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Symposium

Bonifatii Kedrov's methodological essays: Marxist histories of chemistry, science, and technology

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Abstract. The Soviet philosopher and historian of science Bonifatii Mikhailovich Kedrov (1903–1985) issued several reflections regarding the appropriate methodology of history of science and technology. This article focusses on three such reflections — those published in 1940, 1949, and 1968. Examined together, these essays show that Kedrov discouraged the mere presentation of factual material and promoted deeper historical explanations. Although these essays indicate how Kedrov adapted his proposals to the prevailing political situation, there are also reoccurring themes. In particular, the notions of internationalism, nationalism, and priority featured prominently, together with discussions on how industry and broader society guided and initiated scientific progress.

1. Introduction.

Futures for history of chemistry have a past. The topic of this article is their Soviet past, as futures were considered by historians and philosophers in the Soviet Union. The specific visions discussed here originate from the Marxist philosopher and historian of chemistry Bonifatii Mikhailovich Kedrov (1903–1985), who is especially known for his work on atomism, Mendeleev, and the periodic law.[1] Throughout his long career, Kedrov made several methodological proposals for historians of chemistry and natural sciences. These essays called for deeper historical explanations; explicating causes and effects; connecting developments of science with industry, technology, and society ; and exploring the dialectics of historical development.

These prescriptive essays will be interpreted here as articulations of future directions of historical research. The idea that methodological reflections might carry a hope regarding the future of a field is inspired by the comment by Kedrov's colleague, Georgii Bykov. When discussing the tasks or goals of historians, Bykov, a historian of chemistry, noted that studying the emergence and development of phenomena could serve as a methodological principle for histories of natural sciences "both in present and in the future" where there is evidence that these comments were made in response to the kinds of methodological concerns raised by Kedrov.[2]

Aside from taking Kedrov's methodological essays as a vision for future, Kedrov's essays can also read as a part in the broader history of configuring the relationship between history and phi-

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losophy of science.[3] Institutionally speaking, Kedrov's association with histories of science appears to have been a cause of some anxiety among historians. In 1962, Kedrov, known primarily as a philosopher, was appointed as the director of the Institute for the History of Science and Technology (IHST). Kedrov's programme for IHST included a substantial philosophical emphasis, prompting what historian Elena Aronova called the "philosophical turn" of the historical institute.[4] This raised some eyebrows among its historians. According to Aronova, Bykov wrote the following in his letter to the directorate of the Institute in 1965:

> Who are we now? According to the formal stratification of specialties we are historians. By our training, past work, and our diplomas most of us are natural scientists. However, recently our Institute became affiliated with the Division of Philosophical Sciences [of the Academy of Sciences] and hence now we are philosophers. What does this mean? … From our Director we have heard only confusing answers to this question…'[5]

Confusing or not, at several stages of his career — including in an essay published three years after Bykov's letter of concern — Kedrov articulated how Marxist history of natural sciences ought to be conducted. Contrary to Bykov's worries, however, these were not calls for changing the disciplinary identity of historians of science, although Kedrov did address this concern in the abovementioned essay of 1968. Drawing from his philosophical expertise on Marxism and dialectical materialism, Kedrov proposed how history of natural sciences ought to be shaped in more general terms. However, Kedrov had considered the topic for history of chemistry already in 1940. Nine years later, in 1949, when Kedrov was both a participant and a victim of the ideological campaigns, this reflection was extended to a broader articulation regarding methodology of histories of natural sciences. Kedrov's examples drew heavily on chemistry, especially the periodic system.

In what follows, the main elements of these three essays will be identified and compared. Especially notable is Kedrov's recurrent concern about what he calls the "descriptive method" to history of science — method that primarily focusses on laying out facts without any great interest towards explanations. As noted by historian Slava Gerovitch, this growing tendency towards "factological"

[1] On Kedrov, see especially T.J. Blakeley, "Soviet philosophic method:The case of B. M. Kedrov," *Studies in Soviet Thought*, **6**(1) (1966) : 1-24 ; W.G. Hahn, *Postwar Soviet politics:The fall of Zhdanov and the defeat of moderation, 1946-53*. (Ithaca, NY : Cornell University Press, 1982), Ch.6. *Bonifatii Mikhailovich Kedrov: Ocherki, Vospominaniya, Materialy. Ed*. V.A. Lektorskii. (Moscow : Nauka, 2005). Elena Aronova, "The politics and contexts of Soviet science studies (Naukovedenie) : Soviet philosophy of science at the crossroads," *Studies in East European Thought*, **63**(3) (2011) : 175-202. https://doi.org/10.1007/s11212-011-9146-y

2 G. V. Bykov & V. A. Krizman, *Stanislao Cannizzaro, Ocherk zhizni i deyatel'nosti*. (Moskva, Nauka, 1972), p.84.

3 See e. g., Jutta Schickore, "More Thoughts on HPS:Another 20 Years Later," *Perspectives on Science*, **19**(4), (2011) : 453-481. Hasok Chang, "Beyond Case Studies : History as Philosophy," In S. Mauskopf & T. Schmaltz (Eds.), *Integrating History and Philosophy of Science*, (Dordrecht, Springer, 2012), pp.109-123. https://doi.org/ https://doi.org/10.1007/978-94-007-1745-9

4 Aronova (2011) p.193

5 Aronova (2011) p.193

histories of science, which did not show appetite for historical analysis and interpretation, was the result of historians' concern regarding dangers of providing interpretations.[6] This general tendency indicates that Kedrov's calls for steering away from such approaches did not have much of an effect on the field. Nevertheless, his discussions regarding internationalism of science and its relationship with the contributions of individual nations, together with notions of discovery, priority, and the relationship between science and technology re-emerge in Kedrov's prose and are worthy of attention. Examined together, the proposals represent an attempt at formulating Marxist theory of history of science and technology, with special attention to chemistry.

2. History of chemistry and Marxism, circa 1940

Kedrov was born in Yaroslavl in 1903 to a family of professional Bolshevik revolutionaries.[7] His parents were Olga Kedrova, née Didrikil' and Mikhail Kedrov, who later gained notoriety as one of the leaders of Cheka, the Bolshevik party's secret police.[8] Bonifatii and his brothers' childhood was marked by the imprisonment of their father, who was arrested for publishing banned books through a Bolshevik publishing house that he had helped to establish. In 1912, the family escaped to Switzerland at a time when many members of the future leadership of the Bolshevik party were there in exile.[9] Upon the revolutions of 1917, the family returned to Russia where Bonifatii finished his schooling. In 1922, he became a student of the chemical faculty of 1st Moscow National University, where he finished his studies eight years later in 1930.[10]

Kedrov was a student of chemistry at a time when the field of history of science was rapidly institutionalising in the Soviet Union. The Academy of Science Commission on the Study of Russian Sciences, led by the historian A. S. Lappo-Danilevsky, had already been established in 1916.[11] The commission was succeeded by another Academy of Sciences commission, the commission for the Study of History of Knowledge (Komissiya po Istorii Znanii, KIZ) initiated by the geochemist and academician Vladimir Vernadskii with the hope was that it would promote national science and

[6] Slava Gerovitch, "Writing History in the Present Tense: Cold War-era Discursive Strategies of Soviet Historians of Science and Tehnology", In C. Simpson (Ed.), *Universities and Empire: Money and Politics in the Social Sciences During the Cold War*, (New York, The New Press, 1998), p.199.

[7] Bonifatii M. Kedrov, *Zapechatlennyi obraz Lenina.* (*Avtobiograficheskie ocherki*) (Moscow, Izdatel'stvo politicheskoj literatury, 1986), p.8.

[8] Nicolas Werth, "A State against Its People:Violence, Repression, and Terror in the Soviet Union," in *The Black Book of Communism: Crimes, Terror, Repression*, S. Courtois, N. Werth, J-L Panné, A. Paczkowski, K. Bartošek, J-L Margolin (eds.) (Cambridge, Massachusetts: Harvard University Press, 1999) p.114.

[9] Kedrov (1986) p.31-33.

[10] Bonifatii M. Kedrov, "Vospominaniyaob akademike S. I. Vavilove" in *Bonifatii Mikhailovich Kedrov: Ocherki, Vospominaniya, Materialy*. Ed. V. A. Lektorskii. (Moscow: Nauka, 2005), pp.318-319.

[11] V. M. Orel and G.I. Smagina, eds. *Kommissiya po istorii znanii. 1921-1932. Iz istorii organizatsii istoriko-nauchnyh issledovanii v Akademii nauk. Sbornik dokumentov.* (St. Petersburg, Nauka, 2003), p.5. A. N. Dmitriev, "K 70-letiyu Instituta istorii estestvoznaniya i tekhniki im. S. I. Vavilova RAN" VIET, 1, (2002), pp.3-36.

serve as a reminder of the importance of academic research.[12] Meanwhile in Moscow, Cabinet of History of Natural Sciences of the Communist Academy, led by Nikolai Bukharin, was established in 1927.[13]

For a while, the two settings in Leningrad and Moscow housed research on history of science and technology in conjunction. By 1930, after the resignation of Vernadskii, Bukharin was appointed the chairman of KIZ.[14] Subsequently Bukharin appealed to the Academy of Sciences to reorganise the commission to an institute. This proposed change to KIZ's organisational structure was in part motivated by the international importance of its work and its successful participation in the second International Congress on History of Science and Technology in London, where both Moscow and Leningrad scholars had presented.[15] These efforts bore fruit, and KIZ gave rise to what became the Institute of History of Science and Technology (*Institut istorii nauki i tekhniki*, IINT), which after its initial Leningrad years was disbanded in 1938.[16] Organisationally, the Leningrad IINT consisted of several sections devoted to the study of history of physics and mathematics, agriculture, technology, and the Academy of Sciences. The corresponding section for chemistry, established in the spring of 1932, was not able to expand its efforts despite the presence of Leningrad historians of chemistry such as Max Bloch (1882–1941) and Boris Menshutkin (1874–1938).[17]

In Moscow, Kedrov taught alongside Boris Hessen, the historian of physics known as an initiator of externalist history of science. Where Hessen covered history of physics in both the Institute of Red Professors and Moscow University, Kedrov taught history of chemistry in 1936–1938, where his program included atomic theory and periodic law.[18] Although IINT was dissolved and figures like Hessen and Bukharin perished in the purges of 1938, many of its former employees succeeded at continuing conducting research on history of science through the commission for scientific heritage and the publication of the works of figures such as Butlerov and Mendeleev.[19] Kedrov, whose

[12] Orel and Smagina (2003) p.6; On Vernadskii, see Gerovitch (1998) p.191. Kendall Bailes, *Science and Russian Culture in an Age of Revolutions: V I. Vernadsky and His Scientijc School, 1863–1945* (Bloomington: Indiana University Press, 1990).

[13] Dmitriev (2002) p.17. Aronova (2011) p.181. On the Communist Academy, see Michael David-Fox, *Revolution of the Mind: Higher Learning among the Bolsheviks, 1918–1929*. (Cornell University Press, 1997).

[14] Orel and Smegina (2003) p.38.

[15] Dmitriev (2002) p.4.

[16] See Dmitriev (2002) for a detailed account of IIET in the 1930s.

[17] Dmitriev (2002) p.10. Bloch had been already active in the leadership of Vernadskii's KIZ. See also Orel and Smagina (2003) pp.11,669.

[18] On Kedrov's curriculum, see Aronova (2011) p.191 (fn 44). On Boris Hessen, see Loren Graham, "The socio-political roots of Boris Hessen: Soviet Marxism and the history of science," *Social Studies of Science*, **15**(4), (1985): 705–722. S. Winkler, "Individuals and collectives in the philosophy of Boris Hessen: An introduction," *Science in Context*, **34**(1), 2021: 121–136.

[19] On the impact of the purges on the institute, see E. I. Kolchinskii, *Istoriko-nauchnoe soobshestvo v Leningrade-Sankt Peterburge v 1950-2010 gody: lyudi, traditsii, sversheniya.* (*K 60-letiyu Sankt-Peterburgskogo filiala instituta istorii estestvoznaniya i tekhniki RAN im. S. I. Vavilova.* (St. Petersburg: Nestor Istoriya, 2013), p.8–9.

brother and father were arrested in 1939, continued both his political and scholarly activities.[20]

It was against the backdrop of the purges, and the disbandment of IINT that Kedrov, an affiliate of the Institute of Philosophy, published his article "History of Chemistry and Marxism" in the journal *Sovetskaya Nauka*.[21] As a starting point, Kedrov noted that the important task of mapping the development of past chemical thought had not been met. Existing histories only provided factual material without striving for more comprehensive answers. Dialectical and historical materialism was better poised for success since its goal was to map the logic in the development of chemical ideas. Furthermore, it sought to discover chemical ideas were connected with practice and identify the causes that determined the development of chemistry.[22] On these grounds, the explicit aim of Kedrov's article was threefold : to demonstrate historians of chemistry the significance of the works of Lenin, Stalin, Marx and Engels; provide an approach to historical problems that lent itself to evaluating chemistry and history of chemistry ; and introduce tools to critique incorrect conceptions in history of science.[23]

It was the third aim, and specifically the problematic "descriptive method" to history of chemistry, that took the centre stage of Kedrov's critique. In particular, Kedrov elaborated a Marxist method to history of chemistry through contrasting it with the descriptive method. Although there was no denying that first order of business was the collection of factual material, this was only a preliminary stage, and had to be followed by providing deeper explanations.[24] A good example of such more fact-oriented approach was Hermann Kopp's *History of Chemistry*, which were valuable but could not solve the pressing issues facing historians of chemistry.[25] Bourgeois histories had a tendency to stop at the stage of fact collection. If historical explanations were provided, they tended to be superficial, incomplete, and idealistic, and carried the risk of failing to establish appropriate connections between events. With history of chemistry more specifically, the descriptive method manifested itself with a preoccupation with merely laying out materials in a chronological order, or the compilation of chronological tables, without displaying an interest towards developing deeper historical research. (This Kedrov associated with Max Bloch's approach especially.) Thus,

[20] On Kedrov's father and brother, see Hahn (1982) p.163. On Kedrov's activities, see Lektorskii (2005) pp.710-711. During 1936-1937, Kedrov acted as instructor at the science section of the Central Committee of the All-Union Communist Party of the Soviet Union (ZK VKP). In 1939, Kedrov gained two roles in the Academy of Sciences: he was the Head of the Department of the History of Natural Science at the Department for the Training of Scientific Personnel, and Professor of the Postgraduate Department. He also became Senior Researcher at the Institute of Philosophy of the Academy of Sciences in Moscow, the esteemed institution of the Party, which succeeded the Communist Academy's Institute of Philosophy after its dissolution in 1936, as noted in Aronova (2011) p.192.

[21] Bonifatii M. Kedrov, "Istoriya Khimii i Marksizm," *Sovetskaya Nauka*, **11** (1940) pp.27-47. Translations on Kedrov (1940), (1949) and (1968) are mine. Note that Kedrov (1998) is in English.

[22] Kedrov (1940) p.27-28.

[23] Kedrov (1940) p.28.

[24] Kedrov (1940) p.30.

[25] Kedrov (1940) p.27.

bourgeois histories took the establishment of chronological data not as a starting point of research but as its final goal.[26]

Another drawback with the descriptive method was its focus on the individual. In contrast, Marxist methodology placed greater emphasis on the development of "material basis" of society, especially how industrial production acted as a driver of scientific and technological production.[27] As the needs of industry could simultaneously nudge scientists in different countries towards solutions for shared problems, it was likely that if one scientist had not made their respective discovery, another individual would have discovered the same phenomenon or technology. For instance, if Marx or Engels had not formulated the materialist understanding of history, someone else would have done so. Similar points could be extended to the discovery of the periodic system. After all,

> [C]hemists in England, France, Germany and Russia almost simultaneously approached the discovery of the periodic law; if Mendeleev had accidentally interrupted his work before its completion, then someone else, most likely Lothar Meyer, would have still led it to the discovery of the periodic dependency of the elements, although perhaps not as boldly and coherently as Mendeleev.[28]

For Kedrov, the development of research was ultimately determined by practice. This point also applied to theoretical discoveries such as "the discovery of chemical atomism or the law of conservation and transformation of energy."[29]

In less than ten years, illustrating such points with reference to the achievements of Lothar Meyer became dangerous ones to have circulating around. (Subsequently, Kedrov himself came to attack others for giving Meyer's too much credit for the discovery of the periodic system.) At this stage, however, Kedrov's aim was to highlight that material factors, such as industrial production, were the drivers of scientific progress and could be felt in many locations, thus both enabling and explaining the phenomenon of multiple discovery. This went unnoticed in bourgeois historians' accounts due to their greater emphasis on individuals.[30] Excessive interest in the matters of priority was a marker of bourgeois histories:

> …[I]t is clear that questions of priority are of only purely personal interest to the historian of chemistry; critical history of science and technology is primarily interested in the concrete reasons that led to the emergence of a given discovery and its connection with the entire course of development of science; the question of which one of the scientists was the first to announce the discovery and therefore has the right to it is of completely secondary impor-

[26] Kedrov (1940) p.30.
[27] Kedrov (1940) p.32.
[28] Kedrov (1940) p.32. On the priority dispute regarding the discovery of the periodic system, see Michael D. Gordin, "The Textbook Case of a Priority Dispute: D.I. Mendeleev, Lothar Meyer, and the Periodic System." in M. Biagoli & J. Riskin (Eds.), *Nature Engaged:Science in Practice from the Reneissance to the Present*. (Palgrave Macmillan, 2012). pp.59–82.
[29] Kedrov (1940) p.32.
[30] Kedrov (1940) p.33.

tance.[31]

For Kedrov, bourgeois histories' tendency to dwell on priority followed from the "founding principles" of bourgeois histories — the organising narrative according to specific individuals and dates. This was not the case for truly critical history of science. There was no point in dwelling on whether someone like Lavoisier took credit for others' discoveries, but it was better to focus on what genuinely novel material Lavoisier — together with his predecessors and contemporaries — brought to science. The specific moments of prior discovery were not as significant as the ability to explain findings.[32]

Another major issue with the descriptive method had to do with the criteria for selecting facts. Instead of relying on objective criteria for distinguishing the most important relations and events from the broader mass of insignificant facts, it nudged towards utilizing subjective criteria.[33] This made historians "slide across the surface of the phenomenon", making it difficult to identify the general tendencies of the development of science from mere accidents.[34] Furthermore, bourgeois historians let nationalistic factors and class-interests guide which scientists they elevated in their accounts :

> In capitalist countries, the class sympathies of the bourgeois researcher — conscious or unconscious — become the criterion for assessing facts. Nationalist tendencies … are especially often manifested in this case. By inflating in every possible way the significance of the work of their compatriot, they clearly suppress the work of a scientist from another country, despite the fact that the role of this "foreign" scientist in the scientific discovery was, perhaps, decisive.[35]

The act of overlooking foreign researchers' contributions was illustrated with the English attributing the discovery of periodic law to John Newlands, and Lise Meitner titling Meyer the discoverer of the periodic law. In contrast, the works of Marx, Engels, Lenin, and Stalin were "imbued from the beginning to the end with the idea of internationalism, proving that science is international" and taught "how to expose and overcome the narrow nationalism of bourgeois historians".[36]

For Kedrov, the main task of historians of chemistry — like histories of any science — consisted of mapping the essence of phenomena, including the general laws of development of chemical thought, through identifying the internal connections and causes of events. This required going beyond mere facts towards finding explanations. Explanations, then, called for exploring history of chemistry with special attention to its internal logic and its driving forces, where Kedrov history of chemistry was a primarily history of contemporary chemistry, which gave the "key" for understanding its past developments. This process called for utilising the method of dialectical material-

[31] Kedrov (1940) p.34.
[32] Kedrov (1940) pp.34-35.
[33] Kedrov (1940) p.35.
[34] Kedrov (1940) p.35.
[35] Kedrov (1940) p.35.
[36] Kedrov (1940) p.35.

ism.[37]

3. Patriotic histories of science

In 1940, Kedrov strongly associated nationalistic tendencies in histories of science with the bourgeois descriptive method. Correspondingly, Kedrov praised Marxist methodology for encouraging more of an internationalist outlook. In this internationalist vein, Kedrov's subsequent book project highlighted Mendeleev's connections with British and American chemists. The book (*World science and Mendeleev : towards a history of cooperation of physicists and chemists of Russia (USSR), Great Britain, and United States*) was scheduled for publication in 1949, after Kedrov assumed the role of deputy director at the Institute of Philosophy in 1945. It received support from Sergei Vavilov, the president of the Soviet Academy of Sciences, who contributed a preface.[38]

Despite these favourable conditions, the book only saw daylight thirty years after its writing. In 1945, there were still toasts for "world science" at banquets, but this did not last long. Already in February 1946, Stalin outlined plans for the military preparation to gear up the Soviet Union for the next global conflict, noting that science would be a realm of international competition.[39] By 1946, the "zhdanovshchina" in music and art highlighted the leadership's worries that Soviet intellectuals were too influenced by the West, marking the intensification of the anti-cosmopolitanism campaigns of the 1940s-1950s.

Before the halting of Kedrov's "world science" book, he was elected the editor of the newly established *Problems of Philosophy* (*Voprosy Filosofii*) in July 1947.[40] The establishment of this journal was one of the outcomes of the second discussion concerning Georgii Aleksandrov's *History of Western European Philosophy* (1945), held in 16-25 June 1947. The first issue of *Voprosy* published the discussions concerning Aleksandrov's book.[41] In describing the process of putting together the second issue, Kedrov recalled a confrontation with Trofim Lysenko, who paid a visit to the offices of the journal, demanding that the journal affirmed the correctness of his views and condemned those of "Morganists-Mendelians" (geneticists)."[42] Lysenko, angered by Kedrov's dismissive response, went to *Literaturnaya Gazeta*, which subsequently attacked the February 1948 issue of *Voprosy*. After the publication of the first handful of periodical's issues, the newly established philoso-

[37] Kedrov (1940) p.38.

[38] Bonifatii M. Kedrov, *Mirovaya nauka i Mendeleev. K istorii sotrudnichestva fizikov i khimikov Rossii (SSSR), Velikobritanii i SHA*. (Moskva, Nauka, 1983).

[39] Ethan Pollock, *Stalin and the Soviet science wars*. (Princeton University Press, 2006) p.3.

[40] Bonifatii M. Kedrov, "How Our Journal Arose," *Russian Studies in Philosophy*, **36**(4), (1998) : 6-21. https://doi.org/10.2753/RSP1061-196736046

[41] Zhdanov's aides provided Kedrov the full text relaying the philosophical discussions. Kedrov later recalled finding some of the "appended" speeches "totally inadmissible" including a critique of leading physicists. Kedrov's suggestion to omit these statements was ultimately approved by Stalin although initially he had demanded that nothing would get retracted in the name of demonstrating that the event had been "a completely free discussion" Kedrov (1998), pp.11-12.

[42] Kedrov (1998) p.17.

phy journal came under further criticism from the broader press and "high officials."[43]

The exchange was cited as one of the difficulties leading to Kedrov subsequently losing the editorship of the journal on the 6th of February 1949.[44] But before the meeting that ended his stint as the editor, there was another event of significance: in January 1949, Kedrov took part in the Academy of Sciences discussions concerning future directions for history of national science (istoriia otechestvennoj nauki). In this Leningrad meeting, envisaged as a setting to discuss methodology, general tendencies, and directions of history of science, Kedrov gave a presentation that emphasised the importance of patriotic histories of science.[45]

Contrary to the 1940 article, Kedrov's speech did not dwell on the descriptive method but attacked bourgeois histories of science more broadly. Contrasting bourgeois histories with Marxist history of natural sciences, Kedrov advertised that Marxist histories were rooted in a "firm scientific basis" of dialectical and historical materialism. They also focussed on mapping past developments to understand the contemporary position of science and its potential future developments. Such histories were also "imbued with Soviet patriotism," and they protected "the priority of our national scientists." They followed the principle of "partiinost" by working against reactionary ideology, bourgeois objectivism, and idealism.[46] Moreover, Kedrov argued that Marxist histories of natural science had to challenge bourgeois histories which involved the diminishment of Russian achievements and were marked by problematic terminology, lack of attention to the role of practice and industry, and broader societal developments.

In contrast to bourgeois histories, historical materialism demanded that historical data be examined in connection with the material conditions of the society. Concerned about the misrepresentations of the connections between science and industry on one hand, and theory and practice on the other, Kedrov noted that Engels, especially, criticised accounts where industry, practice, and technology were portrayed as something secondary and derivative, dependent on people's spiritual development. Much of the so-called "pure" science derived its purpose and materials from commerce, industry, and the work of people, and such practical activities determined its ultimate goals.

Kedrov noted that for Engels, the broader society was the driver of scientific progress. While bourgeois historians viewed that the progression of industry and technology was due to the level of scientific development, Engels argued that the development of science depended on technology and industry.[47] Writing history of science without due attention to general histories of society, technology, and industry resulted in what he viewed as the German tendency to write about sci-

[43] Kedrov (1998) p.19.

[44] Kedrov (1998) p.20.

[45] *Voprosy Istorii Otchestvennoi nauki : obshee sobranie Akademii Nauk SSSR 5-11 Janvarya 1949 g.* (Moskva ; Leningrad, 1949).

[46] Bonifatii M. Kedrov, "Nekotorye voprosy razrabotki Marksistkoj istorii estestvoznaniya," in *Voprosy Istorii Otchestvennoi nauki : obshee sobranie Akademii Nauk SSSR 5-11 Janvarya 1949 g.* (Moskva ; Leningrad, 1949), p.639.

[47] Kedrov (1949) p.643.

ence as if "it fell from the sky." Such histories ignored the main stimulus for the development and progress of natural science, resulting in accounts where science appeared to originate from nowhere or was a result of scientists' curiosity to uncover pure truths. Those conceptions were idealistic, firmly rooted among bourgeois historians of science.[48]

Similarly to his 1940 article, Kedrov considered individual-centric histories in this context. Although it was undeniable that science was conducted by people and this was reflected on the character and the tempo of its development, idealist historians erroneously concluded that the development of science wholly depended on genius scientists capable of discovering laws of nature. In contrast, Marxism-Leninism viewed that such individuals appeared to answer the requirements of practice, which were generated by their specific historical circumstances. It thus examined this question of the emergence of remarkable individuals "at the crossroads of necessity and accident".[49]

This point had repercussions for crediting individual scientists. Although Kedrov noted that right before the "technological revolution" of the 18th century demonstrated that the society's needs for technology became almost unbearable and spread to many countries, this gave no grounds for dissociating scientific discoveries from their authors and their respective nations:

> The participation of multiple people in this or that invention or discovery cannot be interpreted in the spirit of depersonalizing this invention or discovery, turning it into nobody's [discovery], rootless. On the contrary, the more complex and tortuous the history of a particular invention or discovery, the more acute the need to determine the contribution that representatives of different nations will make to this matter.[50]

"Real internationalism" did not grow from undervaluing the role of different nations and their discoveries, but from their acknowledgement. On these grounds, foreign scholars' attempts to take credit from discoveries made by "our" scholars could not be tolerated. Just as Mendeleev and Butlerov had the priority in their discoveries of the periodic law and theories of chemical structure, also the Russian priority in the discovery of steam engine was unquestionable, since almost a quarter century prior to James Watts, Ivan Ivanovich Polzunov (1728-1766) in Russia had discovered his "steam machine".[51]

After changing course regarding his earlier stance on the insignificance of questions of priority, Kedrov proceeded to discuss the views of especially Stalin and (recently deceased) Zhdanov on histories of science. Especially great danger was presented by "bourgeois objectivism", which could make investigations appear "strongly scientific" and "wholly objective" by presenting narratives as if they were conducted from the point of view of dispassionate facts that spoke for themselves,

[48] Kedrov (1949) p.643.
[49] Kedrov (1949) p.650.
[50] Kedrov (1949) p.651.
[51] Kedrov (1949) p.651. On the obsessive attribution of various discoveries to domestic practitioners, see Gerovitch (1998) pp.196-197.

averting anything to do with class war and ideology.[52] Kedrov concluded that Marxist historians of science ought to be primarily interested in history of advanced trends in natural science and especially history of the struggle against anti-scientific and idealistic tendencies. As a final touch, Kedrov put forward his vision for how histories of natural sciences ought to be written:

> Soviet, i.e. Marxist history of natural science must be written in the spirit of Soviet patriotism, in the spirit of the instructions of our party and its leader, Comrade Stalin. Only such a history can lay claim to be truly scientific and, at the same time, a truly partisan approach to illuminating the past; only such a history can help our Party, our people, to fight against forces hostile to us, seeking to tarnish, slander, and belittle our great Soviet people and their great past; only such a history helps Soviet people to win more and more new victories on their path towards communism.[53]

Shortly after these January discussions, Kedrov lost the editorship of *Voprosy Filosofii*. In his subsequent explanation of the conditions that led to the situation, recalled (by implication) his apparent opposition of Lysenko's Michurinist agrobiology and problematic interpretations of Lenin's unfinished works. Aside from these factors, he also recalled that his critics signalled out his dismissive views regarding the importance of priority disputes:

> Idle critics picked on a half-phrase in my book Engels and Natural Science that read: "I do not consider questions of priority essential for the history of science" and on this basis accused me of totally rejecting priority in science (…) This was followed soon by an oral comment by Stalin that I was wrong, that priority was very important for science and its history. It is well known how this question was inflated later on and to what sad consequences it all led.[54]

These earlier views regarding priority — alongside other factors — put Kedrov in a more vulnerable position. How should we take his comments regarding the importance of domestic achievements? And did the future developments of history of natural sciences follow the blueprint of this vision?

4. Revisiting methodology

In his study of the campaigns of late 1940s and early 1950s, Ethan Pollock (2006) has argued that Stalin's interest in science had to do with the idea that Marxism had a firm scientific basis.[55] In each of the "discussions" held in the course of the campaigns, politicians and scholars attempted to accommodate Soviet science and Soviet ideology.[56] This process included the search and the articulation of a "worldview" where canonical texts were made compatible with the latest scientific discoveries.[57] The campaigns also reflect a shift regarding sources of legitimacy for Communism. As Gerovitch has argued, in the late Tsarist and early Soviet period, science was one of the sourc-

[52] Kedrov (1949) p.659.
[53] Kedrov (1949) p.662.
[54] Kedrov (1998) p.20.
[55] Pollock (2006) p.3.
[56] Pollock (2006) p.8.
[57] Pollock (2006) p.213.

es of legitimacy for Communist ideology. The roles reversed, however. Once the Communist ideology was in a more secure and powerful position, scientists had to appeal to ideology for securing the legitimacy of science.[58]

Philosophers played a role in this process of legitimisation. Although initially in the 1930s, philosophers translated scientific theories into political language (and vice versa), the beginning of the Cold War shifted this situation somewhat.[59] As the need for social scientists with the skillset to analyse and interpret the new situation grew greater, philosophers were given a central role in this battle on the "ideological front": to criticize Western ideas and articulate "compelling visions of Soviet modernity".[60] This had an impact on histories of sciences, too: many historians steered away from interpretative works and focussed instead on more "factological" or "textological" approaches, such as publication of primary source materials.[61]

It was this tendency towards facts freed from further discussion that was in Kedrov's mind when he revisited the topic of methods of histories of science once he had taken the helm of the director of IHST, the successor of IINT that had been disbanded in 1938 and re-established in 1945.[62] In a long essay titled "On the Marxist history of natural sciences", Kedrov drew attention to two distinct extremes in Marxist histories.[63] The first extreme consisted of the "empirical retelling that downplays theoretical generalisation" whereas the second involved "naked philosophising about history of science". This latter approach tended to indulge in abstract schemes derived from some general philosophical positions and include a handful of superficial examples from history of science. For Kedrov, both approaches prevented the correct development of Marxist history. This called for revisiting the question of "how the Marxist development of the history of natural science should be understood and how it should be conducted."[64]

Kedrov argued that Marxist history differed from the mere description of facts and events in that it looked for their real causes and provided scientific explanations of the established facts.[65] Such explanations could be achieved not by taking the facts "in isolation from one another" or "in the form of their chaotic listing" but one had to reveal their internal connections and the ultimate reasons that gave rise to them.[66]

[58] Slava Gerovitch, *From newspeak to cyberspeak. A history of Soviet cybernetics*. (Cambridge Mass, London: The MIT Press, 2002), p.29.

[59] Gerovitch (2002) p.26; Aronova (2011).

[60] Aronova (2011) p.183.

[61] Gerovitch (1998) p.199. Aronova (2011) p.194.

[62] By the 1960s, when Kedrov was appointed as its director, IHST had merged various other commissions to form a single institute which had a branch in Leningrad but was located in Moscow. See Aronova (2011) pp.189-190.

[63] Bonifatii M. Kedrov. (1968). "O Marksistskoi istorii estestvoznaniya," in *Bonifatii Mikhailovich Kedrov: Ocherki, Vospominaniya, Materialy*. Ed. V. A. Lektorskii. (Moscow: Nauka, 2005), pp.111-150.

[64] Kedrov (1968) p.113.

[65] Kedrov (1968) p.113-114.

[66] Kedrov (1968) p.114.

Facts could be laid out and described from any point of view, where their selection, grouping, and accompanying explanations were indicative of the author's viewpoint. For example, a purely empiricist approach involved refraining from giving any explanations. Vulgar materialism explained facts with technology and industrial production only, reducing them

> [D] irectly to the demands of technology, production, practice, and, as a rule, only this alone ; in such case, we will not find a serious scientific analysis of the connection between science and production, or practice, but solely a bare reference to the fact that allegedly everything that arises in science is caused by the needs of practice, that there are and cannot be no other causes here.[67]

For Kedrov, vulgar materialism did not adequately recognise that the relationship between science and industry was a two-way street: science could impact production and industry.[68]

In contrast to vulgar materialism and purely empiricist approaches, "[t]he ideological orientation of work on the history of science is manifested not at the stage of collecting facts, but when the researcher, guided by the Marxist method, proceeds to their theoretical generalisation and begins to look for the causes of the phenomenon."[69] In this context, Kedrov introduced his programmatic claim for historians of science. Marxist history of science required raising histories from "the empirical, descriptive level, at which they were conducted mainly until recently, to a higher, theoretical level, the core of which is the generalisation of historical, factual material, and the scientific explanation of historical and scientific events."[70] This suggests that Kedrov still adhered to his main diagnosis of 1940: the methodological issues lay more with the descriptive scholarship, not at the wild philosophising of the "second extreme."

In Kedrov's subsequent elaboration of this programmatic claim, Marxist history of science, at its best, provided histories that sought to transcend individual facts by identifying their underlying connections and providing explanations. This process of explaining included tracking the dialectical process of movement between abstract and concrete ; movement from qualitative to quantitative ; tracing the connection between industrial production and scientific knowledge while maintaining a separation between external conditions of science and its internal developments. Although each of these aspects would warrant a discussion, it is especially worth zooming into Kedrov's views regarding internationalism. For Kedrov, there existed a "relationship between the international moment in the development of science and the national frame in which any science actually exists and develops in individual countries." In this relationship, international science acted as a "logical generalisation" that summarised the results of scientific activities from all countries by stripping away all the subjective and extraneous material.[71]

Although "world science" in this sense was an "abstraction", Kedrov was careful to note that

[67] Kedrov (1968) p.115.
[68] Kedrov (1968) p.115.
[69] Kedrov (1968) p.116.
[70] Kedrov (1968) p.117.
[71] Kedrov (1968) p.148.

specific hypotheses, theories, concepts, and laws of nature did not bear any kind of a "national imprint" of the country of their creation. Despite this, it was crucial not to ignore the fact that ideas in science were the result of "concrete activities of concrete individuals". On these grounds,

> Without the history of these countries … it is impossible to understand how those constituent elements are developed, which are then included in the system of universal knowledge called world science. Consequently, here, the problem of the relationship between the international and the national in the development of scientific knowledge arises, which ultimately represents a concretisation of the same problem of interaction between two sides of historical and scientific development — material and logical and, accordingly, two strict principles of the Marxist method — historical—materialistic and dialectic—logical …[72]

These messages invited a reconsideration regarding notions of priority. The significance of priority questions emerged from the fact that there was a "competition between two world systems" of capitalism and socialism. Although the priority in space exploration and the peaceful use of atomic energy were indicative of the superiority of the Socialist system, dwelling on this was somewhat problematic as "in the hands of individual chauvinistic historians, they [questions of priority] often become weapons of nationalist propaganda".[73] The challenge for historians, then, was to "objectively determine the contribution to world science that has been made by representatives of various peoples and nations". To achieve this end,

> The extreme complexity and intricacy of the history of individual discoveries should be kept in mind, since in fact many scientists belong not to one, but to different nations … With a formal approach to this issue, priority, and therefore authorship in discovery, is attributed to the one who put forward a similar idea before others; In this case, priority, and along with them, authorship, can be mistakenly attributed not to the one who in fact made the discovery in question, but to the one who vaguely guessed about it before others.[74]

Again, Kedrov maintained that priority could not automatically be assigned to the person who made the first stabs at discovering something significant. Scientific discoveries were "rarely made immediately". Instead,

> usually the first heralds do not have time to convince of the truth of what was found, time calls forth a real creator who has all the means to bring the truth into universal consciousness; However, we must not forget that it can only appear thanks to the work of many and the accumulated amount of data.[75]

Only those who made radical revolutions in the views of other practitioners — their peers — could be considered the true author of the discovery.

It is worth noting that this essay of 1968 dealt with the relationship between philosophy and his-

[72] Kedrov (1968) p.148.
[73] Kedrov (1968) p.149.
[74] Kedrov (1968) p.149.
[75] Kedrov (1968) p.149.

tory of science most explicitly of the three methodological essays. In particular, Kedrov noted that "it is often asked" whether the challenge of providing a dialectical treatment of history of science and technology must be solved by a philosopher or a historian of science. The imaginary opponent here would maintain that it was the historian who must find, collect, and then present facts. This invited the following concern : "Here we are talking about a dialectical, therefore, seemingly purely philosophical treatment of the history of science, and this is no longer the job of a historian of science, but of a philosopher."[76]

For Kedrov, posing such a division of labour appeared a result of a misunderstanding. He argued that it would be naive to think that historians would only provide the factual material and a philosopher would then arrive to generate generalisations. After all, history, like all sciences, did not just present an empirical or factual part, but also had a theoretical component. Only historians of science, as specialists in their field, could truly provide explanations of their material. For Kedrov, providing such explanations was not a matter of leaving behind history and turning into a philosopher, but becoming a "true Marxist scholar, solving not only the tasks of collecting and publishing historico-scientific material, but also its theoretical generalisation, its theoretical explanation."[77]

5. Similarities and differences

Alexander Vucinich argued that only a small part of the output of historians of science in Soviet Union has been "cast within the framework of carefully and consistently elaborated Marxist theory."[78] Kedrov's methodological essays on history of chemistry and natural science, however, represent a series of attempts of formulating such a theory. For Kedrov, histories had to move beyond the presentation of mere facts towards providing deeper explanations that paid appropriate attention to industry and technology, without forgetting that science, too, could impact them. Such explanations required reliance on the dialectical method and exploring the relationship between material and logical, movement between abstract and concrete, and qualitative to quantitative.

Crucially, Kedrov's articulations of the Marxist method to history was achieved with the help of a contrasting foil. Initially, in 1940, the foil was the descriptive method employed by bourgeois historians. Instead of providing objective criteria for selecting facts and events for historical narratives, the descriptive method nudged historians towards subjective ones, inviting individual-centric, idealistic histories of science. By January 1949, the descriptive method gave way to the broader problem of bourgeois, foreign, histories that diminished Russian and Soviet achievements. This helped to highlight that Marxist histories appropriately paid attention to the role of industry and broader society in tracking the development of science (without not forgetting to promote domestic achievements.) Drawing on the ideas of political figures such as Zhdanov (whose son was

[76] Kedrov (1968) p.136.
[77] Kedrov (1968) p.137.
[78] Alexander Vucinich, "Soviet Marxism and the History of Science," *Russian Review* 41 (1982). pp.123-42 ; on p.123.

Kedrov's student) and Stalin, Kedrov's 1949 essay demonstrates how his arguments adapted to the prevailing political situation. This conforms to Gerovitch's analysis that Soviet scholars employed a variety of "discursive strategies" — ways of speaking, writing, and arguing — that adapted to the prevailing political situation, thus guiding the ideological discourse for their benefit by adopting the language of their patrons.[79]

By the 1960s, the initial foil had split into a two-fold point of contrast: an empirical and a theoretical extreme, although it remained the former that got the most press. At this stage, Kedrov reiterated that Marxist histories sought for deeper explanations that acknowledged that industry influenced science but criticized "vulgar materialism" that viewed science solely as a product of the needs of industry and production. This problematic-deemed position, which Kedrov appears to have promoted in the essays of 1940 and 1949, could had served a useful purpose, though. With its emphasis on the influence of societal causes on the development of science, it hinted at the circumstances of the author who had to distance himself from his previous position regarding the limited significance of priority matters.

The matter of priority retained its significance to the sixties, where at this time, it derived its importance from the contest between capitalism and socialism. This message was juxtaposed with one emphasising the importance of "world science", which was an abstraction of the respective contributions of individual scientists working in their specific national settings. Similarly to the problem of the relationship between material and logical, the interactions between the development of science in a national level and "world science" was a problem worthy of philosophical consideration. When it came to specific discoveries, these were not individual moments that could be easily identified, but something that developed over a long time. The credit for the ultimate discovery could only be given to the person who succeeded at articulating or revealing the ultimate truth underlying it to their colleagues, just as Mendeleev had done with the periodic law.

Finally, it should be stressed that the staples of Marxism did not pave the way for only one kind of methodology. Many kinds of schemes could be given with a reference to its central works. This is exemplified by Kedrov's colleague Bykov's methodological discussion given in a co-authored book on Stanislao Cannizzaro, published after the issuing of Kedrov's 1968 essay considered above.[80] A chapter written by Bykov contains a substantial discussion on the value of "historical method" for theoretical chemistry. Starting with a recollection of the 1950s campaign against idealism in structural theory in organic chemistry,[81] which also featured discussion on the history of resonance theory, Bykov noted that this occurred only after the theory had lost its significance. Furthermore, since those taking part in the "heated discussion" had only a "rather vague" idea of

[79] Gerovitch (2002) p.12.

[80] Bykov (1972).

[81] *Sostoyanie teorii khimicheskogo stroeniya v organcheskoj khimii. Vsesoyuznoe Soveshanie 11-14 iyunya 1951 g. Stenograficheskii otchet.* (Moskva, Izd. Akademii Nauk SSSR, 1952). Kedrov's presentation and Q&A is on pp.308-320.

the emergence of the resonance theory, concrete historical analysis was substituted with "arbitrary schemes", "as always in such cases".[82]

Kedrov, as one of the many presenters of the meeting, appears to have been at the receiving end of Bykov's critique. However, especially significant is how Bykov spelled out his understanding of methodology of history of science, which differed from the picture provided by Kedrov :

> Since in theoretical chemistry the repetition of situations of this kind seems quite natural, the significance of the historical method as a means of overcoming crisis phenomena cannot be underestimated. Lenin's instruction to "look at every question from the point of view of how a certain phenomenon in history arose, what main stages in its development this phenomenon passed, and from the point of view of this development, look at what this thing has now become", can serve as a methodological basis for this kind of historical research in the present and future. And in the fulfilment of this mission one can see one of the main tasks of historians of chemistry, professionally mastering the methods of research in their field.[83]

In contrast to Kedrov's explanatory emphases, Bykov maintained that the primary task of historians was to map out the development or the genesis of the phenomenon of interest, where he explicitly stated that this was a future task for historians.

Methodological reflections, as prescriptive evaluations, are not only retrospectives on how research had been conducted, but can express their author's wishes regarding how scholarship ought to be conducted in the future. They may be taken as expressions of hope regarding the future of the field. Although there are clear cases where they can be taken as a prescription regarding scholarship, there are conditions where they are best taken as a means for securing a future for an individual scholar or for their field. Such expressions are not necessarily directed at an audience of scholars and colleagues, but the patrons of the field, making them vehicles in the process of attempting to secure their favour. Discerning which methodological ruminations are directed towards whom is not always straightforward. However, comparing and contrasting methodological critiques and proposals from different points of time allows to look for aspects that are more stable in these visions.

[82] Bykov (1972) p.83.
[83] Bykov (1972) pp.83-84.

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