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Jędrzej Śniadecki as a Student of Chemistry

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Włodzimierz Hubicki (Poland)

JĘDRZEJ ŚNIADECKI AS A STUDENT OF CHEMISTRY

In the second half of the 18th century chemistry almost entirely separates from alchemy and becomes a science. Instead of the speculative and metaphysical ideas of alchemy there appear for the first time some timid attempts to generalise the facts and phenomena observed, to establish a reasonable classification of minerals, to found the basis of the chemical laws. A quantitative description of certain chemical reactions, discovery and elucidation of the nature of such gases as hydrogen, oxygen, carbon dioxide and nitrogen—they have finally disclosed what really are air and water and subsequently resulted in the Law of Conservation of Mass (Lomonosov, Lavoisier), combustion theory (Lavoisier), and a more exact definition of the concept of the chemical element.

The experimental material accumulated for several centuries of alchemy achieves now a new interpretation. There are only few naive ones that still keep on deluding themselves with possible transmuting lead into gold and not many believe in the philosopher's stone. The palpable evidence for how profitable chemistry can be, along with its large prospects made obvious by increasingly numerous new discoveries, have made chemistry to become an extremely popular science in that period.

Thousands of men eager for knowledge dedicate themselves with enthusiasm to the experimental studies; not only in the laboratories filled with junk, full of toxic fumes but also in the elegant society salons the people of the world, noblemen, aristocrats and the rich would discuss on the new achievements in chemistry with careless ignorance.

In France there are organised special courses of chemistry for high society; the courses that would provide fundamentals and would show the prospect of chemistry in a possibly quick and interesting way. It is also not surprising that in France, where the fair sex has always enjoyed apparently special considerations, there were established correspondent chemistry courses exclusively for ladies.

In several countries in Europe some chemical periodicals come to appear regularly, and scientific societies are founded with the purpose to cultivate and to divulgate both chemistry and chemical technology. It is characteristic that a certain merit in the propagation of chemistry is also due to Freemasonry lodges so popular at that time over the whole Europe. In fact many of them, however, rather advocated alchemy.

In Poland the interest in chemistry in those times was not smaller than in other European countries. In 1768 in Warsaw the Physical Chemical Society was founded. The problem of its activity as well as of its membership is obscure, the only one real item of evidence of its existence being the edition of two small printed volumes, entitled *Różne uwagi Fizyczno-Chemicznego Warszawskiego Towarzystwa...* (Some Notes of the Physical and Chemical Society of Warsaw), Warszawa, 1769. That short-living society cast in its lot with other scientific societies in Poland having shortly finished its existence by lack of necessary funds and of interest of its members. Then about 1777 another society was established in the circles linked to the Knight School (Szkola Rycerska) in Warsaw on the initiative of a Frenchman, Jean-Baptiste Dubois. Unfortunately, it did not live long enough, either.

In the second half of the 18th century chemistry in Poland is under the protection of Stanisław August—a man of good intentions but of mediocre abilities; a weak king and diplomat but a great lover of arts and sciences. His versatile dilettantism was highly recognized by the Royal Society of London which had honoured him with its membership. The interest in chemistry that Stanisław August showed is directly connected with his will to replenish his own purse and the treasury, yet the ways he chose to attain his aims were entirely different. On the one hand, the king trusted to various cheaters-chemists who promised him to produce gold. On the other hand, he appointed to responsible positions and to government offices men knowing the true and genuine chemistry. With the same aim he used willingly to send young and capable men abroad for the studies of chemistry of Paris, Freiberg, Banská Bystrica and to many other university towns.

Stanisław August had a chemical laboratory and a mineralogical room in his palace in Warsaw. His appointed chemist and at the same time custodian of his natural science collection was Stanisław Samuel Okraszewski. He often helped the king with confidential advice and explanations of both simple chemical problems and some alchemic intricacies. However, the power of transacting deals with any alchemist or chemist was conferred to a factotum and a king's friend, count August Moszyński, an enthusiastic alchemist. Fraudulent alchemic practices of diverse foreign frauds greatly reduced the king's funds. The swindles of John Christian Simon, of Ferdinand Ludwig Harrsch, of Alexander Cagliostro and of many others had cost the king thousands of ducats. By the end

of his reign Stanisław August taught by experience used to submit any alchemic offer proposed to him to Samuel Okraszewski or to the analytical chemists working in the Mint Office in Warsaw for a chemical appraisal, before he made a decision. Besides the king, like in other European countries, also the Freemasonry patronized chemistry.¹

In the last two decades of the 18th century Poland was not short of genuine chemists. In addition to Okraszewski there were also Ignacy Bienkowski, Jan Kanty Mieroszewski (the two studied chemistry and metallurgy in Banská Bystrica, by the king's order), Karol Kortum, Franciszek Scheidt, Jan Jaśkiewicz, Rev. Józef Osiński, Andrzej Krupiński, as well as foreigners: Jean-Baptiste Dubois, Johann J. Ferber, Jean-Philippe Carrosi and others. The fields for their capabilities were either the Poland's mineral resources, or the medical practice, or else teaching training in schools. The Education Committee in reorganizing the education in Poland, had considered as necessary to introduce the rudiments of chemistry in secondary schools and a more detailed lecture of chemistry at two existing Main Schools, i.e. at the University of Cracow and the University of Wilno (Vilnius). In the later, as it is generally known, the chemistry was lectured by Jędrzej Śniadecki—a personality that was out of the common.

Whoever read the biography of Jędrzej Śniadecki, however, might be struck by the fact that the author of the first original Polish manual of chemistry studied medicine in Cracow and further complemented his knowledge abroad, but when he came back he took on the chair of ... chemistry at the University of Vilnius.

In this connection it leads someone to believe involuntarily that the medical studies were at that time the essence of the whole science and the Doctor of Medicine degree entitled to lecture in any university discipline or that chemistry covered at that time a small body of information which everyone was able to lecture after a shorter or longer preparation. These doubts are still more supported by Adam Wrzosek, a prominent historian of medicine and the author of the major monograph on Jędrzej Śniadecki, who wrote of him with the words: "He was no more gifted to nor had more interest in chemistry than in other sciences. After he had finished the medical studies he became professor of chemistry mainly because ... the position had been procured for him by his brother."²

It can be generally noticed that A. Wrzosek emphasises the scientific

¹ Information on the alchemic and chemical interests of Stanislaus Augusts, on activity of S. Okraszewski; on some alchemic frauds at those times and on propagation of alchemy by some lodges of Freemasonry can be found in the article: Włodzimierz Hubicki, "Background and genesis of the manual *Chemistry and mineralogy* by Okraszewski", *Studia i Materiały z Dziejów Nauki Polskiej*, Seria C, issue 8, pp. 3–33, Warszawa, 1964.

² Adam Wrzosek, *Jędrzej Śniadecki*, in two vols., Kraków, 1910.

work of Śniadecki in the field of medicine and his social activities but he disregards Śniadecki almost entirely as a chemist.³ And every reader after a careful reading of the monography by Wrzosek will be right to believe that the 25-year activity of Jędrzej Śniadecki as a professor of chemistry is due to a chance and to the backing of his well-connected brother. However, this opinion is not right, nay, far from truth, which can be found by a more careful study of the course of the chemical studies of Śniadecki before he took on the chair of the Department of Chemistry.

Towards the end of the 18th century chemistry could be studied essentially only at the learning institutions of the three kinds: 1) at the faculties of medicine of some universities, 2) in the schools of mining and metallurgy in Banská Bystrica, Freiberg, Berlin and in Paris, 3) in the engineering military schools in Berlin, Paris, Vienna, and St. Petersburg. In each type of these schools chemistry was always a secondary subject or one of many subjects and it was taught in a different aspect. Independent of the superior schools some private courses of chemistry were organised by many specialists in numerous towns of Europe. In the faculties of medicine of the second half of the 18th century at the majority of the universities there were departments of natural history whose program embraced lectures in chemistry, botany, zoology and mineralogy. As a result of this the medical studies would offer also possibilities for specialising in any of those disciplines. A great many outstanding chemists, botanists, zoologists and mineralogists of that time are known to have just medical background.

The first Department of Chemistry of the Faculty of Philosophy, and not as before at the Faculty of Medicine, was founded at the University of Jena owing to the endeavours of Johann Wolfgang Goethe, the creator of *Hermann and Dorothea*. In the Main Crown School in Cracow, the first professor of natural history and chemistry became Jan Jaśkiewicz in 1782. Two years later a similar position in the Main Lithuanian School in Vilnius was occupied by Joseph Sartoris, a scholar of Italian origin.

In taking care of the prospective appointments of professors for the educational institution the National Education Commission would send many young men abroad, which were promising from the scientific point of view. Among those was also Jan Śniadecki, brother of Jędrzej, older from the latter by twelve years.

Jan Śniadecki during his sojourn in Paris in 1780–1781 studied not only mathematics and astronomy but was also a diligent auditor of the courses of chemistry headed by Macquer, Darcet, and Sage. Professor Macquer lectured in Jardin du Roi, and Darcet and Sage—in l'École de

³ Wrong opinion on the activities of Śniadecki as a chemist expressed by Wrzosek unfortunately reflects itself in the successive works of many other historians of chemistry.

Mines in Paris. All three were in opposition to Lavoisier's ideas who refuted the phlogiston theory. Nevertheless Jan Śniadecki, in spite of his masters, appraised the importance of the discoveries made by that great French chemist and according to his biographs, it was him who, as one of the first, would propagate the name of Lavoisier in Poland. The young are always ready to follow new theories.

After his return to Cracow Jan Śniadecki kept in scientific touch with Paris. Neither did he lose interest in chemistry as he was experimenting at that time with balloons. But what may a balloon have to do with chemistry? Strange as it may seem there is much in common between these facts.

The first balloon tests of Mongolfier brothers (in view of some great hopes set on them for their communication and military uses) from the very beginning had aroused in France some feverish interest in the attempts to find a suitable gas to fill the balloons with. The gas that would not be so inflammable as hydrogen and would have a low specific gravity, being at the same time cheaper than hydrogen. And so, for instance, Guyton de Morveau attempted to produce a hydrogen substitute by destructive distillation of grain, maize, chestnut, bituminous coal and other material. As a result in the April of 1784 he released a balloon filled up with what he called "gaz inflammable des pommes de terres". The gas represented a mixture of gases but which?—now it is difficult to find out.

As it results from a small book entitled *Opisanie doświadczenia czynionego z banią powietrzną w Krakowie* (Description of the experiment made with an air balloon in Cracow) its authors and at the same time the constructors of the first balloons—Jan Śniadecki, Jan Jaśkiewicz, Jan Szaster and Franciszek Scheidt were also experimenting on the production of a gas that would replace hydrogen. Those "chemical and balloon problems" of both the French and the Cracovian professors sprang from the state of knowledge in those days.

One could not yet tell hydrogen from hydrocarbons; in principle, any gas that could burn was referred to as "inflammable air", i.e. hydrogen.

It can be well understood that it might be anybody but not the fifteen-year-old Jędrzej Śniadecki to miss watching the first balloon experiments. The more so that the chief inspirer of the air balloon experiments was his older brother. It was at that time that the vivid interest in chemistry arose in Jędrzej Śniadecki. To substantiate this point let us quote his own opinion he pronounced later on himself: "I myself for the most part owe my knowledge of chemistry to Jaśkiewicz and Scheidt."⁴ When the young Jędrzej Śniadecki began his studies in the Main Crown School Jaśkiewicz had not lectured there any longer; that

⁴ Jagiellonian Library in Cracow, ms. no. 3138.

is, he must have taught Jędrzej privately earlier, when the latter was still an alumnus of the Nowodworski school.

These data allow to infer that the direction of the university studies of Jędrzej Śniadecki had practically been decided when he was still the pupil of the Nowodworski school. Early in the summer of 1787 Jan Śniadecki went again to France that time with the idea to put his brother to l'École Militaire in Paris. It was not for the young Jędrzej to follow the military career as he did not feel the vocation but to study chemistry there.

The initial plans, however, had changed for completely unknown reasons. During his brother's absence in this country Jędrzej Śniadecki finished with an award the high school and entered the university as a scholarship holder, as a candidate for a high school teacher of physics and mathematics. But the unexpected arrival of his brother from abroad changes the situation. Jędrzej gives up the scholarship and begins to study medicine at the Cracow University.

Until now there were no more details available on the studies of Jędrzej Śniadecki and on the chemical laboratory in the College of Physics. In the light of newly discovered materials I am able to add some facts to this topic. During his four-year studies in the Main Crown School Śniadecki had attended to the following courses: in the school of mathematics—elementary and higher mathematics, mechanics and practical mechanics; in the college of physics—natural history including chemistry and botany, physics and astronomy; in the school of medicine—anatomy, with physiology, pharmacy with its medical aspects, then surgery with obstetrics.⁵

Natural history and chemistry was lectured in the Main Crown School at that time by Franciszek Scheidt⁶—a chemist by industriousness, as seen from the level of his lectures, a physicist by interest, being as he is the author of the book *On Electricity*, and a botanist by his enthusiasm, as evidenced by the Botanical Garden in Cracow and the volumes of the drawings made by Scheidt now kept in Bibliothek National in Vienna.

The chemical laboratory in the College of Physics initiated by Jaśkiewicz and finished by Scheidt comprised several rooms and a large hall in the middle of which there was a table. Next in the laboratory there stood a "docimastic balance in the black-wood lantern", and a long description of this instrument in the inventory was a proof of its price and its value. By the wall there were two earthenware furnaces for distillation as well as a *balneum Mariae*, that is, a water bath. Moreover some thermometers, eudiometers, a barometer made by Gelpi Bros. in Cracow, a micro-

⁵ Records of the Jagiell. Univ., ms. 292.

⁶ More detailed information on the activities of Scheidt can be found in the article: Włodzimierz Hubicki, *Franciszek de Paula Scheidt, the pioneer of the Lavoisier theory in Poland*, in: *Księga Pamiątkowa Dziesięciolecia Uniwersytetu Marii Curie-Skłodowskiej w Lublinie*, Lublin, 1955, pp. 49–141.

scope of Sigaud de la Fond in Paris from 1751, retorts, cucurbites, flasks, dishes, alembics completed the smallest laboratory equipment.⁷

Now the most interesting are such items of the inventory as: thin tubes to the apparatus to air, flasks with side-arms to air, retorts with curved necks also to air "firing glass to the chemical experiments after Priestley's prescriptions"—because they are, along with purchases of many chemicals, the proof that the Cracovian centre of the chemical knowledge at that time kept abreast of the level of knowledge in Europe, and the students were made acquainted both theoretically and experimentally with the problems of contemporary chemistry, with the Lavoisier theory and with the components of air.

As it follows from the documents that I found,⁸ Jędrzej Śniadecki was attending Scheidt's lectures on the third and fourth year of his studies, but it is also likely that he was listening to these lectures on the first two years of his studies. Scheidt was a very scrupulous lecturer and he tried to convey to his disciples as much of the knowledge as he could. The contents of his lectures are known from his own report.

Scheidt, like his predecessor Jan Jaśkiewicz, emphasised particularly the applied chemistry with a special glance at mineralogy and metallurgy. Much of the time he would devote to "docimasy", that is, the chemical analysis of minerals and alloys.

In order to obtain a full picture of the level of the chemical studies in the Main Crown School a mention should be made of two books on chemistry, namely that published in 1787 in Cracow by Andrzej Trzciński entitled: *Nauka o napuszczaniu wody powietrzem kwaskowym* (The Art of Saturation of Water with Acidulous Air) and another one published by Józef Krumłowski entitled: *Nauka Chymiczna... sławnego Jakóba Spielmanna* (The Chemical Science of the Illustrious Jakób Spielmann). The former book is a collection of some fragments of the works of an English chemist Joseph Priestley and of those of an Italian chemist Felix Fontana. Andrzej Trzciński, professor of physics in the Main Crown School, a personality rather uninteresting in view of his notorious plots and denunciations, tried to explain to a Polish reader the contemporary concepts on gases. In the book in question oxygen bears the name of "pure air", hydrogen—that of "inflammable or fatty air", carbon dioxide is called "fixed or acidulous air", nitrogen—"saltpetre air". Though Trzciński showed his apparent erudition in numerous commentaries and quotations from the literature *The Art of Saturation of Water with Acidulous Air* failed to correspond to the state of knowledge on gases in 1787; for it failed to take into consideration the latest achievements in chemistry in that field.

⁷ Records of the Jagiell. Univ., ms. 398 and ms. 489, part II.

⁸ *Ibid.*, ms. 292/2, part II.

Józef Krumłowski was an apothecary in the town of Kazimierz, now a suburb of Cracow. The book of Spielmann translated by him from Latin into Polish even in those times had already been out of date in both its form and contents. An unquestionable merit of Krumłowski has been his attempt to develop a Polish chemical nomenclature.

In the spring of 1792 Jędrzej Śniadecki finishes his studies in Cracow but his plans of further specialization in Paris lost its importance as the atmosphere in France is unquiet, it is just the third anniversary of the storm of the Bastille, people talk loudly about the overthrow of the king and the threat of the French-German war.

As a centre of his further chemical and medical studies became Pavia in which not many Poles were studying at the end of the 18th century. Why did he choose Pavia then? Pavia, and not Bologna where far more Poles studied, or a less distant Vienna, or else any of the German universities? The answer is very simple.

The University of Pavia, after the reforms of Marie Thérèse and Joseph II, became famous throughout Europe in the field of natural sciences and medicine. It was Pavia that, following Paris perhaps, was the major centre of the chemical science. The biographs of Śniadecki unanimously enumerate the names of Śniadecki's masters, professors of medicine: Scarpa, Spalanzani, Frank, Carminati, and the professor of physics Alessandro Volta, overlooking completely the chemical studies of Śniadecki. But Śniadecki himself in a letter to his brother clearly writes: "In Pavia I had an opportunity to learn as much chemistry as was necessary to get an exact idea of the current state of this science."⁹ Also from the letter of Jędrzej Śniadecki we came to know that in Pavia he had to prepare from chemistry to defend his doctoral thesis.

In Pavia the chemical laboratory was organized in 1776-1778 by Giovanni Antonio Scopoli, professor of chemistry and botany, formerly a chemistry and mineralogy teacher for many years in the School of Mining in Banská Bystrica; extremely industrious and very active, with his enthusiasm for chemistry, had infected many university colleagues who were in charge of other departments.

And so the professor of natural history Lazzaro Spalanzani worked enthusiastically in the field that now could be named physiological chemistry and published a book *On the Chemical Examination of the Götting Experiments*. Professor of medicine Pietro Moscatti among other things worked on the composition of water and on mercury phosphate, and would write articles on the chemical nomenclature. It is to be noted here that Jędrzej Śniadecki carried on his medical training during his vacation in 1792 in a hospital in Milan under the guidance of this same Moscatti who was the head of the hospital. Basiano Carminati, professor

⁹ Michał Baliński, *Dziela Jędrzeja Śniadeckiego*, Warszawa, 1840, vol. I, p. 25-26.

of therapeutics and pharmacology, devoted his time to the studies on the chemical analysis of blood and on the chemical nature of stomach juices. Even professor of mathematics George Fontana dealt with the distillation of essential oils. And also Alessandro Volta was experimenting with enthusiasm in chemistry, and the proof of it may be his discovery of methane and many papers that he published on hydrogen and the composition of water. Incidentally I will mention here of some "plots" and endeavours for Volta to take on the chair of the Physics department in Vilnius.

Among the professors of the University of Pavia showing a lively interest in chemistry there must have been also Valentino Bursati as it was him who was in charge of the chemical laboratory on the death of Scopoli. Finally one should not overlook here Johann P. Frank, who isolated sugar from the urine of diabetics. He identified it by alcoholic and acetic fermentation followed by oxidation to oxalic acid in the final stage. It was the topic of his investigations at the time when Jędrzej Śniadecki was in Pavia. Later Frank became professor of medicine in Vienna and then in Vilnius. As it can be seen from the above data the majority of Pavian professors dealt with chemistry. Of all the professors of medicine in Pavia perhaps only one was not engaged in chemistry, the anatomist and surgeon, Antonio Scarpa.

It should be borne in mind, however, that the most outstanding chemist of the University of Pavia of the times when Śniadecki was studying there, was Ludovigo Brugnatelli who was then vice-professor of chemistry. He was immensely active in his investigations and literally untiring in propagating the chemical and physical science in Italy. He was an organizer and editor of several scientific periodicals, among others *Annali di Chimica* and *Bibliotheca Fisica*, and kept closely in touch with chemists of France and of England. He was the author of manuals on chemistry and wrote some several scores of papers published largely in his own press. His co-authorship of new chemical nomenclature should also be mentioned.

At the same time in Pavia there were appearing numerous translations of chemical books, particularly from French, of which especially, one, *Chemical Philosophy* by Antoine Fourcroy¹⁰ had made a great commotion in the chemical world. And the first and foremost desire of Śniadecki on his graduation with a degree of doctor philosophy and medicine from the University of Pavia was to go to Paris with the purpose to get to know that French scientist and possibly to take privately his course of chemistry.

Antoine Fourcroy, professor of chemistry at the Jardin du Roi in

¹⁰ The book of Fourcroy appeared in Poland translated by Jan Gwalbert Bystrzycki, *Filozofia Chemiczna, czyli fundamentalne prawdy terażniejszej chemii*, Warszawa, 1808, p. 318.

Paris, was an excellent experimenter and extremely active propagator and organizer in the field of chemistry.¹¹ He founded the chemical periodical *Annales de Chimie* and would rank at those times among the outstanding French chemists together with Lavoisier. He was a Jacobin and on the death of Marat he was elected a Convent member to replace him. Since 1793 he gave up his scientific work limited his instruction devoting almost all his time to the state affairs. Reorganization of the Academy of Science and of other scientific societies is also the merit of this man, who also removed a number of their members alleged enemies of the Revolution. He headed the State Defence Committee whose task was to develop novel methods for production of gun powder and new ways of the melting of church bells to obtain some alloys suitable for the manufacturing of guns.

Jędrzej Śniadecki had planned to sojourn in Paris for a couple of weeks, which would indicate that he decided to take the course on gases, their physical and chemical properties, offered by Fourcroy privately. But since 1793 Fourcroy had given up this course, beginning instead lectures on manufacturing of saltpetre, gun powder, and guns. Śniadecki came to know this fact while in Genoa, maybe even directly from the correspondence with Fourcroy himself. For that reason Śniadecki gives up the idea of going to Paris and he travels instead through Switzerland and Germany to England.

As a place of his further studies he chose Edinburgh, the scientific centre of Scotland. He was actuated by a wish to get acquainted in more detail with the theory of stimulation created by John Brown, an Edinburgh physician who had already been dead at the time Śniadecki came to Scotland. It is believed that in 1793, that is, when he was still in Pavia, Śniadecki may have written a treatise relating to the theory of stimulation, but the similar writing is not known to bibliographers. Instead there is a book entitled: *In principio theoriae Brunonianae animadversiones* published in 1793 in Pavia under the pseudonym of Jac. Sacchi. The authorship of this book is usually ascribed to Carminati, though it may seem strange that a University professor would wrap his opinions in a shroud of mystery. I believe that it would be worthwhile to ascertain whether the treatise has not been written by Śniadecki himself.

In Edinburgh the main professor of chemistry was Joseph Black, the famous discoverer of the reaction of "fixed air" now referred to as carbon dioxide, of latent heat, etc. In his declarations Fourcroy would emphasise the fundamental meaning of Black's discoveries for the development of chemical theories. When Śniadecki stayed in Edinburgh Black

¹¹ An extensive monograph by Fourcroy was published in English by W. A. Smeaton. *Fourcroy—Chemist and Revolutionary*, Cambridge, 1962.

had already abandoned research but became a lecturer with such a success that crowds of students would come to his lectures. He spoke in a simple, clear way, and what is more important, his lectures were illustrated by demonstrations. Besides he also disposed of a large, well-equipped chemical laboratory. It is obvious that Jędrzej Śniadecki, who in the words of his brother Jan "in chemistry and medicine was trained abroad under great, eminent men", must have attended Black's lectures. As it seems, it was professor Black who became a model lecturer in chemistry for Śniadecki.

After his two-year sojourn on the British Isles Jędrzej Śniadecki moves to Vienna in 1795, where he lived at the house of Johann Peter Frank who was at that time professor at the University of Vienna. In that town he also met with two contemporarily famous chemists Jacquin; Nicolas Jacquin, Senior, was professor of chemistry and botany at the University of Vienna, while his son, Joseph, was vice-professor of chemistry there. Supposedly the latter, a contemporary of Jędrzej Śniadecki, must have told him a number of interesting details and experiences as he had just come back from a scientific travel, having had visited famous chemical centres of Europe. In Vienna the scientific journeys of Jędrzej Śniadecki come to an end.

He comes back to Poland in the spring of 1796, after the 3rd partition. Unexpected changes that he found there made him think of no prospects for any position adequate to his studies. Yet in the following year he assumed the chair of the Department of Chemistry in Vilnius. Obviously the exertions of his brother Jan had helped him in it—as A. Wrzosek argues—but the most important was the professional training in the field that Śniadecki possessed.

Śniadecki had put much work and efforts to a thorough command of the subject that he was to lecture. To support this there is an interesting proof available¹² in the form of a list of books offered in 1808 by Jędrzej Śniadecki to the Library of the University of Vilnius—the document is preserved till the present day. The list comprises 122 items including 89 books on chemistry and two titles of chemical periodicals. By supplementing the books' titles with the probable years of their publication it is easy to ascertain that all the books donated to the Library were published before 1797. The books were partly ordered from abroad by Jan Śniadecki and mostly bought by Jędrzej in this country and abroad when he studied there. Among these there are many-volume works by the most eminent chemists of the 18th century, such as Priestley, Macquer, Lavoisier, Fourcroy, Chaptal, and others. The list contains also 39 volumes of the French chemical journal *Annales de Chimie*, founded in 1789. It can be easily verified that till 1797 were

¹² Jagiell. Library, ms. 3137.

issued 27 volumes of this periodical and till 1808—64 volumes; thus it can be surely inferred that Śniadecki subscribed to that periodical even before he assumed the chair at the University of Vilnius. It is very unlikely that all volumes of *Annales de Chimie* should be bought by Śniadecki at all a time.

In connection with the foregoing list of books I should like to call attention to the fact that A. Wrzosek in his monograph of Śniadecki erroneously writes that the books were borrowed by him¹³ from the Library of the University of Vilnius, before the preparation of the second edition of the manual of chemistry in 1807.

One more proof of the careful preparation of Śniadecki to the prospective university career, contrary to the suggestions by Wrzosek, is the course program published by Jędrzej Śniadecki as early as 1797.¹⁴

The program for that year along with the one prepared for the following year have the same basic idea like the general trend of the chemistry manual that appeared three years latter, that is, in the year of 1800. This clearly indicates that the whole two-year course of chemistry had already been considered and carefully elaborated before Jędrzej Śniadecki began his lectures. It is worthy to remind that J. Śniadecki has for the first time introduced Polish as the lecture language at the Vilnius University. His predecessor in the Department, Joseph Sartoris, lectured the chemistry course in Latin.

Nearly at the very beginning of his activity in Vilnius Śniadecki brings from abroad some rare minerals such as strontianite, chromite, gadolinite, and others, and not with the aim to enlarge the geological collection but to derive from them the recently discovered elements like strontium, chromium, yttrium and cerium. His unfortunate work on the discovery of an element *vestium* in crude platinum convincingly shows that he was interested in the most current problems of those times. The elements from the platinum group; palladium, rhodium, iridium, and osmium have been discovered in the years 1803–1804 by Wollastone and Thenandt. All these facts therefore indicate that Jędrzej Śniadecki not only was adequately prepared to become head of the Department of Chemistry, but he was also at the same time (here again contrary to Wrzosek's opinion) a chemist by vocation. The protective role of his brother consisted in a financial support that Jędrzej needed while studying in this country and abroad, then in helping him to get the university chair, for which Jędrzej Śniadecki was fully qualified. Thus, neither chance nor protection did play any particular role here. That is true that after 1808 J. Śniadecki had actually changed his main interests to medicine but this was conditioned by several reasons of a different nature.

¹³ Adam Wrzosek, *loc. cit.*, vol. II, p. 313.

¹⁴ Władysław Leppert, *Rys rozwoju chemii w Polsce do roku 1830* (A Short History of Chemistry in Poland till 1830), Warszawa, 1917, p. 211.

Śniadecki has ended the preface to the first edition of *Początki Chemii* (Rudiments of Chemistry) with the following words: "All faculties become useful only when the truths, to the discovery and a thorough learning of which they were applied, can be used to the advantage of the society; and herein chemistry is more fortunate than other sciences." In such a way only a keen chemist could speak!

In the end of the present essay on the chemical studies of Jędrzej Śniadecki at least a short account should be made of his merits and achievements for the chemistry in Poland. As I have already mentioned, in 1800 was published the manual: *Rudiments of Chemistry according to the current state of this science, compiled for the benefit of students and pupils, to be used as a model of academic lectures, by Jędrzej Śniadecki, doctor of philosophy and medicine, ordinary public professor of chemistry and pharmacy in the Main Lithuanian School.*

The title completely corresponded to the truth. This two-volume book comprised a brief outline of chemistry, presented according to the highest standards of the year in which it was published. It has been the first original university manual in the field of chemistry that ever appeared in Polish. The benefits that came from the use of that manual for Śniadecki's pupils, were really enormous, about which there is no question. In the manual Śniadecki quotes several scores of contemporary authors citing their most recent ideas and discoveries, indicating thereby the information sources that formed the basis for his manual.

Śniadecki developed Polish chemical nomenclature—the logical vocabulary with an account of the latest developments of the chemistry contemporary to him. The Polish manual used previously which appeared only 9 years sooner *Chemical science of the famous Jakób Spielmann, a Strassbourger professor, written according to the academic lectures, translated from Latin into Polish by Józef Krumłowski, an apothecary in the town of Kazimierz near Cracow*—in comparison with the manual by Śniadecki, it seems to be an anachronism and a relic of a past, remote epoch, and the attempt to polonize particular names for substances and chemical terms, despite laudable efforts of Krumłowski that appear in *Chemical Science*, are almost ridiculous and yielding no precedence in all respects to the nomenclature of Śniadecki.

From the very beginning the lectures of Śniadecki gained a great popularity and not only among the academic youth. I will quote here an excerpt from the memoirs of one of Śniadecki's pupils. Otto Śliażen: "But how nice was that our professor, Andrzej Śniadecki. How charming was his lecture of chemistry, how mild his elocution! The chemistry hall was ample, round-shaped, with the desks so arranged as to form a theatre. Large audience would fill the hall from below upwards to the very walls. Below, over a long table covered with various chemical equipment, would sit over a book and a copy-book a serious,

white-haired old man, a pedantic stickler for cleanliness, with a sweet air on his face; in his smile and eyes there was shown gaiety and a hint of a witty irony. In general all his personality even with his big, aquiline nose, was extremely likable. In the midst of a large audience not even the lightest sound could be heard. Everybody's eyes and ears were directed with great attention down to the place where was sitting with his professor's dignity. He seemed to speak in a half-low voice and each single word of his fell distinctly with a pleasant tone into the most distant ear. By his profound knowledge of and interest in his subject he managed to call the attention of the students and to incite in them liking to the science that he lectured. Sometimes one would come to the lecture with a cold indifference or even with a feeling of dislike but shortly on the appearing of Śniadecki, on the first hearing of his muffled voice, the indifference and the reluctance would vanish, one would be aroused by an increasingly alive interest, and as soon as the hour was over one would regret that the lecture is finished, desiring so much to keep on listening somewhat longer to that quiet organ of the learned old one".¹⁵

In a year's time the chemistry course of Śniadecki was attended by some two hundred and twenty students. The lectures would take two years, six hours weekly. Moreover the students did the laboratory experiments, though not too many units of it. Each student after each semester of the chemistry course, had to take an examination with the professor; all in all one would appear to the professor at least four times during the period of one's studies. Thus the didactic load of the professor was enormous, which stands out even more if one takes into account the fact that Śniadecki in the first years of this work had only one "laborator", i.e. assistant, and as late as by the end of his activity in the Chemistry Department he was helped by two employees.

A tremendous didactic load is one of the reasons why Śniadecki published only several papers of a chemical character from his own research and observations. It is a fact however that Śniadecki would spend much time in the chemical laboratory till the end of his career as chemistry professor, that is, till 1822, the best proof being the paper that appeared in 1822 on the analysis of meteorite: "On the iron of the Rzezczyca meteorite" (*Dziennik Wileński*, vol. I). This work clearly indicates that Śniadecki was a very good analyst. And the fact that in 1806 the new element of the platinum group erroneously discovered by Śniadecki, named by him *vestium*, was questioned by French chemists, it does not detract from his merits as a chemist.

Yet among the merits of the highest rank that Śniadecki made is first of all the education of a great many of his followers. From his

¹⁵ *Ibid.*, p. 63.

laboratory came out: Fryderyk Wolfgang, Ignacy Fonberg, Marek Pawłowicz, Ignacy Domeyko, Michał Oczapowski etc. Later they took on the university chairs in the following towns: Vilnius, Warsaw, Kiev, St. Petersburg, and in the distant Santiago de Chile. Jędrzej Śniadecki was a scientist who permanently has immortalized his name on the pages of the history of Polish chemistry.