

cause of his qualifications he ought, if necessary, to seek such a place, and that an organization of naturalists ought to definitely consider ways and means of extending its influence as far as possible.

This is a day of propaganda. The unworthy type will prevail if it is not overridden or displaced by the worthy type. Any and every learned society is under constructive obligation to do what it can in such a cause, but we must always remember the danger of attempting anything of the sort without first eliminating all traces of pedantry.

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CHARLES CONRAD ABBOTT AND ERNEST VOLK¹

THE recent death of Dr. C. C. Abbott and Mr. Ernest Volk¹ of Trenton, New Jersey, removes two investigators whose work must always occupy a prominent place in attempts to estimate the conditions and chronology of prehistoric man. Not long after the discovery of palæolithic implements in northern France and southern England establishing the existence of man in Europe before the close of the Glacial period, Dr. Abbott began reporting the discovery of implements of similar type in the gravel deposits of glacial age upon which the city of Trenton is built. The first report of his discoveries was made to the Smithsonian Institution in 1875. Between 1875 and 1888 he had found sixty such specimens in the undisturbed gravel at various depths, some of which were as much as twenty-two feet from the surface.

As a resident of Trenton, Mr. Volk's attention was naturally called to Dr. Abbott's discoveries at the outset; but it was not until the fall of 1889 that he began systematic work, under the direction of Professor Putnam, for the Peabody Museum of Harvard University. His services continued for

twenty-two years. The result of his long exploration of the Trenton gravels was published in 1911, in Volume V. of the Papers of the Peabody Museum of American Archaeology and Ethnology. The report proper fills 258 octavo pages, which summarizes his journals from 1889 to 1905, and after that gives his journal in full, in which every day's work is carefully recorded. This fills one hundred pages. There are one hundred and twenty-five photographic illustrations.

In 1880, I was requested by Professor Putnam and Asa Gray to visit Trenton in the interests of the Peabody Museum, to shed what light I could upon the character of the gravel deposits in which palæolithic implements had been found by Dr. Abbott. This I did in company with Professor Boyd Dawkins, of England, who was then in Boston giving a course of Lowell Institute lectures, and Professor Henry W. Haynes, who had made collections from all the fields in Europe and in Egypt where palæolithic implements are found, and with Mr. H. Carvill Lewis, a glacialist of the highest reputation, who afterwards was joined with me in the survey of the terminal moraine across the state for the Pennsylvania Geological Survey; and whose report on the Trenton gravels published as an appendix to Abbott's "Primitive Industry" establishes beyond question the late glacial age of the deposit. Since then I have visited the region almost every year and some years several times, and at two different times spent days together with a committee appointed by the A. A. A. S. to make explorations. It is therefore proper that I should speak in defense of the discoveries, especially of Dr. Abbott and Mr. Volk in view of the fact that persistent attempts have been made to discredit them.

The chief reason for doubting the accuracy of these observations appears to have been that while Dr. Abbott and Mr. Volk had made so many discoveries, hardly anybody else has made any. But to this objection it is sufficient to say that Dr. Abbott and Mr. Volk have had a thousand opportunities to make discoveries where other investigators

¹ A notice of Dr. Abbott's death was given in *SCIENCE*, September 12. Mr. Volk was badly injured in an automobile accident on September 15 and died without recovering consciousness, two days afterwards.

have had but one. The railroad station at Trenton is twenty or twenty-five feet below the surface of the gravel and for years the railroad was continuously at work in excavating the gravel for ballast until they had removed many acres, thus exposing new perpendicular faces of the gravel for inspection every day for several years. As it is the early bird that catches the worm, so it is the early observer who notes the facts, and Dr. Abbott was such an observer. Every day for years, and sometimes two or three times a day, as he went to and fro, he observed these excavations, and his eye soon became trained so that no facts could escape his observation.

At the same time Mr. Volk was engaged for twenty-two years, not only in observing excavations made by other parties but in personal excavations in which many acres were dug over to a depth of about four feet, and everything carefully observed and noted. Mr. Volk's investigations were at last rewarded by the discovery of part of the shaft of a human thigh bone, seven feet and a half below the surface, where there had been no disturbance of the strata. He photographed this in place; and soon after, in the same stratum, found fragments of a cranium. A recent lecturer of high reputation as an anatomist has attempted to discredit this last discovery of Mr. Volk on two considerations, first that he was too much of an enthusiast to make accurate observations; and secondly that this bone is of the type of the modern Indian and therefore could not be so old as glacial gravels are supposed to be.

In answer to this it is sufficient to refer the reader to Mr. Volk's report just mentioned, which is all in the most plain and matter-of-fact style and is accompanied by one hundred and twenty-five plates made from his photographs. If ever I associated with an investigator who attempted to state facts just as he saw them, it was Ernest Volk. The principal reason for discrediting Mr. Volk's discovery is a theoretical one which is far from being established. The critic thinks the bones belong to a race more recent than the glacial deposits. But in the first place, there are current grossly exaggerated estimates as

to the date of the close of the Glacial period. The Swedish geologists are producing incontrovertible evidence that it is less than 7,000 years ago since the ice retreated from southern Sweden; and there is a respectable number of geologists of wide experience in this country who think they have conclusive evidence that the close of the Wisconsin epoch in America occurred less than 10,000 years ago. In the second place Dr. Keith, the leading comparative anatomist of England, maintains that present types of the human skeleton go back in Europe to very much earlier times than can properly be assigned to the Trenton gravel. The permanence of racial peculiarities is by no means a settled question. Instead of denying facts on the basis of a theory involving a rapid rate of change in specific anatomic characteristics, facts should be allowed to modify the theory.

There is also abundant circumstantial evidence of the most positive kind sustaining the testimony of Dr. Abbott and Mr. Volk. For example, with two or three exceptions (which prove the rule), all the artifacts reported by them as found in the Trenton gravels below the disturbed surface of ten or twelve inches are of palæolithic type and made from argillite; while in the upper ten or twelve inches innumerable artifacts are found of modern Indian type, chipped from flint and jasper, with an occasional piece of pottery. This proves conclusively that the argillite implements belong to the original stratification of the gravel. No reason can be given for intrusive burials of argillite that would not be accompanied also by flint and jasper. Some, however, had supposed that these argillite fragments had worked down into the lower strata through the decayed roots of trees, or through holes made by burrowing animals, or through disturbances of the soil by the overturning of trees, or through cracks in the soil that occur in dry weather. All these theories have been urged; but this soil does not crack in dry weather, and the argillite fragments are larger and lighter than the flint and jasper and would not so readily follow down the cavity of

decayed tree trunks as would the other materials.

In 1897 I was asked by the A. A. A. S. to go down with a committee of the Society to inspect Mr. Volk's work. This I did in company with Mr. H. C. Mercer, Professor Arthur Hollick, of Columbia University, and Professor William Libbey, of Princeton. Five days were spent upon the ground. Mr. Volk ventured (what is a very hazardous thing for a scientific man to do), to prophesy what we should find. He let us select our ground, which we did in several places, and had extensive excavations made under our own eyes. What Mr. Volk prophesied was that in the upper foot of disturbed soil we should find numerous artifacts of flint and jasper and some pottery, but that below that we should find nothing of that kind but would find occasionally worked pieces of argillite. This proved to be exactly the case. We found in the lower portion of our excavation sixteen chipped fragments of argillite, all covered with deep patina. We found also some broken pebbles which had been battered to indicate use by man. We also found five flakes of quartz which may have been used as implements but were of an entirely different type from those on the surface. All this accorded with the general facts as reported by Mr. Volk, and to us were perfectly convincing evidence of the accuracy of his observations, and confirmatory of the testimony of Dr. Abbott concerning the prevalence of argillite in the undisturbed glacial strata, establishing a sharp distinction between the occupation of palæolithic man and that of the aboriginal Indians.

The work of Dr. Abbott and Mr. Volk illustrates the importance of having local observers interested in discoveries to be made about their own doors. They were both business men who turned aside to make and record observations which could be made only by those who were on the ground; and their observations have been carefully recorded and published, and their collections preserved where they are open to the observation of all scientific men, namely in the Field Museum of Natural History in Chicago, the American

Museum of Natural History in New York City, but more than anywhere else in the Peabody Museum in Cambridge, Massachusetts. Aside from the volume already noted, Mr. Volk published reports of his early discoveries in the proceedings of the A. A. A. S. in 1894 and in the *Mem. Intern. Congress Anthropology*, 1894. In addition to "Primitive Industry" Abbott's discoveries are recorded in *Rep. Smithsonian Inst.*, 1875; "The Stone Age in New Jersey," 1877; *Rep. Peabody Museum*, 1877 and 1878; *Proc. Boston Soc. Nat. Hist.*, 1881 and 1883; *Am. Naturalist* (Extra), 1885; *Proc. A. A. S.*, 1889; *Archæologia Nova Cæsarea*, 1907, 1908, 1909.

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OBERLIN,

October 6, 1919

SCIENTIFIC EVENTS

INTERNATIONAL SCIENCE AND THE WAR

AN appeal has been addressed to the members of the academies of the allied nations and of the United States by 177 members of the academies of neutral nations—Holland, Norway, Sweden, Denmark, Finland and Switzerland—represented in the International Association of Academies, the opening and concluding paragraphs of which are as follows:

In the autumn of 1813, when for years a most bitter war had been raging between France and England, the English chemist Humphry Davy set out for Italy via Paris. His biographer relates what follows about his experiences in the French capital: "Nothing could exceed the cordiality and warmth of Davy's reception by the French savants. On Nov. 2nd he attended a sitting of the First Class of the Institute and was placed on the right hand of the President, who announced to the meeting that it was honoured by the presence of 'le chevalier Davy.' Each day saw some reception or entertainment in his honour. . . . On Dec. 13th, 1813 he was with practical unanimity elected a corresponding member of the First Class of the Institute."

On October 2, 1918, when a most bitter war raging between France and Germany for four years had practically come to an end, it is stated in a meeting of the French Académie des Science, that "elle a été unanime à déclarer que les relations personnelles sont pour longtemps impossibles entre les savants des pays alliés et ceux des empires cen-