

ELECTION OF FELLOWS

The Secretary announced that the candidates for fellowship had received a nearly unanimous vote of the ballots sent, and that they were elected as follows:

GEORGE IRVING ADAMS, A. M., Sc. D., Washington, D. C. Geologist, U. S. Geological Survey.

JOSEPH BARRELL, Ph. D., South Bethlehem, Pa. Assistant Professor of Geology, Lehigh University.

JOSHUA WILLIAM BEEDE, Ph. D., Bloomington, Ind. Instructor in Geology, Indiana University.

CHARLES KENNETH LEITH, Ph. D., Madison, Wis. Assistant Geologist, U. S. Geological Survey; Assistant Professor of Geology, University of Wisconsin.

WILLET GREEN MILLER, M. A., Bureau of Mines, Toronto, Canada. Provincial Geologist of Ontario.

No new business was presented. The President called for the necrology, and the following memoirs of deceased Fellows were presented:

*MEMOIR OF ALPHEUS HYATT**

BY W. O. CROSBY

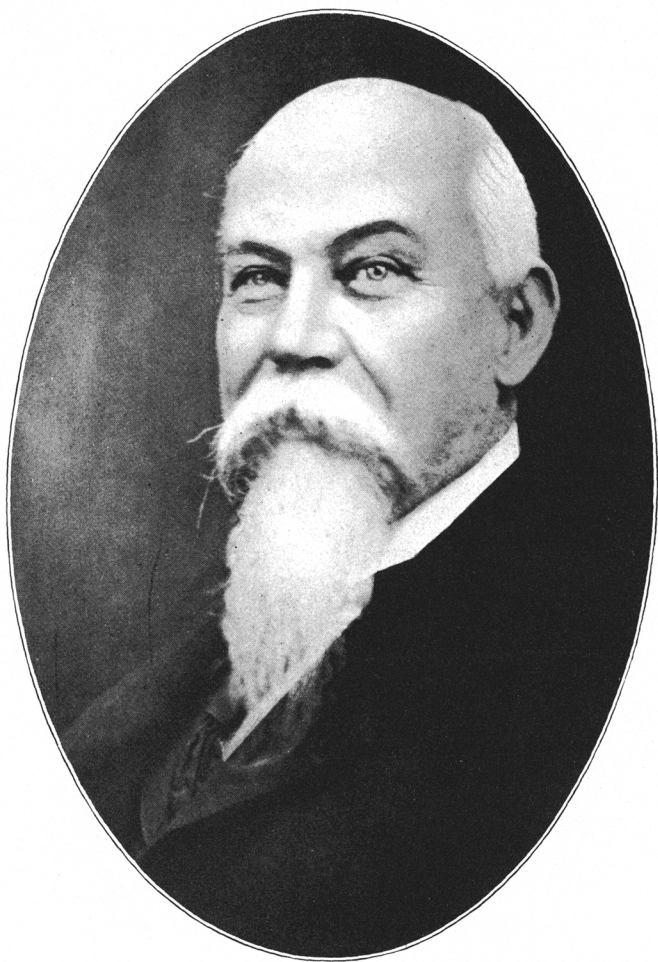
In the death of Professor Alpheus Hyatt the cause of science has met with a double loss—the loss of a careful investigator, whose work enriched the world's store of scientific knowledge, and of a science teacher, who, in teaching others to teach, spread the love and appreciation of science broadcast. Along both these lines his work was of the best, and bore that stamp of vitality and originality which was characteristic of the man.

He was an investigator who labored with painstaking zeal in the field of research, but always with eyes on the bounding horizon. To extend this horizon by the discovery of new truths was one of the dearest objects of his heart, and one which he was privileged to attain. The philosophical results of his work as an investigator, sustained as they are by a foundation of well established facts, give it a value of the highest rank.

As a teacher, his enthusiasm for direct contact with nature and his energy in making this mode of study possible were such that to his pupils no other way of studying nature appears permissible and no obstacle which stands in the way of learning her lessons at first hand too difficult to be overcome.

Descended from an old Maryland family, he was born in Washington, D. C., April 6, 1838. He lived to be nearly sixty-four years of age, and

* Professor Crosby was not present when the memoir was called, and it was read at the session of Wednesday morning. It is, however, inserted here in its appropriate place.



Yours cordially
Alfred Hyatt.

met his death suddenly while on his way to a meeting of the Boston Society of Natural History, January 15, 1902.

His youth fell in that fortunate time for students of nature in America when Professor Louis Agassiz was working and teaching in Cambridge, and it was Alpheus Hyatt's good fortune to be much under his instruction. He entered Yale in 1856, but after his freshman year left college to travel for a year in Europe. The career of a merchant, which his parents had intended for him, did not appeal to his tastes, nor did he take kindly to the study of law, which was next proposed to him. Finally, attracted to Cambridge by the fame of Agassiz, he entered the Lawrence Scientific School in 1858 and took up the study of geology. He graduated in 1862 and spent nine months of the following year in the Union army, from which he retired with the rank of captain. He then renewed his studies under Agassiz in Cambridge, and had for his associates many of the men who have since stood in the front rank of scientific workers in America. His most important work at this period was on the fossil cephalopods, to the study of which he was attracted by the valuable collections in the Museum of Comparative Zoology and concerning which he later published epoch-making papers.

His first work with Agassiz had awakened his mind to a new way of looking at natural objects. He himself says of it:

"He gave me a pentacrinite or stone lily, a rather complex fossil, and told me to study it. This I thought to be easy work, so I took a stroll in the afternoon and thought little of it. Next morning he came up to my table and asked me what I had found. I had never studied from nature before, and began giving a very general description, saying that it was a fossil petrification, etcetera, and had what appeared to be the beginning of a stem. When I had got to this point he said in impatient tone, 'Stop! stop! you don't know anything about it. It is just what I expected. You haven't told me anything that you know. Look at it again and tell me something that you see for yourself.' I had faint book remembrances and had been relying on these. Taken all aback at this, I began to work. I thought about it all day, and dreamed about it at night. Next morning I began to tell him what I had found out, and before I was one-quarter through he stopped me, saying, 'That is good. But,' he added, 'you have not yet told me what I want.' With this he pointed to the side of the room, where star fishes, ophiurans, and sea urchins were kept, and told me to see what more he wanted. In this blind way, and with no further hint, I worked unsuccessfully for a long time. Then I found that I had omitted the most conspicuous point, the star-like appearance. Not knowing whether this was of importance or not, I timidly reported at the next interview this resemblance to the star fishes, and Professor Agassiz was satisfied. This burned into my mind the most important lesson of my life, how to get real knowledge by observation and how to use it by comparison and inference."

This method of acquiring knowledge was never more faithfully and judiciously used than by Professor Hyatt in conducting his researches;

and as a teacher he also possessed the power of awakening the mind of the beginner, and making of every pupil an investigator. The writer well remembers his own gropings in the dark in making the acquaintance of the carapace of the lobster, Professor Hyatt having placed this in his hands for an observation lesson, and the uplifting of soul that came with the consciousness that even the beginner may taste the joy of discovery.

In 1870 Professor Hyatt went to Salem, where he was associated with Messrs. Packard, Putnam, and Morse, his fellow-students under Agassiz, in the work of the Essex Institute and Peabody Academy; and here these four men, destined to be life-long friends, founded and for some years edited the *American Naturalist*.

In 1870 Professor Hyatt became custodian of the Boston Society of Natural History, and in the care and development of its museum entered upon one of the great works of his life. Here was a field where some of the advanced ideas with which his mind was teeming might be developed for the benefit of the public. In the language of a pupil and fellow-worker, he was keenly alive to the correlations existing both in the inorganic and organic world; it was his constant aim to demonstrate these reciprocal relations; his success in this work was such as to make this museum one the arrangement of whose material, both from a scientific and an educational point of view, challenges the progressive thought of the twentieth century; and nowhere, probably, have the principles of a natural classification based upon genetic relationship been more faithfully and admirably worked out.

From 1870 until 1888 Professor Hyatt also held the chair of zoology and paleontology in the Massachusetts Institute of Technology, and from 1877 the chair of biology in Boston University. At the time of his death he had been for many years in charge of the collection of invertebrate fossils in the Museum of Comparative Zoology at Cambridge, and was connected with the United States Geological Survey.

He was elected a member of the National Academy in 1875, and has held membership in many other scientific societies, both in this country and abroad. He was one of the founders and the first president of the American Society of Naturalists, and in 1898 he received the honorary degree of "Doctor of Laws" from Brown University.

From his college days until the end of his life Professor Hyatt was an active investigator. His researches were confined to certain orders of the Invertebrata, and all dealt in some degree with the problem of evolution. To elucidate these problems he used largely the shells of cephalopod molluscs. He made a special and prolonged study of the fossil cephalopods, and came to be recognized as the leading authority on that class. These studies led him to the neo-Lamarckian school of thought,

rather than to the Darwinian—evolution through the use and disuse of parts and other Lamarckian factors appealing to him more strongly than evolution through natural selection.

Some of his most important theories were, however, first fully worked out and illustrated in the memoir on the genesis of the Tertiary species of *Planorbis* at Steinheim. This investigation led him to Steinheim, where he made an exhaustive study of these shells as they occur in the successive strata of fresh water lakes, and, as perhaps the most striking result, he was enabled to demonstrate that—

“ a single species, finding itself in an unoccupied field, proceeded with unexampled rapidity to fill it by the evolution of new species and many forms, all differing from each other, but all referable by intermediate varieties to the original type.”

But the ammonites afforded Professor Hyatt material especially adapted to the kind of work in which he most delighted. In this marvelous group he worked out the correlation between the development of the individual and that of its class. In the span of life of a single creature he read the history of the race. This group also afforded a basis for his demonstration that new characteristics are acquired in response to the demand of necessity, and that these acquired characteristics are inherited at earlier and earlier stages in successive generations, thus accelerating the development of the race. These points are developed in a masterly manner in his paper on the phylogeny of an acquired characteristic, and oppose successfully the view that acquired characters can not be inherited.

Professor Hyatt not only recognized the successive stages in the life history of the individual and correlated them with the adult stages of ancestral groups, but he devised a complete nomenclature for these stages, which has gained general acceptance. The law of acceleration of development, known as the law of tachygenesis, and affording the key to the complex problems of phylogeny, was discovered almost simultaneously, but quite independently, by Hyatt and Cope in 1866, and in all his subsequent writings Hyatt was more than just in his cordial recognition of Cope's claim, finding, with the utter lack of jealousy which was one of his most prominent traits, additional gratification in the coincidence which made these two eminent collaborators warm friends for the rest of their lives. This great principle was rediscovered some years later by Würtenberger, and that it should come to be generally known abroad as Würtenberger's law could not naturally be regarded with quite the same degree of equanimity, although Professor Hyatt never doubted that time would right the error.

Among Professor Hyatt's most important contributions to the theory of organic evolution is his discovery and demonstration of the law of senile characteristics, the old age characters being regarded as prophetic of the adult characters of posterity. Although essentially a corollary to the principle of acceleration during the culmination of a group, applying it forward rather than backward, and forecasting the characters of undeveloped types, we find in this law of retardation during the degradation and extinction of a group a boldness and originality which clearly entitle it to distinct and special recognition.

Hyatt's system of classification takes account of all stages in the development of the individual, instead, as heretofore, of the adult characters only, and he may fairly be said to have founded a distinct school of paleontology, which one of his followers has fitly called the "Hyatt school."

Although Professor Hyatt was primarily and chiefly a paleontologist, his best and most enduring work, as we have seen, was accomplished along biologic rather than stratigraphic lines, and his contributions to the philosophic side of the science are second in value to those of no man. It may be noted in passing, however, that he also accomplished important results in pure biology, and in his studies on the polyzoa and sponges, and he was one of the first to recognize sponges as a distinct subkingdom of animals. In this connection also may be mentioned his beautiful explanation of the spiral shells of molluscs as due to the action of gravity.

The work which was nearest to his heart at the time of his death, and on which he had been engaged for several years, was the solution of certain problems in evolution presented by the land shells of the Hawaiian islands. One of these problems is the cause of variation when, apparently, physical conditions are essentially the same, suggesting an element of spontaneity which makes the organism more or less independent of the environment. He had studied exhaustively many thousands of these shells and had planned to visit Hawaii in the spring of 1902 to study the living animals and their relations to the habitat. He looked forward to the completion of this research as the crowning work of his life; but, incomplete as it now stands, his conception of it and his splendid enthusiasm are an inspiration to those who knew him best.

It is a matter for congratulation that a man so devoted to original work as was Professor Hyatt, a man of such unusual concentration of mind and habit of philosophical thought, should have given himself so largely to the cause of science teaching. He was happy in transmitting to others not only the knowledge he had gained, but something of his own spirit of investigation.

As early as 1870 he set on foot a movement which culminated in the founding of the Teachers' School of Science, a school free to all teachers, where work with specimens and direct contact with nature in field and laboratory should prepare them for the best work in the schools. Professor Hyatt was at the head of this school until his death, and under his wise management, and, above all, his strong personal influence, it has achieved a substantial success and become an important adjunct of the normal schools of eastern Massachusetts. The admiration and affection felt for him by the multitude of teachers who came under his influence was boundless. One of them has said :

"The wealth of his mind, the simplicity of his nature, the kindness and patience of his great heart placed him without a peer in the hearts of his pupils."

Another work which he did for teachers was to maintain at Annisquam, Massachusetts, during the summer months of several years a seaside laboratory where as many as could be accommodated might come for special work. In connection with this laboratory he conducted dredging expeditions along the eastern coast of New England. Such out-of-door work was always congenial to him, and in 1885 he went as far north as the strait of Belle Isle, doing important geological work on the west coast of Newfoundland, and thus supplementing earlier work by himself and others on the island of Anticosti. The Annisquam laboratory, it may be added, prepared the way for the biological laboratory at Woods Hole.

In his beautiful tribute to Professor Hyatt's life and work, Professor A. S. Packard well says that

"Whether we regard him as a man, a patriot, a fellow-student, a scientific investigator, an organizer of societies, of museums, or of methods of science teaching, his many sided life was a rare one. He was a promoter of scientific enterprises, one of the founders of a new school in the philosophy of biology, a master in paleontological methods, and endowed with rare powers of mental absorption and concentration and an unusual capacity for sound generalization."

Those who were so fortunate as to know Professor Hyatt personally will remember him as a man of sunny disposition and a beautiful cordiality of manner. His kindness and consideration toward his pupils were noteworthy. He was one of the most fair minded of men, unusually lacking in professional jealousy and broadly tolerant of the opinions of others.

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In the absence of the author, the following memoir was read by J. S. Diller:

MEMOIR OF JAMES E. MILLS*

BY J. C. BRANNER

James Ellison Mills, son of Doctor Preserved Brayton and Jane Lunt Mills, was born in Bangor, Maine, February 13, 1834, and died at San Fernando, Estado de Durango, Mexico, July 25, 1901. The boyhood of Mr Mills was spent at home, in the public schools and in the woods with crews of lumbermen working for his father. He prepared to enter Harvard College at the age of seventeen, but his father desired that he should first learn what he could of his country by traveling, and accord-

* For the data of this notice I am indebted chiefly to Mr Mills' surviving brother, Hiram Mills, of Lowell, Massachusetts.