 3) silty sand; 4) sand; 5) strong humic horizon; 6) weak humic horizon; 7) yellowish brown bioturbated horizon; 8) krotovinas; 9) bleached horizon (tundra gley); 10) iron staining; 11) frost wedge; 12) Aurignacian; 13) poorly documented Upper Palaeolithic; 14) Gravettian; 14) Late Gravettian; 16) poorly documented Upper Palaeolithic. Abbreviations: 14C: radiocarbon dates in ka uncal BP; Arch.: archaeology; P: periglacial, with deep frost or permafrost conditions (very cold); A: arctic (cold); SA: subarctic (medium cold); B: boreal; 2023 Interst.: interstadials; Org. Mat.: Organic Matter Content. Graphic: Paul Haesaerts.

Figure 4: Mitoc-Malu Galben: Excavation in 1992, view from the East. Photo: Pierre Noiret.

Figure 5: Mitoc-Malu Galben: Excavation in 2013, view from the East. Photo: Pierre Noiret.

Figure 6: Mitoc-Malu Galben: Map of the site in local coordinate system. Squares shown after Otte et al. (2007). Trenches are colour coded by year: 2013 (red), 2014 (green), 2015 (blue), and 2016 (orange). GIS & Graphic: Philip R Nigst.

Figure 7: Excavation at Mitoc in the 1980s, unknown precise location. Photo: Vasile Chirica.

Figure 8: Mitoc-Malu Galben, Sample 1: Examples of blades and bladelets. Graphic: Timothée Libois.

Figure 9: Mitoc-Malu Galben, Sample 3: Examples of blades and bladelets. Graphic: Timothée Libois.

Figure 10: Mitoc-Malu Galben, Sample 4: Examples of blades and bladelets. Graphic: Timothée Libois.

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896 Figure 11: Mitoc-Malu Galben, Sample 5: Examples of blades and bladelets. Graphic:
897 Timothée Libois.

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899 Figure 12: Mitoc-Malu Galben, Sample 6: Examples of blades and bladelets. Graphic:
900 Timothée Libois.

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902 Figure 13: Distribution of length of elongated blanks by excavation phase.

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904 Figure 14: Distribution of length of elongated blanks by sample.

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906 Figure 15: Distribution of length of elongated blanks by 'level'.

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Légendes des figures

Figure 1 : Carte montrant la localisation de Mitoc-Malu Galben. Image : Philip R Nigst. Fond de carte et cours d'eau : Données HYDRO1K de l'U.S. Geological Survey Earth Resources Observation and Science (EROS) Center, doi: 10.5066/F77P8WN0.

Figure 2 : Mitoc-Malu Galben : Localisation du site dans le vallon du Ghireni, à proximité de la vallée principale du Prut. Image : Philip R Nigst. Image de base issue de Google Maps [accédé le 29 avril 2020 : <https://www.google.com/maps/place/Mitoc,+Romania/@48.0957495,27.0224763,1151m/data=!3m1!1e3!4m5!3m4!1s0x473362017c791181:0x1957b68eea174124!8m2!3d48.1009863!4d26.9890442>].

Figure 3 : Mitoc-Malu Galben : Séquence stratigraphique, dates radiocarbone (ka BP non cal.), présence d'ensembles archéologiques, reconstruction environnementale, interstades, teneur en matière organique. Symboles : 1) loess; 2) limon; 3) limon sableux ; 4) sable; 5) horizon humifère bien exprimé; 6) horizon humifère bioturbé; 7) horizon brunifié bioturbé; 8) krotovine; 9) limon gris clair (gley de tundra); 10) hydroxydes de fer; 11) coin de glace; 12) Aurignacien; 13) Paléolithique supérieur peu documenté; 14) Gravettien; 15) Gravettien récent; 16) Paléolithique supérieur peu documenté. Abréviations : 14C : dates radiocarbone (ka BP non cal.); Arch.: archéologie; P: périglaciaire, avec gel profond ou permafrost actif (très froid); A: arctique (froid); SA: subarctique (froid moyen); B: boréal; Interst.: interstades; Org. Mat.: Teneur en matière organique. Image : Paul Haesaerts.

Figure 4 : Mitoc-Malu Galben : Fouilles en 1992, vue depuis l'est. Photo : Pierre Noiret.

Figure 5 : Mitoc-Malu Galben : Fouilles en 2013, vue depuis l'est. Photo : Pierre Noiret.

Figure 6 : Mitoc-Malu Galben : Plan du site suivant le système de coordonnées local. Carrés d'après Otte et al. (2007). Le code couleur des tranchées identifie les années : 2013 (rouge), 2014 (vert), 2015 (bleu), and 2016 (orange). SIG & Image : Philip R Nigst.

Figure 7 : Fouilles à Mitoc dans les années 1980, localisation détaillée inconnue. Photo : Vasile Chirica.

Figure 8 : Mitoc-Malu Galben, Échantillon 1 : Exemples de lames et lamelles. Image : Timothée Libois.

Figure 9 : Mitoc-Malu Galben, Échantillon 3 : Exemples de lames et lamelles. Image : Timothée Libois.

950 Figure 10 : Mitoc-Malu Galben, Échantillon 4 : Exemples de lames et lamelles. Image :
951 Timothée Libois.

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953 Figure 11 : Mitoc-Malu Galben, Échantillon 5 : Exemples de lames et lamelles. Image :
954 Timothée Libois.

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956 Figure 12 : Mitoc-Malu Galben, Échantillon 6 : Exemples de lames et lamelles. Image :
957 Timothée Libois.

958

959 Figure 13 : Distribution des longueurs des supports allongés par phase de fouilles.

960

961 Figure 14 : Distribution des longueurs des supports allongés par échantillon.

962

963 Figure 15 : Distribution des longueurs des supports allongés par "niveaux".

964

Tables and Table captions

Table 1: Mitoc-Malu Galben: Contextual information on the samples for assessing excavation bias.

	1978-1990		1992-1995		2013-2016	
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Square	D1	E1	M3	M3	N1,N2, N3, N4	N1, N2, N3, N4
Year	1984	1984	1992	1992	2013-2016	2013-2016
'Level'	'Aurignacian III'	'Aurignacian III upper'	'Gravettian I'	'Gravettian II'	'Gravettian I'	'Gravettian II'
	9b	8a				
SU	(reattributed)	(reattributed)	7a upper	6c	7a	6c
Surface	Unknown	Unknown	~ 1.5 m ²	~ 1.5 m ²	~ 1.5 m ²	~ 3.5 m ²

970 Table 2: Mitoc-Malu Galben: Absolute and relative frequencies of elongated blanks (blades
971 and bladelets) in sample 1 to 6.

	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6	
	n	%	n	%	n	%	n	%	n	%	n	%
Blade	6	75.00	13	92.86	88	79.28	50	75.76	26	61.90	159	67.37
Bladelet	2	25.00	1	7.14	23	20.72	16	24.24	16	38.10	77	32.62
Total	8	100.00	14	100.00	111	100.00	66	100.00	42	100.00	236	100.00

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973

974 Table 3: Mitoc-Malu Galben: Descriptive statistics of length (in mm) of elongated blanks in
 975 samples 1 to 6.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Maximum	53.79	78.82	102.08	129.76	70.77	94.3
Minimum	31.2	31.83	10.63	8.27	11.37	11.77
Mean	40.57	51.43	46.95	43.01	29.6	37.60
Standard deviation	7.81	14.42	21.8	24.51	14.15	17.61
n	8	14	111	66	42	236

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977

978 Table 4: Mitoc-Malu Galben: Absolute and relative frequencies of elongated blanks (blades
979 and bladelets) by excavation phase.

	1978-1990		1992-1995		2013-2016	
	n	%	n	%	n	%
Blade	19	86.36	138	77.97	185	66.55
Bladelet	3	13.64	39	22.03	93	33.45
Total	22	100.00	177	100.00	278	100.00

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982 Table 5: Mitoc-Malu Galben: Absolute and relative frequencies of elongated blanks (blades
983 and bladelets) by 'level'.

	Aurignacian III		Aurignacian II upper		Gravettian I		Gravettian II	
	n	%	n	%	n	%	n	%
Blade	6	75.00	13	92.86	114	74.51	209	69.21
Bladelet	2	25.00	1	7.14	39	25.49	93	30.79
Total	8	100.00	14	100.00	153	100.00	302	100.00

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986

987 Table 6: Mitoc-Malu Galben: Descriptive statistics of length (in mm) of elongated blanks for
988 each excavation phase.

	1978-1990	1992-1995	2013-2016
Maximum	78.82	129.76	94.30
Minimum	31.20	8.27	11.37
Mean	47.48	45.48	36.38
Standard deviation	13.33	22.86	17.30
n	22	177	278

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992
993

Table 7: Mitoc-Malu Galben: Descriptive statistics of length (in mm) of elongated blanks for each ‘level’.

	Aurignacian III	Aurignacian III upper	Gravettian I	Gravettian II
Maximum	53.79	78.82	102.08	129.76
Minimum	31.20	31.83	10.63	8.27
Mean	40.57	51.43	42.18	38.77
Standard deviation	7.81	14.42	21.41	19.37
n	8	14	153	302

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995

996 **Légendes des tableaux**

997

998 Tableau 1 : Mitoc-Malu Galben : Informations contextuelles des échantillons servant à
999 évaluer le biais lié à la fouille.

1000

1001 Tableau 2 : Mitoc-Malu Galben : Fréquences absolues et relatives des supports allongés
1002 (lames et lamelles) dans les échantillons 1 à 6.

1003

1004 Tableau 3 : Mitoc-Malu Galben : Statistiques descriptives de la longueur (en mm) des
1005 supports allongés dans les échantillons 1 à 6.

1006

1007 Tableau 4 : Mitoc-Malu Galben : Fréquences absolues et relatives des supports allongés
1008 (lames et lamelles) par phase de fouilles.

1009

1010 Tableau 5 : Mitoc-Malu Galben : Fréquences absolues et relatives des supports allongés
1011 (lames et lamelles) par "niveaux".

1012

1013 Tableau 6 : Mitoc-Malu Galben : Statistiques descriptives de la longueur (en mm) des
1014 supports allongés pour chaque phase de fouilles.

1015

1016 Tableau 7 : Mitoc-Malu Galben : Statistiques descriptives de la longueur (en mm) des
1017 supports allongés pour chaque "niveau".

1018