

The Heidelberg Circle: German Inflections on the Professionalization of Russian Chemistry in the 1860s

By Michael D. Gordin*

ABSTRACT

The success of the "second importation" of science to Russia during the Great Reforms of the 1860s is illustrated by examining the extended postdoctoral study of chemists in Heidelberg. While there, they adapted the Russian intelligentsia institution of the "circle," or *kruzhok*, to cope with their alienation from the German culture they were confronting. Upon their return to Russia, they felt the lack of the communicative network they had established while abroad and reimported the *kruzhok* to serve as a central model for the formation of the Russian Chemical Society in 1868.

INTRODUCTION

Science, as everyone knows, was not native to Russia. Although there were limited cosmological, medical, and metallurgical concepts and practices employed across the space now identified with Russia, it was not until the very late seventeenth century that large-scale imports of engineers from central and western Europe began to affect governance and the military. As for elite science—the collection of high-level theories, mathematics, experimental practices, and conceptual frameworks usually understood on the model of western European natural knowledge from the Renaissance onward—that had a very specific birth date in Russia. Tsar Peter the Great (r. 1689–1725), in one of his final decisions, acted upon a suggestion by the noted natural philosopher Gottfried Leibniz and created an Academy of Sciences in his new capital, St. Petersburg. Of course, Peter not only had to arrange for the institution but also had to provide the professionals qualified to staff it. He imported a collection of

* Department of History, 129 Dickinson Hall, Princeton University, Princeton, NJ, 08544; mgordin@princeton.edu.

Abbreviations used in notes: ADIM—Arkhiv-Muzei D. I. Mendeleeva (D. I. Mendeleev Archive-Museum), St. Petersburg, Russia; *BorP*—A. P. Borodin, *Pis'ma: Polnoe sobranie, kriticheski sverenoie s podlinnymi tekstami*, ed. S. A. Dianin, 4 vols. (Moscow, 1927–50); DM-HS—Deutsches Museum, Handschriften, Munich, Germany; TsGIASPb—Tsentral'nyi Gosudarstvennyi Istoricheskii Arkhiv Sankt-Peterburga (Central State Historical Archive of St. Petersburg), St. Petersburg, Russia; *ZhRFKhO*—*Zhurnal Russkogo Fiziko-Khimicheskogo Obshchestva* (*Journal of the Russian Physico-Chemical Society*). Materials originating in Russia are dated according to the Old Style Julian calendar, which lagged twelve days behind the Gregorian New Style calendar in the nineteenth century. Materials originating in Germany are presented in New Style. Unless otherwise indicated, all translations are my own.

central European savants in various areas of the arts and sciences to be his first academicians.¹ Thus science was a foreign import.

However, science, as everyone knows, has been immensely successful in Russia. By whatever measure one chooses—numbers of scientists, rate of publication, important discoveries, peer recognition—Russian scientists have been at the forefront of international scientific developments for at least the last 150 years. So, although science was a foreign import, it was one that took exceptionally well to Russian soil.

Or did it? For over a century after the introduction of the main eighteenth-century institution of Western natural philosophy, the scientific academy, it is difficult to find any significant penetration of science or scientific institutions outside St. Petersburg. Most (although certainly not all) of the achievements of Russian science took place after the transformation of Russian governance during the so-called Great Reforms of the 1860s and 1870s, under the leadership of Tsar Alexander II (r. 1855–1881). Something very specific seems to have happened at the cusp of the 1860s that mobilized a scientific intelligentsia out of what had earlier been a shallow system that had relied on foreign talent. This essay will explore what those transformations were and how they altered the structures by which Russian science was organized.²

What happened to alter the fundamental structure of Russian science is fairly easy to map out schematically: upon the loss of the Crimean War (1853–1856), the Russian state realized that it would risk its future fiscal and military stability if it did not modify features of the Russian polity that made it, in contemporary Russians' terms, relatively "backward" with respect to western Europe. What came to be called the Great Reforms were initiated formally by the abolition of serfdom in February 1861, a reform that had actually been in the planning stages for some time.³ Similar self-conscious "modernizing" reforms ensued in the areas of technical education and technical institutions. Instead of bringing the mountain to Muhammad, as they had done with the Academy of Sciences, Russian bureaucrats decide to send their talented graduate students and "postdocs"⁴ abroad, largely to the German states, thereby taking Muhammad to the mountain. As this essay will argue, using the specific example of chemistry and chemical postdocs, this technical emigration (especially its reverse

¹ On the early eighteenth-century establishment of scientific institutions, see Michael D. Gordin, "The Importation of Being Earnest: The Early St. Petersburg Academy of Sciences," *Isis* 91 (2000): 1–31; and Iu. D. Kopelevich, *Osnovanie Peterburgskoi akademii nauk* (Leningrad, 1977).

² I will not address much of the content of scientific work during this time period; the organization and infrastructure were so complex and of such a striking nature that they need to be examined in detail before one can properly analyze the role of such a system in fostering specific intellectual developments.

³ See W. Bruce Lincoln, *In the Vanguard of Reform: Russia's Enlightened Bureaucrats, 1825–1861* (DeKalb, Ill., 1982); Lincoln, *The Great Reforms: Autocracy, Bureaucracy, and the Politics of Change in Imperial Russia* (DeKalb, Ill., 1990); and Alfred J. Rieber, "Alexander II: A Revisionist View," *Journal of Modern History* 43 (1971): 42–58.

⁴ A word of clarification about my use of the terms "postdoctoral" and "postdoc" in this essay: Strictly speaking, the terms are both anachronistic and inappropriate. The Russian educational system allows for three degrees of higher education: the candidate degree, the master's degree, and the doctoral degree. The candidate degree is very close to an American bachelor's degree. The master's degree is often considered close to a doctorate, but it is actually at a somewhat lower level than a full-fledged Western PhD. After working for several years, Russian scholars file for their actual *doktorskaia*, which is almost exactly analogous to a German *Habilitation*. When I use "postdoc" here, I mean students who have already received significant higher technical training, almost always past the master's degree. The system of transit mixes and matches them with contemporaries we would recognize as postdoctoral students from France, Britain, or the United States.

flow back to Petersburg) led to the creation of a specific form of professionalization of the sciences in postreform Russia, one that both drew from and reacted to the German milieu in which the Russians lived while abroad.

To the extent that this "German captivity" has been discussed with respect to Russian science by commentators, it has received mixed or negative reviews. Either the transformation in Russian institutions is seen as autochthonous, and essentially unrelated to the two- or three-year sojourns the Russians spent abroad, or the exposure to German institutions is seen as deleterious.⁵ For those who hold to an essentialist vision of the Russian national character, to the extent that the returning Russians borrowed anything from the Germans, that borrowing was destructive and only served to hold back some form of authentic Russian science:

The educational system was borrowed from Germany, its negative qualities were intensified while the most important positive qualities were partially or completely suppressed. The Russian national character was not taken into account by that system foreign to its spirit which was put as it were into a straight-jacket and had its wings clipped by the two most efficient tools in the hands of autocracy—censorship and espionage.⁶

This (clearly bigoted) quotation raises a series of intriguing questions: Was the system in fact borrowed from Germany? What features made it "German"? How was "Russian national character" understood, and how did it relate to the sciences? The only way to get at these questions is to back away from facile generalizations and really examine the local dynamics of what happened.

For those dynamics were very much *local* ones, as well as broader cultural transformations. The most important social group for the development of science in Russia—and then eventually the domestication and appropriation of that system of knowledge into Russian science—was the intelligentsia.⁷ The intelligentsia, like any other social institution, had to organize itself somehow, and the basic structure of the Russian intelligentsia was subdivision into *kruzhki* ("circles"; singular, *kruzhok*). (The accents are used here to clarify pronunciation.) In this essay, I argue that the organization of chemistry in Petersburg into a Russian Chemical Society in November 1868 was in large part mediated by the adaptation of the urban social institution of the *kruzhok* under the culturally adverse conditions of the German scientific emigration. Understanding the *kruzhok*, therefore, leads directly into the nexus between the formal structures of Western science and the social structures of the Russian intelligentsia. Although the *kruzhok* provides far less than a total explanation of the professionalization of scientists in Russia, its specific features do go a long way toward explaining the rapidity and vehemence of Russian national identification in the sciences, particularly in chemistry.

⁵ For accounts that stress autonomous Russian developments, see Iu. I. Solov'ev, *Istoriia khimii v Rossii: Nauchnye tsenry i osnovnye napravleniia issledovaniia* (Moscow, 1971); and also to a certain extent Nathan M. Brooks, "The Formation of a Community of Chemists in Russia: 1700–1870" (PhD diss., Columbia Univ., 1989).

⁶ Alexander Petrunkevich, "Russia's Contribution to Science," *Transactions of the Connecticut Academy of Sciences* 23 (1920): 211–41, on 215.

⁷ It has proven perpetually difficult to provide a clean and simple characterization for what exactly the "intelligentsia" was other than a heterogeneous grouping of educated individuals who conceived of themselves and organized themselves somewhat outside the social confines bounded by the autocratic state. As an introduction to the concept and its history, see the introduction to this volume and the essays in Richard Pipes, ed., *The Russian Intelligentsia* (New York, 1961).

It is quite difficult to formulate a precise definition of the *kruzhok*, which is somewhat of a cross between a concentrated, topical salon and an intellectual *Stammtisch*. *Kruzhki* were usually relatively small (fewer than twenty people) and had a defined membership; you could only become a member of a *kruzhok* if proposed by a standing member, and other members could blackball you if you were perceived as unreliable. Given the political stakes of a compromised *kruzhok*—Fyodor Dostoevsky was exiled to Siberia when a police mole reported on proscribed political discussions within the Petrashevskii *kruzhok*, of which the writer was a member—this insularity and exclusiveness were vital adaptations to a highly controlled political climate. They also offered remarkable communicability across increasingly divergent disciplines, as intellectuals and aristocrats tended to belong to several *kruzhki* at a time, carrying concerns from one into another. Most scholarship of *kruzhki* among Russian historians has focused on the two outstanding exemplars from the 1840s—the Westernizers and the Slavophiles—although the tradition extended earlier in time as well as later.⁸ With emancipation in 1861, the historiography stresses these institutions as staples of student culture in the demographic boom of Moscow and Petersburg university populations, where they would eventually serve as kernels of Marxist, populist, and terrorist politics, or as circles of artists and literati.⁹ Daniel Alexandrov—the only historian of science to take the *kruzhok* seriously as an organizing principle for Russian knowledge production—traces his genealogical line from these student *kruzhki* into the Soviet period, and his work gives a picture of the versatility of this institution in Soviet Russia (and abroad, in the case of the famous Kapitza Club at Cambridge).¹⁰ I propose that the *kruzhok*'s legacies were far richer than just this contribution to

⁸Roman Jakobson, "An Example of Migratory Terms and Institutional Models (On the Fiftieth Anniversary of the Moscow Linguistic Circle)," in *Selected Writings*, vol. 2, *Word and Language*, ed. Stephen Rudy (The Hague, 1971), 527–38; N. L. Brodskii, ed., *Literaturnye salony i kruzhki* (Moscow, 1930); Mark Aronson and Solomon Reiser, *Literaturnye kruzhki i salony* (St. Petersburg, 2001); and Frederick I. Kaplan, "Russian Fourierism of the 1840's: A Contrast to Herzen's Westernism," *American Slavic and East European Review* 17 (1958): 161–72.

⁹See, e.g., Allan K. Wildman, "The Russian Intelligentsia of the 1890's," *American Slavic and East European Review* 19 (1960): 157–79; Martin A. Miller, "Ideological Conflicts in Russian Populism: The Revolutionary Manifestoes of the Chaikovsky Circle, 1869–1874," *Slavic Review* 29 (1970): 1–21; Richard Pipes, "Russian Marxism and Its Populist Background: The Late Nineteenth Century," *Russian Review* 19 (1960): 316–37; Franco Venturi, *Roots of Revolution: A History of the Populist and Socialist Movements in Nineteenth-Century Russia*, trans. Francis Haskell (Chicago, 1960); Susan K. Morrissey, *Heralds of Revolution: Russian Students and the Mythologies of Radicalism* (Oxford, 1998); Barbara Walker, "Kruzhok Culture: The Meaning of Patronage in the Early Soviet Literary World," *Contemporary European History* 11 (2002): 107–23; and Walker, *Maximilian Voloshin and the Russian Literary Circle: Culture and Survival in Revolutionary Times* (Bloomington, Ind., 2005).

¹⁰D. A. Aleksandrov [Alexandrov], "Istoricheskaia antropologii nauki v Rossii," *Voprosy istorii estestvoznaniia i tekhniki*, 1994, no. 4:3–22; and Alexandrov, "The Politics of Scientific 'Kruzhok': Study Circles in Russian Science and Their Transformation in the 1920s," in *Na perelome: Sovetskaia biologii v 20–30' kh godakh*, ed. E. I. Kolchinskii (St. Petersburg, 1997), 255–67. A more sociological approach to the role of circles in Soviet science, but one that does not attempt the cultural connection to *kruzhki*, is Linda L. Lubrano, "The Hidden Structure of Soviet Science," *Science, Technology, and Human Values* 18 (1993): 147–75. It is important not to confuse the *kruzhok*, a culturally specific Russian institution, with the more generalized sociological concept of "social circle," which has been somewhat fruitful in analyzing scientific change. On social circle theory, see Charles Kadushin, "Power, Influence, and Social Circles: A New Methodology for Studying Opinion Makers," *American Sociological Review* 33 (1968): 685–99; and Belder C. Griffith and Nicholas C. Mullins, "Coherent Social Groups in Scientific Change," *Science* 177 (1972): 959–64. There is obviously a relation between the two, but they are not identical.

radical student culture: it was also a seedbed of the established, albeit idiosyncratic, professional culture.¹¹

Before beginning with the origins of the emigration, a word of defense is required with respect to the choice of chemistry as the focus of this paper. Although the implications of the argument here for the formation of a professional scientific culture are of necessity broader than merely in one field, there are good reasons to focus on this specific science when exploring the "second importation" of the sciences to Russia. Chemistry was *the* dominant science in late imperial Russia, partially because of its utility to the state in the areas of mining, oil exploitation, agriculture, and munitions; partially because it was at the time the leading science internationally; and partially because it was simply the first science to cross the horizon of modernity by acquiring a professional society and official government recognition. The chemical community is vital to our historical understanding of the nature of professional organization in Russia because it subsequently served as a model for essentially all communities of scientists (and other technical experts) formed in the spaces of the Russian empire. Studying chemistry, then, provides the historian of science a tracer for the evolution of Russian nationalist conceptions precisely at a site where one would least expect it: at the heart of the most international and cosmopolitan physical science.¹² And these Russian developments could not have occurred—or would have occurred rather differently—without the midwifery of a specific German university town.

HEIDELBERG: THE CENTER OF THE CIRCLE

Generally speaking, there have been two strategies that states have followed for introducing Western science into a new cultural context, executed either individually or in combination: importing the scientists as retainers from foreign lands, thus outsourcing the *talent* (think of Peter the Great and his academy project); or sending one's countrymen abroad to receive their training, then bringing them back, thus outsourcing the *training*.¹³ It was this latter strategy that became increasingly common among Russian institutions of higher education and tsarist bureaucrats in the mid-nineteenth century. This strategy was not completely new to Russia after the Crimean War. Medical doctors, for one, had been sent abroad for "improvement" since the mid-eighteenth century, and—after a brief hiatus from 1803 to 1817—continued to

¹¹On professionalization in Russia and its divergence from the classic Anglo-American models, see, e.g., Christine Ruane, *Gender, Class, and the Professionalization of Russian City Teachers, 1860–1914* (Pittsburgh, Pa., 1994); and Harley D. Balzer, ed., *Russia's Missing Middle Class: The Professions in Russian History* (Armonk, N.Y., 1996). For helpful criticisms of the traditional models of professionalization for the history of science, see Jan Goldstein, "Foucault among the Sociologists: The 'Disciplines' and the History of the Professions," *History and Theory* 23 (1984): 170–92; Thomas Broman, "Rethinking Professionalization: Theory, Practice, and Professional Ideology in Eighteenth-Century German Medicine," *J. Mod. Hist.* 67 (1995): 835–72; and B. W. G. Holt, "Social Aspects in the Emergence of Chemistry as an Exact Science: The British Chemical Profession," *British Journal of Sociology* 21 (1970): 181–99.

¹²The counterpart would be a chauvinistic social science or discipline of the humanities. For these, more intuitive, cases, see, e.g., Alexander Vucinich, *Social Thought in Tsarist Russia: The Quest for a General Science of Society* (Chicago, 1976).

¹³These two strategies were undertaken simultaneously in the cases of Japan and China. See James R. Bartholomew, *The Formation of Science in Japan: Building a Research Tradition* (New Haven, Conn., 1989); Paula Harrell, *Sowing the Seeds of Change: Chinese Students, Japanese Teachers, 1895–1905* (Stanford, Calif., 1992); and Weili Ye, *Seeking Modernity in China's Name: Chinese Students in the United States, 1900–1927* (Stanford, Calif., 2001).

be so well into the nineteenth. Likewise, legal scholars had been sent abroad for many years, most notably under the sponsorship of the pivotal legal bureaucrat Mikhail Speranskii in the late 1820s.¹⁴ Nevertheless, the scale of the effort that emerged in the late 1850s dwarfed these earlier qualified attempts to siphon some of the cream off the Western educational establishment.

Even at this point, however, the procedure was implemented on a trial basis. A trickle of scholars—almost always very talented graduate students who had already completed their *magisterskaia*, the second-highest academic degree—were sent abroad to various universities in central and western Europe. Almost none undertook the trip to England. A few ventured to Paris. The vast majority of those who went abroad chose to affiliate with an institution in one of the German states. (This includes medical students who by and large went to Vienna, which in the era before German unification made for a plausible German university.) When the program was instituted on a wider scale in the early 1860s, this trend only deepened.

This migration of students, especially in the early period, was not of a random character. Generally, postdocs in specific fields (legal scholars, chemists, physicians, classicists) tended to congregate at specific sites. For a variety of reasons, the small number of chemists—in the late 1850s not more than twenty—concentrated in Heidelberg, although they almost all traveled widely in Europe during their two- or three-year stay abroad. This core of Russian Heidelbergers proved to be a vital kernel for the institutionalization of a professionalized chemistry in St. Petersburg, and then in the Russian empire more broadly.

There were (as there still are) numerous attractions for the young student who opted to take his stipend in Heidelberg, at Heidelberg University. Founded in 1386, it was the third-oldest German university—and the oldest within the confines of present-day Germany (the older two being in Prague and Vienna). The somewhat tortured and lengthy history of the institution had reached a brighter passage by the early nineteenth century, as Heidelberg University began to transform itself into the very model of a modern research university.¹⁵ The direct impetus for the reorganization of the university in 1803 was the establishment, by Napoleon, of new con-

¹⁴G. Skorichenko, "Imperatorskaia mediko-khirurgicheskaia akademiia v vedenii Ministerstva narodnago prosveshcheniia," in *Istoriia imperatorskoi Voenna-meditsinskoi (byvshei mediko-khirurgicheskoi) Akademii za sto let, 1798–1898*, ed. Ivanovskii (St. Petersburg, 1898), 155–238, 218; and P. Maikov, "Speranskii i studenty zakonovedeniia: Ocherk iz istorii russkago pravovedeniia," *Russkii Vestnik* 266, no. 8 (1899): 609–26; 267, no. 9 (1899): 239–56.

¹⁵Understandably, given the age and distinction of the university, its historiography is vast. Some of the best studies include: Eike Wolgast, *Die Universität Heidelberg, 1386–1986* (Berlin, 1986); Gerhard Hinz, "Die Geschichte der Universität Heidelberg: Überblick," in *Ruperto-Carola Sonderband: Aus der Geschichte der Universität Heidelberg und ihrer Fakultäten*, ed. Gerhard Hinz (Heidelberg, 1961), 20–39; Renate Klausner, "Aus der Geschichte der Philosophischen Fakultät Heidelberg," in *ibid.*, 235–336; Helene Tompert, *Lebensformen und Denkweisen der akademischen Welt Heidelbergs im Wilhelminischen Zeitalter: Vornehmlich im Spiegel zeitgenössischer Selbstzeugnisse* (Lübeck, 1969); and Ludwig Schmeider, *Ruperto Carola: University of Heidelberg*, trans. D. Michael (Düsseldorf, 1931). On the reforms of the university in the early nineteenth century, see Georg Jellinek, ed., *Gesetze und Verordnungen für die Universität Heidelberg* (Heidelberg, 1908); Franz Schneider, *Geschichte der Universität Heidelberg im ersten Jahrzehnt nach der Reorganisation durch Karl Friedrich, 1803–1813* (Heidelberg, 1913); and Richard August Keller, *Geschichte der Universität Heidelberg im ersten Jahrzehnt nach der Reorganisation durch Karl Friedrich (1803–1813)* (Heidelberg, 1913). For the situation of the university before the reforms, see Gerhard Merkel, *Wirtschaftsgeschichte der Universität Heidelberg im 18. Jahrhundert* (Stuttgart, 1973).

fines for the grand duchy of Baden, in which Heidelberg is located. Baden was perhaps unique among the German states for maintaining a vibrant culture of liberalism, which was especially important in the period between the Congress of Vienna (1815) and the abortive revolutions of 1848. The attraction for German students from various *Länder* (states or administrative regions) was quite strong, and Heidelberg offered a counterpart to the famous exaltation of *Wissenschaft* and academic freedom in the Prussian north, but in a more congenial political environment.¹⁶ As a result, the student population—undergraduate and graduate—and the professoriate boomed.

Those populations did not boom haphazardly. As Peter Borscheid argued in a seminal monograph thirty years ago, after 1848 a distinct emphasis was placed on the natural sciences, then a part of the philosophy faculty. (This narrative runs counter to the typical presentation of Heidelberg as a seat of German Romanticism—which, of course, it also was.)¹⁷ According to Borscheid, southern German states perceived the revolutions to be at their roots agricultural disturbances caused by instability in crop production. Justus von Liebig (1803–1873), at the time the doyen of German chemistry from his post in tiny Giessen, argued that substantial development of chemistry in a university context would foster future political stability among the lower classes in two ways: advanced agricultural chemistry would guarantee greater crop stability across harvests, and the development of a cadre of technical experts within universities would encourage the maturation of the chemical industry, which could absorb an impoverished proletariat.¹⁸ Liebig was heavily courted by Baden to take charge of the development of the sciences in Heidelberg, but he accepted an offer from Bavaria instead and shortly thereafter moved to Munich. The second choice in the southern German bidding war was Robert Wilhelm Bunsen (1811–1899). Bunsen had taught in many different German universities throughout his career before moving to Heidelberg in 1854, where he remained until his death.

To the extent that chemistry in Heidelberg has attracted any interest at all, it has been because of Bunsen. Bunsen was one of the towering figures of nineteenth-century chemistry, although most of his major contributions to the field occupied the earlier, pre-Heidelberg, part of his career.¹⁹ Bunsen at various points in time was interested in

¹⁶On the fortunes of Baden's political liberalism from the Napoleonic period to German unification, see Lloyd E. Lee, *The Politics of Harmony: Civil Service, Liberalism, and Social Reform in Baden, 1800–1850* (Newark, Del., 1980); and Lothar Gall, *Der Liberalismus als regierende Partei: Das Grossherzogtum Baden zwischen Restauration und Reichsgründung* (Wiesbaden, 1968).

¹⁷Cyrus Hamlin, "Heidelberg im Zeitalter der Romantik: Die Entdeckung des geschichtlichen Bewußtseins," in *Heidelberg—Stadt und Universität*, ed. Cyrus Hamlin et al. (Heidelberg, 1997): 173–92; and Michael Buselmeier, "Mythos Heidelberg," in *Auch eine Geschichte der Universität Heidelberg*, ed. Karin Buselmeier, Dietrich Harth, and Christian Jansen (Mannheim, 1985), 491–500.

¹⁸Peter Borscheid, *Naturwissenschaft, Staat, und Industrie in Baden, 1848–1914* (Stuttgart, 1976). See also the additional figures and observations in Arleen Marcia Tuchman, *Science, Medicine, and the State in Germany: The Case of Baden, 1815–1871* (New York, 1993).

¹⁹On Bunsen, see Georg Lockemann, *Robert Wilhelm Bunsen: Lebensbild eines deutschen Naturforschers* (Stuttgart, 1949); Henry Roscoe, "Bunsen Memorial Lecture," *Journal of the Chemical Society* 77 (1900): 513–54; Heinrich Debus, *Erinnerungen an Robert Wilhelm Bunsen und seine wissenschaftlichen Leistungen* (Kassel, 1901); Siegfried Lotze, "Die Chemie in Kurhessen vor 150 Jahren: Robert Wilhelm Bunsens 175. Geburtstag," *Zeitschrift des Vereins für Hessische Geschichte und Landeskunde* 91 (1986): 105–31; Fritz Krafft, "Das Reisen ist des Chemikers Lust—auf den Spuren Robert Bunsens: Zu Robert Wilhelm Bunsens 100. Todestag," *Berichte zur Wissenschaftsgeschichte* 22 (1999): 217–38; Margot Becke-Goehring, Ekkehard Fluck, Herbert Grünwald, Karl Rumpf, and Günther Wilke, "Betrachtungen zur Chemie in Heidelberg," in *Semper Apertus: Sechshundert Jahre Ruprecht-Karls-Universität Heidelberg, 1386–1986*, 6 vols. (Berlin, 1985): 2:332–60; and

almost every aspect of the physical sciences (including geology, the subject of a celebrated trip to Iceland), but his most famous discovery, before the Heidelberg-based discovery of spectral analysis in 1859, was his work on the chemistry of cacodyls—highly toxic organic arsenic compounds—which he had completed in Kassel, as well as the laboratory gas burner that bears his name. When Bunsen moved to Heidelberg, he altered his research profile substantially. He gradually ceased to train graduate students and shifted his attention to the first- and second-year laboratory courses for undergraduates, and he reoriented from organic chemistry to inorganic chemistry. In addition, as a former student, Henry Roscoe, recalled, Bunsen tended to shy away from theoretical issues in chemistry: “Bunsen did not enlarge in his lectures on theoretical questions; indeed to discuss points of theory was not his habit and not much to his liking. His mind was eminently practical; he often used to say that one chemical fact properly established was worth more than all the theories one could invent.”²⁰ In the late 1850s and 1860s, a time of some of the most exciting theoretical developments in chemistry, this would only serve to further alienate graduate students. Bunsen also insisted on significant training in physics and is often quoted (probably erroneously) as saying: “Ein Chemiker, der kein Physiker ist, ist gar nichts.”²¹

The attraction for undergraduate students was unquestioned, and they flocked to attend his lectures. His international reputation also appealed to foreign students, especially those who had to justify to state institutions the expense of an education abroad.²² (This was the case for Russian students, although the experience of working with Bunsen, addressed below, did not turn out very happily.) However, perhaps the most significant draw to study with Bunsen in Heidelberg was the extensive laboratory facilities. As a contemporary noted: “Bunsen’s newly built laboratory was for this time, as that of Liebig’s in Gießen had been earlier, a gathering place of young chemists from near and far. Men from almost all countries were found here.”²³ Bunsen had negotiated this laboratory as part of his offer, and construction began on it in 1854. It was overcrowded almost from the start, and in fall 1859, Bunsen had to get new spaces because more than sixty people were working there during the roughly 100 hours he taught experimental chemistry courses each semester.²⁴

Bunsen also managed, as part of his offer from Heidelberg, to arrange for the hires of several major figures in German physical sciences, perhaps his most significant contribution to the transformation of the institution. The first such hire was Gustav

Bunseniana: Eine Sammlung von humoristischen Geschichten aus dem Leben von Robert Bunsen nebst einem Anhang von pfälzischen Lyceums-Anekdoten (Heidelberg, 1904), a collection of humorous anecdotes about Bunsen.

²⁰Roscoe, “Bunsen Memorial Lecture” (cit. n. 19), 550.

²¹“A chemist who is not a physicist is nothing.” Quoted in Roscoe, “Bunsen Memorial Lecture” (cit. n. 19), 554. Debus questioned the attribution: “It is very unlikely that Bunsen said something like this. He would have said: ‘A chemist without physical knowledge is nothing.’” Debus, *Erinnerungen* (cit. n. 19), 148–9 (emphasis in original).

²²Helmut Neubauer, “Chemiker und Musikant: Alexander Borodins Heidelberger Jahre (1859–1862),” *Heidelberger Jahrbücher* 24 (1980): 81–94, 87.

²³Edvard Hjelt, “Friedrich Konrad Beilstein,” *Berichte der Deutschen Chemischen Gesellschaft* 40 (1907): 5041–78, on 5043.

²⁴Theodor Curtius and Johannes Rissom, *Geschichte des Chemischen Universitäts-Laboratoriums zu Heidelberg seit der Gründung durch Bunsen* (Heidelberg, 1908); and August Bernthsen, “Die Heidelberger chemischen Laboratorien für den Universitätsunterricht in den letzten hundert Jahren,” *Zeitschrift für angewandte Chemie* 42 (1929): 382–4.

Kirchhoff (1824–1887), who had been Bunsen’s colleague in Breslau and who in 1859 in Heidelberg discovered, together with Bunsen, spectral analysis.²⁵ But the most famous new recruit was Hermann von Helmholtz (1821–1894), who, besides serving as rector, published his important works on optics and acoustics at Heidelberg, straddling the border between physiology and physics.²⁶ The reason to expand the faculty in this particular way was not just for utility—drawing more students in specific areas that needed strengthening—but also to adorn Heidelberg University as an institution and Baden as a state with a cultural ornament.²⁷ For roughly a decade—from the arrival of the final of the three scholars that made up the so-called *Dreigestirn* (literally “three [guiding] stars”)—until German unification, Heidelberg University was perhaps the center of physical sciences education in the German states. Upon unification, Kirchhoff and Helmholtz departed (separately) for Berlin, the new capital, and Bunsen was left to soldier on alone. Heidelberg’s scientific supremacy faded somewhat in consequence.

Heidelberg’s scientific decade corresponds almost exactly to the height of the Russian postdoctoral emigration there, which proved most fortunate for the fate of science in Russia. Aside from the presence of the *Dreigestirn*—which was a particular attraction for science students—there were other factors at Heidelberg that made it uniquely appropriate for Russian students. Since the early nineteenth century, Russian nobility had traveled to Heidelberg during long European sojourns to take advantage of the mild southern German climate and the convenient gambling at nearby Baden-Baden. As a result, there was a fairly constant circulation of Russians through the town, and a Russian reading room was formally established there in 1862. It proved (relatively) easy to obtain Russian “thick journals” (*tolstye zhurnaly*) and thus stay abreast of the news back home, and the companionship of local Russians proved a relief, as we shall see, from what the students perceived as the baleful influence of the native Germans.²⁸ Heidelberg University was also one of the last universities not to require an Abitur, making registration fairly easy, and it did not demand a written dissertation.²⁹ Those who were exiled from Russia for political (read: revolutionary)

²⁵For biographical information, see Friedrich Pockels, “Gustav Robert Kirchhoff,” in *Heidelberger Professoren aus dem 19. Jahrhundert*, ed. Universität Heidelberg, 2 vols. (Heidelberg, 1903), 2:243–63.

²⁶Franz Werner, *Hermann Helmholtz’ Heidelberger Jahre, 1858–1871* (Berlin, 1997).

²⁷Frank A. J. L. James, “Science as a Cultural Ornament: Bunsen, Kirchhoff, and Helmholtz in Mid-Nineteenth-Century Baden,” *Ambix* 42 (1995): 1–9. See also Arleen Marcia Tuchman, “Experimental Physiology, Medical Reform, and the Politics of Education at the University of Heidelberg: A Case Study,” *Bulletin of the History of Medicine* 61 (1987): 203–15.

²⁸Willy Birkenmaier, *Das russische Heidelberg: Zur Geschichte der deutsch-russischen Beziehungen im 19. Jahrhundert* (Heidelberg, 1995), especially chap. 3 on the scientists; Birkenmaier, ed., *Russische Stimmen aus Heidelberg* (Heidelberg, 1991); Otto Krätz, “Iwan Turgenjew und die russischen Chemiker in Heidelberg,” *Chemie in unserer Zeit* 21 (1987): 89–99; Sergei Sviatkov, “Russkie studenty v Geidel’berge (K 50-letiiu russkoi chital’ni v Geidel’berge),” *Novyi zhurnal dlia vsekh*, Dec. 1912, 69–82. Russo-German antipathy already had a long and fairly specific history, largely a consequence of significant immigration of German specialists and German residents of the borderlands to St. Petersburg and Moscow. On some of the particulars, see Ludmila Thomas and Dietmar Wulff, eds., *Deutsch-russische Beziehungen: Ihre welthistorischen Dimensionen vom 18. Jahrhundert bis 1917* (Berlin, 1992); and Dagmar Herrmann and Alexander L. Ospovat, eds., *Deutsche und Deutschland aus russischer Sicht: 19. Jahrhundert: Von der Jahrhundertwende bis zu den Reformen Alexanders II* (Munich, 1998).

²⁹Krätz, “Iwan Turgenjew” (cit. n. 28), 91.

reasons also found Heidelberg a hospitable outpost (in addition to London, Zurich, and other metropolises of the Russian Revolution abroad).³⁰

From July 1862 to 1865, the attraction to Heidelberg was further cemented as it became the quasi-official center of the Russian postdoctoral export program. Noted physician N. I. Pirogov (1810–1881), who was seminal in the reconstruction of Russian pedagogy in the middle of the nineteenth century, was deputed to the German states in 1862 to serve as the liaison for the Russians abroad. Each Russian student had to visit Pirogov periodically to have his program of study approved, and Pirogov chose to settle in Heidelberg. As a result, Heidelberg had a constant traffic of Russian expatriate students, some enrolled in the university, others not. This Pirogov era, however, falls outside of the temporal scope of this essay as the apex of the Russian chemical emigration was already over by the time Pirogov had settled on the Neckar River.³¹

And so the Russian students came, particularly the chemists, expecting that they would work with Bunsen, Kirchhoff, and Helmholtz. Kirchhoff proved reasonably amenable. Bunsen, however, would have very little to do with graduate students, especially those in organic chemistry, and Helmholtz did not care for Russians very much and usually declined to work with them.³² Bunsen tended to farm out his organic teaching—especially theoretical lectures or advanced organic laboratory instruction—to one of the chemical privatdozenten he had hired. When Russians started to arrive, August Kekulé (1829–1896), soon to be the luminary of chemical structure theory, had just left this position, ceding it to Emil Erlenmeyer (1825–1909), a pharmacist turned chemist.³³ The Russian chemists worked almost exclusively with Erlenmeyer; his surviving attendance books for his classes show that in the fall and spring semesters of academic year 1861/62, for example, half of the students in his laboratory practicum were Russians.³⁴ (In 1865, Erlenmeyer received the Order of St. Anna from the tsar for being so supportive of his émigré students.)³⁵ The Russians did not just flock to Erlenmeyer because of subject matter and lack of alternative; they also genuinely seemed to like him. Yet working with Erlenmeyer to the exclusion of almost any other faculty contact only served to make the Russian postdocs more insular, which shaped their social organization in unexpected ways.

³⁰ Birkenmaier, *Das russische Heidelberg* (cit. n. 28), 9, 53, and chap. 7.

³¹ *Ibid.*, 8; and Aleksandr Brezhnev, *Pirogov* (Moscow, 1990), 375–84. On the longer-term trends in the foreign emigration of students from Russia, see the data presented in A. E. Ivanov, "Rossiiskoe studencheskoe zarubezh'e: Konets XIX–nachalo XX vv.," *Voprosy istorii estestvoznaniia i tekhniki*, 1998, no. 1:91–120.

³² Enrollment data makes this fairly clear, although the hagiography of Helmholtz tends to attribute to the master's influence any discovery by a Russian whose time in Heidelberg coincided with that of Helmholtz or who met Helmholtz. See, e.g., Annette Vogt, "Hermann von Helmholtz' Beziehungen zu russischen Gelehrten," in *Universalgenie Helmholtz: Rückblick nach 100 Jahren*, ed. Lorenz Krüger (Berlin, 1994), 66–86.

³³ W. H. Perkin, "Emil Erlenmeyer," *Journal of the Chemical Society* 99 (1911): 1649–51; Richard Meyer, "Emil Erlenmeyer," *Chemiker-Zeitung* 23 (13 Feb. 1909): 161–2; Otto Krätz, "Emil Erlenmeyer, 1825–1909," *Chemie in unserer Zeit* 6 (1972): 52–8; and M. Conrad, "Emil Erlenmeyer," *Berichte der Deutschen Chemischen Gesellschaft* 43 (1910): 3645–64.

³⁴ As Erlenmeyer wrote to Aleksandr Butlerov on May 4, 1862: "I have about 10 Russians in the laboratory." Reproduced in G. W. Bykow and L. M. Bekassowa, "Beiträge zur Geschichte der Chemie der 60-er Jahre des XIX. Jahrhunderts: I. Briefwechsel zwischen E. Erlenmeyer und A. M. Butlerow (von 1862 bis 1876)," *Physica* 8 (1966): 185–98, 189. Complete attendance lists can be found in Erlenmeyer's papers, DM-HS 1968–589/3, especially, 5–7.

³⁵ Conrad, "Emil Erlenmeyer" (cit. n. 33), 3647.

THE CIRCLE: INNOCENTS ABROAD

One of the distinctive features of *kruzhki* is that they are both formal and informal: they possess a rather defined social form but at the same time are not "organized" in a classical Weberian sense. The informality of the Heidelberg chemical *kruzhok*, in particular its flexible membership, which would change as people rotated in and out of Heidelberg for postdoctoral stints, means that it is impossible to compose a complete inventory of participants; any enumeration would of necessity be partial and incomplete. At the same time, however, given that the interactions among *kruzhok* members were both intellectual and social, certain elements of the Heidelberg circle can be elucidated through individual interactions among members. Instead of providing a futile effort at an exhaustive inventory of individuals and their involvement, I will illustrate the simultaneous diversity and homogeneity of the Heidelberg *kruzhok* by following the paths of four specific individuals, selected for me by the photograph below (Figure 1), for which they sat in 1860: Aleksandr P. Borodin, Dmitrii I. Mendeleev, Nikolai Zhitinskii, and Ladislaus Olevinsky.

These four do not represent a random choice of individuals, as they happened to be captured in this moment, which they all must have agreed to (and agreed to pay for). But nonetheless these four individuals represent a single age cohort, with the same interests (organic chemistry), and each went on to a different career path. Those paths, in sum, prove emblematic of the choices confronting many of these scientific postdocs once they returned to Russia.

For purposes of exposition, I shall begin with the man standing in the background, Aleksandr Porfir'evich Borodin (1833–1887), whose reputation today stems entirely from his musical composition of the operatic masterpiece *Prince Igor* and fewer than twenty other symphonic, vocal, and chamber works.³⁶ Borodin's life was colorfully atypical from the moment of his birth. He was born on October 31, 1833, in St. Petersburg, a royal bastard. His father, Luka Stepanovich Gedianov (1772–1843), was an Imeretian prince originally from Transcaucasia, suitably Russified and living in the center of Petersburg in the 1830s. Gedianov sired young Aleksandr with Avdot'ia Konstantinovna Antonova, a soldier's daughter from Narva, who was twenty-four at the time. To resolve the problem of legitimacy, Borodin was registered as the son of Gedianov's valet, Porfirii Ionovich Borodin, and his wife, Tat'iana Girgor'evna Borodina—which technically meant that the boy was a serf. His biological mother—whom he called "auntie" (*tetushka*) for the rest of her life—took charge of his education at home, having him tutored in German (by Fräulein Luischen, a housekeeper), in French (by Monsieur Béguin, who taught at the Lycee), and in English (by John Roper, who served as a governor at a commercial school).³⁷ Aleksandr was registered as a free peasant on November 3, 1849, and the following year, when he turned seventeen, his mother attempted to register him as a student at St. Petersburg University. This proved abortive, but she managed to enroll him as a student at the Medico-Surgical Academy on the Vyborg Side, in the northeast of Petersburg—largely because her current beau, F. A. Fedorov, knew the inspector, Il'inskii, who directed

³⁶ Michael D. Gordin, "Facing the Music: How Original Was Borodin's Chemistry?" *Journal of Chemical Education* 83 (April 2006): 561–5.

³⁷ This information is emphasized by prominent critic Vladimir Stasov in the canonical obituary that became the basis for all future biographical studies: "Aleksandr Porfir'evich Borodin," *Istoricheskii Vestnik* 28 (1887): 137–68, 138–9.

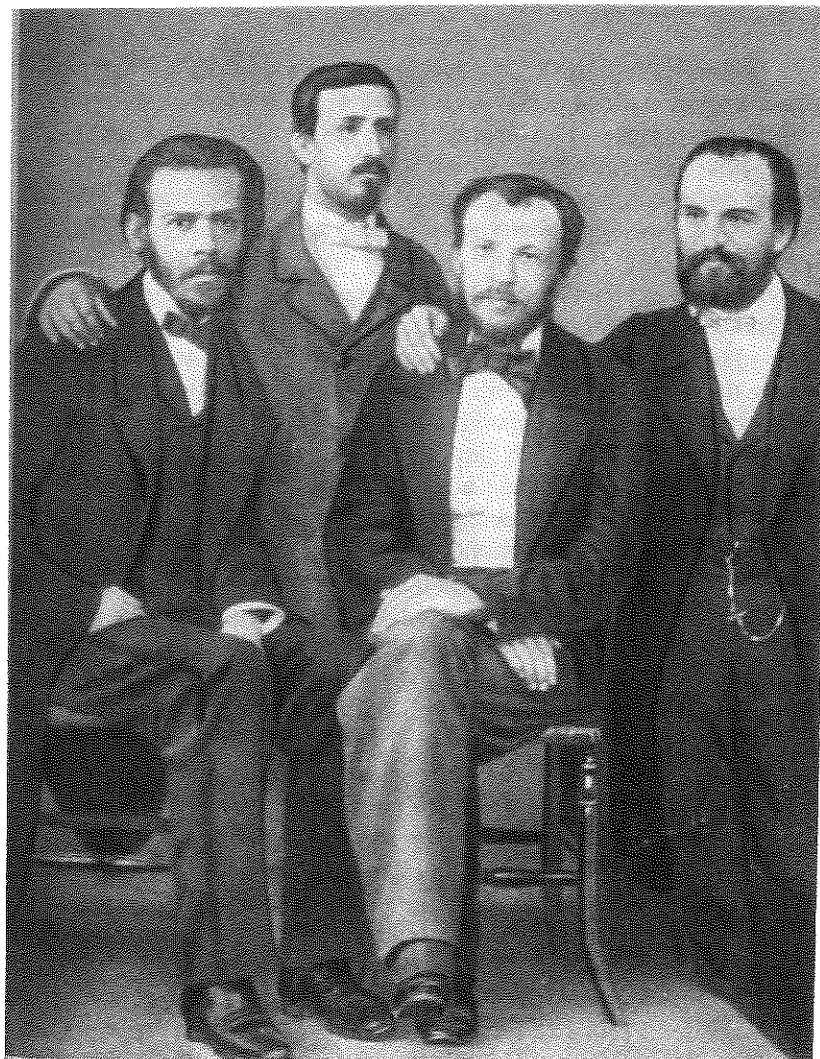


Figure 1. Four members of the Heidelberg chemical kruzok. The individuals are, from left to right: Nikolai Zhitinskii, Aleksandr P. Borodin, Dmitrii I. Mendeleev, and Ladislaus Olevinsky. (Source: R. B. Dobrotin et al., *Letopis' zhizni i deiatel'nosti D. I. Mendeleeva* [Leningrad, 1984], 65.)

admissions there. Antonova, who had had several affairs, some of which produced half-siblings for Borodin, and had married retired physician Kh. I. Kleineke in spring 1839, moved her family to Aleksandr's new neighborhood.³⁸

The most significant move Borodin made at the academy was to approach his

³⁸ The biographical particulars here and in what follows are drawn from the most reliable Soviet-era biographies of Borodin: N. A. Figurovskii and Yu. I. Solov'ev, *Aleksandr Porfir'evich Borodin: A Chemist's Biography*, trans. Charlene Steinberg and George B. Kauffman (New York, 1988); S. A. Dianin, *Borodin: Zhizneopisanie, materialy i dokumenty* (Moscow, 1960); and A. P. Zorina, *Aleksandr Porfir'evich Borodin* (Moscow, 1987).

chemistry professor, Nikolai N. Zinin, and ask to perform experiments in his laboratory as training for a career in chemistry (as opposed to medicine). Zinin's imprint on the young man—from taking him in, directing his specialization in precisely the same areas of experimental organic chemistry he himself studied, and sending him off to Heidelberg for further study, and even apparently controlling issues of his personal toilet—would be hard to overemphasize.³⁹ The role of Zinin was so prominent that several psychobiographers have cast Zinin as the first of a series of father figures by which Borodin sought to replace his biological father—absent by illegitimacy, his mother's dominance, and his father's death.⁴⁰ (We shall return in the conclusion to the historiographical ramifications of Zinin's position in the narrative of Russian chemistry.)

Borodin graduated on March 25, 1856, and served briefly as a physician at the Second Infantry Hospital, but he preferred to pursue a career in chemistry, not medicine. Borodin returned to work with Zinin and on May 3, 1858, defended his dissertation (the first in the history of the academy written and defended in Russian, not Latin), "On the Analogy of Arsenous Acid with Phosphoric Acid in Its Chemical and Toxicological Relations." (He later would obtain a master's in chemistry from St. Petersburg University while working in Zinin's lab at the Medico-Surgical Academy.)⁴¹ Borodin had already been abroad once, escorting the distinguished oculist Ivan Ivanovich Kabat to an international ophthalmological congress in Brussels, during which he visited chemistry laboratories (such as Marcellin Berthélot's) in Paris.⁴² Zinin believed that a postdoctoral trip to study abroad would be beneficial for the development of young Borodin's chemical career and arranged for him to embark on a subsidized three-year stay in Heidelberg (and incidentally also in Paris and Pisa).⁴³

Borodin's letters from Heidelberg to his biological mother provide some of our most vivid sources concerning the life of the chemistry postdocs there. His first missives

³⁹ On the micromanagement of Borodin's personal life, see A. P. Dianin, "Aleksandr Porfir'evich Borodin: Biograficheskii ocherk i vospominanii," *ZhRFKhO* 20, khim. ch. (1888): 367–79, 369.

⁴⁰ Other such father figures were Milii Balakirev and Franz Liszt. See A. Sokhor, *Aleksandr Porfir'evich Borodin: Zhizn', deiatel'nost', muzykal'noe tvorchestvo* (Moscow, 1965), 45; Bärbel Zaddach-Dudek, "A. P. Borodin—russischer Musiker und Naturwissenschaftler im 19. Jahrhundert," in *Wissenschaftsgeschichte in Osteuropa: Europa literarum artiumque scientiam communicans*, ed. Aloys Henning and Jutta Petersdorf (Wiesbaden, 1998), 87–100; and R. P. LaCombe's theory as reported in George B. Kauffman and Kathryn Bumpass, "An Apparent Conflict between Art and Science: The Case of Aleksandr Porfir'evich Borodin (1833–1887)," *Leonardo* 21 (1988): 429–36, 434. Stasov stoked these flames: "[Zinin] considered [Borodin] his spiritual son, and Borodin from his side considered him a second father." Stasov, "Aleksandr Porfir'evich Borodin" (cit. n. 37), 149. Much of this is derived from Dobrosлавin's reminiscences solicited by Stasov: A. P. Dobrosлавin, "Vospominaniia o A. P. Borodine," *Muzykal'noe nasledstvo* 3 (1970): 261–5, 261.

⁴¹ See the correspondence regarding permission to take his master's exam: Borodin to Rector of St. Petersburg University Aleksandr Pletnev, St. Petersburg, 23 March 1859, f. 14, op. 1, d. 5983, l. 1, TsGIASPB; Pletner to Dean of Physico-Mathematical Faculty of St. Petersburg University Emilian Khristianovich Lenz, St. Petersburg, 29 May 1859, f. 14, op. 3, d. 14709, ll. 51–51ob, TsGIASPB.

⁴² Borodin to his mother (Avdot'ia Konstantinovna Kleineke), 15 Aug. 1857, Heidelberg, *BorP*, 1:27–8; Dianin, *Borodin* (cit. n. 38), 40.

⁴³ The subsidy in Borodin's case came from the Ministry of War, which connected it with potential future service in the Medico-Surgical Academy, which was under its jurisdiction. Most other subsidies came from the Ministry of Popular Enlightenment, which was in charge of the university system. Occasionally, the view has been voiced that Zinin sent Borodin to Heidelberg so Mendeleev—who was already there—could straighten him out from his musical leanings and make him serious about chemistry, as for example in Victor I. Seroff, *The Mighty Five: The Cradle of Russian National Music* (1948; repr., Freeport, N.Y., 1970), 71. There is not a single trace of evidence for this claim.

reprise the usual aesthetic awe one finds among nineteenth-century visitors to Heidelberg, as in this letter of November 25, 1859:

Heidelberg is a very nice and clean town—clean to the point that there is no need for galoshes. On Saturdays awkward German women wash not only the sidewalks but also the streets. The location of the city is unusually picturesque: on the one side are mountains (on one of them the wonderful ruins of a castle, overgrown with ivy), on the other side a charming river. The view from my windows is unparalleled—directly before my windows begins an enormous mountain—the *Kanzel* with a tower at its peak.⁴⁴

Even before reflecting on his surroundings, however, Borodin was quick to connect with the society of Russians in the town, especially those he had already met as students in St. Petersburg. (The link of higher education in St. Petersburg, or some connection with the institutions of that city, was one of the most common features of members of the Russian chemical *kruzhok*.) Almost his first stop, as he reported on November 5, 1859, was to the Russian watering hole of the *Badischer Hof*: “Having stopped at the *Badischer Hof* we immediately happened upon the *Hôtel* where all our Russians living in Heidelberg dine. At the table d’hôte I saw Mendeleev[,] Sechenov and many others. After dinner we all headed to Mendeleev’s place; he has a very nice laboratory, clean and even supplied with gas.”⁴⁵ Already here we can see several features of importance: the conglomeration of Russians, the specific locations where they gathered, and the importance of proximity to a laboratory. Borodin even couched his move to *Karpfengasse 2*, a few months later, in terms of proximity to his research: “The chief advantage is that I live next to the laboratory—that’s why I moved.”⁴⁶ Erlenmeyer’s laboratory was two doors down.

The hotel and restaurant *Badischer Hof* was only one of several regular meeting sites, which can be determined easily from Borodin’s letters. The most obvious was Erlenmeyer’s facility at *Karpfengasse 6*, but there were others. Among the most often invoked was the pension run by Karl Hofmann (1811–1877), a former professor of Greek literature at Moscow University (appointed in 1835), who had been forced to leave Russia for Heidelberg in 1849 as a direct result of Tsar Nicholas I’s reaction to the German revolutions of the previous year. He set up his establishment with his Russian wife, Sof’ia Petrovna, and he taught as a privatdocent at Heidelberg University from 1850 onward. His wife in particular turned the establishment at *Bergheimer Straße 14* into a lively center for the émigré Russians. As Borodin’s future wife, whom he met in Heidelberg while she was on a rest cure for tuberculosis, recalled: “We arrived in Heidelberg and stayed in the pension of Hofmann, a former professor of Moscow University. All Russians then would stay at Hofmann’s, as if in memory of his former relationships in Moscow.”⁴⁷ Borodin himself returned while on a scientific visit to Heidelberg in 1877, hoping to see Hofmann again, but found only his widow and some fond memories.⁴⁸

Perhaps most the most important feature one finds in Borodin’s letters, however,

⁴⁴ Borodin to his mother, 25 [13, OS] Nov. 1859, Heidelberg, *BorP*, 1:36.

⁴⁵ Borodin to his mother, 5 Nov. 1859, Heidelberg, *BorP*, 1:33.

⁴⁶ Borodin to his mother, [3/31 or 4/1] 1860, Heidelberg, *BorP*, 1:39.

⁴⁷ E. S. Borodina, “Vospominaniia ob A. P. Borodine, zapisannye S. N. Kruglikovym,” *Muzykal’noe nasledstvo* 3 (1970): 241–52, on 246.

⁴⁸ Borodin to his wife, 30 [18, OS] July 1877, Heidelberg, *BorP*, 2:163. On the details of Hofmann and the pension, see Birkenmaier, *Das russische Heidelberg* (cit. n. 28), 158. For a lively account

was not so much Russians visiting each other in defined spaces, or the way socializing and chemistry were interlinked, but the social institution in which these phenomena took place. Borodin was very explicit that the major form was the *kruzhok*:

The society of foreigners forms here its own circles [*kruzhki*] and does not get acquainted with Germans. There are a lot of Russians here; among them even two literary women—Marko-Vovchok and another lady of some sort who writes articles. There are even Russian literary evenings.

The Russians divide into two groups: those who do nothing, i.e., the aristocratic Golitsyns, Olsuf’evs, etc., and those who do something, i.e., students. These latter all gather together and go for dinner and for evenings out. I have come out, in short—of course with Mendeleev and Sechenov—as a perfect gentleman, extraordinarily simple and very active. The society of Germans is unbearable in the extreme, [with its] primness [and] horrible gossips. . . . And the women here! Simply horrible!—what mugs. The society of German students is yet more repulsive: terrible schoolboyish behavior—downright infants. Imagine that they are all divided into parties, each of which has its own boss, a seigneur. The students of the different parties differ by dress and colors; some have yellow caps, others red ones, a third group white ones and so on. Besides this each student has a silk strap across his shoulders; the seigneur has a tricorne hat. The fashion of the caps is the most curious. Add to this still enormous jackboots of the strangest form, and you will begin to have a sense of the dress of a German student. On Sundays the students get drunk and it is a rare week that goes by without a duel. . . . These duels, on the other hand, are always restricted to trivialities: one has his forehead cut open, another his face—and that’s it. All of their ventures are conducted with a heap of the most ridiculous formalities, which are however always carried out to the letter.⁴⁹

The antipathy to Germans as people (often on aesthetic grounds) and the mocking of the tradition of dueling are not idiosyncratic features of Borodin’s account; they are tropes in foreigner lore. One of the most distinctive features of Heidelberg as a college town in the middle of the nineteenth century was the relatively prominent position of regional societies (*Burschenschaften*) among the student body. Roughly a quarter of the students in the first half of the century belonged to one of these organizations, with membership usually linked either to one’s home region or to the notion of a potentially unified German nation (as in the Teutonia society).⁵⁰ In addition to providing social cohesion for *Landsmänner* who were far away from their home states, the *Burschenschaften* also served as a forum for manly rites of passage, such as the ritual dueling that left scars on the cheeks of the loser. Dueling, of course, was a noted aristocratic (and even nonaristocratic) activity in many countries in the nineteenth century, Russia not least of them; but the nonlethal and corporate nature of German university students’ contests as a distinctive social form sparked particular comment from both Germans and foreigners.⁵¹

of evenings at the pension during the late 1850s, see A. V. Romanovich-Slavatinskii, “Moia zhizn’ i akademicheskaia deiatel’nost’ 1832–1884 gg.,” *Vestnik Evropy* 38 (1903): no. 1:138–197; no. 2:606–50; no. 3:168–214; no. 4:527–66; no. 5:181–205; no. 6:499–508.

⁴⁹ Borodin to his mother, 25[13, OS] Nov. 1859, Heidelberg, *BorP*, 1:36–7.

⁵⁰ Peter Classen and Eike Wolgast, *Kleine Geschichte der Universität Heidelberg* (Berlin, 1983), 44.

⁵¹ Ute Frevert, *Men of Honour: A Social and Cultural History of the Duel*, trans. Anthony Williams (Cambridge, UK, 1995), chap. 4; Frevert, “Honour and Middle-Class Culture: The History of the Duel in England and Germany,” in *Bourgeois Society in Nineteenth-Century Europe*, ed. Jürgen Kocka and Allen Mitchell (Oxford, 1993): 207–40; and Herman Haupt, ed., *Handbuch für den Deutschen Burschenschaftler* (Frankfurt am Main, 1922). For a humorous American interpretation of the duels, see the wonderful account in Mark Twain, *A Tramp Abroad* (1880; repr., New York, 1997), chaps. 5–6.

Perhaps most noteworthy about Borodin's (and other Russians') hostility to the Burschenschaften is what is left unsaid: these were organizations created primarily to provide some sense of territorial identity and cohesion for Germans studying in Baden, away from their families and homesteads.⁵² This has two implications. First, the Russian postdocs were *by definition* excluded from participation in this incredibly important socialization ritual, and thus the Burschenschaften reinforced Russians' isolation from their German peers and encouraged them even further to seek the society of their compatriots. Second, the omnipresence of this kind of semistructured social formation—in the case of the Burschenschaften, quite structured, with uniforms and insignia—performed a function analogous to that of the kruzhok and must have been an additional spur to the mostly unconscious importation of that Russian institution to Heidelberg.

Of the individuals in our photograph, Borodin may have been the most prolific and astute reporter of that institution, but he was not its dominant figure. That role was assumed, perhaps obviously from the image, by the young man sitting in the center: Dmitrii Ivanovich Mendeleev (1834–1907).⁵³ Today Mendeleev happens to be the most well-known nineteenth-century Russian chemist, a fame built entirely on his 1869 formulation of the periodic system of chemical elements, a feat still nine years in the future for him at the time of the photograph. During his two-year stay in Heidelberg, from 1859 to 1861, Mendeleev was not yet a prominent inorganic chemist and central figure in the Petersburg community. What force he had in the group was due to his apparent cleverness and breadth in chemical knowledge, his willingness (as documented above by Borodin) to secede from formal laboratory structures and strike out in organic chemistry on his own in his apartment laboratory, and his lively personality. A satellite member of the kruzhok, physiologist Ivan M. Sechenov, later noted in his autobiography: "Mendeleev made himself, of course, the center of the kruzhok, moreover since, regardless of his young age (he is years younger than I), he was already a prepared chemist, and we [others] were students."⁵⁴ T. P. Passek, the sister of the prominent Russian socialist thinker and activist Aleksandr Herzen, joined other travelers in similar accolades for Mendeleev's personality, entirely divorced from (because ignorant of) any chemical acumen.⁵⁵ The kruzhok met frequently at Mendeleev's apartment at Schulgasse 2, which lay at some remove from Erlenmeyer's chemical laboratory and Borodin's apartment on Karpfengasse. Of course, Mendeleev did not spend all of his time on chemistry or even in Heidelberg. Of the twenty-two months Mendeleev spent abroad on his postdoctoral stay, only five months and twenty days were spent in Heidelberg—the rest was on the road, visiting Italian, French, and German university towns to gather materials, equipment, and literature for the return trip to St. Petersburg, where such supplies were rare.⁵⁶ And, like Borodin, Mendeleev

⁵² Frevert, *Men of Honour* (cit. n. 51), 87; and Rudolf Sperling-Sueviae, *Der Ausschuss der Heidelberger Studentenschaft* (Heidelberg, 1911).

⁵³ For biographical details on Mendeleev, see Michael D. Gordin, *A Well-Ordered Thing: Dmitrii Mendeleev and the Shadow of the Periodic Table* (New York, 2004).

⁵⁴ Ivan Mikhailovich Sechenov, *Avtobiograficheskie Zapiski Ivana Mikhailovicha Sechenova* (Moscow, 1945), 96.

⁵⁵ T. P. Passek, "Vospominaniia T. P. Passek [Chapter 32]," *Russkaia Starina* 20 (1877): 277–300, 294. See also the memoirs of one of Passek's visitors at this time, E. F. Iunge, *Vospominaniia (1843–1860 g.g.)* ([Moscow?], [1914]), 285–8.

⁵⁶ M. D. Mendeleeva, "Novye materialy o zhizni i tvorchestve D. I. Mendeleeva v nachale 60-kh godov," *Nauchnoe Nasledstvo* 2 (1951): 85–94, 92.

clearly felt his experience in Heidelberg was a unique one while it was happening, for he kept a diary of his time abroad, a practice he discontinued shortly after his return to St. Petersburg.⁵⁷ Mendeleev and the kruzhok also read contemporary Russian literature—notably I. A. Goncharov's seriocomic satire of Russian apathy *Oblomov*⁵⁸—and he tore himself away from his peers long enough to father an illegitimate child with an actress.⁵⁹

To return to our photograph, the man sitting on the left is Nikolai Zhitinskii, and he appeared numerous times in correspondence concerning Mendeleev. Mendeleev was asked on occasion by his friends in St. Petersburg to pass regards to Zhitinskii, and Borodin referred to him twice in letters home as "a certain Zhitinskii," always in the context of Mendeleev.⁶⁰ And this is all we know about him today. He published no articles deriving from his chemical research in Heidelberg, and when he returned to St. Petersburg, he vanished without leaving a documentary trace. In this sense, he was a far more typical Russian Heidelberger than either Borodin and Mendeleev, who achieved contemporary fame in music and science, respectively. Most of those who went abroad came back, failed (or failed to try) to find academic jobs, and were lost to history. Zhitinskii serves thus as a marker for both the majority experience of foreign study and for what Russians such as Mendeleev and Borodin feared would happen to them.

The case of the man standing on the right in the photograph is more sobering. His name was Ladislaus Olevinsky, and he was, technically speaking, not a Russian but a Pole. (Poland, of course, had ceased to exist as an independent state since its final partition in 1795, and Olevinsky hailed from the Russian empire.) While most of the Russian postdocs engaged in experimental organic chemical research, Olevinsky was almost unique in having high ambitions of participating in the transformation of organic theory then being effected (separately) by August Kekulé and Aleksandr Butlerov. Although he did publish a few articles while in Heidelberg based on work in Erlenmeyer's laboratory, he was also engaged in formulating a theory of chemical affinity that he believed would transform chemistry. Borodin, for his part, thought the theory was not as interesting as Olevinsky expected it would be and considered most of it heavily derivative of Butlerov's work. Indeed, Olevinsky had spent significant time shadowing Butlerov in Paris, and Borodin was certain that both the ambition and the results stemmed from that proximity.⁶¹

Olevinsky descended into paranoia. He was convinced that Butlerov had been stealing ideas from him, and he also commented on several occasions that Erlenmeyer had been appropriating his work. A friend sadly commented in a letter to Mendeleev

⁵⁷ For this illuminating document, see the helpful publication D. I. Mendeleev, "Dnevnik 1861 g.," *Nauchnoe nasledstvo* 2 (1951): 111–212.

⁵⁸ Sechenov, *Avtobiograficheskie Zapiski* (cit. n. 54), 97. Sechenov incorrectly remembers this book as *Obryv*, also by Goncharov, an impossible choice due to publication dates. Mendeleev also recalls *Oblomov* specifically in his diary.

⁵⁹ Although known to Mendeleev's peers, this fact was kept quiet until recently. For details on Agnes Voigtmann, Mendeleev's mistress, see Birkenmaier, *Das russische Heidelberg* (cit. n. 28), 111; and Annette Nolte, *D. I. Mendeleev in Heidelberg, Russica Palatina*, vol. 22 (Heidelberg, 1993), 79.

⁶⁰ Borodin to his mother, [3/31 or 4/1] 1860, Heidelberg, *BorP*, 1:38; and Borodin to Ivan Maksimovich Sorokin, 8 April 1860, Heidelberg, *BorP*, 1:41.

⁶¹ Borodin to Mendeleev, 19 [7, OS] Jan. 1862, Pisa, *BorP*, 4:253. For Olevinsky's research, see, e.g., Ladislaus Olevinsky, "Ueber das chemische Verhalten der Metall-Aldehydate," *Zeitschrift für Chemie und Pharmacie* 4 (1861): 360–2; and Olevinsky, "Ueber die Wirkung des Benzoylchlorürs auf Natriumbenzylaldehydat," *Zeitschrift für Chemie und Pharmacie* 4 (1861): 625–6.

(already back in St. Petersburg) that Olevinsky's antics stemmed from his having "lost faith in his capability as a chemist."⁶² Mendeleev could hardly have been surprised by this. A visitor to the Heidelberg *kruzhok* had noted that a similar relationship of envy and persecution existed between Mendeleev and Olevinsky, analogizing them to Aleksandr Pushkin's depiction of Mozart and Salieri.⁶³ The level of alienation grew, especially after Mendeleev left Heidelberg in early 1861, and Olevinsky started to distance himself from the only support network he had left: the *kruzhok*. Poles in Heidelberg—who, because of quotas in tsarist universities, constituted the largest foreign population in Heidelberg—refused to sit with Olevinsky at dinner on one occasion (the reason is unclear from the sources, but it seemed related to debates within Polish politics that would eventually erupt in the abortive 1863 Polish uprising against the Russian empire). This only reinforced Olevinsky's feeling of persecution. As Borodin wrote to Mendeleev shortly afterward: "The next week they found [Olevinsky] dead. He dispatched himself with potassium cyanide. What drove him to this is unclear, and the papers he left behind him don't explain anything. He only wrote that the reason was fear of the government, that he already over a week ago burned his diary, memoirs, etc., and bought CyK, but wavered and hadn't decided to take it. It's a blow."⁶⁴

These four individuals, then, represented four paths for Russian Heidelbergers. Some, such as Borodin, returned to Russia, worked as chemists professionally, but devoted most of their time not to research but to nonscientific activities. Others, such as Mendeleev, continued on the path of independent research—although understandably with less spectacular success than Mendeleev achieved. And others went nowhere, either in terms of their careers, or, tragically, because the strains and tensions of being young and on their own proved too much.

Although most chemists we have record of did not descend to an abyss as extreme as Olevinsky's, all felt some apprehension on leaving Heidelberg to return to Russia. Borodin, for example, wrote home after borrowing some money from Erlenmeyer and heading off to Rome with Mendeleev in October 1860:

I admit I am a little sad to part with Heidelberg, where I so peacefully and well spent almost an entire year. True, besides Erlenmeyer, I got to know almost no Germans, and only recently was I in one very nice English group. Thus our Russian *kruzhok* lived here truly as friends, amiably, each lending another mutually what he could. It is unlikely that one will find such a tight and friendly *kruzhok* in another place.⁶⁵

Not even in St. Petersburg, their home.

⁶² N. Il'in to Mendeleev, 5 Feb. 1862, Heidelberg, ADIM I-V-55-1-28. Olevinsky's surviving two letters to Butlerov, dated 1861, both explicate his "theory of limits" in organic chemistry and accuse Butlerov of stealing it. See the reproductions in G. V. Bykov, ed., "Pis'ma russkikh khimikov k A. M. Butlerovu," *Nauchnoe nasledstvo* 4 (1961), 294–301.

⁶³ Romanovich-Slavatinskii, "Moia zhizn' i akademicheskaia deiatel'nost'," (cit. n. 48), 541.

⁶⁴ Borodin to Mendeleev, 19 [7, OS] Jan. 1862, Pisa, *BorP*, 4:253–4. The suicide has proven embarrassing to certain historians, who choose instead to elide the circumstances of the sudden death, as in Figurovskii and Solov'ev, *Aleksandr Porfir'evich Borodin* (cit. n. 38), 41.

⁶⁵ Borodin to his mother, 28 [16, OS] Oct. 1860, Rome, *BorP*, 1:53–4. For another example, see D. Woeikof to Erlenmeyer, 3 March 1879, San Marco, Italy, DM-HS 1968-478/3, 2.

SQUARING THE CIRCLE: HOMECOMINGS

Why were these Heidelbergers so apprehensive about returning to St. Petersburg? It turns out that they had good reason to worry. While in Heidelberg, as Borodin wrote in early 1861 to the now repatriated Mendeleev, he tried not to think of what awaited him upon his return:

You know, I am beginning to feel that I have already lived through the greater half of my life abroad; I am somehow beginning to look at myself as a guest abroad. In the first half of my stay abroad this wasn't true; the date of my return seemed to me unusually far off. I didn't even think of Russia. Now it's different; I am beginning to think of Petersburg, of setting up a laboratory (it's funny, I know) and other miscellany, relating to everyday life in Petersburg.⁶⁶

The miscellany were not a surprise to the Russians who returned. As the fact that Borodin and Mendeleev were in epistolary contact shows, the correspondence among young chemists in St. Petersburg and abroad served a vital function of filling in students on political and (especially) academic gossip about their potential for being hired or equipping a laboratory when they returned.⁶⁷

Just as Mendeleev served as one of Borodin's informants, Mendeleev's primary source about the academic scene in St. Petersburg was one of his close friends, N. P. Il'in, who kept him updated about the fate of positions at St. Petersburg University—the plum jobs in the capital—and speculations about his future from Aleksandr Voskresenskii, their mutual mentor. A lot of gossip went back and forth.⁶⁸ At first, the prospects for a position seemed to be good if Mendeleev managed to get enough accomplished while abroad. Il'in reported: "Voskresenskii sort of said that if you finished a significant work, then maybe you might hope to receive an adjunct post; that wouldn't be bad for you; after all a docent position doesn't count for much."⁶⁹ It was so important to get the work done while away because there was little opportunity to set aside enough time for research in Russia, given the need to teach a large number of hours to support oneself. Time had to be scrounged where it could be. Il'in again: "The whole shame is that there isn't enough free time; I am counting heavily on Holy Week, when I'll be completely free and hope to finish everything I had planned."⁷⁰

⁶⁶ Borodin to Mendeleev, 5 March [21 Feb., OS] 1861, Paris, *BorP*, 4:246.

⁶⁷ As Birkenmaier notes: "Letters often had the additional function of private reporting from abroad, since news from abroad was not then so omnipresent as today." Birkenmaier, *Das russische Heidelberg* (cit. n. 28), 44. Most of the conventionally political gossip concerned serf emancipation, as in this letter from Sechenov to Borodin and Mendeleev, 29 June 1860: "They say the emancipation matter is entirely done. It will be promulgated at the end of the harvest, i.e., in October or November. God make it true. Then you would return to a free Russia." Reproduced in T. Volkova, "Perepiska I. M. Sechenova s D. I. Mendeleevym," *Priroda*, 1940, no. 2:86–92, on 90. Emancipation did not occur until February 1861, two weeks after Mendeleev's return to Petersburg.

⁶⁸ For example, Mendeleev in this period was continually very competitive with Nikolai N. Sokolov, and he received regular reports from Il'in about Sokolov's dissertation defense (which was fairly brutal) and his maneuvers at the university to become Voskresenskii's successor. See N. P. Il'in to Mendeleev, 3 Jan. 1860, St. Petersburg, ADIM I-V-55-1-27; and Il'in to Mendeleev, 21 June 1859 [O.S.], St. Petersburg, ADIM I-V-55-1-27; Il'in to Mendeleev, 22 Feb. 1860, St. Petersburg, ADIM I-V-55-1-30.

⁶⁹ Il'in to Mendeleev, 22 Feb. 1860, St. Petersburg, ADIM I-V-55-1-30.

⁷⁰ Ibid. And, in another letter a month and a half earlier: "Thus you see how it isn't easy, and doubtless this is one of the reasons for our not-too-fruitful researches." Il'in to Mendeleev, 3 Jan. 1860, St. Petersburg, ADIM I-V-55-1-27.

The problem was so widely recognized that it even appeared in published articles, such as one by Dmitrii Voeikov, about his analysis of iodine performed in Erlenmeyer's laboratory in Heidelberg. Voeikov lamented in print: "Sadly it was shortly before my departure for Russia that I was able to make the determination of the iodine content and the spec. weight. I reserve the right to carry this research to its end in Russia."⁷¹ Despite Il'in's encouragement, then, Mendeleev expected that he had not much more in his immediate future than hack science-writing jobs and laborious and financially unremunerative docentships, as he stated in his diary: "What I will do now for money? I'll do something. Well, in Russia I'll have to get a little poorer—not a big misfortune, on the other hand."⁷²

If the first foreseeable problem was lack of time to conduct appropriate research, the second—and in many senses equally problematic—difficulty was lack of adequate laboratory space and resources to conduct interesting research. The difficulties were diverse and unlikely to be resolved by any one individual, even assuming one had a decent paying professorship lined up, as Borodin did at the Medico-Surgical Academy. Recalling Mendeleev's apartment-laboratory in Heidelberg, Borodin wrote to St. Petersburg to see whether there were gas lines set up by the city on the Vyborg Side, so he could equip his laboratory with the most elementary of burners: "But, on the other hand, it is unlikely that it is possible to set this up in Russia."⁷³ It would be years before the urban infrastructure caught up to Borodin's fairly modest demands.

There was also a recent history of organizational dysfunction that could not but signal to the St. Petersburg chemists that there would be significant hurdles to organizing chemists at home and seeking forums for publication. In the late 1850s, in the capital of St. Petersburg, the epicenter of the educational system of tsarist Russia, there were long-standing places where chemistry could be studied (institutions such as the Technological Institute, St. Petersburg University, and the Academy of Sciences). After the Crimean War, these sites continued to produce a small number of specialists who mostly went into teaching, training a meager number of pharmacists and industrial chemists. From 1857 to 1860, an attempt to provide a forum for chemists to organize emerged that was designed to be not merely an educational opportunity for further training but a stepping-stone to a fully functioning chemical community: the private laboratory and journal of Nikolai N. Sokolov (1826–1877) and Aleksandr N. Engel'gardt (1832–1893). Both these chemists were ambitious and talented and undertook strategies *exactly* like those that D. I. Mendeleev and A. M. Butlerov would later employ to such excellent effect—Sokolov in speculative theoretical chemistry like Mendeleev, and Engel'gardt in what would become Butlerov's area of experimental organic chemistry. And yet their professional strategies came to naught. These efforts provide a background of failure to institutionalize and organize that contrasts vividly with the rapid entrenchment of a national chemical community based in St. Petersburg only a decade later. It is only by reflecting on the contrast between the states before and after that the importance of the kruzhok and postdoctoral study in Heidelberg can be appreciated.

⁷¹ D. Woiehoff [Voeikov], "Ueber die Einwirkung von Zinknatrium auf Jodallyl," *Zeitschrift für Chemie und Pharmacie* 6 (1863): 537–9.

⁷² Diary entry of 11 Jan. 1861, Mendeleev, "Dnevnik 1861 g." (cit. n. 57), 115. For more detail on Mendeleev's dire financial situation at the time, see Gordin, *Well-Ordered Thing* (cit. n. 53), 19–22.

⁷³ Borodin to Mendeleev, 5 March [21 Feb., OS] 1861, Paris, *BorP*, 4:247.

At first, probably using Engel'gardt's funds from his patrimonial estate, the two chemists put together a private laboratory—explicitly modeled on Justus von Liebig's Giessen laboratory—that would be open to chemists in the St. Petersburg area.⁷⁴ The idea was to provide a place for individuals to advance chemical knowledge while waiting for an appointment at an institution that could provide them with more permanent laboratory space, generating a chemical network as a byproduct. As a complement to this effort, in 1859 Sokolov and Engel'gardt set up the other sine qua non of professionalized midcentury chemistry: a chemical journal. This periodical, *Sokolov and Engel'gardt's Chemical Journal*, came out in only four volumes over two years. The journal intended to offer an outlet for Russian chemical works published in their native language, but besides publishing the dissertations of the editors and a few incidental original pieces, the journal quickly devolved into publishing translated abstracts of important Western articles. As it was unable to sustain itself in this derivative format—most chemists in Russia could read the German, French, and English originals—the journal went under in 1860.⁷⁵ The laboratory closed that same year, mostly because Sokolov received a privatdocent post at St. Petersburg University and simply donated the laboratory to the university.⁷⁶ In 1869, Engel'gardt was exiled from St. Petersburg for his populist agricultural writings and confined to his rural estate, thus terminating his scientific career.⁷⁷

Sokolov and Engel'gardt did not significantly participate in the burgeoning professionalization of Russian chemistry in the 1860s. The fault (not their own) was that they were born too early; when they reached intellectual maturity, the state was not yet willing to encourage science. There are two additional points to make about this brief venture: First, although there was some demand for both the laboratory and the journal, neither had enough demand to make them going ventures financially. Second, when Sokolov obtained a better post, he simply disbanded the laboratory and moved it to the state institution that employed him. There was neither any sense of loyalty to the project of an autonomous professional community on his part nor enough corporate sensibility among other chemists to resist him. The point of the laboratory may have originally been to focus the network of chemists, but a community had not congealed yet. Nor was it the only failure. N. P. Il'in wrote to Mendeleev in Heidelberg on December 22, 1860 (that is, after the collapse of the Sokolov/Engel'gardt venture):

[L. N.] Shishkov is agitating here for the establishment of a Chemical Society, and the affair moves forward somewhat murkily because he proposed printing the minutes of

⁷⁴ On the importance of Liebig for the transformation of chemical pedagogy via laboratory instruction, see W. H. Brock, *Justus von Liebig: The Chemical Gatekeeper* (Cambridge, UK, 1997); and J. B. Morrell, "The Chemist Breeders: The Research Schools of Liebig and Thomas Thomson," *Ambix* 19 (1972): 1–46.

⁷⁵ Nathan M. Brooks, "Russian Chemistry in the 1850s: A Failed Attempt at Institutionalization," *Annals of Science* 52 (1995): 577–89; and Iu. S. Musabekov, "Pervyi russkii khimicheskii zhurnal i ego osnovateli," in *Materialy po istorii otechestvennoi khimii*, ed. N. A. Figurovskii et al. (Moscow, 1953), 288–302.

⁷⁶ N. Menshutkin, "Pamiati N. N. Sokolova," *ZhRFKhO* 10 (1878): 8–15; P. Lachinov, "Moi vospominaniia ob N. N. Sokolove," *ZhRFKhO* 10 (1878): 15–9.

⁷⁷ The writings in question are translated as *Aleksandr Nikolaevich Engelgardt's Letters from the Country, 1872–1887*, trans. and ed. Cathy A. Frierson (New York, 1993). See also N. S. Kozlov, "Nauchnaia i obshchestvennaia deiatel'nost' A. N. Engel'gardta," *Trudy Instituta istorii estestvoznaniia i tekhniki* 30 (1960): 111–34.

meetings, which requires money and material. The first we can and could have in the necessary quantity, but the second would be, probably, rather little.⁷⁸

The idea (in this case modeled on the Société Chimique in Paris) went nowhere, and the chemists remained disorganized. Every single attempt to organize in the late 1850s and early 1860s simply floundered. Some kind of catalyst to corporate cohesion appeared to be missing.

The failure to coordinate was evident to the Heidelberg postdocs. Borodin wrote Mendeleev sarcastically from Paris about the continued misperception abroad that the situation was better than it was: "Maréchal Vaillant gave a speech and said, among other things, that 'the founding of the Société des amis des sciences cannot remain without influence on other nations and serves as a spur for the foundation of similar societies in England and Russia.'—Where?—I somehow haven't heard of such a society at home."⁷⁹ However, Heidelberg showed the expatriate chemists exactly what the potential of group organization could be. Heidelberg's Natural Historical and Medical Association (*Verein*) was reopened in 1856 (it had closed in 1848) and comprised forty-eight initial members, including some of the most prominent scientists in Heidelberg (such as Bunsen, Kirchhoff, and Erlenmeyer). This was a model the Russians saw up close, one that functioned essentially without official endorsement.⁸⁰

Alongside these various foreign formal models for the organization of chemists as a professionalized entity, there was also an informal model for organization that the Russians could use when they returned to St. Petersburg: the *kruzhok*, which they had exported to Heidelberg initially to deal with the cultural alienation they felt. Back in St. Petersburg, it was a natural solution—albeit relatively untried in the sciences—to the organizational failures of Russian academia, to Engel'gardt and Sokolov's abortive ventures, to Shishkov's deflated effort, and to the newly acquired feeling of isolation induced by contrast to the closeness they had felt in Heidelberg.

OPEN CIRCLES: THE FORMATION OF THE RUSSIAN CHEMICAL SOCIETY

The transformation of the local *kruzhok* into an ersatz chemical society happened on two fronts: in Heidelberg and in St. Petersburg. The Heidelberg transformation was one largely of perception. The *kruzhok* already existed, and chemistry was already its focal point. What the local Russian chemistry students started to do in the early 1860s was to *think* of their informal circle as a budding chemical society. Borodin noted this connection in mid-1861 in a letter from Heidelberg to chemist Petr Alekseev: "Here we are forming (at first, it stands to reason, only in our own *kruzhok*) a chemical society—all in the family, for now."⁸¹ He stated it more bluntly for the just-departed Mendeleev: "A chemical society is being formed here."⁸² Of course, this was more wishful thinking than a reflection of true organization and professionalization; the *kruzhok* had merely acquired a conceptual patina.

In St. Petersburg, by contrast, the *kruzhok* was reinigorated by its former Heidel-

⁷⁸ Quoted in V. V. Kozlov, *Vsesoiuznoe khimicheskoe obshchestvo imeni D. I. Mendeleeva, 1868–1968* (Moscow, 1971), 11.

⁷⁹ Borodin to Mendeleev, 3 April [22 March, OS] 1861, Paris, *BorP*, 4:248.

⁸⁰ Wolfram Schmitt, "Struktur und Funktion des Naturhistorisch-Medizinischen Vereins zu Heidelberg im 19. Jahrhundert," *Heidelberger Jahrbücher* 22 (1978): 71–92.

⁸¹ Borodin to P. P. Alekseev, 24 [12, OS] May 1861, Heidelberg, *BorP*, 4:251.

⁸² Borodin to Mendeleev, 28 [16, OS] May 1861, Heidelberg, *BorP*, 4:251.

berg participants who now found themselves back home with no one to talk to. This new social forum allowed for a continuation of the intimacy attested to in Heidelberg, and since it took place in their new permanent home, they would never have to leave it.⁸³ It would soon grow into a more formal organization due to two factors: demographic growth and the reforms of the 1860s.

The demographic growth was straightforward. Heidelberg proved a common destination for Russian chemical postdocs, but it was still a relatively exclusive club. Not every graduate student got to go abroad, and not everyone went to Baden, so the population attending the *kruzhok* stayed within certain confines. Upon their return to Russia, the chemists felt an even stronger pull to settle in St. Petersburg. This was the growing center of the chemical world in Russia (competing with and then displacing Kazan University, and before the growth of Moscow University's chemistry laboratories during the 1870s) and was thus the most likely place to gain employment, either in academia or in the nascent chemical industry. "Chemical evenings" became very common, as one can find from traces in much of the correspondence. Borodin jumped right into the fray when he returned from Baden, even choosing the chemists' *kruzhok* over the musical *kruzhok* at the apartment of his composition mentor, Miliĭ Balakirev.⁸⁴ (This other *kruzhok* eventually grew into the "mighty little heap" [*moguchaia kuchka*] of Balakirev, Borodin, César Cui, Modest Musorgskii, and Nikolai Rimskii-Korsakov—the epicenter of Russian nationalist music.)⁸⁵ Borodin's vigor soon flagged, and in 1864 he wrote to Alekseev: "I haven't been to the chemical meetings for a long time. I have gotten lazy and there is little time."⁸⁶ They continued without him, however, including papers read by P. P. Alekseev, F. K. Beilstein, N. N. Beketov, Voskresenskii, Nikolai Zinin, N. P. Il'in, M. D. L'vov, G. V. Struve, A. I. Skinder, A. S. Famintsyn, A. I. Khodnev, and L. N. Shishkov—at least half of whom had participated in the Heidelberg *kruzhok*.⁸⁷ Mendeleev was still attending them as late as October 1868, a month before the formation of the Russian Chemical Society.⁸⁸ The sheer number of chemists in the capital and the corporate interests in intradisciplinary communication and publication provided a strong internal impetus to the creation of just such a *professional* body. It was a *kruzhok* grown too big for its britches.

There was simultaneously external pressure from the modernizing bureaucracy and the autocracy of tsarist Petersburg in the 1860s. As noted earlier, the tsarist state expressed a prominent need to "modernize" in terms of emulating the structures of western Europe. Although bureaucrats obviously recognized the importance of adapting certain structures from educational institutions—witness the establishment of the postdoctoral emigration in the first place—a broader cultural movement agitated

⁸³ P. Trifonov, "Aleksandr Porfir'evich Borodin: Biograficheskii ocherk," *Vestnik Evropy* 23 (1888): no. 10:747–79, 755; no. 11:46–81; Iu. V. Ionov and A. Iu. Ionov, "A. P. Borodin—vrach, khimik, pedagog (K 150-letiiu so dnia rozhdeniia)," *Sovetskoe zdavookhranenie*, 1984, no. 1:61–4, 62; and Dianin, "Aleksandr Porfir'evich Borodin" (cit. n. 39), 370.

⁸⁴ Borodin to Balakirev, 8 Dec. 1863, St. Petersburg, *BorP*, 1:59.

⁸⁵ On the *kuchka*, see Francis Maes, *A History of Russian Music: From Kamarinskaya to Babi Yar*, trans. Arnold J. Pomerans and Erica Pomerans (1996; repr., Berkeley, Calif., 2002); and Richard Taruskin, *Opera and Drama in Russia: As Preached and Practiced in the 1860s* (1981; repr., Rochester, N.Y., 1993).

⁸⁶ Borodin to P. P. Alekseev, 12 March 1864, St. Petersburg, *BorP*, 4:264.

⁸⁷ See Kozlov, *Vsesoiuznoe khimicheskoe obshchestvo imeni D. I. Mendeleeva* (cit. n. 78), 11.

⁸⁸ Iu. F. Fritzsche to Mendeleev, 12 Oct. 1868, St. Petersburg, ADIM I-V-7-1-24.

for the erection of the decentralized structures of Western professional life. Voluntary associations assumed a new importance in the Russia of the Great Reforms, as aspects of rural and urban governance were simultaneously being devolved to the newly emergent category of "citizen." Before the Great Reforms, Moscow only had a few voluntary societies, the majority of them charities. The autocracy really began to spur the emergence of such societies by allowing, even encouraging, *zemstva* (rural land councils) and other local organizations to encroach on its public role. Scientific societies were a particular form of this activity after the reforms, and almost every significant scholar was to some degree part of a social grouping, picking up on the tradition of the Russian Geographical Society, which had been a seedbed of the reforms in the first place.⁸⁹

Nevertheless, no social movement on this scale moves monotonically or without resistance. Although parts of the autocracy clearly endorsed this new civic culture, other segments (particularly the security apparatus) were concerned about these new destabilizing forces. Professional societies in the sciences sold themselves as part of the more conservative modernization trend, claiming to bolster scientific progress and thus fiscal stability. In August 1861 the announcement of an organization of Moscow doctors lamented the scarcity of similar organizations: "We have few scientific societies and still less that have in mind the practical side of knowledge which comes into contact with the daily activity of the country. The absence of such associations serves as one of the chief reasons of the extremely slow dissemination of useful information to the people."⁹⁰ The chemists similarly encouraged this rhetoric of their own with a plea for a chemical organization in the St. Petersburg newspaper *Russkii Invalid*:

A chemical society, in our opinion, is entirely possible in Petersburg. There live our most famous chemists, Messrs. Voskresenskii, Zinin, Mendeleev, Sokolov, Shishkov, Khodnev, and Engel'gardt—and in general in Petersburg many young people occupy themselves by studying chemistry. Why shouldn't our scientists gather around themselves an entire society?

We consider it unnecessary to discuss the utility of such a society. Under the society there could be a public laboratory, which there isn't in Petersburg at this time. The University laboratory is too small and serves only for University students. . . . It is too hard to get access to the Academy laboratory. . . . The establishment of a physicochemical society could enable the publication of a "Chemical Journal," in which a division could also be opened for physics.⁹¹

These calls did not result directly in the creation of a chemical society, of course. There were two potential obstacles: one internal to the chemical community, and one external. In Mendeleev's papers, one finds the remnants of a poll taken at one of the

⁸⁹ Joseph Bradley, "Voluntary Associations, Civic Culture, and *Obshchestvennost'* in Moscow," in *Between Tsar and People: Educated Society and the Quest for Public Identity in Late Imperial Russia*, ed. Edith W. Clowes, Samuel D. Kassow, and James L. West (Princeton, N.J., 1991), 131–48; and E. V. Soboleva, *Organizatsiia nauki v poreformennoi Rossii* (Leningrad, 1983). On the Geographical Society, see Lincoln, *In the Vanguard of Reform* (cit. n. 3), 98–100.

⁹⁰ *Russkii Vestnik—Sovremennaia Letopis'*, no. 32 (Aug. 1861): 23, quoted in Kozlov, *Vsesoiuznoe khimicheskoe obshchestvo imeni D. I. Mendeleeva* (cit. n. 78), 13.

⁹¹ "Vnutrenniia Izvestiia," *Russkii Invalid*, 17 Aug. 1861, 733. This anonymous piece was almost certainly penned by Mendeleev—as indicated by the cheekiness of including his postdoctoral name among the actual intellectual and institutional leaders of Petersburg chemistry and the insistence on a cooperation between chemistry and physics.

meetings of the chemical *kruzhok* in St. Petersburg about whether they should petition the Ministry of Popular Enlightenment for official recognition of a chemical society. The vote was seventeen in favor, four opposed. Those four were A. R. Shuliachenko, A. N. Engel'gardt, P. A. Lachinov, and G. G. Gustavson. None of them was a Heidelberger. An early petition from August 17, 1865, was left "without action" on the desk of a ministry functionary.⁹² In January 1868, the Chemical Section of the first Russian Congress of Natural Scientists and Physicians, meeting in St. Petersburg—a conference established by the ministry to increase communication among Russian naturalists—petitioned for the authorization of a chemical society. At this point, with the massive proliferation of such specialist scientific societies both in Russia and abroad, the ministry began to relent and approved the plea of October 26. The Chemical Society, under president N. N. Zinin, began meeting shortly afterward.⁹³ The *kruzhok* dissolved as a matter of course.

CONCLUSION

Even though it was only one component in a synergy of factors that led to the professionalization of science in Russia, the implications of the role of the Heidelberg *kruzhok* in the creation of the Russian Chemical Society are potentially far reaching for understanding some features of the "second importation" of science into Russia. Even across the traumas of two revolutions, a civil war, the cataclysm of the Second World War, and the collapse of Communism, science has maintained a strong foothold in Russian culture. How does one explain the vitality from the middle of the nineteenth century forward, given the comparative lethargy of the pre-Great Reforms Academy of Sciences? I would argue that it was precisely in this hybridization of foreign professional organizations with the domestic institution of the *kruzhok* that allowed for such permanence.

This has everything to do with decentralization. The lesson of the first importation of Russian science into the academy was not lost on either the bureaucrats or the scientists themselves. It was simply not possible to import a science complete from abroad, hoping that institutions would emerge without the cultural backdrop to make sense of this new form of life. Instead, a blend between the forms of science already developed in western Europe with specific Russian forms helped make science something that *fit* with the environment posed by Russia. The fact that these institutions were quasi-formal, with a strong remnant flavor of the underground *kruzhok*, helps account for the stability of these institutions (the scientific societies, the scientific community) across violent ruptures in other formal structures. It is precisely this enduring stability of science in Russia despite shocks such as Lysenkoism and the collapse of the Soviet Union that requires attention to the enduring organization of the intelligentsia.

The irony of all this is that the vigor of Russian sciences was accomplished through the midwifery of alienation within Germany. And the contribution of Germany was not all negative and reactive; it was also positive in providing a forum in which different kinds of hybridizations could be experimented upon. After the establishment of

⁹² See Kozlov, *Vsesoiuznoe khimicheskoe obshchestvo imeni D. I. Mendeleeva* (cit. n. 78), 13–4.

⁹³ For details, see Brooks, "Formation of a Community of Chemists in Russia" (cit. n. 5).

the Russian Chemical Society, however, the German contributions, both positive and negative, were elided or ignored completely. Whereas correspondence with Heidelberg—with Erlenmeyer in particular—continued up to the formation of the society, it dropped off strongly afterward, and communication with the West happened through the formal reports submitted to foreign scientific societies of the doings in St. Petersburg. One way to illustrate this reinvention and domestication of the origin story is through the “founder myth” of Russian chemistry.

The founder represented is Nikolai Zinin, the first president of the Russian Chemical Society. Upon his death in 1880, an image of Zinin was presented to the chemical community by his former students from both Kazan University and the Medico-Surgical Academy in St. Petersburg as entirely *native*, without foreign influence. Consider, for example, Zinin’s obituary in the *Journal of the Russian Chemical Society*, lovingly penned by his former students Aleksandr Butlerov and Aleksandr Borodin:

With his scientific and pedagogical activity is joined the emergence of a Russian chemical school; Russian chemistry is obligated to him preeminently for its entry into autonomous life; his works first persuaded the scientists of Western Europe to allot a distinguished place to Russian chemistry. . . .

He appeared as one of the few gifted, purely Russian scientists who had real scientific achievements to his name. The German element was then very strong in Russia’s scientific estates, and in public one was hardly able to seriously distinguish chemistry from apothecaries’ affairs, the laboratory from the pharmacy, and, having become used to seeing Germans as pharmacists, one all the more paid attention to a leading chemist among the Russians.⁹⁴

It was not enough that Zinin be seen as somehow sprung out of whole cloth from Russian soil—despite the fact that he had also studied abroad in his youth—but he was given by Borodin, in a funeral oration, full credit for emancipating Russian chemistry from the German yoke:

The deceased became a professor in those distant times, when science in Russia was a phenomenon imported from the West. If one came across rare instances of autonomous developments of it here, then it was the exclusive achievement of only a few privileged scientists—professors, academics—and of that larger group of foreigners or, at least, of those who received special education abroad. Science, thus, was obtained ready-made from the West and was considered some kind of sacred object, which only the high priests of science dared deal with, guarding it from the hands of the unordained. In Russia people bowed to it, but they did not serve it; they taught it, but they did not cultivate it.

Having broad knowledge, a deep, bright mind, and a fiery love for Russia, N. N. [Zinin] understood before many others that science will not be at home with us until young forces, in the heart of the fatherland itself, are drawn to working on it, until the foundation for an autonomous Russian school is laid. And there, in Kazan, he first laid the basis of the Russian school of chemistry.⁹⁵

For the chemists who survived Zinin’s death, his image was used as a way of erasing all traces of Heidelberg and the *kruzhok* on the development of what had now

⁹⁴ A. P. Borodin and A. M. Butlerov, “Nikolai Nikolaevich Zinin: Vospominaniia o nem i biograficheskii ocherk,” *ZhRfKhO* 12, khim. ch. (1880): 215–254, on 215, 226.

⁹⁵ Borodin, funeral oration of N. N. Zinin, 9 Feb. 1880, published in *Zdorov’e*, 1 May 1880, 183–4; reprinted in *BorP*, 3:86.

become *Russian* chemistry. A usable past had been found that eliminated the entire history told in this essay.

And this points to perhaps the most important implication of the German origins of Russian *national* identification in the sciences. It was certainly not the case that chemistry in Russia was imported from Germany: there were chemists working in the Russian empire before the 1850s, and even metallurgists and the like before Peter the Great. There was long a tradition of science in Russia. But the experience of living abroad, emulating foreign institutions, and then figuring out self-perpetuating ways of adapting them—*this* promoted a sense of there being a national character to the science, a Russian *national style*. That style was theoretical, bold, impulsive, and stridently argumentative. It was the style of D. I. Mendeleev and V. V. Markovnikov. It was also the style of Emil Erlenmeyer.