

Arthur Gordon Webster, founder of the APS

He was a man of many talents and considerable renown in his day who helped establish physics education in America, but his life ended in a tragic suicide.

Melba Phillips

Fewer than one in a hundred present members of The American Physical Society could name its founder. Carl Barus, head of physics at Brown University for many years and a member of the committee Arthur Gordon Webster organized in 1899 to discuss the possibility of forming a physical society, wrote many years after that meeting, "The foresight and chief credit . . . must be assigned to the tireless activity of Prof. Webster and it is to be hoped that the Physical Society may some day commemorate the event in his honor." According to Ernest Merritt, who was the first secretary of the society and later became its president, "All of us who remember those days are agreed that Webster thoroughly deserved the title that was often given him—'father of The American Physical Society.'"

Webster, professor of physics at Clark University for many years, was a colorful figure, quite well known in his time, who dedicated his life to research and teaching in physics while he also pursued his interests in languages and writing. His report to the secretary of the Harvard class of 1885, on the occasion of the class's 25th reunion in 1910, describes in very simple but sure words the joys and satisfactions of a life of single-minded dedication to one's calling: "My life has been entirely devoted to scientific work, which I have thoroughly enjoyed. I come in contact only with advanced students, and have ample time for my own researches. My life has been totally uneventful, unmarred by accident or sadness. I have hardly been ill since leaving college, a result of the use

of the gymnasium then and since, and the avoidance of athletic contests. My scientific work has been rewarded by election to the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences in Boston."

This seems like an apt description of the life and career of the founder of a learned society, but the circumstances of Webster's death leave us baffled and incredulous: Webster killed himself on 13 May 1923, using a gun he had obtained a day before, ostensibly for use in his research laboratory. Why should so fulfilled and fruitful a life have ended in suicide?

I will discuss in this article Webster's physics career and his contribution to the founding of the APS, and will examine in detail the circumstances—the professional uncertainties and financial insecurity—that led him to the tragic decision to end his life.

Early life and career

Webster, the only son of William Edward Webster and Mary Shannon Webster, was born on 28 November 1863, in Brookline, Massachusetts. On his father's side he was descended from an Englishman, John Webster, who settled in Ipswich in the 1630s, but there was also some Scottish blood in the ancestry, hence the middle name Gordon; from his mother he inherited a strain of Irish blood.

Webster prepared for college at Newton High School and entered Harvard in 1881. After graduating at the top of his class in 1885, he stayed at Harvard for a year as an instructor in mathematics and physics and spent the four following years abroad, mostly at the University of Berlin, as Parker Fellow. In Berlin he studied with Hermann von Helmholtz and took his PhD in 1890

with an experimental dissertation directed by August Kundt. On his return to the United States Webster accepted a position at the promising new graduate school Clark University, as docent under Albert A. Michelson. When Michelson left for the University of Chicago in 1892 Webster became assistant professor and head of the physics department at Clark. He was promoted to full professor in 1900, a rank he held until his death. In 1889 he married Elizabeth Monroe Townsend, daughter of Captain Robert Townsend of the United States Navy. They had two daughters and a son.

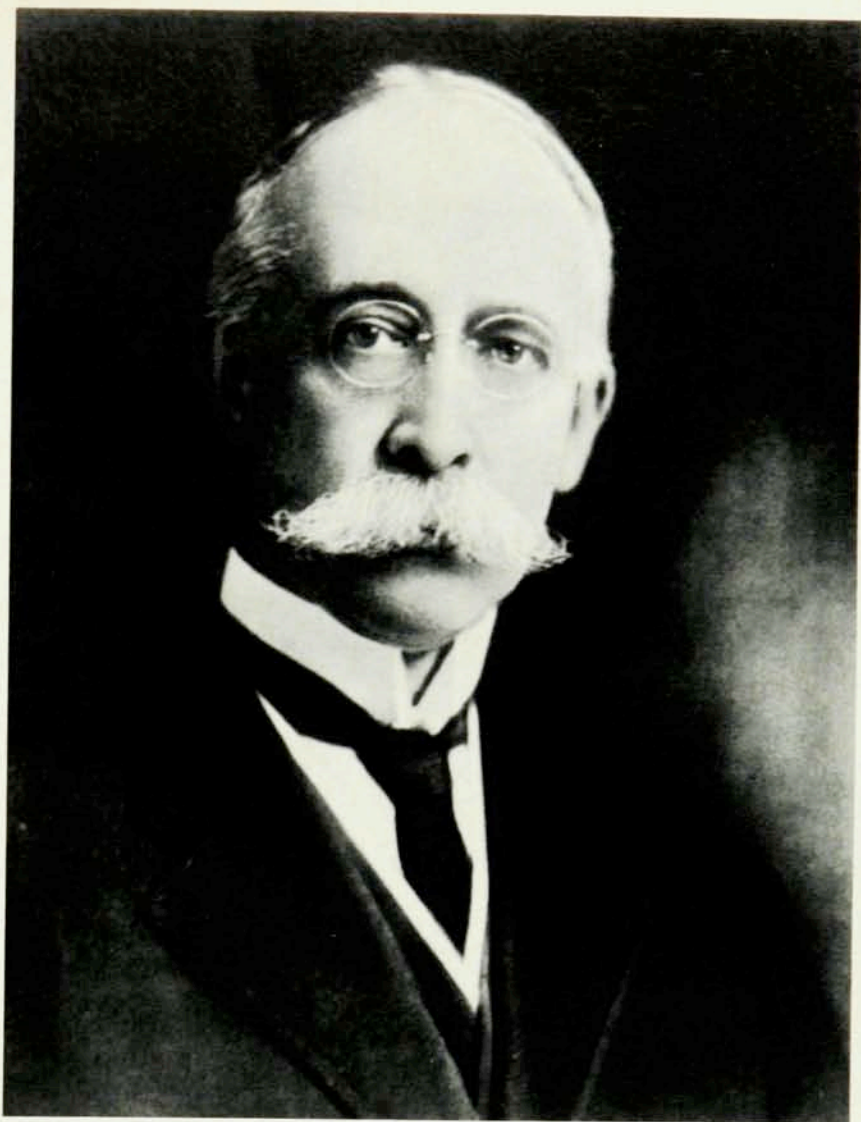
Webster's most notable scientific contributions were to electromagnetism, acoustics and, toward the end, ballistics. He is credited with introducing the concept of acoustic impedance; an early work, completed in 1893, "An experimental determination of the period of electrical oscillations," won for him in Paris the Elihu Thomson prize of 5000 francs, in competition with widely known physicists such as Oliver Lodge and R. T. Glazebrook. He also published several papers on pure mathematics. His approach toward physics was primarily mathematical, but he had a marked talent for doing experiments. According to Joseph Sweetman Ames of Johns Hopkins, who had known him since their Berlin days in 1886, "He was as much interested in what one may properly call the engineering side of his subject as in the purely physical one, and his ability was so great that there was no practical field in which he could not venture with great profit to all concerned." Although he kept well informed on the developments that revolutionized physics—x rays, radioactivity, the electron—and lectured on these to his students, Webster did no research on

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these subjects. During World War I, in the course of his tenure on the Naval Consulting Board, he became a leading authority on ballistics and for several years contributed papers to the National Academy of Sciences on the theory and practice of gunnery.

At Clark University, according to the *Dictionary of American Biography*, Webster developed "a systematic and comprehensive course of lectures on mathematical physics which was unsurpassed in scope and thoroughness by any corresponding course offered elsewhere." Three excellent texts arose from these lectures: *The Theory of Electricity and Magnetism* (1897), *The Dynamics of Particles and of Rigid, Elastic and Fluid Bodies* (1904) and *The Partial Differential Equations of Mathematical Physics*, not quite complete at his death in 1923 and published in 1927 after final editing by S. J. Plimpton of Worcester Polytechnic Institute. These books played an extremely important role in advancing physics education in America for they—especially the books on electromagnetism and dynamics—were the first comprehensive treatises on these subjects by an American.

Webster's formal teaching was limited to graduate students, both at Clark and when he was a visiting lecturer at other universities. He successfully trained 27 doctoral students at Clark, and his influence on young physicists extended well beyond that of instructor and dissertation adviser. According to Walter G. Cady of Wesleyan University, who took his PhD in Berlin in 1900 and first met Webster at a meeting in New York of the American Association for the Advancement of Science soon after he returned to the US, "Webster was noted for the kindly interest he took in the younger men who were just



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coming up in the profession. Many times when a beginner on the verge of stage fright had nervously read a paper of no great importance, which no one else cared to discuss, Webster would think of something complimentary or encouraging about it." Undoubtedly, as Edwin H. Hall of Harvard also remarked, few Americans have done more to promote the higher study of physics in this country.

Webster was devoted to physics above all, but he also had a great talent for languages. There are stories of his giving an address in modern Greek, after taking pains to learn how the language differed from the classical version he had learned in school. He was fluent in several European languages and on numerous occasions was the official American spokesman and representative at conferences in Europe. At the International Congress of

Arts and Sciences held in connection with the Universal Exposition at St. Louis in 1904, Barus recalled, "[I] had the honor of being the speaker for physics at the Congress, charged with the duty of presenting a succinct account of the progress of the whole of contemporary physical thought. It was the first time I had ever addressed a large audience and I was a bit anxious. The ordeal, however, was far less severe than I had expected, and less exacting than A. G. Webster's accomplishment in translating and interpreting, *pari passu*, the papers of French physicists like Langevin, into English."

Besides his contribution to higher education, Webster also worked intensely to promote science among non-scientists. He wrote articles for many magazines including the then popular *Review of Reviews* and *The Nation*. His contributions consisted not only of



Honorary degree recipients at the 20th anniversary of Clark University (1909) included Webster, second from the left in the second row, R. W. Wood and A. A. Michelson, at the extremes of the front row, and Ernest Rutherford, the big man next to Webster toward the left in the second row. The impressive figure in the center front is Vito Volterra, the Italian mathematical physicist. The bearded man in the upper right is Carl Barus. Robert H. Goddard, then a graduate student at Clark, is the balding young man behind Webster in the upper left.

pieces on science and reports of scientific meetings but also letters to the editor, some exhibiting a robust sense of humor. For example, on 4 August 1911, a sweltering day in Worcester by his own account, he wrote three separate letters to *Science* magazine, each in response to a letter published there. In one he agrees with an earlier writer that the atmosphere for science in Washington is rotten, but adds that it is also "infested with a most dangerous parasite, the red-tape-worm!" In another letter: "I hope this letter may provoke discussion, but I do not wish to take part in it. Like all brave anar-

chists, I wish merely to explode the bomb, and then run like . . .!" And in the third letter he raises the question, "Which is worse, the English of scientists or of politicians?" In a quite different vein, his article "Education and learning in America" (*Science Monthly* 11, 419, 1920) is very serious, almost solemn, in the way it deplors, among other things, giving our universities over to athletics.

Founding the APS

According to Merritt, "In the years between 1890 and 1900 the need of a society where physicists could get to-

gether for discussion and the presentation of papers was frequently mentioned. All physicists realized the need. But the one who was most active in the movement which ultimately brought about the organization of the physical society was Professor Arthur Gordon Webster."

Webster's contribution to the APS began with his forming the committee—comprising, besides himself, Ames, Barus, William F. Magie (Princeton University), Edward L. Nichols (Cornell University), Benjamin Osgood Peirce (Harvard University) and Michael Pupin (Columbia University)—that sent out a call for a meeting to discuss and, if possible, to organize a physical society. The meeting was held at Columbia University on 20 May 1899, and Webster, as secretary *pro tem*, sent a notice of the new society to *Science*. He had already obtained permission from Henry A. Rowland (Johns Hopkins University) and Michelson, neither of whom attended the initial meeting, to nominate them for president and vice president, respectively. The presidential terms were two years at the beginning, and Webster was third in this succession, after Michelson.

The physical society that Webster founded fulfilled well its function as a forum for presenting research papers. Gradually, the APS Council also began to raise and vote on policy issues. Webster probably brought up the first of these on 24 February 1900, for on that day he was made chairman of a committee to draw up "a memorial to Congress in the name of the Society, favoring the establishment of a Bureau of Weights and Measures, in connection with the United States Coast and Geodetic Survey." The government, acting on recommendations from several scientific societies including the APS, established the National Bureau of Standards in 1901.

In spite of the prominent role he played in founding the APS, Webster did not gain support on many issues. In a letter to Elizabeth Laird of Mount Holyoke College dated 20 November 1905, in answer to one of hers, he wrote, "I have often tried to get the Physical Society to take up pedagogical questions, but without success." Although the council formulated in 1907 an

explicit policy that "all pedagogical matters lie outside of the Physical Society," Webster apparently must have continued to raise such matters, for the council appointed in 1915 a committee to consider "the extension of the influence of the Society among teachers of physics." This committee, consisting of George W. Stewart (University of Iowa), Webster and W. S. Franklin, moved for adoption three recommendations on 22 April 1916:

► The establishment of student membership

► A special *Physical Review* subscription rate for members of societies that are interested in physics teaching

► The appointment of an APS representative "who shall prepare for each issue of *School Science and Mathematics* a record of some of the most interesting achievements in physics."

Only the third recommendation was promptly put into effect and Homer L. Dodge was appointed "for the purpose of presenting various items of research in physics" to the editorial board of *School Science and Mathematics*, the most influential journal of the time for physics teachers. The choice of Dodge, who had been an assistant for Webster's lectures on mathematical physics at Columbia in the summer of 1913, suggests the role Webster must have played in drawing up these recommendations and having them adopted by the APS Council. (Dodge later became the first president of the American Association of Physics Teachers.)

Webster participated actively in the actual meetings of the society, which were usually held at Columbia University. H. W. Farwell, a beginning graduate student at Columbia in 1906, remembered: "Some of the older men were always alert to point out flaws or give praise, as the occasion demanded. If any one of those meetings passed without numerous comments from Arthur Gordon Webster we young folks felt something was wrong." And Lyman J. Briggs of the National Bureau of Standards wrote to Karl Darrow in 1949: "The two most colorful physicists in the early days of the Society were Prof. A. G. Webster and Prof. W. S. Franklin. They seldom missed a meeting and they almost invariably had something to say about each paper. Webster had a brilliant mind and his

keen analysis of a paper in his booming voice was something to remember."

It was inevitable that some people should find such an outgoing individual abrasive. His frankness may well have been hard to take on occasion, but in the words of A. Wilmer Duff of the Worcester Polytechnic Institute, "there was a quality of naive sincerity about his occasional impulsive speech that, while it did not always prevent temporary resentment, did usually avert anything like permanent hostility." We know relatively little of Webster's personal and social life, but there is considerable evidence of his charm. Pupin, who was Webster's contemporary in Berlin, recalled: "During a short visit in Paris, in 1887, Webster and I made the acquaintance of many Serbian students who were studying there. . . . I never visited Belgrade without taking away with me many cordial greetings for Webster from these acquaintances of many years ago. I often heard them say to me: 'If Americans are like Webster then it is no wonder that you prefer to live in America.' . . . When he stood up for right and justice and truth he was fearless and full of fight, and he reminded you of the Massachusetts men who fought at Bunker Hill. When you addressed yourself to his sympathy he was as mellow and as gentle as the gentlest saint in heaven."

Webster at Clark University

Clark University was founded by Jonas G. Clark, a Massachusetts farm boy who became a multimillionaire as a successful merchant in California after the gold rush. He began shipping goods to San Francisco in 1851 and moved there in 1853. When he retired to Worcester, his home city, he set out to realize his dream of founding a university. He chose a group of distinguished trustees, who selected G. Stanley Hall, a brilliant psychologist at Johns Hopkins, as president. But Hall and Clark differed in their ideas about the university. It was Hall's dream to create a great graduate institution, while Clark really wanted a "college where boys of limited means . . . could obtain an education at low cost." Although Clark agreed to have the graduate school started first, he was not impressed with Hall's plans in spite of the fact that

when the university opened in 1889 the faculty was unequaled by any other university in the country—Michelson headed the physics department, the anthropology department included Franz Boas, and Charles O. Whitman, head of biology, was also director of the Woods Hole Marine Laboratory. Because of his differences with Hall, Clark restricted the funds he gave for the university and, after 1892, furnished no more money during his lifetime; Hall, on the other hand, could not fulfill his promises. Many faculty members were unhappy at this situation, and news of their discontent soon got around. In 1892—the year of "Harper's raid"—William Rainey Harper, president of the newly founded University of Chicago, offered positions at better salaries to a number of professors at Clark, so that, in the words of the 1937 history of Clark University, "at the end of the academic year 1892, but two men of full professorial rank remained."

Jonas Clark died in 1900, willing his fortune to the university, but on condition that a college be established under a different administration from that of the graduate school. This was done in 1902. Facilities, including a good library, were shared between the college and the graduate school, and so were some members of the faculty. But the low tuition did nothing to make the college prosperous, and despite the infusion of its founder's money, financial difficulties were inevitable. In 1920 Hall resigned as president of the university, and the trustees decided to combine the two schools. They chose Wallace W. Atwood to lead the joint institution. Atwood had been the author of a series of very successful school textbooks in geography. He started a new graduate department—in geography—set up a summer school, with an emphasis on geography, for schoolteachers and turned Clark into a very different institution.

Because of Webster's courses and his reputation as a physicist, the physics department at Clark was very highly regarded. Good students came to Clark, and other universities turned to it for suggestions and recommendations to fill positions in physics. For example, in 1896 D. W. Hering of New York University got permission to en-



Webster in academic dress.

gaged an assistant in physics, and we learn from the NYU archives that "Clark University had at that time the reputation of giving, under Professor A. G. Webster, perhaps the best training in physics in the United States; and to Clark Dr. Hering turned for his assistant." Hering chose Thomas W. Edmondson, who had come from England with bachelor's degrees from both London and Cambridge universities, had been a fellow at Clark from 1894 to 1896 and got his PhD there in 1896. And the Clark physics department retained until Webster's death a good measure of its prestige. Webster apparently loved Clark: He turned down the offers he received from other institutions—he was wooed by the University of Illinois in 1909 and gave the address at the opening of the new physics laboratories there that year—and continued to head the physics department despite his relative isolation in research and Clark's diminishing commitment to research and graduate education. Robert Hutchings Goddard, generally acknowledged as the father of modern rocketry in this country, was an alumnus of Clark and took his physics PhD there in 1911.

Jonas Clark's will had declared that "the said university in its practical management, as well as in theory, may be wholly free from every kind of denominational or sectarian control, bias or limitation, and that its doors may be open to all classes and persons, whatsoever may be their religious faith or political sympathies, or to whatever creed, sect, or party they may belong." For many years, the atmosphere at Clark could be characterized as liberal, but the "red scare" of the early 1920s, with its Palmer Raids, although it was directed primarily at aliens and labor,

also seriously affected educational institutions, and few more sensationally than Clark University. Early in 1922 the Liberal Club, a student organization, invited as a speaker Scott Nearing, an economist and sociologist who was a socialist. The students had obtained permission from Atwood, but the president arrived at the hall halfway through the evening and stopped the lecture. The incident received nationwide publicity. There is no record of any connection between this event and Webster, but Atwood's arrogant patriotism must have disturbed Webster: There exists a newspaper report that "Dr. Webster was in controversy with President Wallace W. Atwood over the barring of the magazine *The Nation* from the library of the university." Webster had been a frequent contributor to *The Nation*, especially in reporting international scientific conferences, but he would have spoken out in any case, for according to G. Stanley Hall, "he spoke out his mind in the press, in faculty, political, and other meetings, and even in the American Academy of Sciences. He, better than anyone I ever knew intimately, illustrated academic freedom to the fullest."

Atwood, acting as if to make Clark the kind of college that Jonas Clark may have originally envisioned, abolished the graduate department of mathematics, forcing two full professors into retirement. There were rumors that the entire graduate school was to be abolished and that physics would go next. In 1922 Princeton University conferred the honorary degree of Doctor of Science on Webster, but at Clark he was in danger of losing his job. He had signed a one-year contract with Clark not too long before his suicide, his son related shortly after the tragedy, but that contract came so late in the academic year that one can have little doubt that Webster's future was uncertain and that there was little support for his research in acoustics and ballistics.

Physics, too, had changed in the previous two decades. Several new and exciting areas of research had opened up and no one person, no matter how learned and gifted, could be expert in all aspects of the subject. President Hall's account of his last conversation with Webster—"he portrayed his experiences with this drama of struggle and readjustment in his own department, which led him as we all know to focus and become our leading authority on sound and ballistics, and renounce the leadership in the fascinating new fields opened up by x rays, metatomic physics, and relativity"—suggests that the fear of losing his position must have

been traumatic for Webster. What seems to have been his conscious decision to become a leader in the classical mathematical physics rather than follow the new developments—most of which were happening in Europe—probably now made it difficult for him to secure a position elsewhere. That Webster could not face up to this adversity is entirely understandable, but it is a pity that he found himself in such a situation, for even though he did not make many very original discoveries, he was certainly highly esteemed by some of the most renowned physicists of his day. After Webster's death, for example, J. J. Thomson wrote that Webster had taken a very active part in the lectures Thomson gave at the sesquicentenary celebration at Princeton and "showed that he possessed an intimate knowledge of the latest developments in both Pure Mathematics and Physics," and Owen W. Richardson remarked: "None of those who, like myself, had the privilege of being associated with him will ever forget his great geniality, his quick mind and his forceful methods of expression. Any scientific gathering which secured his presence was assured of success."

The scientific world found Webster's suicide one of the most shocking and astonishing things that could have happened. The event was noted in scientific circles both here and abroad, and was the subject of a special feature of the *Sunday New York Times*, with statements from Pupin and George Pegram; Harvard's Edwin Hall wrote a five-column obituary in *Science*. But there was only a brief—though moving—obituary in the *Physical Review*, written by a former student, Gordon S. Fulcher, then editor of the *Physical Review*. In retrospect it seems that The American Physical Society should have taken official note of the death of its founder, but he was not memorialized by its Council, and I have found no mention of him in the programs of membership meetings. It seems time for us to remember our institutional roots after so many years!

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Almost all the source material for this article can now be found in the Niels Bohr Library and the archives of the AIP Center for History of Physics. It has been a pleasure to add to this documentation through the kind generosity of Stuart Campbell, university archivist at Clark University, to whom I owe special thanks. It is also a pleasure to thank the entire personnel at the Center for History of Physics for their ongoing assistance. Most quotations in the article are taken from Arthur Gordon Webster, 28 November, 1863 – 15 May 1923; in *Memoriam*, Louis N. Wilson, ed., *Publications of the Clark University Library*, vol. 7, no. 4 (1924).