EDNA CARTER

1872 - 1963

Edna Carter came to Vassar College as a freshman in 1890. She retired as professor of physics in 1941. For twenty years afterward she kept in touch with members of the faculty and continued to know many of the graduating seniors in physics. There were thus seventy years in which she had close contact with the college and she found it good.

Miss Carter's career in physics spanned the discovery of X-rays, of the electron, and of radioactivity; the introduction of quantum theory and its application to atomic structure, of relativity and of quantum mechanics; the invention of radio and the subsequent development of radar and lasers; the growth of nuclear physics and the discovery of many new particles; the discovery of fission and fusion; Hubble's idea of the expanding universe. She had a gift for understanding the essense of these new discoveries and ideas, so that physics courses changed continuously through the decades to include what was new, so that students at all levels were aware of the almost explosive opening up of new knowledge and of Miss Carter's excitement about it. She also always found some way for every incoming member of the department to teach what he thought important in the melee of new physics.

Miss Carter's own research in physics began with a study of the energy of X-rays in Würzburg, Germany, for which she received her Ph.D in 1906. From her results the wave length of X-rays could be deduced, on the assumption that they had a wave nature. The definitive proof of this assumption came in 1912 with von Laue's work. In 1911 Miss Carter received the Sarah Berliner Research Fellowship of the American Association of University Women, then the largest fellowship offered to women. She returned to Würzburg to work on vacuum sparks and renewed her friendships with German physicists. In later years, when her family settled in California, she carried on her research at the physics laboratory of Mount Wilson Observatory in Pasadena. There she continued her work on the spectra of sparks, becoming in the process a spectroscopist and astronomer. Her work was published in various journals in Germany and in this country and she was named a Fellow of the American Physical Society.

Edna Carter was born in High Cliff, Wisconsin, on January 29, 1872 of pioneering parents from New Hampshire. The youngest of nine children, her playground was the small village on Lake Winnebago, the countryside, the lake shore, and her father's boat, the Benjamin Franklin Carter, carrying freight and passengers to Oshkosh, Appleton and Fond du Lac. Her childhood delight in exploring any kind EDNA CARTER (Continued)

of situation remained throughout her life one of her dominant characteristics.

As a student at Vassar her first interest was in biology, taught by Marcella O'Grady who introduced the subject here. In her junior year she took physics with Mr. Cooley and in her senior year a newly introduced second course in physics. These were the courses that indicated the direction her life would take. After graduation she returned to Wisconsin to attend a state normal school in Oshkosh, an outstanding school where young teachers fresh from John Dewey's classroom found themselves forced to sharpen their wits in discussion with some of the most renowned teachers in Wisconsin.

The next year she became assistant principal in a nearby high school. In her own words, "There I taught a great variety of subjects and sometimes burned the midnight oil literally in a lamp which smoked badly if I forgot to adjust it. My most vivid remembrance of that year concerns an argument with a minister. His sermon in 'Education Week' was a shock to all my ideas about science imbibed from Professor O'Grady's teaching, so I wrote an article for the local paper. This drew a bitter personal attack and bad consequences ultimately for my antagonist. Fortunately for me Dr. Cooley at this point asked me to return to Vassar as assistant in physics."

Following two years at Vassar she went to The University of Chicago where she studied with two great American physicists, Michelson and Millikan. She then returned to Oshkosh for five years where she taught in the normal school, an experience she always recalled as one of the most satisfying of her life, because of the caliber and strength of purpose of teachers and students.

In the meantime Marcella O'Grady had married a distinguished German biologist, Theodor Boveri, in Würzburg. They urged Miss Carter to join them in Germany to study for her Ph.D. in physics. This she did in 1904, going by way of England to a meeting of the British Association for the Advancement of Science where she met Lord Kelvin, Lord Rayleigh, Sir Oliver Lodge, and other distinguished physicists. In Wfirzburg she worked in the laboratory with an international group including Russians, a Finn, and a Norwegian, as well as several Germans. Here Rbntgen had discovered X-rays and although he had been called to Munich she came to know him well. For her work she used the same EDNA CARTER (Continued)

induction coil with which he had discovered the X-rays. It was later sent to the Deutches Museum. The director of her thesis was Wien who, like Rbntgen, was a Nobel prize winner in physics. She later spoke of these days of the great Germany, of discussions in the laboratory, weekly colloquia followed by nachcolloquia and nachnach colloquia which extended far into the night, walking and skiing expeditions, a trip on a raft of logs on the river Main, visits to Professors' homes. The talk was always of physics. These were the days of "Akademische Freiheit," with its implication of privileges of academic detachment from political involvement, so much cherished by professors at that time for it left them free to devote themselves to their work. They were later to regret their lack of knowledge of how they were governed. She also spoke of being the only woman in the laboratory and how naturally the men accepted her as one of the group.

In her two years in Germany Miss Carter not only laid the foundation for her own work, but she lived in close contact with the best minds in physics. When she went to Germany in 1911 she became friends with the von Laue's. It was at this time that he found proof of the nature of X-rays and she received from him as a Christmas card a picture of the X-ray diffraction pattern which could be explained only by a wave theory. In later years she exchanged visits here and in German with Wien, the von Laue's, and others, until their deaths.

In 1906 Miss Carter came to Vassar to stay permanently. Her work during sumers and leaves of absence in Pasadena from about 1914 yielded rewards for the college beyond the direct enrichment of her teaching. The men with whom she worked and talked, Hale, Hubble, Babcock, King, and Millikan who had left Chicago to go to The California Institute of Technology became friends of the college. Interesting speakers were glad to come here. Important equipment, otherwise difficult to get, became available for the laboratory. One example of the latter is the Hale spectrohelioscope, originally mounted in a shaft built for it in the Sanders laboratory of physics. In a search for better seeing it was later moved to the observatory. It has recently been returned to its original place in the laboratory for use by students of physics and astronomy.

As a young teacher at Vassar College in the years just after her return in 1906 Miss Carter opened a world of physics to the students, and ways of inquiry that were a revelation to them, and they quoted her to their friends so that her presence was felt among them far beyond her classroom and was cherished by them even after they had been graduated fifty years. As chair– EDNA CARTER (Continued)

man of the department in 1919–1939 she organized its courses, sought its staff, and designed the functional Henry Sanders Laboratory of Physics. Her quiet brilliance was recognized and trusted by her colleagues who persistently through years elected her to important comittees.

When she first came to live in Lathrop, another specially able member of the faculty comented to one of her freshmen how "wonderful to have some one come to live here who is so thoughtful." In the years when Kendrick was a community, she was a center of its habitual discussion of principles and goals in education, the advancement of learning and the state of the world; of its generous, loyal give and take among friends; of its fearlessness and delight in sharing its daily tasks. She was relentless toward any compromising debasement of college standards, incorruptible in her integrity, but tireless and generous in helping people who cared about learning, or who had some need, whether undergraduates, gifted young scholars, col-

leagues, refugees from European tyrranies, or naval officers turning to teaching. Her clear eyes would twinkle and a luminous or amused smile would come over her face as she would cut through pretense or circumlocution and come out with sharply perceived facts needed in the situation and likely to be glossed over by less direct and well-centered people. Patiently she would explain principles of physics to an inquiring colleague at the breakfast table as well as to her classes, and she would draw out the best about their interests from a teacher of English, or Latin, or Theatre, or Geography, assuming the arts and the sciences to be at home with each other. In her own leisure she painted with oils and joined other members of the faculty in Professor Chatterton's special class for them. She had a way of noticing and remembering their talents. After her retirement from Vassar she organized a department of physics at Albertus Magnus College in New Haven, Connecticut, where she served two years as professor of physics. Following this she did war work on rockets at The California Institute of Technology. She finally retired at 73. We have been glad that she lived among us for years after her retirement, her mind clear, her belief steady in the greatness of the college and in the need of it still in educating women at high levels. Helen Lockwood Barbara Swain Monica Healea, Chairman XVI 104-106