

Contribution of Russian Chemists to Foundation of the French Chemical Society (La Société Chimique de France) (1857–1860)¹

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Received August 26, 2007

Abstract—A little-known history of the contribution of Russian chemists to the foundation of the French Chemical Society (La Société Chimique de France) was discussed in the context of the original proceedings of the earliest meetings of the Society and some other materials of that time (1857–1860). It was shown that prominent Russian chemists, such as A.M. Butlerov, L.N. Shishkov, and some others, were among the founders of the Society and its most active members during the formative years of this scientific organization.

DOI: 10.1134/S1070363208050368

A FREE TRIBUNE

The French Chemical Society (La Société Chimique de France) was founded in Paris in June 1857 by initiative of three young men. Two of them were foreigners originated from different areas of Italy, which was split in those years into several small states: Arnaudon, Chevreul's student at Gobelin Manufacture (Manufacture des Gobeelins)², arrived from Turin; Ubaldini from Faience³ was Balard's and Berthelot's student at College de France; and Collinet, Jean-Batiste Dumas' laboratory assistant. They established a tradition to gather and discuss their "own researches and new publications" [1]. By December 1860, Ubaldini and Arnaudon returned home, the former to Florence, and the latter, to Turin. According to Jacques [2], those founders wished to be provided with an opportunity to hold discussions free from academic subordination.

The proceedings of the first meeting (séance), dated June 4, 1857, contain information about the Collinet's

presentation on chemical equivalents [3]. Laureau, Riche's student at the Faculty of Natural and Exact Sciences of the University of Paris, presented the first part of the historical report on preparation of sodium carbonate, and Ubaldini reported on a crystallographic research published in Italy. Arnaudon presented data on ozone. In 1858, Collinet fell seriously ill, and since 1860 has not been mentioned among participants of these meetings; the same concerns [4].

The second meeting held on June 11, 1857, was attended for the first time by Gensoul, Sainte-Claire Deville's student, a native of Lyons, as well as by Rosing, Dumas' student from Christiania (nowadays Oslo, Norway). On June 30, those attending the meeting adopted a charter proposed by Collinet, Rosing, and Pavesi (an Italian from Milano, engaged at the Laboratory headed by Sainte-Claire Deville at Ecole Normale). This document states that the meetings were aimed to inform the participants about the latest achievements in all areas of chemistry. Also, the new organization got the name of a Chemical Society. It was decided that the President and the Bureau would be elected monthly. Jacques Arnaudon (1829–1893) was elected the first President.

On August 18, 1857, the Society, comprised of twelve persons at that time, got the government's authorization. One of the Society members was Shishkov, a Russian from St. Petersburg, engaged at Dumas' Laboratory.

¹ The text was submitted by authors in French.

² Manufacture des Gobelins was founded as a dyer's in the middle 15th century by Jean Gobelin. Since 1697, it has specialized primarily in production of carpets and items that were specifically termed gobelins (translator's comment).

³ A Rome's district, the State of Vatican in those times; a ceramics fabric in Faience gave the name to the faience material (translator's comment).

Leon (Leontii) Nikolaevich Shishkov (1830–1908) is a Russian chemist from an old noble family [one of his ancestors was Aleksandr Semenovich Shishkov, a famous adherent of the purity of the Russian language (in the beginning of XIX century), Admiral, Minister, and President of the Russian Academy]. L.N. Shishkov graduated from the Mikhail Artillery High School in St. Petersburg (1851). He was teacher (since 1860, Professor) at the Mikhail Artillery Academy, where he organized an exemplary for those times chemical laboratory. After retiring in 1865 he continued researches at a domestic laboratory at his estate near Lipetsk. The major research activities by Shishkov were devoted to chemistry of explosives. L.N. Shishkov studied physicochemical aspects of black gunpowder combustion; he examined the composition and structure of fulminic acid and its salts, fulminates. Shishkov was the first to synthesize and describe a number of nitro compounds: tetranitromethane, trinitromethane (nitroform), etc. L.N. Shishkov worked at J.-B. Dumas', S. Wurtz's, and R. Bunsen's laboratories. He was on friendly terms with A.M. Butlerov (Boutlerow), A.P. Borodin, D.I. Mendeleev, N.N. Beketov, and other Russian chemists (translator's comment).

There were three Italians, one Portuguese, one Norwegian, one American, and five Frenchmen (including three Parisians, one inhabitant of Mulhouse, a city in today's French Department Haut-Rhin, near Strasbourg, and one Lionnaise) among the Society member. This international membership of the Society was further preserved: On December 1, 1857, new members were admitted into the Society: Lucchesini from Pisa [a student at the Parisian Central Technological School (Ecole Centrale des Arts et Manufactures)], Frappoli from Milano (a former student of L. Chiozza and Bunsen), Saenger from Prussia, Seeligman from Mainz (engaged at that time at Manufacture des Gobelins); Henri Villain from Saarbruecken engaged at Payen's Laboratory; and Hanhart from Switzerland (a Kopp's and Berthelot's student engaged at a laboratory of College de France). Thus, connections with Parisian laboratories existed for all the participants of the Society's meetings, except for Saenger engaged at a private dyeing factory in Surene (now, a suburb of Paris).

By December 31, 1860, the Society enumerated already 129 permanent (residents of Paris) and 66 corresponding (who lived outside Paris) members, including eleven Russians (from Kiev, St. Petersburg, Kharkov, Kazan, etc.).

HIGH REPUTATION OF THE SOCIETY IS RECOGNIZED BY FAMOUS CHEMISTS

On July 28, 1857, the Society members distributed among themselves the duties on reviewing publications in some periodicals: The "Scientific and Industrial Review" (*Moniteur scientifique*) (*Moniteur scientifique du chimiste et du manufacturier*) [1857 1859]: *livre journal de chimie appliquée aux arts et à l'industrie spécialement consacré à la chimie générale pure et appliqué*, G. Quesneville, Ed.: Paris (Meier from Mulhouse); "Philosophical Magazine" (Laureau); *Liebigs Annalen der Chemie* (Rosing); and Reports of Lisbon Industrial Institute (*Rapports de l'Institut industriel de Lisbonne*) (Mantas from Lisbon, Chevreul's student at Manufacture des Gobelins).

At the 10th meeting held on August 11, Leon Shishkov "took up the rank of a Society member" (this specific formulation suggests that the young founders of the Society regarded joining them by a professor from St. Petersburg as an honor). The last meeting before the summer vacations held two days later adopted a plan of "summarization of the latest theoretical achievements," to be supervised by Shishkov.

At the meeting held on December 1, Shishkov presented "a report on the experimental results concerning the isomerism phenomenon," based mostly on A.P. Borodin's works: "He discusses, above all, the factors responsible for the alkaline nature of some organic compounds and their reactions with acids. Also, he develops a concept of interrelation between ammonia and alkaloids."

Since December 8, the literature reviewing duties were redistributed. Specifically, Seeligman reported on publications in "Liebigs Annalen," "Poggendorfs Annalen der Physik und Chemie" were reviewed by Frappoli; Gensoul reported on other publications on chemistry; and Bauvallet, Georges Ville's assistant at the French National Museum of Natural History (Museum National d'Histoire Naturelle) reviewed publications on chemistry and pharmacy. Laureau reported on the "Bulletin of the Society for Encouragement of National Industry" ("Bulletin de la Societe d'Encouragement pour l'Industrie Nationale"), and Lucchesini, on "Philosophical Magazine." Shishkov spoke "in French" about the study dedicated to gunpowder he published in German jointly with Bunsen.

On December 15, Shishkov presented his ideas concerning a new furnace design suggested by Collinet and, in this connection, informed his colleagues "about

the furnace and gas flow regulator designed by Bunsen." Collinet suggested "printing the presentations and sending them to the corresponding members." After vigorous discussion this suggestion was "categorically rejected" by Shishkov and Rosing (who, maybe, were afraid that free information exchange could injure their reputation in the eyes of the "high and mighties").

In view of the growing Society's membership, it was decided to rent premises at 40 francs.

At the 14th meeting held on December 22, 1857, Shishkov made a presentation about "very interesting facts on the basicity of acids." Also, he introduced Butlerov (a widely recognized researcher already in those times [5]) to his colleagues, who unanimously accepted him as a Society member.

A.M. Butlerov (1828–1886) was N.N. Zinin's student in Kazan, before Zinin (1812–1880) moved to St. Petersburg in 1848. An associate professor since 1851, a year later he took the position previously occupied by Klaus at the Kazan University. In 1854 Butlerov defended his dissertation thesis in Moscow, where he once again met Zinin. According to P. P. Alekseev's (Alexeeff's) memoirs, Butlerov argued: "Two brief meetings with Zinin were sufficient for this period to become a whole epoch in my evolution. Zinin demonstrated to me the importance of Laurent's and Gerhardt's theory and noted their recently published works, "Méthode de chimie" by Laurent and "Traité de chimie organique" by Gerhardt, and advised me to follow the Gerhardt's system (known in Russia as "Gerhardt's types theory," translator's comment) in my teaching activities. I followed this advice, which allowed such a progress on my way along the science route that my further stay abroad in 1857–1858, including five months spent in Paris, molded a scientist from a student."

At the meeting held on December 29, Butlerov reported about his "observations on the influence of the mass of a liquid on dissolution and precipitation of different salts."

Apparently, this contribution from recognized Russian researchers made young co-founders of the new society confident in validity of their enterprise. At the same meeting, Rosing was elected the President for the next month.

On January 5, 1858, Shishkov presented a study on a method of preparation of uric acid, carried out by him jointly with Rosing.

At the meeting on January 20, Lieben from Vienna "reported on the history and interpretation of the theory of radicals." Shishkov "spoke on the same subject, though in a more general context," whereupon he said goodbye to the Society members and "expressed his gratitude for their friendly attitude to him." Shishkov was not regarded as an ordinary member of the Society, and President Rosing made a "brief thankful speech" on the occasion of his departure.

WAS THERE A NEED IN TRANSFORMATION TO AN ACADEMIC SOCIETY?

On January 5, Filipuzzi (a former Hofmann's laboratory assistant) from Padua (Italy) and on January 13, 1858, two new members (a pharmacist from Luxembourg and a Brazilian, a Berthelot's student) joined the Society. Arnaudon introduced Gustave Jouhassin, a former Chevreul's student, who supervised chemical works at the brown coal processing factory in Manosque (Provence). He was the second expert in technical chemistry, who joined the Society. Similarly to Sengera, expert in dyes, Jouhassin belonged to the "Chevreul's school."

At the meeting held on January 13, 1858, Rosing "presented his general ideas concerning the goals of the Society." There was a debate around revision of the Charter.

On January 27, Frappoli informed the Society members about the new Piria's formulas representing the structure of fatty acids, ketones, and aldehydes. Butlerov expressed the opinion that "the old theory provided equally adequate description to the same facts." He reported on some new observations concerning the action of iodine on alkaline alcoholic solutions which "underlie the work done by him at Wurtz's laboratory." He and Rosing warned their colleagues against the use of commercial products whose purity was claimed without any sound grounds. In connection with the Hanhart's presentation on manufacturing Marseilles soap, Butlerov "reported on the saponification processes practiced in Russia, [...] in particular, on the use of eggs for toilet soap manufacture. Rosing "initiated a brief discussion of the active nature of soap." That was nearly half a century since Chevreul's early works, but the interest in these issues was still preserved abroad in those times.

At the meeting on February 3, Rosing presented the notes, "written in German" and sent by Shishkov from

Munich, about his work on gunpowders, carried out jointly with Bunsen.

Rosing suggested undertaking some joint actions by the Society members, and this resulted in “laying down the foundations of a collection of products and samples” on February 17.

On March 3, Rosing suggested purchasing the Gerhardt’s treatise in chemistry and arranging subscription to “Comptes rendus de l’Académie des sciences” (“Reports of the French Academy of Sciences”), as well as to “Annales de physique et de chimie” (“Annals of Physics and Chemistry”) and “Annales de chimie et de pharmacie” (“Annals of Chemistry and Pharmacy”). Also, compiling a reference book dedicated to French and foreign chemistry professors was discussed on March 17.

The participants of the meeting on February 17 heard, and Rosing welcomed with especial enthusiasm, Butlerov’s report on “the general principles of the structure of matter.” On behalf of all of the Society members Rosing “expressed the gratitude to Butlerov for the excellent report and the ardent desire that Butlerov further developed this line of the extremely interesting theory.” It was not until then that he started “his own presentation about his latest study of benzene chlorination, carried out jointly with Shishkov.”

On February 24, 1858, the “Collection of products and samples” was opened by Butlerov who granted the first item, a metylene iodide sample owned by him. On March 10, Hanhart provided a human fat sample.

All the scientists mentioned above were foreigner travelers; they visited chemists in provinces; after moving from Paris to neighboring countries they reported about the methods, theories, and processes they learned about and mastered. Hanhart “provided some details on the manufacture of the garancine dye, according to the observations he made during the trip in Sorgue, near Avignon” (December 15, 1857). Rosing “described the manufacture of artificial mineral waters in Dresden,” which he studied during the trip over Germany (February 20, 1858). Frappoli “reported about a new method of analysis of meteoritic iron, applied by him jointly with Bunsen.” Filipuzzi provided details on “preparation of some products from illuminating gas condensate in Liverpool.” Rosing explained how some substances were extracted from tar in Christiania (February 24, 1858).

On March 10, the “ultimate goal” of the Society was discussed once again, now with emphasis on

whether famous persons were eligible as nominees. By contrast to “advanced” Russian chemists who did not consider it disgraceful to communicate with young, yet unknown researchers, the “maitres” of French chemistry did not welcome such mixing. Butletov told his colleagues that he would like to adhere to the rule specifying “simply saying the words necessary to help each other in chemical issues.” He expressed the opinion that “joining by persons more learned than the existing members can only be useful for the Society.” Collinet did not welcome integration of new members with already established reputation into the Society. Arnaudon treated this as a far-fetched problem: Whoever the nominees, it would be decided by voting who specifically would become a Society member. He did not consider such expansion of the membership as a reason for modifying the Charter of the Society. Rosing summed up this discussion by stating that “most of the members supported the expansion of the Society,” and no nominee should be rejected a priori. At the same time, Ranvier warned against “possible inconveniences that could be rendered in certain cases to other members by excessively high-ranking members.”

Gensoul made a presentation concerned with food issues; Butlerov proceeded with reporting on methylene iodide.

The proceedings of the meeting held on March 17 incorporated, by Rosing’s initiative, a summary of the discussion, which noted “the regret expressed by minority” of the Society members in connection with the “Society’s changing to the route different from that conceived by its founders.” Butlerov objected with fervor: “The major goal of the Society members consists in mutual enlightening. To constantly pursue this goal, we should consider ourselves as an academic society destined, along with other, well-established academic societies, to promote the progress in science. We should never lose this goal from the sight so that both young beginner researchers and more advanced academics be welcome as the Society members. Only this will allow the former to most seriously benefit from their membership. Also, in my opinion, this is the best way for the Society to follow its Charter.” At that meeting, four new members joined the Society, including V.V. Bek, “a Russian engineer, professor in chemistry at the Mining Institute in St. Petersburg, now at Wurtz’s laboratory,” introduced by Butlerov.” The other new members were Aimé Girard, Jourdin, and Alfred Riche.

On April 7, Butlerov reported “on soap manufacture in England” after coming back from a trip. Hanhart (from Ditikon near Zurich), Lieben (from Vienna), and Rosing took part in discussion. Arnaudon made a second presentation about the Chevreul’s color circle and the color contrast law. Further, Butlerov reported “about Hofmann’s laboratory and instruments for preparation of ethyl zinc,” as well as about some other Hofmann’s activities.

At the meeting held on April 21, Butlerov informed the Society members about his future departure. On April 28 he addressed the Society with a speech of gratitude for the reception rendered to him and said goodbye to his colleagues. In 1864, Butlerov moved from Kazan to St. Petersburg, where he was elected a member of the Imperial Academy of Sciences. Later, he became a teacher of A.M. Zaitsev and V.V. Markovnikov.

JOINING THE SOCIETY BY “YOUNG GRAND MASTERS” OF FRENCH CHEMISTRY

On May 12, Rosing suggested a new project of a printed edition, “*Revue chimique*” (“Chemical Review”), to “publish translations of foreign works exclusively.” This proposal was approved on May 29 by a special commission on a condition that the edition would be free of charge. On that very day, Friedel, Perrot, and Schlagdenhauffen from Strasbourg (all from Wurtz’s Laboratory) and Wurtz himself joined the Society. On June 2 Gerhardt was elected the President of the Society. In view of the inflow of new members, Arnaudon demanded undertaking efforts to get new, more suitable premises. On June 9, Berthelot and Cloëz joined the Society.

At the meeting on June 16, Jourdin, Vice-President, professor at Sacred Barbara College, informed his colleagues about his finding premises for holding meeting on a free of charge basis. Barreswill suggested organizing a library in his letter addressed to the Society.

On June 23, Couper presented his novel chemical theory. Independently of Kekule, Archibald Scott Couper (1831–1892) from Wurtz’s laboratory advanced in 1858 a concept of tetravalent carbon with the atoms able of combining into chains. Couper showed carbon-carbon bonds with dashed lines. At the meeting on June 30, Girard was reelected the President of the Society.

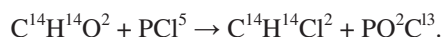
On July 7, Arnaudon suggested that the Parisian Society, similarly to the London Society, “undertook collective translation of foreign works.” Olivier noted that “the Society would get the Reports of the Academy of Sciences from St. Petersburg via Shishkov, professor at the St. Petersburg Academy of Artillery.” On July 28, just on the summer vacation eve, the “final” version of the Charter was adopted. Since June 2, Rosing’s name was no more mentioned in the proceedings of meetings of the Society. Forty-nine new members joined the Society within one year.

The Society resumed its meetings on November 3. From the very beginning, the Society members reported on studies published in France and abroad (at the meeting on January 15, 1858, Arnaudon informed his colleagues about the work made by Cloëz on separation of nickel from similar metals); they presented historical essays (on January 5, 1858, Arnaudon reported on the history of Rubia peregrina, a bright red dye obtained from wild moraine roots); reviewed the situation in individual branches related to chemistry (on May 5, Rosing portrayed the situation with agricultural chemistry). Also, there were reports on visits to industrial enterprises, e.g., those on July 28 by Ubaldini, Arnaudon, and Rosing about their visit to a dyer’s in Clichy; on December 1, 1857, by Rosing about his visit to the Kwanet phosphorus manufacturing factory in Lyons; and on December 15 by Collinet about Bonafous and Co pharmaceutical manufacture in Marseilles. The Society members shared information on details of industrial processes (e.g., on December 3, 1857, Arnaudon, reported on bread baking process; on February 24, 1858, Filipuzzi informed his colleagues about candle manufacture). The Society members exchanged the facts they learned via personal contacts. For example, Collinet on July 28, 1857, reported on discovery of nitroform by Shishkov; Arnaudon on February 3, 1858, informed his colleagues about the experiments by Niepce de Saint-Victor “on light preservation in sealed bottles [apparently, meant is phosphorescence (translator’s comment)] and on photographic applications of this light.” In some cases the Society members also reported on their own, both published and current, results (on July 28, 1856, Rosing reported about the experiments on heating a phosphorus pentachloride acetyl chloride mixture in a sealed vessel: “So powerful an explosion caused the oil bath to break”). On August 4, 1857, Rosing informed his colleagues about the studies of pyrogallous acid. On January 13,

1858, Arnaudon reported on the action of light on samples of dyestuffs obtained from bark of some wood species from Paraguay.

Couper presented his researches “on benzene;” in 1858 he discovered bromobenzene and 1,4-dibromobenzene.

The proceedings of a later time lost most of their characteristic expressiveness; they no more informed about polemics; the subjects of presentations narrowed and became more specific. For example, Riche “reported about nitric acid reacting with alkaline imides and nitriles to yield, along with an ester and alcohol, from which alkaline amides were prepared, nitrates corresponding to the radical replacing the second hydrogen equivalent.” (Alkaline amides mentioned by Alfred Riche are primary amines, alkaline imides, secondary amines, and alkaline nitriles, tertiary amines; thus, this confused text describes nitrosation of secondary and tertiary amines [6]). On November 10, 1858, Friedel summarized his studies on the action of phosphorus perchloride on butyrene and methyl benzoyl and concluded that this reaction was completely analogous to that between phosphorus perchloride and acetone, with butyrene giving chlorides of the composition $C^{14}H^{14}Cl^2$ and $C^{14}H^{13}Cl$.⁴



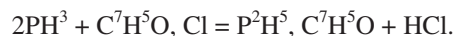
Friedel characterized propylchlorobutyrol $C^{14}H^{14}Cl^2$ as an extremely unstable substance which could not be prepared in the pure form because of decomposition during distillation into $C^{14}H^{13}Cl + HCl$; however, analyses suggested its existence; the chloride $C^{14}H^{13}Cl$ was prepared in the pure form; it had a boiling point between 135 and 140°C. The same concerned methyl benzoyl: $C^{16}H^8Cl^2$ could not be prepared in the pure form, but its derivative boiling at 190°C (here, butyrene is dipropylketone, and methyl benzoyl, acetophenone) was obtained. Friedel used formulas in his presentation, which was an innovation at that time, but these formulas still corresponded to the classical system of equivalents with $H = 1$, $C = 6$, $O = 8$, $Cl = 35.5$, $P = 31$, and $N = 14$ [7].

On that very date the Society members got acquainted with the two first issues of the “Répertoire

de chimie pure et appliquée” (“Methods of Pure and Applied Chemistry”) published by Wurtz and Barreswill, “with an appendix dedicated to the Parisian Chemical Society,” analyzing the French and foreign studies on chemistry. The first printed Bulletin of the Society meetings in 1858–1860 (“Société chimique de Paris, Bulletin des séances 1858–1860”) was published by Wurtz and Félix Le Blanc in 1860. In 1864, the above-mentioned “Répertoire” merged with the “Bulletin.” Initially, the reports were published annually, and later, bimonthly. The dates of the meetings were chosen in such a way that they differed from those of the meetings of the La Société Pharmaceutique de France (French Society of Pharmacists), so that pharmacists be involved, or at least not pushed away, from, cooperation. However, further growth of membership, most likely, slowed down (Cloëz suggested a token and penalty system “to encourage cooperation”). Armand Gautier [8] mentioned that, in those times, French chemists belonged to one of the three schools: Sainte-Claire Deville’s school, Bussy’s pharmaceutical school, and Wurtz’s school. The competition among these schools prevented sharing achievements by chemists, because “both the ideas and the very language of a different school were not perceived by its competitors.”

THE FIRST APPLICATION OF ATOMISTIC CONCEPTS IN A SOCIETY COMMUNICATION

On November 20, 1858, N.N. Beketov, professor at Kharkov University, “sent a summary of his studies on the action of phosphine on benzoyl chloride.” Beketov obtained two compounds, of which one was identified by him as “tribenzophosphide,” soluble in an alcohol and melting below 100°C, to which Beketov assigned the molecular formula “ $C^{21}H^{15}O^3P = (C^7H^5O)^3P$.” In this connection, it should be mentioned that, in his manuscript, Beketov identified a benzoyl group, explicitly specified the phosphorus valence, and used the Gerhardt’s equivalents $H = 1$, $C = 12$, and $O = 16$, which were not commonly accepted in France at that time. To the second, an orange-yellow compound, insoluble in an alcohol, which Beketov failed to purify, he tentatively assigned the rational formula $P^2H^5C^7H^5O$. The publication even contained the reaction equation:



Beketov reported that tribenzophosphide was formed under the action of benzoyl chloride on this

⁴ Modern symbols represent $C^{14}H^{14}Cl^2$ as $C_7H_{14}Cl_2$; $C^{14}H^{13}Cl$, as $C_7H_{13}Cl$; $C^{14}H^{14}O^2$, as $C_7H_{14}O$; $C^{16}H^8Cl^2$, as $C_8H_8Cl_2$; and PO^2Cl^3 , as $POCl_3$ (editor’s note).

substance. This was the first application of atomistic symbols in a Society communication.

N.N. Beketov joined the Society on December 14, simultaneously with his compatriot Garnitskii from the Kharkov University.

Fedor Minich Garnich-Garnitskii (1834–1892) graduated from the Kharkov University. After 2 years of training at Wurtz's laboratory in Paris, as well as in Gottingen and Heidelberg, he was engaged as a teacher at the Kharkov grammar school and provided a course of lectures on physics to medical students at the University. After a mission abroad in 1863, Garnich-Garnitskii taught organic chemistry as private-senior university lecturer. Later, he defended the thesis for a doctor's degree and was appointed professor at the Kharkov University (since 1870, of the Kiev University). Garnich-Garnitskii is the author of the following works: "Sur la synthèse du chlorure de benzoyl et de l'acide benzoïque" ("C.R.," 1864), "Sur une méthode générale de synthèse des acides gras volatils" ("C.R.," 1865), and "Sur les combinaisons de la glycérine avec les aldehydes," as well as "Synthesis of benzoic and cinnamic acids" (Master's Dissertation, 1866), "Formation of organic compounds from carbonic acid elements" (Doctor's Dissertation, 1867), "On the need and possibility of supplying the Southwest Krai with Donetsk Basin coal" ("Proceedings of the West Kiev Branch of Technical Society," 1871), "Analytical tables for students" (1878), etc. (according to Brockhaus and Efron Encyclopedic Dictionary, translator's comment).

Also, Guignet, Kraft, Félix Leblanc, Delaire, Boutmy, and some other French researchers joined the Society, most of which had fairly modest achievements at that time. But at the same meeting, Pasteur, Dehérain, Cahours, and Sainte-Claire Deville, "young grand masters" of French chemistry, were introduced to the Society. Since December 28 they undertook the leadership in the Chemical Society.

That, last in 1858, meeting considered nine new nominees, including Grandeau and Troost; the Society founders were removed from their leader's posts by "those who wished that the Society be expanded through attracting stars of the first magnitude in science," assisted by Aimé Girard. In that situation, Dumas, an Institute Member (Academician), agreed to assume the presidency." The "Scientific Review" ("Moniteur

scientifique de Quesneville") qualified that event as "a chemical 18 brumaire" [9].⁵

On January 11, 1859, P.P. Andreev from St. Petersburg joined the Society. Beketov sent a communication "about a new case of formation of benzoyl chloride $C_7H_5O.Cl$." He was aware of Cahours' method consisting in treatment of carboxylic acids with phosphorus pentachloride to prepare acyl chlorides. Beketov qualified this method as "a simple way to change from compounds of the water type to hydrochloric acid": "I attempted preparing these acid chlorides, as they are termed by Gerhardt," via replacing phosphorus pentachloride by a mixture of sea salt and "anhydrous potassium or sodium bisulfate" (sulfate and oleum), approximately at 200°C." Beketov illustrated his reaction scheme with a chemical equation combining the atomic designations and Berzelius' double atom symbols. He expected formation of sulfur trioxide as an intermediate to absorb sodium oxide and form sulfate "to prevent formation of Mitscherlich's sulfobenzoic acid."

The Chemical Society members were highly impressed by the clear and logical work by Beketov and his excellent knowledge of the works by foreign scientists, Cahours and Mitscherlich, as well as of the Gerhardt's theory.

On February 8, Garnitskii represented in atomic designations his researches on the "action of carbon oxychloride on aldehydes." He treated acetic aldehyde with phosgene and obtained a product which he identified by the phase transition temperature, vapor density, and elemental analysis data.

Beketov sent a new communication about "the action of hydrogen under various pressures on some solutions of metals," and F.F. Beilstein, about "the action of sodium ethylate on esters."

The participants of the meeting held on February 25 became acquainted with a communication "on transformation of acetal into aldehyde," sent by F.F. Beilstein, and P.P. Andreev reported the data on the specific weights and thermal expansion of some liquefied gases (SO_2 , NH_3 , CO_2 , and NO), he obtained in 1857.

On March 11, Beketov made a presentation "On some reduction phenomena," and Dumas resumed

⁵ The coup d'état of November 9 (18 brumaire according to the revolutionary calendar), 1799, that led to the Napoleon Bonaparte's dictatorship (translator's comment).

discussion of the equivalent weights of elements. On May 13, Beketov presented his "Notes concerning formation of pemanganic acid." On May 24, Wurtz made an extensive presentation on Butlerov's work dedicated to methylene derivatives, as well as on the work by Golovinskii, concerning "the action of some dibasic combinations of halogens on silver oxalate," based on the experiments he conducted at the Kazan University.

The Society adopted a modified charter that reflected its new ambitions and fixed the official name, Société chimique de Paris (Parisian Chemical Society). The Society declared its goal as promotion of success and spread of researches on general and applied chemistry via encouraging the works by its members, publication of their works, introduction of prizes, and other measures. It was decided that the President would be elected for one year. The works communicated to the Society in 1858–1859 were predominantly those by guests from Russia and Beilstein. Next year, specifically French chemists made the largest contribution to the activity of the Society. However, on February 24, 1860, the Society once again heard reports about works by Russian scientists. Wurtz, in Butlerov's name, presented an extensive report about the products of the reaction between sodium ethylate and iodoform. On July 13, Leon Shishkov made a presentation about the rational formula of fulminic acid at the meeting chaired by Lois Pasteur (Shishkov's impression of that scientific Society which was considerably reformed since the initial stage of its existence would be of much interest).

On August 10, Wurtz once again presented Butlerov's studies "of new methylene derivatives," and the report he made on November 23 was devoted to Borodin's study of "monobrominated compounds of valeric and butyric acids." In 1886, soon after the unexpected Butlerov's passing in Bordeaux,⁶ P.P. Alekseev pointed out the following in his obituary notice sent to the Parisian Chemical Society from Kiev: "Butlerov always worked openly, under everybody's very eyes. [...] It can even be argued that he thought in equally open manner, since he involved other persons into all his mental constructions to verify them in the same

open manner before those who surrounded him. He made no secrets either of his ideas or his plans of realization of these ideas. [...] This open manner was a powerful tool that allowed his students and disciples to clearly see every step in his work, monitor its progress, and follow him through all complex stages of solving the mysteries of nature." This is equally pertinent to all other Russian members of the French Chemical Society (La Société Chimique de France) of that time.

EPILOGUE

This essay portraying the activities of the Parisian Chemical Society (Société chimique de Paris) in the first three years since its foundation demonstrates that it owes its birth and high reputation to foreign researchers. Russian chemists were especially active in supporting young founders of the Society. They stimulated the interest of the Society members in their own works and the interest in the Society through their works. Their traveling favored exchange of ideas. Devoid from hierarchical constraints in their attitude toward "grand masters" of French chemistry and standing aside from their struggle for the influence, they felt free to bring into France those advanced methods and theories that for long met opposition in Paris. In Parisian Chemical Society they found a free tribune, an international audience of young chemists striving to increase their knowledge, and a forum for free exchange of ideas.

Close relations between Russian researchers and French chemists who frequently visited Paris, persisted at a later time. P.P. Alekseev often visited Paris in 1860–1862. A professor at the St. Vladimir Kiev University in 1890, he remained a corresponding member of the French Chemical Society. On November 1, 1890, in the foreword to the French edition of his monograph on methods of transformation of organic compounds, Edward Grimo, professor at the Parisian Polytechnic School (Ecole Polytechnique de Paris) and President of the Parisian Chemical Society pointed out the following: "Our chemical literature lacked specifically this kind of book. That is why I attracted Darzens (a student) and Lefèvre (laboratory assistant) to translation of this work" [P. Alekseyeff, "Méthodes de transformation des combinaisons organiques," Paris: Masson, 1891].

The archives of the French Chemical Society contain an exciting correspondence dating back to the eve of the Second World War. On January 21, 1937,

⁶ Other sources (e.g., <http://www.euchems.org/Distinguished/19thCentury/Butlerov.asp>) inform that A.M. Butlerov passed in Biarritz and was buried in a chapel near his family estate in the Butlerovka village (no more existing now), Spas district, Kazan governory (translator's note).

Prof. Orekhov wrote to Champetier, Editor-in-Chief of the "Bulletin de la Société Chimique de France:" "There exist different, fairly clear reasons, for which many of our chemists who earlier published their works in German magazines would like to abandon this practice and send their communications to your Bulletin. I do not know, however, whether your editorial board accepts communications from persons other than the Chemical Society members." Another issue was that of translation of the communications written in Russian, complicated by the impossibility of transfer of the Russian currency to pay for translations. Thanks to Raymond Delaby, Secretary General of the Society, the French Ministry of Foreign Affairs allocated a grant for this purpose. On February 28, the Ministry informs the Society about allocation of 12000 francs (of which only 10000 was obtained, as noted by Delaby on the letter from the Ministry and as stated in the financial report for 1937, comprising the "grant for the translations" item [10]). In his letter of March 8, 1937, to Orekhov, Delaby wrote the following: "In this connection, the Bureau of the Society would be very glad to accept communications for publication." The Secretary General of the French Chemical Society suggested that his correspondent made a "trial step" in this sphere. This suggestion was communicated to Academician N.D. Zelinskii, the Chairman of the Moscow Branch of the D.I. Mendeleev All-Union Chemical Society. Zelinskii expressed his gratitude "for the efforts undertaken toward even more direct intellectual rapprochement of the scientists of the two countries." Both parties agreed to present the first series of communications for preliminary examination by the Mendeleev Society (letter of May 22, 1937, from Delaby to Orekhov).

As a result, in the period till 1940, "Bulletin de la Société Chimique de France" published communications on original works of Russian chemists on alkaloids, hormones, organic synthesis, and electrochemistry. The most well-known Russian scientist whose works were published in the Bulletin was Aleksei Evgen'evich Chichibabin (Tchibabine) (1871-1945), a V.V. Markovnikov's disciple, the author of the two-volume "Course of Organic Chemistry" published in France (Hermann, 1933),⁷

⁷ A classical textbook by A. E. Chichibabin "Essentials of Organic Chemistry" was published in 1925 and subsequently passed through many editions (of which the 7th is of 1963) (translator's note).

with the introductory chapter written by Victor Grignard. That is one of the first works in which organic chemistry was treated in terms of the physical chemistry concepts. Full Member of the Academy of Sciences of the USSR, awarded with prestigious Butlerov prize by the Russian Physicochemical Society [11], A. E. Chichibabin lived in France since 1930. Over a period of time he headed a research laboratory of the Kuhlman firm, and later headed a laboratory at College de France, where he continued the researches together with some of his disciples: Andreev, Bestuzhev, and Barkovskii (Barkovsky).

Since November 1936, the Bulletin published communications by A.E. Favorskii and F.Rudneva, V.M. Rodionov, V.V. Levchenko, V.S. Zvorykina, S. Stakheeva-Kaverzneva, and N.I. Gavrilov. In 1937, some new Russian chemists joined the French Chemical Society, specifically, Ya. Leont'ev, professor in chemistry at Moscow Zootechnical Institute of the Commissariat for Agriculture; B. Afanas'ev, head of laboratory at the Forestry Institute in Sverdlovsk; Honorary Academician M.A. Il'inskii; and N.N. Vorozhtsov from Moscow.

On March 25, I. Ushakov from the Laboratory of Chemistry of Hormones and Steroids at one of the Moscow Institutes sent two articles to the "Bulletin de la Société Chimique de France:" Prof. A.P. Orekhov from the Scientific Research Chemical and Pharmaceutical Institute (NIKhFI, sector of alkaloids) sent 4 articles; V.M. Rodionov provided two articles, of which one was dated June 11, from the Laboratory of Dyes at the Moscow Textile Institute, and the other of January 25, 1938, from the Laboratory of Organic Chemistry at the All-Union Institute of Experimental Medicine (VIEM); N.I. Gavrilov, Head of Section of Proteins at VIEM, sent 5 articles dated October 23, November 3 and 11, and December 3 and 23.

Thus, the scientists of the two countries, Russian chemists and the French Chemical Society, have an old tradition of fruitful exchange and friendly contacts.

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