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ARTHUR GORDON WEBSTER

THE death of Professor Arthur Gordon Webster by his own hand on Tuesday, May 14, was to all scientific circles in this country one of the most shocking and astonishing events of the kind that could have happened.

Few Americans have done more than Webster to promote the higher study of physics in this country. He had remarkable gifts and corresponding accomplishments; and, like other men who have been largely effective, he came at the right time for the exercise of his powers.

He was a scholar and a teacher rather than a discoverer or explorer in science. He acquired knowledge easily, copiously, joyfully, and he imparted it in the same way, though he was perhaps somewhat impatient of the drudgery and seclusion of original research; and America needed such a man when he came on the scene.

Rowland and some others, but Rowland more than any other or all others, had already shown the way and set the fashion of experimental investigation for young physicists in American universities; but Rowland was hardly a systematic scholar and was certainly not a systematic teacher. His famous remark, *"I neglect them,"* described accurately his method of dealing with his students, so far as general instruction was concerned, and the example he set in this respect might well have been, perhaps was, injurious to sound scholarship in this country.

European physical laboratories, the best of them, had still much to teach us, and of course many individual Americans had profited by this teaching. B. O. Pierce, for example, understood the matter and labored quietly within his personal sphere of action to improve conditions in America, but he was not the man to proclaim his gospel from the housetops.

Webster took his A.B. at Harvard in 1885, the first scholar in his class, with *summa cum laude* in both mathematics and physics. He remained, as instructor in mathematics, a year more at Harvard, in the course of which he undertook, naturally without great success, a new determination of the mechanical equivalent of heat. Then he went to Berlin to study under Helmholtz. Professor Pupin, in his interesting autobiography, *From Immigrant to Inventor,* tells of meeting him there and of being induced to accompany him to Paris for a few weeks, "to see what physical science was doing at the Sorbonne and at the

Collège de France, and to compare the academic world of Paris with that of Berlin." It is clear enough, on this and other evidence, that Webster did not confine himself closely to the laboratory of Helmholtz or even to the study of experimental physics. He puts himself down in *Who's Who* as having studied during the years 1886–90 at Berlin, Paris and Stockholm. He was four years, instead of the more usual three, in getting his Ph.D. at Berlin, and even so his thesis was, I believe, a philosophical or theoretical disquisition rather than the record of experimental research accomplished. On the other hand, he gained an exceptionally broad and accurate knowledge of the state of physical and mathematical science in Europe, and became remarkably proficient in the use of several languages.[1]

Returning to America in 1890, he became a member of the physics staff at Clark University, then a new institution, as junior to Michelson. His next fifteen years were especially fruitful. Lecturing, from the start, on the higher mathematical aspects of physics, he became, I believe, head of the department and director of the physical laboratory in 1892, when Michelson was called to Chicago. In 1893 he completed an important piece of work, "An Experimental Determination of the Period of Electrical Oscillations,"[2] which won for him, by an award announced in 1895, the Elihu Thomson Prize of 5,000 francs. The details of this event are interesting. Thomson had received, in a competition announced in 1889 by the City of Paris, a prize of 5,000 francs for his watt-meter. He then offered the same amount for a new competition, as a prize for the best work on one of four important problems in electricity. The committee for the award consisted of J. Carpentier, Hippolyte Fontaine, Hospitalier, Mascart, A. Potier and Abdank Abakanowicz. The memoirs were to be presented on or before September 15, 1893, and four were offered, one in German, one in French, and two, numbered at first three and four, respectively, in English. The committee awarded the prize to the fourth paper, with words of especial praise for the author, who proved to be Webster. But number three was considered also worthy of a prize, and ultimately, through the generosity of Professor Thomson and the French and English Thomson-Houston Companies, received also 5,000 francs. This memoir was on the same subject as that of Webster, and was the joint work of Oliver Lodge and R. T. Glazebrook.[3]

[1] In after years he used to address in their own tongue assemblies of Greeks in Worcester.

[2] The paper describing this work is to be found in the *Physical Review*, Vol. 6 (1898) of the First Series, at p. 297.

[3] I have taken this account mainly from SCIENCE, Vol. I (1895), p. 190.

Webster's work in this case was, as he clearly states, an experimental verification of the formula given years before by other men, of whom he mentions Helmholtz and Schiller. It is a good example of the sort of experimental problem toward which he inclined and for which he was, no doubt, best fitted, that is, a problem requiring exact measurements in a field that could be explored mathematically in advance. And to say this is to give him high praise, with the implied admission, perhaps, that he was not a man likely to undertake venturesome explorations or to introduce distinctly new ideas. The following passage taken from his illuminating, and in every way admirable, review[4] of the English edition of Hertz's *Electric Waves,* is relevant here: "The proper order of procedure [in experimental work] may be stated, 'Think, calculate, plan, experiment, think—and first, last, and all the time, *think.*' The method often pursued is: 'Wonder, guess, putter, guess again, theorize, and above all avoid calculation.'" This is good, safe counsel, and probably it was much needed in America at the time it was given, though the world doubtless owes a good deal to the class of unsystematic and usually unsuccessful theorizers who wonder, guess, putter, and guess again.

In 1897 Webster published his *Theory of Electricity and Magnetism,* based upon the lectures he had been giving during six years of teaching at Clark University. This treatise was high above the level of any preceding American text-book in this field, with the exception of B. O. Pierce's *Newtonian Potential Function,* a work of narrower scope, which appeared first in 1886. The book is not, and does not profess to be, new in its subject-matter; it is rather the work of a highly competent and accomplished scholar gladly serving as guide to bring young men into the intellectual company of the great leaders of thought, to whom here as always he rendered loyal, ungrudging homage. The *Preface* ends thus: "If the book shall succeed in clearing up some of the difficulties generally encountered by the student and in inducing him to read the classical writings of Maxwell, Helmholtz, Hertz and Heaviside the object of its author will have been achieved."

In the same year he gave a course of public lectures, on *Electricty* and *Ether,* under the auspices of the Lowell Institute of Boston, no small honor for a man but 34 years old.

In 1899 he took a leading part in founding the American Physical Society, and I believe that he was the initiator of this movement, though I speak subject to correction by those who are more intimately informed regarding the matter than I am. At the organizing meeting, which was held at Columbia Uni-

[4] *Physical Review,* Vol. 3 (1895–6) of the First Series.

versity May 20, he was elected secretary and addressed the assembly in explanation of the call. He was made chairman of the committee chosen to draw up a constitution for the society, and in the permanent organization was made chairman of the council. Rowland was made president, Michelson, vice-president, and Merritt, of Cornell, secretary.

Webster contributed a great deal to the success of the society in its early years. When he did not present papers of his own, he listened diligently to those read by others, a duty occasionally neglected by some of us, and his frequent comments were appreciative and illuminating. Moreover, they were delivered with such vigor, and such evidence of high spirits, that they created a cheerful and lively atmosphere for what might have been, at times, a rather perfunctory and dreary program.

Few men, it seems to me, have so genuinely rejoiced in the nature and achievements of their science as Webster did in physics and the mathematics pertaining thereto. He used to speak of the higher revelations in this field of study almost in the spirit of the old hymn,

I love to tell the story of unseen things above.

And yet he was not over mathematical in his discussions; for he had what, in a review[5] of J. J. Thomson's *Electricity and Magnetism,* he describes as "the thorough knowledge of mathematics that enables one to express mathematical truths in plain language."

His standing among American men of science after a dozen years of his professional life is well shown by the fact that he was elected a member of the National Academy of Sciences in 1903, at the age of 39, there being at that time, I believe, only two younger members, George E. Hale and Theodore W. Richards.

His *Dynamics* appeared in 1904, and the same general comments can be made on this book that apply to his *Electricity and Magnetism.* In reviewing the *Dynamics,* for the Harvard Graduates' Magazine, I described the author as "one of the best spokesmen for physics and the mathematics most used in physics," and said further that, although at first sight the volume under discussion might appear to be intended for the mathematician rather than the physicist, closer examination showed it to be written with a very lively sense of the objective world. Though printed in English, the book was published by Teubner, of Leipsic, as volume XI in the Series *Lehrbücher der Mathematischen Wissenschaften.*

Webster was, in fact, especially interested in mechanics, and his later research work in general had to do with matters of a mechanical nature, such as the energy of sound waves and the pressure developed in the explosion chambers of guns.

[5] SCIENCE, Dec. 13, 1895.

It is clear that he had done a great deal in his first twenty years out of college. In dealing, very briefly, with the remainder of his life, I can hardly do better than repeat certain paragraphs from a letter I wrote to the Boston *Herald* soon after his death, and which appeared in that paper on May 20: Thus far we discover no hint of impending tragedy in the record of his career, but in the light of what has come at last it is not difficult to see that years ago he began to be, in some measure, the victim of his own gifts and attainments. If there had been some element of wholesome dullness in his make-up, just enough to show him early in life that he must not try to attend all meetings of physicists, understand all papers, and speak all languages, while conducting a research laboratory and teaching all the higher branches of his science in his own university, his early years would have been less brilliant, but perhaps his later ones would have been happier. With the tremendous advances and revolutionary changes that have marked the history of physics during the last two or three decades, the program which he had undertaken became too much for the powers of any man.

He probably saw this at the last, but when it seemed too late to change. He grew somewhat morbid, a state of feeling partly shown and partly masked by his humorous habit in speech and writing. Those who knew him well saw that he was depressed at times, and even despondent, but his physical vigor was so great, his bodily health seemingly always perfect, that no one appears to have realized how dangerously his mind was plunging, under cover of those sometimes extravagant bursts of humor that seemed the evidence of high spirits.

Arthur Gordon Webster was a good fellow, and an upright, blameless man. In thinking, so far as I can bear to think, of what his last days must have been, I recall the words of William James, who had known the depths of despondency, spoken to another man of like experience, "No one has a right to speak of life who has never felt the *fear* of life."

EDWIN H. HALL

HARVARD UNIVERSITY

GAME LAWS FOR THE CONSERVATION OF WILD PLANTS

REFERENCE was made in a recent number of SCIENCE (January 12, 1923) by Dr. Gager to the Vermont law of 1921 in which a list of over forty species of native ferns and flowering plants were specified as protected. The law prohibited general commercial collection of these forms but allowed limited gathering for scientific purposes. By inference, all species not mentioned in that list are considered sufficiently common so that their natural in-