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Reassessment of the “Abbevillien” in the perspective of the new discoveries made on the Lower Palaeolithic and Quaternary sites of Abbeville (Somme-Northern France)

Marie-Hélène Moncel (1), Pierre Antoine (2), Arnaud Hurel (1), Jean-Jacques Bahain (1)

(1) UMR 7194 HNHP, MNHN-CNRS-UPVD – Département Homme et environnement, Muséum National d’Histoire Naturelle, Institut de Paléontologie Humaine, 1 rue René Panhard, 75013, Paris, France.

(2) UMR 8591 CNRS-Univ. Paris I et Paris Est Créteil. Laboratoire de Géographie physique, Environnements quaternaires et actuels, CNRS, 1 pl. A. Briand 92 195 Meudon, France.

Abstract

North-West of Europe yields few traces of early human occupations, in particular for the Acheulean. In this context, the Somme Valley in northern France, one way to access to the Britain during various Pleistocene low sea levels, provided numerous evidences of Lower Palaeolithic human occupations through fieldworks initiated during the XIXth century. These localities are associated with the original definition in the 1930s by the French prehistorian Abbé Henri Breuil of the “Abbevillien” (Abbevillian facies), based on lithic pieces including crudely-made bifaces recovered in particular in some famous key-localities of Abbeville, Carpentier, Léon and Moulin Quignon quarries.

The history of the term and its definition subsequently gave rise to debates concerning the chronocultural framework of Palaeolithic assemblages among the scientific community of prehistorians over time, from Jacques Boucher de Perthes, Gabriel de Mortillet, Geoffroy d’Ault du Mesnil, Victor Commont, Henri Breuil and François Bordes. New investigations on these three localities, all associated with the High terrace of the Somme system, pushed back to c. 670-650 000 years the age of the expansion of the Acheulean both in Northern France and Western Europe. They question on the ability of hominins to occupy northern latitudes, both under temperate and cold climates. Our work including new excavations and associated field observations of the three Abbeville localities involved at the onset of the controversy allows a re-examination of the Abbevillian and contributes to the discussion on the history of Prehistoric Science and the Earliest ‘Acheuleans’ in North-Western Europe.

Key words: early Acheulean, Abbevillian, Europe, artefacts, terminology

Introduction

32 The earliest evidences of human occupations of North-West Europe would be dated from ca 700 to 900 ka.
33 Current data (British sites of Happisburgh 3 and Pakefield, and several German sites such as Münster-
34 Sarmsheim, Dorn-Dürkheim, Mauer, Kärlich A, Miesenheim for instance) suggest that the earliest hominins
35 occupied this area only during temperate climatic periods and left the area when the climate was too cold
36 (Parfitt et al., 2005, 2010; Wagner et al., 2011; MacDonald et al., 2012; Fiedler et al., 2019; Farjon et al., 2020).

37 However, the earliest British localities only yielded series of cores and flakes, without evidence of biface
38 production, even if the small size of the assemblages does not allow a clear determination of the technology
39 diversity of these hominins. In England, bifaces are found in younger assemblages dated between MIS 15 and
40 MIS 13 (i.e. Ashton et al., 2011; Ashton and Lewis, 2012; Preece and Parfitt, 2012; Hosfield et al., 2011; Candy
41 et al., 2015; Voinchet et al., 2015), suggesting late dispersion of Acheulean in this part of Europe while present
42 from 900 ka in Spain, and from 650-670 ka in the Center of France and Italy (la Noira, Notarchirico; Moncel
43 et al., 2020a, b) and in the Somme Valley, Northern France immediately South of the Channel (Moulin
44 Quignon, Antoine et al., 2019).

45 Indeed, access to Britain across through the Channel River, was likely through the Somme Valley (i.e.
46 favourable territories along rivers; Cohen et al., 2012). The Quaternary deposits of this area are known since
47 the middle of XIXth Century and research undertaken over the past 20 years on the fluvial terraces and loess
48 sequences of the Somme Basin allowed multidisciplinary investigations on human settlement and
49 environmental change (Antoine et al., 2003, 2007, 2011). Researches on the earliest traces of occupations in
50 this valley have focused in particular on the oldest part of the terrace system, on former quarries in Amiens
51 and Abbeville despite poorly preserved. It is at Abbeville that the French term 'Abbevillien' was created in the
52 1930s, by the French prehistorian, archaeologist and geologist Henri Breuil following the discovery of roughly
53 shaped bifaces associated with large mammal remains from temperate (interglacial) environments from the
54 fluvial deposits of a High Terrace in the Somme Valley stepped system (Breuil, 1932, 1939; Breuil and Kelley,
55 1954). For decades, no new fieldworks were performed on these key localities, currently included in
56 Abbeville, to check if the past discoveries were reliable.

57 After a long gap in research, new investigations were performed from 2010 through an interdisciplinary
58 research program focusing first on two sites, the Carpentier and Leon quarries, protected as reference
59 archaeological sites and respectively property of the French government and of the National Museum of
60 Natural History. The aim was to check the observations made in these Early Middle Pleistocene deposits by
61 former archaeologists and geologists as d'Ault du Mesnil (during the second half of the XIXth century) and
62 more recently by Commont (before the First World War), then by Aufrère and Breuil (before the Second
63 World War), and to provide robust dating for the earliest evidence of human occupations of the Somme valley
64 using a modern multidisciplinary approach including geochronology studies (ESR and ESR/U-series dating).

65 In 2016, thanks to urban renovations works in the area of the former Moulin Quignon quarry, the main locality
66 of this +40m fluvial terrace which was excavated by Boucher de Perthes during the XIXth century, a test-pit
67 campaign undertaken by our team lead to the evidencing of *in situ* remains of fluvial deposits containing
68 Palaeolithic artefacts, leading to the rediscovery of the iconic Moulin Quignon Site (Antoine et al., 2019).
69 Results of the fieldworks on these three Abbeville localities (**Fig. 1**) provide a new perspective of the
70 chronological and expansion of the earliest Acheulean in North-West and West Europe, pushing back the age
71 of the Acheulean expansion in “punctuated long chronology” (Hosfield and Cole, 2018), and offer the
72 opportunity to examine the meaning of the term “*Abbevillian*” through an historical perspective.

74 **The Abbevillian: a term related to Abbeville’s discoveries in the past**

75 **1. Moulin Quignon and Boucher-de-Perthes**

76 The Quaternary deposits of the Somme River Valley are, among others (Van Riper, 1993), at the origin of the
77 recognition of the principle of high human antiquity, and therefore of prehistoric archaeology (Boucher de
78 Perthes, 1847; Lyell, 1860, 1863; Falconer et al., 1863; Prestwich, 1860, 1863; Milne Edwards, 1863). When
79 Boucher-de-Perthes worked at Moulin Quignon quarry since the 1840s, he was among the first prehistorians
80 to find handaxes in fluvial deposits and identify them as evidence of ancient human cultures (**Fig. 2, SOM,**
81 **12**). In 1863, he found also human remains in this quarry, which was at that time exploited by local workers
82 (Boucher de Perthes, 1864a, b). Those remains included a mandible which now appears to be a fake (it was
83 recently dated from the Middle Age by ¹⁴C), initiating the so-called ‘affaire de Moulin Quignon’ (Hurel et al.,
84 2016a, b; Vialet et al., 2016) (**Fig. SOM1**). British prehistorians went on to challenge the authenticity of the
85 artefacts found there and lively debates ensued (Boucher de Perthes, 1864a). When the mandible and other
86 human remains were refuted in 1863 and 1864, the handaxes and the site were in turn also totally rejected
87 by the scientific community (Milne Edwards, 1864). The artefacts were considered to be fake pieces and the
88 site was slowly forgotten, despite some fieldwork attempts to rehabilitate it during the nineteenth and
89 twentieth centuries. Interestingly the first classification models of lithic assemblages constructed by Gabriel
90 de Mortillet at the end of the nineteenth included the pieces extracted from the Abbeville sites and were
91 associated first to Acheulean then to Chellean (de Mortillet, 1872, 1883), but the preservation of this
92 emblematic site has never been successfully completed.

93 **2. Geoffroy d’Ault du Mesnil’s excavations**

94 When Geoffroy d’Ault du Mesnil went to Abbeville in 1875, he swiftly started fieldwork. His purpose was to
95 establish a global framework for regional Quaternary terrains. However, he failed to distinguish the fluvial
96 terrace levels of the *Champ de Mars* (Middle Terrace) from the High Terrace in which the *Moulin Quignon*,
97 *Carpentier* and *Léon* quarries are located. Indeed the three sites are associated to the same alluvial formation

98 overlying bedrock step at + 40m of relative height above the maximum incision of the River Somme below
99 the present-day valley) (Bahain and Antoine, 2020; Antoine et al., 2019) (Fig. 3).

100 In the archaeological classification that d’Ault du Mesnil presented during the universal exhibition of 1889,
101 he distinguished the Chellean, characterized by some “*Instruments-grossièrement taillés...(ayant)..pour*
102 *caractère des formes lourdes et massives. Le procédé de fabrication à larges éclats et leur grande dimension*
103 *donnent à ces outils un aspect particulier que personne ne peut méconnaître)* – *Crudely shaped instruments*
104 *characterized by heavy and massive forms. The procedure used for making large wide flakes gives these tools*
105 *a specific aspect that is very easy to recognize*” and the Acheulean, with some “*Instruments taillés a petits*
106 *éclats. Les instruments (...) présentent une grande variété de formes. Les uns amygdaloïdes, les autres*
107 *lancéolés, plats et soigneusement façonnés, sont les plus communs; ils sont taillés à petits coups et affectent*
108 *une forme régulière, presque symétrique, ce qui les distingue facilement de ceux de l’époque précédente –*
109 *(Shaped instruments with small flakes. The instruments (...) present a large variety of shapes. Some are*
110 *amygdaloid, other lanceolate, flat and carefully shaped forms are the most common; they are shaped by small*
111 *blows and are regularly, almost symmetrically shaped, which easily differentiates them from those from the*
112 *previous epoch)”,* thereby reintroducing the appellation that Mortillet had abandoned between 1872 and
113 1883 (d’Ault du Mesnil, 1889). Geoffroy d’Ault du Mesnil also differentiated these two types of instruments
114 on the basis of their stratigraphic origin and associated fauna (d’Ault du Mesnil, 1889) (Fig. 4, SOM3). Later,
115 he announced that he discovered coarse bifaces *in situ*, massive amygdaloid and lanceolate forms, with
116 sinuous edges, and flakes in fluvial levels associated with fauna including *Elephas meridionalis*, indicating a
117 warm to temperate climate (d’Ault du Mesnil, 1896). Unfortunately Geoffroy d’Ault du Mesnil published little
118 on his excavations which further complicated the use of the discoveries by succeeding archaeologists. He
119 speaks in his 1896,s paper about several archaeological levels “*dans les sablières au dessus du Champ de Mars*
120 *(in sandpits located above Champ de Mars)”,* putting the “Chellean tools” in “*une marne sableuse grise (limon*
121 *crayeux), à stratification horizontale avec Elephas primigenius, Elephas antiquus, Elephas meridionalis,*
122 *Rhinoceros merckii... et très rarement de la base des graviers (sous-jacents) - (a grey sandy marl (chalky silt),*
123 *horizontally stratified with Elephas primigenius, Elephas antiquus, Elephas meridionalis, Rhinoceros merckii...*
124 *and very rarely from the base of the (underlying) gravels)”* and the ‘Acheulean’ bifaces (more elaborate
125 limandes) in the sands and gravels situated above the marl. His rare publications unfortunately do not specify
126 in which quarry he found these pieces and only a schematic map and summarized description of the
127 stratigraphic levels is given (see explanations and discussions in Lopez-Romero, 2015 and Bahain et al., 2016).

128 3. Victor Commont and the Carrière Carpentier

129 Later, Victor Commont, who conducted research in the Somme Valley from the beginning of the twentieth
130 century until the end of the First World War, noted urbanization and the difficulties in finding the quarries
131 from the time of Boucher de Perthes and d’Ault du Mesnil, as they were no longer exploited (Commont,

132 1910a, 1910b, 1911). He also followed the exploitation of two new quarries, the Carpentier and Leclercq
133 quarries, located at the eastern limit of the same fossil alluvial formation exploited by his predecessors at
134 Moulin Quignon and Carrière Léon. He used a similar approach to that of d'Ault du Mesnil but with more
135 descriptive detail and much more rigour. Problematically, Victor Commont did not find archaeological pieces
136 in the White Marls of the Carpentier Quarry, but only fairly advanced pieces in the upper sandy-gravelly slope
137 deposit levels (Commont, 1910a, b). The First World War and the premature death of Victor Commont in
138 1918 unfortunately put a stop to research at Abbeville.

139 **4. Breuil and Aufrère: Abbevillian versus Chellean**

140 Taking into consideration the discoveries of Geoffroy d'Ault du Mesnil and Victor Commont, whom
141 considered to be excellent archaeologists, Abbé Breuil, his pupil Bowler-Kelley and Aufrère, resumed work at
142 Abbeville in 1937 and 1939 at the Carpentier quarry and the Léon quarry. Abbé Breuil was in possession of
143 d'Ault du Mesnil's field notebooks and suggested that the two latter quarries were part of the same fluvial
144 formation as Moulin Quignon (Breuil, 1939 and Breuil, autobiographical notes conserved at the National
145 Museum of Natural History) (**Fig. SOM6**). Abbé Breuil was thus the last scientist to consult Geoffroy d'Ault du
146 Mesnil's notes and see the archaeological and palaeontological material found by him at Abbeville before it
147 disappeared, surely destroyed by wartime bombing. Breuil remained convinced that Geoffroy d'Ault du
148 Mesnil was right (Breuil, 1939) and tried to reconcile his observations with those of Commont. It is important
149 to underline that it is likely that Geoffroy d'Ault du Mesnil never exploited the Carpentier quarry, which was
150 mainly exploited after 1906 (Commont, 1910), and that the White Marl described by d'Ault du Mesnil in his
151 1896 paper was probably observed in another quarry westward. The descriptions of the pieces given by
152 Geoffroy d'Ault du Mesnil indicate that they were not fakes for him (d'Ault du Mesnil, 1896). A few,
153 sometimes slightly rolled bifaces were collected, with gray patina different to that on the pieces from the
154 sand levels, and with sinuous edges.

155 When Breuil, Kelley and Aufrère returned to the Carpentier quarry, they observed the stratigraphic sequence
156 described by Victor Commont, which generated publications on the fluvial terrace geology, but did not find
157 bifaces *in situ* in the White Marl (Breuil et al., 1939a, b). At the neighboring Léon quarry, at the same level as
158 the Carpentier and Moulin Quignon quarries, they reported a Clactonian flake and an almond-shaped biface
159 found at the base of the sands in contact with the White Marl (Marne Blanche). In a postscript of his 1939
160 article (Breuil, 1939), Breuil also mentioned that coarse bifaces were found by Aufrère, Bowler-Kelley and
161 himself during surveys in the gravel level at the base of Leon quarry and the Moulin Quignon terrace and
162 surveys of the Porte du Bois.

163 The revision of Palaeolithic industries proposed by Breuil added further complexity to the description of
164 human history. After the creation of the terms 'pre-Chellean', 'Chellean' and 'Acheulean' by former
165 excavators, Abbé Breuil replaced the term 'Chellean' in the 1930s proposed by Mortillet by 'Chelléo-

166 Abbevillian' to describe an early phase of the Acheulean, followed by 'Clactonian with flakes' and 'Acheulean',
167 (Breuil, 1932, 1939; Breuil and Koslowski, 1934).

168 The Chellean industry described by Mortillet is an industry discovered at Chelles, a town located 25 km east
169 of Paris. This assemblage (currently considered as a reworked assemblage in secondary position) is composed
170 of coarse bifaces, with sinuous edges, a thick cortical base, and thick removals (Mortillet de, 1872). Abbé
171 Breuil considered that the term Abbevillian was better suited than the 'Chellean' since it corresponded to
172 bifaces found in primary position in the High Terrace at Abbeville (Alluvial formation VII at + 40 m). In this
173 way, the Acheulean period (associated to lower fluvial terraces of the same system) would follow the
174 Abbevillian (Breuil, 1932, 1934, 1939; Breuil and Kelley 1954).

175 In the Breuil's mind, the Abbevillian was associated - on the basis of the d'Ault du Mesnil's observations - with
176 the temperate Cromerian fauna of the Carpentier quarry, similar to that of the Cromer Bed in Great Britain,
177 and thus took on a chronocultural meaning for Breuil for whom the Abbevillian characterized human groups
178 and settlement dynamics, as opposed to the 'Clactonian' industry, with no bifaces. Breuil went on to apply
179 the term Abbevillian in a singularly broad geographical sense. He subsequently established, over the years,
180 the existence of an Abbevillian in North Africa, Spain, Italy and even in Java.

181 Breuil and Kelley (1954) presented the 'Abbevillian' bifaces, as coarse tools, made on flint nodules, with rare
182 removals and sharp edges, and "deep percussion conchoidal scars", preserving the cortex at their base. The
183 shape of the flint nodules was considered to have influenced the morphology of the tools. Very quickly, as
184 "coarse" bifaces also exist in more recent series, the meaning of the term also acquired a typological
185 connotation and was gradually disconnected from the environmental and chronological framework defined
186 by Geoffroy d'Ault du Mesnil. Unfortunately, however, most of the bifaces recovered from the Somme alluvia
187 during the nineteenth century, have no clear stratigraphic attribution. Nonetheless, Bowler-Kelley (1937) and
188 Breuil and Kelley (1954) still retained without any new observation and discovery the chronostratigraphical
189 attribution of d'Ault du Mesnil ("rares bifaces dans le gravier de base, *in situ* au sommet de ces graviers, plus
190 abondants dans la Marne Blanche associées à de la faune - (rare bifaces in the base gravels, *in situ* at the top
191 of these gravels, more abundant in the White Marl associated with fauna"). They also discussed the reality of
192 the Clactonian industry by evoking the role of activities to explain the lack of bifaces. However, the term
193 Clactonian was retained for longer than the Abbevillian, which was soon subject to contradictory debates.

194 **5. Contradictory debates. The Abbevillian as a typological definition.**

195 Throughout the XXth century, contradictory debates opposed those who accepted and those who refuted the
196 existence of the Abbevillian as a specific lithic industry, but also opposed prehistorians working in the field to
197 those working on collections (for example, Aufrère, 1937, Bordes, 1992, Bourdier, 1969, 1974a, 1974b; Roe,
198 1964; Tuffreau, 1987; Tuffreau et al., 1989) (**Fig. SOM4, 5**). At Abbeville, these debates were mainly linked to
199 the original stratigraphic position of the bifaces and especially to the ongoing confusion as to the precise

200 location of the quarries where the assemblages were discovered. They were also due to the scarcity and
201 imprecision of the publications of Geoffroy d'Ault du Mesnil. Aufrère (1937) considered firstly that the bifaces
202 were probably made by workers or brought in from other places and terraces (Porte du Bois sector), while
203 for Pottier (1937), on the basis of observations at Carpentier quarry, the last observable quarry at the time of
204 his study, the industry collected by Geoffroy d'Ault du Mesnil came from the upper part of the sequence, i.e.,
205 from the sandy-gravelly slope deposits located above the White Marl, in agreement with the Commont's
206 discoveries.

207 These negative comments led Breuil to publish in 1939 some unpublished stratigraphic sections of the
208 formations studied by Geofroy d'Ault du Mesnil. He resumed the situation at that time as follows: *“La*
209 *question importante [...] est celle de la contemporanéité de l'industrie abbevillienne [...] avec la faune très*
210 *ancienne, à affinités pliocènes, des graviers inférieurs et de la marne superposée. D'Ault du Mesnil l'affirme*
211 *expressément comme ne faisant aucun doute. Commont ne l'a pas retrouvée aux carrières Carpentier et*
212 *Leclerc. Cela a rendu sceptiques certains auteurs sur la valeur du témoignage du premier (The important*
213 *question [...] is that of the contemporaneity of the Abbeville industry [...] with the very ancient fauna, with*
214 *Pliocene affinities, from the lower gravels and the superimposed marl. D'Ault du Mesnil expressly states this*
215 *as being beyond doubt. Commont did not find it at the Carpentier and Leclerc quarries. This has made some*
216 *authors sceptical about the value of the testimony of the former)”*.

217 During most of the twentieth century, Abbé Breuil was one of the few researchers who defended the works
218 of Geoffroy d'Ault du Mesnil and the reality of his discovery of bifaces in the Abbeville White Marl (Marne
219 Blanche) and he attempted in particular to reconcile the contradictory observations of Geoffroy d'Ault du
220 Mesnil and Victor Commont (Breuil, 1939) (**Fig. SOM6**). Towards the end of his life, Abbé Breuil reaffirmed
221 the authenticity of the observations and discoveries of d'Ault du Mesnil and the presence of Abbevillian
222 bifaces in the fluvial sediments of the High Terrace under the “dragee layers” that he called “Marne de la
223 Porte du Bois à Abbeville” (Breuil and Lantier, 1959).

224 Later, Bourdier (1969) did not question the authenticity of the discoveries and pointed out Abbevillian bifaces
225 (reworked or not) recovered in the White Marl (Marne blanche) and deposited at the Musée des Antiquités
226 Nationales in Saint-Germain en Laye, 20 km west of Paris (**Fig. SOM44**). Unfortunately we did not find these
227 pieces that Bourdier described as asymmetrical, with large removals, without final retouch. The edges were
228 described as blunted, however with no signs that the bifaces are not in place, which may seem contradictory.
229 Bourdier and Lautridou (1974) also reported unpublished works of Abbé Breuil and Aufrère at the Léon
230 quarry. The latter indicated that many crushed and patinated bifaces were recovered in the gravels of the
231 Champ de Mars, associated to a terrace formation located 10 m below the High Terrace on which are located
232 the sites of Moulin Quignon, Carpentier and Léon. They even described very coarse bifaces which they called
233 ‘pre-Abbevillian’ pieces. The bifaces gathered by d'Ault du Mesnil are presented as pieces with blunted edges

234 but are not shiny, rolled and patinated. The discoveries of Breuil and Aufrère do not, according to Bourdier
235 and Lautridou (1974), rule out a chronological distinction between the Abbevillian and the ancient Acheulean
236 because, according to Victor Commont's statements, a period of decalcification seems to have occurred after
237 the deposition of the White Marl before it was gullied and covered by the sands and gravels reworked by
238 slope processes from the high terrace.

239 Agache (1971) nuanced these interpretations. He showed that most of the bifaces called 'Abbevillian' in
240 museum collections were collected from the surface – i.e., without relation with any observed stratigraphic
241 sequence - or came from reworked levels located in lower terraces in the Somme system, e.g., in the fluvial
242 gravels of the Champ de Mars formation. Those bifaces are rolled, striated, sometimes crushed and almost
243 always bear a bright, multicolored patina, with yellow-brown colors and, often, pinkish spots near the cortex.
244 However, Agache also reported the presence of rare Abbevillian bifaces recovered *in situ* in the White Marl
245 and thus contemporaneous with the fauna, without specifying whether these data derived from new personal
246 observations or pre-existing published interpretations. These Abbevillian bifaces are described "*comme*
247 *taillés avec habileté, mais généralement à grands éclats, ce qui leur donne un profil très sinueux et l'aspect*
248 *d'ébauches (as skillfully flaked, but generally with large flakes, which gives them a very sinuous profile and*
249 *the appearance of roughouts)" (Fig. 5). Medium and small dimensions are predominant. The cortex is often*
250 *preserved, either in the middle or at the base. Pointed bifaces and picks are not uncommon. A photo of one*
251 *face of one of these bifaces from the Boucher-de Perthes Museum was published by Agache (Agache, 1971).*
252 *It is reputed to come from the Neuillès-Joron collection but it could not be traced in our study. In spite of a*
253 *bright brown patina and sharp edges, its technological characteristics make it a dubious piece, especially since*
254 *nothing is known of its exact stratigraphic origin.*

255 Twenty years later, in his work on the typology of the Lower and Middle Palaeolithic industries, Bordes (1992)
256 presented a synthesis of the cross-section of the Carpentier quarry, distinguishing the base coarse gravel with
257 no industries according to Victor Commont and rolled 'coups de poing' according to Geoffroy d'Ault du
258 Mesnil. He did not call into question this stratigraphic attribution. Bordes nevertheless described and
259 presented drawings of so-called 'Abbevillian' bifaces from the Champ-de-Mars (lower terrace) and not from
260 the Carpentier quarry. These drawings show asymmetrical pieces, often with cortical bases and rare removals
261 (Fig. SOM5). The term is considered typological, as pointed out by A. Tuffreau (Tuffreau, 1987; Tuffreau et
262 al., 1989): "*Tout classement a posteriori de pièces mises au jour sans contexte stratigraphique précis ne peut*
263 *entraîner que la constitution de séries artificielles, des bifaces grossiers « abbevilliens » d'une part et des*
264 *bifaces « acheuléens » d'autre part. Il faut donc proscrire définitivement le terme « abbevillien » que ce soit*
265 *dans le sens « culturel » classique ou, pour éviter toute confusion, dans le sens typologique, tel qu'il figure*
266 *dans la typologie de Bordes (1961) - (Any a posteriori classification of pieces recovered without a precise*
267 *stratigraphic context can only lead to the creation of artificial series, coarse 'Abbevillian' bifaces on the one*

268 *hand and 'Acheulean' bifaces on the other. The term 'Abbevillian' must therefore be definitively proscribed,*
269 *whether in the classical 'cultural' sense or, to avoid any confusion, in the typological sense, as it appears in*
270 *Bordes's typology (1961)''.*

272 **New investigations at Carpentier, Leon and Moulin Quignon quarries. An enigma resolved?**

273 New fieldwork was recently performed at the Carpentier, Léon and Moulin Quignon quarries, all located on
274 Alluvial formation VII of the Somme system, located on a bedrock step at + 40 m of relative height (Antoine
275 et al., 2016, 2019; Chauhan et al., 2017), renewing our knowledge of the earliest Acheulean traces of
276 occupations in the Northwest of France (**Fig. 6**). New data also questions the past discoveries and their
277 meaning to describe the earliest European bifaces. The abundant bifaces gathered in Abbeville and stored in
278 the collections of the Museums derive mainly from the "Champ de Mars", "Stade" and "St. Gilles" sites, which
279 are clearly located in a younger terrace formation (around + 30 m, relative altimetry, i.e. 10 m below the
280 Carrière Carpentier formation (**Fig.10**).

282 **1. Carpentier quarry**

283 **Stratigraphy, geochronology and paleoenvironnement**

284 From 2010 and 2014, new investigations were performed on the main section of Carpentier quarry preserved
285 in this listed heritage site. The Carpentier quarry, acquired by the French Government in 1938, is one of the
286 rare accesible evidence of the High Terrace of the Somme valley in this urban area. According to its relative
287 altitude versus the current bedrock valley incision, the alluvial formation of the Carrière Carpentier represents
288 the downstream extension of the alluvial formation VII of the terrace system at Amiens (Renancourt
289 Formation), corresponding to the third incision stage following the highest and earliest terrace (Antoine et
290 al., 2003, 2007). The stratigraphic sequence of the Carpentier quarry consists of a succession of fluvial gravels
291 covered by whitish fluvial calcareous sandy silts with calcareous nodules ("Marnes Blanches" = White Marl)
292 (Antoine et al., 2016) (**Fig. 7**). The fluvial succession is then covered by a slope sequence composed of
293 hillwashed sands and thick clayey soliflucted gravel beds, locally trapped in deep sinkholes. According to the
294 various bio-proxies (molluscs, large vertebrates, small mammals), the White Marl was deposited during the
295 early part of an interglacial phase in an aquatic slow running environment, as emphasized by the development
296 of oncoliths and the presence of fish and aquatic molluscs. The landscape was composed of a mosaic of open
297 bush and forest areas, in which wet and grassy vegetation developed on riverbanks. On the basis of terrace
298 stratigraphy, ESR and ESR/U-series dating results, and biostratigraphic data, the fluvial deposits of the White
299 Marl can be securely attributed to MIS 15 (Voinchet et al., 2015; Antoine et al., 2016). In addition, some
300 Acheulean bifaces were discovered *in situ* at the base of the slope deposits, directly overlying the fluvial

301 sequence while only geofacts were found in the White Marl and the coarse layer (**Fig. 8, SOM 7**). These
302 artefacts are most likely coeval with the end of MIS 15 or an early stage of MIS 14, between 550 and 500 ka,
303 and represent, together with the artefacts from Amiens “Rue du Manège”, the oldest *in situ* evidence of
304 Acheulean occupation in Northern France before the *in situ* Acheulean settlements at Cagny-la-Garenne
305 dated to early MIS 12 at ± 450 ka (Tuffreau, 1987; Voinchet et al., 2015; Antoine et al., 2003, 2016).

306 **Lithic corpus and evidence of hominin occupations**

307 During the new fieldwork performed from 2010 to 2014 at this site, no unquestionable artefacts were
308 discovered in the White Marl or in the underlying gravel layer, in keeping with Victor Commont’s assertions,
309 while several faunal remains were recovered in the White Marl (the quarry is famous for the abundant large
310 mammal remains discovered there). Moreover, no clear evidence of human intervention can be shown on
311 the bones (Antoine et al., 2016). The rare potentially flaked flint findings were considered as geofacts due to
312 post-depositional effects (i.e., analysis of the geofacts by Pei, 1936) (**Fig.5**).

313 Indeed, some Acheulean bifaces were discovered *in situ*, but at the base of the slope deposits directly
314 overlying the fluvial sequence, i.e., at the same stratigraphic location as the pieces recovered by Commont
315 (1910a) (**Fig. 8, SOM7**). Such types of oval-shaped bifaces were even described by Commont (1910b) and
316 related to the “Acheulean” pieces found in the gravels of the Fréville Formation in Amiens (Commont, 1909a,
317 b) and at the Moulin Quignon site in Abbeville (Aufrère, 1934; Breuil, 1939b; Breuil and Lantier, 1959). Based
318 on our observations and analyses (Antoine et al., 2016), these artefacts are most likely coeval with the end
319 of MIS 15 or with an early stage of MIS 14 between 550 and 500 ka (Antoine et al., 2016).

321 **2. Leon quarry**

322 Léon quarry, property of the National Museum of Natural history of Paris, is located about 100 m to the south
323 of Carrière Carpentier in the same alluvial formation. Presently completely filled with waste deposits, this
324 locality was studied in the 1930's by Abbé Henri Breuil. His few published data indicate here the discovery of
325 some pieces without clear stratigraphic location. In 2014 and 2016, two missions were organized in order to
326 investigate the remnants of the deposits and if artefacts could be found. The new excavations on this former
327 quarry showed that only a few square metres of *in situ* calcareous alluvial deposits are preserved below 3 to
328 4 m of modern embankments and waste (Moncel et al., 2014). The fine calcareous sediments observed
329 include sandy but also finer, silty levels, whose facies is close to that of the "White Marl" of the neighbouring
330 Carpentier Quarry (**Fig. 9**). On the 160 m² of the field, 45 m² were opened in the north-west part. Only 3 m²
331 of preserved White Marl formation has been found during this fieldwork campaign. This deposit lies *in situ*
332 on the bedrock at the same altimetry than the Carrière Carpentier sequence. Some large mammals bone
333 fragments and two flint geofacts similar to those of the Carrière Carpentier were discovered.

335 3. Moulin Quignon

336 Stratigraphy, geochronology and paleoenvironnement

337 Recently, the re-examination of the site of Moulin Quignon, based on both the study of the collections
338 deposited by Boucher-de-Perthes at the National Museum of Natural History and new fieldwork, indicated
339 the preservation of an undisturbed fluvial sequence. At Moulin Quignon, the alluvial formation overlies the
340 chalk bedrock at the same altimetry than the fluvial deposits of the Carpentier and Léon sequences (+ 40 m
341 relative height). New fieldworks undertaken in 2016, 2017 and 2019 allowed the evidencing of well preserved
342 sandy and gravely sediments, including Acheulean artefacts and thus the rediscovery of this emblematic
343 Palaeolithic site more than 150 years after the first investigations of Boucher de Perthes.

344 Lithic corpus and evidence of hominin occupations

345 The technological analysis of the bifaces indicates that the tools are characterized by the management of the
346 whole bifacial volume with diversified morphological results. Only one of these is a crude biface, similar to
347 the definition of Abbevillian bifaces. The other tools are incorporated in the diversity of Acheulean bifaces.
348 They are almost totally shaped, and some are regularized by final retouch on the cutting edges. Some of them
349 present several series of removals covering the surfaces and thinning of the extremity. The biface cross-
350 sections are symmetrical or asymmetrical. The bifaces found recently at Moulin Quignon resemble the bifaces
351 found by Boucher-de-Perthes at the same site and stored at the National Museum of Natural History at Paris
352 (Moncel et al., 2016). They are similar to the bifaces found in more or less contemporaneous sites comprising
353 diversified bifaces and general management of the bifacial volume (Moncel et al., 2019, 2020) (**Fig.2**). The
354 term Abbevillian should thus be definitively abandoned as a definition of crudely made handaxes and an early
355 Acheulean.

356 Based on stratigraphic observations and ESR dates, this new archaeological assemblage is dated to the early
357 MIS 16 glacial stage, around 670-650 ka ago (Antoine et al., 2019). That means that these pieces are currently
358 the earliest evidence of human occupation in the Somme Valley and the North of France. Furthermore, they
359 are the earliest bifaces from North-western Europe, as they are markedly older than the bifaces found in the
360 UK, along the Bytham River (Voinchet et al., 2015; Hurel et al., 2016a, b; Antoine et al., 2019). This discovery
361 pushes back the age of the oldest Acheulean occupation of North-western Europe by more than 100 ka and
362 fills the gap between archaeological records from Northern France and the U.K. It also challenges hominin
363 dispersal models in Europe showing that hominins using bifacial technology, such as *Homo heidelbergensis*,
364 were able to overcome cold climate conditions as early as 650 ka and reasserts the importance of the Somme
365 valley, where Prehistory was born at the end of the nineteenth century (Antoine et al., 2019) (**Fig. 11**).

The new Acheulean discoveries at Abbeville in the European corpus.

The term Abbevillian is definitively considered as an outdated term. Its history is linked to the history of scientific ideas throughout the twentieth century and the debates surrounding the discoveries of crudely shaped bifaces in the high terrace of the Somme Valley at Abbeville. The discoveries reported by d'Ault du Mesnil were only defended by Breuil but in the light of recent investigations and discoveries, especially at Moulin Quignon, it is more and more likely that those finds are certainly not fakes (**Fig. 12**).

Discoveries made over the past decade have updated the hypothesis of an ancient phase of the Acheulean industry, formerly known as the Chellean by Mortillet or the Abbevillian by Breuil. However, it is very different from the definition of the Abbevillian (Moncel et al., 2013, 2018a, b, c; Vallverdu et al., 2014; Voinchet et al., 2015; Moncel and Ashton, 2018). This earliest phase is contemporaneous with persistent core-and-flake industries (i.e., Carbonell et al., 1999; Arzarello et al., 2006; Parfitt et al., 2005, 2010). The bifaces are not crudely made. This definition is no longer moreover based solely on the archaic biface guiding fossil, but also on other behavioral changes that occurred between 700-550 ka regarding biface production but also core technologies (Moncel et al., 2013, 2019, 2020; Gallotti and Peretto, 2015; Pereira et al., 2015).

If we summarize recent findings comprising bifaces, after Barranc la Boella with a few crudely made Large Cutting tools dated to 1 Ma-900 ka, and Lézignan-la-Cèbe (800 ka), the earliest series with elaborate bifaces date to around 670 ka (Notarchirico in Southern Italy, 610-675 ka; la Noira in the Center of France, 650-670 ka, Moulin Quignon, in Northwest France, 650-670 ka) (Moncel et al., 2013, 2020; Vallverdu et al., 2014; Pereira et al., 2015; Bourguignon et al., 2016). In Britain, series of the Bytham River (Maidcross Hill, Warren Hill, Broosky) with bifaces were recently dated by ESR and U-Th series to MIS 15/14 (Roberts and Parfitt 1999; Ashton et al., 2008; Ashton and Lewis 2012; Schreve et al., 2015; Voinchet et al., 2015). The bifaces of these early series contain both totally shaped and crudely made tools, as described in the Abbevillian, for instance by d'Ault du Mesnil (1889, 1896) or Breuil and Kelley (1954).

New evidence resulting from the rediscovery of the historic site of Moulin Quignon demonstrates that the first Acheulean occupation north of 50°N is dated to about 650-670 ka during an early glacial phase under a cold context. However, the shape and intensity of biface shaping at Moulin Quignon and in broadly contemporaneous sites correspond to what was described by Bordes (1992) and Bourdier (1974, 1992) for Abbevillian bifaces. It is important to mention that the bifaces found by Boucher de Perthes at the Moulin Quignon quarry and stored at the Museum National d'Histoire Naturelle in Paris are similar to the recent discoveries at the Moulin Quignon site, in terms of shaping methods and invasiveness. They are not fake pieces made by workers and introduced into the quarry. Crude bifaces are present in all the series, regardless of age, and are considered either as evidence of workshops or deliberately crudely shaped tools.

399 La Noira stratum a (also corresponding to an Early Glacial human occupation around 650-670 ka) comprises
400 the highest diversity of Large Cutting Tools in these earliest assemblages where the lithic corpus contains a
401 large number of artefacts, including bifaces, bifacial tools and diversified crudely shaped tools that can be
402 called 'expedient tools' (Moncel et al., 2020). Among these series, the technological features of these early
403 bifaces can be summarized as followed: (1) bifacial volume management for some of them by several series
404 of removals, (2) various shaping methods producing asymmetrical (plano-convex) and symmetrical bifaces,
405 (3) some final retouch to regularize the sinuous or rectilinear edges, (4) careful work on the tip and (5) varying
406 invasiveness of shaping. The final form of the bifaces is highly diversified in all the lithic series, as a result of
407 the sole management of the biface or tool resharpening in some cases.

408 Several younger sites yielded comparable bifacial industries (Caune de l'Arago, levels P-Q, Southern France,
409 MIS14; Cagny-la-Garenne I and II, Northern France, MIS 12) (Barsky and Lumley, 2010; Tuffreau, 1987;). Biface
410 standardization appears later in Western Europe, from MIS 13 onwards (Roberts and Parfitt, 1999; Garcia
411 Medrano et al., 2019). In France, no evolution over time is recorded between MIS 16 and 12 (around 700 to
412 450 ka), but the situation seems different on the terraces in Britain from MIS 13 onwards according to Roe
413 (1964) and Bridgland and White (2015), with phases of morphological biface evolution (Moncel et al., 2015;
414 Antoine et al., 2016). Rather than focusing on terminology, the debate should now concern the question of
415 the introduction and diffusion of these new behaviours, or a local origin. In addition, the relationship between
416 *Homo heidelbergensis* and Middle Pleistocene population dispersals also remains unresolved (Stringer, 2012;
417 Bermudes de Castro et al., 2017).

418 Revisiting the three key-localities of Abbeville, Carpentier, Leon and Moulin Quignon quarries, allowed
419 precisising both the paleoenvironmental framework and the age of the +40m High Terrace of the Somme Valley
420 and confirmed traces of human occupations as the past prehistorians had already found. It also allowed to
421 characterize and better describe the White Marl and its extension, making possible to relate the three
422 localities. Carrière Carpentier and Carrière Léon did not yield clear evidence of human occupation for the
423 earliest levels. Only Moulin Quignon indicate without doubly that hominins were present along the Somme
424 Valley at least around 650-670 ka, during the Early MIS16. In the state of knowledge, the Acheulean did not
425 reach the British territories as any biface dated to MIS 16 was discovered so far in this area. The reason is
426 perhaps due to the state of discoveries in England, taphonomic preservation (sites now under the sea),
427 unfavourable environmental conditions or low densities of populations.

428 The history of the term of Abbevillian and its various definitions over time follow the succession of fieldworks
429 in the Somme valley, trying to find evidence of early human occupations in quarries for a long time in
430 activities. If hominins were present at Moulin Quignon, they could also be present at the place of Carpentier
431 and Leon quarries. The pursuit of the research on the remaining formation could help to increase the quantity
432 of artefacts and above all mapping the precise location of the occupations in the paleo-landscape to

433 understand how and where hominins settled. It is considered that the Northern territories were occupied
434 only during favourable periods, instead of Southern Europe where ecological niches allowed continuity
435 settlements for hominins (i.e. Dennell et al., 2011; Bermúdez de Castro and Martinon Torres, 2013; Bermúdez
436 de Castro et al., 2013; Mosquera et al., 2013; Rodriguez-Gomes et al., 2014; Ashton, 2015; Pope et al., 2017).
437 The new fieldworks at Moulin Quignon suggest that hominins moved in this area under cold conditions or at
438 least during a short more temperate event of a glacial stage. Micro-wear data on Acheulean sites of the same
439 age indicate a large diversity of activities performed by the groups, in small or large territories (Lugli et al.,
440 2017; Hardy et al., 2018; Moncel et al., 2020a). They are proof of ability of the Acheulean hominins to adapt
441 themselves to various environments where large herbivores lived such as Elephants (Ashton et al., 2014;
442 Peretto et al., 2015; Solodenko et al., 2015; Barkai, 2016; Moncel et al., 2020a; Santagata et al., 2020).
443 Hominids could have followed herds of herbivores in corridors, finding local raw materials, as we observe in
444 the Center of France or in the South of Europe at la Boella (Spain) or Isernia-la-Pineta and Notarchirico (Italy),
445 pushing their dispersion to the North when possible.

447 **Conclusion**

448 The term '*Abbevillian*' was created in the 1930s in France, by the French prehistorian, archaeologist and
449 geologist Abbé Henri Breuil, following Palaeolithic industry in the deposits of the +40 m High terrace of the
450 Somme River at Abbeville during the nineteenth century. Those discoveries consisted of roughly shaped
451 bifaces associated with faunal remains from warm contexts in the fluvial deposits of a high terrace in the
452 Somme Valley stepped system (Breuil, 1932, 1939; Breuil and Kelley, 1954). The history of this term and its
453 definition sum up debates on the chronocultural framework of Palaeolithic assemblages throughout the
454 twentieth century in the scientific community of prehistorians. Abbé Breuil replaced the term Chellean by
455 Abbevillian to describe an early phase of the Acheulean (Breuil, 1932, 1939). This term was frequently
456 "exported" and used by prehistorians working in European countries and outside Europe in Africa and Asia,
457 using the term of Chellean (Abbevillian) or Clacto-Abbevillian (Neuville and Ruhlmann, 1941; Breuil, 1943,
458 1945; Burkitt, 1945; Clark, 1953; Movius, 1954; Clark Howell, 1960; Clark et al., 1966; Isaac, 1969; Ayres and
459 Rhee, 1984). It has lost all claim to universality, both because the European model (and its terminology) no
460 longer has universal value, and because conclusions can no longer be based on typological considerations
461 alone.

462 Most of the Abbevillian lithic pieces, those used to build the term of Abbevillian, were never published and
463 unfortunately disappeared, probably under the bombs of both world wars which destroyed the Abbeville
464 Museum. Some drawings and one photo are the only remaining evidence of these artefacts and it was
465 impossible to confirm their stratigraphical position due to the destruction or inaccessibility of the sites or
466 urbanization since the 1950s (Agache, 1963, 1971).

467 However, recently, archaeological excavation campaigns were carried out at some of these localities at
468 Abbeville. The data obtained, together with those accumulated during the past two decades of fieldwork in
469 the Somme Valley, allow us to re-examine the history of this outdated term and to contribute to the
470 discussion on the history of Prehistoric Science and the Earliest 'Acheulean' in North-Western Europe. The
471 observations of the past prehistorians were right, at least those of Boucher-de-Perthes. An Early Acheulean
472 existed in North-Western Europe but according to the new excavations, it was not characterized by only
473 crudely-made bifaces as suggested by the definition of the Abbevillian. Unfortunately, the old collections *in*
474 *situ* are no longer available to compare with the new ones to help us to decipher what was perhaps due
475 among the technological strategies to the location or the function (workshops) of the site. New fieldworks at
476 these three key-sites of Abbeville renews our knowledge on the + 40m High Terrace of the Somme system.
477 The past findings and the observation of Quaternary deposits and artefacts were done into quarries. This new
478 multidisciplinary approach has provided early evidence of hominin occupations at least at the MIS 16 and
479 asks continuing researches to know if hominins were present during the deposit of the White Marl and the
480 MIS 17 in the Somme Valley.

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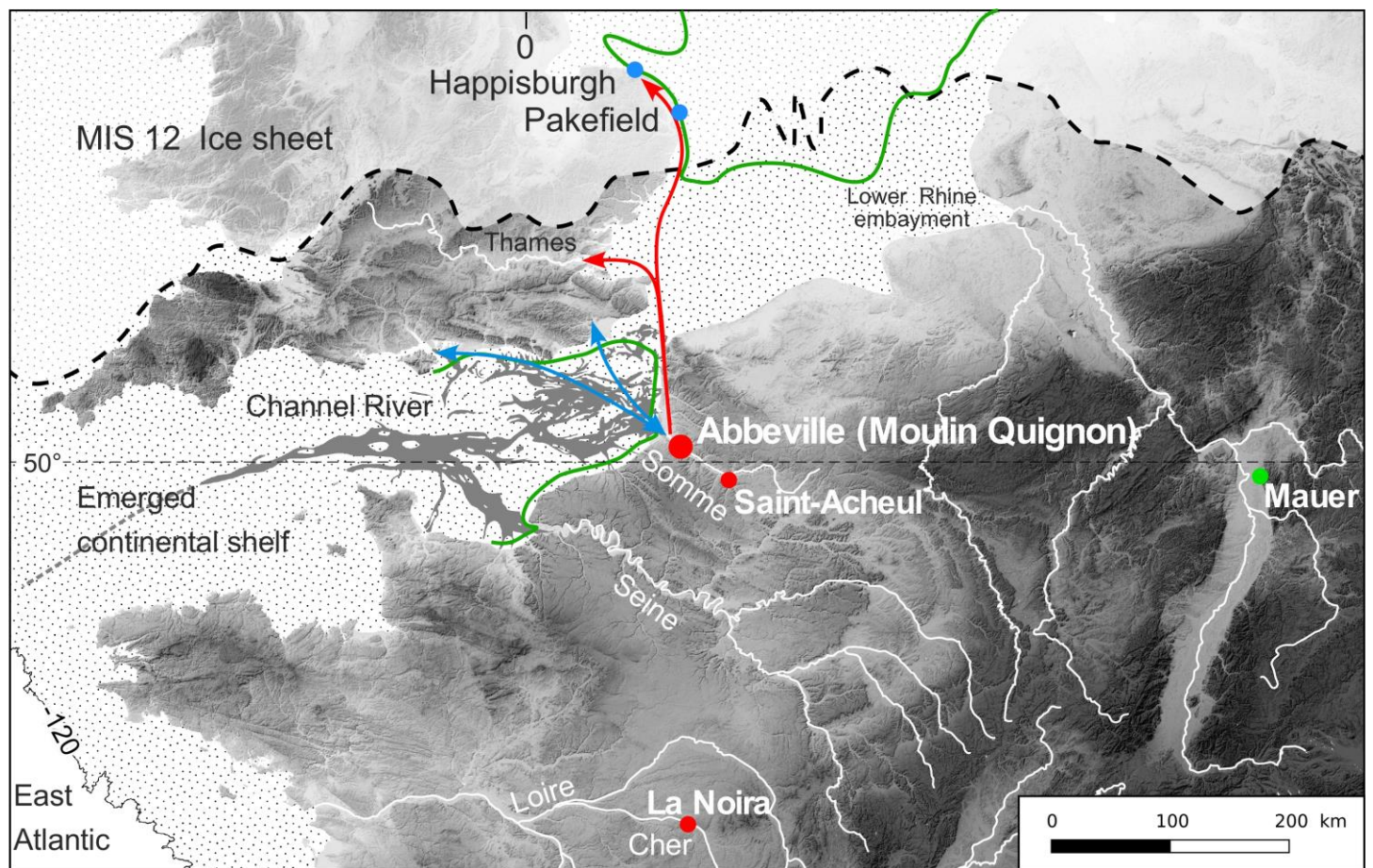
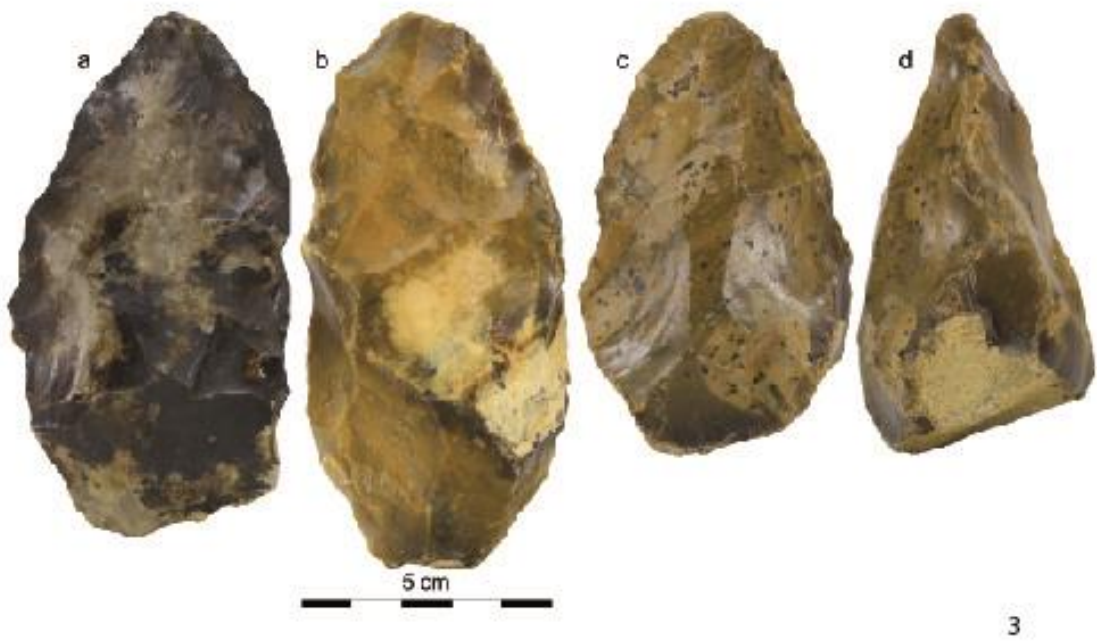
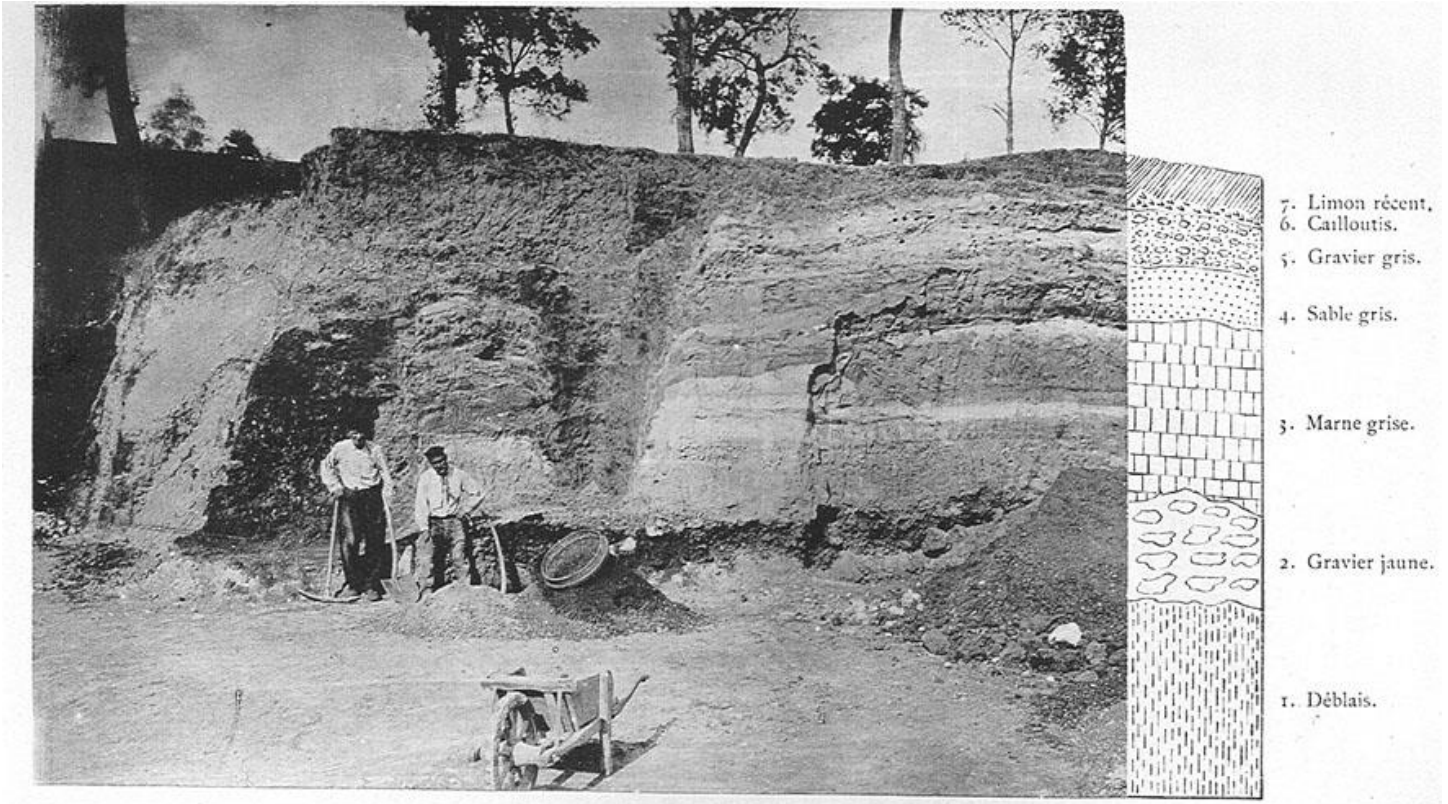


Figure 1. Location of some sites of the Somme Valley and relationships to the earliest north-western sites. The early occupation of the Northern European territories.



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Figure 2. Handaxes found by Boucher de Perthes (n° 2144, 2146 and 2147, 5 m deep) and the new fieldwork at Moulin Quignon (Antoine et al., 2020).

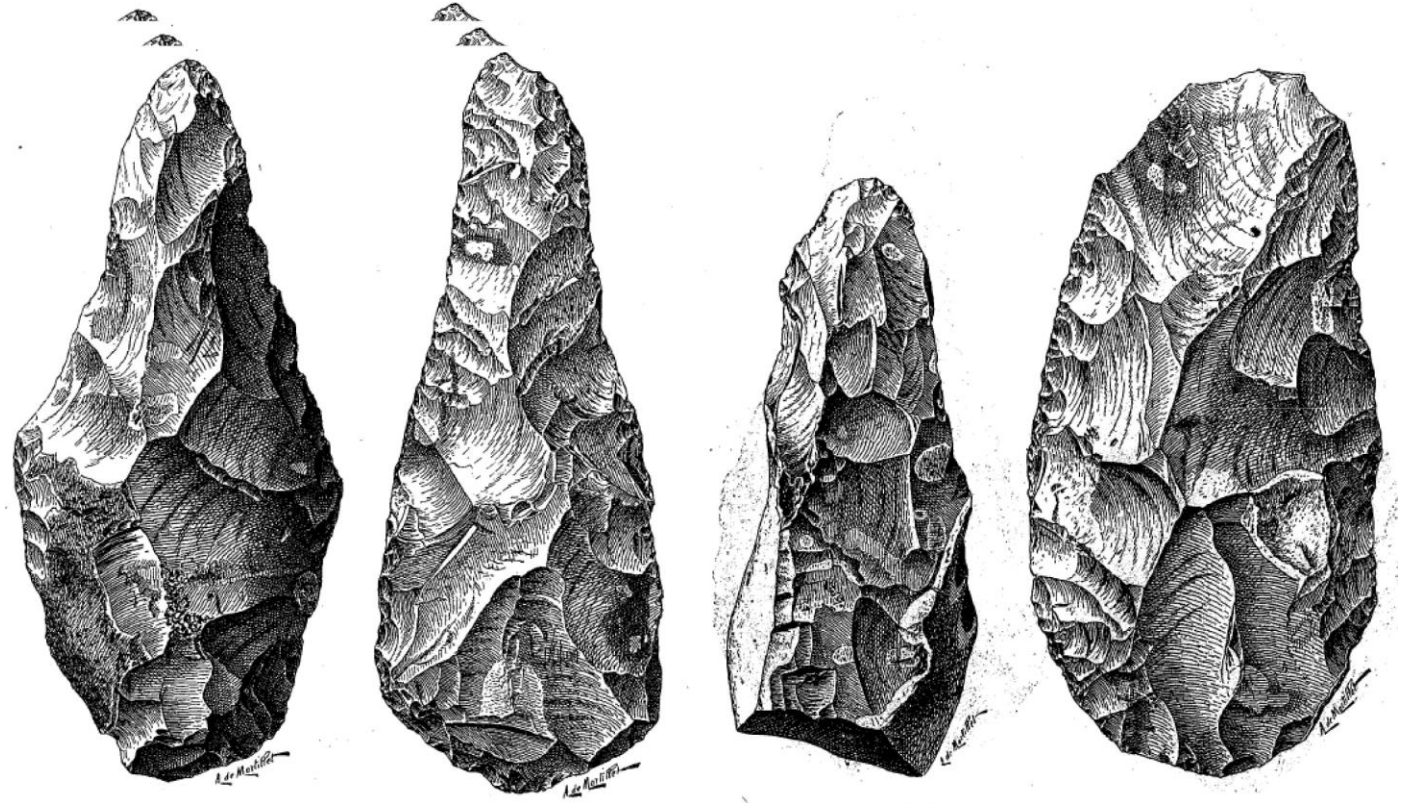


SABLIÈRE
 au-dessus du champ de Mars d'Abbeville.
Puits naturels traversant les couches de graviers.

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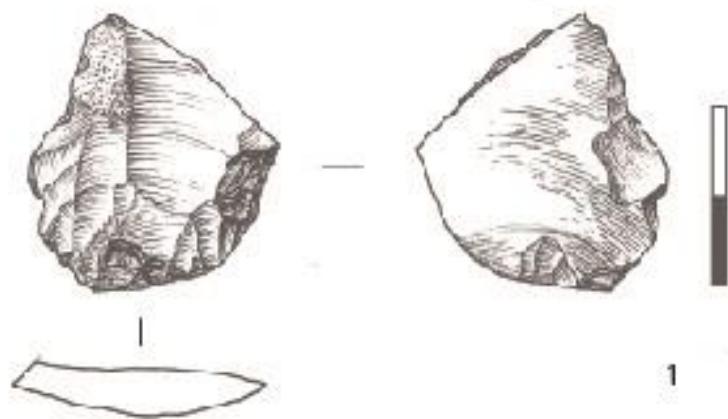
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Figure 3. Sandy quarry at Abbeville named 'Champs de Mars' from d'Ault du Mesnil, 1896



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810 Figure 4. Crudely-made Chellean handaxes found by d'Ault du Mesnil (1889).

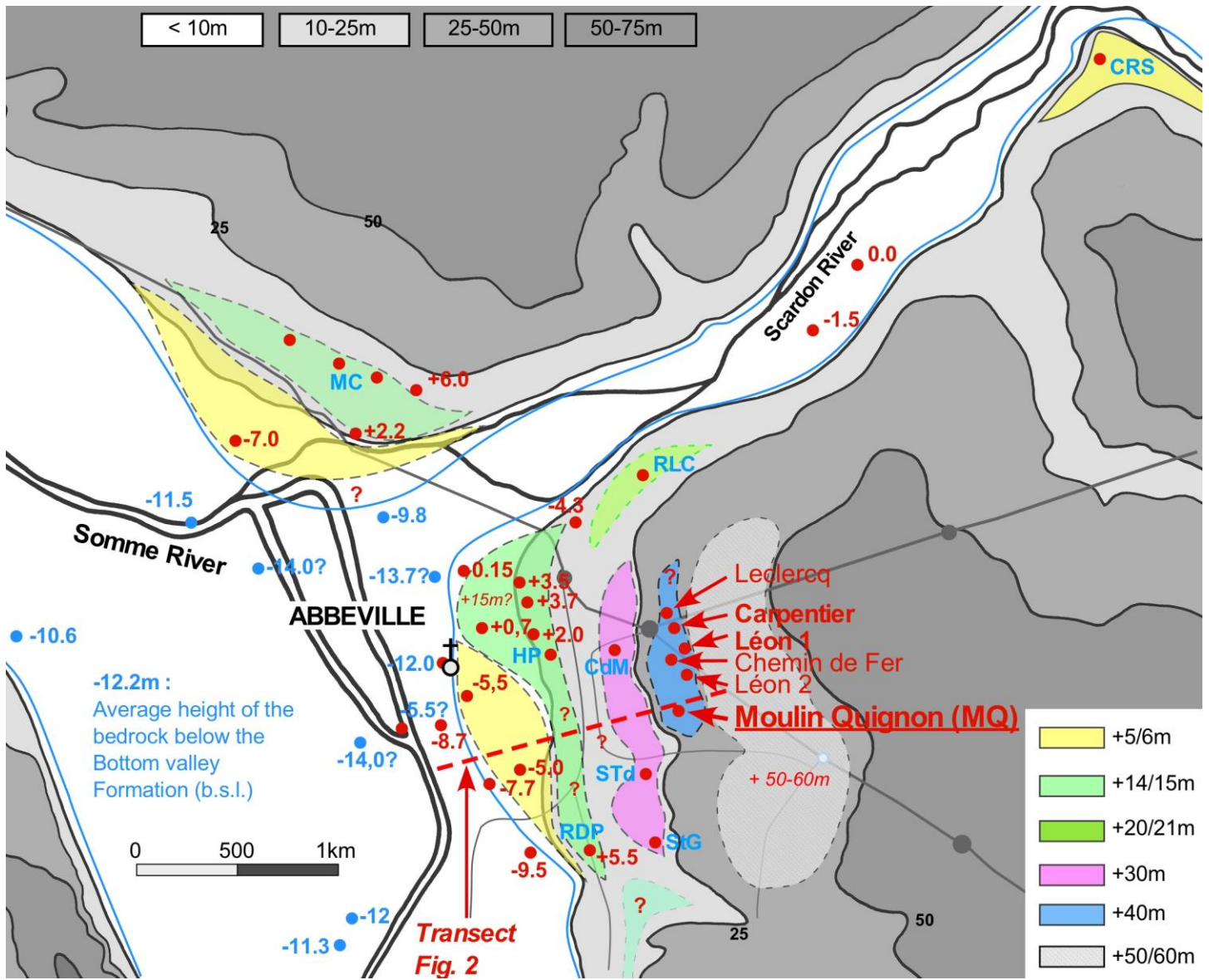


1. Abbeville, carrières Carpentier. Bifaces abbevillien aux arêtes fraîches. Taille à grands éclats. Talon globuleux. Longueur 16 cm.



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812 Figure 5. Figure 8. Carpentier Quarry. N°1, 3 geofacts found during new fieldwork at Carpentier Quarry (Antoine et al.,
813 2016) and n°2 handaxe attributed to the White Marl by Agache (1971).



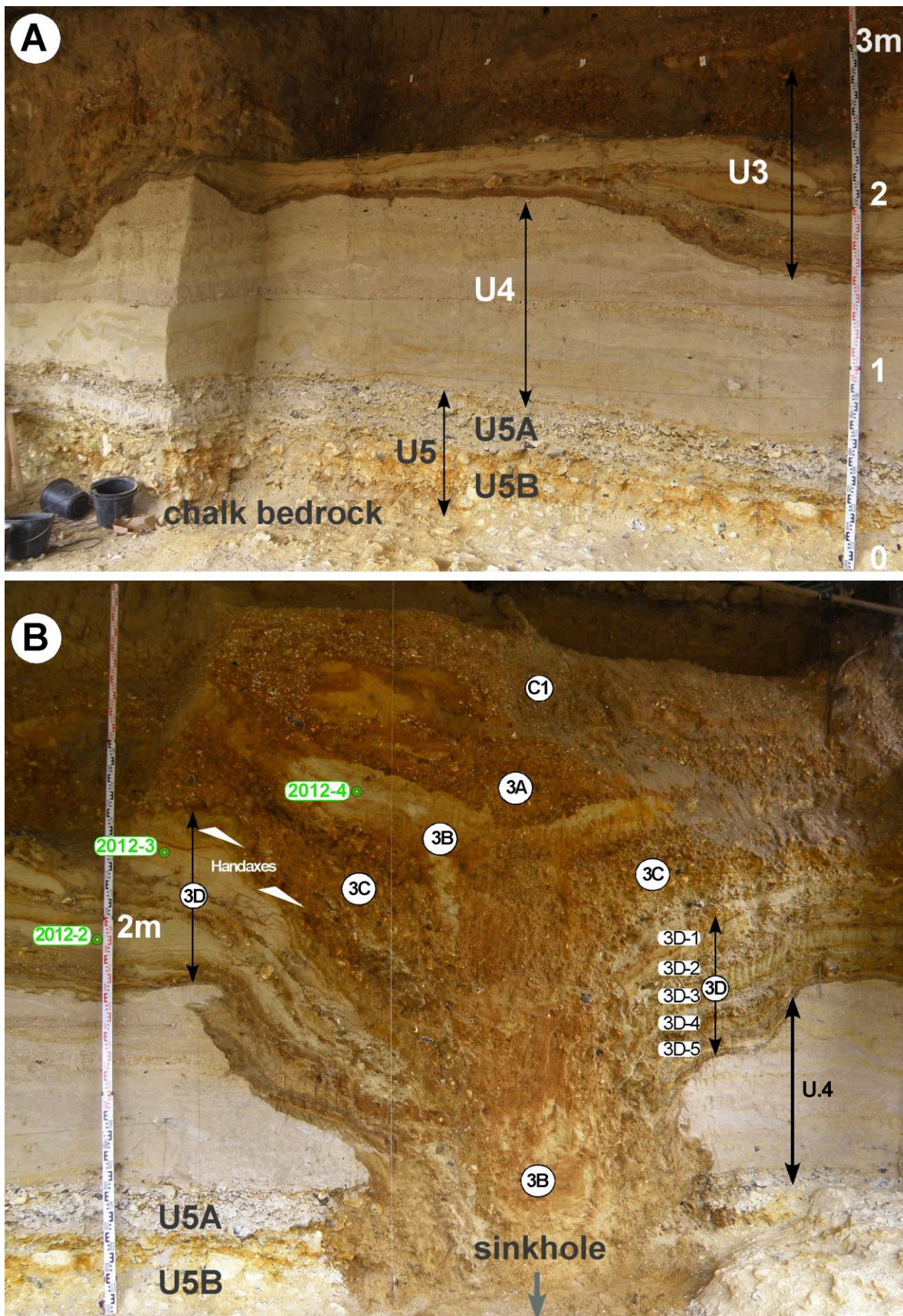
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815 Figure 6. Location of the Moulin Quignon, Carpentier and Leon sites on a map of the Quaternary alluvial formations of the

816 Abbeville area according to (Antoine et al., 2016 modified. Transect of figure 10: red dotted line. Other sites: MT-CB:

817 Mautort-Cambron, RdP: Rue de Paris, Std: Abbeville-Stade, CdM: Abbeville Champ de Mars, HP: Abbeville Hôpital, MC:

818 Abbeville-Menhecourt, RLC: Abbeville-Rue du Lieutenant Caron, CRS: Caours.



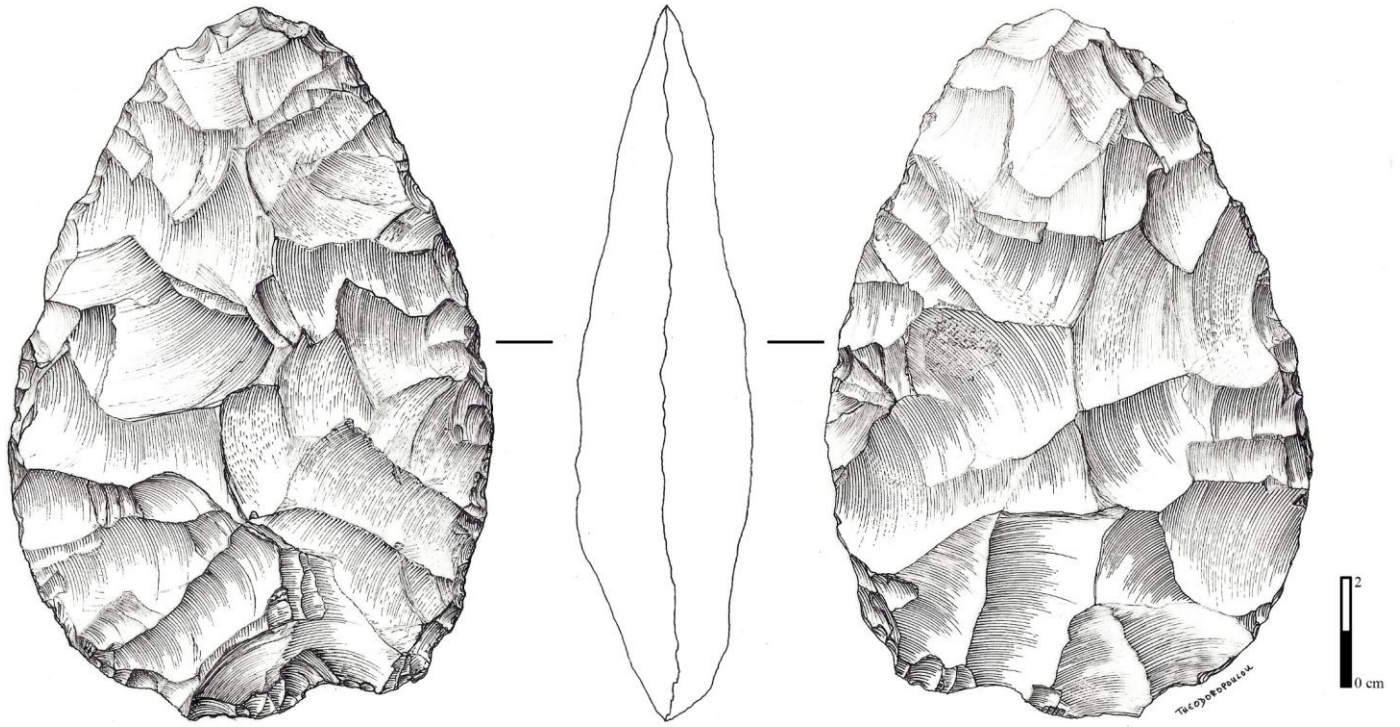
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Figure 7. Photographs from the Carrière Carpentier section (2011-2013). A - General view of the central part of the section with stratigraphical units (U4 for White Marl). B - View of the eastern part of the section showing a deep sinkhole filled by slope deposits (Antoine et al., 2016).



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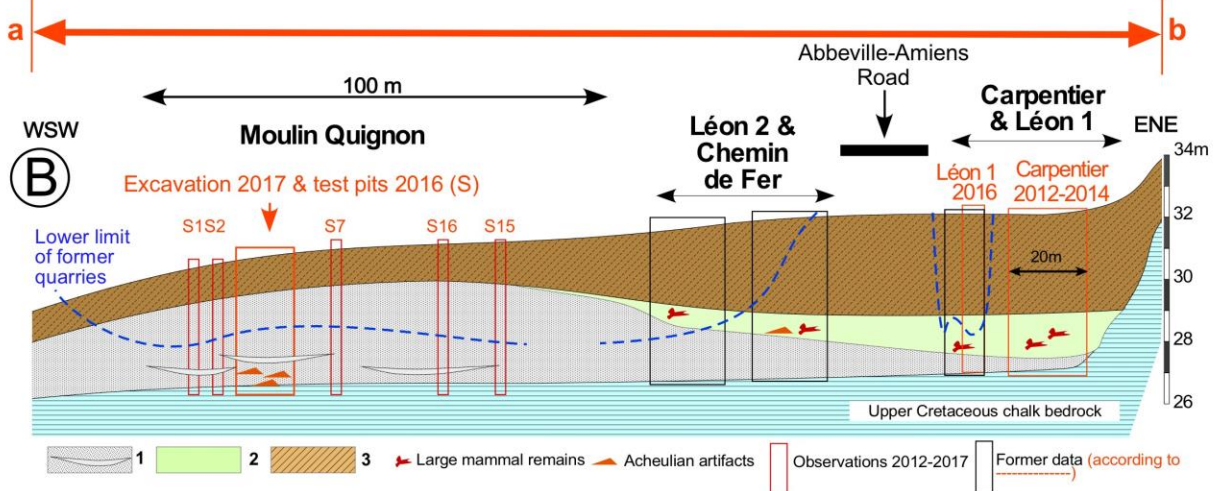
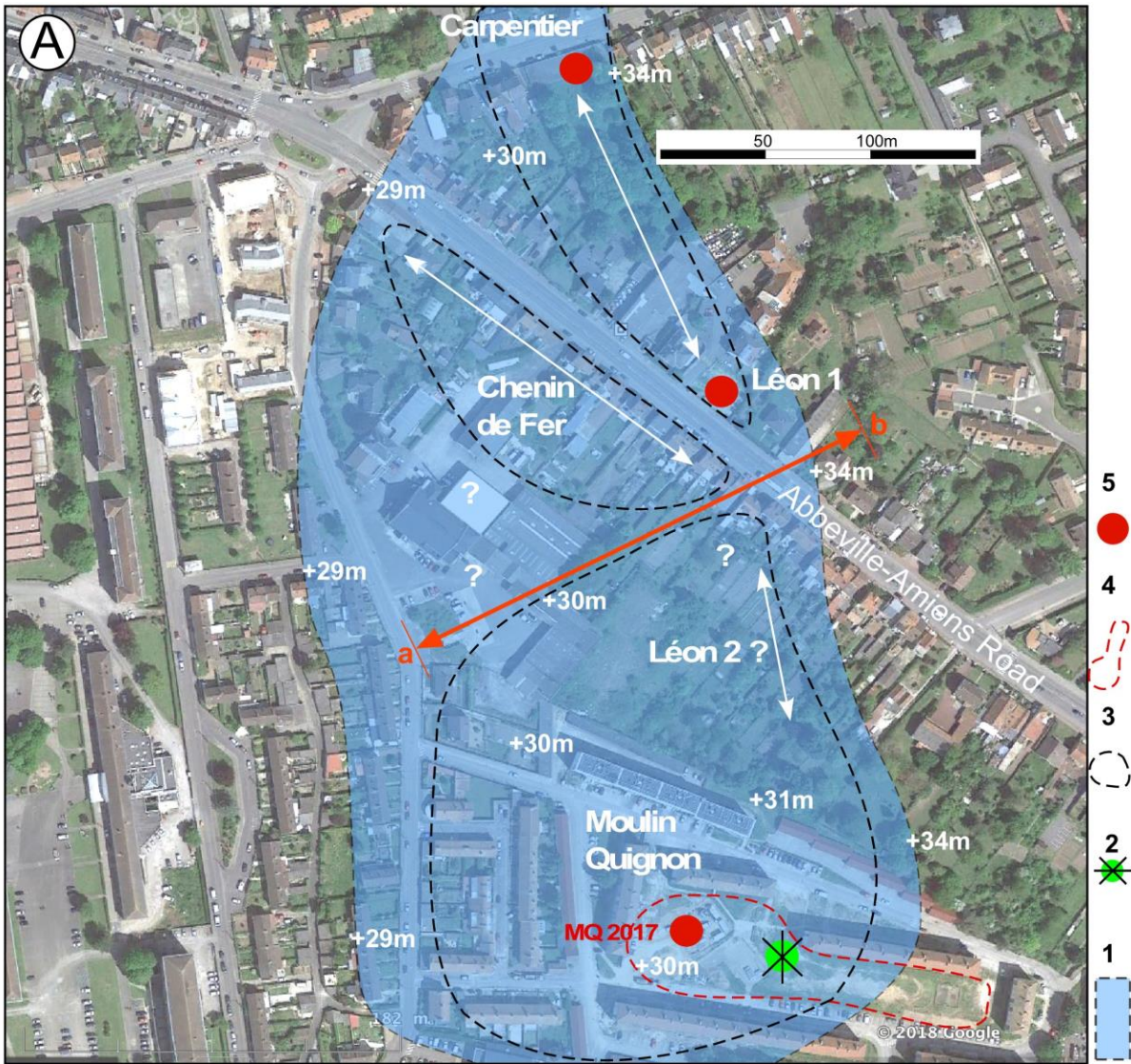
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Figure 8. Biface found at Carrrière Carpentier. New fieldworks (2010-2014). Upper part of the sequence, sandy levels above the White Marl (From Antoine et al., 2016).



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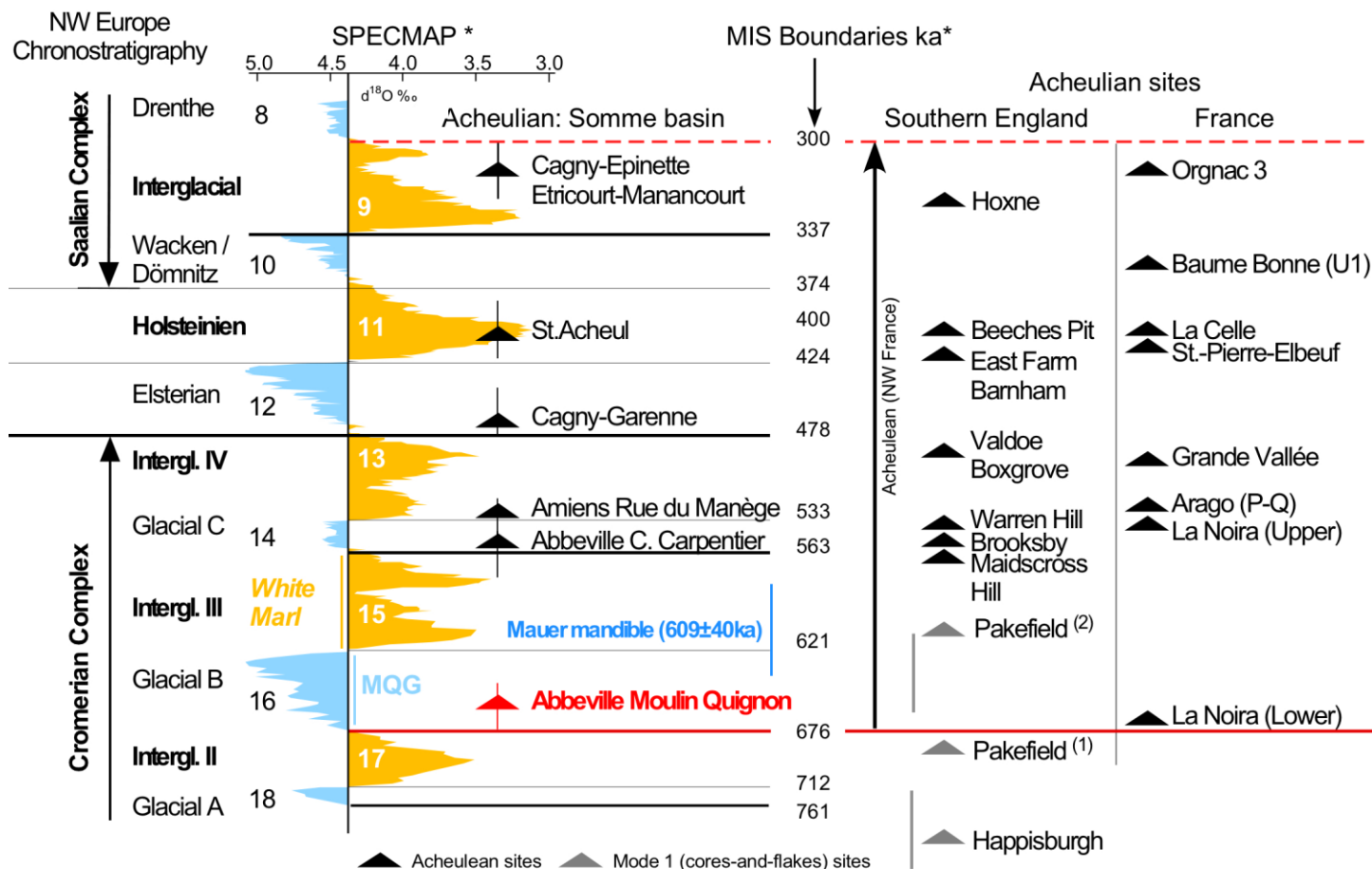
827 Figure 9. Remains of the White Marl deposit at the Carrière Léon, new fieldworks (Photo P. Antoine). Fragment of bone
828 and geofact in flint along the measuring tape.



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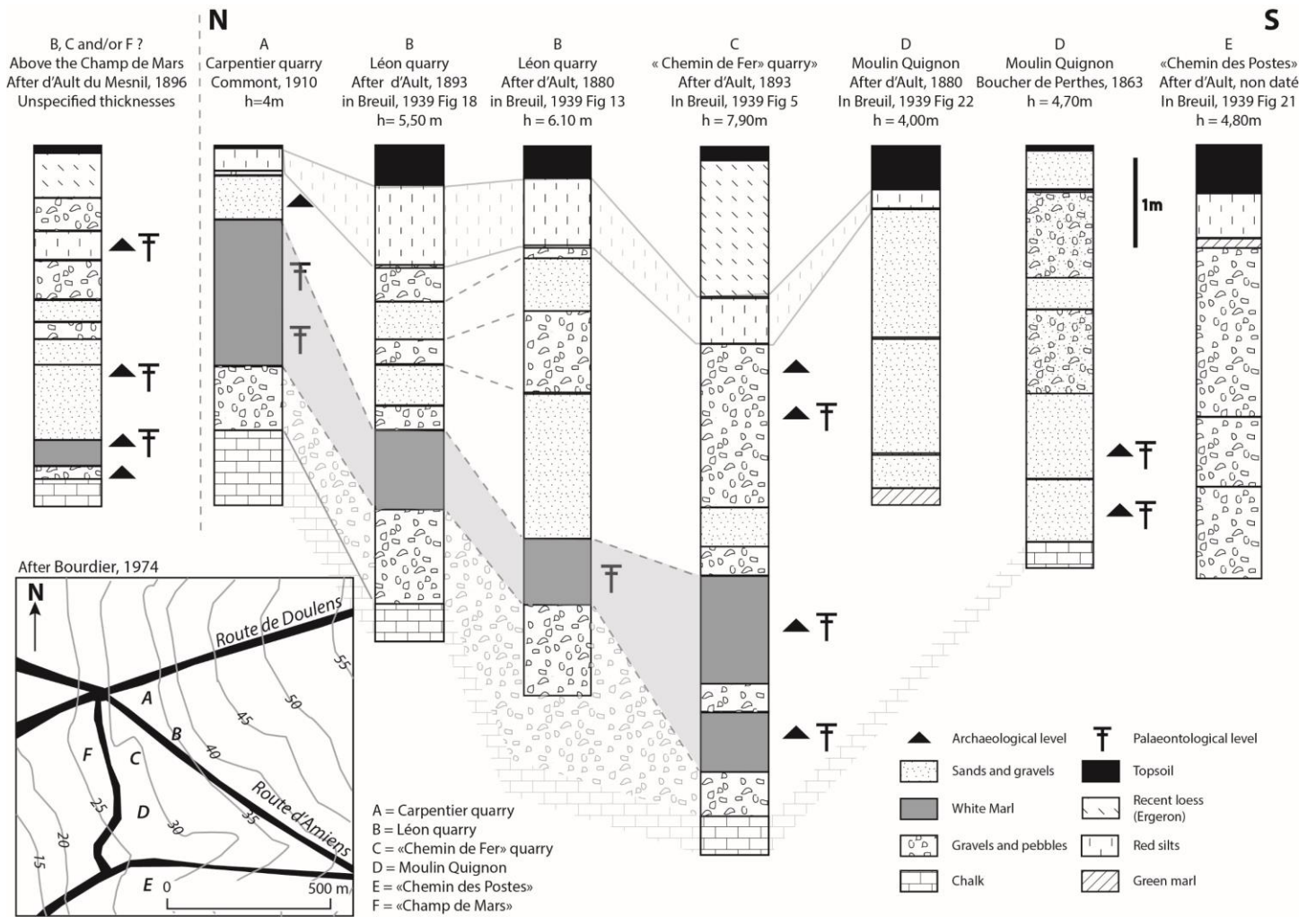
Figure 10. a) Detailed map of the Carpentier Alluvial Formation (+ 40 m) between Carpentier and Moulin Quignon. ab) Cross-section of the main units of the Alluvial Formation and of the slope deposits. This profile (real altitudes and thicknesses) was constructed by the projection of all the stratigraphic information obtained from recent research in the Carpentier, Léon 1 and Moulin Quignon sites and former descriptions (Antoine et al., 2016, 2019) on one transect

834 perpendicular to the main axis of the alluvial formation (a-b). 1) Reconstructed extension of Alluvial Formation VII:
 835 (Carpentier Formation, + 40 m). 2) Location of the Moulin Quignon windmill at the end of the nineteenth century. 3)
 836 Attempted reconstruction of the contour of the quarries at the end of the nineteenth century according to (27, 28). 3)
 837 Area explored during the test-pit campaign in 2016 (17 test-pits) 4) Location of the recently described sequences (2012-
 838 2017). + 34 m: Altitude of the soil surface, 5) Quarries.



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840 Figure 11. Chronological schema and position of the sites of the Somme Valley in the European framework.



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Figure 12. Comparison of logs of quarry and terrace sections drawn up by the main prehistorians in the Somme Valley over time (J-J. Bahain and P. Antoine).