GARDINER GREENE HUBBARD.

In 1883 Gardiner Greene Hubbard and Alexander Graham Bell founded this Journal. It was first published at Cambridge by Moses King, and its first editor was S. H. Scudder. The magazine was designed to be a means of communication between scientific men of America as a bearer of scientific news, an agency for the announcement of scientific discoveries and a forum for scientific discussion. It was not intended as a business enterprise, but it was hoped to establish it on a sure foundation as a gift to American scientific men. The death of Mr. Hubbard was announced in the last week's issue. As one of the original board of directors for the Journal it may be appropriate for us to recount some of his achievements in the interests of scientific affairs.

Mr. Hubbard was born in Boston on the 25th of August, 1822. He came of a scholarly ancestry, his father, Samuel, being an alumnus of Yale, and a Doctor of Laws from Yale, Dartmouth and Harvard, an accomplished lawyer, and a member of the Supreme Court of Massachusetts. The family is English, its first representative in America being William Hubbard, a graduate of Harvard in 1642 and known as an early historian of New England. Mr. Hubbard himself was graduated at Dartmouth in the class of 1841, studied law at Cambridge, and was admitted to the bar in 1843, when he entered the office of Benjamin R. Curtis and remained with the firm until Mr. Curtis was elevated to the Supreme Bench of the United States. Mr. Hubbard continued to practice his profession in Boston for more than twenty years, and subsequently in Washington for five years. The degree of Doctor of Laws was conferred on him by Dartmouth and by Columbian University. His career as a lawyer was eminently distinguished, although it terminated twenty years ago, at which time he was drawn into more active public life.

It is not Mr. Hubbard's legal experience of which we shall speak, but of the rôle which he played in certain public affairs and for which he will long be remembered. In 1860 he was led by the result of a severe illness in one of his children to investigate the possibility of teaching the deaf to speak. At this time there were two systems of instruction for deaf children prevailing in Europe—gesture language and oral speech.

In 1803 Francis Greene, a merchant of Boston who had a deaf child, thus became interested in the education of the deaf and made some study of the oral system. A memorial tablet has just been erected to Greene in Boston. In 1844 Horace Mann went to Europe and made a special study of the subject as it was practiced in Germany, and on his return attempted to introduce the system in America. About the same time the philanthropist Howe, who was the teacher of Laura Bridgeman, became interested in the same subject. An account of the case was published by the Smithsonian Institution. During this epoch the wife of Governor Lippett, of Rhode Island, whose child was deaf, attempted to teach the oral method, and about the same time Mr. Hubbard, whose little daughter had been rendered deaf by severe illness, became interested in oral speech, and by him Miss Rogers was induced to open a school of this character at Chelmsford, near Boston. Mr. Hubbard advertised for pupils for her school and supported it with his own means. The pupils here assembled made rapid progress, when Mr. Hubbard applied to the Legislature for a charter for the school. In the first instance it was refused; the chairman of the committee, himself having a deaf child, was the champion of sign language. Mr. Hubbard was not discouraged; he still pressed the subject on the public and enlisted those who

were especially interested in it by calling attention to the pupils of Miss Rogers' school, one of whom was his own daughter. He again applied to the Legislature for a charter and took the pupils of the Chelmsford school to the State Capitol and gave the committee a demonstration of the utility of the method. At about the same time he also induced Mr. Dudley to permit his child to visit Miss Rogers' school, and she became domiciled for a time at Miss Rogers' residence. In a few weeks Mr. Dudley visited his child, and when he appeared the little girl ran to her father and called him 'Papa.' He found that she was able to converse with him, being able to speak a few words and to understand a few when spoken by Mr. Dudley by interpreting the movements of his lips; thus Mr. Dudley became a champion of oral speech, and when the subject was again presented to the Legislature he made an eloquent appeal for a charter for the school. At this juncture a gentleman named Clarke offered a sum of money for the endowment of such a school to be located at Northampton; the benefaction was accepted by the Legislature and the charter was granted. Miss Rogers' school was transferred to Northampton, Mr. Hubbard himself becoming the president of the board of trustees, on which board he continued until his death. Thus was the teaching of speech to deaf children permanently and officially introduced into the United States.

The deaf constitute quite a large class of persons in modern society who have been rescued from a cheerless state by the efforts of philanthropic men. This class of the population had previously been condemned to a state of inactivity and dependence. In future years it will be difficult to appreciate the dreary life of the deaf as it appeared in youth to those who are now passing away with old age. Deprived of the means of intellectual culture, they seemed to be stricken with a paralysis of reason and to wander as useless burdens on society. Instruction in speech has transformed them into helpful independence, so that the deaf may now bear an integral and honorable share in the society of their fellow-men, taking a part in the activities of modern life where the sweet music of speech makes glad the soul. Mr. Hubbard did not invent oral speech, but he became the leader of the men who developed the agencies by which oral speech has become the means of communication among a class of persons who were formerly mutes and who therefore took no part in the arts, industries, institutions and intellectual activities of mankind, while now they may be active, useful and happy members of society.

The student of men as they are engaged in human development may derive a lesson of great interest concerning the interdependence of demotic activities. Arts, industries, institutions, languages and opinions are developed in such a manner that one of these realms cannot be developed without the others. So, for example, a man without institutions is more dangerous than a wolf. In the same manner the investigator as a scientific man engaged in the pursuit of knowledge must depend on the inventor engaged in the application of knowledge, who in turn is dependent on the man of affairs for the utilization of his inventions. To designate this particular class of persons the English language gives us no term. Etymologically the word 'undertaker' is appropriate, but it has been used to designate a director of funerals. The French language has the term *entrepreneur*. Mr. Hubbard was the *entrepreneur* of scientific inventions and discoveries—the man of affairs who pushed them into the service of mankind. He was the *entrepreneur* of oral speech for the deaf, for he introduced it into all of the institutions of America designed to ameliorate the

condition of this class. Men without language are imbecile, as men without institutions are anarchists; but men with language are useful and happy members of the community, as men with institutions are self-respecting citizens.

As a lawyer, business man and benefactor Mr. Hubbard had acquired national reputation, when, in 1876, President Grant appointed him chairman of a special commission to investigate the question of railway mail transportation. The labors of this commission have greatly promoted the intercommunication of the people throughout the Union, for the plans of the commission were adopted by a succession of Postmasters-General and formulated into statutes by members of Congress. The results of his work did not end in national statutes and administrative devices, for he pursued it among telegraph companies.

When Mr. Hubbard was engaged in providing speech for his daughter and then expanding his energies into providing for all the deaf of the nation he naturally became interested in the science of acoustics, and this led him into association with a young student of the science who had already become an inventor. Alexander Graham Bell had so investigated the principles of acoustics that he could invent a telephone. In this instrument Mr. Hubbard evinced a deep interest. It was an instrument to make the inaudible audible, as the microscope was designed to make the invisible visible. At first it was supposed that it might be useful in communicating between different rooms in the same building or between adjoining buildings; but Mr. Hubbard saw in it an instrument of communication for all the governmental departments of a city, all of the business institutions of the city, and all the people of a city. More than this, he conceived that it might be the means of communication from town to town and city to city throughout the country, finally to become a means of international communication. For this purpose Mr. Hubbard devised the business machinery for the introduction of the telephone to the world. He organized a company for this purpose and managed the company by business devices with a great central company and a multitude of local companies by which the telephone business was introduced into all portions of the civilized world. Now a man can be put in communication with his baker through the telephone; in the next minute he may be put in connection with a railroad office or a steamship company; at the next minute with the Governor of his State; at the next minute with some other man elsewhere in the world. To accomplish all this has taken many years of intelligent active labor. Before this we could communicate with the world by lightning light; now we can communicate with the world by lightning sound. The man who devised all this business machinery, set it into operation, and made it all a business success, was Mr. Hubbard.

Mr. Hubbard was not the discoverer of the laws of acoustics which are represented in the telephone; he was not the inventor of the telephone, but he was the *entrepreneur* who distributed the telephone among all men of the civilized world and made it a practical agency for social intercommunication. Having accomplished all these things he retired from business and made his home at Twin Oaks, in Washington City.

At the seat of the federal government there are many bureaus that have to deal with the science of geography. First, there is the time-honored bureau known as the Coast Survey, which is charting the coasts of the sea as an aid to the mariner; then there is the Geological Survey, which is making maps of the United States in the interest of mining and manufacturing;

then there is the Weather Bureau, which is making a daily map of the heavens to exhibit the temperature and storms of the land in the interest of commerce and agriculture; then there is a Hydrographic Bureau preparing charts of all the seas in the interests of foreign commerce. In addition to these great geographical bureaus there are many others that are necessarily interested in geography. Thus, the General Post Office must prepare maps of postal routes. Now the little army of men who are engaged in geographical work in Washington organized themselves into a body known as the National Geographic Society. When they were duly organized they cast about for some one who could manage their affairs as its president and who would interest himself in the diffusion broadcast among the people of this geographical knowledge, which all these bureaus were acquiring. The man selected for this purpose was Gardiner Greene Hubbard, who was elected its first president.

The function of the National Geographic Society is the discussion of the principles of geography and the diffusion of geographical knowledge among the people. To carry out this purpose Mr. Hubbard organized a journal called the *National Geographic Magazine*, which has already acquired a good circulation and become an influential publication. Then he organized a system of bulletins designed to discuss the elements of physiography as a compendious library for teachers in the public schools, and finally he organized in the city of Washington a system of public lectures on geography, enlisting not only the members of the Society, but many other able public men in this enterprise. In all of these agencies the working geographers of Washington most heartily cooperated, and the National Geographic Society has within very few years attained an influence and efficiency which is unequalled in America and perhaps in the world. Thus Mr. Hubbard was the *entrepreneur* of geographical knowledge.

Investigation and discovery lead to useful, honorable and glorious careers, but knowledge must result in invention if it becomes useful, and inventions themselves must be applied to public affairs if they are to be a boon to mankind.

Mr. Hubbard died at three o'clock on the 11th of this month, loved by his kindred, beloved by his friends and honored by the world.

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*ON THE ORIGIN AND AGE OF THE RELIC-BEARING SAND AT TRENTON, N. J.**

THE locality where human antiquities have recently been found near Trenton, New Jersey, is situated about two miles south of the heart of the city. The points where the finds are being made are on a somewhat extensive plain, the principal formation of which is composed of the sand and gravel deposited by the glacial drainage which came down the Delaware during the last glacial epoch. On the east side of the Delaware the plain extends about two miles east of the locality where the finds are made. It also has a considerable development on the west side of the river, and extends many miles up and down the Delaware north and south of the locality in question. From Trenton it also stretches northeast a number of miles along the Assanpink creek. In the vicinity of Trenton this plain has an elevation of 50 to 60 feet. Through it the Delaware has cut a wide valley, the flood-plain of which is now less than ten feet above sea-level. The relation of the flood-plain to the plain above shows that, after the latter was made, the river excavated a valley in it, cutting it down essentially to tide-level. This valley has been cut since the last glacial epoch.

* Paper presented at the summer meeting of the American Association for the Advancement of Science.