

## CHAPTER VII.

### *THE ANTIQUITY OF MAN AND PREHISTORIC ARCHÆOLOGY.*

#### I. THE THUNDER-STONES.

WHILE the view of chronology based upon the literal acceptance of Scripture texts was thus shaken by researches in Egypt, another line of observation and thought was slowly developed, even more fatal to the theological view.

From a very early period there had been dug from the earth, in various parts of the world, strangely shaped masses of stone, some rudely chipped, some polished: in ancient times the larger of these were very often considered as thunderbolts, the smaller as arrows, and all of them as weapons which had been hurled by the gods and other supernatural personages. Hence a sort of sacredness attached to them. In Chaldea, they were built into the wall of temples; in Egypt, they were strung about the necks of the dead; in India, fine specimens are to this day seen upon altars, receiving prayers and sacrifices.

Naturally these beliefs were brought into the Christian mythology and adapted to it. During the Middle Ages many of these well-wrought stones were venerated as weapons, which during the "war in heaven" had been used in driving forth Satan and his hosts; hence in the eleventh century an Emperor of the East sent to the Emperor of the West a "heaven axe"; and in the twelfth century a Bishop of Rennes asserted the value of thunder-stones as a divinely-appointed means of securing success in battle, safety on the sea, security against thunder, and immunity from unpleasant dreams. Even as late as the seventeenth century a French

ambassador brought a stone hatchet, which still exists in the museum at Nancy, as a present to the Prince-Bishop of Verdun, and claimed for it health-giving virtues.

In the last years of the sixteenth century Michael Mercati tried to prove that the "thunder-stones" were weapons or implements of early races of men; but from some cause his book was not published until the following century, when other thinkers had begun to take up the same idea, and then it had to contend with a theory far more accordant with theologic modes of reasoning in science. This was the theory of the learned Tollius, who in 1649 told the world that these chipped or smoothed stones were "generated in the sky by a fulgurous exhalation conglobed in a cloud by the circumposed humour."

But about the beginning of the eighteenth century a fact of great importance was quietly established. In the year 1715 a large pointed weapon of black flint was found in contact with the bones of an elephant, in a gravel bed near Gray's Inn Lane, in London. The world in general paid no heed to this: if the attention of theologians was called to it, they dismissed it summarily with a reference to the Deluge of Noah; but the specimen was labelled, the circumstances regarding it were recorded, and both specimen and record carefully preserved.

In 1723 Jussieu addressed the French Academy on *The Origin and Uses of Thunder-stones*. He showed that recent travellers from various parts of the world had brought a number of weapons and other implements of stone to France, and that they were essentially similar to what in Europe had been known as "thunder-stones." A year later this fact was clinched into the scientific mind of France by the Jesuit Lafitau, who published a work showing the similarity between the customs of aborigines then existing in other lands and those of the early inhabitants of Europe. So began, in these works of Jussieu and Lafitau, the science of Comparative Ethnography.

But it was at their own risk and peril that thinkers drew from these discoveries any conclusions as to the antiquity of man. Montesquieu, having ventured to hint, in an early edition of his *Persian Letters*, that the world might be much

older than had been generally supposed, was soon made to feel danger both to his book and to himself, so that in succeeding editions he suppressed the passage.

In 1730 Mahudel presented a paper to the French Academy of Inscriptions on the so-called "thunder-stones," and also presented a series of plates which showed that these were stone implements, which must have been used at an early period in human history.

In 1778 Buffon, in his *Époques de la Nature*, intimated his belief that "thunder-stones" were made by early races of men; but he did not press this view, and the reason for his reserve was obvious enough: he had already one quarrel with the theologians on his hands, which had cost him dear—public retraction and humiliation. His declaration, therefore, attracted little notice.

In the year 1800 another fact came into the minds of thinking men in England. In that year John Frere presented to the London Society of Antiquaries sundry flint implements found in the clay beds near Hoxne: that they were of human make was certain, and, in view of the undisturbed depths in which they were found, the theory was suggested that the men who made them must have lived at a very ancient geological epoch; yet even this discovery and theory passed like a troublesome dream, and soon seemed to be forgotten.

About twenty years later Dr. Buckland published a discussion of the subject, in the light of various discoveries in the drift and in caves. It received wide attention, but theology was soothed by his temporary concession that these striking relics of human handiwork, associated with the remains of various extinct animals, were proofs of the Deluge of Noah.

In 1823 Boué, of the Vienna Academy of Sciences, showed to Cuvier sundry human bones found deep in the alluvial deposits of the upper Rhine, and suggested that they were of an early geological period; this Cuvier virtually, if not explicitly, denied. Great as he was in his own field, he was not a great geologist; he, in fact, led geology astray for many years. Moreover, he lived in a time of reaction; it was the period of the restored Bourbons, of the Voltairean

King Louis XVIII, governing to please orthodoxy. Boué's discovery was, therefore, at first opposed, then enveloped in studied silence.

Cuvier evidently thought, as Voltaire had felt under similar circumstances, that "among wolves one must howl a little"; and his leading disciple, Élie de Beaumont, who succeeded him in the sway over geological science in France, was even more opposed to the new view than his great master had been. Boué's discoveries were, therefore, apparently laid to rest forever.\*

In 1825 Kent's Cavern, near Torquay, was explored by the Rev. Mr. McEnery, a Roman Catholic clergyman, who seems to have been completely overawed by orthodox opinion in England and elsewhere; for, though he found human bones and implements mingled with remains of extinct animals, he kept his notes in manuscript, and they were only brought to light more than thirty years later by Mr. Vivian.

The coming of Charles X, the last of the French Bourbons, to the throne, made the orthodox pressure even greater. It was the culmination of the reactionary period—the time in France when a clerical committee, sitting at the Tuileries, took such measures as were necessary to hold in check all science that was not perfectly "safe"; the time in Austria when Kaiser Franz made his famous declaration to sundry professors, that what he wanted of them was simply to train obedient subjects, and that those who did not make this their purpose would be dismissed; the time in Germany when Nicholas of Russia and the princelings and ministers under his control, from the King of Prussia downward, put forth all their might in behalf of "scriptural science"; the time in Italy when a scientific investigator, arriving at any conclu-

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\* For the general history of early views regarding stone implements, see the first chapters in Cartailhac, *La France Préhistorique*; also Joly, *L'Homme avant les Métaux*; also Lyell, Lubbock, and Evans. For lightning-stones in China and elsewhere, see citation from a Chinese encyclopædia of 1662, in Tylor, *Early History of Mankind*, p. 209. On the universality of this belief, on the surviving use of stone implements even into civilized times, and on their manufacture to-day, see *ibid.*, chapter viii. For the treatment of Boué's discovery, see especially Mortillet, *Le Préhistorique*, Paris, 1885, p. 11. For the suppression of the passage in Montesquieu's *Persian Letters*, see Letter 113, cited in Schlosser's *History of the Eighteenth Century* (English translation), vol. i, p. 135.

sion distrusted by the Church, was sure of losing his place and in danger of losing his liberty; the time in England when what little science was taught was held in due submission to Archdeacon Paley; the time in the United States when the first thing essential in science was, that it be adjusted to the ideas of revival exhorters.

Yet men devoted to scientific truth laboured on; and in 1828 Tournal, of Narbonne, discovered in the cavern of Bize specimens of human industry, with a fragment of a human skeleton, among bones of extinct animals. In the following year Christol published accounts of his excavations in the caverns of Gard; he had found in position, and under conditions which forbade the idea of after-disturbance, human remains mixed with bones of the extinct hyena of the early Quaternary period. Little general notice was taken of this, for the reactionary orthodox atmosphere involved such discoveries in darkness.

But in the French Revolution of 1830 the old politico-theological system collapsed: Charles X and his advisers fled for their lives; the other continental monarchs got glimpses of new light; the priesthood in charge of education were put on their good behaviour for a time, and a better era began.

Under the constitutional monarchy of the house of Orleans in France and Belgium less attention was therefore paid by Government to the saving of souls; and we have in rapid succession new discoveries of remains of human industry, and even of human skeletons so mingled with bones of extinct animals as to give additional proofs that the origin of man was at a period vastly earlier than any which theologians had dreamed of.

A few years later the reactionary clerical influence against science in this field rallied again. Schmerling in 1833 had explored a multitude of caverns in Belgium, especially at Engis and Engihoul, and had found human skulls and bones closely associated with bones of extinct animals, such as the cave bear, hyena, elephant, and rhinoceros, while mingled with these were evidences of human workmanship in the shape of chipped flint implements; discoveries of a similar sort had been made by De Serres in France and by

Lund in Brazil; but, at least as far as continental Europe was concerned, these discoveries were received with much coolness both by Catholic leaders of opinion in France and Belgium and by Protestant leaders in England and Holland. Schmerling himself appears to have been overawed, and gave forth a sort of apologetic theory, half scientific, half theologic, vainly hoping to satisfy the clerical side.

Nor was it much better in England. Sir Charles Lyell, so devoted a servant of prehistoric research thirty years later, was still holding out against it on the scientific side; and, as to the theological side, it was the period when that great churchman, Dean Cockburn, was insulting geologists from the pulpit of York Minster, and the Rev. Mellor Brown denouncing geology as "a black art," "a forbidden province"; and when, in America, Prof. Moses Stuart and others like him were belittling the work of Benjamin Silliman and Edward Hitchcock.

In 1840 Godwin Austin presented to the Royal Geological Society an account of his discoveries in Kent's Cavern, near Torquay, and especially of human bones and implements mingled with bones of the elephant, rhinoceros, cave bear, hyena, and other extinct animals; yet this memoir, like that of McEnery fifteen years before, found an atmosphere so unfavourable that it was not published.

## II. THE FLINT WEAPONS AND IMPLEMENTS.

At the middle of the nineteenth century came the beginning of a new epoch in science—an epoch when all these earlier discoveries were to be interpreted by means of investigations in a different field: for, in 1847, a man previously unknown to the world at large, Boucher de Perthes, published at Paris the first volume of his work on *Celtic and Antediluvian Antiquities*, and in this he showed engravings of typical flint implements and weapons, of which he had discovered thousands upon thousands in the high drift beds near Abbeville, in northern France.

The significance of this discovery was great indeed—far greater than Boucher himself at first supposed. The very

title of his book showed that he at first regarded these implements and weapons as having belonged to men overwhelmed at the Deluge of Noah; but it was soon seen that they were something very different from proofs of the literal exactness of Genesis: for they were found in terraces at great heights above the river Somme, and, under any possible theory having regard to fact, must have been deposited there at a time when the river system of northern France was vastly different from anything known within the historic period. The whole discovery indicated a series of great geological changes since the time when these implements were made, requiring cycles of time compared to which the space allowed by the orthodox chronologists was as nothing.

His work was the result of over ten years of research and thought. Year after year a force of men under his direction had dug into these high-terraced gravel deposits of the river Somme, and in his book he now gave, in the first full form, the results of his labour. So far as France was concerned, he was met at first by what he calls "a conspiracy of silence," and then by a contemptuous opposition among orthodox scientists, at the head of whom stood Élie de Beaumont.

This heavy, sluggish opposition seemed immovable: nothing that Boucher could do or say appeared to lighten the pressure of the orthodox theological opinion behind it; not even his belief that these fossils were remains of men drowned at the Deluge of Noah, and that they were proofs of the literal exactness of Genesis seemed to help the matter. His opponents felt instinctively that such discoveries boded danger to the accepted view, and they were right: Boucher himself soon saw the folly of trying to account for them by the orthodox theory.

And it must be confessed that not a little force was added to the opposition by certain characteristics of Boucher de Perthes himself. Gifted, far-sighted, and vigorous as he was, he was his own worst enemy. Carried away by his own discoveries, he jumped to the most astounding conclusions. The engravings in the later volume of his great work, showing what he thought to be human features and inscriptions upon

**some** of the flint implements, are worthy of a comic almanac ; **and** at the National Museum of Archæology at St. Germain, beneath the shelves bearing the remains which he discovered, which mark the beginning of a new epoch in science, are drawers containing specimens hardly worthy of a penny museum, but from which he drew the most unwarranted inferences as to the language, religion, and usages of prehistoric man.

Boucher triumphed none the less. Among his bitter opponents at first was Dr. Rigollot, who in 1855, searching earnestly for materials to refute the innovator, dug into the deposits of St. Acheul—and was converted : for he found implements similar to those of Abbeville, making still more certain the existence of man during the Drift period. So, too, Gaudry a year later made similar discoveries.

But most important was the evidence of the truth which now came from other parts of France and from other countries. The French leaders in geological science had been held back not only by awe of Cuvier but by recollections of Scheuchzer. Ridicule has always been a serious weapon in France, and the ridicule which finally overtook the supporters of the attempt of Scheuchzer, Mazurier, and others, to square geology with Genesis, was still remembered. From the great body of French geologists, therefore, Boucher secured at first no aid. His support came from the other side of the Channel. The most eminent English geologists, such as Falconer, Prestwich, and Lyell, visited the beds at Abbeville and St. Acheul, convinced themselves that the discoveries of Boucher, Rigollot, and their colleagues were real, and then quietly but firmly told England the truth.

And now there appeared a most effective ally in France. The arguments used against Boucher de Perthes and some of the other early investigators of bone caves had been that the implements found might have been washed about and turned over by great floods, and therefore that they might be of a recent period ; but in 1861 Edward Lartet published an account of his own excavations at the Grotto of Aurignac, and the proof that man had existed in the time of the Quaternary animals was complete. This grotto had been carefully sealed in prehistoric times by a stone at its entrance ; no

interference from disturbing currents of water had been possible; and Lartet found, in place, bones of eight out of nine of the main species of animals which characterize the Quaternary period in Europe; and upon them marks of cutting implements, and in the midst of them coals and ashes.

Close upon these came the excavations at Eyzies by Lartet and his English colleague, Christy. In both these men there was a carefulness in making researches and a sobriety in stating results which converted many of those who had been repelled by the enthusiasm of Boucher de Perthes. The two colleagues found in the stony deposits made by the water dropping from the roof of the cave at Eyzies the bones of numerous animals extinct or departed to arctic regions—one of these a vertebra of a reindeer with a flint lance-head still fast in it, and with these were found evidences of fire.

Discoveries like these were thoroughly convincing; yet there still remained here and there gainsayers in the supposed interest of Scripture, and these, in spite of the convincing array of facts, insisted that in some way, by some combination of circumstances, these bones of extinct animals of vastly remote periods might have been brought into connection with all these human bones and implements of human make in all these different places, refusing to admit that these ancient relics of men and animals were of the same period. Such gainsayers virtually adopted the reasoning of quaint old Persons, who, having maintained that God created the world “about five thousand sixe hundred and odde yeares agoe,” added, “And if they aske what God was doing before this short number of yeares, we answere with St. Augustine replying to such curious questioners, that He was framing Hell for them.” But a new class of discoveries came to silence this opposition. At La Madeleine in France, at the Kessler cave in Switzerland, and at various other places, were found rude but striking carvings and engravings on bone and stone representing sundry specimens of those long-vanished species; and these specimens, or casts of them, were soon to be seen in all the principal museums. They showed the hairy mammoth, the cave bear, and various other animals of the Quaternary period, carved rudely but vigorously

by contemporary men; and, to complete the significance of these discoveries, travellers returning from the icy regions of North America brought similar carvings of animals now existing in those regions, made by the Eskimos during their long arctic winters to-day.\*

As a result of these discoveries and others like them, showing that man was not only contemporary with long-extinct animals of past geological epochs, but that he had already developed into a stage of culture above pure savagery, the tide of thought began to turn. Especially was this seen in 1863, when Lyell published the first edition of his *Geological Evidence of the Antiquity of Man*; and the fact that he had so long opposed the new ideas gave force to the clear and conclusive argument which led him to renounce his early scientific beliefs.

Research among the evidences of man's existence in the early Quaternary, and possibly in the Tertiary period, was now pressed forward along the whole line. In 1864 Gabriel Mortillet founded his review devoted to this subject; and in 1865 the first of a series of scientific congresses devoted to such researches was held in Italy. These investigations went on vigorously in all parts of France and spread rapidly

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\* For the explorations in Belgium, see Dupont, *Le Temps Préhistorique en Belgique*. For the discoveries by McEnery and Godwin Austin, see Lubbock, *Prehistoric Times*, London, 1869, chap. x; also Cartailhac, Joly, and others above cited. For Boucher de Perthes, see his *Antiquités Celtiques et Antédiluviennes*, Paris, 1847-'64, vol. iii, pp. 526 *et seq.* For sundry extravagances of Boucher de Perthes, see Reinach, *Description raisonnée du Musée de St.-Germain-en-Laye*, Paris, 1889, vol. i, pp. 16 *et seq.* For the mixture of sound and absurd results in Boucher's work, see Cartailhac as above, p. 19. Boucher had published in 1838 a work entitled *De la Création*, but it seems to have dropped dead from the press. For the attempts of Scheuchzer to reconcile geology and Genesis by means of the *Homo diluvii testis*, and similar "diluvian fossils," see the chapter on *Geology* in this series. The original specimens of those prehistoric engravings upon bone and stone may be best seen at the Archæological Museum of St.-Germain and the British Museum. For engravings of some of the most recent, see especially Dawkins's *Early Man in Britain*, chap. vii, and the *Description du Musée de St.-Germain*. As to the Kessler etchings and their antiquity, see D. G. Brinton, in *Science*, August 12, 1892. For comparison of this prehistoric work with that produced to-day by the Eskimos and others, see Lubbock, *Prehistoric Times*, chapters x and xiv. For very striking exhibitions of this same artistic gift in a higher field to-day by descendants of the barbarian tribes of northern America, see the very remarkable illustrations in Rink, *Danish Greenland*, London, 1877, especially those in chap. xiv.

to other countries. The explorations which Dupont began in 1864, in the caves of Belgium, gave to the museum at Brussels eighty thousand flint implements, forty thousand bones of animals of the Quaternary period, and a number of human skulls and bones found mingled with these remains. From Germany, Italy, Spain, America, India, and Egypt similar results were reported.

Especially noteworthy were the further explorations of the caves and drift throughout the British Islands. The discovery by Colonel Wood, in 1861, of flint tools in the same strata with bones of the earlier forms of the rhinoceros, was but typical of many. A thorough examination of the caverns of Brixham and Torquay, by Pengelly and others, made it still more evident that man had existed in the early Quaternary period. The existence of a period before the Glacial epoch or between different glacial epochs in England, when the Englishman was a savage, using rude stone tools, was then fully ascertained, and, what was more significant, there were clearly shown a gradation and evolution even in the history of that period. It was found that this ancient Stone epoch showed progress and development. In the upper layers of the caves, with remains of the reindeer, who, although he has migrated from these regions, still exists in more northern climates, were found stone implements revealing some little advance in civilization; next below these, sealed up in the stalagmite, came, as a rule, another layer, in which the remains of reindeer were rare and those of the mammoth more frequent, the implements found in this stratum being less skilfully made than those in the upper and more recent layers; and, finally, in the lowest levels, near the floors of these ancient caverns, with remains of the cave bear and others of the most ancient extinct animals, were found stone implements evidently of a yet ruder and earlier stage of human progress. No fairly unprejudiced man can visit the cave and museum at Torquay without being convinced that there were a gradation and an evolution in these beginnings of human civilization. The evidence is complete; the masses of breccia taken from the cave, with the various soils, implements, and bones carefully kept in place, put this progress beyond a doubt.

All this indicated a great antiquity for the human race, but in it lay the germs of still another great truth, even more important and more serious in its consequences to the older theologic view, which will be discussed in the following chapter.

But new evidences came in, showing a yet greater antiquity of man. Remains of animals were found in connection with human remains, which showed not only that man was living in times more remote than the earlier of the new investigators had dared dream, but that some of these early periods of his existence must have been of immense length, embracing climatic changes betokening different geological periods; for with remains of fire and human implements and human bones were found not only bones of the hairy mammoth and cave bear, woolly rhinoceros, and reindeer, which could only have been deposited there in a time of arctic cold, but bones of the hyena, hippopotamus, sabretoothed tiger, and the like, which could only have been deposited when there was in these regions a torrid climate. The conjunction of these remains clearly showed that man had lived in England early enough and long enough to pass through times when there was arctic cold and times when there was torrid heat; times when great glaciers stretched far down into England and indeed into the continent, and times when England had a land connection with the European continent, and the European continent with Africa, allowing tropical animals to migrate freely from Africa to the middle regions of England.

The question of the origin of man at a period vastly earlier than the sacred chronologists permitted was thus absolutely settled, but among the questions regarding the existence of man at a period yet more remote, the Drift period, there was one which for a time seemed to give the champions of science some difficulty. The orthodox leaders in the time of Boucher de Perthes, and for a considerable time afterward, had a weapon of which they made vigorous use: the statement that no human bones had yet been discovered in the drift. The supporters of science naturally answered that few if any other bones as small as those of man had been found, and that this fact was an additional proof of the great

length of the period since man had lived with the extinct animals; for, since specimens of human workmanship proved man's existence as fully as remains of his bones could do, the absence or even rarity of human and other small bones simply indicated the long periods of time required for dissolving them away.

Yet Boucher, inspired by the genius he had already shown, and filled with the spirit of prophecy, declared that human bones would yet be found in the midst of the flint implements, and in 1863 he claimed that this prophecy had been fulfilled by the discovery at Moulin Quignon of a portion of a human jaw deep in the early Quaternary deposits. But his triumph was short-lived: the opposition ridiculed his discovery; they showed that he had offered a premium to his workmen for the discovery of human remains, and they naturally drew the inference that some tricky labourer had deceived him. The result of this was that the men of science felt obliged to acknowledge that the Moulin Quignon discovery was not proven.

But ere long human bones were found in the deposits of the early Quaternary period, or indeed of an earlier period, in various other parts of the world, and the question regarding the Moulin Quignon relic was of little importance.

We have seen that researches regarding the existence of prehistoric man in England and on the Continent were at first mainly made in the caverns; but the existence of man in the earliest Quaternary period was confirmed on both sides of the English Channel, in a way even more striking, by the close examination of the drift and early gravel deposits. The results arrived at by Boucher de Perthes were amply confirmed in England. Rude stone implements were found in terraces a hundred feet and more above the levels at which various rivers of Great Britain now flow, and under circumstances which show that, at the time when they were deposited, the rivers of Great Britain in many cases were entirely different from those of the present period, and formed parts of the river system of the European continent. Researches in the high terraces above the Thames and the Ouse, as well as at other points in Great Britain, placed beyond a doubt the fact that man existed on the British

Islands at a time when they were connected by solid land with the Continent, and made it clear that, within the period of the existence of man in northern Europe, a large portion of the British Islands had been sunk to depths between fifteen hundred and twenty-five hundred feet beneath the Northern Ocean,—had risen again from the water,—had formed part of the continent of Europe, and had been in unbroken connection with Africa, so that elephants, bears, tigers, lions, the rhinoceros and hippopotamus, of species now mainly extinct, had left their bones in the same deposits with human implements as far north as Yorkshire. Moreover, connected with this fact came in the new conviction, forced upon geologists by the more careful examination of the earth and its changes, that such elevations and depressions of Great Britain and other parts of the world were not necessarily the results of sudden cataclysms, but generally of slow processes extending through vast cycles of years—processes such as are now known to be going on in various parts of the world. Thus it was that the six or seven thousand years allowed by the most liberal theologians of former times were seen more and more clearly to be but a mere nothing in the long succession of ages since the appearance of man.

Confirmation of these results was received from various other parts of the world. In Africa came the discovery of flint implements deep in the hard gravel of the Nile Valley at Luxor and on the high hills behind Esneh. In America the discoveries at Trenton, N. J., and at various places in Delaware, Ohio, Minnesota, and elsewhere, along the southern edge of the drift of the Glacial epochs, clinched the new scientific truth yet more firmly; and the statement made by an eminent American authority is, that “man was on this continent when the climate and ice of Greenland extended to the mouth of New York harbour.” The discoveries of prehistoric remains on the Pacific coast, and especially in British Columbia, finished completely the last chance at a reasonable contention by the adherents of the older view. As to these investigations on the Pacific slope of the United States, the discoveries of Whitney and others in California had been so made and announced that the judgment of scien-

tific men regarding them was suspended until the visit of perhaps the greatest living authority in his department, Alfred Russel Wallace, in 1887. He confirmed the view of Prof. Whitney and others with the statement that "both the actual remains and works of man found deep under the lava-flows of Pliocene age show that he existed in the New World at least as early as in the Old." To this may be added the discoveries in British Columbia, which prove that, since man existed in these regions, "valleys have been filled up by drift from the waste of mountains to a depth in some cases of fifteen hundred feet; this covered by a succession of tuffs, ashes, and lava-streams from volcanoes long since extinct, and finally cut down by the present rivers through beds of solid basalt, and through this accumulation of lavas and gravels." The immense antiquity of the human remains in the gravels of the Pacific coast is summed up by a most eminent English authority and declared to be proved, "first, by the present river systems being of subsequent date, sometimes cutting through them and their superincumbent lava-cap to a depth of two thousand feet; secondly, by the great denudation that has taken place since they were deposited, for they sometimes lie on the summits of mountains six thousand feet high; thirdly, by the fact that the Sierra Nevada has been partly elevated since their formation." \*

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\* For the general subject of investigations in British prehistoric remains, see especially Boyd Dawkins, *Early Man in Britain and his Place in the Tertiary Period*, London, 1880. For Boucher de Perthes's account of his discovery of the human jaw at Moulin Quignon, see his *Antiquités Celtiques et Antédiluviennes*, vol. iii, p. 542 *et seq.*, Appendix. For an excellent account of special investigations in the high terraces above the Thames, see J. Allen Brown, F. G. S., *Palæolithic Man in Northwest Middlesex*, London, 1887. For discoveries in America, and the citation regarding them, see Wright, *The Ice Age in North America*, New York, 1889, chap. xxi. Very remarkable examples of these specimens from the drift at Trenton may be seen in Prof. Abbott's collections at the University of Pennsylvania. For an admirable statement, see Prof. Henry W. Haynes, in Wright, as above. For proofs of the vast antiquity of man upon the Pacific coast, cited in the text, see Skertchley, F. G. S., in the *Journal of the Anthropological Institute* for 1887, p. 336; see also Wallace, *Darwinism*, London, 1890, chap. xv; and for a summary, as cited, Laing, *Problems of the Future*, London, 1889. For a striking summary of the evidence that man lived before the last submergence of Britain, see Brown, *Palæolithic Man in Northwest Middlesex*, as above cited. For proofs that man existed in a period when the streams were flowing hundreds of feet above their present level, see *ibid.*, p. 33. As to the evidence of the action of the sea and of glacial ac-

As an important supplement to these discoveries of ancient implements came sundry comparisons made by eminent physiologists between human skulls and bones found in different places and under circumstances showing vast antiquity.

Human bones had been found under such circumstances as early as 1835 at Cannstadt near Stuttgart, and in 1856 in the Neanderthal near Düsseldorf; but in more recent searches they had been discovered in a multitude of places, especially in Germany, France, Belgium, England, the Caucasus, Africa, and North and South America. Comparison of these bones showed that even in that remote Quaternary period there were great differences of race, and here again came in an argument for the yet earlier existence of man on the earth; for long previous periods must have been required

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tion in the Welsh bone caves after the remains of extinct animals and weapons of human workmanship had been deposited, see *ibid.*, p. 198. For a good statement of the slowness of the submergence and emergence of Great Britain, with an illustration from the rising of the shore of Finland, see *ibid.*, pp. 47, 48. As to the flint implements of Palæolithic man in the high terraced gravels throughout the Thames Valley, associated with bones of the mammoth, woolly rhinoceros, etc., see Brown, p. 31. For still more conclusive proofs that man inhabited North Wales before the last submergence of the greater part of the British Islands to a depth of twelve hundred to fourteen hundred feet, see *ibid.*, pp. 199, 200. For maps showing the connection of the British river system with that of the Continent, see Boyd Dawkins, *Early Man in Britain*, London, 1880, pp. 18, 41, 73; also Lyell, *Antiquity of Man*, chap. xiv. As to the long continuance of the early Stone period, see James Geikie, *The Great Ice Age*, New York, 1888, p. 402. As to the impossibility of the animals of arctic and torrid regions living together or visiting the same place at different times in the same year, see Geikie, as above, pp. 421 *et seq.*; and for a conclusive argument that the animals of the period assigned lived in England not since, but before, the Glacial period, or in the interglacial period, see *ibid.*, p. 459. For a very candid statement by perhaps the foremost leader of the theological rear-guard, admitting the insuperable difficulties presented by the Old Testament chronology as regards the Creation and the Deluge, see the Duke of Argyll's *Primeval Man*, pp. 90-100, and especially pp. 93, 124. For a succinct statement on the general subject, see Laing, *Problems of the Future*, London, 1889, chapters v and vi. For discoveries of prehistoric implements in India, see notes by Bruce Foote, F. G. S., in the *British Journal of the Anthropological Institute* for 1886 and 1887. For similar discoveries in South Africa, see Gooch, in *Journal of the Anthropological Institute of Great Britain and Ireland*, vol. xi, pp. 124 *et seq.* For proofs of the existence of Palæolithic man in Egypt, see Mook, Haynes, Pitt-Rivers, Flinders-Petrie, and others, cited at length in the next chapter. For the corroborative and concurrent testimony of ethnology, philology, and history to the vast antiquity of man, see Tylor, *Anthropology*, chap. i.

to develop such racial differences. Considerations of this kind gave a new impulse to the belief that man's existence might even date back into the Tertiary period. The evidence for this earlier origin of man was ably summed up, not only by its brilliant advocate, Mortillet, but by a former opponent, one of the most conservative of modern anthropologists, Quatrefages; and the conclusion arrived at by both was, that man did really exist in the Tertiary period. The acceptance of this conclusion was also seen in the more recent work of Alfred Russel Wallace, who, though very cautious and conservative, placed the origin of man not only in the Tertiary period, but in an earlier stage of it than most had dared assign—even in the Miocene.

The first thing raising a strong presumption, if not giving proof, that man existed in the Tertiary, was the fact that from all explored parts of the world came in more and more evidence that in the earlier Quaternary man existed in different, strongly marked races and in great numbers. From all regions which geologists had explored, even from those the most distant and different from each other, came this same evidence—from northern Europe to southern Africa; from France to China; from New Jersey to British Columbia; from British Columbia to Peru. The development of man in such numbers and in so many different regions, with such differences of race and at so early a period, must have required a long previous time.

This argument was strengthened by discoveries of bones bearing marks apparently made by cutting instruments, in the Tertiary formations of France and Italy, and by the discoveries of what were claimed to be flint implements by the Abbé Bourgeois in France, and of implements and human bones by Prof. Capellini in Italy.

On the other hand, some of the more cautious men of science are still content to say that the existence of man in the Tertiary period is not yet proven. As to his existence throughout the Quaternary epoch, no new proofs are needed; even so determined a supporter of the theological side as the Duke of Argyll has been forced to yield to the evidence.

Of attempts to make an exact chronological statement throwing light on the length of the various prehistoric peri-

ods, the most notable have been those by M. Morlot, on the accumulated strata of the Lake of Geneva; by Gilliéron, on the silt of Lake Neufchâtel; by Horner, in the delta deposits of Egypt; and by Riddle, in the delta of the Mississippi. But while these have failed to give anything like an exact result, all these investigations together point to the central truth, so amply established, of the vast antiquity of man, and the utter inadequacy of the chronology given in our sacred books. The period of man's past life upon our planet, which has been fixed by the universal Church, "always, everywhere, and by all," is thus perfectly proved to be insignificant compared with those vast geological epochs during which man is now known to have existed.\*

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\* As to the evidence of man in the Tertiary period, see works already cited, especially Quatrefages, Cartailhac, and Mortillet. For an admirable summary, see Laing, *Human Origins*, chap. viii. See also, for a summing up of the evidence in favour of man in the Tertiary period, Quatrefages, *Histoire Générale des Races Humaines*, in the *Bibliothèque Ethnologique*, Paris, 1887, chap. iv. As to the earlier view, see Vogt, *Lectures on Man*, London, 1864, lecture xi. For a thorough and convincing refutation of Sir J. W. Dawson's attempt to make the old and new Stone periods coincide, see H. W. Haynes, in chap. vi of the *History of America*, edited by Justin Winsor. For development of various important points in the relation of anthropology to the human occupancy of our planet, see Topinard, *Anthropology*, London, 1890, chap. ix.