



AMS Dating and Microscopic Analysis of the Sherborne Bone

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Since the discovery, in the earlier part of this century by pupils at Sherborne School, Dorset, of a horse's head engraved on bone, and its declared Palaeolithic antiquity, much scientific and public debate has centred on its authenticity. A recently published letter in *Nature* showed the bone to be only some 500 to 700 years old, and therefore conclusively not Palaeolithic in age. Here, we describe the historical background to the original discovery and subsequent scientific debate, present details of our optical and scanning electron microscopic investigation and their results, and discuss the significance of the engraved bone in the context of contemporary scientific thinking at the beginning of this century. It is concluded that the engraving on the Sherborne bone, which depicted known Palaeolithic art, was the result of an innocent hoax perpetrated by unidentified schoolboys, and not the work of a professional forger.

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Introduction

In the annals of science, there are many examples relating to the authenticity of *objets d'art* and archaeological artefacts that have evoked much controversy, both in the popular press and in scientific journals. Although such controversies can continue over many decades, advances in scientific techniques invariably ensure that the problems relating to authenticity of artefacts are eventually resolved (e.g. Bahn, 1990; Giacobini, 1995).

Such an example is the case of the "Sherborne bone", a supposed example of Palaeolithic art (a horse's head engraved on bone), discovered by schoolchildren in Sherborne, England, and which has recently been conclusively shown as being a fake (Stringer *et al.*, 1995). In this report we describe in more detail the historical background to the discovery of the bone, the subsequent scientific debate, and the confirmatory evidence using optical and electron microscopy, and accelerator mass spectrometer (AMS) dating.

Historical Background

The authenticity of a horse's head engraved on the Sherborne bone, one of the few possible examples of

Palaeolithic art from England, has been the subject of an intense scientific debate since its discovery earlier this century.

Arthur Smith Woodward (1914) was the first to publish a description of the object and some information about the circumstances of its discovery after exhibiting it to the Geological Society. The engraved bone (Figure 1) was found three years earlier by two pupils of Sherborne School: Arnaldo Cortesi (an Italian) and Philip Grove. According to Woodward, the bone was picked up in "an old heap of quarry-debris near the Bristol road, on the outskirts of Sherborne (Dorset); and there can be no doubt that it was originally obtained from one of the small dry valleys with steep sides which furrow the dip-slope of the Inferior Oolite north of the town". Woodward suggested, without providing any proof, that the object "may have occurred in a rock-shelter, which was destroyed by quarrying: for the heap of debris which yielded the specimen was most probably derived from a sheltered spot with a south-western aspect, which would serve admirably for human habitation".

Shortly after its discovery the bone was submitted by the boys to Mr Robert Elliot Steel, science master at Sherborne School and curator of the school museum.

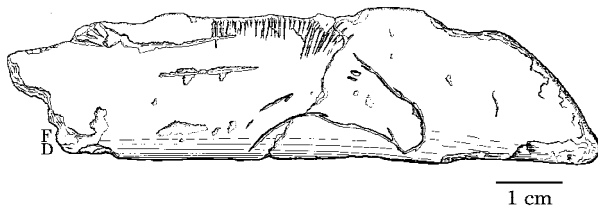


Figure 1. Enlarged tracing of the engraving on the Sherborne bone.

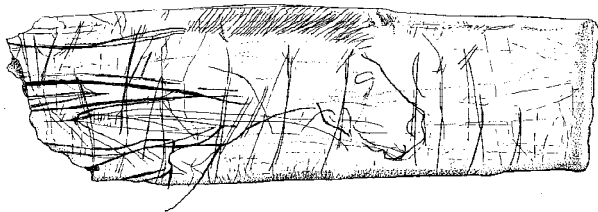


Figure 2. Tracing of the bone fragment with an engraved horse from Robin Hood Cave, Creswell Crags. Actual size 7.3 × 2.3 cm (after Sieveking, 1993).

Steel had previously located an important Pleistocene deposit a quarter of a mile away from the aforementioned quarry, from which he had collected teeth of mammoth and woolly rhinoceros. Being aware of the potential interest of the discovery, Steel asked Woodward to examine the bone.

The authenticity of the object seemed clear to Woodward, for he did not address this question in his 1914 paper. He made the supposition that, although difficult to identify with certainty, the fragment seemed to agree well in shape with part of the anterior rib of the Mongolian wild horse (*Equus przewalskii*), an identification which implicitly supported the Palaeolithic age of the object. He also noticed that the new piece of pictorial art was “especially remarkable as being almost identical, both in subject and in style” with that found in the Robin Hood Cave, Creswell Crags, reported 37 years earlier to the Geological Society by Boyd Dawkins (Figure 2) (Dawkins, 1877). This strong similarity did not, however, suggest to him any doubts as to the authenticity of the Sherborne finding.

Seven members of the Geological Society, who had had the opportunity to observe the object, entered into the discussion that followed Woodward’s description. None of them questioned the authenticity of the finding. Three members expressed their agreement for an attribution to the Palaeolithic rather than the Neolithic on the basis of the depicted style of the engraving, or by indicating that the hog-maned horse apparently did not exist in Europe in Neolithic times.

A. S. Kennard (1914) underlined the utmost importance of the find in respect to the debate on the authenticity and provenance of the Robin Hood Cave engraved piece. In fact, after the discovery of this object, found in circumstances not so different from those described for the Sherborne bone, doubts were

expressed by one of the co-directors of the excavation about its authenticity (Heath, 1879, 1880). Thus, according to Kennard, the discovery of the new piece would remove all suspicion of forgery relating to the Robin Hood Cave finding.

Kennard’s view was challenged ten years later by William Sollas, where in a footnote in the 3rd edition of his *Ancient Hunters and their Modern Representatives* (Sollas, 1924) he dismisses the authenticity of both of these finds: “There is a singular absence of an attempt at art in all the Palaeolithic stations of England. The horse figured here (i.e. the Creswell horse) is, I am assured, a forgery introduced into the cave by a mischievous person. The horse described by Dr Smith Woodward (i.e. the Sherborne horse) is a forgery perpetrated by some school boys”.

In a reply to this, Woodward (1926) pointed out that the bone was in “a semi-fossilized condition” and that “all who study the specimen will agree that the drawing must have been made when it was fresh”. He also added that Arnaldo Cortesi, the survivor of the two schoolboys who discovered the bone, had written to him confirming the genuineness of the find.

Sollas (1926) responded that its “semi-fossilized” condition did not constitute any real proof of the Palaeolithic age of the bone, and added that the engraved outline was poorly executed and, above all, displayed a too intriguing similarity to the Creswell horse. In an appendix to Sollas’ (1926) letter, Charles Bayzard, his laboratory assistant, stated that as he was rearranging the school’s geological collection at the time the bone was discovered, he was in the position to know that an illustration of the Creswell horse was known to the schoolboys from a copy of Boyd Dawkins’ *Early Man in Britain* (1880), accessible at the Sherborne School museum. Moreover, just after the discovery he was told by a group of boys that the engraving was a fake copied from the illustration of the Creswell Horse and that the forgery was performed as a hoax upon Elliot Steel, the science master.

Although Woodward took the matter no further, Steel promptly replied to Bayzard’s allegations with a letter published in *Nature* three weeks later (Steel, 1926) where he provided new circumstantial information about the discovery and implied the hoax was played on Bayzard and not on himself. Steel reinforced his version by adding a letter (partially published in an appendix of his text) in which Ross Jefferson, a student one year older than Grove and Cortesi, declared that on the day of the discovery he stopped Cortesi from throwing the bone in the day-room fire and told him to show it to Steel. He also added that “the idea of the bone not being genuine was a rumour started by that arch-humorist Mr. X”.

Steel also added a psychological factor to corroborate the authenticity of the discovery. Since Cortesi was always very jealous of his find and held it to be attributed to himself alone, it was improbable that anyone else at Sherborne drew it, and he certainly

could not himself. As a new boy in a public school, he would scarcely think of hoaxing his new schoolmasters, and, in fact, Cortesi's letter to the headmaster refutes this idea.

The question of the authenticity of the find was raised again by Fowler (1955) who had taken charge of the bone in 1939 and deposited it in the British Museum (Natural History), and by Torrens (1978) who first underlined the interest of Steel's letter to *Nature*, unnoticed until then by scholars potentially interested in a re-analysis of the object.

The matter was again widely reconsidered by Farrar (1979) in which he dismisses the hypothesis of a professional hoax against Woodward, perpetrated by Sollas and Bayzard, and involving the complicity of others. Indeed, a complicity involving schoolboys (such as Cortesi or Grove) would have been dangerous to the professional reputation of both Sollas and Bayzard. Farrar also dismisses the hypothesis that the bone was authentic, but was discovered elsewhere and planted in the quarry.

In contrast, Farrar argued for the authenticity of the engraving, citing features such as the hog-mane bristling upwards rather than forwards, and particularly the drooping muzzle being more pronounced than might be expected; a feature which cannot be considered a clumsy error by a faker as similar muzzles are seen in other Palaeolithic depictions of horses. Farrar's paper was appended with a note by Kenneth Oakley who in 1957 had completed, at Farrar's request, the determination of fluorine, uranium and nitrogen (F-U-N) content of the bone in order to provide a relative date. By comparing values from the Sherborne bone with those from a fossil horse bone from layer 18 of Gough's Cave, Oakley (1979) concluded that the Sherborne bone was fossilized and that its calcium carbonate (CaCO_3) content was consistent with derivation from a limestone cave deposit, another factor cited by Farrar to support the authenticity of the object.

Farrar's conclusions were challenged by Sieveking (1980) based on a detailed analysis of the engraved lines on the Sherborne bone and a comparison with experimental engravings on fossilized bone using flint tools. Sieveking argued that there was no reason to suggest, as Woodward had, that the state of the bone could guarantee the Palaeolithic age of the engraving, and also that no preparation of the bone, common on Palaeolithic pieces, was present on the Sherborne piece. Sieveking noted that the engraved lines were somewhat discontinuous and hesitant in comparison with authentic Palaeolithic outlines and that "Under magnification . . . where the engraved line crosses a natural crack in the bone, the cut dips down into such a crack whereas a line engraved before any cracking occurred would maintain an even depth", a proof that the bone was altered when engraved. Sieveking also noticed that the lines of the mane continued onto a rougher surface flaked away apparently in antiquity. If the engraving

had been made in Palaeolithic times, the lines would have been interrupted by the flaking. The contrary suggested an engraving done recently on altered bone. Finally she put forward that the Sherborne head is much more similar to Dawkins' rather poor illustration of the Creswell horse, published in 1880, than to the original. The latter displays a delicate engraving and a number of additional extraneous lines, common in Palaeolithic mobiliary art, but absent in the Sherborne bone.

Further exchanges between Sieveking and Farrar continued (Farrar, 1981; Sieveking, 1981) on detailed features of the engraving, incorporating other contemporaneous observations (Molleson, 1981).

The matter rested there with the authenticity of the object still in dispute, until resurrected in this current study by F. d'Errico in response to a television company producing a series about unsolved questions in archaeology. This paper presents and discusses the results obtained from a multidisciplinary approach (including AMS dating) to resolve the controversy surrounding the Sherborne bone.

Independently, and without knowledge of this study, James Gibb, archivist at Sherborne School, presented a paper to the Society of Antiquaries in November 1994 in which he summarized the main points of the Sherborne controversy and provided some new historical details.

Materials and Methods

Optical microscopy of the bone was undertaken using a Wild M3C optical microscope. Images of the engraved and recently damaged areas were acquired by means of a CCD KP-M1E/K Hitachi camera mounted on the microscope and connected with a Iivi Macintosh equipped with a KINGFISHER frame grabber board and an NIH IMAGE public domain software program. During the image acquisition, the illumination of the bone surface was adjusted so as to avoid shadows inside the engravings. Grey values histograms were obtained from selected zones of unfiltered digitized images.

The bone was also examined using a Hitachi S2500 analytical scanning electron microscope (ASEM) equipped with a Link AN10000 energy-dispersive microanalysis system, as well as with an ISI-ABT 55 environmental scanning electron microscope (ESEM) which enables backscattered electron images to be obtained without the application of a conducting carbon coat on the specimen.

Subsequent to microscopic analysis, and after chemical pretreatment (Hedges *et al.*, 1989) and combustion (Hedges *et al.*, 1992), AMS dating was carried out by the Oxford University Accelerator Unit on a sample obtained from the non-engraved obverse surface of the rib.

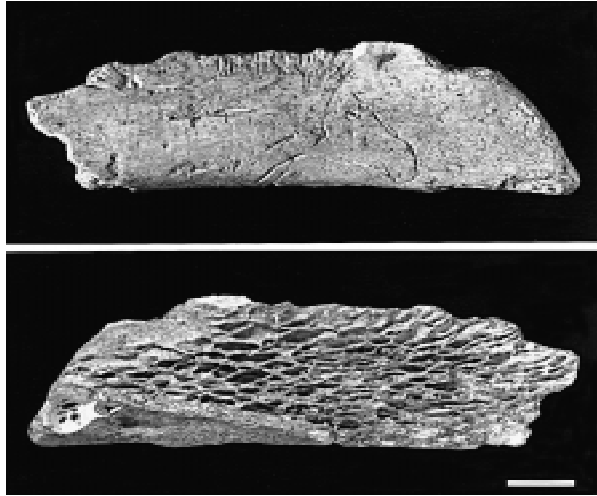


Figure 3. The two sides of the Sherborne bone before the sampling for the AMS dating. Top: engraved outer face; bottom: inner face. Note the sediment still filling the spongy bone and the circular pit of the Oakley sampling near the left end. Scale=1 cm.

Results

Microscopic analysis

Both sides of the bone (Figure 3) are covered by a light-brown coloured patina due to sediment residues filling micro depressions corresponding to vascular orifices. Sediment also adheres to pits of variable dimensions produced by the local alteration of the bone surface. Sediment residues, however, are absent from the edges of the fracture which divides the object into two sections, and from the surface of the pit left by Oakley's sampling as well as from the surfaces of other recently damaged zones (breaks on the left end of the fragment and at the right of the mane). All the engraved lines are also free of sediment with the possible exception of a few lines of the mane.

When observed with an optical microscope, the lines depicting the horse head (Figure 4(a)), the neck (Figure 5(a)), the eye, the back profile as well as its three short extensions appear very clear in comparison with the surrounding unengraved area and are quite similar in colour to the recently damaged surfaces. Figure 6 allows a comparison between the grey values histograms of the surface left by a recent breakage at the right of the mane and those of two engraved lines (jaw and back profiles). Two grey values histograms of the unengraved area neighbouring each of these three zones and elaborated from the same digitized image are also provided in order to facilitate comparison.

Clear differences appear between the values of the recently damaged surface (Figure 6(a)), composed of a wide range of light greys, and its two surrounding areas (Figure 6(b), (c)), consisting of narrow peaks of dark greys. A quite similar pattern arises by comparing the grey values histogram of the back profile (Figure 6(d)), including the two large incisions visible at its left end, and those of two adjacent areas (Figure 6(e), (f)). The

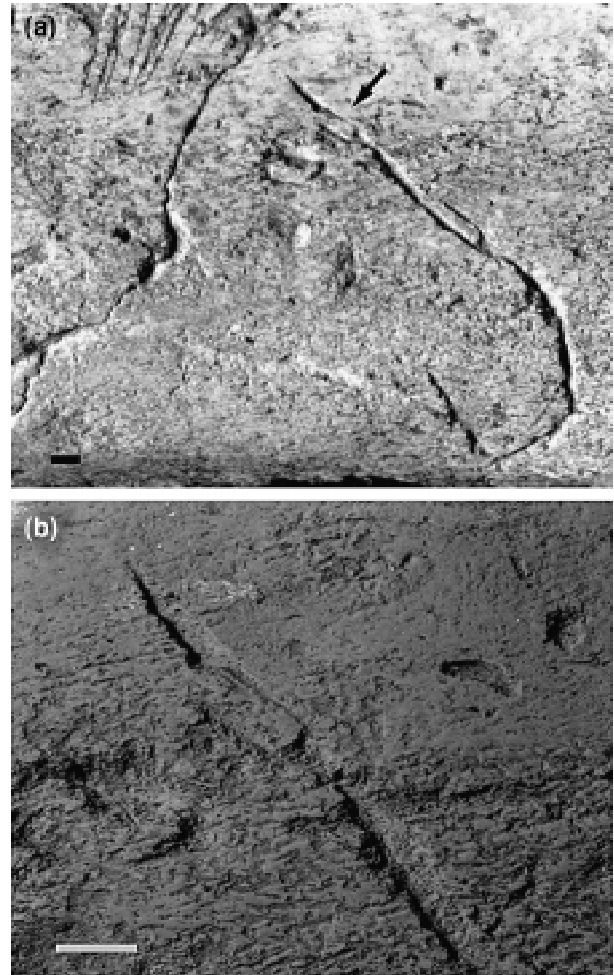


Figure 4. (a) Detail of the horse head. The arrow indicates the zone enlarged in (b). (b) Close-up of the line depicting the frontal profile. Scales=1 mm.

former is characterized by an area of numerous white pixels followed by a wide peak of light grey pixels having an apex at values of approximately 100, while the latter are composed of narrower peaks displaying virtually no pixels with values lower than 100. Differences are less evident in the case of the jaw profile. Pixels with grey values ranging from 100 and 150, however, are relatively abundant, comprising about a third in the engraved surface (Figure 6(g)), while they are almost absent in the histograms from the surrounding areas (Figure 6(h), (i)).

ESEM analysis of the horse outline by backscattered electron imaging (Figures 4–5 and 7–8) reveals none of the features generally visible on experimentally engraved lines produced by lithic tools on fresh bone, such as fine multiple parallel striae on the walls of the groove, or sharp edges or small striae parallel to the main groove (d'Errico, Giacobini & Puech, 1982/83; Shipman & Rose, 1983; Bromage, 1984; Olsen & Shipman, 1988; Fritz *et al.*, 1993; d'Errico, 1994). On the contrary, the surfaces of the Sherborne engraving

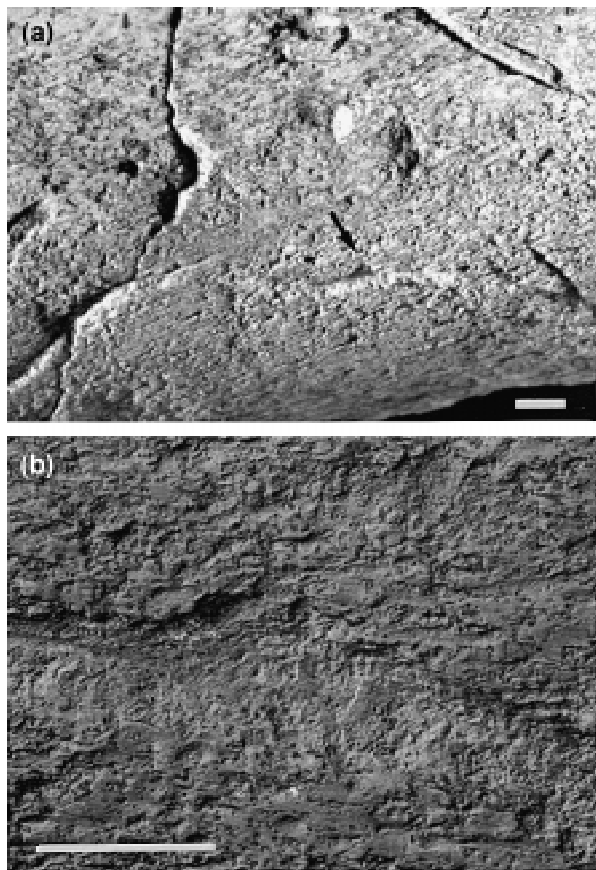


Figure 5. (a) Detail of the line drawing the horse jaw and neck demonstrating the difference in colour between the engraved and unaltered surfaces. Arrow indicates area enlarged in (b). (b) Close-up of the jaw line showing the rough appearance of the engraved surface. Scales=1 mm.

display a granular rough texture. Some of these surfaces also show fractures perpendicular to the groove direction (Figure 7). Engraved line edges are frayed as a consequence of continuous microflaking of outer circumferential lamellae. Thus, line size changes continuously. Depending on the pressure exerted by the tool, the point seems to have broken the “crust” constituted by the first altered lamellae or just abraded it (Figure 4(b)).

Residues are sometimes visible on the bottom of the grooves (Figure 5(b)). However, they appear abraded and flattened by the movement of the engraving tool. Examination of the undamaged cortical surface has revealed no major changes in the microtopography of the bone. However, 5 μm -wide orientated striations were detected between the lines of the mane (Figure 7(c)) which seem to cut into the bone surface as well as into the sediment filling depressions. No traces of pigment were found on either side of the sample. A few red microspots visible near the back profile are attributed to red ink.

Microscopic analysis of the medullary face revealed that a number of spongy bone trabeculae are still filled

with sediment. Several micro-roots are trapped in this filling (arrowed in Figure 9). One can be traced entering and exiting different parts of the spongy bone. Oakley's sampling has uncovered spongy tissue which is also filled by sediment similar in composition to that trapped by the spongy bone on the remaining surface of the medullary face. With the exception of residual traces of glue appearing along the fracture that cut the bone in half, no evidence of other chemical products (such as preservatives) was detected by the microscopic analysis of the bone and at the location of the sample removed for the AMS dating.

The observation by Sieveking that at certain points where the engraved line crosses a natural crack the cut dips down into such a crack is difficult to confirm, as she did not provide a precise location for such cracks. Observations performed by Sieveking and Molleson on the chronological relationship between the mane and the edge wear are also problematic. In fact, on Palaeolithic engravings it is often difficult to distinguish the chronology of the engraving and flaking from those followed by later wear, as impressions of engraved lines are often still visible on altered surfaces without this indicating their posterity.

AMS dating

The following accelerator radiocarbon date (OxA-5239) of 610 ± 45 radiocarbon years BP was obtained from the bone sample from Sherborne: OxA-5239 Sherborne, E.5305, $\delta^{13}\text{C} = -20.9$ per mil. This date is uncalibrated in radiocarbon years BP (Before Present–AD 1950) using the half life of 5568 years.

Discussion

The AMS dating of the bone indicates that the animal died sometime between the end of the 13th and the start of the 15th century. Clearly the bone and the engraving cannot be of Palaeolithic age. Theoretically the engraving could have been executed anytime between the death of the animal and 1911. However, stylistic considerations suggest that it was probably made shortly before its discovery and certainly after 1877, the year of the publication of the Creswell horse. This depiction is still the best candidate as the source of inspiration for the Sherborne engraving. The two horses share the same orientation, the same engraving technique, i.e. the use of thin single lines, and the same centering of the image on the fragment, which truncates both outlines in the same places, i.e. at the level of the back and the breast. Both upstanding manes are rendered by thin lines slightly tilted forward, making no separate delineation for the ear. In considering differences in the rendering of the muzzle, the head is likely to be the anatomical part which is most subject to variation due to the engraver's ability. The altered state of the Sherborne bone could have been another factor which

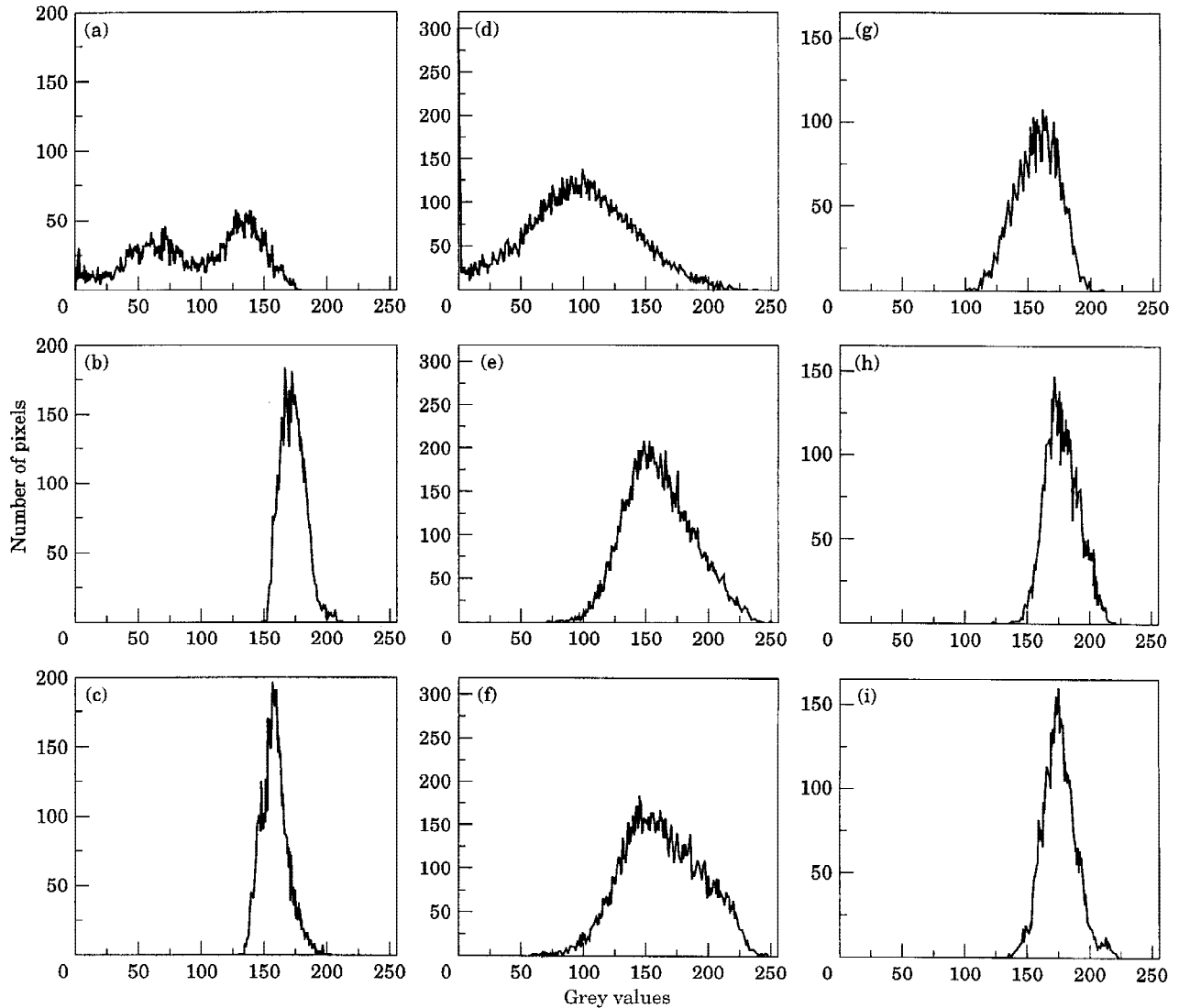


Figure 6. Grey values histograms from the damaged surface on the edge of the bone at the right of the mane (a), from the horse's back (d), and the jaw profile (g) as well as from two unengraved areas neighbouring each of these three zones respectively (b, c; e, f; h, i).

has conditioned the engraver's hand motions, engendering differences when compared with the head of the Creswell outline.

Microscopic analyses of the engravings and of the undamaged surface of the bone confirm that the object is a fake. In particular, the study of the medullary face of the object has revealed that the spongy bone is still filled with sediment. The sediment and roots contained within are the residue of the original matrix adhering to the bone when it was buried and are not an attempt to artificially age a fresh bone. This is confirmed with EDX microanalysis of the sediment filling the spongy bone and of that still present on the engraved side. This analysis demonstrates a similar elemental composition, suggesting that the patina covering the engraved side, but not the engravings themselves, is the result of the bone's burial in the soil.

Except for the few oriented micro-striations found within the horse's mane, probably the result of actions taking place during or after the unearthing of the object, the bone surfaces have preserved, almost intact, the microtopography of periosteum-free bone. This suggests a good preservation of the object and a sedimentary environment in which mechanical alteration was limited (Bromage, 1984; Shipman & Rose, 1988; d'Errico, 1993).

Buried objects generally retain sediment inside relatively protected areas (depressions, pits, grooves, etc.). Archaeological engraved objects often bear lines filled with sediment, making microscopic examination of the engraved line's internal morphology difficult.

In the Sherborne bone, the residues of sediment adhere to both vascular orifices and altered areas, indicating that their filling occurred during burial of

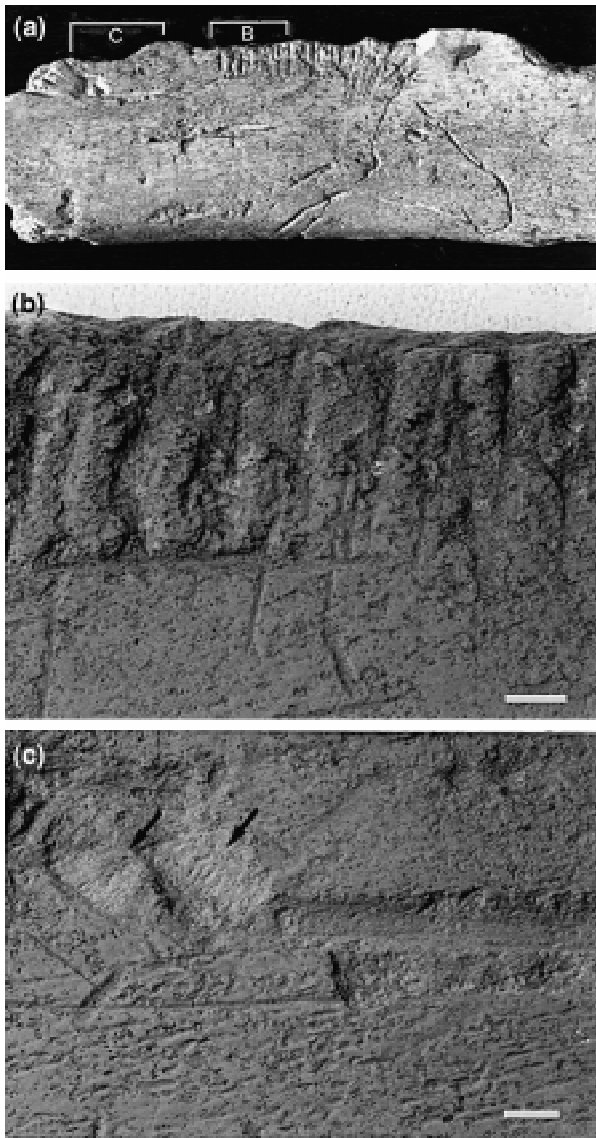


Figure 7. (a) Horse head with indication of the two zones enlarged in (b) and (c). (b) Close-up of the mane. (c) Close-up of the left end of the line depicting the horse's back. Arrows indicate large engravings showing microfractures perpendicular to the groove direction. Scales = 1 mm.

the object. In contrast sediment is almost completely absent from the engraved lines, suggesting the engravings were produced at a later time. This is confirmed by the morphology of the engraved lines, as the displacement of the tool has taken place on a bone apparently lacking its organic component. The presence of residues of sediment at the bottom of the grooves seems to indicate that sediment was adhering to the bone surface when the engraving took place. Image analysis shows that the engraved lines have grey values histograms different from those obtained from unengraved areas, but similar to those of recently damaged surfaces. Differences in grey values between engraved lines and altered zones could be due to the fact that the

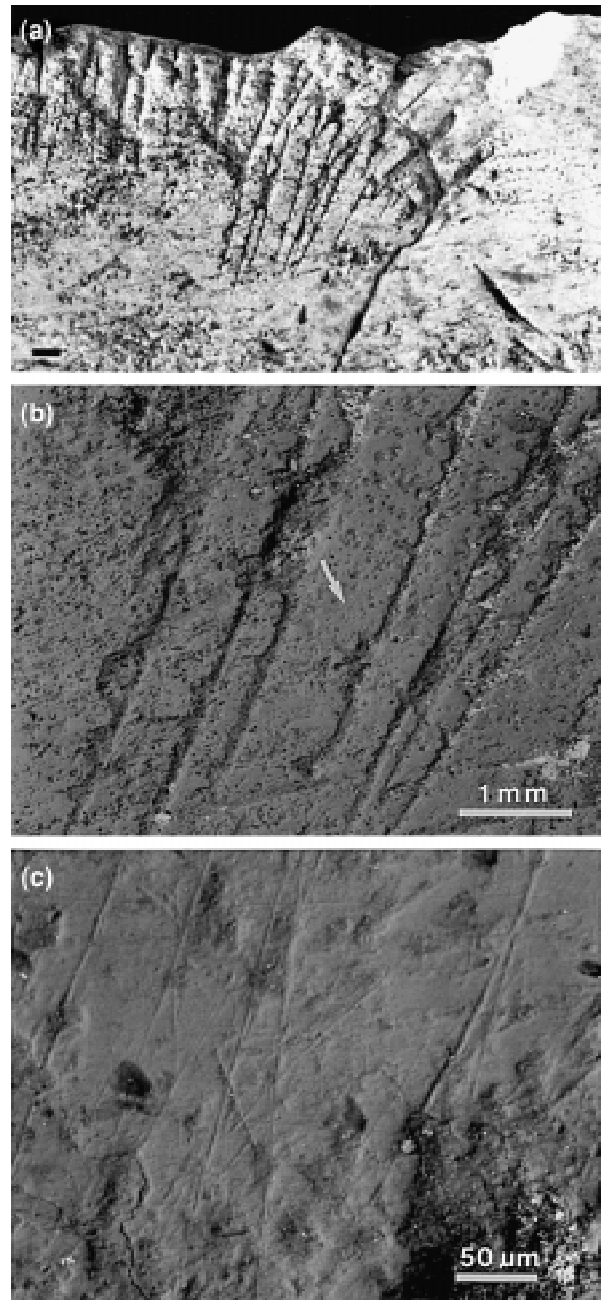


Figure 8. (a) Detail of the mane at the level of the fracture dividing the object in half. (b) Close-up of the fine unaltered lines of the mane. The arrow indicates the zone enlarged in (c). (c) The natural surface of the bone is covered by oriented striations approximately 5 μm in width.

engravings still preserve some sediment compacted inside the grooves by the movement of the tool, while recently altered zones are completely free of any sediment. This further supports the conclusion that the bone was engraved after burial, and not reburied after engraving.

The fine oriented striations observed between the lines of the mane intersect zones which are still filled by

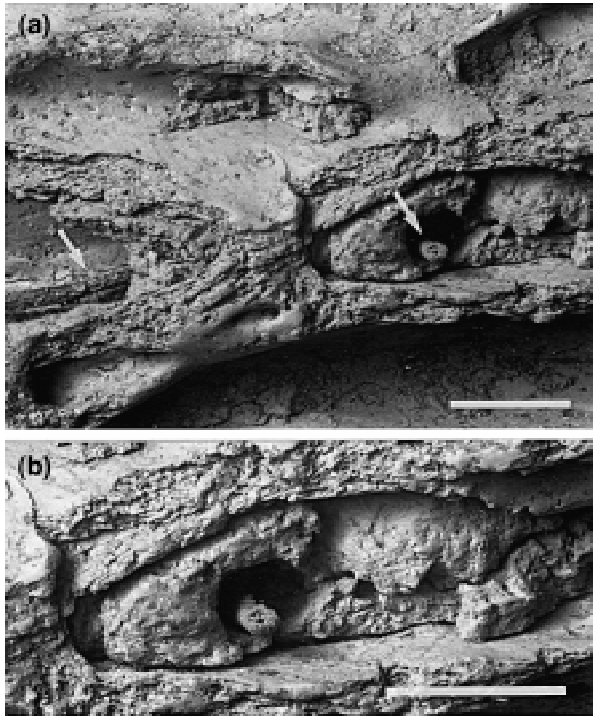


Figure 9. (a) Detail of the medullary face documenting the presence of a root trap in the sediment filling the spongy bone (arrow). The root passes under a spongy bone bridge. (b) Close-up of the previous area. Drying up of the sediment has produced widening of the cavity containing the root and the contraction of the sediment away from the bony surfaces.

sediment, suggesting that these striations were produced in the course of manipulation (e.g. cleaning, casting, etc.) which took place after unearthing of the bone.

The search for the culprit(s) and significance of the Sherborne affair

The exposure of the Sherborne bone hoax does not reveal the identity of its perpetrator(s), and indeed one can even wonder whether it is worth carrying out a quest for the identity almost a century after the fact. Following the publication of Spencer's (1990) recent inquiry into the Piltdown hoax, Chippindale (1990) asked "who still cares, in the year 1990 who dunnit?".

The Sherborne bone discovery had almost no influence on the development of studies on Palaeolithic art. For this reason it would be difficult to understand, by identifying the perpetrator, how "a prevailing paradigm may influence and even dominate not only thinking but even discovery" (Tobias, 1992). Nevertheless, the search for the culprit(s), and whether they can be identified as a member of the scientific establishment of that time, is clearly of interest in order to understand the thinking of scientists at the beginning of this century, and specifically their views on Palaeolithic art and whether this attitude has influenced scholars working in the second half of this century.

Moreover, it would be unrealistic to discuss the Sherborne affair without examining the scientific debates and attitudes at the time. Only two years before his presentation of the Sherborne bone to the Geological Society, Woodward, in collaboration with Dawson, presented to the same institution the first Piltdown remains, and both Woodward (Bowden, 1977) and Sollas (Halstead, 1978, 1979; Dodson, 1981; Koenigswald, 1981) are still suspected of having a knowledge of the Piltdown forgery or even of having played an active role in it.

The dating of the Sherborne bone itself does not provide a definitive answer to the identity of the author of the forgery. However, the fact that the bone is now shown to be relatively young, makes a hoax organized by the schoolboys more likely than a fake organized by professionals. Certainly the latter would have found it easier to engrave a fossil bone from a palaeontological collection, since, despite the presence of a school museum, access to such material would have been more difficult for schoolboys. Sherborne is a medieval town and the quarry where the bone was found is medieval in origin. The probability of picking up a bone of that age was high for someone looking for an adequate medium on which to engrave.

Another element indicating a hoax made by the schoolboys is the subject depicted and the way it was rendered. A number of Palaeolithic depictions of horses engraved on cave walls and on mobiliary objects had been discovered and published in France and Spain before the discovery of the Sherborne bone. However, these publications were known and accessible to only a restricted number of specialists and amateurs. We know from Charles Bayzard's appendix to Sollas' letter to *Nature* that a copy of Boyd Dawkins' *Early Man in Britain* was present at the Sherborne School museum. This was probably one of the very few books on the subject available at Sherborne. A forger with a restricted knowledge of what he could counterfeit would have a narrow choice of originals to reproduce. A professional having a wider knowledge of the subject would have been unlikely to have attempted to clone such a famous object, thereby making the fake more easily detectable.

Another aspect suggesting that the forger was not a professional is the appearance of the engraved lines. Methods to artificially age objects were known and to some extent available at the time to specialists; as demonstrated by the rather elaborate techniques used in the same years by the forger to age most of the Piltdown finds (Weiner, 1995). Even without using such relatively sophisticated procedures, a forger having some experience in palaeontological or archaeological excavations could have found a way to age artificially the lines. The presence of sediment filling the inner lines of the mane seems to indicate that this was attempted.

It is possible that this treatment was performed on a larger scale by the forger but was subsequently

removed by the cleaning of the lines after the discovery, either by people in charge of the bone or by technicians during its casting. However, even such careful cleaning, involving the removal of sediment from the bottom of thin incisions, modification of the line morphology or development of new lines produced by the movements of the various implements would have been likely. In contrast, no change can be observed between the rather accurate tracing of the bone published by Woodward and its present state. Our microscopic analysis of all of the old casts of the piece preserved at The Natural History Museum, London, has revealed no differences between these casts and the original specimen. We conclude, therefore, that the forger did not employ any elaborate methods to age the bone artificially.

Thus, these aspects suggest the search of the individual(s) involved in the forgery should be restricted to the Sherborne schoolboys. To go further in the quest of the culprit is largely a matter of speculation.

Contrary to the contemporary Piltdown affair in which the search for the forger(s) is made more difficult by the abundance of the documentation and the number of the suspects, carrying out an investigation in search of the possible forger(s) in the case of Sherborne is difficult because of the few facts available and reduced knowledge of the environment where it took place. Except for Bayzard's and Steel's letters to *Nature*, as well as Cortesi's later comment on the finding, scholars have had to judge the matter largely with second hand information. Even Sollas, who first suspected the hoax, had only Bayzard's words to rely upon.

According to Steel (1926), Cortesi and Grove, who had only been at the school for some two or three weeks, were unlikely to have been the organizers of a hoax. However, they may have been tricked by older students in "discovering" a planted bone. Ross Jefferson, who had stopped Cortesi from throwing the bone into the fire and had told him to show it to the science master, may have been involved. An older student, a friend of Cortesi, confirmed in 1973 to Gibb (1994) the scene described by Jefferson in his letter to the headmaster. Cortesi always maintained the authenticity of the find: Grove's mother and brother both confirmed, after his death, that he did the same. All of these factors suggest that Cortesi, and perhaps Grove, are innocent of implication in any hoax.

In his letter to the headmaster, Jefferson puts the blame for the rumour that the bone was not genuine on another boy, "that arch-humorist Mr. X" whom he does not further identify. Jefferson (J. H. P. Gibb, pers. comm.) was a year older than Cortesi and Grove and must have had some knowledge of Palaeolithic art, as Elliot Steel was lecturing to the boys on this subject. Steel, who was undoubtedly a passionate amateur, could have shown Dawkins' illustration of the Creswell engraving to the students, stressing the importance and

uniqueness of the find. This could have been at the origin of the hoax.

After a lapse of 85 years, the very identity of the forger(s) may never be known. Indeed, it is more informative to ask why Woodward, despite the surprising resemblance of the new engraving to the Creswell depiction he first noticed, and the rather doubtful provenance of the new find, accepted the Sherborne discovery without apparently making any reasonable attempt to question its authenticity. Woodward is generally considered by historians working on Piltdown (Weiner, 1955; Langham, 1978; Spencer, 1990; Tobias, 1992) as the innocent dupe chosen to deliver Piltdown into the scientific arena. However, the fact that Woodward had a similarly apparently uncritical approach two years earlier when Dawson showed him the first Piltdown finds does not fully explain his approach in the case of a less elaborate forgery like Sherborne. In addition, it is somewhat surprising that Woodward's opinion remained fully unchallenged at the meeting of the Geological Society.

Of relevance, however, is that the three decades overlapping the end of the 19th and the beginning of the 20th centuries were undoubtedly one of the most flourishing periods for fakers of prehistoric finds. The controversy about the authenticity of Altamira, which ended only in 1902 with the publication of the Cartailhac "*Mea culpa*" *d'un sceptique*, certainly resulted in a world-wide acceptance of Palaeolithic cave art, but also contributed to making scientists more sensitive toward the possibility of forgeries in the field. Controversies taking place in the same years (Couraud, 1985) about the authenticity of the Azilian engraved pebbles, for example, demonstrated to English scholars that forgery did not spare Palaeolithic mobiliary art.

On the other hand, an increasing number of genuine Palaeolithic painted and engraved caves, as well as portable art objects, were discovered in the same years in continental Europe, but almost none in England. Some English scholars faced this apparent contradiction with an expectation of new finds. This attitude is apparent when reading the observations that followed Woodward's presentation of the Sherborne bone to the Geological Society. Sollas himself, in association with Breuil, claimed in 1912 that they had found prehistoric cave paintings (a series of red bands with a deposit of stalagmite over them) in Bacon Hole, Wales (Daniel, 1992; Bahn, 1993). It later emerged that the stripes had been made in 1894 by a workman daubing the wall.

Sollas was probably affected by this failure when he attempted to stress English individuality by rejecting as fakes, or imported from the continent, all the pieces of representational art discovered in England. This attitude has contributed towards making English archaeologists more sensitive than their European colleagues to the problems of authenticity of Palaeolithic art. For

a long time European prehistorians have considered that if there is not positive proof of fakery, then the artefact should be considered as genuine; whereas their English colleagues have preferred to search for clues which would establish proof of authenticity.

It is worth noting that even after the circumstantial rebuttal by Dawkins of Sollas' rejection of the Creswell horse, the authenticity of the find was again questioned (Garrod, 1926; Armstrong, 1956; Grigson, 1956; Gilbertson, 1989). Our study does not advance the debate relating to the authenticity of the Creswell horse, but the techniques applied here may in future prove beneficial to resolving questions of this nature. Similarly, Daniel (1992) and Bahn (1993) have paid a great deal of attention over the years to the question of the authenticity of several Palaeolithic finds, and especially of the Rouffignac cave depictions. The Spanish cave of Zubialde, newly discovered in the Basque country, was initially believed authentic by several Basque archaeologists. This aroused profound suspicions among English specialists who were interviewed by *The European* shortly after the discovery. The controversy resulting from this intervention provoked Basque archaeologists to carry out analyses which subsequently showed the Zubialde cave art to be a forgery.

The Sherborne bone is one of the few mobiliary art objects which have provided AMS dates. Other examples are the Kendrick's cave mandible, first attributed to the Upper Palaeolithic (Sieveking, 1971) and now dated at around 10,000 BP (Gowlett, 1986), and the whelkshell pendant from Holly Oak, Delaware, a fake reproducing the mammoth engraving found by Lartet and Christy at La Madeleine, France in 1864, recently dated to only 1530 BP (Bahn, 1990). The detection of fakes would certainly be an important application of AMS dating to the study of Palaeolithic mobiliary art as a number of disputed objects are known in the literature (Vayson de Pradenne, 1932; Bahn, 1993).

Many AMS dates have been obtained in the last few years from Palaeolithic cave depictions (see for example Clottes *et al.*, 1992, 1995; Valladas *et al.*, 1992; Clottes, 1993; Lorblanchet, 1993). These dates are dramatically changing previously accepted interpretative hypotheses and evolutionary patterns of Palaeolithic art. However, the most comprehensive stylistic chronologies of Palaeolithic art, such as that of Leroi-Gourhan (1965), relied upon both cave and mobiliary art depictions. Mobiliary art from relatively well dated contexts was used to attribute cave art depictions either chronologically or culturally. However, a large number of Palaeolithic art objects, very well characterized stylistically, but from old excavations, were not taken into account in building chronological frameworks. In many of these objects, samples could readily be obtained for AMS dating, which would provide fundamental clues to understanding patterns of evolution in Palaeolithic art.

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