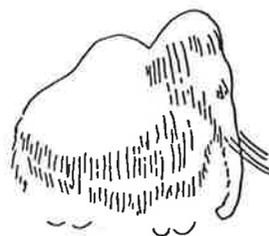


Dieu est éternel, mais l'homme est bien vieux.

Jacques Boucher de Perthes, 1857



The Establishment of Human Antiquity

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1983



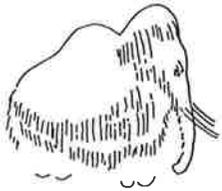
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8

A New Resolution Reached: 1850–1860

Analyses of human morphological diversity did not stand alone in mid-nineteenth century scientific thought. Increasingly detailed information concerning the tremendous linguistic and cultural diversity of the world's peoples also suggested that our species had been on earth far longer than the biblical chronology would allow, though the results of the morphological studies were certainly most visible.¹ By about 1850, analyses of all this diversity had greatly weakened adherence to the Mosaic chronology. "It makes no difference to our argument," wrote the Reverend William Whewell in 1853, "whether we accept six thousand or ten thousand years, or even a longer period, as the interval which has elapsed since the creation of man took place, and the peopling of the earth began."²

While studies of modern diversity could strongly imply that the biblical chronology was wrong, however, this was all they could do. They could not address the crucial issue of whether human beings were geologically ancient, whether they had appeared on earth prior to the time the globe had taken on its modern form. Only archaeological data could do that, because only archaeological data could be tightly associated with deposits that were geologically ancient.

"The present state of things is that to which the existence and history of Man belong," said Whewell, and there is no evidence that our species existed alongside the mastodon and the mammoth, no vestige of man "previous to the deposits and changes which we can trace as belonging obviously to the present state of the earth's surface, and the operation of causes now existing."³ And, Whewell noted, that present state extends back an unknown but clearly vast amount of time. The resolution of this aspect of human antiquity had to come from the earth itself.

When Pierre Cordier informally transmitted the opinion of the commission appointed by the Academy of Sciences to report on the first volume of *Antiquities* to Boucher de Perthes, he noted that the publication of this work would probably come to "excite lively opposition . . . and to provoke further observation." The solution, Cordier suggested, would probably result from the ensuing debate. The commission's opinion about lively opposition may have been an obvious one, but it was nonetheless correct.

Boucher de Perthes's work attracted attention not only on both sides of the English Channel, but on both sides of the Atlantic Ocean. I have mentioned that the initial reaction to the first volume of *Antiquities* was largely negative. Although that reaction cut across national boundaries, the response of the English geologist Gideon Mantell was typical.

Mantell's review of the data that seemed to suggest a great human antiquity was delivered to the Royal Archaeological Institute in Oxford in June 1850. It was, in fact, "a perusal of the treatise of M. Boucher de Perthes"⁴ that suggested to him that such a review was necessary. His approach to the evidence for ancient peoples was generally Lyellian in its cautious and even-handed nature. Mantell gave examples of such clearly modern materials as coins and nails embedded in breccia to show that geological settings that seemed to imply great antiquity might be extremely misleading, and he used Kent's Cavern as a prime example of a misleading site of this sort. Here, he argued, human remains had sunk through the travertine layer before it had hardened, and had thus become accidentally mixed with the remains of extinct mammals. As a result, it could be concluded that "the occurrence of the remains of man with those of extinct species of animals, in a deposit that is covered by a thick layer of solid rock, must not be regarded as a certain proof that the human bones are of as high antiquity as those of the quadrupeds with which they are associated."⁵ Although he felt it possible that human remains might someday be found with the remains of mammoth and other ancient, extinct mammals, he also felt that the associations to date "have generally, upon a rigid examination, failed to establish the synchronism of the human and quadrupedal remains."⁶

But Mantell abandoned his even-handed approach when it came to Boucher de Perthes and his *Antiquities*. Boucher de Perthes had, he correctly observed, "deteriorated the value of his antiquarian labours by vague and erroneous con-

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clusions, which but a slight acquaintance with the elements of geology would have enabled him to avoid."⁷ Moreover, one could "perceive at a glance that the so-called antediluvian works of art, figured and described by M. Boucher de Perthes, are nothing more than accidental forms of pebbles and stones . . . which can never have been fashioned by the hand of man."⁸ While the idea of reviewing the evidence for human remains discovered in possibly ancient contexts had been suggested to Mantell by Boucher de Perthes's book, that book itself did not merit serious consideration, and Mantell did not consider it.

Mantell was not pleased with his experience at the Royal Archaeological Institute: "Most of the leading members of the Institution were absent! dining out. . . . Very great mismanagement and enough to deter me from undergoing so much trouble again for so little purpose."⁹ Nonetheless, because his critique was published it did not go unnoticed. In France, Alfred Maury (1817–1892) translated and paraphrased Mantell's review, added a more detailed discussion of French sites, and published the results in the *Memoirs* of the National Society of Antiquaries of France in 1852. Maury agreed with virtually everything that Mantell had to say, though he felt that the problem of accidental admixture in caves had been overstated. Many sites, Maury felt, had contained human relics stratigraphically above those of extinct mammals but had not been dug with sufficient care to keep those materials separate. Excavators themselves had intermingled debris from upper strata containing human remains with debris from lower strata that lacked them. This, he thought, was what had led de Serres astray.

It was not, however, what had led Boucher de Perthes astray, for Maury was convinced that Boucher de Perthes had carefully distinguished the various beds with which he had worked. The problem with Boucher de Perthes's work stemmed from his heavy dependence on his workers to find human relics. On matters of such a crucial nature, the workers were not to be trusted, and there was good reason to entertain serious question as to where the artifacts had really been found: "It is very possible, after having read M. Boucher de Perthes's book, to have doubts on the precision of the observations relating to the elevations at which the axes were discovered."¹⁰ In addition, Maury felt that many of the stone tools illustrated by Boucher de Perthes were not stone tools at all. Instead, they seemed to be naturally occurring flints whose shape recalled those of modern implements. Only the preoccupation of an antiquarian, Maury thought, could have "made him interpret as products of art that which was only the work of nature."¹¹ Finally, Maury asserted that those aspects of Boucher de Perthes's results that could not be interpreted as due either to the mistakes of the workers or to the misinterpretation of naturally occurring objects had resulted from accidental admixture. In short, he felt that nothing Boucher de Perthes had presented to support a great human antiquity was of any value.

Between them, Mantell and Maury voiced the major criticisms that were to be made during the initial wave of reaction to the first volume of *Antiquities*.

Boucher de Perthes had been deceived by his workers, he had mistaken natural items for items worked by human hands, he had missed stratigraphic evidence for accidental admixture, and he clearly had little knowledge of contemporary geology. Many of these were reasonable responses because many of them were, in fact, correct. But these responses at least helped make Boucher de Perthes's work better known. A second way of handling his work—ignoring it entirely—did not accomplish this.

This second route was taken by many scientists, including the Swiss paleontologist François-Jules Pictet (1809–1872). In the second edition of his *Treatise on Paleontology* (1853), Pictet addressed a short but meaty section to the question of whether "man appeared on the surface of the earth before the modern epoch."¹² He reviewed the older and generally rejected evidence for ancient people, including Scheuchzer's salamander and the Guadeloupe skeleton, and then turned to the real issue. Pictet felt that the question was a straightforward empirical one, that there was no a priori reason to believe people had not coexisted with the extinct mammals whose remains had been found in the diluvium. He carefully reviewed the cave data, and included a lengthy series of references to the work of de Serres, Tournal, Christol, Teissier, Schmerling, and others. He observed that Schmerling, in particular, had presented information that was "difficult to contest,"¹³ and then summarized potentially ancient human remains from open sites, including Boué's material and the human remains from Denise. He had visited Denise with Aymard and was convinced of the integrity of the association here, suggesting that while the human bones were old, they were not as old as the deposits in the caves of Belgium or southern France. He concluded that some of the evidence forwarded for the contemporaneity of human beings and extinct mammals was valid: "the first men who entered Europe perhaps saw the cave bear, the elephants, and the contemporary animals; some among them were victims of the same inundations. . . . The definitive establishment of man in Europe and the occupation of this continent by a large population probably took place after the great inundation, which deposited the rolled pebbles in the caverns and on the plains of our continents."¹⁴

Here, in a major work, was a sympathetic view of the argument that people and extinct mammals had coexisted. Pictet not only provided a concise review of the evidence but also concluded that some of the associations were real and that people had lived and died with the extinct mammals. But what of Boucher de Perthes and his evidence? Of the more than 50 references Pictet provided, none referred to Boucher de Perthes's *Antiquities*.

Not everyone who discussed Boucher de Perthes's work during the early 1850s discussed it unfavorably. Those who responded positively, however, were hardly influential scientists. One of the favorable responses came from Abraham Hume (1814–1884), a Liverpool cleric. In 1851, Hume published his discussion "On Certain Implements of the Stone Period" in the *Transactions* of the Historic

1. Reconhecimento de material como de fabricação humana
2. Associação de material com espécies extintas

Criticas a Boucher de Perthes

Pictet

Criticas favoráveis a Boucher de Perthes

Society of Lancashire and Cheshire, a society he had helped found 3 years earlier. Here, Hume accepted most of Boucher de Perthes's arguments concerning the early stone tools from Abbeville: they were real artifacts, including the figured stones (some of which Hume illustrated), they had been used as symbolic items, and they were probably antediluvian in age. Indeed, Boucher de Perthes saw Hume's acceptance of his work as a real coup, and used Hume's paper to contrast the rejection he had received in France with the acceptance he had gained in England.¹⁵ What Boucher de Perthes did not point out in this overstatement was that Hume did not agree with all that he had argued in 1847. Hume not only felt that the difficulties of assessing the age of these artifacts were insurmountable, a point with which Boucher de Perthes would have agreed, but also felt that "man has been on the face of the earth nearly 6000 years,"¹⁶ a position very different from that which Boucher de Perthes had taken. Although Hume agreed that Boucher de Perthes had discovered antediluvian implements, that term had a very different meaning for the Liverpool cleric than it had for the Abbeville antiquarian.

The most extensive discussion of Boucher de Perthes's work published during the early 1850s, however, came not from Europe but from America, and was provided by William Usher in Nott and Gliddon's *Types of Mankind* (1854). Usher's 15-page discussion of Boucher de Perthes was dedicated to providing translations of parts of the first volume of *Antiquities*, reproducing illustrations from that volume, and emphasizing the great antiquity of Boucher de Perthes's antediluvian artifacts. Usher, of course, had nothing but praise for all those who had provided evidence for ancient peoples, including Boucher de Perthes, since such evidence helped make the case for an extremely long human existence on earth, an existence that was part of the attack Nott and Gliddon were then making on the monogenist position (see Chapter 7).

In short, the initial reaction of influential scientists to the first volume of *Antiquities* was to reject or ignore it. Acceptance came from those working on the fringes of the scientific community, a place that Boucher de Perthes himself unwillingly occupied. Cordier's prediction of lively opposition had come true.

Cordier's prediction of further observations also turned out to be accurate. The most important of those observations during the early 1850s resulted from the work of Marcel-Jérôme Rigollot (1786–1854). Rigollot was a physician from the town of Amiens, 40 kilometers upstream from Abbeville in the Somme River valley. He had broad antiquarian interests, and was an active participant in, and frequent president of, the Society of Antiquaries of Picardy. Rigollot's experience in geological and paleontological matters was much more extensive than Boucher de Perthes's; as early as 1819, he conducted research on the extinct mammals known from the valley of the Somme and provided Cuvier with materials that were incorporated into the second edition of Cuvier's *Researches*.¹⁷

In 1849, Rigollot wrote to Boucher de Perthes to inform him that "the

Academy of Amiens has also received your volume and has charged me with making a report for them, a report that will also serve for the Society of Antiquaries."¹⁸ At the time, Rigollot was by no means disposed to agree with Boucher de Perthes's arguments and conclusions. According to one of Rigollot's colleagues, his visit to examine Boucher de Perthes's collection was not one he was highly motivated to make: "Dr. Rigollot was led into M. Boucher de Perthes's gallery to examine his collection of antediluvian artifacts. *He did not want to come here, and it was almost necessary to do him violence to get him to do it; he treated these discoveries as impossible, even as absurd.*"¹⁹

In 1853, however, Rigollot was told that at St. Acheul, near Amiens, stone tools had been found in deposits that had also yielded elephant bones. As a result, he excavated both here and at St. Roch, about 2.5 kilometers distant (Figures 8.1 and 8.2). At St. Acheul, Rigollot discovered stone implements in gravels that also held the remains of elephant, horse, cattle, and deer; at St. Roch, he found stone tools associated with the remains of rhinoceros. Of these two sites, St. Acheul was by far the most productive. Workers here found over 400 stone implements, while Rigollot himself retrieved over 150. To confirm the antiquity of his discoveries, Rigollot brought in two geologists: Charles-Joseph Buteux (1794–1876), who had written major works on the geology of the valley of the Somme, and Edmond Hébert (1812–1890), professor of geology at the Sorbonne. These geologists confirmed that the deposits at St. Acheul and St. Roch were, indeed, of diluvial age.

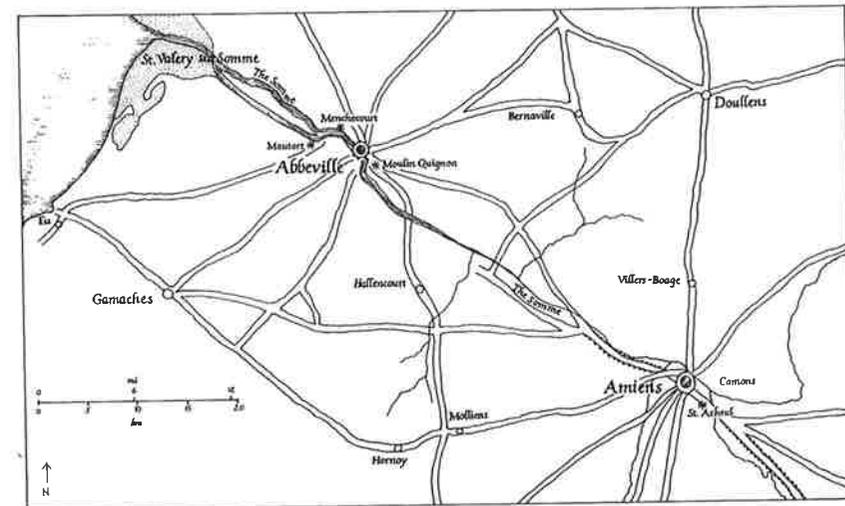


Figure 8.1. General location of the Abbeville and Amiens sites, adapted from Prestwich (1861).

the Somme River valley associated with the remains of such extinct mammals as elephant and rhinoceros.

2^d vol
Antiquités
(B. Perthes)

What is remarkable about the second volume of *Antiquités*, however, is not the presentation of new data on the same issue, but the theoretical framework in which the data were now embedded. Between the time he wrote his initial monograph and the time he wrote the second, Boucher de Perthes had traveled extensively in Europe and had also corresponded with many of the leading earth scientists in England and on the continent.³³ He was no longer the isolated provincial amateur, and he was now in much better command of contemporary geological approaches to the more recent aspects of earth history. As a result, the arguments he made concerning that history were vastly different than they had been 10 years before.

He now felt that the effects of glaciation or of events that had accompanied glaciation could account for the deposition of much of the diluvium, a position then much in favor among geologists. He also felt that global cooling accounted for the extinction or extirpation of the large mammals, also an argument in favor among some major earth scientists. Louis Agassiz was one such scientist. "A Siberian winter established itself," Agassiz wrote in 1837, "on ground previously covered by rich vegetation and occupied by great mammals, similar to forms that today occupy the warm regions of India and Africa. Death enveloped all nature in a shroud."³⁴ Although he did not mention Agassiz's opinion, Boucher de Perthes now asked "will we one day see again the earth covered by a shroud which, for centuries to follow, will throw the earth into the sleep of death?"³⁵ While Agassiz's catastrophic explanation of Pleistocene extinctions was not widely followed during the 1850s,³⁶ it was certainly no mark of ignorance to side with this respected scientist.

Boucher de Perthes also drastically changed his views on the relationship between the floods that had deposited the diluvium in western Europe and the human beings that had been affected by those floods. No longer had the entire antediluvian human population been destroyed by those waters. Some, though not many, escaped, and the catastrophe itself became "that of which tradition remains with us."³⁷ Indeed, the tradition itself became support for his position:

All traditions speak of a deluge that caused the death of both men and animals, with the exception of a few. But, in order for the memory to remain, men must have been witnesses and men must have survived it. Science recognizes and geology proves that almost all mammals disappeared in the great catastrophe: how could men alone have escaped? And if there were no men, how could those of today have the revelation of the event? Be consistent and do not divide the question: either the deluge of Noah is a fiction or it is true. If it is true, it is necessary to admit it with all the consequences: it is necessary to believe, with our fathers and after Scripture, that the same cataclysm struck both the throng of terrestrial creatures and the men among them.³⁸

Gone were the separate races of human beings, each destroyed by a separate catastrophe; gone was the notion that antediluvian people were not the ancestors

of modern ones. Yet Boucher de Perthes still felt that "not only is modification of the human form possible, it is probable. The modern species must show differences at least as great as those which exist between the antediluvian animals and the living races."³⁹ It was not impossible, he noted, that one of the reasons the bones of antediluvian people had not been reported was that they had been mistaken for those of apes.

He was, in fact, able to present evidence that such morphological change had occurred. In 1853, Frédéric-Antoine Spring (1814-1872), a physician and professor at the University of Liège, had reported the discovery of human bones and the remains of clearly postdiluvian mammals from a cavern located in the mountain of Chauvaux, near Namur, southcentral Belgium, in the Meuse River valley. Spring had actually made the discovery in 1842, but withheld publication, he said, because he was unable to decide how old his material was. Now, however, he was sure that it was postdiluvian, and he made the results of his work known. Spring argued that the bones he had found did not pertain to any race of people native to modern western or central Europe; he saw them as much more similar to both American Indians and Africans.⁴⁰ Although Spring asserted that the people represented by the Chauvaux bones had been replaced by a wave of immigrants from the east, Boucher de Perthes assumed that they were ancestral to modern Europeans. This assumption made, Boucher de Perthes then used this material to support his argument that change in human morphology through time did occur, while agreeing with Spring that the Chauvaux remains were postdiluvian.

In 1847, Boucher de Perthes had linked catastrophic extinctions of human beings, their subsequent recreation, and morphological change into a single antitransformationist package. Now, however, he was arguing that some peoples had escaped the last catastrophe, while retaining the notion of morphological change through time. Since he could no longer call on the formation of a new set of human beings to create the physical change he believed had occurred, he needed a new mechanism to explain that change. The mechanism he used was transformation:

We doubt the possibility of the modification of animated forms and of the transformation of what we call one species into another, and our most distinguished experts affirm that this transformation is impossible. I agree, if we are dealing with a sudden change or even with change limited to a time that can be embraced by our ordinary calculations, but I am convinced that this metamorphosis can take place in the long run. Forms change not only as a result of needs, passions, customs, habits, but also in so far as variation in the elements and location requires this modification.⁴¹

To Boucher de Perthes, it now seemed possible that postdiluvian mammals were descended from antediluvian ones. Why, he asked, would God destroy something simply to remake it? It was far easier to believe that "the existing races descend, in spite of these differences, from the primitive and antediluvian races."⁴²

Handwritten notes:
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x x x 1857

The human species was no exception to this transformationist rule. In fact, Boucher de Perthes observed, one did not even need the fossil record to know that changes in mode of life and climate could cause morphological change over long periods of time. Only such change could account for the tremendous physical diversity seen among modern peoples, diversity that must have developed from a single, original pair of human beings.

However, while Boucher de Perthes now argued in favor of descent with modification and used evidence drawn from modern human physical diversity and from Spring's work to support this position, his approach was still a fairly mild one. His strongest statement on the transformation of species appeared in a note, not in the body of the text itself, and even that statement was a sober one. In addition, his discussion of the magnitude of morphological change through time in human beings was primarily confined to variation within the species; his comment that antediluvian human bones might have been mistaken for the bones of a nonhuman primate was also in a note. In the text itself, Boucher de Perthes's arguments did not sound much stronger than Prichard's.

It is telling that Boucher de Perthes chose Spring to provide his fossil example, since human bones from potentially ancient European deposits that had been assigned to non-European races had been reported years before the first volume of *Antiquities* appeared. Not only had Boué reviewed such finds in 1830 and 1832,⁴³ but Schmerling's attribution of the Engis skull to a member of the Ethiopian race was widely known. Boucher de Perthes seems to have relied on Spring's discussion because he had not read the earlier reports of these discoveries. He knew of Spring's work because, as he noted, Spring had sent him a copy of his paper. Much of Boucher de Perthes's discussion of prior discoveries of fossil human bones in the second volume of *Antiquities* was drawn directly from Spring's review of those finds. While Boucher de Perthes was now much less intellectually isolated than he had been in 1847, he was still not fully versed in the literature on ancient human remains.

Even though he clearly had not read the voluminous literature dealing with human remains from ancient deposits, Boucher de Perthes nonetheless took a strong stand on the meaning of those associations that had been reported from caves and of which he was aware. He argued that many of these caves were filled with deposits that were entirely postdiluvian in age, and that even those containing antediluvian materials were not to be trusted:

These caverns have sometimes presented a mixture of highly disparate objects belonging to markedly distinct ages. Thus, these sites have provided the bones of great carnivores and of other families that have not lived in our climates for many centuries, mixed with polished stone axes, projectile points, pottery whose paste is indicative of recent manufacture, finally gallic or roman coins. It is thus neither in the osseous breccias nor in the post-diluvian caverns that one will find irrefutable proof of the existence of antediluvian man, for the age or the origin of the bones found there will always remain surrounded by doubt.⁴⁴

Boucher de Perthes took this highly critical stand for two reasons. First, his position on this issue aligned him with the contemporary conservative approach to the meaning of cave data, and gave his discussion an aura of caution that helped highlight the care with which he worked and the validity of his results. Second, and probably more important for him, it underlined the significance of his own contribution. If the human remains from caves were not ancient, then he was the first to prove the case for antediluvian people. "You will remember my efforts"⁴⁵ he said, and the less one trusted the cave discoveries, the more novel and important his work became.

His figured stones were still real and many of his stone tools were still symbolic items (Figures 8.3 and 8.4). But the overall impression provided by the second volume of *Antiquities* is very different from that provided by the first. Boucher de Perthes was no longer the totally isolated provincial working completely outside of contemporary science. Nonetheless, it is also true that the second volume did not provide the detailed exposition of the crucial Menche-court and Hospital data. That information was to be found only in the first volume, where it was surrounded by very odd statements on earth and life history. To understand precisely what Boucher de Perthes had found that led him to argue for ancient peoples in the first place, one had to read his initial monograph. As a result, it was difficult to separate the old Boucher de Perthes from the new one.

Thus, the new resolution that was to be reached on the question of human antiquity stemmed from work done in England. This work enabled Boucher de Perthes's discoveries to be extracted from the theoretical framework in which he had initially placed them and to be recognized for what they really were. The crucial step in reaching this resolution was the excavation of Brixham Cave.

Located near Torquay in southwestern England, Brixham Cave was discovered in January 1858, during limestone quarrying operations that revealed not only the cave but also the fossil bones within it. Soon after, the geologist and educator William Pengelly (1812-1894) visited the site and realized that it might provide an excellent source of specimens for the Torquay Museum.⁴⁶ As Pengelly was attempting to gain access to the site from the owner, the paleontologist Hugh Falconer (1808-1865) arrived to examine the cave for himself. Falconer and Pengelly agreed to cooperate in the examination of the site; on his return to London, Falconer appealed to the Geological Society of London for the financial support needed for the work to proceed. The nature of Falconer's appeal makes it clear that he saw the potential value of Brixham Cave in the light of the information it could provide on the sequence of Pleistocene faunal change in England.⁴⁷ Brixham Cave was, as Jacob W. Gruber has noted in his invaluable discussion of these events, to be "explored by geologists with a view toward the solution of certain geological problems."⁴⁸

The Geological Society of London responded to Falconer's appeal by assist-

Inglaterra

Brixham
Cave

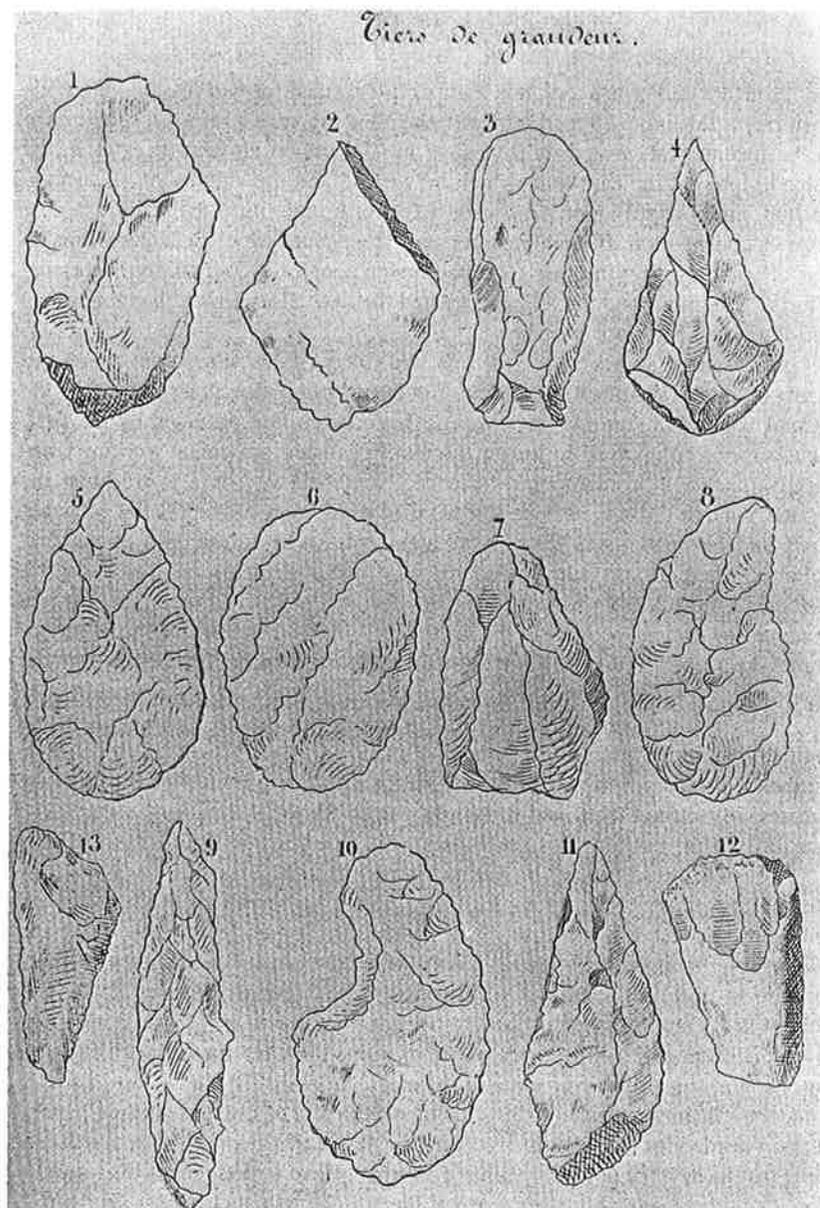


Figure 8.3. Antediluvian stone tools from the vicinity of Abbeville illustrated by Boucher de Perthes (1857). The artifact illustrations in the second volume of *Antiquities* were little better than those in the first. These particular specimens came from various sites in the Abbeville area.

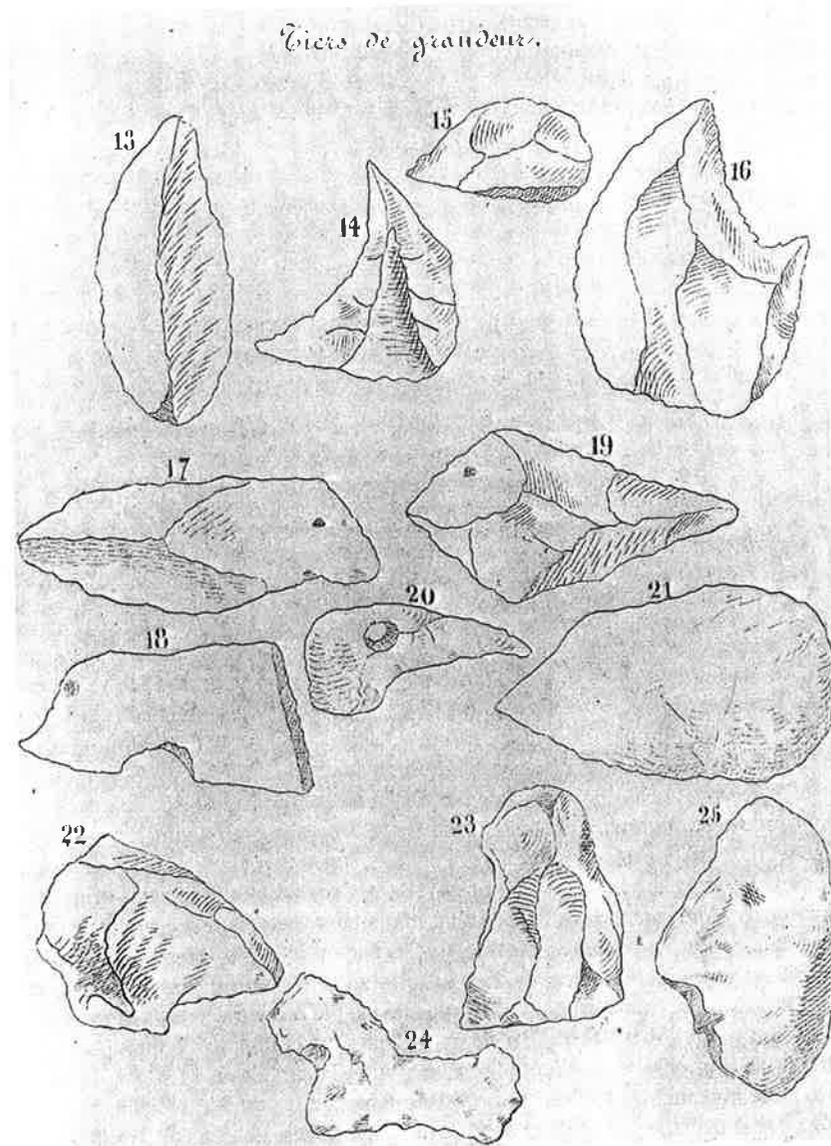


Figure 8.4. Figured stones illustrated by Boucher de Perthes (1857). In this series, Boucher de Perthes identified number 13 as the depiction of a leaf, number 14 as the tooth of a shark or crocodile, number 20 as the head of a bird, and number 25 as a human face.

ing him in obtaining the necessary funding, and by establishing a committee of prestigious British scientists to oversee the work. Among others, that committee included Charles Lyell, Joseph Prestwich, R. C. Godwin-Austen, the famed anatomist and paleontologist Richard Owen (1804–1892), and both Falconer and Pengelly.

Brixham Cave was thus to be excavated for the same general reason that Tournal, de Serres, and Schmerling had excavated their caves. But there were significant differences between those earlier excavations and those that were to take place in this new site. Those differences resulted from the scientific stature of the individuals involved in the Brixham Cave work, and from the detailed nature of the questions being asked of the deposits here. Since those questions dealt with faunal change through time, it was clear that precise stratigraphic information was required. The excavators were quite explicit about this point:

The Committee, fully impressed with the probability of remains of different periods being met with at the different levels in the cavern floor, determined from the outset on working the upper deposits horizontally inwards, as far as might be practicable, in the same horizon, and then of working the lower deposits successively in the same manner. In this manner they considered that they would avoid the risk of confounding the remains of different levels, which is apt to take place when excavating cave-bottoms vertically down to the rock floor, and which has vitiated the results obtained in many other cave-explorations, more especially in regard of the contested position of human industrial remains.⁴⁹

In addition, “whenever a bone or other article worthy of preservation was found, its situation (that is to say, its distance from the mouth or entrance of the gallery in which it occurred, as well as its depth below the surface of the bed in which it lay) was carefully determined by actual measurement.”⁵⁰ After being so measured, each item was then numbered and catalogued.

Even with this relatively slow method of excavation, designed to guarantee that proper stratigraphic context would be preserved for all significant objects, the work quickly proved productive. Pengelly stated that about 1500 bones were removed during the first 6 weeks of excavation, including the remains of extinct mammals. And, on 29 July 1858, a flint implement was found beneath a continuous calcareous layer 7.5 centimeters thick. The antiquarian John Evans (1823–1908) later described this artifact as a “portion of a flake, 2¾ inches long and 1¼ wide . . . obtusely pointed, and truncated at the butt-end. . . it bears evident marks of wear.”⁵¹ By the time the excavations were completed in the summer of 1859, 36 flint objects had been discovered in Brixham Cave, of which 15 were felt to be undeniable artifacts. Many of these had been found in sealed strata that also contained the remains of such extinct mammals as elephant, rhinoceros, cave bear, and hyena (Figures 8.5 and 8.6).

The results of the Brixham Cave excavations were first made public at the 1858 meeting of the British Association for the Advancement of Science. Here two papers on the site were presented, one by Pengelly, the other prepared by

Método de
excavação
1858

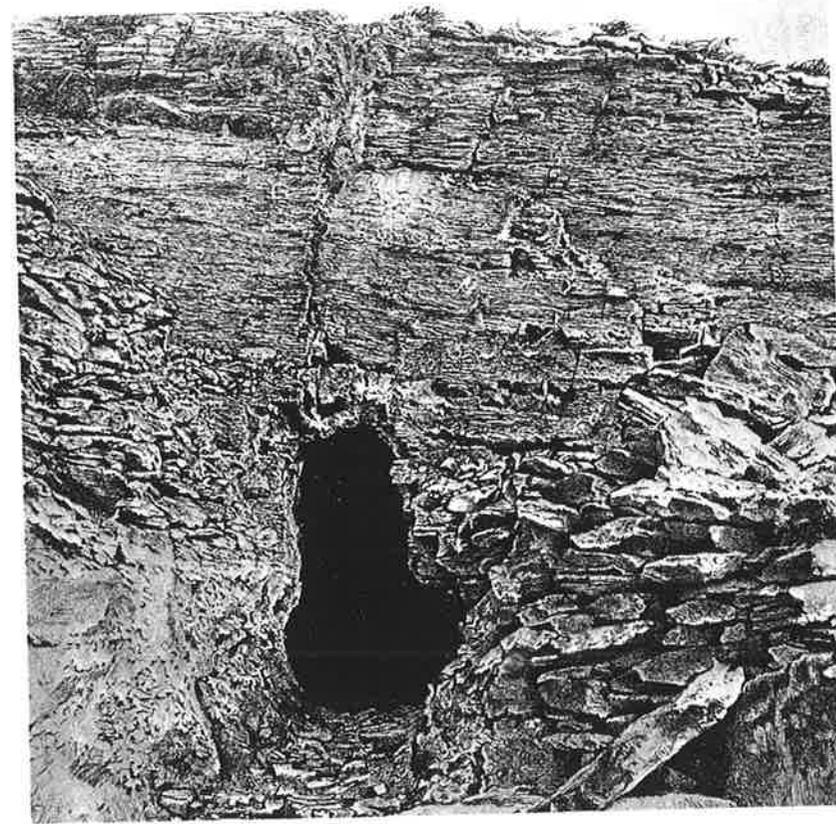


Figure 8.5. The entrance to Brixham Cave, as illustrated by Prestwich (1873). The excavation of this site under the direction of some of England's finest geologists and paleontologists led directly to the reexamination of Boucher de Perthes's sites.

Falconer but representing the report of Geological Society's committee. Although Pengelly's presentation simply mentioned the flint implements, the other observed that

several well-marked specimens of the objects called 'Flint Knives' and generally accepted at the present day as the early products of Keltic or pre-Keltic industry, have been exhumed from different parts of the cavern, mixed in the ochreous earth indiscriminately with remains of *Rhinoceros*, *Hyaena*, and other extinct forms. One of these so-called 'Flint Knives' was brought up . . . from a depth of 30 inches below the superficial stalagmite . . . We failed in detecting evidence that these so-called 'Flint-Knives' were of different age, as regards the period of their introduction, from the bones of extinct mammals occurring in the same stratum of cave-earth, or that they were introduced into the cavern by different agencies.⁵²

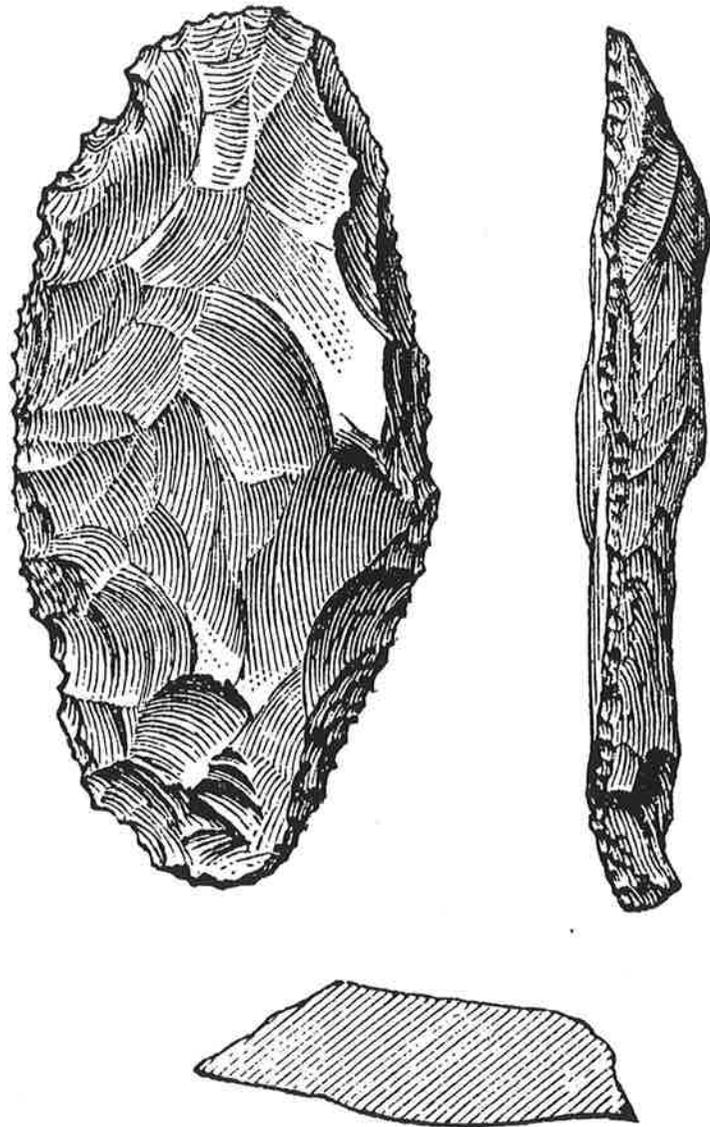


Figure 8.6. Brixham Cave flint implement number 7, as illustrated by Prestwich (1873). According to the Brixham Cave report, artifact number 7 (8.3 cm long, 4.4 cm wide) was discovered on 17 August 1858 in the Flint-knife Gallery of Brixham Cave, 42 feet (13 m) from the entrance of this gallery, and at a depth of 42 inches (1.1 m) from the top of the third bed. Such precision in excavation and note-taking characterized the excavation of this site.

Neither of these presentations was published in the *Reports* of the British Association for 1858 but, as Pengelly noted, "all the great geologists"⁵³ were there. Brixham Cave was opening the question of human antiquity in Britain in a way that it had not been opened since Cuvier provided his time markers. These were the results of a carefully conducted excavation made by individuals whose qualifications could not be reasonably doubted.

The results of the Brixham Cave excavations, however, were not published in any detail until 1873. In addition the site was still a cave, no matter how carefully it had been excavated. Although Prestwich, for instance, visited Brixham Cave with Pengelly and was impressed by what he saw, he was not fully convinced by the artifacts because he "considered that cave evidence alone was not sufficient."⁵⁴ The real significance of the work here stemmed from the fact that the status of the individuals who had made the discoveries opened people's eyes and that it led to the immediate reexamination of the discoveries made by Boucher de Perthes and Rigollot.

In October 1858, Falconer wrote to Boucher de Perthes, noting that "next Saturday, I will be travelling to Paris, when I will stop at Abbeville for two hours in the hope of finding you there. During the last three months, we have found flint knives in English bone caverns that are probably of great antiquity."⁵⁵ Boucher de Perthes was in, and Falconer examined his collection and came away favorably impressed. On 1 November, while still in Abbeville, he wrote to Prestwich that Boucher de Perthes had shown him

'Flint' hatchets which *he had dug up* with his own hands mixed *indiscriminately* with the molars of *Elephas primigenius* [mammoth]. . . . Abbeville is an out-of-the-way-place, very little visited, and the French savants who meet him in Paris laugh at Monsieur de Perthes and his researches. But after devoting the greater part of a day to his vast collection, I am perfectly satisfied that there is a good deal of fair presumptive evidence in favour of many of his speculations regarding the remote antiquity of these industrial objects, and their association with animals now extinct. . . . Let me strongly recommend you come to Abbeville. I am sure you would be richly rewarded.⁵⁶

Prestwich followed the suggestion and spent his annual Easter geological excursion visiting Boucher de Perthes in April 1859.⁵⁷ As Aufrère has noted, Boucher de Perthes was ready for the visit. He had begun a register for visitors to his home; the very first names in that register were those of Prestwich and Evans, who joined Prestwich after his arrival in Abbeville. 1859

While here, Prestwich not only saw Boucher de Perthes's collection, but also visited Menchecourt, Moulin Quignon, and other sites that had provided both stone tools and the remains of extinct mammals. Although three possible flakes were found while he was at Menchecourt, no undoubted implements were found during his tour of the Abbeville locations. He continued on to Amiens to examine St. Acheul, where he again failed to find any artifacts in place. After returning to Abbeville, however, he received a message from Amiens informing him that what he wanted to see had now been found. He returned to St. Acheul,

where he was joined by Evans, and both were able to observe a flint implement in place about 6 meters below the original surface level, in deposits that also contained the remains of extinct mammals.⁵⁸

Prestwich, who had been sceptical, was now convinced, as was Evans. Early in May, Prestwich wrote to Boucher de Perthes that "I have the conviction that the opinion you advanced in 1847 in your work on the Celtic and antediluvian antiquities, that the axes are found in undisturbed gravel and associated with the bones of the great mammals is just and well founded."⁵⁹ Other visits to Abbeville and Amiens by British scientists followed. Prestwich returned in June 1859 with the antiquarian John W. Flower (1807-1873), the geologist Robert W. Mylne (1817-1890), and R. C. Godwen-Austin; on this trip, Flower excavated a handaxe at a depth of 5 meters from the surface at St. Acheul. In July, Lyell made the trip, afterwards visiting Le Puy to inspect the site of the Denise discoveries. All came away convinced of the validity of the finds that had been made by Boucher de Perthes and Rigollot.

The visitors presented and published a flurry of papers on their observations. Prestwich's paper was delivered to the Royal Society of London in May 1859; a lengthy abstract was published in the Society's *Proceedings* in 1860, and the full version appeared in the Society's *Transactions* in 1861. Evans's paper was presented to the Society of Antiquaries in June 1859 and published in *Archaeologia* in 1860. Flower gave his in the same month to the Geological Society of London, which published it in 1860. Lyell's presentation was made in September 1859 at the meeting of the British Association for the Advancement of Science, which carried it in their *Reports* in 1860. All of these papers agreed on one essential point: the artifacts found at Abbeville and Amiens did, indeed, prove that people had coexisted with the now-extinct mammals.⁶⁰

Of all these publications, the most symbolic was certainly Lyell's. Britain's most influential geologist, Lyell had argued against the contemporaneity of human beings and the extinct beasts in every edition of the *Principles* through the last to have been published (1853). In addition, his belief in the geological recency of humankind was tightly linked to his belief that people occupied a special place on earth, a place that was in part indicated by their very recency. His trip to France had, however, shown him that he had been wrong. His presentation to the British Association in September, some 2 months after he had left for Abbeville, was delivered from a powerful position, for he was then president of the geology section of that association.

Lyell was succinct and clear about his new opinion of human antiquity. He began by discussing the earlier scepticism:

For the last quarter of a century, the occasional occurrence, in various parts of Europe, of the bones of man or the works of his hands, in cave-breccias and stalactites associated with the remains of the extinct hyaena, bear, elephant, or rhinoceros, has given rise to a suspicion that the date of man must be carried further back than we had heretofore imag-

ined. On the other hand, extreme reluctance was naturally felt on the part of scientific reasoners to admit the validity of such evidence, seeing that so many caves have been inhabited by a succession of tenants, and have been selected by man, as a place not only of domicile, but of sepulture, while some caves have also served as the channels through which the water of flooded rivers flowed, so that the remains of living beings which have peopled the district at more than one era may have subsequently been mingled in such caverns and confounded together in one and the same deposit. The facts, however, recently brought to light during the systematic excavation . . . of the Brixham Cave, must, I think, have prepared you to admit that scepticism in regard to the cave-evidence in favour of the antiquity of man has previously been pushed to an extreme.⁶¹

Recent work at Denise, he noted, still left the antiquity of human bones from that site in doubt. While that was the case, however, he also noted that he was

fully prepared to corroborate the conclusions which have recently been laid before the Royal Society by Mr. Prestwich, in regard to the age of the flint implements associated in undisturbed gravel, in the north of France, with the bones of elephants, at Abbeville and Amiens. These were first noticed at Abbeville, and their true geological position assigned to them by M. Boucher de Perthes, in 1847, in his "Antiquités Celtiques," while those of Amiens were afterwards described in 1854, by the late Dr. Rigollot. . . . I have myself obtained abundance of flint implements . . . during a short visit to Amiens and Abbeville. . . . The stratified gravel resting immediately on the chalk in which these rudely fashioned implements are buried, belongs to the post-pliocene period. . . . The great number of the fossil instruments which have been likened to hatchets, spear-heads, and wedges is truly wonderful. . . . Although the accompanying shells are of living species, I believe the antiquity of the Abbeville and Amiens flint instruments to be great indeed if compared to the times of history or tradition. . . . The disappearance of the elephant, rhinoceros, and other genera of quadrupeds now foreign to Europe, implies . . . a vast lapse of ages, separating the era in which the fossil implements were framed and that of the invasion of Gaul by the Romans.⁶²

Flower's presentation dealt with his excavation of a handaxe at St. Acheul; Evans focused on the undoubtedly artifactual nature of the tools involved. Although it might appear that the names of Pengelly and Falconer were missing from this set of papers, in fact they were not. In May 1859, Pengelly presented a synopsis of the Brixham Cave discoveries to the Royal Institution of Great Britain, noting that "whatever was the antiquity of the bone-earth in the cavern, the human period is as ancient."⁶³ After his trip to Abbeville, Falconer had gone to Italy where he excavated in Maccagnone Cave, near Palermo, and found stone tools with the remains of hippopotamus, elephant, and hyena. He presented these discoveries at the same meeting of the Geological Society in which Flower discussed his work, and both papers were published in the same volume of the Society's *Quarterly Journal*.⁶⁴

Although Lyell's paper was clearly the most symbolic of the lot, Prestwich's was the most detailed and carried the empirical evidence for what the others were arguing. Prestwich's paper began by recalling a "few highly probable instances" of earlier, rejected discoveries of ancient human remains—those

by Schmerling, MacEnery, Boucher de Perthes, and Rigollot—and by noting that the entire issue had been revived by the discoveries at Brixham Cave. He discussed the sections he had examined at Abbeville and Amiens in detail, providing stratigraphic profiles and lists of animals for Menchecourt, Moulin Quignon, and St. Acheul. He argued that the flint implements were real, and that they had not reached the positions in which they were found by accident (Figure 8.7). Prestwich also directed attention to Hoxne. Evans had called his notice to Frere's paper, and Prestwich had visited Hoxne as a result.⁶⁵ He found no stone tools here, but workers assured him that they were to be found, and Prestwich concluded that Hoxne provided a situation analogous to the Somme Valley sites.

Prestwich's view of the implications of these discoveries for human antiquity was more restrained than Lyell's. People, he observed, had existed "anterior to the surface assuming its present form, so far as it regards some of the minor features."⁶⁶ Yet this did not mean that our species was extremely ancient:

It might be supposed that in assigning to Man an appearance at such a period, it would of necessity imply his existence during long ages beyond all exact calculations; for we have been apt to place even the latest of our geological changes at a remote, and, to us, unknown distance. The reasons on which such a view has been held have been, mainly,—the great lapse of time considered requisite for the dying out of so many species of great Mammals,—the circumstance that many of the smaller valleys have been excavated since they lived,—the presumed non-existence of Man himself,—and the great extent of the later and more modern accumulations. But we have in this part of Europe no succession of strata to record a gradual dying out of the species, but much, on the contrary, which points to an abrupt end, and evidence only of relative and not of actual time. . . . The evidence, in fact, as it at present stands, does not seem to me to necessitate the carrying of man back in past time, so much as the bringing forward of the extinct animals towards our own time.⁶⁷

But the conservative Prestwich made his position on the major issue clear: people had been associated with the extinct mammals, and this association predated the time the earth had taken on its modern form. Although his position may appear somewhat similar to de Serres's earlier stand, the similarities are only superficial: de Serres's point was that the co-occurrence of human remains and extinct mammals implied the extreme recency of the mammals and that the deposits involved had been laid down after the earth acquired its modern form. Indeed, Prestwich soon clarified his position. In 1863, he observed that while the actual amount of time that had passed since the flint implements had been deposited cannot be calculated, it is "obvious, however, that our present chronology with respect to the first appearance of Man must be greatly extended; but, like a mountain-chain in the distance, its vast magnitude is felt before an exact measurement of its height and size can be taken."⁶⁸

This entire set of papers has the appearance of a coordinated onslaught. In the space of a few months during the middle of 1859, Pengelly and Prestwich (May), Evans, Falconer, and Flower (June), and Lyell (September) had presented their views to the five British scientific associations whose opinion counted

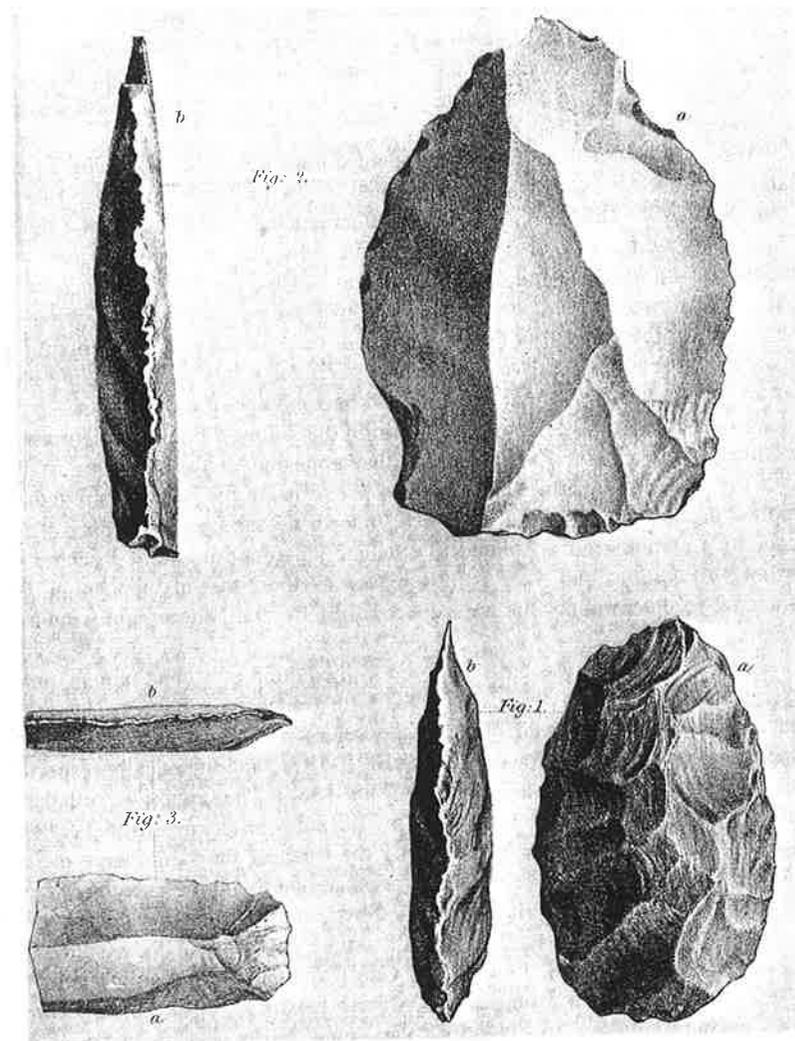


Figure 8.7. Flint implements from Abbeville, as illustrated by Prestwich (1861). The artifact illustrations provided by Prestwich left no doubt as to the nature of the items depicted. Such was not the case with Boucher de Perthes's earlier figures.

the most: the British Association for the Advancement of Science, the Geological Society of London, the Royal Institution of Great Britain, the Royal Society of London, and the Society of Antiquaries. Clearly a new resolution had been reached on the question of human antiquity by some of the most influential of British scientists. Human beings had coexisted with extinct mammals at a time that was ancient in terms of absolute years, and at a time when the earth was not yet modern in form.

What was happening on the continent during this rush of activity in England? In France, the issue was complicated by the presence of Léonce Élie de Beaumont (1798–1874). A geologist, mathematician, and disciple of Cuvier, Élie de Beaumont was a firm opponent of the view that the human species was geologically ancient. He followed de Luc and Cuvier, for instance, in equating the onset of formation of modern sand dunes with the onset of modern geological conditions, in inferring from the magnitude of these dunes that such conditions began only a few thousand years ago, and in equating this period of time with “all of human history.”⁶⁹ In 1853, he had become one of the perpetual secretaries of the Academy of Sciences, a position that allowed him some latitude in determining the nature of publications that appeared in the *Accounts* of the Academy’s weekly meetings. He was not above using his political strength to suppress aspects of work he did not like; indeed, he had been a member of the Academy’s commission appointed to evaluate the first volume of Boucher de Perthes’s *Antiquities* and there is little reason to doubt that his opposition was influential in determining that any report issued by that commission would be negative.

Élie de Beaumont was fully opposed to the notion of a great human antiquity, and with that to anything connected with Boucher de Perthes. However, Boucher de Perthes did have two major supporters in France by 1858: the highly respected paleontologist Édouard Lartet (1801–1871) and the equally respected zoologist Isidore Geoffroy Saint-Hilaire (1805–1861). The supportive collaboration of these two scientists was clear in the publication of Alfred Fontan’s discussion of the caverns of Massat, near the town of the same name in far-southern France. In one of these caverns, Fontan had found the remains of cave bear, hyena, and a large cat (later identified by Lartet as the extinct cave lion⁷⁰) intermingled with human teeth. Fontan’s report appeared in the Academy’s *Accounts* for 10 May 1858, followed by Geoffroy Saint-Hilaire’s discussion of Lartet’s identification of some of the Massat fossils. At the same meeting, Geoffroy Saint-Hilaire also put on display some of Boucher de Perthes’s artifacts, noting that they had been “found with the bones and fossil tooth fragments of elephants.” In addition, he took the opportunity to “render homage to the perseverant and fortunate zeal”⁷¹ that Boucher de Perthes had shown in conducting his work. This was high praise from a member of the elite Academy of Sciences.

It was a year later that the issue broke open in France, spurred by the reports of the British scientists. Late in the summer of 1859, the paleontologist Albert Gaudry (1827–1908) visited Amiens in response to Flower’s discovery at St. Acheul. Gaudry’s excavations at St. Acheul were also a success: he extracted nine handaxes from the diluvium. He communicated his results to the Academy of Sciences, which published an abstract of them in the reports for 26 September and a longer account in the reports for 3 October,⁷² including the conclusion that his discovery proved “definitively that man was contemporaneous with several of the great, extinct fossil animals.”⁷³ There was, however, no mention of Boucher de Perthes’s work in Gaudry’s publication.

A few weeks later, Georges Pouchet (1833–1894) of the Rouen Museum of Natural History published a similar report in the *Accounts*. Pouchet’s interest in examining St. Acheul resulted from a discussion with Lyell, who had visited the Rouen Museum on 23 August 1859. Two days later, Pouchet was on his way to Amiens in hopes of retrieving specimens to display at his museum. He proved to be as lucky as Flower and Gaudry, and was able to excavate a handaxe from undisturbed deposits. He sent his results to the Academy, which published an extract of his letter on 10 October. Pouchet’s communication was like Gaudry’s in more than one way: not only had Pouchet found a handaxe in diluvium, but he also failed to mention Boucher de Perthes’s work.⁷⁴

The reasons that Pouchet and Gaudry did not mention Boucher de Perthes, however, were significantly different. Pouchet omitted mention of Boucher de Perthes’s work because, as he noted in 1860, he simply had not read it at the time.⁷⁵ Gaudry was a different case. Not only was he fully aware of Boucher de Perthes’s research, but he had credited both Boucher de Perthes and Rigollot in the communication that had gone to the Academy. That section of his report never appeared.

On the same day that Pouchet’s results were communicated to the Academy, Geoffroy Saint-Hilaire decided to intervene on Boucher de Perthes’s behalf. On 10 October, he wrote to Boucher de Perthes, told him that “not even your name has been uttered,”⁷⁶ and requested a summary of his discoveries that he could transmit to the Academy. Boucher de Perthes complied, and his summary, including a review of the support he had received from the English geologists, appeared in the *Accounts* for 24 October.⁷⁷ Boucher de Perthes also wrote to Élie de Beaumont, expressing dissatisfaction that his work had not been mentioned, and Élie de Beaumont took the occasion of the 24 October meeting to note that he had overseen the excision of the names of Boucher de Perthes and Rigollot from Gaudry’s paper. He observed that “the memoir read by M. Albert Gaudry in the meeting of last October 3 included a paragraph concerning the flint axes found at Abbeville, in which the name and work of M. Boucher de Perthes was mentioned, so justice was done.” The paragraph was dropped, he explained, because the paper had to be shortened, as was the case with most papers, and because

everyone knew of Boucher de Perthes's research anyway: "the removal of the paragraph concerning the motives that brought M. Gaudry to look in the diluvium for the products of human art was essentially a tacit homage to the notorious [notoire] rights of priority of M. Boucher de Perthes."⁷⁸

Lartet was also subject to Élie de Beaumont's power. In April 1860 he wrote to Boucher de Perthes that

I decided several days ago to present a short note to the Academy of Sciences that started with these lines: "Of all the discoveries that tend to give a high antiquity to the appearance of the human race in the western part of the European continent, none, without exception, are more conclusive than the worked flints recovered by M. Boucher de Perthes. . . ." An omnipotent will, the same that had M. Gaudry's memoir inserted, decided, contrary to my request and also contrary to generally adopted custom, that not one line of this note would appear in the reports.⁷⁹

Lartet did not mention the paper by name, but he was referring to his "Geologic Antiquity of the Human Species in Europe," a paper that appeared by title only in the Academy's *Accounts* for 19 March 1860.⁸⁰ He did, however, get his paper published. It appeared in 1860 in the Swiss *Archives of Physical and Natural Sciences*; a much modified version also appeared in the *Proceedings* of the Geological Society of London, altered because the fact of contemporaneity was no longer an issue among members of that body.⁸¹ The paper sheds much light on why Élie de Beaumont suppressed it, for it would have offended any follower of Cuvier.

Lartet had begun his paper by praising Boucher de Perthes, just as his letter to Boucher de Perthes indicated. He then noted that many had questioned the validity of the associations between human remains and those of extinct mammals, and suggested that the best demonstration of contemporaneity would be provided by the bones of extinct mammals that had been worked by human hands, as long as the indicative marks could not have come long after the death of the animal. "It was this that I tried to verify in the collections of the museum of natural history, and particularly on those described or mentioned by Cuvier."⁸² Lartet found exactly what he was looking for in Cuvier's material ("Oss. foss., in-4°, 1822, tome IV, pl. VI, fig. 9" he carefully observed⁸³). This was a nasty cut, attempting to show Cuvier wrong on such a major issue by using items that Cuvier himself had handled, a cut that probably went too far not only for Élie de Beaumont but for others in the audience on 19 March as well. As if this were not enough, Lartet then used Élie de Beaumont's own hypotheses on the effects of mountain building to date the arrival of people in Europe, and argued against Élie de Beaumont's position that the history of life had, during later geological times, been interrupted by major catastrophes. Élie de Beaumont's reaction to all this is understandable, and Lartet clearly was not the completely innocent victim of an "omnipotent will" as he suggested in his letter to Boucher de Perthes.

Soon after Élie de Beaumont rejected Lartet's paper, he accepted a series of comments by the geologist Eugène Robert (1806-1879) that maintained that the strata from which the stone tools had come were not the true diluvium, but had instead been deposited much later in time. Any association between the stone tools and extinct mammals, he asserted, was accidental, caused by the reworking of older deposits. "Between the presence of the first men of Europe and that of the great Pachyderms," he concluded, there has been "an enormous distance, of thousands of years for example."⁸⁴ Boucher de Perthes published a response to this critique, Robert answered, and Boucher de Perthes responded again.⁸⁵ The last response, however, was preceded by Élie de Beaumont's opinion of the whole matter:

Concerning the flint axes found in the valley of the Somme, of the Seine, and elsewhere, it does not seem demonstrated, as of the present, that any of these axes, or any other products of human industry, have been extracted from *diluvial terrain* NOT REWORKED.⁸⁶

This comment was published in the Academy's *Accounts* for 5 June 1861. While 4 years earlier it would have been the received opinion, it now marked Élie de Beaumont as an outsider on the issue. French scientists as influential in their country as Lyell and Prestwich were in Great Britain had joined with Boucher de Perthes. Not only were Geoffroy Saint-Hilaire, Lartet, and Gaudry firmly on his side, but the 1859 English and French examinations of the Somme Valley sites had brought even such earlier opponents as Maury into the fold during that year.⁸⁷ Hébert was completely correct when he wrote to Boucher de Perthes in December 1860 that "now it is a dead issue, and the people who still question the existence of man during the quaternary epoch are evidently not up to date on the question."⁸⁸

Symbolic of the decision by French scientists in favor of a vast human antiquity was Lartet's "New Researches on the Coexistence of Man and the Great Fossil Mammals," published in 1861. This important paper looked forward, not back. For Lartet the crucial issue was no longer whether people and mammals had coexisted, but was instead that of deriving a method for placing the many sites containing the proof of this contemporaneity in proper chronological order. This issue was to become extremely important during the following decades and, in more refined form, remains of crucial importance today. Lartet's solution to this problem was to derive a relative chronology for the human remains from the nature of the fauna with which they were associated, an approach similar to that which Tournai had taken in 1829. He defined four successive faunal ages for western Europe—the age of cave bears, of elephants and rhinoceroses, of reindeer, and of aurochs—and suggested that archaeological materials be ordered in terms of the faunal stage to which the associated mammals belonged. The only mention he gave to the old question of contemporaneity was confined to a footnote:

It is true that some persist in objecting to Boucher de Perthes: "that it is not demonstrated, as of the present, that any of these axes, or any other product of human industry, has been extracted from *diluvial terrain not reworked*." . . . In the observational sciences, the first condition of all discussion is the impartial consideration of facts; the second, logic and good faith in objections. The moment that an adversary, refusing to examine the facts, limits himself to denying by sentiment or prejudices, the discussion must stop, for it will cease to have a scientific nature.⁸⁹

Lartet did not mention Élie de Beaumont by name, but he did not have to.

Boucher de Perthes held his victory celebration in 1860. In that year, he published *Antediluvian Man and His Works*, much of which was dedicated to a discussion of the support that others had now provided his discoveries. He also provided a synopsis of the history of his research, implying along the way that he had been interested in the question of human antiquity since 1805.⁹⁰ In 1860, he had won and he knew it.

And where was Marcel de Serres during all of this? Now aged, he was in Montpellier publishing works that retracted nearly all he had said concerning the association of human remains with the remains of extinct mammals. By the mid-1850s it had become clear to him that his approach to the reconciliation of Genesis and the deeper archaeological record simply would not work. Many of the extinct mammals were undoubtedly older than any interpretation of the biblical chronology would allow, and no one of any scientific stature had accepted his argument that those animals belonged to a modern world. He was faced with a difficult decision. Either his religion was wrong or his geology was wrong. He found the flaw in his geology. In 1855, he published a lengthy review of bone caverns and the human remains they contained in which he surveyed virtually every cave that had provided evidence for the contemporaneity of human beings and extinct beasts, including, of course, the caverns of Bize, Pondres, and Souvignargues. He rejected all evidence of the association of human remains with animals of diluvial age. The mixtures, he argued, were "the result of purely accidental causes," of the reworking of older material upwards and of younger material downwards. People, he now argued, "were not contemporary with elephants, rhinoceroses, *Megatherium*, no more than the great lions, hyaenas, megalonyx, and gigantic bears."⁹¹

He soon found what seemed to be a pristine cave, a model of what the other caves must have looked like before they had been disturbed. The cavern of Pontil, in southern France, contained three separate, stratified deposits: an uppermost, recent bed; a middle group of materials holding artifacts of Gallo-Roman age; and a lowermost complex of deposits containing the remains of such extinct mammals as rhinoceros and cave bear. The human remains and extinct mammals were separated by a thick, almost impenetrable calcareous crust. Were it not for this fact, he argued, running water and other disturbing processes would inevitably have caused intermixture, producing precisely those associations seen in other caverns "where conditions like those of Pontil are not present."⁹² Al-

though de Serres was willing to accept possibly very recently extinct mammals as human contemporaries, the Pleistocene mammals were not to be included.⁹³ Indeed, he retooled his earlier arguments on the magnitude of recent extinctions, arguments originally forwarded to remove the troubling implications of the association of human remains with extinct mammals of diluvial age. Now, holding those associations as invalid, he used the same arguments to stress the modernity of the associations he would accept, for extinct species of such animals as horses, cattle, and deer.⁹⁴

Thus, while Fontan was arguing for the antiquity of the human remains from the cavern of Massat, de Serres was arguing against the validity of the Massat associations.⁹⁵ In the same volume of the *Archives of Physical and Natural Sciences* in which Lartet and Pictet were arguing that biotic continuity throughout the Quaternary implied that the human species could have existed for the same length of time, de Serres was arguing that Boucher de Perthes's stone tools were not diluvial in age and that true diluvial deposits "do not contain the least vestige of tools or the products of human industry, no more than the bones of our species."⁹⁶ And in the third edition of his *Cosmogony of Moses Compared with Geological Facts* (1860), published 2 years before his death, de Serres maintained that the dispersal of the diluvium predated the appearance of people on earth and that human beings came into existence some 8000 years ago, about 2500 years before the biblical Deluge. In a statement that MacEnery could have written, he observed that "it is only after long and exacting study that we have recognized our mistake"⁹⁷ in interpreting the mixture of human remains with those of extinct mammals in cave deposits. The Bible is a "great scientific work,"⁹⁸ and all science is in accord with it, including the scientific knowledge gained from the bone caverns. De Serres had lost, and he knew it.

By 1860, then, a new resolution on the question of human antiquity had been reached both in Great Britain and in western Europe. It was now very generally agreed that people had coexisted with the extinct mammals, that they had been on earth prior to the time that the earth had taken on its modern form, and that they had existed for a series of millennia that could not be encompassed within the biblical chronology. Not everyone agreed, as I will discuss, but the situation was now reversed from what it had been just a few years before. Majority opinion now held that people were both geologically ancient and ancient in terms of the number of years they had been in existence. Only a very small minority held otherwise. An argument that had lasted for 60 years was now over.

Notes and References

1. In his 1858 presidential address to the British Association for the Advancement of Science, for instance, Richard Owen noted that two lines of evidence called for a higher human antiquity than "assigned to it in historical and genealogical records": Leonard Horner's deeply buried ce-

Incorporated
methods

de Serres

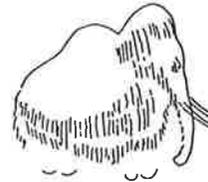
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- ramics from the Nile Valley (see Chapter 9), and the diversity of human languages (Owen 1859:xciv-xcv).
2. [Whewell] 1853:93.
 3. [Whewell] 1853:90.
 4. Mantell 1851:237.
 5. Mantell 1851:249-250.
 6. Mantell 1851:248.
 7. Mantell 1851:238.
 8. Mantell 1851:238.
 9. Curwen 1940:255.
 10. Maury 1852:277.
 11. Maury 1852:277-278. Much later, Maury noted that the doubtful nature of many of Boucher de Perthes's artifacts had hurt his cause considerably (Maury 1867).
 12. Pictet 1853:145.
 13. Pictet 1853:151.
 14. Pictet 1853:154.
 15. Boucher de Perthes 1857:7.
 16. Hume 1851:49.
 17. Biographical information on Rigollot is drawn from Rembault 1855; Cuvier discussed Rigollot's specimens in Cuvier 1821b:110 and 1822, Part 1:50, 111.
 18. Aufrère 1940:110.
 19. Boucher de Perthes 1857:467-468.
 20. Rigollot 1855:308.
 21. Rigollot 1857:678-679.
 22. The presentation of Rigollot's memoir on 14 November is noted in the Société des Antiquaires de Picardie *Bulletins* 5 (1855).
 23. Rigollot 1854, 1856.
 24. Rigollot 1854:13; 1856:33.
 25. Rigollot 1854:13; 1856:34.
 26. Rigollot 1854:16; 1856:36.
 27. Rigollot 1854:3-4; 1856:23-24.
 28. Hébert 1855a.
 29. Hébert 1855b:255.
 30. Buteux 1855; see also Buteux 1857.
 31. See the discussion accompanying Buteux 1855.
 32. Prestwich 1866:215.
 33. See the correspondence and discussion in Ledieu 1885.
 34. Agassiz 1837:xxiv.
 35. Boucher de Perthes 1857:21.
 36. Grayson 1983.
 37. Boucher de Perthes 1857:32.
 38. Boucher de Perthes 1857:357.
 39. Boucher de Perthes 1857:444.
 40. Spring 1853.
 41. Boucher de Perthes 1857:373.
 42. Boucher de Perthes 1857:80.
 43. Boué 1830, 1831-1832[1832].
 44. Boucher de Perthes 1857:69.
 45. Boucher de Perthes 1857:210.
 46. Biographical information on Pengelly is taken from Woodward 1895.
 47. Prestwich 1873.

48. Gruber 1965:385.
49. Prestwich 1873:476-477.
50. Prestwich 1873:482.
51. Prestwich 1873:549.
52. In Murchison 1868:495-496. Pengelly's paper appeared by title only (Pengelly 1859).
53. In Gruber 1965:390.
54. Prestwich 1866:214.
55. Aufrère 1940:114.
56. In Murchison 1868:597.
57. Prestwich's Easter field trips are discussed by Woodward 1907.
58. Prestwich 1860.
59. Aufrère 1940:114.
60. Prestwich 1860 and 1861; Evans 1860; Flower 1860; Lyell 1860. Lyell also discussed the Abbeville and Amiens material in his correspondence (Lyell 1881, Volume 2:341; Wilson 1970:lvii).
61. Lyell 1860:93.
62. Lyell 1860:94-95.
63. Pengelly 1862:150.
64. Falconer 1860b.
65. Prestwich 1861.
66. Prestwich 1861:309.
67. Prestwich 1861:309.
68. Prestwich 1863d:52; see also Prestwich 1866.
69. Élie de Beaumont 1845:219.
70. Lartet 1861.
71. Fontan 1858; Geoffroy Saint-Hilaire 1858:902-903.
72. Gaudry 1859a,b.
73. Gaudry 1859a:454.
74. Pouchet 1859.
75. Pouchet 1860a; see also Pouchet 1860b.
76. Ledieu 1885:246. Geoffroy Saint-Hilaire also raised the issue directly to Pouchet (Geoffroy Saint-Hilaire 1860).
77. Boucher de Perthes 1859; Prestwich announced his support in the *Accounts* of the Academy of Sciences the following week (Prestwich 1859).
78. Élie de Beaumont 1859:582.
79. Aufrère 1940:118; see also Ledieu 1885:256-257.
80. Lartet 1860d; see also Lartet 1860a.
81. Lartet 1860c, 1860b.
82. Lartet 1860c:194.
83. Lartet 1860c:195.
84. Robert 1861b:64; see also Robert 1860.
85. Boucher de Perthes 1861c; Robert 1861a; Boucher de Perthes 1861b.
86. Élie de Beaumont 1861:1133-1134; see also Boucher de Perthes 1861a and Robert 1863.
87. Maury 1859; Pictet 1859, 1860a.
88. Ledieu 1885:266. General agreement with Boucher de Perthes can also be seen in the comments of various individuals in the "Discussion of Diluvial Axes" held by members of the Anthropological Society of Paris on 17 November 1859 (Société d'Anthropologie de Paris *Bulletins* 1:60-78, 1860).
89. Lartet 1861:216. The first section of this paper, on Aurignac, was translated into English and published the following year (Lartet 1862).
90. Boucher de Perthes 1860; see also Boucher de Perthes 1864a:1-107. Boucher de Perthes's new

version of the history of his interest in the question of human antiquity quickly made its way into the literature (see, for instance, Anonymous 1863c).

91. De Serres 1855–1857[1855]:87; see also de Serres 1855–1857[1856].
92. De Serres 1857a:650.
93. De Serres 1857a,b.
94. De Serres argued this point in a number of very similar papers. The lengthiest version is de Serres 1860b; see also de Serres 1859, 1860c, and 1860d.
95. De Serres 1858.
96. Lartet 1860c; Pictet 1860a; de Serres 1860d:114; see also Collomb 1860 and Gaudin 1860.
97. De Serres 1860a, Volume 2:lxvii.
98. De Serres 1860a, Volume 2:376.



A Great and Sudden Revolution

“No subject has lately excited more curiosity and general interest among geologists and the public than the question of the Antiquity of the Human Race,—whether or no we have sufficient evidence in caves, or in the superficial deposits commonly called drift or ‘diluvium,’ to prove the former co-existence of man with certain extinct mammalia.” So began Charles Lyell’s *Geological Evidences of the Antiquity of Man*, published in 1863. This work addressed not only the antiquity of the human species, but also the origin of species through descent with modification. The first of these topics had been raised by the events I discussed in the previous chapter; the second, by the publication of Charles Darwin’s *Origin of Species* in 1859. Lyell did not support evolution by natural selection in the way Darwin hoped he would, and Darwin was “greatly disappointed” that he had not even spoken decisively on the more general issue of transmutation.¹ Lyell did, however, throw his full weight behind the evidence for human antiquity.

Lyell began by resurrecting the cave data. Noting that his earlier writings had given “no small weight to the arguments of M. Desnoyers, and the writings