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We also wish to thank C. Letourneux and C. Hoare for proofreading and M. O' Farrell who translated some of the English.

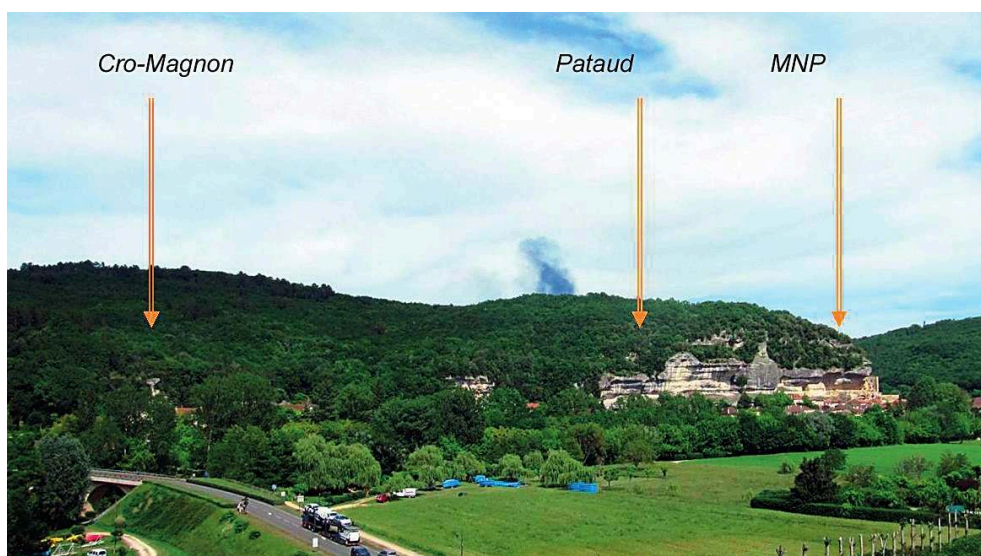
1 - Introduction

- ¹ In 2002, the 14C dating by AMS of a perforated shell (*Littorina littorea*) associated with the skeletons discovered in the Cro-Magnon rock shelter (Lartet 1868) yielded a younger age for these fossils, which had been attributed to the early Aurignacian for a long time (Henry-Gambier 2002). This date indicated that the top of the archaeological sequence of the Cro-Magnon rock shelter contained recent Aurignacian and/or Gravettian layers, after the early Aurignacian, a hypothesis that Breuil (1907, 1909 and 1960), D. de Sonneville-Bordes (1959 and 1960), E. Pittard (1962) and J. Bouchud (1966) had envisaged on the basis of the material collected by several researchers or amateurs, under or around the sepulchral zone at the end of the 19th and the beginning of the 20th century. The date of this shell, Beta 157439: 27 680 ± 270 BP, or 31 324-32 666 cal., BP⁴,

either corresponds to an interval coinciding with a recent or even a final phase of the Aurignacian, or to an early phase of the early Gravettian (Henry-Gambier 2002). Either way, it rules out an attribution to the early Aurignacian, which corresponds to an earlier period of time in Europe (Zilhão and d'Errico 1999 and 2003; Szmíd et al. 2010; Higham et al. 2011; Joris and Street 2008; Conard and Bolus 2003). The condition of the shell indicates that it had been abandoned on a beach shortly beforehand by the undertow, which undermines the hypothesis that shells dated to 27 to 28 000 BP were gathered by much more recent human groups. This conservation status characterizes all the littorinae in the collections of the Muséum national d'histoire naturelle (Paris), the Musée d'Archéologie nationale (Saint-Germain-en-Laye), the Musée d'Aquitaine (Bordeaux), the Muséum d'histoire naturelle (Toulouse) and the Musée du Périgord (Périgueux). This observation would tend to suggest that the Cro-Magnon skeletons are no older than 28 220 BP⁵.

- 2 Although this conclusion was challenged by P. Mellars (2004), it was coherent with the position of the human bones at the top of the infilling, well above the complex attributed to the early Aurignacian. Moreover, the examination of the still accessible lithic material did not bring to light elements from the end of the Upper Palaeolithic or more recent periods⁶. The existence of three pendants in mammoth ivory found beside the human bones with similar characteristics (cf. *infra*) to other Gravettian funerary ornaments had led one of us to opt for an early Gravettian attribution (Henry-Gambier 2002 and 2008). However, it remained difficult to definitively rule out the hypothesis that the human remains from the Cro-Magnon rock shelter were contemporaneous with a recent phase of the Aurignacian, as there are very few references to Aurignacian funerary practices in Europe.
- 3 A reexamination of the Gravettian sequence of the Pataud rock shelter, located less than 300 m downstream of the Cro-Magnon rock shelter (and on the same bank of the Vézère River), of the new Gravettian 14C dates (Higham et al. 2011) and the Gravettian ornaments indicates that the Cro-Magnon fossils belong to the early Gravettian (fig. 1).

Figure 1 - Cretaceous cliff on the Vézère left bank: localisation of Cro-Magnon and Pataud rock shelters (Photography D. Henry-Gambier).



2 – The stratigraphic data

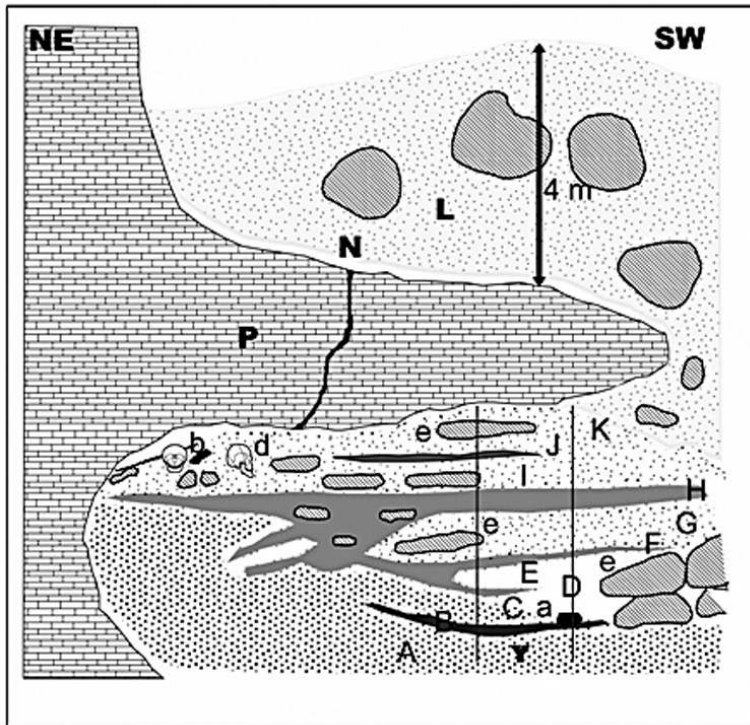
2.1 – The sequence from the Cro-Magnon Rock shelter

- 4 Less than fifty years after the discovery of the Cro-Magnon rock shelter in March 1868, the site was empty⁷. E. Massénat spent time there in 1868 after L. Lartet, then again in 1872-1873. On September 8 1872, L. Lartet and P. Broca escorted the AFAS congress to visit the site during a meeting in Bordeaux and they proceeded to enhance their collections (Cartailhac 1872). In 1893 and 1897, E. Rivière excavated at Cro-Magnon with G. Berthoumeyrou, the owner of the site. H. Breuil carried out some of his earliest field research there in 1897 and 1898 then, in 1905, undertook new excavations with D. Peyrony. Towards 1906-1907, M. Pestourié, G. Berthoumeyrou, lieutenant Bourlon, Dr. Raymond and L. Giroux conducted sporadic fieldwork. F. Leyssale, the owner of the “hôtel de la Gare” (which was to become the future Cro-Magnon hôtel), also collected material from the site. Succinct publications relate these interventions, which generally concern the sepulchral zone along and in front of the cliff (Massénat 1869 and 1877; Rivière 1894, 1897 and 1905; Girod 1906; Peyrony 1907; Breuil 1907 and 1909). No plan or stratigraphic section – or other usable document – of these excavations or gatherings was published. The most comprehensive and rigorous information for the Cro-Magnon site is that of L. Lartet (1868).
- 5 L. Lartet intervened several days after the human bones were removed under the leadership of A. Laganne, E. Lartet’s early foreman, at which stage only the lower complex was preserved in the zone where the skeletons were discovered. The observations concerning the upper part of the sequence were thus made on either side of the sepulchral zone, where the levels were still intact.
- 6 The rock shelter was completely filled in when it was discovered and contained a 4 to 5 m thick infill. L. Lartet (1868) identified 11 levels (from the base to the top: A to K). According to his description and the sections, two complexes can be distinguished (fig. 2):
 - a 2 to 3 m thick lower complex (A to H) with abundant anthropogenic remains, made up of alternating sterile levels of scree (A, C, E) and rather well-defined anthropogenic levels (B, D, F, G, H), which attest to episodes of human occupation and phases of abandon of the rock shelter;
 - an upper complex (I, J, K) 1 to 1.5 m thick, with sparse faunal remains and industries, separated from the lower complex by a series of limestone slabs resulting from the collapse of the rock shelter vault. Layer J, a thin, relatively limited charcoal lens, contained washed and incrustated stalagmite elements. The human remains were lying at the back of the rock shelter, just under the vault, at the base of the upper complex (level I). They were partly exposed (Lartet 1868; Jaubert 1868). The human remains were thus deposited after the deposition of level H and before that of level K, the last episode of infilling of the shelter, and were thus synchronous with the last occupation of the rock shelter. In 1868, L. Lartet attributed the lower complex to the “Aurignac epoch”, defined by E. Lartet (1861), and later extended this conclusion to the upper complex and consequently to the human remains.
- 7 Today, the analysis of the human bones curated at the Muséum national d’histoire naturelle enables us to confirm some of these early observations, and particularly the position of the remains at the top of the infilling beneath the vault: the presence of ancient fractures on dry bone is compatible with the hypothesis of rather exposed

bones and the concretions covering the skull (no 4253) and the coxal bones (n° 4314) of Cro-Magnon 1 (fig. 3 and 4), for example, are in keeping with the hypothesis of partially covered bones subjected to water flow, like for certain elements in layer J (see supra). This indicates that the bodies were not buried and that this is therefore not a burial (Henry-Gambier 2008, 2013; Henry-Gambier et al. 2013).

- 8 However, the conditions of the discovery of the skeletons, the fact that L. Lartet was not present during the removal of the remains, the speed and methods of the excavation, as well as the conception of prehistoric cultures which pervaded L. Lartet's interpretation at that time mean that we cannot endorse his conclusions concerning the attribution of the sepulchral level to the Aurignac period according to the terminology of that period.
- 9 Due to the loss and the mixing up of part of the collections issued from the diverse excavations, it is impossible to conduct a complete restitution of the cultural sequence. However, based on publications (Lartet 1868; Jones 1865-1875; Bourlon 1907; Girod 1906 and 1907; Peyrony 1907; Breuil 1907, 1912) and the material curated in different museums, it is possible to establish the main framework of the sequence, with a certain degree confidence.
- 10 The base of the sequence included the early Aurignacian with points with split bases, as shown by the material from the L. Lartet collections (Lartet 1868; Jones 1865-1875). The early Aurignacian was also identified in the remains of the E. Rivière, H. Breuil and D. Peyrony excavations, corresponding to levels B and G (Rivière 1897; Peyrony 1907; Breuil 1907 and 1909). Above this was one or several recent Aurignacian levels, as shown by the nosed burins and the nosed scrapers in the Bourlon collection in the Institut de Paléontologie Humaine (Sonneville-Bordes 1959 and 1960), a collection which was partly issued from the excavation of level H by G. Berthoumeyrou (Movius 1969). A nosed burin also exists in the small series of the L. Lartet collection in the Muséum d'histoire naturelle in Toulouse (F. Bon, pers. com.).

Figure 2 - Cro-Magnon rock shelter: Stratigraphy (drawing D. Henry-Gambier according to Lartet 1868; Lartet and Christy 1865-1875).



A. Limestone debris; B. first layer of ashes, etc.; C. limestone debris; D. second layer of ashes, etc; E. Limestone debris reddened by fire under the next layer of ashes, etc; F. third layer of ashes; G. red earth, with bones etc; H. thick layer of ashes with bones (main hearth); I. yellowish earth, with bones, etc; J. thin bed of washed gravels incrustated with stalagmites. Faint hearth traces; K. Limestone scree; L. Removed talus; N. Crack in the shelter roof; P. Projecting ledge of Cretaceous limestone forming the roof of the shelter; Y. Pillar made to support the roof; a. elephant tusk; b. bones from an elderly skeleton; c. block of gneiss flattened on one side; d. human bones; e. limestone slabs fallen from the roof at different times (Legend according to Lartet 1868 - p. 342; Lartet and Christy 1865-1875 - p. 67).

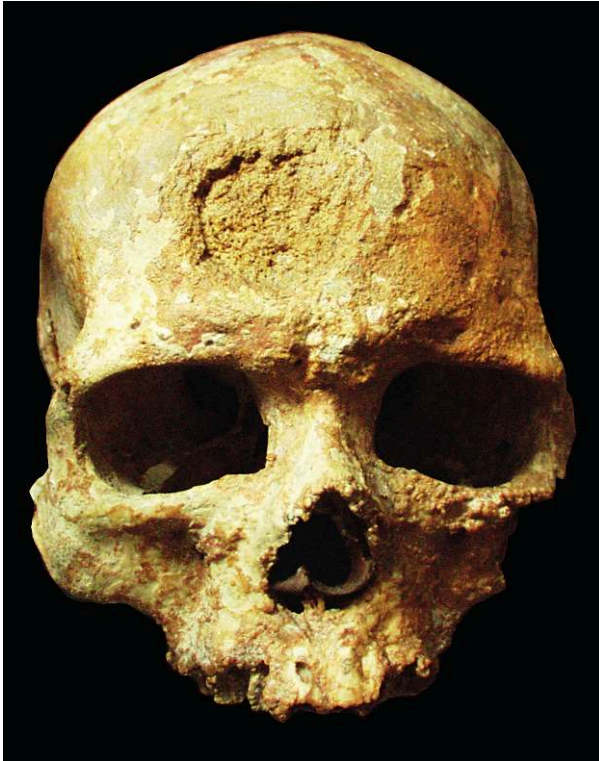
- 11 The top of the infilling contained Gravettian remains, represented by a series of Gravette points from the Rivière collection at the Latenium Museum (Pittard 1962 and Bouchud 1966). A possible Gravette point (CMA 99 25 29) and a Bayac fléchette (CMA 99 25 29), issued from a series of pieces from the E. Cartailhac collection from the Muséum d'histoire naturelle in Toulouse (Delluc and Delluc 2013) would tend to confirm this Gravettian presence. However, the exact context of these two pieces and their relation to the material found at Cro-Magnon remain, in our opinion, difficult to prove. Moreover, two engraved bones of Gravettian workmanship, representing a human and a bison, were also found in this level (Breuil 1907, 1960). These engravings were found in the rock shelter by G. Berthoumeyrou in or around 1897 on the far left side of the site (Breuil 1960), and now belong respectively to the collections of the Périgord Museum, in Périgueux, and the Latenium Museum (Pittard 1962; Féaux 1902). H. Breuil drew these pieces in 1900 and compared them to engravings from level III with Gravette points from the Trilobite Cave, in Arcy-sur-Cure (Breuil 1907, 1960). Lastly, the 14C littorina date (Henry-Gambier 2002) provides additional evidence of Gravettian presence.
- 12 In the context of the “Aurignacian battle”, the existence of the Solutrean at Cro-Magnon was very controversial (Breuil 1907, 1909, 1912 and 1960; Masséat 1869 and

1877; Massénat and Girod 1893; Girod 1906 and 1907). The E. Massénat collection (MAN), and the L. Lartet collection (Muséum d'histoire naturelle de Toulouse), contain a series of Solutrean lithic pieces (Smith 1966; Pelegrin and Bon pers. com.), which can, according to P.E. Smith (1966 - p. 159), be attributed to the Middle Solutrean. H. Breuil (1909) finally acknowledged a Solutrean presence at Cro-Magnon and the presence of a small Solutrean "hearth", at the front of the rock shelter. On the other hand, neither the texts, nor the published figures (Lartet and Christy 1865-1875), nor the analysis of the lithic collections point to occupations after the Solutrean (Pelegrin and Bon, pers. Com.). This sequence with early and recent Aurignacian remains, Gravettian and probably some Solutrean elements, evokes the Pataud rock shelter sequence (Movius 1975, 1977; Bricker 1995). However, it is important to underline that the respective amplitude of the represented cultural phases seems to have been different at both sites.

Figure 3- Cro-Magnon rock shelter: coxal bone n o 4314 with calcite deposit (Collection MNHN, Photograph O. Henry-Gambier).



Figure 4 - Cro-Magnon rock shelter. Skull n° 4253 with calcite deposit (Collection MNHN, Photograph D. Henry-Gambier).



2.2 - The Pataud rock shelter sequence

- 13 The Pataud rock shelter infill was excavated by H.L. Movius between 1953 and 1964 and attains a thickness of 9 m. It is thus much more substantial than that of Cro-Magnon. The archaeostratigraphy is made up of fourteen archaeological levels separated by sterile scree (Movius 1977) and comprises one of the most complete early Upper Palaeolithic sequences in Europe, extending from the early Aurignacian to the Solutrean (fig. 5).
- 14 The Aurignacian is made up of nine archaeological levels (C14 to C6), respectively allotted to the early Aurignacian (C14 to C9) and the recent Aurignacian (C8 to 6; Chiotti 2005). The Gravettian contains four layers attributed to the early (C5), middle (C4), recent (C3) and final (C2) Gravettian. The thickness and the abundant archaeological material in these layers indicate significant occupations (Movius 1977; Bricker 1995; Nespoulet et al. 2008). The Solutrean layer (C1) is associated with an early phase of this culture, and contains little material, which has been subjected to severe disturbance. Laurel leaf points from the middle Solutrean were also present outside the main excavation zone, on top of the talus (Nespoulet 1993).
- 15 The recent review of the geology and the sedimentogenesis of the site (Agsous 2008; Lenoble and Agsous 2012), based on the north and south sections, led to the identification of eight lithostratigraphic units formed of one or several lithofacies (from the top to the bottom: I to VIII).
- 16 The early Aurignacian is in unit VII, the recent Aurignacian in units VII and VI. Unit VII is a well-stratified scree facies resulting from the progression of stone-banked

solifluction slides whereas unit VI is a massive deposit made up of blocks, heterometric stones and limestone slabs corresponding to scree gravity accumulation.

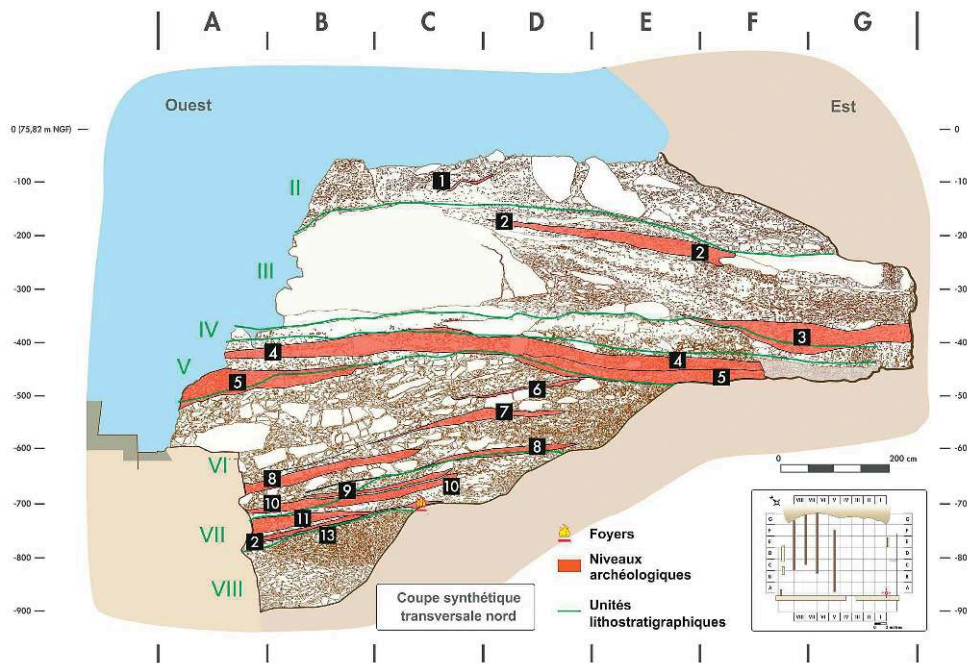
- 17 The early Gravettian and the middle Gravettian are in unit V, the recent and final Gravettian in unit III (Agsous 2008; Lenoble and Agsous 2012). Unit IV contains little material and corresponds to run-off and processes of gravity accumulation. Unit V is a massive deposit with a matrix corresponding to a solifluction deposit beneath grass. In unit III, the recent Gravettian is present in deposits accumulated by gravity towards the exterior of the shelter and solifluction beneath grass towards the interior whereas the final Gravettian is in stone-banked solifluction deposits and cryoturbated deposits.
- 18 Whatever the syn and post-depositional phenomena identified at the site, the sedimentary inputs almost always come from the surrounding limestone by scree phenomena (repeated collapse of small volumes of rocks) and collapse (caving in of the shelter roof).

2.3 - Cro-Magnon and Pataud

- 19 Data from the two infillings are very disparate as the two sites were studied almost 150 years apart but they nonetheless confirm the existence of common points between the two sites.
- 20 1 - The major role of processes of gravity (scree and rock shelter roof collapse) in the formation of the infilling. L. Lartet (1868) described "sterile scree" between occupation episodes and collapsed slabs from the shelter roof at different levels of the stratigraphy. The infill from the Cro-Magnon rock shelter thus formed in a similar palaeoenvironmental context to that of the Pataud rock shelter and probably presented the same morpho-sedimentary system. If the sedimentological information from the top of the Cro-Magnon stratigraphy (I, J and K) is not sufficient to define the correlation between the sepulchral level from Cro-Magnon and one of the Pataud levels, it is nonetheless evocative of the characteristics described for the lithostratigraphic complexes V and IV of the Pataud rock shelter (Agsous 2008; Lenoble and Agsous 2012).
- 21 2 - Early and recent Aurignacian occupations as well as Gravettian and Solutrean presence. The Cro-Magnon rock shelter was practically filled at the end of the Aurignacian and therefore the Gravettian sequence could not have attained the same proportions as at the Pataud rock shelter. Moreover, no elements point towards middle Gravettian occupations at Cro-Magnon, (Noailles burins are absent), nor to recent or final Gravettian episodes. Only the early Gravettian appears to have been present. Although it is impossible to rule out the hypothesis of an early Gravettian occupation at the front of the shelter, the scant diagnostic material in the Cro-Magnon series does not point to long and intensive occupations, but rather to sporadic visits. Conversely, it is worth mentioning the 1 789 Gravette points from layer 5 of the Pataud rock shelter (typical points, atypical points and microgravettes) (Leoz 2007). It is more than likely that an occupation of comparable intensity at Cro-Magnon would have led to a much more widespread, albeit biased, collection of Gravettian material than that suggested by the material which survived loss and destruction linked to excavations or the hazards of curation since 1868. It is noteworthy that the elements illustrated by H. Christy and E. Lartet (1865-1875) are Aurignacian and correspond to the excavation of the lower levels.

- 22 Finally, in both rock shelters, the Solutrean occupations took place when the shelter was practically totally filled in and the roof had collapsed, except, perhaps in the Movius shelter, located to the south of the Pataud rock shelter⁸.

Figure 5 - Pataud rock shelter: Stratigraphic section (Drawing C. Lecante and L. Chiotti).



3 - Dating

- 23 L. Lartet (1868) considered that the bones were at the base of layer I, which was clearly separated from layer H, which he excavated when he first arrived at the site, by a collapsed level (fig. 2). According to H.L. Movius (1969), the burial was from level H, which was acknowledged as synchronous with level 6 of Pataud, the ultimate phase of the Aurignacian sequence. Based on the ¹⁴C date of 32 800 BP ± 450 (GrN-3117) for level 7 of the Pataud rock shelter, he evaluated the age of the overlying level 6, and consequently, that of the sepulchral level in the Cro-Magnon rock shelter, at 30 000 BP.
- 24 The comparison of the date (Beta 157439: 27 680 ± 270 BP, or 31 324-32 666 cal BP) of the perforated littorina from Cro-Magnon with the results of the first series of ¹⁴C dates from the Pataud rock shelter sequence (Bricker 1995) invalidates the correlation of the sepulchral level of the Cro-Magnon rock shelter with level 6 (recent Aurignacian) from the Pataud rock shelter. It suggests, on the other hand, a correlation with level 4 (middle Gravettian) or level 5 (early Gravettian). The new dates (Higham et al. 2011) from the Aurignacian sequence and the beginning of the Gravettian at the Pataud rock shelter confirm that the Cro-Magnon littorina is much more recent than level 6 (tab. 1). The date fits into the intervals of the four earliest dates for level 5. According to T. Higham and his collaborators, the results for the Pataud rock shelter point towards a hiatus of 1 850 to 3 250 years between the last Aurignacian occupation and the early Gravettian. If this date was confirmed, the perforated littorina from Cro-Magnon would not be of Aurignacian age.

Table 1 - Pataud level 5 and 6 C14 datations (from Higham *et al.* 2011). CALIB version 6.0 - intcal09.14C (Reimer *et al.* 2009).

Référence laboratoire	Site et couche	Date BP conventionnelle	Date calibrée BP à 2 sigma
2225-38	Abri Pataud couche 5	26 780±280	30 895 - 31 545 (p=1)
21587	Abri Pataud couche 5	28 150±290	31 575 - 33 173 (p=1)
21585	Abri Pataud couche 5	28 180±270	31 613 - 33 176 (p=1)
21586	Abri Pataud couche 5	28 230±290	31 620 - 33 257 (p=1)
21588	Abri Pataud couche 5	28 250±280	31 646 - 33 264 (p=1)
21681	Abri Pataud couche 6	31 200±400	34 955 - 36 515 (p=1)

4 – Data from the ornaments

4.1 – The pendants from the Cro-Magnon rock shelter

- 25 When the rock shelter was discovered, three ivory pendants were found in the immediate vicinity of the skeletons (Lartet 1868 - p. 12-13). They are illustrated in the *Reliquae Aquitanae* (Lartet and Christy 1865-1875 - PL XI). Two of them are kept in the Prehistory laboratory in the Muséum national d'histoire naturelle and the third has disappeared.

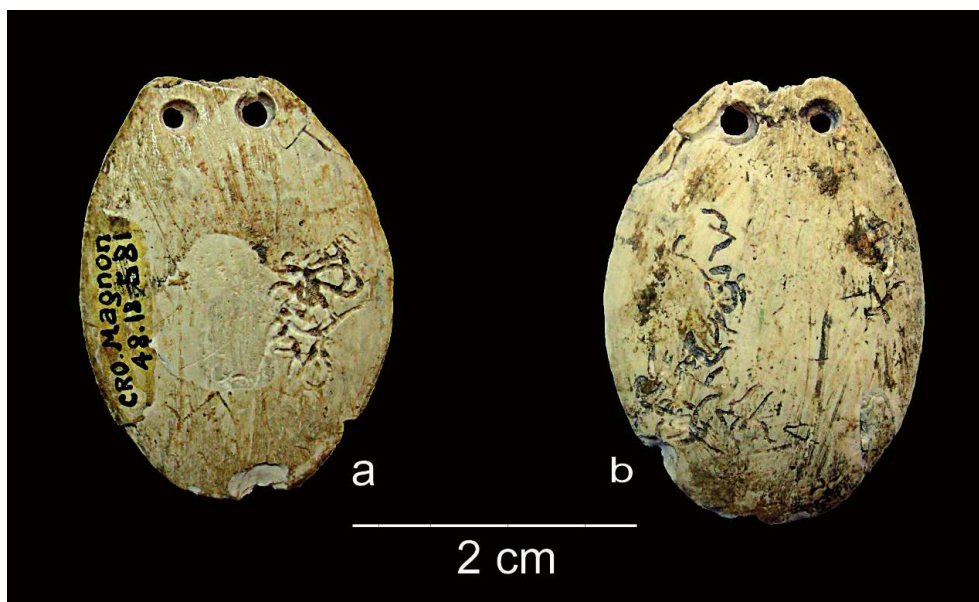
First pendant, piece n° 48-18-581

- 26 The pendant n° 48-18-581 is oval (31.5 mm; 23 mm) and has a flat section (thickness 4.9 mm). It is slightly asymmetric, as one of the edges is more convex than the other. One end of the pendant bears two perforations of equal diameter (2.9 mm), 3.3 mm apart (fig. 6 and tab. 2). The irregular fracture above the two perforations presents a blunted and slightly concretionary facet which attests to its age and reveals the internal structure of the ivory. Some gaps can be observed in the centre of both sides of the piece, due to scaling and/or post-depositional alteration of the ivory (one of these has been partially filled with plaster), as well as vermiculations. The edges are chipped in several places and are characterized by progressive thinning, giving them a bulging profile. It is possible to make out scraping traces extending from the lateral side nearest the perforations to the opposite end. These marks precede the perforations, which cut into them, and indicate an early shaping phase of the pendant. Many other finer striations, clustered together with no preferential orientation indicate a phase of very careful abrasion. Sheen also covers both sides of the pendant. The perforation has a bi-conical section and was made from both sides of the piece, probably by semi-rotating scraping. The perforated sides are smooth and no striations resulting from the action of the flint tool are visible. This smoothness could be due to the repeated rubbing of a cord through the hole, which would indicate the prolonged use of the pendant. In this case, it is difficult to identify how the pendant was worn (if it was hung or attached to something).

Table 2 - Cro-Magnon et Pataud (Dordogne) - Dimensions and characteristics of perforations pendants (H = height, Larg. = width, Ép. = thickness, max. = maximum, prox. = proximal).

N° objet	État de conservation	Haut. max. mm	Larg. max. mm	Ép. max. mm	Ép./H	Nombre de perforations	État des perforations
AP/61-5-7898	Région ou partie proximale manquante	11,1	13,0	3,6	0,3	1	extrémité proximale cassée anciennement
AP/61-5-9613	complète	11,4	11,4	3,6	0,3	1	complète
AP/61-5-6302	région proximale manquante	12,9	11,7	4,5	0,3	1	totalemment endommagée (non photographiée)
AP/61-5-6301	région proximale manquante	13,3	13,8	4,0	0,3	1	bord supérieur et bord latéral cassés
AP/60-5-5411	région proximale manquante	13,3	10,0	4,9	0,4	1	bord supérieur cassé anciennement
AP/61-5-6235	région proximale manquante	14,1	10,0	3,0	0,2	1	bord supérieur et bord latéral cassés
AP/61-5-7009	complète	15,4	10,8	4,4	0,3	1	complète
AP/59-5-1806	complète	15,7	11,8	5,4	0,3	1	complète
AP/61-5-6947	région proximale manquante	16,5	12,7	3,2	0,2	1	bord supérieur cassé anciennement
AP/61-5-8476	région proximale cassée	17,5	13,4	3,9	0,2	1	bord supérieur cassé anciennement
AP/60-5-2190	région proximale manquante	18,9	13,8	5,1	0,3	1	bord supérieur cassé anciennement
AP/61-5-7749	complète	20,3	13,2	4	0,2	non perforée	
CM 48-18-582	région proximale manquante	16,0	13,2	4,4	0,3	1	bord supérieur cassé anciennement
CM 48-18-581	région proximale manquante	31,5	23,0	4,9	0,2	1	complète

Figure 6 - Cro-Magnon rock shelter: pendant n° 48-18-581, sides 1 (a) and 2 (b). (Collection MNHN, Photograph D. Henry-Gambier).



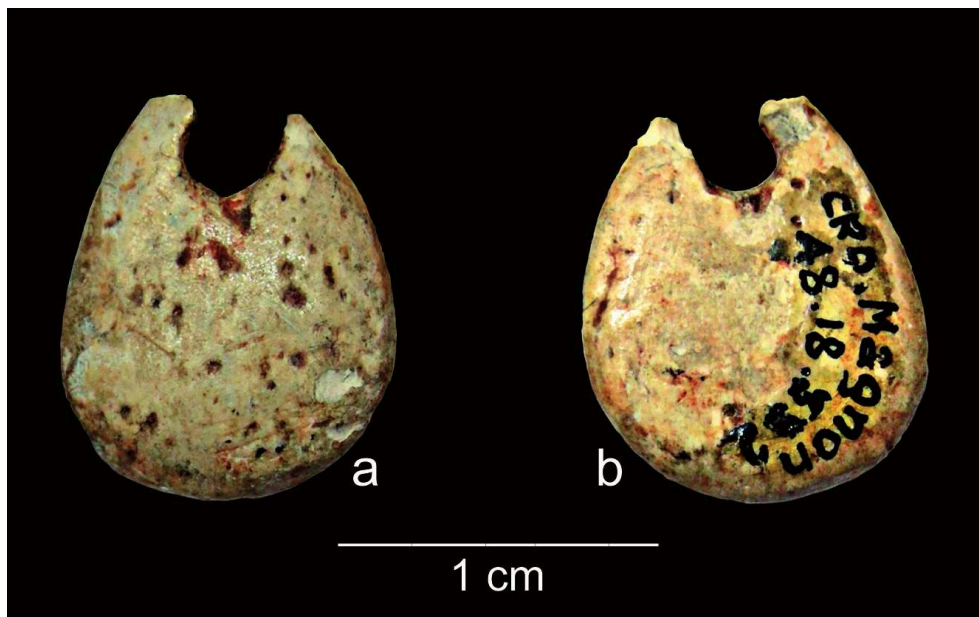
Second pendant, piece n° 48-18-582

- 27 Pendant n° 48-18-582 is smaller than the previous piece (16 mm; 13.2 mm) and proportionally thicker (thickness 4.4 mm). It displays more marked asymmetry and a less regular shape. It is broken at the perforation (fig. 7 and tab. 2). The fracture facet is

white and its aspect suggests relatively recent erosion. The surface of the piece is covered by a thick and shiny film due to the product used for the consolidation process. It is also covered in dark stains, linked to natural degeneration, and other dots. The side bearing the inventory number is plane and undoubtedly corresponds to the cleaved surface during the sectioning of the tusk, whereas the other side is more convex. The edges of the pendant are regularly rounded and polished. On both sides, blunting and sheen have erased most traces of scraping and abrasion. Before the perforation *stricto sensu*, a “scraping” phase (Taborin 1993) was applied to both sides to thin the zone to be perforated and to make it easier to grip the surface with a flint tool. Moreover, ocher-covered incisions are still visible under the lower edge of the perforation.

- 28 The concretions observed on the first pendant and the ocher colouring the second point towards a close link between these ornaments and the human bones, which are also partly concretionary and covered in ocher.

Figure 7 - Cro-Magnon rock shelter: pendant n°48-18-582, faces 1 (a) and 2 (b). Photography D. Henry-Gambier, collection Muséum national d'Histoire naturelle).



Third pendant, disappeared from the collection

- 29 The last pendant of the series appears to have been complete, judging by the lithography published by E. Lartet and H. Christy (1865-1875 - PLXI). The size and shape of this piece are very similar to those of the pendant 48-18-582.

4.2 – The pendants from level 5 of Pataud rock shelter

- 30 Level 5 of the Pataud rock shelter yielded twelve ivory pendants (tab. 2) discovered between 1959 and 1961 by H.L. Movius in bands III, IV and V (Vercoutère 2004 and Vercoutère et al. 2008).
- 31 Four of these are intact, eight present damage in the proximal region. One has not yet been perforated. They are described as pendants shaped like “pumpkin seeds” (Bricker

- 1995) or “pumpkin pips”, although their dimensions and their shape vary. They are all relatively thin and none of them can be considered as a reproduction of a cervid canine (fig. 8 and 9).
- 32 The pendant AP/61-5-9613 is diamond-shaped. The distal end is wider than the proximal end. Pendant AP/61-5-7009 fits into a rectangle, and the distal and proximal sides are slightly convex. The other pendants are characterized by edges converging towards the proximal end. On the other hand, the distal extremity is regularly convex.
- 33 The shaping of these pieces is variable and in some cases is incomplete. It was carried out by scraping, which left marks on the edges of most of the pendants. Both sides also bear scraping marks, which vary according to the intensity of abrasion and the sheen which covers the surface. The latter is difficult to define as, in certain cases, it could be due to intentional polishing, whereas in others, it may result from wearing the pendants. Lastly, pendant AP/60-5-5411 is a rough out and shaping was abandoned before the abrasion phase.
- 34 On the distal end of pendant AP/61-5-9613, a clear fracture facet suggests that this piece was one of a series made from an elongated blank shaped by scraping (Hahn 1995; Goutas 2004). This is not so clear on the proximal end. This fracture facet is very narrow and discrete and results from the final breaking of the blank by bending. At both ends of the pendant, the presence of incisions perpendicular to the axis of the piece and parallel to each other, attest to cutting by sawing.
- 35 The existence of two pendant modules (tab. 2) either implies that they were produced from rods of different modules, or else, for the smaller pendants, that the volume of the rough outs was significantly reduced by additional scraping, as suggested by N. Goutas (2004, 2005) for other ornamental elements. Finally, we can also envisage a last hypothesis, whereby this difference in module could result from a repair process of certain elements after the breakage of the perforated zone. The setting up of a new perforation, or a new general shaping of the piece could have led to the progressive reduction of the original volume of the pendants. However, at the present time, no technological argument backs up this latter hypothesis (renewed shaping, rupture of the profile, dissymmetry of the pendants, etc.).
- 36 The narrowest part of the rough out was perforated. The piece AP/61-5-7749 was not perforated when shaping had been completed; on the other hand, the perforation of the pendant AP/60-5-5411 seems to have been conducted before the abrasion phase. In most cases, thinning by scraping, which left deep and vertical striations on either side of the perforation, seems to have been carried out to regularize the blank prior to perforation.
- 37 The latter was carried out by semi-rotating scraping, apart from for the pendant AP/60-5-5411, for which after the thinning phase, the perforation was made by pressure or by light percussion with a pointed tool. It is not possible to distinguish these two techniques (Goutas 2004). Percussion or pressure may also have been used on the other pendants before the rotating scraping and this may have eradicated the marks left by this first stage of perforation preparation.
- 38 The scraped zones bear traces of red ocher, as does the rest of the surface, which could result from the use of an abrasive agent. However, the pendant AP/60-5-5411 bears a lot of ocher whereas the abrasion phases had not yet begun. It is thus possible that the ocher present in the sediment might be at least partially responsible for this colouring.

- 39 The study of the pendants from level 5 of the Pataud rock shelter suggests an operative schema similar to that described by N. Goutas (2004 and 2005) for the early Gravettian pendants from the site of La Gravette (Dordogne):
- production of an elongated rod-like blank (secondary block);
 - general shaping of the blank by scraping;
 - cutting of the rod at regular intervals to produce the pendant preforms: transversal sawing and breaking by bending;
 - shaping of the preforms by scraping;
 - abrasion;
 - and possibly, polishing.
- 40 The perforation is made either before the abrasion or after the polishing.

Figure 8 - Pataud rock shelter: pendants, side 1 (collection MNHN, photograph L. Chiotti).

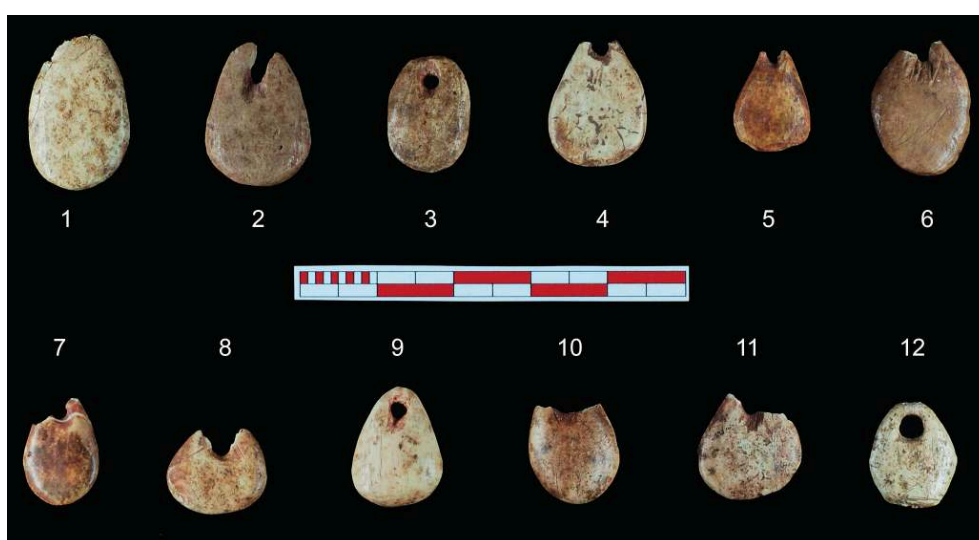


Figure 9 - Pataud rock shelter: pendants, side 2 (collection MNHN, photograph L. Chiotti).



5 - Comparison of the pendants from Cro-Magnon and Pataud

- 41 The two ivory pendants from the Cro-Magnon rock shelter present several common features with those from the Pataud rock shelter:
1. the use of an identical raw material, ie., ivory from a mammoth tusk;
 2. a similar module, a more or less oval shape and a flat section. The pendant 48-18-581 from Cro-Magnon is very similar to the unfinished pendant AP/61-5-7749 from Pataud; the Cro-Magnon pendant 48-18-582 fits into the morphological variability of the other pendants from Pataud;
 3. the operative schema for shaping the pendant 48-18-582 from Cro-Magnon is identical to that applied to the Pataud pendants. However, for the pendant 48-18-581, a different technique was used for the perforated zone: the two openings were perforated by semi-rotating bifacial scraping with no visible signs of previous preparation. In Pataud and on the pendant 48-18-581 from Cro-Magnon, all the openings were perforated by bifacial scraping, then by rotating scraping. The perforation of two holes on the pendant 48-18-581 from Cro-Magnon could perhaps explain this change in technique. Other reasons can also be envisaged, such as production by different artisans.
- 42 This similarity between the two rock shelters also concerns the shell ornaments. The dominant species at Cro-Magnon, *Littorina littorea*, is also present in level 5 at the Pataud rock shelter (Dance 1975), although in smaller quantities. However, at Cro-Magnon, there is a greater diversity of species, with the presence of: *Purpura (nucella) lapillus*, *Turritella communi* and *Sipho jeffreysianus*, which are Atlantic species; *Hinia reticulata*, a Mediterranean or fossil species; *Trivia europeae*, an Atlantic or Mediterranean species; fossil *Turritella* sp., *Chlamys* sp. and fossil *Ostrea*. These species are not characteristic of any particular Upper Palaeolithic culture in Western Europe (Fisher 1872; Taborin 1993), but some of them, such as *Purpura (nucella) lapillus*, *Turritella communi* and fossil *Ostrea*, have been identified in the early Gravettian at the site of La Gravette. Moreover, the manufacturing process for the perforated zones of the shells is identical at all three sites (Taborin 1993), although this argument is only of limited relevance here as shell perforation techniques were very stable during the Upper Palaeolithic.

6 - Discussion, conclusion

- 43 The concomitant review of the ivory pendants from the sepulchral level of the Cro-Magnon rock shelter and the early Gravettian level 5 from the Pataud rock shelter shows that these ornamental elements have the following features in common; raw material, shape and manufacturing techniques. The specific technique of perforation used for the pendant 48-18-581 from Cro-Magnon could be explained by an adaptation of the perforation process to the desired shape, or to a different method of attaching or hanging the pendant, or even to the intervention of another artisan. This specific example, which is a pendant with two perforations, is an example of “use of varied combinations of techniques for the manufacture of ornaments”, observed by N. Goutas (2004 - p. 254) on animal teeth in other Gravettian sites.

- 44 In any event, these ivory pendants enable us to propose a correlation between the sepulchral level of the Cro-Magnon rock shelter and the early Gravettian level (C5) from the Pataud rock shelter. The age of the perforated littorina, which corresponds to the new 14C dates from level 5 of the Pataud rock shelter, corroborates this conclusion.
- 45 Moreover, the characteristics of the Cro-Magnon pendants are similar to those of pendants from the Gravettian sites of La Gravette, in Dordogne (Moreau 2003; Goutas 2004); Geissenklösterle (Scheer 1995) and Mauern, in Germany; Mamutowa, in Poland (Otte 1981); Grub-Kranawetberg, in Austria (Antl 2005) or Arcy-sur-Cure, in Bourgogne (Girard and Baffier 2003), which also confirms that the Cro-Magnon pendants belong to the Gravettian. The choice of shell species and the perforation and manufacture techniques of these elements also validate this correlation (Taborin 1993).
- 46 The attribution of the Cro-Magnon sepulchral level to the Gravettian can thus be considered to be definitive, as it is based on a series of significant facts:
- the position of the skeletons under the vault of the shelter, at the top of the stratigraphic sequence and above the Aurignacian complex;
 - the presence of Gravette points and a Bayac flechette in the ancient collections. The latter is a diagnostic element of the early Gravettian, particularly in level 5 of the Pataud rock shelter (Bricker 1995; Leoz 2007);
 - similarities in the materials, shapes and manufacture techniques (and also undoubtedly the serial production mode) between the ivory ornaments from Cro-Magnon and those from level 5 of the Pataud rock shelter and also from other Gravettian sites in Europe;
 - the 14C date of one of the littorinae associated with the skeletons.
- 47 The presence of ocher on the human bones and the probable association of a large flint blade with one of the skeletons (Lartet and Christy 1865-1875; Jones 1865-1875 - Plate XX n° 3) also provide evidence for a Gravettian age for this level. Ocher and large flakes are some of the attributes associated with certain corpses in Italian Gravettian burials (Mussi 1986; Henry-Gambier 2008; Onoratini et al. 2011). Furthermore, the date of the littorina from Cro-Magnon and the fact that the ivory pendants from Cro-Magnon are almost identical to those from level 5 from Pataud, but also to those from the early Gravettian from La Gravette, indicate that the Cro-Magnon human remains deposit can be attributed to an early phase of the Gravettian.
- 48 Lastly, at the time of the deposition of the human remains, the Cro-Magnon rock shelter was practically totally filled in. The height below the vault after the deposition of level H was no more than 1 m at the highest point (Lartet 1868). An occupation in the rock shelter would thus have been, at the least, very uncomfortable, if not impossible. There are thus two possibilities: either the early Gravettian groups occupied the zone in front of the shelter, or else the Cro-Magnon rock shelter was exclusively used for funerary purposes. It is clearly difficult to choose between these two hypotheses. During the early Gravettian, the Pataud rock shelter was a vast shelter, at least 8 to 10 m deep, with an estimated ceiling height of 2 to 2.5 m (Movius 1977), and was thus suitable for a durable installation, as shown by the very high density of archaeological material in level 5 and the multiple anthropogenic structures (mainly combustion) observed in the rear part of the shelter. This could indicate two synchronous functions for the vast, intensively occupied shelter (Pataud) and a practically fully filled in shelter (Cro-Magnon): Cro-Magnon may have been the funerary site for the Gravettians from level 5 in the Pataud rock shelter⁹.

- 49 This hypothesis may seem somewhat audacious, but it appears to be very unlikely that the early Gravettian groups from the two shelters, located just 300 m apart at the most, with no visual obstacles between them, could have ignored each other.
- 50 Nor can this hypothesis be ruled out in the large open-air Gravettian sites in central and eastern Europe (Predmost, Pavlov, Krems) where certain tombs could be located outside habitat zones. On the other hand, in Italy, where graves are abundant in caves or rock shelters, they are part of the occupation levels. But the relationship between these levels and the funerary deposits is difficult to establish (Henry-Gambier 2008), as the lapse of time separating the funerary deposit and the occupation is still not known. Yet, a temporary abandonment of the cavity after the deposit of one or several corpses cannot be excluded, and can also be considered as a type of separation between the living area and funerary space.
- 51 A second aspect concerns the number of deceased per site. Although several Gravettian sites, such as Arène Candide in Italy, Lagar Velho in Portugal or Vilhonneur in France have yielded a single individual deposit, the sites of Pavlov, Predmost, Dolni Vestonice, Krems, Cussac, Balzi Rossi, Pataud (level 2) and Cro-Magnon, either contained several deposits of human remains in what has been assimilated to a single cultural complex, or several individuals in a same tomb (Henry-Gambier, 2008; 2013). The presence of a relatively high number of deceased in a same site, with similar modalities, could provide a strong argument for long-term or repeated occupations by a same group. However, and in particular for the early discoveries, it is often difficult to estimate the duration and sequencing of the deposits: at Cro-Magnon, at least five individuals were deposited¹⁰ but the absence of information concerning anatomical connections at the time of discovery means that it is impossible to determine whether it is a plural (simultaneous deposits of corpses) or collective burial (deposits staggered throughout time). For the time being, no definitive answer exists to these questions, which are at the core of current research on the funerary behaviour of Gravettian populations in Europe. Moreover, this hypothesis opens up interesting perspectives in relation to the behaviour of Gravettian groups, with regard both to their organization of domestic space and their approach to death and the deceased.
- 52 A first aspect concerns the dissociation between the funerary zone and the living area. This dissociation has been attested at Cussac for the middle Gravettian (Henry-Gambier et al. in press) and is very likely at Vilhonneur in Charente for the early Gravettian (Henry-Gambier et al. 2007). In both these sites, the deceased were deposited in deep and decorated cavities which have not yielded any trace of habitation up until now. It could also be possible, although with less certitude, for the final Gravettian from the Pataud rock shelter (level 2) where the funerary deposits and the habitat appear to be separate (Henry-Gambier et al., 2013).

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NOTES

4. Calibrated date, CALIB programme version 6.0 according to intcal 09.14C (Reimer et al. 2009). Probability = 1.

5. Maximum limit of the 2 sigma dating interval.

6. A recent palaeogenomic article (Fu et al., 2013) published an age of 690 +/- 39 BP OxA-V-2321 with the reference Cro-Magnon 1. This date was not carried out on the Cro-Magnon 1 specimen but on a sample taken from a bone from a complex (MNHN 23 30 - 25 290 and 25 291) stocked with eponymous fossils with inventory numbers ranging from 4252 to 4345. No context (inventor, exact localization, stratigraphic origin) is available for the bones from this intrusive complex in the collection. The bones bear a totally different patina to that of the bones from the Palaeolithic complex and no traces of ocher have been observed, whereas all the bones discovered in 1868 present ocher stains. It is important to recall that the many attempts to directly date the Cro-Magnon fossils found in 1868 (two by the Gif-sur-Yvette laboratory, twelve by Oxford...) showed that the collagen was not preserved. This episode attempts to cast doubt on the age of the skeletons discovered in 1868 and illustrates the unacceptable practice of taking samples without an anthropologist who knows the collection and its history. The quest for a scoop undoubtedly justifies some of these methods.

7. During the course of the private restructuring of the Cro-Magnon site, remnants of archaeological levels were discovered adhering to the walls of the rock shelter. It is unfortunate that no archaeological operation based on scientific objectives related to current research on the Gravettian and the Aurignacian was organized at this time. This operation should have included the topographic recording of the site and its environment, the sieving of old and recent spoil, research into possible remnants of in situ levels and the study of the material.

8. Although the engraved ibex on the vault of the Movius rock shelter in the present day site museum is Solutrean (Delluc and Delluc 1986), this part of the site was not entirely filled in during the Solutrean.

9. Level 5 from the Pataud rock shelter yielded three human teeth including one perforated tooth (Legoux 1975; Vercoutère et al. 2008). Two of these are milk teeth.

10. Recent and ongoing studies (ex. Villotte 2009, 2011; Villotte et al. 2011; Henry-Gambier et al. 2005) validate an MNI of four adults and one child. The adults are represented by one hundred and twenty remains (whole or fragmentary bones), which correspond to a very poor rate of skeletal representation (Henry-Gambier 2011). The distribution of the bones per specimen (CM 1, 2, 3, 4) is currently being reviewed. For example, in the current state of research, twenty bones at the most can be associated with the skull CM1 n° 4253 (Henry-Gambier 2011).

ABSTRACTS

In 2002, the ^{14}C AMS dating of a perforated shell (*Littorina littorea*) associated with the skeletons discovered in 1868 (Lartet 1868) in the Cro-Magnon rock shelter (Beta 157439: $27\,680 \pm 270$ BP, or 31,324-32 666 cal BP), excluded their attribution to the Early Aurignacian and suggested that they were deposited during an early phase of the Gravettian. A revision of the Gravettian sequence of the Pataud rock shelter, located less than 300 meters downstream on the same bank of the Vézère River, along with new ^{14}C dates of this sequence and a study of the pendants from layer 5, now enable us to confirm the attribution of the fossils from Cro-Magnon to the Early Gravettian.

En 2002, la datation ^{14}C par SMA d'un coquillage percé (*Littorina littorea*) associé aux squelettes découverts en 1868 dans l'abri Cro-Magnon conduisait à rajeunir ces fossiles, attribués depuis leur découverte à l'Aurignacien ancien. Cette date indiquait que le sommet de la séquence archéologique de l'abri Cro-Magnon comportait des niveaux Aurignacien récent et/ou Gravettien. Cette date, Beta 157439 : 27680 ± 270 BP (31 324-32 666 cal BP), est comprise dans un intervalle coïncidant soit avec une phase récente de l'Aurignacien soit avec le Gravettien ancien (Henry-Gambier 2002). Un réexamen de la séquence gravettienne de l'abri Pataud, situé à moins de 300 m en aval de l'abri Cro-Magnon sur la même rive de la Vézère, de ses nouvelles datations ^{14}C ainsi que de ses parures gravettiennes permet aujourd'hui d'asseoir solidement l'appartenance des fossiles de Cro-Magnon au Gravettien ancien.

INDEX

Keywords: Cro-Magnon, Pataud, Dordogne, Homo Sapiens Sapiens, Gravettian, Burial, Pendant

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