netic elements between the five-degree points and within the accuracy attainable even by ocean magnetic work. In fact the outstanding residuals would be on the order of 10 to 100 times the error of observation. This inability to represent the earth's magnetic condition by means of a closed mathematical formula having a definite physical interpretation might again be looked upon as a disadvantage. I, however, am inclined to look upon it as an advantage; for we have thereby a definite proof of the fact that magnetic observations are sufficiently delicate to disclose all of the heterogeneities and irregularities in the constitution of our earth. Had we time we might profitably spend a few minutes in looking at the testimony which may be furnished the geologist in this respect by the magnetic needle.

In conclusion permit me to refer to an incident which occurred at the meeting of the British Association held at Bristol in 1837. Sir William Hamilton, attending the session of the Chemical section and getting into a quarrel with his chemical brethren, remarked: "The nearer all the sciences approach Section A (mathematics and physics), the nearer they would be to perfection." I would make but one slight alteration in this assertion, namely, that the nearer we all approach to mathematics and *cosmical* physics, the nearer we should be to perfection.

L. A. Bauer

The Carnegie Institution of Washington

CHARLES OTIS WHITMAN

Professor Charles Otis Whitman, head of the department of zoology of the University of Chicago, died of pneumonia after a brief illness on December 6, 1910. He was born in Woodstock, Maine, December 14, 1842. He received the degree of A.B. from Bowdoin College in 1868, and A.M. in 1871. From 1869 to 1872 he was principal of Westford Academy and in 1872 was teacher in the English High School of Boston. A few years later he was studying zoology with Leuckart in the University of Leipzig and received the degree of doctor of philosophy from this university in 1878. From 1880–81 he was professor of zoology in the University of Tokio, and in 1882 we find him studying at the Zoological Station of Naples. From 1883–85 he was assistant in the Zoological Laboratory of Harvard University and was then appointed Director of the Allis Lake Laboratory at Milwaukee (1886–89). He was then called to the charge of the department of zoology of the newly founded Clark University, and in 1892 he became head of the department of zoology in another newly founded university, the University of Chicago, which position he held until his death, being thus associated with the whole of the formative period of this institution. He was the first director of the Marine Biological Laboratory, from 1888 to 1908, and established the policy of the institution. He was founder and also editor of the *Journal of Morphology,* the *Biological Bulletin* and the Woods Hole series of Biological Lectures. He was the chief organizer of the American Morphological Society, now the American Society of Zoologists, and was its president for the first four years. He was also a devoted teacher of advanced students many of whom now occupy important academic positions in this country. He was a member of many scientific academies and societies, and received the honorary degrees of LL.D. from Nebraska in 1894 and Biol.D. from Clark University in 1909. Among the subjects that occupied him during a life of intense activity in biological research were: the embryology, morphology and natural history of leeches, the morphology of the Dicyemidæ, the embryology of the bony fishes; evolution of color characters in pigeons; natural history of pigeons; hybridization and heredity in pigeons; and studies in animal behavior.

Professor Whitman's life was devoted entirely to scholarly ideals of biological research

which he sought to realize with rare singleness of purpose. Not only did he devote himself to personal research with extraordinary enthusiasm and thoroughness, but he had an almost prophetic comprehension of the ways and means for furthering biological investigation, and he was able to secure the cooperation of his colleagues in his enterprises by virtue of a personality that was both singularly winning and compelling. In 1887 he founded the *Journal of Morphology,* now in the twenty-second volume, for the publication of research in zoology, and established it at once on so high a plane that it took rank with the foremost journals of zoological research of the world. It has since served as model for newer research journals in America. In 1888 he was called to be director of the Marine Biological Laboratory of Woods Hole, then newly established, and presided over its fortunes for a period of twenty-one years, during which time it came to be the leading center of biological research in America with a unique and interesting form of organization described more particularly farther on. Before any one else in America, he also urged the need of the establishment of an experimental station for the study of problems of evolution, heredity and animal behavior, a "biological farm" as he preferred to call it, and although he was not successful himself in establishing such a station, others have since brought it about. In the later years of his life Professor Whitman's personal researches became continually more engrossing and he gradually relinquished his other undertakings into the hands of younger men.

Professor Whitman belonged to no narrow field of zoology. His scientific interests were broad and they were continually bringing him into contact with workers in other fields. He had a very deep interest in all the fundamental problems of biology and we thus find him forming close scientific association with workers in the fields of botany, physiology and psychology as well as in his own field of zoology.

In many respects the Marine Biological Laboratory constitutes Professor Whitman's chief monument. Here his ideas had their fullest scope. His fundamental idea in the conduct of the laboratory was cooperation; and he succeeded in establishing what has well been called a marine university, in which the ownership and control as well as the conduct of affairs is vested in the body of active scientific investigators. The entire body of past and present investigators with few exceptions, constituting the corporation, is the court of last appeal; it elects the board of trustees mainly from its own membership, and the immediate control of laboratory affairs is carried out by the board through their appointive agents, the directors and members of the staff. The result has been the realization in our own time and country of the ancient ideal of the university, a republic of scholars.

Such an organization is exposed to dangers internal and external, and though both kinds appeared at various times Professor Whitman always refused to compromise any fragment of his fundamental idea. He was therefore often called an impractical idealist by men both within and without the organization. Idealist he was, whether impractical or not was none of his concern. He often seemed to be most resolute when he stood almost alone, as when a safe harbor of refuge for the laboratory appeared within the protecting breakwaters of an established and endowed institution, and nearly all were ready to put into port. Yet he preferred liberty and the storm, and all finally stood by him.

Professor Whitman instantly recognized creative ability in an investigator, and his appreciation was invariably hearty, and his support ever ready to the fullest extent. It is no accident that many of the important discoveries in biology in America during the last twenty years were made at Woods Hole. Professor Whitman had early recognized the ability of the workers in question, and had invited them to work at Woods Hole and secured their allegiance to the laboratory, and to himself; for his was a most magnetic personality. Thus he gradually attached to the interests of the laboratory an increasingly strong body of scientific investigators.

Professor Whitman's interest in the teaching side of his profession is fully demonstrated by his organization of teaching as a department coordinate with research in the Marine Biological Laboratory. He steadfastly resisted the influence of some of the investigators in favor of doing away with instruction at the laboratory. He held that teaching exerted an important reflex influence on the body of investigators. He enjoyed and valued the presence of the student element, for whom he had constant sympathy and towards whom he exhibited the utmost friendliness. It has resulted at Woods Hole that the institution, which was made by investigators, has aided in the making of many investigators. Surely no environment more favorable for awakening and stimulating scholarly ambition could be found.

Although Professor Whitman published relatively few papers he nevertheless occupied a commanding position in science. Some of the reasons have already been indicated. His "eye was single and his whole body was therefore full of light"; his devotion to scholarship was never open to the slightest shadow of suspicion. He was continuously engaged in his personal research which dealt with the most fundamental problems of biology, and he had accumulated vast stores of data, which we hoped he would live to publish himself. But apparently he could never satisfy himself with reference to the fundamental problems on which his mind was fixed; the grand consummation of his work had not come, and he could not reconcile himself to the publication of more or less fragmentary pieces of work. His published papers, mostly short, are models of condensed thought, written in a fine, polished, characteristic style. No less care was devoted to the form than to the substance, and some of his papers certainly will endure as classics of the biology of his time. His activities in connection with the *Journal of Morphology* and the Marine Biological Laboratory brought him into close personal relations with the leading biologists of his time, most of whom learned to value highly his somewhat rarely and deliberately uttered expressions of opinion on scientific problems.

It was, therefore, not only his publications but also his work with his journal, his laboratory and his students, his constant helpful association with other workers and the example of his austere and studious life that brought him recognition. He never permitted himself to be distracted by the confusion of modern life, social or academic, nor diverted from his steadfast purpose by clamor for quick results.

It is impossible for us yet to measure justly the value of such a life to our community; it conveys a much-needed lesson of consecration to the ideals of scholarship; our appreciation of it will surely increase in proportion as time eliminates all the petty details that confuse the picture of a great man's life, and permits its essential nobility to shine forth undimmed.

F. R. L.

December 21, 1910

With the death of Charles Otis Whitman America has lost the third of her greatest scholars. Professor Whitman's name belongs with those of William James and Simon Newcomb, not only because of the profound influence he has exerted on the development of zoology in this country by means of his personality, by founding at Woods Hole a unique biological university and by the establishment of the *Journal of Morphology*, but also because of the strength of his character and the greatness of his achievements in science.

His scientific work marks him as a great master, for his finished, published papers are truly masterpieces both of content and expression. In addition to these he had accumulated by long, patient and untiring study an enormous mass of observations on the habits and behavior of pigeons, their phylogeny, inheritance, the origin of species and the progression of species by orthogenesis, independent of natural selection. The general results of this work he had presented from time to time in brief addresses and he was preparing for publication a full report of it, when he be-

came ill. Among the results of his scientific work none is more fundamental than his proof of the real course of descent of the pigeons. He showed that Darwin had been mistaken in believing the barred type of pigeon to be primitive. The evolution was in reality from the checkered to the barred type. This discovery led him to the evidence of orthogenetic development in the pigeons and filled in, provisionally at any rate, one of the most puzzling gaps left by Darwin in the problem of evolution. A correct understanding of the direction of evolution of the pigeons gave him, also, the key to the interpretation of the phenomena of inheritance, enabling him to escape the pitfalls which beset the steps of those who do not know the past history and direction of evolution of the forms with which they are working. In addition to this splendid and fundamental work there were, also, long years of study of the embryology and phylogeny of the leeches, the results of which were in part published in his papers on metamerism, the inadequacy of the cell theory of development, and embryology, but in large part remain unpublished, preserved in notes and exquisite drawings. It is probable that much of this work and that on the pigeons will be found in such form that it can be published. As a scientist, Professor Whitman was painstaking, self-critical, patient and profound.

It is not, however, of his work as a scientist upon which I wish to dwell, but rather to recall his personality that the memory of it may remain always with us. His white hair; his kindling, eager, but thoughtful eyes; his tender, gentle smile; his reticence of speech; his consideration for others; his generosity and courage; his hospitality and graciousness as a host; these endeared him to us all. We shall never forget his simple, unassuming, modest manner; his encouraging sympathy; his ripe and sane judgment. If when he was alone he lived simply, the absorbed student of science, when with his guests in his home he was the embodied spirit of hospitality.

His great influence as a teacher was due in part to his fine example and noble ideals, and in part to his habit of picking out young men, who showed any love for science, inviting them to his home, drawing them out, encouraging them and giving them his friendship. Many of them he helped financially, and all of those fortunate enough to work near him owe him a debt of gratitude for his sympathy and inspiration. Probably no teacher in zoology since Louis Agassiz has exerted so great an influence on young men.

His uncompromising loyalty to principle and his high ideals of work and conduct were among his strongest characteristics. The Woods Hole Laboratory represented his ideal of a laboratory in its organization and spirit. Again and again he stood almost alone against his most intimate friends and associates who, frightened at the financial outlook, wished to sacrifice those ideals. He invariably prevailed in the long run and events have proved his judgment to have been sound. He was a rock upon which all plans which were not shaped in accordance with ideals but rather in accord with opportunity, were sooner or later wrecked. This loyalty to ideals was shown, also, in his struggle for a biological farm at the University of Chicago. Having outlined an ideal biological farm he refused firmly to give up any feature of it which was essential to that ideal. He preferred to wait until the ideal could be had, rather than to compromise on some less perfect scheme.

He was always loyal, also, to his ideals of science and no amount of criticism or pressure could induce him to publish one word until he was sure that word was the truth and nothing more or less.

He had also an uncompromising and outspoken hatred of shams and half-truths of all sorts. Unreliability in any particular he could never tolerate. He was slow to condemn any man, but once he had weighed him and found him wanting, he never afterwards trusted him. In common with many biologists he had no belief in a future life, but his own life demonstrated in the highest degree, how unnecessary such beliefs are to a truly noble soul.

If there was any one characteristic which

endeared him more than another to all in contact with him, it was his instinctive consideration for others and his warm sympathy. No matter how busy he was, he always welcomed one with a warm clasp of the hand and that charming, tender smile; no matter how long one stayed, it was always too soon to go; no matter how often one came, here was a friend who wished you to come more often. Those in trouble came to him. Every tie of affection, gratitude and respect bound us to him. Every meeting with him was a reinspiration in those splendid ideals of which his whole life was the expression.

We have lost a most loyal and affectionate friend, a great scientist and scholar, a truly noble and simple man.

Albert P. Mathews

Scientific Notes and News

At the Pittsburgh meeting, December 27–29, 1910, of the Geological Society of America the following officers were elected for the year 1911:

President—W. M. Davis, Cambridge, Mass.

First Vice-president—W. N. Rice, Middletown, Conn.

Second Vice-president—W. B. Scott, Princeton, N. J.

Secretary—Edmund Otis Hovey, New York City.

Treasurer—William Bullock Clark, Baltimore, Md.

Editor—Joseph Stanley-Brown, Cold Spring Harbor, N. Y.

Librarian—H. P. Cushing, Cleveland, Ohio.

Councilors (1911–13)—Heinrich Ries, Ithaca, N. Y., and A. H. Purdue, Fayetteville, Ark.

At the recent Pittsburgh meeting of the American Paleontological Society, Professor William B. Scott, of Princeton University, was elected president. The statement in regard to the presidency, taken from the daily papers and printed in the last issue of Science, was incorrect. Other officers of the society are as follows: *First Vice-president,* Arthur Hollick, New York City; *Second Vice-president,* W. D. Matthew, New York City; *Third Vice-president,* Stuart Weller, Chicago, Ill.; *Secretary,* R. S. Bassler, Washington, D. C.; *Treasurer,* Richard S. Lull, New Haven, Conn.; *Editor,* Charles R. Eastman, Cambridge, Mass. Correspondents were elected as follows: Professor G. Alfred Nathorst, Stockholm; Professor E. Koken, Tübingen; S. S. Buckman, England, and Professor Charles Déperet, France.

Professor Ralph S. Tarr, of Cornell University, was chosen president of the Association of American Geographers at its recent meeting in Pittsburgh.

Professor L. B. Mendel, of Yale University, was elected president of the Society of Biological Chemists at the New Haven meeting.

At the annual election of the American Philosophical Society held on January 6 the following officers were chosen for the ensuing year: *President,* William W. Keen; *Vice-presidents,* William B. Scott, Albert A. Michelson, Edward C. Pickering; *Secretaries,* I. Minis Hays, Arthur W. Goodspeed, James W. Holland, Amos P. Brown; *Curators,* Charles L. Doolittle, William P. Wilson, Leslie W. Miller; *Treasurer,* Henry La Barre Jayne; *Councilors* (to serve for three years), Henry F. Osborn, Joseph G. Rosengarten, Edward W. Morley, Henry H. Donaldson.

A marble bust of President Emeritus Eliot, the work of Mr. Louis Parker, of New York, has been placed in the faculty room of Harvard University.

Dr. S. Weir Mitchell, who has been a trustee of the University of Pennsylvania since 1875, has resigned.

The Zoological Society of London has elected as corresponding members Mr. Theodore Roosevelt and Mr. W. H. Osgood; Mr. S. H. Scudder as foreign member.

Dr. H. C. Bumpus, director of the American Museum of Natural History, has been decorated by King Charles, of Roumania, with the grand cross of the commander of the order of the crown.

Sir T. Carlaw Martin, LL.D., editor of the *Dundee Advertiser,* has been appointed director of the Royal Scottish Museum, Edinburgh.