Antoine Paul Nicolas Franchimont 1844-1919 (Leiden)
and Charles Adolphe Wurtz 1817-1884 (Strasbourg)
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Antoine Paul Nicolas Franchimont (1844-1919) was appointed to the position of professor of chemistry at The Leiden Institute of Chemistry in 1874 along with J.M. van Bemmelen (Driessen). The Leiden University has boasted a proud, venerable reputation of chemistry since it was founded in 1575. Approximately 300 years later, Franchimont became the first chair of organic chemistry in Europe at Leiden. He received his Ph.D. in 1871 at the young age of 27. Three years later, Franchimont was promised a "new laboratory, but he had to wait twenty-seven years before he could move into a new building in the Hugo de Grootstraat" (Driessen).

After the new laboratory opened in 1918, Franchimont unfortunately died a year later; however, chemistry flourished in the laboratories in the centre of Leiden for approximately seventy years. The number of students increased from one or two per year to about one hundred in the late 1960's (Driessen). Franchimont is also credited with co-discovering triphenylmethane and anthraquinone. In addition, he also studied the acylation of sugars and cellulose, nitroamino compounds, and the chemistry of hydrogen azide, urea, urethanes, nitric acid, and oxalic acid (Bachas). Lastly he is attributed to discovering "tetryl," which was a widely, popular explosive in the early 1900s (Bachas).

Charles Adolphe Wurtz (1817-1884)

It was once said, “Chemistry has perhaps the most intricate, most fascinating, and certainly most romantic history of all the sciences” by Dr. Oliver Sacks author of the *Awakenings*. This is especially true considering the turmoil and chaos chemistry underwent during the nineteenth century. Several old theories were thrown out and entirely new concepts dashed onto the world stage. Of the many actors of this dramatic play, Charles Adolphe Wurtz played a central role in the Parisian chemistry of the second half of the century (Rocke 73). He was a French chemist and professor, who was born in Strasbourg in 1817 and died in Paris in 1884. He was born in Alsace, a German-speaking French province that borders the Rhine. He was a student of both Liebig and Dumas. After Wurtz’s studies of medicine, he taught in Geissen (Germany). Wurtz was much more fortunate in his friendships, which helped him achieve higher success, than many of his colleagues. For example, in 1845 he became the assistant of Jean-Baptist Dumas and succeeded Dumas at the École of Médecine in 1853 and in 1875, he became the first professor of organic chemistry at “Sorbonne from 1852-1875, at the Faculty of Medicine, Paris (1853–75), and at the Faculty of Sciences, Paris (from 1875)” (“Wurtz” and Moore 167).

Noted for his research in organic chemistry, he discovered methyl and ethyl amines in 1849, glycol in 1856, “in 1867, Wurtz and Kekule had shown that when benzene-sulphonic acid was heated with potassium hydrate, it gave a phenate and sulphate,” and aldol condensation in 1872 (Harrow 247). Unexpectedly, Wurtz “discovered primary aliphatic amines and called attention to their remarkable resemblance to ammonia” (Moore 163). Along with the work of Hofmann, Wurtz’s work on the amines showed that the formula of ammonia could not be simpler than NH3; his findings basically convinced everyone that the new compounds, amines, belonged to the ammonia type (Moore 163, 167). Ideas combined with several ideas of esters and acids belonging to the *water type* from Williamson and Berthelot led Wurtz to the discovery of glycol, which is the simplest diatomic alcohol (Moore 165). He also developed a method of synthesizing hydrocarbons by treating alkyl halides with sodium, called the Wurtz reaction. In 1855 the Wurtz reaction was adapted by the German chemist Rudolf Fittig to the preparation of mixed aliphatic and aromatic hydrocarbons, later called the “Wurtz-Fittig reaction” (“Wurtz”). Wurtz also contributed to the view that “abnormally low vapor densities are due to dissociation” (Moore 167). Wurtz also invented a bulbed fractionating column known as the Wurtz column. In addition, he used his knowledge of chemistry to aid his country in a time of need. During the Franco-Prussian war, fat supplies ran low, Wurtz succeeded in making colza oil palatable (Moore 167).

In addition, he wrote influential works in support of the atomic theory and on medical and biological chemistry such as the noted *Dictionnaire de Chimie Pure et Appliqué* (3 vol., 1868–78; supplement, 1880–86) (Wurtz). Wurtz’s *Dictionnnaire* has proved a veritable apple of discord among the other famous chemists of his time (Moore 167). At the beginning of Wurtz’s famous *History of Chemical Theory*, he wrote, “Chemistry is a French Science. It was founded by Lavoisier, of immortal memory” (Tilden 238). This statement caused uproar in the chemistry community that it forced him to write several letters of apology for his proposition; in fact, many of those letters are still preserved today (Tilden 238). His other literary works were also extensive. For example, he translated Gerhardt’s *Précis de Chimie Organique* into German. Wurtz’s works along with his *Traité de Chimie Biologique* well represent the knowledge of physiological chemistry of the period 1880-1885 (Moore 167). It should be noted that although Wurtz defined chemistry as a French science founded by Lavoisier, the definition has never been truly accepted by the English or the Germans. For instance, the “German universities opened their doors so freely to foreign students and many college professors in the United States finished their educations in a German university that it was but natural for them to regard Germany as the true leader in chemistry" (Moore 294).

Wurtz is often described as kind-hearted toward his students and as a hard worker by his peers. As a dean of his Faculté, he pleaded for the desperately needed reconstruction of the medical campus. When not fulfilling his numerous, exhausting duties as dean, "he continued to pour heart and soul into his research laboratory, crammed into small rooms he had carved out of the Faculté de Médecine more than 15 years earlier" (Rocke 299). Finally after the catastrophe of the Franco-Prussian war, in the new Third Republic, academic scientists would finally see some of their wishes fulfilled. Over the last three decades of Wurtz's life, he was determined to win a victory in France for the forces of atomism.

French scientists, who had a reputation for insularity, began to withdraw from international collaboration during the 1820s. After a few years, foreigners noticed the difference. This change was not reversed or even ameliorated by the French government, which often provided scientists with material resources. Laboratories for teaching and research were small and rare. In 1863, Napoleon appointed Victor Duruy (1811-1894) as Minister of Public Instruction. Some evidence shows that Napoleon chose Duruy because he thought that Duruy "would introduce major reforms based on a modified German model;" however, Napoleon never provided Duruy with any more guidance to his position than "You'll do fine" (Rocke 277). Duruy then asked Wurtz directly "to gather information on foreign support for academic chemistry" (282). Wurtz wrote to numerous foreign colleagues and based on the information he received, he later reported that "the organization of these institutions and the state of study of practical chemistry in the Faculties demand the serious attention of Your Excellency

(Napoleon)...and concerns the future of France" (283). Wurtz once wrote that chemistry is French and God forbid that France should allow it to be surpassed. He further recommended that the chemical laboratory at the Faculté de Médecine be taken over by the state, and be properly supported" (283). In January of 1866 Duruy appointed Wurtz dean of the Faculté de Médecine. However, it would be long before the battle for financial support from the government would end. Duruy, Louis Pasteur, and Wurtz were now all fully involved in the issue and were determined to no longer accept the half measures made by the government to appease scientists (291). Wurtz was sent on numerous trips to Germany in order to investigate how the conditions of the laboratories and admirable treatment of German chemists attributed to their supreme advancement in the field. On June 5th, 1868 Duruy sent Dean Wurtz once again across the Rhine to the "fullest, longest, and finest fact-finding mission yet" (293). What Wurtz discovered amazed him. The chemical institute at the University of Leipzig was astounding in its impressive grand style and appeared to be determined to conquer scientific and intellectual authority. Wurtz was also frustrated with the teaching methods used in France compared to the superior methods used in Germany. He stated that oral instruction is insufficient and that "eyes see and hands touch;" learning by doing is the best method. He advised that France needed to create similar practical training laboratories in other disciplines. Finally on July 31st, 1968 Duruy's dream came true. Napoleon signed the decrees in order to create the École Pratique des Hautes Études (EPHE). Dumas and Wurtz were both named to the Counseil Supérieur of the new organization. Wurtz is also incredibly famous for his laboratory, which was recognized internationally as one of the world's premiere "finishing schools" for elite chemists (Rocke 352). Gifted young people came from all over the world to claim Wurtz as a mentor, such as Butlerov, Lieben, Menshutkin, and van't Hoff. Wurtz's influence was crucial for many chemists, for example, an Austrian student during 1859-60 recalled that they had “formed a ‘people of brothers’ devoted with equal enthusiasm to the study of science, under the direction of a superb researcher who as a teacher was accessible equally to everyone, who was always cheerful and benevolent, and who know how to keep us earnestly at our work” (Rocke 352-3).

Going back into time to the year 1860, chemical science was a state of turmoil. Berzelius, the lawgiver of chemistry was dead and chaos prevailed. The cry for order was finally called above the clash of competing theories. In September of 1860, at the instance of Wurtz, Weltzien, and Kekulé, a convention was assembled in hope of bringing at least some formal compromise among chemists and other scientists gathered from all over the world. Representatives from France, England, Germany, Russia, and Italy were all present. There were one hundred forty chemists in total, who gathered in Karlsruhe. The following questions were paired for discussion: Were atoms and molecules entirely different? Would it be necessary to establish the difference between atom and molecule? Would it be necessary to name the smallest quantity of a body capable of entering into chemical combination by the term molecule? Should Dalton’s compound atom be entirely suppressed? (Jaffe 117-119). Many were willing to accept the new definition of molecule, however, most had serious reservations about the subject in its entirety. Wurtz, Miller, and Persoz joined in the discussion and instead of clarifying the issue or coming to an agreement, “an interminable debate ensued, which further confused the animated controversy” (Jaffe 118). Dumas presided over the gathering, while a young Italian named Stanislao Cannizarro rose to lecture the Congress of Karlsruhe about Avogadro’s ideas as a champion of reform. He was eager to bring Avogadro’s message to the world stage. The new method of determining molecular weights and Dalton’s blunder for using the terms, atom and molecule, interchangeably, were introduced for the first time. Even though the terms, atom and molecule, had been used since the seventeenth century, there was always much confusion on what they truly meant; both terms, until the convention, did not have universal definitions used in all countries (Jaffe 119). After long discussions ensued, the new “molecule” was accepted after fighting its way into the society of Dalton’s atoms. All were fascinated by the clarity of the term, molecule, as distinct from the atom. However, it was not until Cannizarro worked a lifetime to bring Avogadro back into the world and twenty-seven years after Wurtz’s death that a monument to Avogadro’s memory was unveiled. In today’s educational system, Avogadro’s prophetic sentence, “Equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules” is only briefly mentioned. It is even more rare to note the importance of chemists such as Wurtz, who helped assemble the important convention. Through his tireless efforts, Wurtz helped draw attention to Avogadro’s tremendous ideas to the world stage and personally mentored brilliant chemists, who then later educated their own students with their vast knowledge of chemistry. “It is hardly too much to say that modern chemistry began in 1860” (Moore 184).

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