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Stood

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VALUES FOR WHICH MRS. ELLEN H. RICHARDS STOOD*

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WE meet today to pay tribute to Mrs. Ellen H. Richards. Mrs. Richards, who was known in her college days as Miss Ellen H. Swallow, was a graduate of Vassar College in the Class of 1870. She was the first woman student admitted to the Massachusetts Institute of Technology, as well as the first woman student to graduate in the above-named institution, and "so far as known the first woman to be admitted to any scientific school in this country."

The degree of Master of Arts was conferred upon Mrs. Richards by Vassar College, and the degree of Doctor of Science was conferred by Smith College in October, 1910. In 1879 she was made an active member of the American Institute of Mining Engineers. In June, 1894, she was made an Alumna Trustee of Vassar College.

For more than a quarter of a century Mrs. Richards was a member of the Faculty of the Massachusetts Institute of Technology. Soon after her appointment as instructor in the department of Sanitation and Chemistry at Technology, she was made assistant to Professor Nichols in 1884. In 1886 Dr. Thomas N. Drown succeeded Professor Nichols, and Mrs.

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Richards was placed in charge with a corps of assistants of the first sanitary-chemistry laboratory in the world.

In June, 1875, Miss Ellen H. Swallow married Professor Robert Hallowell Richards, who was chief of the Mining Engineering Department of the Massachusetts Institute of Technology.

Miss Swallow wanted to be a teacher. She wanted to be a chemist. Two chemical firms were unable to give her positions, and one firm suggested that she should apply for entrance to the Massachusetts Institute of Technology. Miss Swallow asked for the requirements of admission to the Massachusetts Institute of Technology a few months after her graduation from Vassar College. On December 10, 1870, the Faculty voted to admit Miss Ellen H. Swallow as a special student in Chemistry, and, at the same time, resolved "That the faculty of the Massachusetts Institute of Technology are of the opinion that the administration of women as special students is as yet in the nature of an experiment, each application to be acted upon on its merits, and no change in the former policy is expedient." Such negative forces might have brought about in a woman student a "psychosis of negation." But these factors to Miss Swallow proved an asset. Thus she entered the Massachusetts Institute of Technology, "a proving house of organized knowledge," and she rose above restrictions.

Fortunately, the women students who entered the Massachusetts Institute of Technology in 1878 were freed from these restrictions, as "girls were admitted to the Institute on the same footing as boys." In no small measure,

Mrs. Richards and her work furthered the advancement of women. The women students who have entered the Massachusetts Institute of Technology or any other scientific institution of advanced standing, and who have enjoyed full educational advantages, have no conception of the difficulties of those earlier days of pioneering.

The dwindling band of those who have been Mrs. Richards' students or who have known her personally will meet ten years hence to celebrate the hundredth anniversary of her birth, which occurred December 3, 1842. On March 30, 1911, at the age of 68, Mrs. Richards passed to the Great Beyond, and left with us an heritage rich in memories of one who was great in her science, great in her humanity and great in her simplicity. There was a distinct religious atmosphere pervading her life that filtered through an education that never came to an end. It must be realized that every individual has his or her own part to play, and the playing of that part involves co-operation and team-work with every other individual. There was a community of aim and unification of effort and thinking for one's self in the greater and smaller things of Mrs. Richards' life.

"General education prepares the ground. Special education determines the choice of a career—determines the particular form in which the individual can render service to mankind." There was no enlightened self-interest in the mental activities of Mrs. Richards. There was no conflict between self-interest and duty. Nor did the pursuit of happiness become the essence of a personal ambi-

tion. There was a remarkable richness of knowledge of the facts of pure and applied science. There was an appreciation of the research workers who had preceded the present generation. There was a rare power in the directional control of her experiments and constructive proof-bearing activities.

With an unfailing modesty, rare earnestness, well-poised enthusiasm and tireless energy, Mrs. Richards worked with a mind constructive for material end results and for the betterment of human beings.

Mrs. Richards knew her Bible. She knew her John Stuart Mill, John Bright, Adam Smith, Darwin, Spencer, Tyndall, Foster, and so along the line to the thinkers and doers of her day. She found time to enjoy the æsthetic and literary treasures. There was an intimate knowledge of the ancient classics and the well-known languages of her time. In fact, she knew what others had written through the widening fields of science and engineering.

Mrs. Richards was a real pioneer, whose life was not sufficiently lengthened to witness the acceptance of all of her experimental researches and procedures as commonplaces of facts. Mrs. Richards was informative along the fields of sanitation, chemistry, and public health, meteorology, minerology and botany; also engineering practice as mining, heating and ventilating. She was equipped in biology and physiology. Manufacturing processes and procedures and works practice interested her, as well as improvements in cost production, in income and output, and in the making of better and more salable articles than possible by older methods. As a result, Mrs. Richards looked

upon the best interests of the industry as freed from forcing up profits. In all of her work there was a standard of proficiency that bore the hall-mark of "stable profit growth" and competency and a full measure of usefulness.

Mrs. Richards was one of the pioneers who happily found time in a crowded life for a little constructive recreation; perhaps not in the ordinary sense, as her trips were for the most part to and from conventions and meetings where she read papers. She served as a mine prospector or mine consulting engineer, an inspector of sewage disposal, an inspector of plant management, a water analyzer, an advisor in home economics, a reviewer of researches in progress, an industrial expert, sanitary advisor in schools, factories, asylums and prisons.

Mrs. Richards was always an exponent of the right values of foods and foods free from adulterations. She was an expert in cleansing materials.

Mrs. Richards was an admirer of the beautiful in nature. She knew and loved plants, and bird life interested her. The country-side people appealed to her. She was a country girl until her college days at Vassar. To quote her biographer: "Mrs. Richards had known what it was to be poor and to be obliged to earn her own living."

Her parents were academy trained. She was their only child. They infused in their daughter the best in themselves and the best in their own era, and the essence of old New England traditions.

Mrs. Richards cherished the meeting of old or new friends either near or far afield or in

her Jamaica Plain home. There Professor and Mrs. Richards applied the same energy, enthusiasm and happy spirit which they gave to their professions. These gatherings will never remain the dead matter of history. They have made a lasting impression of good cheer and comradeship in a common endeavor.

Lectures, papers and talks before University and College groups and technical and farm institutes, schools, trade unions, trade and agricultural schools, as well as educational, economic, civil, municipal, public-health and factory groups, occupied a large part in the drama of her life.

Mrs. Richards served on commissions; she was called in as expert advisor on foods in the home, college, school, institutions, prisons and asylums. She was a contributor to magazines, scientific journals and household and health leaflets.

Mrs. Richards founded or was the moving spirit in carrying on many associations. Among them may be mentioned the American Home Economics Association, Woman's Chemical Laboratory at the Massachusetts Institute of Technology, Rumford Kitchen at the World's Fair, Teaching Mineralogy to Public School Children, New England Kitchen of Boston (one of its chief functions was to serve lunches to the public school children of Boston), Naples Table Association, Hyannis Marine Laboratory, Normal School of Household Arts, Society to Encourage Studies at Home, Woman's Education Association, and the well-known Lake Placid Club, which held its first meeting in 1898.

When I consider, in addition to the above

listing, the books Mrs. Richards wrote, and her biographer states "she wrote much also that was embodied in other publications than her own," the letters of inquiry, the interviews, the consultations, the research studies, the out-of-hours studies, the Massachusetts Institute of Technology staff teaching, I am reminded of her advice to "Keep thinking," or I would interpret it, "Keep thinking furiously."

As success came to Mrs. Richards, she remained unspoiled. There was a rare refinement of demeanor, a strong independence of character, rich fertilities in thought and product-producing effects, and a wide cultural outlook. Mrs. Richards had the ability to eliminate non-essentials that acted as retarding forces. With Mrs. Richards those who held her views or those who were opposed to them, there was a timely leading to the thoughts of other people.

It was my rare fortune to have been a pupil of Mrs. Richards in the Woman's Chemical Laboratory at the Massachusetts Institute of Technology in Boston. I was strongly impressed by her remarkable experimental skill, the lucid statements of problems, the clear, concise discussions, the purposefulness of action and directional control. There was always a logical, systematic and sanitary arrangement of laboratory material. Mrs. Richards belonged to a choice group of educators who had the directional control of their thought processes and procedures. She taught her students to know cause and effect and to reach conclusions by "reasoned decisions." I have been influenced by her training, and in no small measure have I applied her practices and pro-

cedures to my own field of work. Mrs. Richards felt that there was no better way of dealing with a problem than to try to realize the effect of every step from the point of view of an individual who would be affected by such a step.

Mrs. Richards' policy was to lead and assist rather than fetter and control. The full confidence and understanding of her pupil were gained without effort. Mrs. Richards felt that a confidence once lost would probably never be fully restored. She realized that the human element can not run like a machine. It is much more delicate to handle and much more difficult to keep in an efficient state. The school record of a student was examined, but Mrs. Richards held that the personal interview and examination of the student were most important and reliable. She always wanted to make the student feel at ease in her interviews. Mrs. Richards realized that there must be sacrifice on the part of the individual if he aspires to obtain conservation of full values for the general good.

Mrs. Richards knew it was of immense importance for the public to know about foods and the adulteration of foods. To know the health, sanitary and economic values of foods and how they could be efficiently used. This must be done by teaching the public to think and to act for these objects. Mrs. Richards knew that air, water, sleep, food, clothes and shelter are the primary necessities of man's physical existence. "Food in the maintenance of health and the control of disease is being increasingly recognized as medicine lays more and more stress upon preventive as against

curative measures." Mrs. Richards worked for pure, for unadulterated foods. The nutritional values, preparation and cooking of foods were an undeveloped field until Mrs. Richards recognized it as removed from merely a trade or industry. She looked upon foods as the main bulwark of man's physical existence.

Mrs. Richards became interested in ventilating and heating. She easily recognized that these problems are intimately concerned with all civilized peoples, and this happened a half century ago. Heating then was a trade to deliver heat as heat, and no thought given to its effect on the individual. Mrs. Richards knew that relief could be brought to the workers by dispersing the population over a wider area. Thus they would avoid the swollen rentals of houses, the sunless houses, smoke-ridden atmosphere, sewer gases, inside congested homes, crowded, unfavorable and unsightly surroundings. Social disorder, squalor and misery must be met for the greater part by the engineer's skill, if the triumphs were to exceed the failures. To quote her biographer, Miss Hunt: "Mrs. Richards' many notable contributions to the science of healthful living included pioneer work in analyzing drinking water supplies, she having been the first to recognize the importance of this phase of public health. In the space of a year she analyzed more than 100,000 samples of water for the Massachusetts State Department of Public Health in 1887 and 1888. The survey lasted nearly two years and the water supply of 83 per cent of the population was tested."

The following activities of Mrs. Richards for public health have always made a deep im-

pression upon me. To quote again her biographer: "At the time when Mrs. Richards came upon the Board of Trustees of Vassar, the question of sewage disposal was pressing. The custom had been to throw all the sewage, with a little previous treatment, into Casperkill Creek at a point about six miles from the Hudson River. But as time went on the authorities of Poughkeepsie objected to this method of disposal, and the project of building a sewer to the Hudson River was considered, at a cost which was variously estimated at from $37,000 to $50,000. While this matter was under consideration in the trustees' meeting, Mrs. Richards, being a new member, sat silent. Finally when her opinion was asked, she said it had always seemed to her that educational institutions should lead and not follow in the matter of sanitation, and that for Vassar College to dispose of its sewage by allowing it to flow into the Hudson River would be mediæval. When asked to suggest an alternative, she outlined fully and from intimate knowledge of the newest and most reliable methods a plan for a sewage disposal plant. This plant was later installed at a cost of $7,500. In order to help the project along, she herself gave her professional service for many years, analyzing the drinking water of the college frequently, in order to make sure that it was not being contaminated."

These are simply a few of Mrs. Richards' many movements to find health "for all," and to base human society on better and more elevated scientific principles. Mrs. Richards looked upon demonstrations more than shop window displays. She aimed to educate the

public, to improve and to cheapen industrial, home and community processes and procedures, to re-valuate industrial management, to benefit health, to have clean and unadulterated foods, to have clean people, clothes and surroundings, to purify the atmosphere, and to eliminate unnecessary drudgery, in order to save energy, time and money. The pace of modern civilization was increasingly rapid; consequently all things leading to economy of effort assumed fundamental importance. The more extended use of applied science by engineering principles, processes and procedures would lighten human labor and improve the conditions of life. Mrs. Richards wanted to bring about a higher standard of living. It would conserve for the next generation the right values of sustenance in its relation to the average individual's needs, and stand for the essence of our existence. Mrs. Richards strove for a declaration of standards — of measurement and performance and quality.

She never adhered to the mere drawing out of a diagram of routine, but always gave a careful study to the practical application of this diagram. During the last thirty years of her life, Mrs. Richards became the undisputed possessor of euthenics. This word was coined by Mrs. Richards, and it stands for "the science of controllable environment."

It was but natural, as we study the exacting and constructive endeavors of Mrs. Richards, that a book so extraordinarily fertile in the fact knowledge of the "science of controllable environment" should have been the culmination of her life's work. It was a sound contribution drawn from the well of experience to

the knowledge of the problem. As an engineer, Mrs. Richards was up against realities, and she knew how to meet them. This book in its conception was a part of an organic whole. It was an ideal object of pursuit during the years. We are richer in its contents, but a vision of the future writings leaves us the poorer for the untimely passing of our leader and scholar.

Engineering training gave a new meaning to the word euthenics, and training in euthenics gave a new meaning to the word engineering. Many of the benefits of the pioneering and humanizing works we are now enjoying are the fruits of Mrs. Richards' researches. The inspirational value of Mrs. Richards' scientific and personal influence played a great part in sending out her men and women students to face realities, and to apply the knowledge gained to the needs, benefits and happiness of mankind. There ~~even~~ *aven* existed goodwill based on sympathy, resourcefulness, progression and understanding. Mrs. Richards was a scientist. She went beyond the ordinary scientist into the widening fields of engineering. She adapted and moulded the fact knowledge gained in the laboratory to every-day engineering operations. Mrs. Richards worked to improve, to add to, and to maintain the resources of the individual and his environmental world. It was always to work toward maximum efficiency at the minimum expense of energy, time and money. Mrs. Richards wanted her students to have an opportunity of access to such facilities as would bring out their full measure of capability and broad usefulness. Thus Mrs. Richards believed in an

enlargement of the student's scope. She strove to send her students out, not as finished products, but equipped to meet and to work by processes and procedures of applied science in a more complete fact-knowledge way because they had been under her training.

Mrs. Richards had an open mind, a critical and an analytical mind. She lived in harmony with exact physical laws, and she adapted herself to the revision of theories, facts, developments and standards.

On my long study table are grouped books that appeal to me in their inspirational and constructional outlook and scholarly offerings. I look upon them as a refuge, "a sort of cloisteral refuge." Here, then, among them you will find "The Life of Mrs. Richards" and many of the works of Mrs. Richards, including "The Art of Living," "Euthenics," "Plain Words About Foods from a Sanitary Standpoint." Books not in my possession, although I have read them, are: "Air, Water and Food," "Food Materials and Their Adulterations," and "Home Sanitation"—and more books and many papers.

It is interesting to note that Mrs. Richards drew the manufacturers' attention to the right-sided lip on sauce-pans. The lip was inconveniently placed for right-handed people. Later the manufacturers made sauce-pans with the lips on the left side or lips on both sides.

Mrs. Richards pointed out the futility of attempting to raise the temperature of water above 212° F. in an uncovered receptacle. Violent boiling did not increase the temperature; it did waste the gas. Mrs. Richards

stated that those who purchased coal bought work, as faulty carbonization distributed waste products which were dirty, and in the end results were costly and valuable by-products were destroyed.

Mrs. Richards wanted to find methods to have clean air, as it was one of the primary necessities of man's physical existence. She emphasized the importance of sunlight, as it exalted the powers for health.

Mrs. Richards stated that laboratories do not count as much as the quality of the researchers. She noted the steam issuing from a kettle; close to the mouth there was nothing to be seen, but outside the condensed steam was visible. Thus the law of gases was in evidence.

Mrs. Richards on one occasion in my office suggested making a study of the distance droplets traveled due to an explosive or mild cough. As these minute droplets contain bacteria and ride about on dust particles as in miniature air-planes, it would be sensible to remove the dust or make it less active, by humidifying the air. Thus I could continue, but these statements were made to increase our powers of observation and to know what we should see. Viscount Bryce has said: "Be happy in the processes of seeing and observing."

True service is far-reaching, for it is based upon a comradeship of sound values in the interest and welfare of human society. Mrs. Richards became extremely sensitive to all that pertained to the uplift of her fellows and their environments. Mrs. Richards was essentially an engineer, a super-engineer in her thought by "reasoned decision," her dynamic force and

fact-finding actions. She equipped herself to provide her pupils with the selected tools to work with. She strove "to get free and useful effects from predetermined useful causes." Mrs. Richards' initial statements were reasoned statements. No time was lost in reaching her objective. Her students knew how and when to apply the knowledge gained and why it should be done. Mrs. Richards believed in organizations to protect and to promote the interests of the group and to mainain an effective voice in furthering their interests.

Mrs. Richards devised means to rehabilitate the unnatural instability of home, industrial and community management, thereby to lessen waste in energy, time and money. The force behind this management was Mrs. Richards' rebellion against what she realized as "inhuman realities." I have tried to reveal the thoughts of Mrs. Richards as indicative of her personality, timely leadership, funded knowledge and spiritual values.

We can find a common ground in our desire to re-echo the tributes which have been so loyally and ably paid by Mrs. Richards' biographer, Caroline L. Hunt. We shall do well to keep this book, "The Life of Ellen H. Richards," in mind for one's self, for our friends and for our friends' friends.

Mrs. Richards knew that new means and methods must be cultivated to improve the lot of mankind. "He who helps himself helps another." This was the essence of the task she set herself to do.

Mrs. Richards did not stray by accident into any field of usefulness. From the web-like centers of her mind she so controlled the threads that facts and new relations took form in rich fulfillment of her predictions. As Mrs. Richards progressed in developmental power and "stable profit growth was made and maintained" in her numerous activities, she had the rare gift of blending them into the common human heritage. "The Art of Living" as understood by Mrs. Richards had a scope, depth and rareness that made service to others the highest appeal to human nature. Mrs. Richards worked for a "commodity of happiness," and a brighter day of freedom in thought, in action and in output.