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IRA REMSEN

Two men, Ira Remsen and Wilhelm Ostwald, stand out during the last fifty years as great teachers and as founders of chemical journals which have had a profound influence on the development of chemistry. In these two respects their work is comparable with that of Liebig during the middle of the nineteenth century.

Ira Remsen was born in New York City, February 10, 1846. His parents were both descended from the early Dutch settlers of New York and his mother had also Huguenot blood in her veins. For two years, from eight to ten, the boy lived in the country and had that intimate contact with nature which is impossible for a lad who spends his life exclusively in a city. A part of his early education was received in country schools. After further study in the public schools of New York City he entered the Free Academy, now the College of the City of New York, where he studied Latin, Greek, mathematics, history and a very little science. He did well in Latin and Greek and it was doubtless during those years that he laid the foundation for that perfect command of accurate English which has made it such a delight to read his books and to listen to his lectures. His interest in science seems to have been awakened at this period by the popular, illustrated lectures given by Dr. Doremus at the Cooper Institute.

He did not, however, complete the four years of work required for graduation at the Free Academy. Many years later he received the bachelor's degree from the College of the City of New York, as of the class of 1865. He was accustomed to say, with some pride, that he was one of the few men who had received the rank of M.D. from the College of Physicians and Surgeons without having received the bachelor's degree. He also said, at one time, that he thought he was the only university president in America who had not completed a four years' college course.

After a few years in the Free Academy, Remsen's father decided that he should become a physician and apprenticed him to a doctor who taught in a homeopathic medical college. Here he read some chemistry and tried some chemical experiments for himself, sometimes with disastrous results to his fingers and clothing, as he told his students in recalling those days. He attracted the attention of his preceptor, however, and was made lecture assistant and quiz instructor in the college.

He soon revolted at the inefficient instruction and induced his father to send him to the College of Physicians and Surgeons of Columbia University. At the age of twenty-one he graduated and was supposed to be ready for the practice of medicine.

Once more he refused to be guided by the wishes of his father and, instead of entering a desirable partnership, which was offered him, with a well-known physician, he set out for Germany to study chemistry.

Liebig's name had attracted him to Munich and he had not learned that the great master had given up the direction of students some time before and had gone to the Bavarian University with the understanding that he could devote his time to his own studies and writing and that his duties should consist in giving a single course of lectures in inorganic chemistry. Remsen was forced to study with an able *Privatdocent,* Jacob Volhard. From him he received his first systematic laboratory instruction. Before that he had never performed the simplest analysis. Thorough training in analytical chemistry was, at that time, considered to be the only routine laboratory work necessary for the preparation of a chemist to begin research, and we may be sure that the fundamental basis for his career was well laid during this year of intimate association with Volhard.

During the summer of 1868, Wöhler made one of his friendly visits to Liebig and through Volhard, Remsen was introduced to him and arranged to go to Göttingen in the fall. There he began research work under the direction of Fittig and two years later received his degree of Ph.D. at the age of twenty-four. When we remember that Remsen spent only one year in the systematic study of chemistry and two years in research in earning his degree, we are tempted to question whether the long years of routine instruction which are required of young chemists to-day do not tend to dim that eager enthusiasm and repress the initiative so invaluable for a successful career.

It does not follow, however, that because Remsen did not take the varied courses of routine lectures which we expect of students to-day he failed to become very thoroughly acquainted with the chemistry of his times. He once told me that during his stay in Germany he read the volumes of Liebig's *Annalen*—150 volumes had been published in 1870—until he was acquainted with all the important papers published in that journal.

The same year that Remsen received his doctor's degree, Fittig was called to the professorship at Tübingen and he asked Remsen to go with him as his lecture and laboratory assistant. He continued in this position for two years and in this way, for five years in all, he drank in the spirit of the German laboratories.

It was a fortunate time for the eager, enthusiastic young man. In 1858 Canizzaro had shown the importance of Avogadro's principle and laid the foundation for a system of true atomic weights. The same year, Couper and Kekulé extended Frankland's doctrine of valence to explain the structure of carbon compounds, and hundreds of professors and students were working together, after the model of Liebig's laboratory, in the fascinating world of organic chemistry.

It was at Tübingen, too, that a young Scotchman rang at the door one day and asked, in broken German, for the "Vorlesungszimmer." Remsen answered, "Oh! I guess you want the lecture room." So there was begun the life-long friendship with Sir William Ramsay. Only a few months before his death, Sir William wrote to Remsen, "Well, I am tired and must stop. I look back to my long friendship with you as a very happy episode in a very happy life; for my life has been a very happy one." When Remsen helped with the plans of the Kent Chemical Laboratory of the University of Chicago, he provided few rooms for isolated students and he made the remark that students learn more from each other than from their teachers. When two such students as Ramsay and Remsen met, we can well believe that this was true.

Remsen returned to America in 1872 and, after some delay, was appointed professor of chemistry and physics at Williams College. When he assumed his duties he found no laboratory and scant encouragement to teach science other than as a small element of general "culture" in an old-fashioned classical college. After a year, he was furnished a laboratory for his own use and there he carried on researches on the action of ozone on carbon monoxide—a subject to which he returned some years later—and on parasulfobenzoic acid. The latter led to an attempt to oxidize orthosulfobenzoic acid and its sulfamide and this, in turn, led to a long series of investigations carried out with students at the Johns Hopkins University. These studies finally established "Remsen's Law" that groups in the ortho position interfere with the oxidation of alkyl groups of aromatic compounds by means of chromic or nitric acid.

As an illustration of the spirit of the New England colleges of that day, the following incident related by Professor J. M. Kingsley is illuminating:

> In the autumn of 1874, together with the rest of the junior class in Williams College, I began the study of chemistry under Professor Ira Remsen. After a few days I asked him for the privilege of carrying my studies farther in his private laboratory, as there was no laboratory work connected with the regular course. He replied to the effect that he would have to lay my request before the faculty, as there was no provision for such work in

the curriculum. A few days later he asked me to stop after the class was dismissed, and then he informed me, in the most disgusted tones, that "The Faculty, *in their wisdom,* have decided that you would break too much glassware and waste too many chemicals to allow you to work in my laboratory."

Kingsley became a zoologist of note instead of a chemist.

Shortly after his return to America, Remsen published a translation of Wöhler's "Organic Chemistry." He also published a beautifully written "Theoretical Chemistry." These books, and still more his persistence in research under discouraging conditions, attracted the attention of President Gilman, who was seeking men for his faculty at the Johns Hopkins University. He had already secured Gildersleeve for Greek, Rowland for physics and Sylvester for mathematics. Remsen was invited to Baltimore to meet the Board of Trustees and was entertained at a dinner at which he was seated beside one member of the board after another. In this way Professor Remsen became one of that galaxy who worked with President Gilman to organize the first genuine university in America, where more than half the students were graduates of other colleges and where the purpose was not so much to teach what is already known as to develop men into productive scholars and add to the world's knowledge. President Gilman had the somewhat rare quality of fully trusting the men he selected and allowing them to develop the work of their departments without interference. His injunction to Remsen was, "Do your best work in your own way."

Professor Remsen followed rather closely the models with which he had become so familiar in Germany. He gave lectures on inorganic chemistry during the first semester and on organic chemistry, the second. These were well illustrated with experiments and he had a crystal-clear, masterful method of presenting his subject. Once a week there was a meeting of graduate students for reports on current literature.

But the most important and vital part of his instruction was the daily visit to the desk of each research student. Often, at critical points, he would stop and work for minutes or for an hour or more with the student, and the product, in the end, was the joint work of professor and student, as it had been in Liebig's laboratory. Most of the topics studied grew, directly or indirectly, from his investigation of the oxidation of para- and orthosulfobenzoic acid and the law of the protection of ortho alkyl groups from oxidation.

Quite early in the course of these studies, Fahlberg, working under his direction, discovered that the orthosulfamide of benzoic acid may be easily oxidized by potassium permanganate in a neutral or faintly alkaline solution. The product was called by Remsen benzoic sulfinide. It is several hundred times as sweet as sugar and some years later Fahlberg developed the commercial production of the compound under the name of saccharin.

The discovery of benzoic sulfinide naturally led to the investigation of many other similar compounds. This also led, rather directly, to the discovery of the sulfonephthaleins and the study of the chlorides of sulfobenzoic acid. Professor Reid reports how he came to study the decomposition of diazonium compounds with alcohol. The laboratory book said "add alcohol and smell the aldehyde." A student came to him and said he did not smell aldehyde. Remsen took the tube and could not smell aldehyde either. He made this into a good story, telling how stubborn the student was who wouldn't smell aldehyde when told to do so.

The work of Professor Remsen and his students never degenerated into the mere preparation of new compounds. He always endeavored to establish some general principle in relation to the substances prepared.

In 1883 Professor Remsen came back to the action of ozone on carbon monoxide and a very careful investigation demonstrated that the latter is not oxidized when the mixture with ozone is heated to 300° and the ozone is completely decomposed. He also, in an investigation which proved that phosphorus usually contains a little carbon, demonstrated that carbon monoxide is not oxidized when mixed with air and passed over moist phosphorus, although ozone is formed in quantities. A satisfactory theoretical explanation of these remarkable results is still to be found.

In 1889 Professor Remsen made an exhaustive study of the literature of the double halides and found that, with very few exceptions, the number of mols of an alkali halide combined with one mol of another halide is equal to or less than the number of atoms of chlorine in the other halide. A considerable number of experimental investigations were carried out with his students to test the validity of this generalization. The conclusion that two chlorine atoms unite to form a bivalent group has not been generally accepted and does not agree well with the more recent electronic theories of chemical combination.

When Remsen went to Johns Hopkins University in 1876, there was no satisfactory medium in America for the publication of an account of his researches. A few of his articles were published in *The American Journal of Science,* but Professor Dana, the editor of that journal, soon decided that researches in organic chemistry did not furnish material of sufficient interest to his readers and advised publication abroad.

Professor Remsen was not satisfied with this and, with the aid of other chemists, he established *The American Chemical Journal*. With far-sighted vision, he made this a medium of publication for American chemists and not an organ of the Johns Hopkins University. For thirty-five years this journal was a very important agency for the promotion of genuine chemical work. It was the first American journal in this field which secured widespread recognition abroad and it would be difficult to overestimate its value in stimulating chemical work and in placing Americans in their rightful place among the chemists of the world. At the close of the fiftieth volume President Remsen decided that publication in America would be better served by incorporation of *The American Chemical Journal* with *The Journal of the American Chemical Society*. This was done and the latter journal carries on its title page a record of the consolidation of the two journals.

Remsen's first book was a "Theoretical Chemistry," written while he was at Williams College. It passed through five editions and was translated into German and Russian. His "Organic Chemistry" was published in 1883 and has been the medium through which many chemists, physicians and others have been introduced to the subject. His text-books of "Inorganic Chemistry," both elementary and advanced, are characterized by a logical, lucid style which has made them very popular and widely used. The "Organic Chemistry" was translated into many foreign languages and several of the other books were also translated.

A long series of students, trained in intimate association with Professor Remsen, are now widely scattered and many of them hold important positions as teachers and in the industries. They look back to him as to a father, who always required high quality in their work, who was wise in his advice and helpful in their difficulties.

Professor E. E. Reid writes, "It is impossible to characterize or describe Remsen. He had a keen sense of humor and a ready wit, a personality in the fullest sense of that term. He drew people to him but always kept them in their place."

In 1881 Boston had trouble with her water supply and Professor Remsen was called upon for his advice. He was fortunate enough to discover the cause of the difficulty. On many other occasions he was called upon for public services to Baltimore, Maryland and the United States. He was for some years a member of the Good Roads Commission of the state.

In 1901 Remsen succeeded D. C. Gilman as president of Johns Hopkins University. The resources of the university had been depleted by the depreciation of some of its securities and the period of his administration was a difficult one. In spite of this, the university continued its steady and satisfactory development. The school of engineering was founded and the cramped quarters in the heart of the city were exchanged for the magnificent campus which the university now occupies in the outskirts of Baltimore.

President Remsen retired in 1913. After that he spent his time in travel, in revising his books, in work for the government as chairman of the Referee Board organized during Roosevelt's administration to consider questions pertaining to the law for the control of food products and their adulteration, and in consulting work for one of our largest industrial corporations. He died at Carmel, California, in 1927, at the age of eighty-one.

He was the recipient of many honors. The degree of LL.D. was conferred by Columbia, Princeton, Yale, Toronto, Harvard and Pennsylvania. He was a foreign fellow of the London Chemical Society and foreign member of the French Chemical Society. In 1902 he was president of the American Chemical Society; in 1903, of the American Association for the Advancement of Science. During 1907–13 he was president of the National Academy of Sciences. In 1908 he was awarded the gold medal of the Society for Chemical Industry and in 1910 was president of that society. In 1914 he received the Willard Gibbs medal of the Chicago Section of the American Chemical Society.

In his boyhood Remsen was reared in a very strict, religious atmosphere and he retained a simple religious faith throughout his life. In his address "On the Life History of a Doctrine," delivered as president of the American Chemical Society, after pointing out that "faith is called for at every turn in scientific matters as well as spiritual," he said, "It would be as illogical to give them (atoms) up as it is, in my opinion, to deny the existence of a power in the universe infinitely greater than any of the manifestations familiar to us; infinitely greater than man; a power that 'passeth all understanding.'"

WILLIAM A. NOYES
UNIVERSITY OF ILLINOIS

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE RENO MEETING OF THE PACIFIC DIVISION—II

AMERICAN PHYTOPATHOLOGICAL SOCIETY, PACIFIC DIVISION

(*T. E. Rawlins, secretary pro tem.*)

The Pacific Division of the American Phytopathological Society met on June 23. The first paper, by W. T. Horne, discussed the fruit decays of the feijoa.