Translation of the fragment of the memoir **"Recollections of my life, or the posthumous notes of the Pickwick club"** by Lev I. Krishtalik (1927-2022), published by Vasiliy V. Ptushenko in 2022.

This fragment describes the end of 1940s – beginning of 1950s period. The author graduated from the Moscow Chemical-Technological Institute in 1948, worked in applied Institute of Chlorine Industry, was interested in the basics of electrode kinetics, and tried to approach Frumkin school.

I would like to say a few words here about the state of Soviet science at that time and the atmosphere around Frumkin's school. Following the ideological battles of 1946, and especially after Lysenko's destruction of genetics in 1948[1], all sorts of unprincipled careerists, ignoramuses, and mediocrities цуте гз. They were driven by the sentiment: "Why should we be worse than others? We want to rule, too." Their primary, lethal weapon was the accusation of "idealism" and "servility toward the West". If the target happened to be Jewish, a heavy dose of antisemitism was added to the mix. All of this was actively encouraged by <the communist >party ideologues and supported by so-called philosophers.

Cybernetics was denounced as a "bourgeois pseudoscience". An attempt was made to incite a conflict between so-called "university physics" and "academic physics" (individuals who failed to grasp modern physics dismissed it as incorrect (much like Lenard[2], who famously labeled the theory of relativity "Jewish physics"). In this instance, however, things did not escalate into a full-scale purge; the authorities were informed that if they wanted an atomic bomb, they had better leave the physicists alone.

A conference was organized to denounce the "idealistic theory of resonance"[3]. The resonance theory represented the first attempt to apply quantum mechanics to the analysis of a wide range of chemical problems. Its creator, Linus Pauling, received a Nobel Prize for this theory—though this occurred after the controversial campaign against it in the USSR. Like any initial approximation, it was imperfect and was subsequently superseded by newer, more effective approaches and computational methods in quantum chemistry; nevertheless, its significant contribution to shifting the way chemists think is undeniable. However, the critics of the resonance theory did not target its actual shortcomings; instead, they attacked its physical foundation (quantum mechanics), which, from the perspective of primitive, mechanistic thinking, appeared paradoxical and, consequently, ideologically flawed. Our prominent researchers in this field, Yakov Kivovich Syrkin, and Mirra Efimovna Dyatkina, have taken the worst hit.

The eminent scientist Nikolai Nikolayevich Semenov was accused of "bowing down to the West"[4], as he had dedicated his monograph on chain reactions to the founders of physical chemistry, Jacobus Henricus van't Hoff and Svante Arrhenius. Consequently, N.N. found himself forced to defend his actions. His primary scientific opponent was Professor Akulov. It was said (though I cannot vouch for the absolute accuracy of the account, the situation is quite characteristic) that during a discussion at the Academic Council of the Faculty of Chemistry, Akulov, having run out of scientific arguments, simply moved to profanities. With complete composure and dignity, Nikolai Nikolayevich remarked: "Professor

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[1] See "The pushback against state interference in science: how Lysenkoism tried to suppress genetics and how it was eventually defeated". Genetics 2021. V. 269. iyab162, and Refs therein, authored by the editor of Krishtalik's memoir (*translator's footnote*).

[2] Philipp E.A. von Lenard (1862–1947), Nobel prize 1905, strong supporter of Nazi regime (*translator's footnote*).

[3] For initial orientation in this story and information about main actors, English-speaking readers can study the articles "Theoretical chemistry in Russia". J. Chem. Education. 1954. V. 31. P. 504-514, and "A soviet marxist view of structural chemistry: The theory of resonance controversy". ISIS. 1964. V. 55. P. 20-31 (*translator's footnote*).

[4] More general presentation of campaign as a whole can be found in "Physics, Genetics and the Zhdanovshchina". Europe-Asia Studies. 1998. V. 50. P. 1183-1202 (*translator's footnote*).

Akulov, a full member of the Academy of Sciences of the Byelorussian SSR, has stepped beyond the bounds of objective criticism of my work."

S. V. Gorbachev[5] served as the leader of the opposition to Frumkin. To provide a counterpoint to Frumkin, he needed an icon. For this role, he put forward the "great Russian scientist" N. A. Izgaryshev[6]. It must be said that Nikolai Alekseyevich did have undeniable achievements as one of the pioneers of electrochemical research in our country; however, his work in the 1950s remained at the level of the qualitative concepts that had prevailed at the beginning of the century. To his credit, N.A. never engaged in public attacks against Frumkin.

At about 1950[7], Gorbachev became editor-in-chief of the <Russian> «Journal of Physical Chemistry». M. I. Temkin was removed from this position (deemed "undesirable" due to his Jewish origin), while another editor-in-chief, N.N. Semenov, reportedly chose to step down rather than continue under such circumstances. Gorbachev then seized the opportunity: the journal began to feature a large number of papers by him and his associates — work that, under other conditions, would never have been published. For instance, his doctoral student N. Zhuk published a discovery[8] that refuted Frumkin's theory of slow discharge: the polarization curve for chlorine evolution on platinum did not follow the Tafel equation, but instead exhibited an S-shaped profile. When he presented this discovery at the All-Union Conference on Electrochemistry, it was immediately pointed out that such a curve had already been observed in the 1920s by Förster, who had correctly explained it as the passivation of an electrode due to oxygen adsorption. In response, he could come up with nothing better than to claim that oxygen could not compete with a stronger oxidizing agent, chlorine (he modestly omitted this idea from the account of the discussion included in the conference proceedings). This scientifically illiterate piece of work served as experimental evidence for Gorbachev's new theory. His "brilliant" idea was as follows: it is known that the rate of ordinary reactions is proportional to **exp(-E/kT)**, E is activation energy. The activation barrier is overcome by means of thermal energy, which, Gorbachev concluded, meant by means of kT. In other words, he failed to grasp that the thermal energy expended to overcome the barrier is equal to E, not kT; the exponential term exp(-E/kT) actually represents the Boltzmann probability that a system will attain an energy E. Taking this line of reasoning further, he asserted that the potential difference between electrodes does not, in fact, decrease the activation energy (as is the case in the derivation of the Tafel equation), but rather acts in tandem with kT to overcome the barrier. Consequently, according to Gorbachev, the rate of an electrochemical reaction is proportional to exp(-E/(kT + ϕF)), where ϕ is the potential difference and F is the Faraday constant. This equation described the peculiar curve of Zhuk[9].

A.N. Frumkin stated publicly to Gorbachev that his article was a disgrace to Soviet electrochemistry. Gorbachev had published other notable works as well, for instance, a new theory of diffusion

[5] Gorbachev Sergey Vasilievich (1899–1979) — electrochemist; he was deputy director of the Moscow Chemical-Technological Institute during that period (*editor's footnote*)

[6] Izgaryshev Nikolay Alekseevich (1884–1956) — electrochemist, expert in metal corrosion and theory of galvanic cells; the pupil of N.D. Zelinskyi, N.A. Shilov, and W. Ostwald. One of the lecturers who left Moscow University in 1911 in protest against the authorities' violation of the University autonomy. In 1922, he was in the list of scientists to be deported from the USSR, but O.Yu Shmidt petitioned for his stay in USSR as there were no other scientists of his specialization (*editor's footnote*)

[7] This happened in September 1949 r. More precisely, initially he became deputy chief editor, and N.A. Izgaryshev became chief editor. Before it, N.N. Semenov and M.I. Temkin shared these duties. Simultaneously, editorial board was almost completely changed: in addition to M.I. Temkin, A.I. Brodskyi, Ya.K. Syrkin, L.D. Talmud, V.G. Khlopin and some others were removed (*editor's footnote*)

[8] S.V. Gorbachev, N.P. Zhuk, The effect of temperature on the rate of electrolytic chlorine evolution. Zhurnal Fizicheskoi Khimii. 1951. V. 25. P. 841–853 (*editor's footnote*)

[9] Most probably, this is related to Gorbachev's articles "Combination of concentrational and chemical polarization". Zhurnal Fizicheskoi Khimii. 1952. V. 26. P. 1303–1310, and "Thermodynamic criteria for equations of the kinetics of electrochemical reactions. 1953. V. 27. P. 1362– 1369 (*editor's footnote*)

kinetics, which implied that ion discharge occurs even when ions are completely absent from the layer adjacent to the electrode[10]. Armed with this body of "scientific" work, Gorbachev attacked Frumkin at All-Union electrochemistry conferences. Since this was clearly insufficient, other tactics were also employed. For example, a certain individual was brought to the podium to claim that, by applying Gorbachev's ideas, they had successfully protected pipes at peat-extraction sites from corrosion. The implication being that Frumkin's theory was therefore incorrect (a supposed demonstration of a link to practical application). Professor B. B. Kudryavtsev[11], a member of Gorbachev's chair, who was not himself an electrochemist—made a sensational denunciation: he claimed to have analyzed all of Frumkin's published work, asserting that "there are no references to the work of Russian scientistsб only to foreigners and 'his own people'" (read: Jews). Frumkin's response was: "It is not for you to decide who is a Russian scientist and who is not". Sindyukov, a former postgraduate student in the Department of Electrochemistry, Moscow University, who had failed to complete his degree[12], declared the following: "We have built socialism, we are building communism, yet for them <pointing a finger at Frumkin> α is still equal to 1/2" (where α refers to the coefficient associated with the electrode potential in the expression for activation energy).

It is impossible to list the entire torrent of demagoguery and falsifications that was unleashed upon Frumkin. He conducted himself with courage and wisdom, and managed to prevent the adoption of devastating resolutions.

[10] This issue was discussed in Zhurnal Fizicheskoi Khimii between V.G. Levich and S.V. Gorbachev, see at Levich page (*translator's footnote*)

[11] Kudryavtsev Boris Borisovich (1909-1966) (*translator's footnote*)

[12] Sindyukov Vasilyi Grigorievich (1910-1985) started his PhD in autumn. He finally defended PhD thesis on nickel cathodic and anodic polarization behavior in concentrated solutions of acids in 1946 (*translator's footnote*)