

Recognizing from his letter that he was writing of a case of the formation of the rather rare "snow-rollers," I wrote immediately requesting details, and received in reply the following letter:—

MILLEDGEVILLE, O., Feb. 7, 1892.

PROFESSOR E. W. CLAYPOLE.

Dear Sir: On the morning of Jan. 30, 1892, a curious phenomenon was witnessed here—snow-rollers—of which I send account. I found it difficult to obtain trustworthy information as regards extent of area. None of the city papers spoke of that, and only quoted from local county papers, the correspondents of which furnished all that I saw regarding the occurrence. The rollers may have extended over a very large area in southern Ohio. They were formed in the streets of Wilmington, in Clinton County, though they are not mentioned in the adjoining country. Wilmington is twenty miles from here. No one residing a mile from here, in any direction, with whom I have spoken, witnessed the phenomenon.

People here are divided in opinion whether they fell or were formed by rolling. Our local editors alluded to their correspondents who spoke of the balls as bearers of "fish-stories," refusing to believe them.

The morning of Jan. 30, 1892, presented in this vicinity a phenomenon of nature as striking as it is rare. The surrounding clean, level fields were covered with balls of snow, varying in size from three to five inches long and from one to two inches wide. Wheat-fields and meadows abounded with these balls, and suggested, at first sight, that a troop of school-boys had been having a battle with the snow.

Two fields, of thirty acres each, that came under my observation (one a new-sown wheat-field and the other a meadow) were literally covered with these "snow-rollers," there being at least 500 on the acre. Roadsides and lots contained a few, and, what is remarkable in this connection, I noticed them on housetops and straw-ricks.

On close investigation, I found the balls to be uniformly light and fragile, so that to lift one and preserve its form was impossible. Some were oblong, some almost spherical, while others resembled a tea-cup or small bowl.

There were no tracks behind them, or, if these had been made, the falling snow had obliterated them.

The accompanying weather conditions were as follows: The ground had been covered with snow for three weeks. A crust had formed on the top, thick and firm enough in places to bear up a person. This thawed a little during the afternoon of the 29th. The ensuing night was warm, the mercury registering 40° F. By ten o'clock a brisk wind was blowing, which increased in velocity, and soon the snow began to fall in large, moist flakes. The morning showed that about a half-inch had fallen on the crust, and on this lay the balls.

The phenomenon was reported from several places in this vicinity, chiefly in Fayette County, and from Clinton County, which adjoins it on the west, but nowhere did the rollers extend uninterruptedly over any great area.

W. S. FORD.

In reply to a later enquiry, Mr. Ford informed me that no one took a photograph of this interesting occurrence. This is much to be regretted, as I am not aware that a view of any kind is in existence showing these snow-rollers. The chance of obtaining a unique negative was lost.

I cannot say if the phenomenon here described is really so rare as the scarcity of published accounts would lead us to infer. Perhaps the publication of this note may lead to clearer knowledge on this point.

Not having access to the earlier scientific literature on the subject, I am able to quote only a few instances of snow-rollers. Several years ago there was a short correspondence in the columns of *Nature*, from which I condense the following statements.

In the issue of March 29, 1883, Mr. G. J. Symons wrote that he believed that the first recorded account of the phenomenon appeared in an early number of the *Philosophical Transactions*, from the pen of Dr. Clouston of Sandwich Manse, in the Orkney Islands.

Mr. Symons adds that he has heard of but one case in England. This was reported by Admiral W. F. Grey in the *Meteorological Magazine* for May, 1876. It occurred on his lawn in the south-east of England, and the balls or rollers varied from the size of an ordinary snow-ball to that of a cubic foot, and each one left a decided track to the leeward. In this case they were seen to form in the evening.

The correspondence above quoted was called out by a letter from Mr. S. Hart of Trinity College, Hartford, Conn., to the editor of *Nature*, mentioning that on Tuesday evening, Feb. 22, 1883, a light, damp snow fell on the crust that had formed over the earlier snowfall, and that a brisk wind sprang up after midnight. Next morning on the college campus and in the adjoining park and empty lots numbers of natural snow-balls, spherical and cylindrical, from twelve to eighteen inches in diameter, and hollow at both ends, were strewn over the ground. Behind them were visible to leeward tracks 25 or 30 feet long in the new-fallen snow. The rollers were so light and fragile that handling was impossible. A few of them could be traced 60 feet and some had even been rolled up hill. They were especially fine on the frozen Connecticut River.

The same writer also reports a similar occurrence in New Jersey in 1808, when the rollers were seen to form in the day-time, and extended over at least 400 square miles of country.

In a subsequent letter, printed in the number of *Nature* for March 6, 1884, Mr. Hart returns to the subject and reports a repetition of the phenomenon in Oneida and Herkimer Counties, in New York, on Tuesday, Jan. 22, 1884, adding that the rollers were of the same size as in the former case, but were in some instances firm enough to be picked up and handled without crumbling. This is, so far as I know, the only occurrence in which this has been reported possible.

The wide experience of Mr. Symons is sufficient ground for assuming that the formation of snow-rollers is not frequent in Great Britain, and the scarcity of records here leads to a similar conclusion for this country. Further reports on the subject are desirable.

#### LETTERS TO THE EDITOR.

*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

#### Some Detailed Evidence of an Ice-Age Man in Eastern America.

MR. HOLMES's statement in his communication to *Science* for Jan. 20, that "If there was, as is claimed, an ice-age man or at any rate a palæolithic man in eastern America, the evidence so far collected in support of these propositions is so unsatisfactory and in such a state of utter chaos that the investigation must practically begin anew," should not be allowed to go unchallenged. I will content myself, however, by giving the details in a single case, namely, those concerning the implement which was found in 1889 by Mr. W. C. Mills at Newcomerstown, Ohio, and which is now in the collection of the Western Reserve Historical Society in Cleveland.

Though the discovery was made in October, 1889, it was not brought to public notice until the next spring, when I chanced to meet Mr. Mills and learned about it. He then forwarded it to me, when its exact resemblance in form and finishing to an implement which I have in my own collection, that was obtained by Dr. Evans of London at Amiens, France, greatly impressed me. I forwarded it immediately to Professor H. W. Haynes of Boston, whose expert judgment is second to that of no other person in America, or indeed of the world. Professor Haynes exhibited it at the meeting of the Boston Society of Natural History on May 7, 1890, and his account was published in the *Proceedings* of that evening. In conclusion, after having enumerated its distinctive characteristics, he said, "I desire to express most emphatically my belief in the genuineness and age of this Newcomerstown implement, as well as to call attention to the close re-

semblance in all particulars which it bears to those unquestioned palæolithic implements [which he exhibited beside it] of the Old World." This implement is not a "reject," but is a finished implement, with the secondary chippings all around the edge. The cuts, reproduced from photographs, on pages 252 and 253 of my volume on "Man and the Glacial Period," perfect as they are, by no means do the implement justice.

I promptly gave an account of this discovery in *The Nation* in its issue for April, 24, 1890, and repeated it in substance with some additional particulars on page 620 of the third edition of my volume on "The Ice Age in North America." The account in my later volume is still more condensed. The detailed evidence is published in Tract No. 75 of the Western Reserve Historical Society, Cleveland, Ohio, which contains the report of the meeting when Mr. Mills was present and gave his own testimony. This was held Dec. 12, 1890.

The facts are these: There is a glacial gravel terrace in Newcomerstown at the mouth of Buckhorn Creek, where it enters the larger valley of the Tuscarawas River. There can be no question about the glacial age of this terrace. It is continuous up the river to the terminal moraine. Its surface is about 35 feet above the flood-plain of the Tuscarawas; it consists of stratified material, containing many granitic pebbles and much granitic gravel. The deposit at Newcomerstown extends over many acres, having been protected from erosion in the recess at the mouth of Buckhorn Creek. Through the middle of this deposit the railroad has cut its road-bed, and for years had been appropriating the gravel for ballast.

Mr. Mills is an educated business man, who had been a pupil in geology of Professor Orton of the State University, and had with him done considerable field-work in geology. Mr. Mills's character and reputation are entirely above suspicion. In addition to his business he took a laudable interest in the collection of Indian relics, and had in his office thousands of flint implements, collected by him and his associates in the vicinity, who had been organized into an archæological society. His office was but a few yards' distant from the gravel pit from which I have said the railroad had been for so many years obtaining ballast. The perpendicular face of this bank of gravel as it was exposed from time to time by the excavations of the railroad men was frequently examined by Mr. Mills, not with special reference to finding implements, for that thought had not entered his mind, but for the sake of obtaining specimens of coral, which occasionally occurred in the gravel. While engaged in one of these rounds on the 27th of October, 1889, he found this specimen projecting from a fresh exposure of the perpendicular bank, 15 feet below the surface, and, according to his custom, recorded the facts at the time in his note-book. There was no lack of discrimination in his observations, or of distinctness in his memory. There is no possibility of any doubt about the undisturbed character of the gravel from which Mr. Mills took the implement with his own hands. The photograph of the bank, to which I refer in my volume, is not, as I say, of the same one from which this implement was taken, but it is so like it that it illustrates the character of the problem just as well. I will, however, speedily prepare an illustration from photographs of the terrace at Newcomerstown.

These facts, submitted at the meeting of the Western Reserve Historical Society referred to, were fully detailed upon the spot to myself and a party of gentlemen, consisting of Judge C. C. Baldwin, E. A. Angell, Esq., Wm. Cushing, Esq., all lawyers of eminence, and Mr. David Baldwin, who accompanied me in a visit to the place on the 11th of April, 1890. We had all the opportunity to question and cross-question that could be desired. Now this is only one case, but it comes in as cumulative evidence with other cases; that of Dr. Metz of Madisonville being almost equally good. I will only make a further passing reference to the evidence at Trenton. Dr. Abbott is not the only competent person who has discovered implements at Trenton in undisturbed gravel. In addition to those mentioned in my communication for Nov. 11, Mr. Lucien Carr has specifically stated in two different meetings of the Boston Society of Natural History (see their Proceedings for Jan. 19, 1881) that he, in company with Professor J. D. Whitney, found several implements at Trenton, one of which

was in place "under such circumstances that it must have been deposited at the time the containing bed was laid down."

I submit that this evidence is neither "chaotic" or "unsatisfactory," but is as specific and definite and as worthy to be believed as almost anything any expert in this country, or any country, can be expected to produce. If the public cannot be convinced by such evidence, it is doubtful if any expert will be able to convince them. "If they believe not Moses and the prophets, neither will they believe, though one rise from the dead."

No one will have any objections to Mr. Holmes beginning the investigations anew, but many will object if, when he makes discoveries of relics of man in glacial deposits, he shall claim that they are the first discoveries of the kind which have been made in America.

G. FREDERICK WRIGHT.

Oberlin, O., Jan. 27.

#### Palæolithic Man in North America.

If the weight of opinion may be considered as having settled any question, the fact that in some part of the world man once existed in so low a stage of culture as to have possessed only implements rudely chipped out of stone may be regarded as established. If this so-called "palæolithic man" existed anywhere else, why may we not suppose that he has lived on this continent also? To hold the contrary is to imply that this part of the world was not peopled until mankind had developed into the neolithic stage of culture. With such an *a priori* probability, therefore, of finding proofs of his existence here as well as elsewhere archæologists have applied themselves to the task of searching for such evidence in this country. But when archæologists make use of the term "implements rudely chipped out of stone," they have in mind certain well-known and perfectly defined objects. They do not mean pebbles showing the marks where certain portions have been casually detached by blows. By the term "palæolithic implement" the instructed archæologist intends certain definite and fixed types of chopping or cutting utensils, which have been found in large quantities, more especially in western Europe, both in gravel beds of ancient quaternary rivers and sealed up in caverns by overlying layers of stalagmite. These chipped implements have a *facies*, or family likeness, that is unmistakable, and they are accompanied by the remains of certain extinct animals, which furnish a guarantee of their great antiquity. They are implements perfect, complete, and finished in themselves, and not merely objects rudely blocked out to a general outline of the shape intended to be given to them by subsequent toil. They are entirely unlike those rude beginnings of implements which were intended to be perfected by being ground down to a polished surface. Such unfinished articles are quite as common as the polished stone axes themselves, both in Europe and in this country, but no competent archæologist would ever confound one with the other. The general appearance of a series of palæolithic implements and of a set of unfinished, chipped, neolithic implements is entirely different. Thus the term "palæolithic implement" has become a perfectly established technical term, and archæologists, understanding well its full meaning, have accordingly sought for examples of it in the river-gravels of North America. They have confidently asserted that they have found such, not in large quantities, it is true, but sufficiently to establish the fact that palæolithic man lived here also, as well as in Europe, Asia, and Africa.

But quite recently there has been put forth by a little knot of men, principally connected with the U. S. Geological Survey, the claim that this conclusion is entirely wrong; that no palæolithic implement has ever been discovered in this country, and that those objects which are claimed to be such are merely "rejects," or imperfect or unfinished articles left behind by the natives who were found in possession of this continent, and who were then living in "the age of polished stone."

"With that half-wisdom half-experience gives" these geologists, whose archæological studies have been limited to our native Indian tribes and their remains, have had the assurance to maintain that the so-called "palæolithics" of this country are nothing more or less than what are sometimes styled "turtle-backs," or those unfinished polished celts, one of whose sides has had less