

ARTICLE VII.

RECENT DISCOVERIES BEARING ON THE ANTIQUITY OF MAN.

BY THE REV. PROFESSOR G. FREDERICK WRIGHT, OBERLIN THEOLOGICAL SEMINARY.

A NEW epoch in the discussion concerning the antiquity of the human race began in 1841, when Boucher de Perthes first discovered rudely fashioned stone implements in the high gravel terraces which border the valley of the Somme at Abbeville, in Northern France. From the time of these discoveries onward, the question of man's antiquity has been one of geological rather than of literary history. These discoveries of Boucher de Perthes occurred in undisturbed gravel deposits which must have accumulated when the flood-plain of this small stream was one hundred feet higher than now. But, as the valley is about a mile in width and has evidently been formed by the erosive action of the stream, the period of time required for its production seems immense. Its impressiveness, however, will be diminished somewhat, if we keep in mind that the strata consist of chalk, which is capable of rapid erosion. There is also the possibility that here, as in so many other places, there may

convinced of the genuineness of the reported facts, deduced from the geological situation the great age of the deposits in which the implements occur. In connection with the human relics, it was discovered, furthermore, that the forms of animal life then associated with man in Europe were considerably different from those now existing there. At that time there roamed, through the forests and over the plains of Northern France and Southern England, in company with man, the mammoth, the straight-tusked elephant, the lion, the grizzly bear, the bison, three species of rhinoceros, the hippopotamus, the cave bear, and many other gigantic animals now extinct.

After attention had once been securely fixed upon the matter, it was found that human implements of this early age were not confined to the valleys of Northern France, but that they also occurred in considerable number in Southern England in gravel deposits corresponding in character and age to those at Abbeville. Such indications of the early advent of man were found at Hoxney near Diss, in Suffolk, England, and in the vicinity of Southampton and of the Isle of Wight.

Many volumes have been written in Europe designed to throw light upon the age of the gravel deposits of France and England containing these earliest known indications of the occupation of the country by man and his extinct congeners in the animal world. Sir Charles Lyell in his "Antiquity of Man," James Geikie, in his "Great Ice Age" and in his "Prehistoric Europe," John Evans in his "Stone and Flint Implements." Boyd Dawkins in his "Cave Hunting"

250,000 years. Sir William Dawson, however, in his "Story of the Earth and Man" and elsewhere, and Professor Prestwich, in his recent great work on geology, take a more moderate view.

But the question of glacial action in Europe is specially complicated on account of the configuration of the country. In the first place, the North Sea forbids the continuous study of the glaciated area; in the second place, the east and west system of mountains, which were themselves, and are still, independent centres of glaciation, introduce conditions which greatly increase the complexity of the problem; so that the discussions of glacial chronology have been much less satisfactory in Europe than those which have been based upon later investigations in America.

The student of glacial geology in America is peculiarly fortunate in the simplicity of the problem there presented and in the size and continuousness of the area open to investigation. The southern border of the glaciated area has now been delineated for several thousand miles, extending in a sinuous course from the Atlantic Ocean to the Pacific. From this work it appears that the watersheds of the country are so situated that along this whole border the drainage is to the south, and that one can study scores of valleys in which the southward-flowing currents from the melting ice have deposited high-level gravel terraces whose relation to the glacial period can readily be detected. Innumerable lakes, also, now in process of filling up with sediment, were formed at that time by the irregular deposition of morainic material, and countless preglacial channels were filled with the *débris*

It was therefore a matter of the greatest interest when, in 1875, Dr. C. C. Abbott reported the discovery of rough stone implements in undisturbed strata of the extensive gravel deposits on the banks of the Delaware River upon which the city of Trenton, New Jersey, is built. Since Dr. Abbott's first discovery, he has been constantly on the lookout as the railroad was making excavations in the gravel, and has been rewarded by finding as many as sixty implements at various depths (some of them as much as sixteen feet) in undisturbed gravel. The implements are made from argillite, which occurs in ledges in the near vicinity, and they are of substantially the same type with those that had been discovered in similar deposits in France and England.

Attention to the delta terrace of gravel in which Dr. Abbott has found so many implements shows that, without doubt, it belongs to a class of deposits which were formed in the southerly flowing streams which emerged from all along the ice-front during the period in which it was rapidly melting. My own special studies of this class of glacial phenomena began at Trenton, in 1880, and have been continuous from that time on, until I have now traced a large portion of the whole glacial boundary in the United States, and have carefully examined nearly all the valleys which served as channels for the southern drainage of the melting ice-sheet.

As a result of the information acquired by these examinations, I was led to see that there were numerous places in the interior of the United States where the gravel deposits connected with the glacial period were so similar to those

Ohio, discovered a flint implement in the undisturbed glacial gravel of that valley, and, two years later, another in a similar situation in the same valley at Loveland, about thirty miles above. About the same time Mr. Hilborne T. Cresson, of Philadelphia, made the discovery of a well-shaped flint implement in the glacial terrace which lines the East Fork of White River, in Medora, Jackson county, Indiana. Later still, in October, 1889, Mr. W. C. Mills, of Newcomerstown, Tuscarawas county, Ohio, found in that town a finely shaped flint implement sixteen feet below the surface of the terrace of glacial gravel which lines the margin of the Tuscarawas Valley. Mr. Mills was not aware of the importance of this discovery until meeting with me some months later, when he described the situation to me, and soon after sent the implement for examination. In company with Judge Baldwin, the president of the Western Reserve Historical Society, and several others, a visit was made to Mr. Mills, and we carefully examined the gravel pit in which the implement occurred, and collected evidence which was abundant to corroborate all of his statements. The implement in question is made from a peculiar flint which is found in the Lower Mercer limestone strata a few miles distant, and it resembles in so many ways the typical implements found by Boucher de Perthes, at Abbeville, that, except for the difference in the material from which it is made, it would be impossible to distinguish it from them. The similarity of pattern is too minute to have originated except from imitation.

Thus the fact has been established beyond all question that man was in America in the closing stages of the glacial period; so that in considering questions of human chronology we are compelled to study, first of all, the data bearing on the time which has elapsed since the close of that period. In April, 1884, I published an article in the *Bibliotheca Sacra*, collecting the evidence then at hand going to show that

the Niagara gorge represents the work effected since the closing stages of the glacial period, and hence that if we can fix upon the rate of recession, this is a true glacial chronometer. From the data respecting the rate of recession then at command, I was led to conclude that less than 12,000 years would be required for the production of the gorge.

Since the publication of that article fresh surveys have been made, and abundant evidence is now at hand confirmatory of the moderate conclusions there drawn. Material has also been accumulated from various other sources respecting the recession of waterfalls, the filling up of glacial lakes, and the enlargement of post-glacial valleys, and all the evidence supports the conclusion that the ice cannot have disappeared from British America and the northeastern part of the United States earlier than from 8,000 to 10,000 years ago.

But the most interesting evidence concerning the antiquity of man in America, and indeed in the world, has come from the Pacific coast. During the height of the mining activity in California, from 1850 to 1860, numerous reports were rife that human remains had been discovered in the gold-bearing gravel upon the flanks of the Sierra Nevada Mountains. These reports did not attract much scientific attention until they came to relate to the gravel deposits found deeply buried beneath a flow of lava locally known as the Sonora or Tuolumne Table Mountain. This lava issued from a vent near the summit of the mountain range, and flowed down the valley of the Stanislaus River for a distance of fifty or sixty miles, burying everything in the valley beneath it, and compelling the river to seek another channel. The thickness of the lava averages about one hundred feet, and so long a time has elapsed since the eruption that the softer strata on either side of the valley down which it flowed have been worn away to such an extent that the lava now rises nearly everywhere above the general level, and has be-

come a striking feature in the landscape, stretching for many miles as a flat-topped ridge about half a mile in width, and presenting upon the sides a perpendicular face of solid basalt for a considerable distance near the lower end of the flow.

It was from under this mountain of lava that the numerous implements and remains of man occurred which were reported to Professor J. D. Whitney, of Harvard College, when he was conducting the geological survey of California between 1860 and 1870. The implements consisted of stone mortars and pestles suitable for use in grinding acorns and other coarse articles of food. There were, however, some rude articles of ornament. In one of the mining shafts penetrating the gravel underneath Table Mountain, near Sonora, there was reported to have been discovered in 1857, a human jawbone, one portion of which was sent by responsible parties to the Boston Society of Natural History, and another part to the Philadelphia Academy of Sciences, in whose collections the fragments can now be seen.

Interest reached a still higher pitch when, in 1866, an entire human skull with some other human bones was reported to have been discovered under this same lava deposit, a few miles from Sonora, at Altaville, in Calaveras county, and hence known as the "Calaveras skull." Persistent efforts were made soon after to discredit the genuineness of this discovery. Bret Harte showered upon it the shafts of his ridicule, and various other persons gave currency to the story that the whole report originated in a joke played by the miners upon unsuspecting geologists. These attacks were so successful that many conservative archaeologists and men of science have refused to accept the skull as genuine.

Recent events, however, have brought such additional evidence to the support of this discovery that it would seem unreasonable any longer to refuse to credit the evidence. At a meeting of the Geological Society of America, at

Washington, in January, 1891, Mr. George F. Becker, of the United States Geological Survey, who for some years has had charge of investigations relating to the gold-bearing gravels of the Pacific coast, presented the affidavit of Mr. J. H. Neale, a well-known mining engineer of unquestionable character, stating that he had taken a stone mortar and pestle, together with some spear-heads (which through Mr. Becker he presented to the Society), from undisturbed strata of gravel underneath the lava of Table Mountain, near Rawhide Gulch, a few miles from Sonora. At the same meeting Mr. Becker presented a pestle which Mr. Clarence King, the first director of the United States Geological Survey, took with his own hands out of undisturbed gravel under this same lava deposit, near Tuttle town, a mile or two from the preceding locality mentioned.

I was so fortunate, also, myself as to be able to report to the Society at the same meeting the discovery, in 1887, of a small stone mortar by Mr. C. McTarnahan, the assistant surveyor of Tuolumne county. This mortar was found by Mr. McTarnahan in the Empire mine, which penetrates the gravel underneath Table Mountain, about three miles from Sonora, and not far from the other localities above mentioned. The place where the mortar was found is about one hundred and seventy-five feet in from the edge of the superincumbent lava, which is here about one hundred feet in thickness.

These three independent instances, each of them authenticated by the best of evidence, have such cumulative force that probably few men of science will longer stand out against it.

Associated with these discoveries, there is to be men-

in August, 1889, by Mr. M. A. Kurtz, while boring an artesian well at Nampa, Ada county, Idaho. The strata passed through included, near the surface, fifteen feet of lava. Underneath this, alternating beds of clay and quicksand occurred to a depth of three hundred and twenty feet, where there appeared indications of a former surface soil lying just above the bed rock, from which the clay image was brought up in the sand pump. The evidence of the genuineness of this discovery was such as to satisfy Mr. Adams, then president of the Union Pacific Railroad, and I have myself spent some time in correspondence and upon the ground in collecting the evidence, all of which was published in the "Proceedings of the Boston Society of Natural History," for January, 1890. From this it would seem that there could be no reasonable doubt that the facts are as stated.

The whole of the summer of 1890 was occupied by me in a careful study of the lava deposits both in Idaho and in California, with a view to learning their significance with reference to these discoveries. It appears that in the Snake River Valley, Idaho, there are not far from twelve thousand square miles of territory covered with a continuous stratum of basaltic lava, extending nearly across the entire diameter of the State from east to west. Nampa, where the miniature image was discovered, is within five miles of the western limit of this lava flow, and where it had greatly thinned out. The relative age of the lava is shown by its relation to Tertiary beds of shale and sandstone, containing numerous fossils of late Pliocene species. These are overlaid by the lava; thus determining its post-Tertiary character. Examination with reference to the more precise determination of

of Western Idaho is not excessive, and very likely may be brought within a period of from 10,000 to 20,000 years. The enormous erosion in the canyon of the Snake River, near Shoshone Falls, in Central Idaho, is doubtless of a much earlier date than that in the Bois e River near Nampa.

A study of the situation in Tuolumne and Calaveras counties, California, reveals a state of things closely resembling in important respects that in Western Idaho. At first sight the impression is made that an immense lapse of time must have occurred since the volcanic eruption which furnished the lava of Table Mountain. The Stanislaus River flows in a channel of erosion a thousand feet or more lower than the ancient channel filled by lava, and in two or three places cuts directly across it. An immense amount of time, also, would seem to be required to permit the smaller local streams to have worn away so much of the sides of the ancient valley as to allow the lava deposit now so continuously to rise above the general surface. Still, the question of absolute time cannot be considered separately without much further study. It is by no means certain that, when the lava stream poured down the mountain, it always followed the lowest depressions; but at certain points, it may have been dammed up in its course so as to be turned off into what was then an ancient abandoned channel.

The forms of animal and vegetable life with which the remains of man under Table Mountain are associated, are, indeed, to a considerable extent, species now extinct in California, and some of them no longer exist anywhere in the world. But a suggestion of Professor Prestwich, in England, made with reference to the extinct forms of life associated with human remains in the glacial deposits in Europe, is revived by Mr. Becker, of the Geological Survey, with reference to the California discoveries; his inference being, not that man is so extremely ancient in California, but that many of these plants and animals have continued to a more recent date than has ordinarily been supposed.

The connection of these lava flows on the Pacific coast with the glacial period is unquestionably close. For some reason which we do not fully understand, the vast accumulation of ice in North America during the glacial period is correlated with enormous eruptions of lava west of the Rocky Mountains, and in connection with these events, there took place on the Pacific coast an almost entire change in the plants and animals occupying the region. Mr. Warren Upham, our most accomplished student of glacial phenomena in America, is thoroughly convinced that on the Pacific coast they lingered much later than in the region east of the Rocky Mountains. Indeed, it is pretty certain that not many centuries have elapsed since the glacial phenomena of the Sierra Nevada Mountains were much more pronounced than they are at the present time, and it is equally certain that there have been vast eruptions of lava in California within three hundred years. So Mr. Upham is inclined to assign the lava flow of Table Mountain to as late a date as from 10,000 to 30,000 years.

Such, in brief, is the present condition of the discussion concerning the antiquity of man in America,—an antiquity which probably is far greater than any which has been definitely determined in the Old World. While the investigation is proceeding it is of the utmost importance for all parties to refrain from taking extreme positions, and the conditions are such that all can well afford to wait for further evidence. On the one hand, the establishment of the genuineness of these discoveries of human relics on the Pacific coast, and of their great antiquity, goes far to discredit the materialistic theories of evolution by which many have endeavored to account for the origin of the human race. The Calaveras skull is in no sense ape-like in character, but may well have contained the brain of a philosopher. The chief prejudice against the reception of the utensils reported by Professor Whitney as from under Table Mountain has

arisen in view of their supposed contradiction of archæological theories involving the regular and slow development of the human race. Especially does the Nampa image show considerable artistic skill in representing the human form. Altogether these earliest evidences of man indicate that he was, from the first, in the full possession of all characteristic human qualities.

And, finally, as the able and exhaustive article of Professor Green in the *Bibliotheca Sacra*, for April, 1890, demonstrates, we do violence to Scripture if we impose upon the genealogical tables of the Old Testament an inelastic chronology. The evident purpose of those tables is to impart lines of descent, and not periods of chronology. The student of the Bible, therefore, may rest in quiet, feeling sure that He who is the author both of nature and of the Bible has set bounds to the disturbing forces of our faith, and has said to them, as to the sea, Thus far shalt thou come, and no farther. We may not know exactly the height to which the restless sea may rise, but the limit of variation in the tide cannot be such as to render the foundation of our faith unstable.