Russian Journal of Applied Chemistry, Vol. 77, No. 5, 2004, pp. 863–865. Translated from Zhurnal Prikladnoi Khimii, Vol. 77, No. 5, 2004, pp. 868–870.
Original Russian Text Copyright © 2004 by Morachevskii.

HISTORY OF CHEMISTRY AND CHEMICAL TECHNOLOGY

Vladimir Fedorovich Luginin (to 170th Anniversary of His Birthday)

V.F. Luginin, an outstanding Russian thermochemist, a talented experimenter, and a progressive who created the first Russia's Thermal Laboratory at Moscow University at his own expense was the author of quite a number of manuals of calorimetry and head of a prominent scientific school.

Vladimir Fedorovich Luginin was born in Moscow on May 20, 1834, into a rather wealthy nobleman's family. His father, Fedor Nikolaevich Luginin, a former General Staff officer and a participant of the war with Turkey (1825–1829), owned a large forest estate in Vetluga uezd of Kostroma province, which was inherited by his sons. Luginin received an excellent domiciliary education at home. His teacher was H.A. Trautschold (1817–1902), formerly one of Liebig's assistants, later, a known scientist, professor of geology at Petrovskaya (now Timiryazev) academy. As mentioned in [1–3], Trautschold stimulated his pupil's interest in natural sciences and acquainted him with prominent scientific centers, and primarily those in France and Germany, during their trips to West Europe.

In 1849, at the age of 15, Vladimir Luginin entered, on his father's advice, the Mikhail artillery college in St. Petersburg, which was one of the best Russia's military colleges of that time. At that college, as well as at Mikhail artillery academy, taught the most prominent Russian scientists: mathematician M.V. Ostrogradskii (1801–1862), physicist H.F.E. Lenz (1804–1865), and known chemists A.A. Fadeev (1810–1898) and L.N. Shishkov (1830–1909).

In August 1853, Luginin graduated from the cadet department of Mikhail college and was left there to receive higher artillery education as one of the best graduates. However, the war between Russia and Turkey, which began in October 1853, interrupted Luginin's education, and he was assigned to the front-line forces in February 1854. The young officer took part in military action at the Danube River and in the defense of Sevastopol. Only in May 1856, he returned to St. Petersburg and continued his education at the Artillery academy, wherefrom he successfully graduated in April 1858. In 1861, Luginin retired from military service and could commence studies of natural sciences at the best scientific centers of West Europe. For a long time he attended lectures at Heidelberg University (Germany), worked at the chemical laboratory of R.W. Bunsen (1811–1899), studied organic synthesis at the laboratory of J. Wislizenus (1835–1902) in Zurich, attended lectures delivered by Clausius (1828–1888), perfected himself in organic chemistry at the laboratory of C.A. Wurtz (1817–1884) in Paris. In 1866–1867, Luginin published his first studies in organic chemistry. However, his scientific interests switched by that time to physical chemistry, and primarily to thermochemistry. This was favored by scientist's work at the laboratories of H.V. Regnault (1810–1878) and M. Berthelot (1827–1907) in Paris. At Regnault's laboratory, Luginin studied the applicability of the Henry–Dalton law to the solubility of CO_2 in water at various pressures, determined the density of hydrocarbons of the homologous series of benzene in a wide range of temperatures. Further scientist's attention was focused on studies of thermochemical nature. He preserved friendly relationships with M. Berthelot for many years.

1070-4272/04/7705-0863 © 2004 MAIK "Nauka/Interperiodica"

In 1873, Luginin returned to Russia and organized in St. Petersburg a small private laboratory, where he commenced calorimetric measurements. Later, a special laboratory was organized in St. Petersburg, at Luginin's expense and on his initiative, for determining the calorific value of combustible materials.

Beginning in 1882, Luginin worked in Paris. A laboratory aimed to carry out thermochemical studies was organized at the house where his family lived.

At the end of 1888, Luginin again returned to Russia. V.V. Markownikoff (1837–1904), a professor of Moscow University, allowed him to work at his laboratory. In 1889, a group of professors of Moscow University submitted a petition for conferring on Luginin "the degree of a doctor of chemistry without examinations for master's degree and without submitting a dissertation," in acknowledgment of Luginin's achievements in the field of thermochemistry. In January 1890, this move was satisfied. Having received the degree of a doctor of chemistry, Luginin decided to transfer his thermal laboratory from Paris to Moscow, to Moscow University. As mentioned in his memoirs by I.A. Kablukov (1857–1942, honorary member of the Academy of Sciences of the USSR since 1932), a Luginin's disciple and a professor of Moscow State University, Luginin's thermal laboratory "took the first place among thermal laboratories of not only Russia, but West Europe as well" [4]. At that same time, Luginin started to deliver to students of the physicomathematical faculty of Moscow University lectures on thermochemistry, thermometry, and calorimetry. In 1891, Luginin was elected a privatdocent, and in June 1899, he was appointed a supernumerary extraordinary professor of Moscow University by the initiative of a large group of professors.

In 1897, Luginin donated to Moscow University his personal library, which included journals on chemistry and physics, both domestic and foreign, published during several decades, rare publications by foreign scientists, domestic scientific literature, and books on history, philosophy, and agriculture. Luginin had a perfect command of four European languages and was interested in a wide variety of problems. Up to 8000 of books from the "Luginin library" are kept at the library of Moscow University [4].

In 1903, Luginin decided to hand over to Moscow University the whole equipment of the thermal laboratory, purchased by him. The laboratory was named "Professor Luginin thermal laboratory." In recognition of the scientist's services, he was given the rank of an honorary member of Moscow University.

Because of the deterioration of his health, Luginin had to go abroad more and more frequently. He was at his laboratory for the last time in 1906.

Luginin occupied himself with experimental thermochemistry for about forty years and became a prominent specialist in this field; his experimental data were considered highly reliable for that time and cited in world's reference literature. The main Luginin's studies in this field were considered in a monograph by Yu.I. Solov'ev and P.I. Starosel'skii [5] and in quite a number of other review publications [6–8] and in separate communications [9–11].

The first Luginin's communication, carried out in cooperation with M. Berthelot and reporting the results of a thermochemical study of the decomposition of fatty acid halides, was published in France in 1869. Seven more joint studies of these scientists were carried out and published in French journals during the period from 1870 to 1875. The first study carried out independently by Luginin in Russia was aimed to determine the heat effects of formation of potassium and sodium trichloroacetates (1873). Beginning in 1880, the main attention was paid by the scientist to determining the heats of combustion of various organic acids. Using a combustion chamber modified by him, he studied organic compounds of various classes and types. V.F. Luginin described his experimental methods in a paper "On Measurement of the Heats of Combustion of Organic Compounds," published by him first in France (1882) and then in Russia (1884). A series of studies carried out by him together with I.A. Kablukov were concerned with determining the heat of bromine addition to unsaturated compounds.

Luginin wrote a number of textbooks on calorimetry, of which the most important is *Opisanie razlichnykh metodov opredeleniya teplot goreniya organicheskikh soedinenii* (Description of Various Methods for Determining the Heats of Combustion of Organic Compounds, 1894). In this textbook, the newest experimental techniques for determining the heats of combustion were considered. As a supplement to the book, Luginin presented tabulated heats of combustion for about 1000 substances.

In the 1890s, V.F. Luginin carried out extensive studies of the specific heats and the heats of vaporization of various liquid organic substances: alcohols, ketones, esters of dibasic acids, and saturated hydrocarbons. In the process, the scientist used a rather perfect method for determining the heats of vaporization, developed by him. Based on his own experimental data, Luginin came to a conclusion that the known

"Trouton's rule" is not universal and is observed to some extent only for organic compounds of the same class, or, even better so, within the same homologous series of one or another class. Already at the end of his scientific activities, Luginin carried out, together with A.N. Schchukarev (1864–1926), thermochemical studies of copper and magnesium alloys with aluminum (1906).

Together with his scientific activities, Luginin was actively engaged in Russia's public life. Among his close friends were N.G. Chernyshevskii (1828–1889), A.I. Herzen (1812–1870), and N.P. Ogarev (1813–1877). V.F. Luginin and his younger brother Stanislav Fedorovich Luginin (1837–1866), marshal of the nobility of Vetluga uezd, also paid much attention to solution of zemstvo's problems and published a number of papers concerned with this issue.

An honorary doctor of chemistry of Moscow University, Vladimir Fedorovich Luginin died on October 13 (26) in Paris after a severe prolonged illness. To his memory were devoted spacious obituaries written by Kablukov [4] and K.A. Timiryazev [12], and memoirs by professors of Kharkov University Shchukarev and I.P. Osipov [13]. Owing to the scientist's daughter (married name princess M.V. Volkonskaya), V.F. Luginin's works were published in 1917 under the editorship of Kablukov [14]. She also supported financially the publication of the catalog of the library donated by Luginin to Moscow University [15].

Such known thermochemists as Kablukov, Shchukarev, Osipov, P.V. Zubov, V.V. Swietoslawski, M.M. Popov, and others worked at the Luginin Thermal laboratory at Moscow University at different times [8]. To the history of the Luginin laboratory from the time of its foundation till the middle of the 1980s was devoted a publication by G.L. Gal'chenko [10]. The evidence concerning Luginin's life and scientific and public activities is included in all the main Russian encyclopedias and world's biographic reference books [16, 17].

REFERENCES

1. Kablukov, I.A., *Front Nauki Tekh.*, 1935, no. 9, pp. 41–48.
2. Kablukov, I.A., *Usp. Khim.*, 1940, vol. 9, no. 6, p. 733.
3. Kablukov, I.A., *Uch. Zap. Mosk. Gos. Univ., Khim., Yubilein. Ser.*, 1940, issue 53, pp. 47–52.
4. Kablukov, I.A., *Vladimir Fedorovich Luginin*, Moscow, 1912.
5. Solov'ev, Yu.I. and Starosel'skii, P.I., *Vladimir Fedorovich Luginin*, Moscow: Akad. Nauk SSSR, 1963.
6. Kapustinskii, A.F., *Ocherki po istorii neorganicheskoi i fizicheskoi khimii v Rossii* (An Outline of the History of Inorganic and Physical Chemistry in Russia), Moscow: Akad. Nauk SSSR, 1949.
7. Kipnis, A.Ya., *Razvitie khimicheskoi termodinamiki v Rossii* (The Development of Chemical Thermodynamics in Russia), Moscow: Nauka, 1964.
8. Solov'ev, Yu.I., *Istoriya khimii v Rossii* (History of Chemistry in Russia), Moscow: Nauka, 1985.
9. Figurovskii, N.A. and Sokolova, N.D., *X Vsesoyuznaya konferentsiya "Problemy kalorimetrii i khimicheskoi termodinamiki"* (X All-Union Conf. "Problems of Calorimetry and Chemical Thermodynamics"), Chernogolovka, June 12–14, 1984, vol. 1, part 1, pp. 5–10.
10. Gal'chenko, G.L., *X Vsesoyuznaya konferentsiya "Problemy kalorimetrii i khimicheskoi termodinamiki"* (X All-Union Conf. "Problems of Calorimetry and Chemical Thermodynamics"), Chernogolovka, June 12–14, 1984, vol. 1, part 1, pp. 11–18.
11. Sokolova, N.D., *Istoriya khimii: oblast' nauki i uchebnaya distsiplina* (History of Chemistry: Field of Science and Subject), Moscow: Mosk. Gos. Univ., 2001, pp. 245–247.
12. Timiryazev, K.A., *Sochineniya* (Works), Moscow: Sel'khozgiz, 1939, vol. 8, pp. 349–353.
13. *Pamyati Vladimira Fedorovicha Luginina: Sbornik* (In Memory of Vladimir Fedorovich Luginin: Coll. of Works), Kharkov, 1913.
14. *Trudy Vladimira Fedorovicha Luginina, professora Imperatorskogo Moskovskogo universiteta* (Coll. of Works of Vladimir Fedorovich Luginin, Professor of Emperor's Moscow University), Kablukov, I.A., Ed., Moscow, 1917.
15. *Katalog biblioteki imeni Vladimira Fedorovicha Luginina* (Catalog of Vladimir Fedorovich Luginin Library), issue 1: *Matematika i estestvoznanie* (Mathematics and Natural Sciences), Moscow, 1917.
16. Volkov, V.A., Vonskii, E.V., and Kuznetsova, G.I., *Vydayushchiesya khimiki mira. Biograficheskii spravochnik* (World's Outstanding Chemists, Biographic Reference Book), Moscow: Vysshaya Shkola, 1991.
17. Soloviev, Y.I., *Dictionary of Scientific Biography*, Gillespie, C.C., Ed., New York, 1981, vol. 8, p. 545.

A. G. Morachevskii