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OF

EDWARD WIGHT WASHBURN

1881–1934

BY

WILLIAM ALBERT NOYES

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Edward Wight Washburn was born at Beatrice, Nebraska, on May 10, 1881. He died, suddenly, of heart failure February 6, 1934. In spite of his all too short life, he has left a record of varied and valuable work which has given him a place of high rank among the chemists of his time.

His son, William de Veer Washburn, has furnished the following account of his ancestry, early life and education on the basis of family records.

I. ANCESTRY

Washburn's. Washburn's ancestry can be traced back through twenty generations of Norman English stock to Sir Roger de Wasserbourn, a Norman knight, with family seats in Great Washburne and Little Washburne in England, and following in an unbroken line, predominantly English, down to Edward Wight Washburn.

In 1626, the ancestor, John Washburn, sailed from Leyden, Holland, to rejoin his wife and children, who had sailed on an earlier voyage to Plymouth, Massachusetts Bay Colony. Edward Wight Washburn was also a descendant of Mary Chilton and John Winslow, who came to America in the Mayflower in 1620. Their daughter, Susanna Winslow, married Robert Latham and their daughter, Hannah Latham, married Joseph Washburn, ancestor of Edward Wight Washburn, about 1700. The subject of this sketch was of the eighth generation of the Washburns in America.

The generation to which John Washburn belonged saw the family moving from Massachusetts Bay to unsettled Central Maine, on China Lake, between the present cities of Augusta and Bangor. With the opening of Northern Maine by the new railroads, the family again moved to that section.

His father, William Gilmor Washburn, went in the 1870's to the comparatively new town of Beatrice, Nebraska, there to set up a flourishing lumber and brick yard.

He was married in Beatrice in 1880 to Flora Ella Wight, a childhood sweetheart who had travelled west for the wedding. The first of their five children was born on May 10, 1881, in Beatrice and was christened Edward Wight Washburn.

The Washburns of England had been "respectable" middle class gentry, which class has been the backbone of England and of New England. In this country they had been, as a rule, of the pioneer merchant class, with the sons leaving the fathers' employ to set up their own business in neighboring towns or in new territories just opening for settlement.

Wife's ancestry. His wife's ancestry was Dutch, entirely. Her father, Caspar Louis de Veer, was the original buyer of caracas chocolate for the Walter Baker Chocolate firm in Boston, and head buyer for that firm. Her name was indicative of the stock from which she sprang. Her father and mother were both from Surinam (or Dutch Guiana), a Dutch colony over which for three preceding generations "de Veers" had been Governor-Generals. Prior to that "de Veers" had been Dutch soldiering and sailoring knights.

II. CHILDHOOD AND EARLY EDUCATION

Rather a precocious child of the school marvel type, Edward was graduated from Beatrice grammar and high schools with the highest marks attained in those schools up to that time. He read indiscriminately everything available till about the second of his three years in high school (having completed the four year course in three at that school). He studied assiduously, apparently from curiosity and from a love of study.

He had very little aptitude for sports, although he showed a genuine liking for them. He cared little for business or mechanics.

Early in his teens he acquired a special interest in the physical sciences, although the small town corn-belt high school of the 90's was most inadequately equipped to teach these subjects. He exhausted the possibilities of scientific studies in the town high school all too soon. Not dismayed, he spent his savings and chore-money for texts and for materials imported from Chicago and the east. In his own makeshift laboratory, a "den" assigned to him by his admiring father, he set himself as teacher and student body in scientific subjects. He assigned himself sections of text and laboratory experiments from his manuals and at the end of his three years in high school he had completed the equivalent of a first year college course in physics and chemistry. He acquired a fair knowledge of scientific German from his own efforts.

He had decided to become a research chemist, since that comparatively new field seemed to offer more opportunity, for experiment. Very little encouragement was received from the family in this direction as they were becoming alarmed at the not infrequent explosions and odors emanating from his mysterious "lab," the one room in the house from which they were absolutely debarred.

III. UNIVERSITY

The budding scientist had shown some of his laboratory notes to his high school principal and that gentleman prevailed upon Edward's father to send the young man to college. However, in the eyes of most Nebraskans at that time the State University was good enough and only "snobs" went east to college.

Edward had his heart set on a B.S. from the Massachusetts Institute of Technology and a Ph.D. from Leipzig, but it seemed out of the question. One year exhausted the curriculum in chemistry offered at that time at the University of Nebraska. At the end of that year Edward left school until he could put by enough money to see him through one year at the Institute of Technology.

By teaching science, mathematics, history, English and German, acting as assistant principal, and coaching football and debating at McCook (Nebraska) High School for two years and by saving his money enough was put by for his first year at the Institute. After one year an unexpected income from tutoring carried him through to his B.S. in 1905.

At the Institute of Technology he plunged without hesitation into chemistry as a major subject, with emphasis on research. His contact with Arthur A. Noyes, Professor of

Theoretical Chemistry, persuaded him that further study under such inspiration was at least the equivalent of a Ph.D. abroad. Therefore, when Professor Noyes took over the position of Director of the research laboratory in physical chemistry in 1903, Washburn was one of his earliest research students. He obtained a position as research associate under Dr. Noyes in 1906 and studied there until he received his Ph.D. in 1908.

While at the Institute of Technology he had made the acquaintance of, and spent his spare time in courting, a young lady, Sophie de Veer, who shared many of his tastes and was a close friend of his sisters. The young woman lived next door to the house which the Washburn family had taken when his father and his father's brother returned east to open a lumber yard in Boston in 1902.

Miss de Veer finished a normal school course at the same time that Washburn received his Ph.D. Dr. Washburn went to Urbana, Ill., immediately after graduation to take a position as Associate in Chemistry in the University of Illinois, but on his visits at home came in frequent contact with Miss de Veer, who was teaching kindergarten. In 1910 they were married at the bride's home in Roslindale, Mass.

In 1908, when I wished to secure a man who could develop the division of physical chemistry at the University of Illinois in the direction of modern research as well as teach the subject for both undergraduate and graduate students, I asked my friend, Arthur A. Noyes, to recommend someone whom he considered of unusual promise. He named Dr. Washburn and his judgment was abundantly justified in Washburn's subsequent career. As his thesis for his doctorate he used the optical rotation of raffinose as a marker, by means of which he demonstrated, for the first time, that at least some of the ions in a solution of an electrolyte are hydrated, i.e., that they are combined with water in such a manner that water is carried with the ion as it travels through the solution under the influence of a gradient in the electric potential.

At the University of Illinois Dr. Washburn gathered about him an enthusiastic group of young men who carried on research work under his direction while working for the doctorate. As often happens, the topics studied were more or less connected with his work at the Institute of Technology. A very careful study, both theoretical and practical, was made of the best forms of apparatus for the accurate determination of electrical conductance. The work included a study of both moderately concentrated and of very dilute solutions. Finally methods were developed for the calculation of conductance at infinite dilution.

Since conductance depends partly on the viscosity of the solution, a new and very accurate viscosimeter was developed and used. With this the viscosity of water at different temperatures was determined and also the viscosity of solutions of raffinose, the sugar used in determining the hydration of ions.

A very careful theoretical and experimental study of the iodimetric determination of arsenious acid laid a foundation for the development of the iodine coulometer. Heretofore, the only chemical method considered sufficiently accurate for the quantitative measure of electrical currents was the silver coulometer. Washburn and Bates developed the iodine coulometer to a comparable degree of accuracy, and Bates completed the study, by a careful comparison of the silver and iodine coulometers at the National Bureau of Standards in Washington.

His textbook of Physical Chemistry was published in 1915 and an important table showing the hydrogen ion at the point of apparent neutrality for the indicators in common use was prepared. The use of indicators in practical water analysis was discussed.

Professor Washburn directed the work of the division of physical chemistry at the University of Illinois for eight years, 1908-16. An examination of the list of papers published during this period and during the years immediately following, while work already begun was being completed, reveals the fundamental and important character of the researches which he initiated.

Several of the men who studied with Washburn at this time now hold responsible positions widely scattered over our country.

It is unfortunate that in 1916 the exigencies of the University and the financial needs of his family induced Washburn to leave the division of physical chemistry and accept a position as head of the department of ceramic engineering. On the other hand, the authorities of the University showed their wisdom in selecting for this position a man thoroughly trained in physical chemistry rather than one trained chiefly in the technique of ceramics. It had been found extremely difficult to secure a man fully competent in the two fields.

Dr. Washburn was head of the department of ceramics for six years. The publications of this period show how conscientiously and intensely he devoted himself to a study of the new field, in which he was working. His most important contributions were on the drying of ceramic ware, on porosity, the relation between the crystalline forms of silica, the viscosity of molten glass and on optical glass.

It was at this time that the Army and Navy were in desperate need of a new supply of optical glass, because the supply from European sources was cut off. Dr. Washburn made some valuable contributions to the study of the problem of manufacturing such glasses.

At the organization meeting of the International Union of Pure and Applied Chemistry, held in London in 1919, the Union approved as one of its projects the compilation of International Critical Tables of Numerical Data of Physics, Chemistry and Technology, and assigned to the United States of America the financial and editorial responsibility for the undertaking. The project was later given the patronage of the International Research Council at its Brussels meeting in 1922.

Dr. Washburn was at the meeting in London and, later, he was asked to undertake the task of preparing the Critical Tables as Editor-in-Chief. In order to do this he resigned his position at the University of Illinois and moved to Washington. There for four years, 1922-26, he worked on the gigantic enterprise of collecting and evaluating all the numerical data of physics, chemistry and technology. With the aid of a competent Board of Editors and a very large band of experts in the various fields, approximately 1000 in all, the work was carried through to completion, and the Critical Tables will long remain as a monument to his ability and steady, self-sacrificing devotion to the execution of an extremely difficult task.

In 1926 he was selected by a group of eminent chemists and physicists as their first choice for appointment as the Chief Chemist of the National Bureau of Standards. Here he had the opportunity to direct the work of the chemists of the Bureau in many different and varied lines and also could undertake, with the aid of able assistants, work of importance in which he had a more personal interest.

His son writes:

"In his eyes, one of his greatest ambitions was reached when he found himself in his own laboratory, with good assistants, freedom from the pressure of students and with cooperation from the Director at the Bureau of Standards. It was at that time that he felt he was finally started in the career for which he had spent almost a lifetime in preparation."

The three most important achievements of this period were:

1. The fractionation and isolation of the constituents of petroleum far more accurately and completely than this had ever been done. Primarily a physical chemist, he showed in this work a mastery of the technical methods of organic chemistry worthy of high praise.

2. Of the crystallization of rubber, in which he had the assistance of five other chemists, his son says:

"What he felt to be the hardest research project he had done was the photographing of crystalline rubber at the Bureau of Standards."

3. After the discovery of the isotope of hydrogen now called deuterium, an achievement for which Harold C. Urey received the Nobel Prize, Dr. Washburn suggested that "heavy water" might be concentrated by electrolysis and undertook experiments to carry out the suggestion. His experiments were successful and provided the first method used in preparing deuterium oxide in quantity. A very large new field of chemistry has been opened up by this method. For a bibliography of deuterium, see Bibliography of Deuterium by Ann R. Young, issued by Pennsylvania State College, Pennsylvania, Aug. 1934.

Dr. Washburn's son, William de Veer Washburn, has furnished me with the following statement of some of his father's characteristics:

"Hobbies. Assiduous study throughout his life of the history of every civilized country—contract bridge—genealogy of Washburns. He had a strong liking for his briar pipe, cross-word puzzles, detective stories, family circle, dancing (after his wife had taught him to dance), card games of his own invention, long walks.

"He liked to write one-act plays for amateur theatricals.

"He was very reticent except in the family circle or when with intimate friends and did not make close friends easily.

"He was an inveterate punster.

"He was typically absent minded except when at his desk or in the laboratory.

"He read omnivorously—at least one book each night before retiring.

"His only attachments were—his laboratory, his wife, his family.

"In keeping with his usual shyness in public he was a little afraid of formal recognition of his achievements and discouraged very strongly any attempts by his associates to secure publicity for him or his work."

This sketch would not be complete without some further reference to Mrs. Sophie de Veer Washburn, the wife to whom he was so devoted and who meant so much in his life.

She was always deeply devoted to him and to his work. She read the proofs of his publications and in many ways helped to make possible that intense concentration which was such an important factor in his success.

She had, also, a very pronounced individuality of her own. She was devoted to her children, but with the sort of devotion which recognizes the right of a child to develop initiative and personal characteristics of his own. The manner in which the family is carrying on as a unit now that both father and mother are gone, demonstrates that this attitude of the parents has been especially useful in their case.

Mrs. Washburn died in 1932, two years before her husband. There are four children, William de Veer, Janet, Roger D., and Barbara.

Dr. Washburn was chairman of the International Committee on Physico-Chemical Standards, Member of the International Research Council in Brussels in 1919 and 1922, Fellow of the

Royal Society of Arts, Honorary Member and Life Member of the American Ceramic Society (Editor of the Journal 1920-22), Member of the National Academy of Sciences.

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