from the weaknesses to which all democratic government is subject, we must rather work for a greater knowledge and honesty of purpose, a higher cultural level, in the community as a whole; and although we must certainly beware of claiming that the diffusion of scientific knowledge and of the spirit of science is alone sufficient, we may safely claim that it would be an important factor in the moral and social development of the people. "The cultivation of science in its highest expression," to quote the words of Pasteur, "the cultivation of science in its highest expression is perhaps even more necessary to the moral condition than to the material prosperity of a nation." It is because science inculcates "veracity of thought and action" without which, as Huxley said, "there can be no alleviation to the sufferings of mankind," that we must work for its more widespread diffusion throughout all classes of the community. It is, moreover, largely because of its moral and spiritual value, as I have said, that we must claim the inclusion of science in our general educational curricula, whether of the schools or of the universities. A knowledge of the facts of science and of the physical universe in which we live is good and necessary, but if we fail to communicate to the student the spirit of science, the passion for truth, the spirit of cooperation, of tolerance, of charity and of unselfishness which are the spirit of true scientific endeavor, we shall have failed in our most important work.

In conclusion let me say that while we must urge the claims of science on the grounds both of its practical and spiritual value, we should do so with restraint and moderation, for, in pursuing truth according to the methods of scientific investigation, we must bear in mind that the truth to which we attain is only a partial truth. Let us always remind ourselves of the all-roundness of truth and let us remember that in our scientific approach we see but one side, one aspect of truth. Let us always recognize that through religion, art, literature and philosophy we have other paths of approach and see other aspects of the truth. Let us then carry with us the thought of the English poet, Sir William Watson, as expressed in his epigram, "The guests of heaven":

> Science and Art, compeers in glory,
> Boast each a haunt divine,
> "My place is in God's laboratory,"
> "And in His garden mine."

ALEXANDER FINDLAY

UNIVERSITY OF ABERDEEN

REYNOLD ALBRECHT SPAETH

REYNOLD ALBRECHT SPAETH died in Bangkok, Siam, on June 26, 1925. In his untimely death zoology and physiology alike have lost a valued student; their followers the companionship of a rare and charming personality. In writing from Woods Hole, where for many summers he had made his home, I must express particularly the personal bereavement which so many of us feel, for he possessed in great measure qualities which endeared him to his fellows.

Spaeth was born in Philadelphia thirty-eight years ago, of a family containing many members distinguished for their achievements in medicine, theology, philosophy and literature. His schooling was received at the Germantown Academy and the North Eastern Manual Training School in Philadelphia. As a boy he was greatly interested in natural history and became proficient in bird photography.

At Haverford College his interests were first turned into definitely scholarly and scientific channels, largely under the influence of Professor Henry S. Pratt. Of this period a college mate, who later became one of his most valued friends, writes:

> I think he was the freshest freshman that ever entered the institution, and, with his usual alertness, as soon as he found how irritating this was he exaggerated it artfully. I was president of the sophomore class at the time and he annoyed me as much as he could. Later on we often laughed about it.
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> I remember that almost from the beginning of his sophomore year he began to be spoken of by the fellows in the college as some one a bit peculiar, since he had an extraordinary taste for settling down with Dr. Pratt in the biological laboratory and actually working over the classification of the small organisms in which he had become interested. During the four years when I was at college he was the only student who I remember doing anything intellectual for its own sake and because he liked it. The rest of us did what we were told. Some of us had sense enough to do this in a minimal degree; others, being rather more obedient, did a full stint, but I can not see that it ever netted much. I think that Ren was quite unique in the fact that he actually accomplished a piece of work, parts of which were published, during his undergraduate life at Haverford. I can emphasize the fact that I and several others viewed Ren with considerable wonderment because of his real attachment to this intellectual pursuit. I can even remember I envied him to some degree, and later, when I entered the medical school, I came to realize how much more his education must have meant to him than mine had to me.
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> He was always well liked, but owing to his powers of mimicry and his great capacity for detecting bluff he found it exceedingly easy to make enemies. As I see it now I believe that they sensed his greater degree of intellectual alertness and the fact that he did not hesitate to laugh at them.

The zoological work referred to was a study of the local distribution of the genus Cyclops and resulted in the publication of what I am told is the best existing description of the members of this group which occur in the eastern United States.

On graduating from Haverford College in 1909 Spaeth obtained a teaching fellowship at Harvard and entered on a four-year period of graduate study in zoology, under the guidance of Professor G. H. Parker. It was at this time that I first knew him, for I was an undergraduate taking courses in which he was the "assistant." I remember clearly the enthusiasm with which one day he showed me the beautifully simple contrivances he had worked out in connection with his researches on the chromatophores of fish. It was this abundant enthusiasm which distinguished him not only as a teacher but in all the things to which he turned his attention. And it was this perhaps, together with a certain assurance which was part of it, which gave me at that time the feeling that Spaeth was one for whom the future held something special in store. And this feeling, I think, was shared by other and wiser heads than mine.

The physiology of the chromatophores of fishes was the subject of his doctor's dissertation and occupied him for several years after the termination of the period of his graduate study. This was work of the first quality: thorough, comprehensive, imaginative, critical, of fine experimental ingenuity, ranging in its scope from painstaking accumulation of quantitative data to broad speculation on the relationships of chromatophores and other types of contractile cells. For his earlier work in this field he was awarded the Walker Prize by the Boston Society of Natural History. It was characteristic that this investigation was a distinct departure from the traditions of the laboratory in which it was done—a characteristic creditable to Spaeth and to that laboratory alike. At Woods Hole his attention had been drawn to the application of physical chemistry to biological problems, and he recognized clearly the fundamental nature of this method of attack. In his research he felt that his training in the physical sciences was deficient and extended his period of graduate study in order to ground himself thoroughly in these subjects. He concerned himself with the physical chemistry of protoplasm, utilizing his chromatophores as visible indicators of changes in the protoplasmic state. Höber's "Physikalische Chemie der Zelle und der Gewebe" became his handbook and long remained the most bethumbed book on his desk.

On being granted a Sheldon Traveling Fellowship by Harvard University in 1913 he spent the greater part of a year in Professor Höber's laboratory at Kiel, and occupied for a shorter period the Smithsonian Table at the Naples Zoological Station. On August 18, 1913, he had been married to Edith Eleanor Taussig. Shortly after their return from Europe their son, Walter, was born.

In 1914–15 he was instructor in biology at Clark College and during the following two years served as an instructor in the Zoological Department at Yale. Following this he held briefly an assistantship in the Hygienic Laboratory of the United States Public Health Service at Washington. During the summers of this period he was engaged in teaching embryology and, later, physiology at the Marine Biological Laboratory, Woods Hole. His investigations at this time were concerned in rounding out his work on chromatophores and particularly in attempting to utilize this material in pharmacological assaying. Several ideas occupied him also which, although they apparently proved fruitless, were interesting in indicating the bold and ingenious nature of his thinking. One of these involved an attempt to detect the possible radioactive formation of copper, using the extraordinary sensitiveness of certain organisms to this element as an indicator of its presence. Another led him to seek for differences in the optical activity of substances in the right and left blastomeres of dividing eggs.

In 1919 Spaeth became connected with the School of Hygiene and Public Health at Johns Hopkins University as an associate in physiology. It was his purpose to concern himself with the problem of fatigue in its relation to industrial and public health and he entered on his new duties by preparing a characteristically thorough review of the literature on this subject. His experimental work took several directions, but involved him chiefly in an inquiry into the relation between fatigue and resistance to infection. His position naturally forced on him the obligation of the scientist to the community at large, and he spent considerable time acting as consultant on industrial hygiene, in popular writing and in the preparation of moving pictures of marine animals. All this was excellently done, yet in the end this period is something of a disappointment. The experiment of setting a man trained in the fundamentals of general science on the practical physiological problems of the moment had not proved the success that had been hoped for. Perhaps it was inevitable that investigations in these problems should lack the fine qualities of his earlier work on chromatophores. Perhaps the very versatility of Spaeth's mind and the enthusiastic interest with which he met each new contact led to a scattering of his endeavors. At all events the outcome was disappointing, and at the

end of five years, when he should have felt that he had found himself and his problem, he believed that he was in a *cul de sac* and was ready for a change.

A year ago he was asked to take part in the reorganization of the medical school of the Chulalongkorn University in Bangkok, Siam, and accepted the appointment as professor of physiology. The opportunity, which this position seemed to hold out, to take up again problems in physiological zoology was welcome and the prospects which the tropical environment of Bangkok offered were not distasteful to his adventurous nature. At the same time he felt keenly the obligations which he was assuming toward the Siamese university and devoted the entire summer to preparing himself in those aspects of medical physiology with which he had not previously had experience. The enthusiasm with which he came to look forward to going out to Siam was well justified. From boyhood his avocations had developed him into a skilled field naturalist. He was very fond of shooting and fishing and was one of those persons with the knack of finding game where no one else had thought to look for it. His physique was exceptional; he had been an excellent athlete and could come back from a long day's hunting without a sign of tiring. With his rather broad knowledge of zoology and physiology as a background for these proclivities it seemed fair to hope for original accomplishment from him in the tropics. And in addition there was little fear that the inertia which so often comes with life in warm climates would quell the exuberance of his energies.

In October he moved his family, which had been enlarged by the addition of a daughter the year before, to Bangkok. He was very happy there; perhaps more happy than he had been anywhere before. He liked the place and the climate. He made friends there, as he always did readily. He felt that the opportunities for research were exceptional and that everything was coming his way at last. He was planning to investigate the oestrous cycle in monkeys, and had received a grant from the National Research Council in support of this work. During the spring he made three expeditions into the jungle for the purpose of collecting material for his studies. On all these trips he suffered some hardships—was in fact lost in the jungle without food for thirty hours on one occasion—but felt no ill effects which he could not, in his vigorous way, disregard. Apparently his energy and self-confidence led him to neglect the necessary safeguards of his health and he had become worn down by his activities more than he realized. In June, while in the midst of preparing a report on his research work, he became ill. Septicemia, resulting from the extension of an infection contracted on his first jungle expedition, had developed and in two weeks he was dead.

So ended the scientific career of Reynold Spaeth, before the promise of his early years could be fulfilled. But on another side he left a full achievement. For Spaeth developed richly the charms and virtues of his personality. He had a natural gift for entertainment: could sing and play and draw and mimic with a gentle humor which made him most engaging company. Eager, assured, a thoroughgoing individualist, with ready, witty tongue and quick insight he gave his mind openly to others, yet with a generosity and patent frankness which saved him from bitterness toward those he could not hold with. For one so prone to action his mind was philosophical and in a true sense religious. But most of all he had a zest for living. In the intensity with which he lived his life there was perhaps some recompense for its too short duration. For in the joy of life he never forgot the discipline of scholarship and was ever loyal to his scientific conscience.

ALFRED C. REDFIELD

SCIENTIFIC EVENTS

MEMORIAL TO VINAL NYE EDWARDS

ON September 1 there was unveiled at the Woods Hole Bureau of Fisheries a bronze tablet in memory of the late Vinal Nye Edwards. The *Fisheries Service Bulletin* states that Mr. Edwards was associated with the bureau and the Woods Hole laboratory from 1882 up to the time of his death in 1919, a period of nearly forty-seven years. It was he who first showed Professor Spencer F. Baird the marine life of the Woods Hole region, and it is probable that Woods Hole was selected as the site for the first biological laboratory of the newly established Fish Commission mainly because of the information Mr. Edwards was able to give. He was engaged as collector for the laboratory during all his long term of service, and his intimate acquaintance with the life of the region proved an invaluable aid to the advancement of biological investigation.

The movement to erect a memorial to Vinal Edwards was initiated in July, and the response in the form of contributions and interest was so immediate and generous that an order was soon placed for the tablet. The arrangements were in charge of a committee of which Dr. Edwin Linton was chairman. Dr. Linton himself has been associated with the Woods Hole laboratory since its beginning and was intimately acquainted with Mr. Edwards. The other members of the committee were G. R. Hoffses, Dr.