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Projecting Chemistry in Lomonosov's Russia (1741–1765)*

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▼ **ABSTRACT** This paper describes the projecting career of a polymath, academician, professor of chemistry, and "father of Russian science" Mikhail Vasil'evich Lomonosov (1711–1765). Hitherto, scholars have treated Lomonosov's scholarly career as primarily motivated by a disinterested quest to bolster the sciences in Russia. This paper argues that Lomonosov's promotion of chemistry at the Imperial Academy of Sciences and the Russian court was inextricably tied to his entrepreneurial ambitions as a projector. Examining selected examples of Lomonosov's projects and projecting strategies, this paper shows how projects contoured his orations, odes, and scholarship, and in doing so underscores the centrality of projects to the crystallization of Russia's popular scientific culture and discourse, and the development of chemistry as an academic discipline.

▼ **KEYWORDS** Mikhail Lomonosov; 18th-century Russian chemistry; projects; patronage; serfdom

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* Portions of this paper previously appeared in my dissertation. See Ullman, "From the Workshop." Unless otherwise noted, all translations are my own.

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BREPOLS

On March 6, 1754, professor of chemistry and academician at St. Petersburg's Imperial Academy of Sciences Mikhail Vasil'evich Lomonosov (1711–1765) penned a belated letter to mathematician Leonhard Euler (1707–1783), sharing with his "esteemed" colleague some fortuitous news:

> On December 16 of the same year [1752], by the resolution of the Governing Senate, I was granted a thirty-year privilege to manufacture [mosaics] and other similar goods from colored glass, exclusively, and was given 4,000 rubles for the establishment of a workshop … The Most Gracious Empress bestowed upon me in Ingria 226 peasants with 9,000 jugers of land, so that I have sufficient fields, pastures, fishing spots, and abundant forests.[1]

Lomonosov and Euler were not frequent interlocutors; their acquaintance, like the contents of their letters, was scholarly, not personal. Did a private factory for colored glass fall under the purview of scholarly activities? Lomonosov seemed to think so. After all, it was in his capacity as a chemistry professor that he lobbied Empress Elizabeth (*r.* 1741–1761) and her Senate to support the venture.

Lomonosov's pivot to private industry was not a natural outcome of a fruitful research program, however. Academicians were paid to research, teach, and occasionally advise the state, not commandeer private manufactories. But as an adept projector, someone who pitched lucrative ventures in the service of the commonweal, Lomonosov made it appear as though a private factory was a logical culmination of his research program, pursued from the onset for the greater good of the Russian realm.

The colored glass factory was just one among many ventures Lomonosov proposed throughout his professional career: others included the construction of a chemical laboratory, the manufacture of Prussian blue pigment, the launch of a popular scientific journal (*A Monthly Journal*), the creation of an academic town, the founding of brick factories, and even a colonial expedition to the East Indies.[2] Like many projectors of his time, he also dabbled in social and economic reform, drafting proposals to stimulate population growth, enlighten the peasantry, and improve agriculture.[3]

And yet Lomonosov's activities as a projector have gone unnoticed by historians. This oversight stems from multiple factors, all of which seem to converge on political and cultural aspects of his legacy. In the nineteenth century, as the Russian Empire moved to align itself with major European powers, culturally and economically, Russian intellectuals sought to carve out a place for Russian thinkers in the pantheon of European civilization.[4] Lomonosov was

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1 Lomonosov, *Polnoe sobranie*, 10:500–503.

2 Ibid., 10:194–98, 216–18, 498; 6:417–506; Chenakal et al., *Letopis'*, 241–42, 304; Biliarskii, *Materialy*, 671–73.

3 Lomonosov, *Polnoe sobranie*, 6:381–403.

4 Radishchev, *Journey*, 232–48; Odoevsky, *Russian Nights*, 254; Pushkin, *Polnoe*, 11:31–33, 225–27, 230.

clearly a great thinker, but how great and what kind? As a polymath, he worked across a dizzying array of disciplines from natural philosophy and chemistry to geology, geography, oceanography, mining, literature, fine arts, and higher education. He even co-founded Moscow University (1755), Russia's first. His intellectual range was undeniable, but it also often limited his engagement with a given discipline, including chemistry, the very field in which he held a professorship.[5] Moreover, as chemistry and physics advanced, his scientific contributions came to seem outdated.[6] Thus, nineteenth-century commentators celebrated him less as a scientific visionary and more as an enlightener, educator, and "father of modern Russian language"—an honor he eventually ceded to Aleksandr Pushkin (1799–1837).[7]

With the rise of the Soviet regime, Lomonosov's scientific legacy received renewed attention. It was the Soviets who decisively enshrined Lomonosov as the "father of Russian science," crediting him with the confirmation of the law of conservation of matter, the conception of heat as the rotatory motion of insensible particles, the discovery of Venus's atmosphere, the invention of a single-mirror reflecting telescope and night-vision tube, and the demonstration of the similarity of properties of mercury to other metals.[8] Several factors contributed to this reassessment. In the early twentieth century, newly uncovered archival materials revealed the full scope of Lomonosov's scholarly output. The Soviet regime, for its part, favored personalities who disrupted social hierarchies, and Lomonosov, born into an illiterate peasant family of merchant fishermen, fit the mold. He defied both familial expectations and social conventions to become not only a natural philosopher but also the first Russian-born member of the Imperial Academy of Sciences. Lomonosov even assisted the future curators of his legacy. In his papers, he cultivated a Baconian persona of a tireless promoter of natural sciences, portraying his kaleidoscopic interests as auxiliary to his labors in chemistry and physics.[9] Thus, layers of scholarly commentary have obscured the interlacing of Lomonosov's career in chemistry with his ambitions as a projector.

This paper considers Lomonosov's activities as a projector, arguing that projecting was central to both the launch of his career in chemistry and the pursuit of his industrial ambitions. Scholars have yet to examine his chemical

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5 Pekarskii, *Istoriia*, 2:447–48.

6 Leicester, "Introduction," 40.

7 Pushkin, *Polnoe*, 11:31–33; Radishchev, *Journey*, 232–48; Odoevsky, *Russian Nights*, 254; Usitalo, *The Invention*, 167–74; According to Usitalo, Lomonosov's reputation as the "father of Russian science" was forged in the late eighteenth century and continued into the Soviet period, when it was merely reinforced. See Usitalo, *The Invention*, 20–21, 128, 205, 246. Like Leicester, I give more weight to the commentaries of Radishchev, Pekarskii, and Biliarskii on Lomonosov, and depart from Usitalo's analysis for the nineteenth century.

8 Leicester, "Introduction," 11, 41; Menshutkin, *Lomonosov*; Usitalo, *The Invention*, 246; Shiltsev, "Mikhail Lomonosov."

9 Ospovat, "Lomonosov Writes"; Gordin, "Lomonosov."

laboratory, research, or factory through the lens of projecting.[10] Yet, as this paper will show, Lomonosov secured approval for the construction of a chemical laboratory through the deployment of effective projecting strategies. Once his laboratory was operational, projects continued to animate the substance of his research, culminating in his mosaics factory at Ust'-Ruditsa.

Lomonosov used a tapestry of strategies to realize his projects, the most potent of which was rhetorical. He artfully peppered his orations and odes with his latest ventures, having recognized that to secure imperial permission and resources to run a private enterprise as an academician, he needed to persuade the Empress and her grandees that chemistry was vital to the prosperity of the Russian realm. This meant promoting chemistry as the science of empire-building. Given the nascency of Russia's popular scientific culture, his rhetorical efforts not only served his ambitions but also helped crystallize that very culture. It was also in the course and as an outcome of his projecting that he formulated the first program for the study of academic chemistry in Russia, "Physical Chymistry" (*chymiae physicae*), proving that projecting was not only a hobbyhorse of profit-seekers and parvenus but could also be an epistemically generative exercise. In the mid-eighteenth century, Lomonosov's Wolffian synthesis of "Physical Chymistry" offered a promising experimental framework for the study of chemical principles (first-order constituents of mixed bodies)—still mostly considered beyond the reach of chemical inquiry at the time.[11]

Lomonosov was not publicly labeled a "profit-seeker" (прибыльщик), a derisive moniker often lobbed at Russian projectors. Even so, tacit accusations of self-enrichment, a decidedly unbecoming pursuit for an academician, were circulating at court, and with some justification. One of his factory's enduring legacies was the receipt of 211 serfs, first in stewardship, then as hereditary ownership. Soviet scholars were the first to problematize Lomonosov's reliance on serf labor, but they pulled their punches. Eager to safeguard a cherished cultural icon, they devoted disproportionate analytical energies to rationalizing rather than scrutinizing his motivations. In doing so, they failed to notice how Lomonosov deftly intertwined paternalism with scientific ambition and practical factory needs to propel the Lomonosov clan into the ranks of the landed gentry. To that end, this paper draws on the main themes of the special issue, such as risk and violence, to argue that Lomonosov's insistence on serf labor over hired labor was not a reflection of cultural norms but a calculated choice that secured wealth and lasting privileges for himself and his family.

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10 Luk'ianov, *Istoriia*, 1:437–49; Figurovskii. *Istoriia*, 1:354–58; Bezborodov, *Lomonosov*; Raskin, *Khimicheskaia laboratoriia*; Crease and Shiltsev, "Founding"; Menshutkin, *Lomonosov*; Leicester, "Lomonosov"; Shelkovnikov, "Russian Glass"; Danilevskii, *Lomonosov*; Makarov, *Khudozhestvennoe nasledie*; Werrett, "Enlightened Icons"; Werrett, "Green is the Colour."

11 Lomonosov, "Introduction."

European and Russian Projectors

"All men are projectors," opined political economist and serial projector Johann Heinrich Gottlob von Justi (1717–1771), for "a project is [merely] a detailed draft of a certain endeavor intended to promote our own or others' temporal happiness."[12] Justi likely cast too wide a net, but in doing so, he also aptly captured the ubiquity of projectors and projects in the eighteenth century. The archetype of a projector as a public figure who proposed projects that served public and private interests crystallized in England in the seventeenth century, becoming a pan-European phenomenon in the eighteenth century.[13] In European and Russian contexts, projectors were united by an enterprising spirit that they packaged in a promise to alleviate social ills while lining their investors' pockets. Yet they were also regarded with suspicion, as many of their projects failed, but not before incurring spectacular financial losses shouldered by their investors, typically princely rulers and men of state.[14] Recent works on projectors have yielded some fascinating insights into the epistemic consequences of projecting. Through a critical study of German projectors, their promises to apply academic rigor to revamping industries essential to princely treasuries, and the slew of failed projects that inevitably followed, Andre Wakefield has shattered the seemingly ordered façade of cameralist science.[15] More recently, Vera Keller has narrated an entangled history of Early Stuart projectors and, like Wakefield, has exploded the traditional narrative of early modern science, which continues to credit the emergence of early scientific experimental culture to gentlemanly codes of conduct, rooted in polite conversation and disciplined stoical reasoning. Instead, Keller has shown that "European men of science did not produce their new form of knowledge because they had disciplined themselves," but rather because "they improvised by disregarding discipline and boundaries and triumphantly seizing both intellectual and material resources from elsewhere."[16]

Like much of Europe, eighteenth-century Russia attracted its share of projectors. Under Peter the Great (*r.* 1696–1725), Russia offered enterprising personalities boundless opportunities to capitalize on the sprawling resource-rich empire ostensibly starving for European knowledge. Experts and charlatans alike flooded St. Petersburg, hawking their skills and schemes to well-meaning but unprincipled nobles and parvenus, who in turn owed their fortunes to the whims of the Tsar. Social critic and historian Prince Mikhail Mikhailovich Shcherbatov (1733–1790) described one especially brazen projector as a "voluptuous," "corrupt" monster, whose schemes drained the

12 Justi, *Neue Wahrheiten*, 5:536.

13 Keller and McCormick, "History of Projects," 430–33, 435–42.

14 Defoe, *An Essay*, 1–18; Johnson, *A Dictionary*, vol. 2, entries on "Projections" and "Projector"; Fedyukin, *Enterprisers*, 16–18.

15 Wakefield, *The Disordered Police State*.

16 Keller, *The Interlopers*, 30.

royal treasury and "brought poverty and sickness among the people."[17] The subject of Shcherbatov's ire was none other than Count Petr Ivanovich Shuvalov (1711–1762), a Russian senator, Empress Elizabeth's confidant, and Lomonosov's patron. According to a contemporary, Count Shuvalov had set up something of a project mill that he operated out of his lavish St. Petersburg apartments, churning out hundreds of projects, "some of which were intended to augment the revenues of the treasury, at least on paper, by millions of rubles; other projects were intended to top off the Count's private income."[18] Many found Shuvalov's insatiable appetite for cash odious, but for Shcherbatov, Shuvalov's greatest sin was "not the harm he had caused but the example he set for others to follow."[19]

Igor Fedyukin offers the most effective treatment of Russian projectors to date.[20] Through the select study of Russia's educational institutions, Fedyukin has compellingly argued that the flowering of schools in eighteenth-century Russia was not the outcome of top-down legislation but instead had come about through the initiatives of private individuals, whom he calls "administrative entrepreneurs," dubbed at the time "profit-seekers" (прибыльщики) or projectors.[21] Fedyukin sorts Russian projectors into three types: the "expert," the "minister," and the "functionary." Of the three, the expert was the most emblematic type of projector, who leveraged his/her expertise to propose to set up a new enterprise or to draft a new procedural protocol for an existing institution. The format of these proposals was fluid; some were drafted and pitched casually in letters and memos, others were composed and presented formally to state bodies. Expert projectors tended to be foreigners, or Russians who were either educated or spent time abroad and were thus familiar with foreign practices. They usually proposed projects that did not meet the monarch's expressed needs but rather claimed to have located a critical problem unknown to the government that they could solve. According to Fedyukin, these experts were often "social and administrative outsiders, and in a sense, it was their very marginality that forced them into the role of the expert."[22] Because of their unstable social identity, they had to rely on a patron who would act as a conduit to the corridors of power and help secure the monetary resources to realize their projects.

The projector models within both European and Russian contexts fit Lomonosov. He was Russia's first indigenous professional natural philosopher, who used his platform as a natural philosopher to opine on subjects and topics outside of his disciplinary purview, from rhetoric to industry, fine arts, and

17 Shcherbatov, *Corruption*, 209–21.
18 Danilov, "Zapiski," 2:54.
19 Shcherbatov, *Corruption*, 206.
20 Fedyukin, *Enterprisers*; for earlier treatment of Russian projectors, see Pavlov-Silvanskii, *Proekty*; and Miliukov, *Gosudarstvennoe khoziaistvo*.
21 Fedyukin, *Enterprisers*, 17–21.
22 Ibid., 22.

social reform. As an experimental philosopher, Lomonosov was an intellectual heir to the Early Stuart projectors, especially since he styled himself after their most celebrated personality, Sir Francis Bacon (1561–1626).[23] Yet he did not quite resemble typical Early Stuart projectors, who were high-born, moneyed, and professionally unaffiliated, which eased their access to powerbrokers and fed into their unrestrained impulse to transgress boundaries, especially disciplinary ones.[24] As a trained chemist, Lomonosov was an "expert" and thus an archetypal Russian projector. He was a social outsider, having descended from a family of free peasant fishermen (крестьян-помор), albeit relatively prosperous, from northern Russia. He possessed a skill set that he acquired during his educational sojourn in Germany. When framing his projects, he always insisted that they were critical to the prosperity of the Russian realm, an opinion the Empress did not always share. Finally, he had come under the protection of a powerful patron, Ivan Ivanovich Shuvalov (1727–1797), who brokered his interactions with the Empress and introduced him to a wider circle of powerful statesmen, who helped realize some of his projects.

Fedyukin calls his projectors "administrative entrepreneurs," suggesting that the categories of projector and entrepreneur were fluid. To some extent this analysis is correct. All projectors were entrepreneurs, but not all entrepreneurs were projectors, at least not in Russia. A struggling entrepreneur had to meet a higher threshold of proof to justify the state's assistance, such as attestation of personal capital investment, coupled with evidence of the productive potential of his operations.[25] A projector, however, relied on his expertise or insight into a given area and promises, usually unsubstantiated, that his project would yield some benefit to the state.

Lomonosov's Projects and Projecting Strategies

Lomonosov began projecting shortly after he had returned from his studies abroad and taken up the post of a physics adjunct at the Imperial Academy, in the summer of 1741. He had spent the previous four years studying in Germany under philosopher Christian Wolff (1679–1754) and chemist Johann Henckel (1678–1744). Lomonosov must have recognized the potency of projecting practically on arrival, but it may also be that he deployed the rhetoric of projecting so early on because the Imperial Academy spoke the language of projects.

According to its legislative edict, the Imperial Academy of Sciences was conceived as a scholarly institution whose chief duties were to educate Russian students and future scholars, disseminate the natural sciences among the

23 Ospovat, "Lomonosov Writes"; Gordin, "Lomonosov."
24 Keller, *The Interlopers*, 62–90.
25 *Polnoe sobranie zakonov*, no. 9693, 13:170; no. 9487, 12:846.

public through assemblies and translation initiatives, and advance knowledge through original scholarship.[26] Yet, as Michael Gordin and Simon Werrett have compelling argued, as a brainchild of Peter the Great, the Imperial Academy's true purpose was to model European civility and cameralist "good order" through pedagogy, public lectureships, and original scholarship.[27] More recently, Alexander Iosad has urged us to reconsider the Academy within the original framework in which it was conceived: as a project. After all, the legislative edict literally termed the institution a "project."[28] The Academy's identity as a project was further reinforced by its self-governance: it answered only to the monarch. In principle, this independence was attractive; in practice, it plunged the institution into a perennial state of uncertainty, since royal patronage became crucial to its survival. To survive and thrive, the Academy had to demonstrate its utility ("польза") to the monarch and the common good it served by engaging in extra-scholarly activities, such as proffering practical expertise to the state, maintaining a popular publication outlet to promote its vision of natural sciences, and glorifying the monarchical rule by curating its displays of power. Thus, we ought to keep in mind that when Lomonosov spoke of utility, common good, and import substitution, he was also actively mirroring the Academy's project identity and its broadly cameralist trajectory.

Chemical Laboratory

The first project Lomonosov pitched concerned the construction of a chemical laboratory on the grounds of the Academy. According to Fedyukin's criteria for expert projects, a chemical laboratory fell within the category of "setting up a new enterprise." It further aligned with other expert projects, in that the authorities did not think one was needed. Before Lomonosov, the absence of a laboratory was not disruptive to the study of chemistry at the Academy, as its only chemist, Johann Georg Gmelin (1709–1755), had abandoned the science for natural history—although Gmelin's decision was also partly motivated by a lack of a laboratory.[29]

For Lomonosov, as a budding chemist, the absence of a laboratory proved acutely intolerable. Between January 1742 and December 1745, he tabled six proposals for a laboratory, of which five are extant. If we were to consider his proposals cumulatively, he justified the need for a laboratory using six premises: (1) to realize the expense of his chemical training; (2) to enrich the study of chemistry, natural philosophy, and natural history of minerals; (3) to instruct students; (4) to improve the arts; (5) to justify the employment

26 Ibid., no. 4443, 7:220–24.

27 Gordin, "The Importation"; Werrett, "An Odd Sort," 64.

28 Iosad, "'Sciences Strange and Diverse,'" 70–74.

29 Pekarskii, *Istoriia*, 1:432–33; professors or adjuncts who wanted to perform chemical experiments used either the physics cabinet or other laboratories across the empire. See Sigrist, "The First Generation," 15; Werrett, "Green is the Colour."

of a chemistry professor at the Academy; and (6) to honor and benefit the Fatherland through the study of nature by chemical experimentation.[30] Lomonosov's efforts paid off only in July 1746, when Empress Elizabeth intervened to approve his request. Even so, not a single brick was laid until August 1748, and the laboratory was not even operational until the winter/spring of 1749. For the speedy realization of projects, patrons were indispensable, and Lomonosov was without one until the spring/summer of 1750.

A laboratory was key to jumpstarting Lomonosov's projecting career, since after its founding he pitched three projects in short succession: Prussian blue, colored glass, and mosaics. We could conclude that as well as serving as his first project, a chemical laboratory also created the necessary condition (a situation) for further projecting, akin to his decision to specialize in chemistry. After all, chemistry was a science conducive to projecting, as it yielded both epistemic insights and marketable commodities.[31] With that said, one needed space and technologies to experiment, thus Lomonosov's projecting career stalled until his first project was realized.

Prussian Blue

Lomonosov took to his new laboratory in earnest, performing a flurry of experiments on dyes, pigments, enamels, and colored glass. This burst of activity paid off quickly. Within seven months, he informed the president of the Academy, Count Kirill Grigor'evich Razumovskii (1728–1803), of having discovered how to make a cheaper variant of the Prussian blue pigment. Lomonosov's letter to Count Razumovskii, penned in January 1750, resembled the style and contents of his laboratory proposals—that is, it was drafted in a series of numbered paragraphs and related the motivations for his research concentration, his discoveries, and their practical application beyond the Academy:

> Professors should strive not only for theoretical discussions but, above all, for tangible benefits to society and the advancement of the arts… thus, for the greater good, I decided to search for such products that are of need to artists and are imported from other regions at a high price … I sought out the methods for producing pigments for painting and discovered how to make Prussian blue.[32]

Surprisingly, Lomonosov did not conclude his letter with a proposal to manufacture Prussian blue. Instead, he asked Razumovskii to assign him "two or three students" for the "purpose of learning chemistry." Doing so, he argued, would "generate a twofold benefit: new inventions for the arts and

30 Lomonosov, *Polnoe sobranie* , 9:9–13, 14–31.
31 Smith, *The Business of Alchemy*, 269, 199–201.
32 Lomonosov, *Polnoe sobranie*, 9:47–49.

the instruction of students," who may go on "to contribute to their homeland." The letter's concluding paragraph was likely intentionally formulated as a non sequitur. To convert a research laboratory into a commercial manufacturing complex was a presumptuous request, even as he tried to make it more palatable by joining epistemic ambitions (training students) with economic ones (cheap pigment). For his part, Razumovskii either failed to discern or did not wish to entertain Lomonosov's true motives, since he only responded to the request for students.[33]

Undeterred, Lomonosov continued to broach the subject of Prussian blue with Razumovskii indirectly. In May 1750, in another letter to the president, he renewed his request for students, even though it was satisfied in February of the same year. This time, however, Lomonosov framed his experimental venture, for which he again sought students, as a lucrative enterprise that would meet the need for locally produced pigments, offset the expense of laboratory upkeep, and train Russian technicians:

> The samples of Prussian blue made by me proved to be quite suitable, and … would be possible to produce at the Laboratory in considerable quantities and to sell with significant profit, from which the Laboratory could be maintained, that is, for buying coal, firewood and other materials, various utensils, and instruments … To ensure uninterrupted production of Prussian blue and that in the future the laboratory should have indigenous Russian laboratory technicians, it is necessary to have two or three laboratory students of Russian descent.[34]

Ultimately, nothing came of Lomonosov's commercial designs on Prussian blue, and he abandoned the pigment in August 1750. His decision was likely driven by the discovery that the same pigment was already being manufactured at an established factory of amateur chemist Anton Tavleev, whose pigment Lomonosov was tasked to evaluate in the summer of the same year. Lomonosov found Tavleev's product satisfactory, allowing the latter to secure a 30-year monopoly on the pigment.[35] Presumably, Lomonosov could have challenged Tavleev's certificate of monopoly, as monopolies were rescinded if a superior product was developed or the state's quotas were unmet.[36] But it probably would have been an uphill battle to convince the state to take a chance on an academic chemist over a seasoned manufacturer when both produced a product of similar quality.

Lomonosov's brief engagement with Prussian blue proved instructive anyway, as it underscored his unqualified need for a patron. Perhaps in the winter of 1750, he sought one in Razumovskii, since it was Razumovskii who had

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33 Chenakal et al., *Letopis'*, 158.

34 Lomonosov, *Polnoe sobranie*, 9:50–51.

35 Pekarskii, *Istoriia*, 2:442–43; Lomonosov, *Polnoe sobranie*, 9:665–66; *Polnoe sobranie zakonov*, no. 9692, 13:165.

36 *Polnoe sobranie zakonov*, no. 9487, 12:841–47; no. 9895, 13:513–14.

cajoled the Empress into funding the laboratory.[37] By the summer of 1750, however, Lomonosov had gained the attention of another rising grandee: the Empress's new lover, the youthful and dashing Ivan Shuvalov. As a Petrine project, the Imperial Academy enjoyed close ties to the court, but coming under the protection of a patron with peerless proximity to the monarch eased Lomonosov's access to powerbrokers at court, better positioning him for his next bout of projecting, which settled on colored glass.

Colored Glass/Mosaics

Lomonosov began experimenting with colored glass in May 1749, and between 1750 and 1751 he performed some 4,000 trials.[38] Yet his pitch for a colored glass factory did not materialize until October 1751. His failed stint with Prussian blue likely alerted him to the importance of shoring up the support of high-ranking officials who would advocate on his behalf. But to persuade Russian grandees to back his ventures, he first needed to position chemistry as a science worthy of patronage. An opportunity presented itself in August 1750, when Ivan Shuvalov invited him to the royal summer residence, Tsarskoe Selo, for a private audience with Empress Elizabeth.[39] During their tête-à-tête, Lomonosov meditated on the relationship between theory and practice in chemistry, regaling the Empress with his experiments in colored glass, porcelain, pigments, and dyes, which he stressed were indispensable to the economic flowering of the Russian realm. To memorialize their encounter, he composed an ode, titled "An Ode in which Her Majesty is thanked by the writer for the greatest mercy showed to him at Tsarskoe Selo on August 27, 1750."[40]

The composition of odes was a popular aristocratic pastime and a potent vehicle for securing patronage for those on the peripheries of Russia's social hierarchies, since odes constituted one of the primary discursive modes of courtly culture in Russia. Lomonosov had a penchant for writing odes and had earlier composed a handful on religious themes and to honor the royal family.[41] Unlike his previous odes, this one almost exclusively praised the sciences. He began by extolling the Empress for her generous support to the natural sciences and called on the "happy sciences" to expand the frontiers of knowledge:

> O you, Happy Sciences! // Diligently extend your hands // And your gaze to the farthest places, // Traverse the land and the seas, // And the steppes, and the deep forest, // And into the depths of the Riphaean [Ural] Mountains, and the summit // And even to the heights of the celestial

37 Lomonosov, *Polnoe sobranie*, 9:656.
38 Ibid., 2:438, 683–84.
39 Ibid., 8:984.
40 Ibid., 8:394–403.
41 Ospovat, "Lomonosov writes," 261; Levitt, *Early Modern Russian Letters*; Levitt, *The Visual Dominant.*

> sky. // Everywhere, investigate continuously, // That which is grand and beautiful, // Which the world has not seen; // Through centuries of labor, delight, // And reveal however much possible, // The largess of Elizabeth.[42]

Toward the end of the ode, he singled out four sciences to heed his call: mechanics, chemistry, geography, and meteorology. Since an ode dedicated to the monarch enjoyed robust circulation, chemistry was awarded the highest task:

> Penetrate the earthly depths, Chemistry, // With your keen gaze, // Reveal the precious treasures, // That lie within Russia's bosom; // Multiply the glory of the homeland // And strengthen the dominion even more, // Pursue artful nature, // Clothe yourself in colors resembling it, // And what is beautiful only in the summer, // Make it eternal through your mastery.[43]

As we can see, the duties Lomonosov assigned to chemistry fell within two chemical subspecialties: mining and commercial chemistry. The pairing of the two was strategic. Mining already enjoyed royal attention, as the iron and copper industries yielded a net positive balance of trade, while the recent discovery of gold and silver in the Urals further whetted the state's appetite for precious metals.[44] The relevance of commercial chemistry to the prosperity of the empire was less apparent, however. To secure his factory, Lomonosov needed to impress upon the Empress that, like mining chemistry, commercial chemistry also yielded material objects of vast economic value.

The ode was well received, but Lomonosov would not press the topic of colored glass for another year. Projecting was a delicate art. Faced with an indifferent patron, aggressive pleas risked cooling ties. Moreover, since Lomonosov had spent the previous decade assiduously crafting the persona of a proud academic, the slightest insinuation of financial emolument threatened to dispel the scholarly airs within which he subsumed his projects.[45] This quiet interlude, however, did not preclude his interactions with other noblemen who shared his interests in colored glass—notably, the Vice-Chancellor, Count Mikhail Larionovich Vorontsov (1714–1767).

Lomonosov had courted Count Vorontsov's favor earlier but with little success.[46] A shared interest in colored glass for mosaics enlivened this courtship to mutual satisfaction. Vorontsov became Lomonosov's lifelong interlocutor, as well as his protector and advocate at court. Gaining Vorontsov's confidence

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42 Lomonosov, *Polnoe sobranie*, 8:400–401.

43 Ibid.

44 Danilevskii, *Ruskkoe zoloto*, 42–48; Blanchard, *Russia's "Age of Silver"*, 59–162; Portal, *L'Oural*; *Polnoe sobranie zakonov*, no. 3464, 5:760–62; no. 7766, 10:734–39.

45 Lomonosov, *Polnoe sobranie*, 10:545–47.

46 See the dedication text in Lomonosov's *Volfianskaia eksperimental'naia fizika*.

was a bold move, as the Vice-Chancellor was a powerful statesman in the midst of forming a competing political faction that increasingly butted heads with the Shuvalovs, particularly in the sphere of domestic policy.[47] Lomonosov must have realized early on that his patron did not care for colored glass but might still intercede on his behalf if only to prevent his political rival from snatching his retainer from under his nose. Thus, on having secured Vorontsov's approval, Lomonosov penned a letter to Shuvalov, dated August 15, 1751, asking for his help to "realize his scientific work by way of a factory":

> Vorontsov, in his great mercy towards me, took from me samples of mosaic compositions for his highness to survey … I humbly request that you kindly endeavor to assist me in my humble request so that, I would have the means and opportunity, to realize my scientific work by way of a factory, since although my head is filled with ideas, my hands are singular … For every insignificant issue, I am forced to frequent the Chancellery and bow to officials, which, honestly, is of great embarrassment for me, especially considering that I have patrons like you …[48]

In his missive to Shuvalov, Lomonosov positioned his need for a factory not as a lucrative or artistic venture but as a matter of pride and honor for his august patron. He also strategically mentioned his encounter with Vorontsov, whose approbations were sure to strengthen his cause and if not then perhaps arouse a tinge of resentment. Shuvalov, however, remained unmoved, and the exchange ended in an impasse.

A few weeks later an opportunity once more presented itself, and with an audience just as illustrious. On September 6, 1751, Lomonosov was tasked to deliver the bi-annual lecture hosted by the Imperial Academy with the Russian court in attendance. His oration, "On the use of chemistry," built upon the sentiments he had shared with the Empress a year earlier. He delineated the contours of legitimate chemistry, its practices, and practitioners while extolling the virtues of chemistry as an ideal science to augment and enrich the Russian Empire and the arts and sciences more broadly. Again, he linked his praise of the mining industry to that of commercial chemistry, this time bolstering the latter's claim to eminence by declaring the brilliance of chemically prepared colored glass superior to the natural hues of stones:

> It is rare and quite difficult to attain the various hues of different colors from natural stones that are desired for use in compositions by artists … the color of manufactured glass that is attained by art is far superior to the color of natural stones, and in the future, with the effort of chemists, it will attain greater perfection … Therefore, it is not in vain that master

47 Ransel, *Politics of Catherinian Russia*, 40, 42–43.
48 Lomonosov, *Polnoe sobranie*, 10:470–71.

> craftsmen prefer art to nature, since art requires less labor and yields better results.[49]

Like his odes, his paean to chemistry was widely publicized, with advertisements running in the local St. Petersburg newspaper *Vedomosti*. His lecture was subsequently reprinted in both Russian and Latin and sold at the Academy's bookshop.[50]

Lomonosov's rhetorical efforts to promote colored glass appeared to pay off. On October 8, 1751, a mere month after his oration, the Ministry of Interior asked Lomonosov to teach one of its craftsmen the techniques of making colored glass. Lomonosov acquiesced but quickly sought to capitalize on the state's sudden interest in the subject by proposing to set up an industrial complex devoted solely to the purpose (October 29, 1751):

> Should the Chancellery decide that glass factories should manufacture large colored dishes and fancy goods… then I wish this art should be spearheaded by the present, honest, and sober individual, who also could understand chemical processes which is a requirement for such an undertaking. As to the practical establishment of this venture, I could submit a proper project.[51]

Although the Imperial Academy favored his proposal, forwarding it to the state's Chancellery for consideration, nothing materialized from this pitch either.[52] Lomonosov would wait an additional year before petitioning Empress Elizabeth directly, devoting the lengthy interlude to assembling his first glass mosaic picture.

While Lomonosov's early attempts to enter the industrial sector were unsuccessful, his projecting strategies, which included research reports, odes, and orations, significantly advanced the status of chemistry both at the Imperial Academy and within the Russian court. Before Lomonosov began projecting, practical chemistry was closely associated with the unschooled lower orders who dominated Russia's chemical industry.[53] By promoting chemistry through courtly genres such as orations and odes, Lomonosov helped usher chemistry into polite society. It was only after he had launched a public campaign that framed chemistry as vital to the economic prosperity of the Russian realm that the science began to gain unprecedented visibility among Russia's elite.

Likewise, Lomonosov's experiments with colored glass proved epistemically generative for his pedagogic curriculum, playing a key role in establishing chemistry as a scholarly science in Russia. In the course of his trials

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49 Ibid., 2:364–65.

50 *Vedomosti*, no. 73, 1751, 553–54.

51 Lomonosov, *Polnoe sobranie*, 9:73–74.

52 Chenakal et al., *Letopis'*, 188.

53 Kahan, "The Costs of 'Westernization'"; Kahan, "Entrepreneurship," 407–12; Ullman, "From the Workshop," chaps. 1 and 2.

(1749–1751), Lomonosov devised a novel method of staining glass by adding mineral pigments to glass melts. These pigments were prepared by dissolving metal salts in water, precipitating them with ammonia or potassium hydroxide to form hydrous oxides or basic salts of heavy metals, which were then dried and added to glass melts.[54] As he had developed the course materials for "Physical Chymistry" alongside these experiments, unsurprisingly, the experimental component of this course focused on the behavior of alkalis and acid salts as agents of precipitation and change.[55] "Physical Chymistry" was the first time chemistry was taught as an independent stand-alone discipline at the Imperial Academy, and was quite innovative for its time, having offered an experimental framework for the study of the motion and cohesion of insensible particles through chemical experimentation.

Mosaics

Within a year of delivering his much-lauded oration, Lomonosov gifted the Empress a product of his laboratory's labors: a glass mosaic icon of the Madonna. In a letter to the mathematician Euler, he confessed to timing his gift for September 5, 1752, the Empress's name day.[56]

According to Simon Werrett, Lomonosov's choice of the icon genre for his first mosaic was deliberate. Elizabeth's rule championed Petrine reforms while projecting Orthodox devotion.[57] Lomonosov's icon mosaic mirrored this seeming dichotomy. Not only was the icon emblematic of Orthodox worship, but mosaics were endemic to Russia's religious landscape, having embellished the walls of Russian cathedrals for centuries. Meanwhile, like Petrine reforms, Lomonosov's method of manufacturing colored glass was a genuine innovation that promised to improve and enrich Russia's glass industry. Thus, Werrett concludes, Lomonosov's mosaic icon was effective precisely because it joined "traditional Orthodoxy" with "Enlightened chemistry."[58] According to contemporary art critic Jacob von Stählin (1709–1785), Lomonosov "earned for this successful feat the gracious attention of the Empress as well as a substantial reward. The Empress placed this mosaic amongst Icons in her apartments."[59]

Having secured the approbation of the Empress, Lomonosov was emboldened to appeal directly to her *Kabinet* with his "Proposal to organize the mosaic craft."[60] Within a few weeks, he submitted another proposal, "A request to the Senate for permission to open a colored glass factory."[61] Scholars have

54 Lomonosov, *Polnoe sobranie*, 2:372–80, 682–81.
55 Lomonosov, "An Attempt."
56 Lomonosov, *Polnoe sobranie*, 10:500–503.
57 Werrett, "Enlightened Icons," 8–9.
58 Werrett, "An Odd Sort," 157–58; Werrett, "Enlightened Icons," 17–19, 22.
59 Makarov, *Khudozhestvennoe nasledie*, 132–33.
60 Lomonosov, *Polnoe sobranie*, 9:75–79.
61 Ibid., 9:79–82; *Polnoe sobranie zakonov*, no. 10057, 13:750–53.

interpreted these proposals as two distinct enterprises, but a cursory study of both alongside his factory's product output suggests that he was repackaging the same project and tweaking it for a different audience.[62] For brevity, we will treat the *Kabinet* and Senate proposals together but focus on the latter, since the state met the requests outlined in it.

The two proposals were materially similar, as both sought to manufacture colored glass from locally sourced materials to decrease the state's reliance on imports. The difference between them was in the scope of operations. The *Kabinet* (first) proposal was modest. Lomonosov only asked for permission to set up a mosaic assembly complex with an interest-free loan as startup capital. By contrast, in the Senate (second) proposal, in addition to an interest-free loan, Lomonosov sought the use of state lands (in Koporsk County) and natural resources attendant to the lands (forests, waterways, clay, and sand). He also included two more requests, which he conceded were substantial: a monopoly on the production of colored glass, and serf labor. To justify his requests, he used a specific rhetorical term, that of "loss" (убыток). Thus, he claimed that the state must grant him a 30-year monopoly on colored glass because otherwise anyone could replicate his processes, in which case a "loss may come."[63] Similarly, in his request for 200 state-owned male serfs to service his factory, he argued that hired labor, once trained, might abscond, culminating in a "futile loss" (напрасный убыток).

The term "loss," in Lomonosov's usage, was synonymous with risk and thus encapsulated the same cost–benefit analysis implied by the term "risk" that cropped up in projects across Europe. The rhetorical formulation that joined labor and loss was a well-worn one for Lomonosov. He reprised it in another project, titled "Brief description of various journeys across the Northern Seas and an indication of a possible passage through the Siberian Ocean to East India" (1764), in which he proposed to launch a colonial expedition to the East Indies through the East Siberian Sea and the Arctic Ocean.[64] While acknowledging that the expedition might result in both monetary and human "loss," the latter being unconscionable, Lomonosov reasoned that the "sacrifice" of but "a hundred individuals" was justified when weighed against what stood to be gained: "We can acquire entire lands in other parts of the world for the expansion of navigation, commerce, power, for the state and national glory, to brandish Russian maritime heroes to the entire world, and for the greater enlightenment of all humanity."[65] As mentioned in the introduction to this special issue, this sort of relativization of risk was typical of projects across Europe, which calibrated risk to return on investment.[66]

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62 Menshutkin, *Lomonosov*, 94–95.
63 Lomonosov, *Polnoe sobranie*, 9:79–82.
64 Ibid., 6:417–506.
65 Ibid., 6:497–98.
66 Keller and McCormick, "Projects in the History of Knowledge," 15.

The Senate approved Lomonosov's proposal on December 14, 1752, a feat he owed to the machinations of the Shuvalov political clan.[67] It was likely Senator Count Petr Shuvalov, Ivan's second cousin and a serial projector in his own right, who strongarmed the Senate into favoring it.[68] Petr reprised his role as Lomonosov's chief advocate in the Senate in 1758, helping him win the commission to decorate Peter I's tomb in the Peter and Paul Cathedral.[69]

Lomonosov's Factory and Serf Labor

Lomonosov's Factory in the Eyes of His Contemporaries

Lomonosov may have trumpeted each of his schemes under the rhetorical banner of the common good, but not everyone at the Russian court was convinced. We can piece together some of this opposition from the letters he exchanged with his patron, Ivan Shuvalov. Shortly after securing Senate approval, Lomonosov received a troubling missive from Ivan, imploring him to abandon his commercial designs.[70] This letter must have perturbed Lomonosov, since he immediately went on the offensive, placating his patron with missives and poems, all in the hope of convincing him that the factory was a noble endeavor and would not interfere with either his scientific or literary pursuits.[71]

One letter from this communication stands out for both its timing and contents.[72] On May 10, 1753, a mere month after Elizabeth formally transferred lands and serfs into his stewardship, Lomonosov wrote to Ivan, assuring him that the recent "generosity" of the Empress could not "divert" his "love and diligence in the sciences," especially after all he had endured in their pursuit.[73] He then turned to condemn malicious critics, "who speak out of spiteful envy" and will "be shamed in their wrongful opinions," before launching into a tirade against the foolish notion that poverty was the lot of a learned man: "if anyone still holds the opinion that a learned person must be poor, I offer them the example of Diogenes, who lived with dogs in a barrel and left his compatriots a few witty aphorisms to pat their ego." He preferred to follow in the footsteps of such scientific luminaries as Isaac Newton, "the wealthy Lord Boyle, who achieved all his fame in the sciences by using a great sum of money," Christian Wolff, "who through lectures and gifts amassed upwards of five hundred thousand [thalers] and to top it off a baronetcy," and Hans

67 Speranskii, *Polnoe sobranie zakonov*, no. 10057, 13:750–53.

68 Lomonosov, *Polnoe sobranie*, 10:477–78, 813.

69 Ibid., 9:700–701.

70 Sometime in December 1752, Shuvalov wrote to Lomonosov, imploring him to abandon his factory and devote himself to the literary arts. Shuvalov's letter did not survive, but Lomonosov's response to it, dated January 3, 1753, did and confirms the gist of their conversation. See ibid., 10:474–75.

71 Ibid., 10:478–80; Segel, *Literature*, 1:214, 218.

72 Lomonosov, *Polnoe sobranie*, 10:474–75, 478–80; 8:508–22.

73 Lomonosov took literary license with the scope of his hardships. See Usitalo, *The Invention*, 38, 93.

Sloane, "who left behind a library that no private individual could afford to buy."[74]

Lomonosov's spirited defense of his factory suggests that the opposition to his entrepreneurial ambitions at court was mounting. His critics may have stopped short of calling him a profit-seeker, but the underlying message was clear: projecting was not appropriate for an academician. The Imperial Academy commanded certain *gravitas* in Russian society, reflected in the deliberate exclusion of academicians from the social ranking system ("The Table of Ranks").[75] Academicians were not supposed to scale the social ladder or line their pockets at the state's expense.

Scholarly Treatment of Lomonosov's Factory

Unlike his contemporaries, historians have not viewed his factory as a lucrative enterprise. Lomonosov was perennially hounded by creditors, and shortly after his death, the factory closed for good.[76] But this line of reasoning is deeply misleading because it assumes that no personal benefit could be reaped from a failed venture. Most projects failed, but failure of operations did not preclude personal self-enrichment. Indeed, his contemporaries shrewdly discerned that the true value of his factory lay not in the solvency of his operations but in the resources—human and non-human (lands, pastures, waterways)—that he had secured in the execution of his factory complex.

Soviet scholars were the first to highlight the centrality of serf labor to Lomonosov's factory, as well as the first to problematize it. After all, how could a son of the fatherland, himself of peasant stock, partake in such exploitative behavior? Nevertheless, Soviet scholarship on the topic remains scant and only performatively critical.[77] Lomonosov is often presented as a benevolent landlord who provided his charges with candles, which no landlord did unless he was a "great humanitarian."[78] An absence of runaway serfs from his factory is taken as proof that his serfs were treated better than those at neighboring estates, where serf flight was rampant.[79] Finally, Lomonosov's claim that he employed serf labor for the "common good" and never for "his own profit" is taken for granted.[80]

Because Soviet scholars devoted their analytical energies to sanitizing Lomonosov's behavior, they failed to notice that there was no legal mechanism that allowed him or his heirs to inherit the lands and/or labor allocated for

74 Lomonosov, *Polnoe sobranie*, 10:478–80.
75 Iosad, "'Sciences Strange and Diverse,'" 73–74, 86–87.
76 Leicester, "Mikhail Lomonosov"; Shelkovnikov, "Russian Glass"; Danilevskii, *Lomonosov*; Makarov, *Khudozhestvennoe nasledie*.
77 Danilevskii, *Lomonosov*, 130–72; Lomonosov, *Polnoe sobranie*, 9:692; Paina, "Lomonosov," 126–42.
78 Paina, "Lomonosov," 139.
79 Ibid., 142, 132.
80 Ibid., 141.

his factory. The Manufacturing Charter of 1723, which Lomonosov cited in his Senate proposal, allowed any entrepreneur *to purchase* labor and land, but *only* for the explicit use of the factory, and *forbade* the transfer or resale of both beyond the factory complex.[81] Lomonosov had not only secured the lands and labor for his factory for free, but the legal mechanisms that would have allowed his descendants to retain both in the absence of a factory were absent. And yet, on his passing, his daughter Elena Lomonosova inherited all the serfs and lands anyway. How was this possible?

The Legality of Lomonosov's Serf Ownership

When Empress Elizabeth awarded Lomonosov lands and peasants, both were loaned to him for the operational lifespan of the factory.[82] On August 22, 1755, two years after the factory was set up, Lomonosov petitioned the Senate for lifetime and hereditary ownership of the factory, serfs, and lands on which they lived and worked. In his petition, Lomonosov claimed his serfs were crushed by onerous taxes, which he hoped to alleviate by assuming their ownership, and presumably their tax burden. The petition, however, did not stop there. Should the Senate satisfy his request, he then asked to be relieved from paying the same local taxes, since paying them "may lead to the deterioration of [his] factory."[83] The Senate satisfied both requests. Thus, under the pretense of seeking a tax exemption for his workers, he won a deed of their ownership in perpetuity. Lomonosov could have asked the Senate for a tax reprieve on his serfs' behalf, which the Senate might have satisfied, since it granted him a similar reprieve. Likewise, he could have included a provision in his will that released his serfs from servitude upon the factory's closure, but he did neither.

On Lomonosov's passing in April 1765, the factory came under the stewardship of his wife, Elizabeth Lomonosova,. Within months, however, the president of the Imperial Academy of Fine Arts, Ivan Ivanovich Betskoi (1704–1795), brazenly flouted the deed of ownership and, with the tacit support of Empress Catherine II (*r.* 1762–1794), assumed control of the factory, to the vociferous protests of Lomonosov's kin.[84] We can interpret Betskoi's actions along two intersecting lines of reasoning. First, Russian monarchs were not bound by the decisions of the Senate. Second, Lomonosov should not have been granted hereditary ownership of the factory in the first place, and by dispossessing Lomonosov's widow of the factory, Betskoi was merely correcting administrative excesses of Elizabeth's Senate. The latter reasoning is strengthened by the Senate's begrudging confirmation of Elena's legal claims to her father's lands and serfs. In its final ruling, the Senate stressed that it

81 Speranskii, *Polnoe sobranie zakonov*, no. 4378, 7:167–74; Lomonosov, *Polnoe sobranie*, 9:81.
82 Lomonosov, *Polnoe sobranie*, 10:500–503.
83 Ibid., 9:104–5.
84 Vorontsov, *Arkhiv Kniazia*, 4:504–6.

satisfied Elena's petition *only* in "recognition" and gratitude to her father's "service to Her Majesty and the Fatherland through his valuable contributions to the sciences," thereby implying that she was not legally entitled to either. Catherine II personally intervened to adjudicate the matter; the Senate document bore her signature.[85]

Bearing this context in mind, we ought to reconsider Lomonosov's initial justification for the use of serf labor. In his Senate petition, he claimed that hired labor might abscond, which would result in a "futile loss."[86] His fears were not misplaced; when it came to hired labor, it was a "seller's market," and workers often left their employers for better opportunities.[87] Yet according to historian Jerome Blum, non-noble estates preferred hired labor to serf labor, even though the former was pricier and capricious, because it was voluntary, skilled, and did not come with state oversight—if a factory received state assistance, the state reserved the right to interfere in its operations.[88] These sorts of considerations made serf labor unattractive to most cost-cutting efficiency-seeking manufacturers. And yet, from the onset, Lomonosov insisted upon serf labor and once in possession launched a legal campaign to secure hereditary rights to it. His actions strongly suggest that he sought serf labor not out of necessity but because doing so allowed him and his children to become hereditary landowners. By 1769, Elena Lomonosova held a deed of ownership to 501 individuals and their offspring, catapulting the Lomonosov clan into the comfortable ranks of the middling gentry—a respectable position for the daughter of a Russian peasant from the north, where serfdom did not even exist.[89]

Serfdom was not quite slavery, but it was still a miserable state of existence.[90] Even E.S. Paina, whose article dexterously and artfully excused Lomonosov's labor practices, reluctantly revealed her misgivings in her final summation: "After Lomonosov's death and the closure of the factory, the Ust'-Ruditsa estate was transferred to his heirs. Subsequently, his peasants shared the fate of millions of serfs residing on the noble estates of Russia." The "fate" of which Paina wrote was that of perpetual servitude.[91]

Conclusion

This paper has examined Lomonosov's proposals for a chemical laboratory and the manufacture of Prussian blue pigment, colored glass, and mosaics as

85 Makarenko, "Lomonosov," 312, note 2.
86 Lomonosov, *Polnoe sobranie*, 9:81.
87 Blum, *Lord and Peasant*, 321–22.
88 Ibid., 314–16.
89 Paina, "Lomonosov," 138; Makarenko, "Lomonosov," 312 and notes 1–3.
90 On the legal distinction between serfdom and slavery, see Moon, *Russian Peasantry*.
91 Paina, "Lomonosov," 142.

part of a wider tapestry of projects and projecting strategies that he pursued throughout his career. Indeed, perusal of his laboratory reports reveals that immediately upon securing a laboratory he undertook experimental trials to improve or develop processes to produce superior cost-effective marketable goods. The end goal of each of his experimental attempts was the establishment of some private commercial enterprise that he would spearhead. To realize his entrepreneurial ambitions, he mobilized rhetorical, material, and human resources at his disposal, and in doing so, delineated a distinct relationship between chemistry, politics, and profit, all the while augmenting his own social capital as a landowner.

Lomonosov's projecting career also captures a brief but significant moment in the history of Russian chemistry. By considering it, this paper has sought to highlight the role played by personal ambitions, orations, odes, and artifacts in the crystallization of chemistry as a courtly and scholarly science in Russia. Lomonosov's "Physical Chymistry," the first academic course to teach chemistry as an independent discipline unattached to either metallurgy or pharmacy at the Imperial Academy, was based on his experimental trials with colored glass. Likewise, the insights gleaned from these experiments were instrumental in the development of his theory of color, presented in the 1756 oration, "On the Origin of Light."[92] Although Lomonosov employed an outdated theoretical framework, corpuscular theory, to understand light and color, his chemical experiments revealed that there were three primary colors: red, yellow, and blue. Finally, it was only after Lomonosov had set out to improve chemistry's public image and expand its platform as a science of a prosperous empire at the Russian court that chemistry entered the polite space and began to command royal attention and aristocratic patronage, which ultimately led to its flowering at the turn of the nineteenth century and beyond.

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92 Lomonosov, "Oration."

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