DISCUSSION

SOLAR AND RADIO PERIODICITIES

AT the April, 1932, meeting of the National Academy of Sciences I gave a paper which has been published under the title "Periodicity in Solar Radiation," by C. G. Abbot and Gladys T. Bond (Smithsonian Misc. Coll., Vol. 87, No. 9). Dr. L. W. Austin has published "Tables of North Atlantic Radio Transmission Conditions for Long-wave Daylight Signals for the Years 1922–1930" (Proc. Radio Engineers, Vol. 20, No. 4). It occurred to Mrs. Bond and me to see whether the departures from monthly normals in radio transmission showed the seven periodicities of 7, 8, 11, 21, 25, 45 and 68 months, respectively, which occur in the variation of solar constant values. We therefore computed the monthly normals from Dr. Austin's figures, and obtained the departures of all his observed monthly radio transmission values, 1922–1930. This series we analyzed by the aid of the periodometer. We found the seven periodicities above named and one other of 18 months, all well indicated. Combined they account for all longer period radio transmission variations. On the whole, the amplitudes of the solar periods and of the radio periods run nearly parallel. The cycle of eighteen months, though not found in solar variations, is conspicuous in terrestrial temperatures, as pointed out in our paper above cited. The phase relations between solar and radio periodicities are very interesting. We hope to publish details of the investigation in the autumn, but believe that the readers of SCIENCE will be interested to know that periodicities in solar radiation seem to accompany periodicities in radio transmission.

C. G. ABBOT

REPORTS OF THE PRINCETON UNIVERSITY EXPEDITIONS TO PATAGONIA

1896–1899

THE late Mr. J. B. Hatcher, at that time curator of vertebrate paleontology in the Princeton Museum, planned these expeditions and raised the principal funds for them from the students who had been with him in his various western explorations.

The first and third of the expeditions comprised Mr. Hatcher and Mr. O. A. Peterson, now of the Carnegie Museum in Pittsburgh; and the second one, Mr. Hatcher, and Mr. Colburn, of Washington, as ornithologist.

The principal object of the expeditions was to collect the wonderful fossil mammals of the Santa Cruz formation, which had been made known to the world by the late Dr. F. Ameghino, of Buenos Aires. In this the work was eminently successful; but was so expanded as to cover a great many other fields, and very extensive collections of invertebrate fossils and of the recent mammals, birds, fishes, reptiles, freshwater shells, plants, etc., of southern South America and Tierra del Fuego were made.

It was Mr. Hatcher's idea to publish this great wealth of new material in a series devoted to those topics alone; and when this project was laid before the late Mr. J. Pierpont Morgan, he generously contributed a large sum, which was at that time estimated to be sufficient for the whole publication. The various groups of fosils and recent animals and plants were entrusted for study and report to various specialists, nearly all of whom found it necessary to demand much more text and many more plates than they had originally estimated. The additional expense over the original scheme was met by contributions from the trustees of the Carnegie Institution of Washington and of Princeton University. Planned for six quarto volumes, the series has grown to twelve such volumes with three atlases of plates.

The first part was issued in the spring of 1901; the last part, concluding Volume VII, has just appeared. Needless to say, the editor is very much gratified at being able to issue the entire work over the thirty-one years which have elapsed since the publication of Part 1.

W. B. SCOTT
Editor

PLEISTOCENE MAN IN MINNESOTA[1]

DR. FRANK LEVERETT, geologist of the U. S. Geological Survey, prepared volume number 12 of the Minnesota Geological Survey, under Director Professor William H. Emmons. The volume is entitled "Surface Formations and Agricultural Conditions of Northwestern Minnesota." It was published in 1914. On sheet 1 of the map accompanying said volume Dr. Leverett shows certain "clayey lake beds," designated "L C"—one of which in Ottertail County is now of peculiar importance. The legend on the map which describes these clayey lake beds reads, "Chiefly in low part of areas of extinct lakes where fine material found lodgement below level of wave action."

From twelve feet beneath the existing varved silt which in glacial time flowed into and filled the ancient lake in Ottertail County, a human skeleton has been recovered under controlled and documented conditions.

May 7, 1932, Drs. C. R. Stauffer, G. A. Thiel, geologists, and F. K. Butters, botanist, colleagues in the University of Minnesota, visited the site of the find and, in agreement, bear scientific testimony concerning the geological nature of the extinct lake from whose silted depths the human skeleton was rescued.

[1] A preliminary announcement.

Together the three above scientists and the writer dug out anew the spot where the skeleton was found. There we secured seven fragments still in place which are additional parts of the original fossil materials in my laboratory. We thus authenticated the exact site of the find which had fortunately been documented by a diary entry written on the spot by the road boss on the day of the discovery. Even in this preliminary announcement, I must note the cooperative and intelligent interest, in the matter of this find, of the following gentlemen connected with the Minnesota State Highway Commission, namely Messrs. C. M. Babcock, P. F. Stary, Clarence Wright and C. A. Steffen. In the face of the state program for extensive road building, we had written asking to be informed of such possible finds of ancient man as might be exposed by extensive earth cuts made during road work. The recovery, preservation and initial information of the subject of this announcement is one of the fortunate results of this state-wide cooperation.

Our extinct glacial lake had existed earlier than most of the extensive world-famous Glacial Lake Agassiz. It now seems probable that the extinct lake of our immediate interest may have been contemporaneous with an early stage of Glacial Lake Agassiz—*i.e.*, with Agassiz when it was only about 120 miles long, north and south, and only some 40 to 50 miles wide. Its eastern border was then confined by glacial ice or by the Leaf Hills Moraine (also close within which ice or moraine our lesser lake probably then existed farther to the east). At the north, Agassiz was then confined by glacial ice which, as it melted in retreat, left the Fergus Falls Moraine and the Leaf Hills Moraine on the north and northwest. Thus as early as 1895, or 37 years ago, Dr. Warren Upham had published authoritative data which will be of value in the geological dating of our Pleistocene skeleton in his book, "The Glacial Lake Agassiz," volume 25 of the United States Geological Survey. In its early phases of existence, Glacial Lake Agassiz drained southward through the present Minnesota River, starting near what is now Lake Traverse. That early outlet of Agassiz was several miles southwest of and a few hundred feet lower than the lake beneath whose ancient silt the skeleton was discovered. The varved silt bed covers points in the near-by topography at least fifty feet higher than the point where the skeleton was found and where it had originally been naturally deposited under the undisturbed varved silt. The lake had been filled with silt in the form of "rock flour" washed out from beneath the near-by glacier. The fine silt had settled seasonally in thin even layers. To-day the varves still lie horizontally just as they had been deposited in the glacial lake below the level of wave action.

The skeleton recovered is of a youth under twenty years of age. The skull is of a primitive *Homo* who, of course, must have been of an American ancestral type. The nasal aperture has distinctly simian sill and borders. There is no projecting nasal spine. The teeth are unusually large. There is a marked degree of prognathism. The sagittal suture is extremely simple. So far as reconstruction and measurements have progressed, the type of man revealed is suggestively more proto-Eskimo than proto-Indian. The body apparently had originally all been in the lake in the spot where the skeleton was so largely recovered. With exception of the bones of hands and feet, the entire body is well represented in the parts we now possess.

It is interesting also that artifacts were found with the skeleton, including a crude dagger of antler and a large pendant of shell—both of which had been attached to and worn by the youth, as each has a hole for a leash.

Complete scientific data will later be presented on this Pleistocene man—which, for purposes of identification, we name "the Minnesota man."

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THE LITERATURE OF TAXONOMY

IN a paper entitled "A New View-Point in Paleontology,"[1] Dr. E. M. Kindle outlines the difficulties which confront the paleontologist who attempts to use—or find—the scattered literature of taxonomy. As a partial remedy for the situation, he proposes the republication, upon standardized cards, of original descriptions and figures, with such supplementary material as is essential to their use. This card catalogue is to be prepared first for Devonian invertebrates of North America; upon it, fourteen or fifteen paleontologists already are working, or have agreed to work.

Being members of these fifteen, with copy for more than eight hundred cards describing sponges, stromatoporoids and sponges already in our files, we recognize the value of Dr. Kindle's suggestion. Probably it offers greater aid to working paleontologists—especially those in institutions whose libraries are small and poorly supported—than does any other he could have made.

Yet it seems to us that such a catalogue solves only present and past problems. Unless it is accompanied by a plan for future publication, also upon standardized cards, the present situation is bound to be repeated as new species and subspecies are described.

Nor does it seem enough to provide for additions to the catalogue, in the form of cards reproducing

[1] Trans. Royal Soc. Canada, 25, sec. 4: 21–27, 1931.