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63. Korbut, 2:303, 313–14; Chanbarisov, pp. 324–25. Quote in Korbut, 2: 313.
64. G. V. Vernadskii, "Iz vospominanii," *Novyi zhurnal*, 1971, no. 104, p. 187; ibid., 1971, no. 105, pp. 203–20; G. V. Vernadskii, "Bratstvo 'Priiutino,' " *Novyi zhurnal*, 1969, no. 97, pp. 229–30.
65. *TsGA*, f. 2306, op. 1, d. 634, p. 9rev. Those turned down included the economist and Provisional Government minister A. A. Manuilov and the engineer and Kadet D. S. Zernov. The one admitted was M. I. Rostovtsev, because (according to Lunacharskii) of his great expertise as an archaeologist. As it turned out, however, Rostovtsev decided to emigrate and Zernov managed to return anyway.
66. Ipatieff, p. 271.
67. Pitirim A. Sorokin, *Leaves from a Russian Diary* (NY, 1924), pp. 229–34.
68. Ibid., pp. 224–25; *Svoboda Rossii*, July 4, 1918, no. 63; *Istoriia Leningradskogo gosudarstvennogo universiteta*, pp. 188–89.
69. *Segodnia*, Riga, Sept. 20, 1931, no. 260, p. 4; ibid., Oct. 31, 1931, no. 301, p. 2; N. O. Losskii, *Vospominaniia: Zhizn' i filosofskii put'* (Munich, 1969), pp. 209–11.
70. *Piat' let raboty Tsentral'noi komissii po uluchsheniiu byta uchenykh* (M, 1927), pp. 3–7; Chanbarisov, pp. 329–34; *Rostovskii gosudarstvennyi universitet, 1915–1965*, pp. 291–92; Sorokin, *Leaves*, pp. 245–46; *TsGA*, f. 298, op. 1, d. 21, pp. 34–35, 51, 55–56rev.
71. *Tekhnologicheskii institut imeni Leningradskogo soveta*, 1: 212; Losskii, p. 206; Sorokin, *Leaves*, pp. 223–24.
72. Korbut, 2:308; Ipatieff, pp. 277–78.
73. Korolev, p. 132.
74. Losskii, p. 212; N. S. Timashev, "1915–1921," *S-Peterburgskii politekhnicheskii institut Imperatora Petra Velikogo, 1902–1952*, sbornik no. 2 (Paris-New York, 1958), p. 120; Korbut, 2:330; N. A. Berdiaev, *Dream and Reality: An Essay in Autobiography*, trans. Katherine Lampert (New York, 1951), pp. 232–36.

NATURAL SCIENTISTS AND THE SOVIET SYSTEM

Kendall E. Bailes

Historians have traditionally stressed the weakness of the middle class in late Imperial Russia. What they have largely overlooked is that the Russian middle class, admittedly small, was also not homogeneous. It was as much a professional class, perhaps more so, as an entrepreneurial class (to use a distinction developed more fully in Harold Perkin's book *The Origins of Modern English Society, 1780–1884*). The evidence in Alfred Rieber's recent book, which documents considerable conflict between entrepreneurial, merchant, and professional groups in late tsarist Russia, strongly suggests that the already small Russian middle class was further weakened by such conflicts and by the relative size and prominence of the professionals in comparison with merchants entrepreneurs.[1]

Tension between the ideals and aims of Russian professionals and those of businessmen, including industrialists and commercial farmers, is evident in the late tsarist period and received different political expression after the legalization of parties following the 1905 revolution. The Russian middle class was weak not simply because it was small in numbers, but also because it lacked homogeneity and cohesion in its values and outlook. There were, however, growing intermediate occupational groups that were increasingly conscious of their common interests, as well as the conflicts among them, whether one chooses to call them a middle class, the middle classes, or use some other label, like entrepreneurial and professional groups. Lenin and the Bolshevik leadership, well aware of this divide within the Russian middle class between the professional occupations and entrepreneurial and mercantile groups attempted to exploit it after the October Revolution.

A study of one professional group, natural scientists, in the years from 1917 to 1921 is instructive, both in demonstrating a high degree of continuity with the prerevolutionary era in the attitudes and behavior of this professional group and its need to adapt to a rapidly changing political, social, and economic

situation. The material below should demonstrate the degree to which scientists themselves played a leading role in shaping Soviet research institutions and professional culture in the early years of the Soviet system and why they were able to maintain considerable autonomy from the state.

Natural Scientists and the Soviet State

Most natural scientists, like the large majority of other professional groups, greeted the October Revolution with either hostility or scepticism about its aims and viability. There were few Marxists among the natural scientists, let alone members or sympathizers of the Bolsheviks. In the first few weeks after the October Revolution, the General Assembly of the Academy of Sciences, the most authoritative scientific institution in Russia, passed a resolution condemning the Bolshevik seizure of power and supporting the election of a constituent assembly to create a parliamentary system. In their opposition to the October Revolution, the Academy of Sciences joined many other prominent professional organizations such as the Union of Engineers, the Teachers' Union, the Academic Union, and the Pirogov Society of Physicians, all of which passed resolutions condemning the Bolshevik seizure of power and calling for a boycott of the new government.[2] Only a handful of natural scientists, in the first few months after the October Revolution, approached the new Soviet government and offered their help.[3] Most waited for the Bolsheviks to approach them, and such overtures were not generally made until the first part of 1918.

Unlike the municipal unions and unions of government workers, however, most scientists stayed on the job and did not join the picket lines of civil servants who took strike action in front of government buildings for a time after the October Revolution. Most adopted a "wait-and-see" attitude. For the most part, their approach, expressed in N. I. Vavilov's directive to R. E. Regel at the end of 1917, was to "Act as if nothing has happened."[4] Many scientists undoubtedly hoped that, if ignored, the Bolsheviks would simply go away: their government was not considered viable, and they would not, it was believed, be able to hold onto power. Others, like the prominent geochemist and academician V. I. Vernadskii, took a longer, more evolutionary point of view. Even if the Bolsheviks did not disappear, their government would evolve into a form less radical and more suited to the realities of Russia. As Vernadskii wrote on February 9, 1918, to his former student, the mineralogist Alexander Fersman (who was to play an important role in talks between the Soviet government and the Academy of Sciences during 1918 to 1921):

> For me, one thing alone is clear. We must use all our strength to insure that scientific (and all cultural work) in Russia is not interrupted but strengthened. . . . In the final analysis, I do not doubt [our] eventual triumph and I look upon the forms of new governmental structures with equanimity: the masses are simply too great and there is too much talent in them. It is necessary to use all our effort to insure that the new generation makes a break with the past of its fathers . . . and here our chief strength lies in scientific work.[5]

There were even fewer Bolsheviks among natural scientists than among engineers and physicians, where there existed a small nucleus of party members who were to play an important organizational role in the early years of the Soviet government. The few professional scientists who were also Marxists tended to be young and lacked prestige or influence in their profession. Natural science was dominated politically by Russian liberals who were either active members of the Kadet Party or sympathized with many of its aims. Those scientists who were not political liberals tended either to be apolitical, immersed in their scientific work, or quietly conservative.

Most politically active natural scientists wanted parliamentary government, civil liberties, and local self-government, as well as economic development, the spread of education and "enlightened" ideas, and greater corporate autonomy. Curiously enough, however, there seem to have been few spokesmen for the development of capitalism per se, among those Russian scientists who did make public their views both before and after the 1917 revolution.[6] In searching for a hint of economic views in prerevolutionary writings of prominent Russian scientists one finds, if anything, that they generally stressed the need for state direction and regulation of the economy. They were probably comfortable with a mixed economy in which the state, particularly in Russia, played a leading role in economic development. Natural scientists were sympathetic toward diversification of the network of scientific research, which before 1917 was largely concentrated in the state universities and higher technical schools. They favored decentralization of its control, with a variety of sources of support, private and public, and with self-administration by autonomous groups of scientists.[7]

Many scientists had therefore pinned their hopes on the Provisional Government and its replacement by a liberal democracy allied with the democratic countries of the West, a government that would be more decentralized than its predecessor, that would encourage more initiative from its citizens, and that would permit more self-rule by public and professional bodies. The Ministry of Education of the Provisional Government had formed several commissions to prepare a reorganization of the scientific research network and to propose legal guarantees of academic freedom and increased corporate autonomy for scientific institutions.[8] The work of these commissions, which were composed of prominent scientists such as Vernadskii, the chemist N. S. Kurnakov, the physicist D. S. Rozhdestvenskii and the permanent secretary of the Academy of Sciences, Sergei F. Oldenburg, was interrupted by the October Revolution. (Before the October Revolution, Oldenburg had been minister of education in Kerenskii's cabinet; he had appointed his lifelong friend from university days, Vernadskii, asistant minister of education, in charge of higher education and scientific research institutions.)

It is therefore not surprising that the Academy of Sciences, which had felt

so powerless under the tsarist regime, would be less than enthusiastic about the overthrow of the Provisional Government, in which some of its most prominent members had become influential. Oldenburg, for example, expressed his indignation and pessimism about the Bolshevik takeover at a general meeting of the academy held on December 29, 1917: "It would be cowardly not to look truth straight in the eye and recognize now that the Russian people have failed a great historical test and not stood their ground in a great world conflict: the dark ignorant masses have succumbed to a deceptive temptation and to superficial and criminal promises, and Russia stands on the edge of destruction."[9] It is also not surprising that in one of the first official communications between the academy and the Soviet government, during early 1918, the academy's president, the geologist A. P. Karpinskii, called on the soviets to revive the work of these commissions and bemoaned the break in continuity that had become "one of the misfortunes of Russian life."[10]

What perhaps is surprising is the great caution and tact with which the Soviet government, especially the central authorities, such as Lenin and his minister of education, A. V. Lunacharskii, treated the scientific community, beginning with the Academy of Sciences. The large majority of scientists were treated with great circumspection in the early months of Soviet rule. The permanent secretary of the academy, Oldenburg, was not arrested as a former minister of the Provisional Government nor apparently even harrassed for published statements such as the one quoted above. In fact, he remained the chief administrator of the academy until his removal by Stalin's government in 1929. Oldenburg, in turn, was greatly impressed by Lenin when he made a courtesy call to see the new Soviet leaders soon after the Bolshevik takeover. Although there was a great divide beween this Kadet scholar and Lenin, the radical intellectual, Oldenburg seems to have come partially under Lenin's spell.[11] What particularly impressed him was Lenin's passionate interest in education and science and his skills as a politician. For an establishment intellectual like Oldenburg, the contrast between Lenin and the last tsar, Nicholas II—surrounded as he was by people whom the educated classes considered charlatans and ignoramuses—could not have been sharper. Although Soviet sources no doubt exaggerate the ease with which scientists like Oldenburg were won over and the degree to which they enthusiastically supported the government, many prominent members of the academy were willing to judge the situation for themselves as it developed rather than actively seeking to oppose the new government. Their modus operandi for decades had been one of working within the established governmental system for peaceful change rather than taking to the streets in order to force change more rapidly. Thus, the development of their relations with the Soviet government was consistent with their previous behavior.

Several weeks after the October Revolution, at a meeting of the newly established Commission on Education (which later became the Commissariat of Education, Narkompros), a special commissar for the academy was appointed, I. V. Yegorov.[12] His role appears to have been more to protect the academy

from mob attacks and the chaotic conditions of the time than to interfere in its work, and by early 1918 he had faded from the scene. Within a month of the October Revolution, the president of the academy, Karpinskii, its vice president, the mathematician Steklov, and Oldenburg, its secretary, paid a visit to the new commissar of education, Lunacharskii. No record of their conversation has been found, and it is unclear whether this represented more than a courtesy call. Substantive talks between the academy and the Soviet government began in January 1918.

The academy was the first Russian scientific institution that the Soviet government attemped to win over to active cooperation. Although small in size, with only 44 full members and some 220 employees in 1917 (109 of them qualified specialists), in prestige and authority the academy represented the acme of Russian scholarly life. Fewer than half of its full members in 1917 were in the natural sciences, but, in contrast to earlier periods of its history, the natural scientists had begun to dominate its activity by 1917.[13] Karpinskii and Steklov, both natural scientists, became its first freely elected officers after the fall of the tsarist government in 1917. Its permanent secretary, Oldenburg, though a specialist on Eastern religions and cultures, got along well with natural scientists and numbered among his closest friends the most prominent spokesman for the liberal scientific community during the previous decade, V. I. Vernadskii, founder and chairman of the academy's Commission for the Study of Natural Productive Forces (KEPS). He was also close to Vernadskii's former student Alexander Fersman, the scientific secretary of KEPS who was elected a full member of the academy in 1918. (The Soviet government was to foster this trend toward dominance of the natural scientists in the academy by its policy of budget appropriations after 1917.)

Although the size of the Academy of Sciences in 1917–18 is known, the exact number of natural scientists who did research professionally in Russia during this period is not. In fact, one of the complaints of the scientific intelligentsia during the late tsarist period was that no survey of scientists or scientific insitutions had ever been undertaken by the government, a situation the Academy of Sciences set out to rectify in 1918. Until that time, the academy complained, Russian scientists had to turn to a German yearbook, *Minerva*, for up-to-date surveys and information about developments in Russian science. This German source was neither comprehensive nor necessarily accurate. The academy's survey of scientists and scientific institutions in Russia was, however, interrupted by the 1917 revolutions and Civil War. The first volume, *Nauka v Rossii*, was not published until the 1920s.[14] The best estimate is that in 1914 there were approximately 12,000 professional research scholars in Imperial Russia, but this number includes scholars in the humanities, including theology, the social sciences, engineering, and agronomy as well as the natural sciences.[15]

To estimate the number of professionals in the natural sciences (physics, mathematics, chemistry, the earth sciences and biology primarily) is much more difficult. We do know that in the period between 1904 and 1913, only about

one-sixth of all the higher degrees (*magister* and doctoral degrees) granted by Russian universities were in the physical and mathematical sciences.[16] Because most Russian natural scientists received their higher degrees from a Russian university by this time, the proportion provides some guide to the percentage of scholars who worked in the natural sciences, albeit an unreliable one. According to figures compiled by the Soviet government, by 1918 there were 7,326 professional scholars in the RSFSR (excluding the Ukraine and border areas.)[17] Again, however, the data is not broken down by disciplines, and these figures include those in the humanities, social sciences, and technology.

By 1928, according to Soviet data, these numbers had grown to 14,805 for the RSFSR, with more than half in the "exact and applied sciences," but this larger proportion no doubt owed to the Soviet government's active policy of favoring natural science and technology over other areas of research.[18] My best guess is that beween one-sixth and one-third of the professional researchers in Russia by 1914 were natural scientists, that is, between 2,000 and 4,000. They were employed mostly in higher education, although increasing numbers worked as consultants to government and industry and an unknown number worked full-time in government ministries or in government technical services such as the Geological Committee (which employed 114 scientists by 1916).[19] Few worked full time in private industry, in the Academy of Sciences, or in the tiny number of private science institutes that existed by 1917. Their numbers are unlikely to have grown much by 1917–18, given the war and the fact that many university students were drafted or volunteered for military service.

In other words, the group we are considering here is unlikely by 1918 to have represented more than a few thousand active researchers, a minuscule part of Soviet Russia's population of well over one hundred million persons (excluding Poland, the Ukraine, Finland, the Caucasus, and Central Asia). Although the cooperation of this group was certainly not necessary for the Bolsheviks to take power and perhaps not even necessary for them to hold power in the short run, over the long term Bolsheviks such as Lenin and Lunacharskii could not conceive of building the Soviet state or a communist society without their help. The Russian scientific community, though small, represented for a significant part of the Bolshevik leadership an essential element of the future that they had seized power to build.

In January 1918, a special section of the Commission of Education was created for the "mobilization of scientific forces" to aid the Soviet government. It was headed by a former Menshevik who joined the Communist Party in 1918, L. G. Shapiro. Shapiro promptly met with Sergei Oldenburg and presented him with a request that the academy aid the Soviet government in matters requiring scientific expertise, particularly in areas related to the economy and social policy. Shapiro's written proposal was that the academy create a special commission for this purpose that would draw on the talents of all scientists in the country, not just those associated with the academy.[20] Shortly after Shapiro submitted this proposal, he also approached one of the officers of the Moscow Society of Agriculture, a group of biologists and agricultural scientists, as well as the Petrograd Association for the Development and Dissemination of the Positive Sciences and asked for their cooperation with the new government. The vice president of the Moscow Agricultural Society immediately turned to the Academy of Sciences to ask its opinion of such cooperation. He told Shapiro that the society would probably not oppose such cooperation with the Soviet government, especially if it could be conducted under the general supervision of the Academy of Sciences.[21]

According to the mathematician Steklov's diary entry for January 24, 1918, Oldenburg reported to a general meeting of the academy that Shapiro had promised the academy "full preservation of its independence."[22] On January 29, the commissar of education, Lunacharskii, reported to the Education Commission (Narkompros) that the academy was ready to aid it and that VSNKh and had agreed to enter into talks about reform of the academy.[23] Lunacharskii mentioned nothing about a promise to preserve the independence of the academy, and the published report of the academy's discussions of this first approach from the government for cooperation makes no mention of the academy's willingness to consider reform of its structure. Thus, from the beginning of formal talks between the Soviet government and the Academy of Sciences, two issues surfaced that were to become points of friction between the Soviet authorities and members of the academy. Nonetheless, other factors drove the two groups together as well: the academy, traditionally a state-supported institution, needed money to operate and protection from popular forces among the radical intelligentsia and working class (such as the Proletkult movement and the Education Department of the Petrograd regional government [Sevpros]) that wanted to abolish it altogether.

A general meeting of the academy discussed Shapiro's proposal on February 16(3) and formed a commission to prepare a reply. Alexander Fersman, the academic secretary of KEPS, wrote this commission a long memorandum in which he objected to giving the Soviet government advice on particular, specialized segments of the economy. The academy, he believed, should continue to concern itself with broad scientific questions. He added, "In these grave moments of Russian reality, the task of conserving what we have must take precedence over the idea of new tasks."[24] A few days later, the academy formulated its reply to Shapiro. It was couched in vague and general terms. The academy, in essence, indicated that it would judge each request for help from the government on its own merits and would help if equipped to do so. The main task of the academy, the reply emphasized, was to foster scientific creativity, but it would assist the government where possible "for the good of Russia." The academy's reply was followed a few days later by a request from Oldenburg for an advance to the academy of 65,000 rubles. On March 5, Lunacharskii wrote the academy disagreeing with the implication that it was not properly equipped to aid the government on economic and technical problems and urging cooperation. On March 9, Oldenburg again wrote Lunacharskii, asking for money for the academy. This time Narkompros came forward with a generous appropriation and also intervened with the local

Petrograd authorities to prevent some of the academy's space from being requisitioned as living quarters for outsiders. Lunacharskii also assured the academy that its press would not be seized or closed down, a fear that may have been provoked by the actions of the Soviet government in closing opposition newspapers in this period.[25]

By March 24, Fersman apparently had a change of heart and sent a memorandum from KEPS outlining the concrete ways in which it was willing to help the Soviet economy. That same day, the president of the academy, Karpinskii, sent a letter to Lunacharskii indicating that the academy had not ceased working a single day since the October Revolution. At the same time he complained of the popular view in Soviet circles that intellectual workers were somehow privileged and undemocratic. A week later (April 2) Oldenburg again wrote Lunacharskii asking for money, this time specifically to support KEPS, which he indicated had never had a regular budget under the tsarist government. By early April, Lunacharskii reported to Lenin and to the Council of People's Commissars (Sovnarkom) the academy's readiness to cooperate with the government. On April 5, 1918, Luncharskii announced this publicly with a newspaper article about the academy, and on April 19, the Soviet government issued its first public decree in the area of science and announced that it was financing the work of the academy to study the natural productive resources of Russia.[26]

Although Lenin apparently took no direct role in these early negotiations with the academy, he was pleased with the initial results. As Lunacharskii remembered Lenin's reaction during the April Sovnarkom meeting, "Vladimir Il'ich responded to my report about the Academy of Sciences that it was necessary to support it financially, to motivate it to take those steps which would link its work with our tasks, that it was necessary to find support there among the more progressive scientists."[27] Lenin advised Lunacharskii to publicize widely the academy's agreement to cooperate with the Soviet government. "The fact that they wish to help us is good," he reportedly told Lunacharskii. "Tell the whole world that the Academy of Sciences has recognized our government."[28]

Soviet historians consider Lenin's desire to attract "bourgeois specialists" such as scientists as part of his general strategy of proletarian class struggle, in this case to detach professionals from support of the bourgeoisie in an effort to weaken and divide the opposition. This may be true for the later Civil War period (1919–20), but one should be cautious in drawing such a conclusion about these early months of Soviet rule. The negotiations between the Soviet government and scientists during this early period took place primarily at the level of Narkompros. Lenin and most other party and government leaders were preoccupied with much more pressing matters in the early months of Soviet rule, such as ending the strikes of public employees and conducting peace negotiations with Germany. No documentary evidence has come to light indicating that Lenin paid a great deal of attention to the academy prior to April. One should be careful about reading back into the record arguments that Lenin made during the party debates of 1919 over the use of "bourgeois specialists,"

arguments justifying their use as a form of "class struggle," giving "experts" higher pay and other privileges. To note this is not to deny that securing the cooperation of the academy and other members of the scientific and technical intelligentsia did, in fact, objectively weaken the middle-class opposition to the Bolsheviks and aided the process of detaching a large part of the professional middle class from possible attempts to create a more unified opposition to Bolshevik rule. This doubtless was a consequence, but that it was among the original intentions of early Bolshevik talks with the Academy of Sciences is unclear.

In March and April 1918, the Soviet government also began to formulate more general principles as the basis of a science policy. In the March 1918 issue of the journal *The National Economy* [*Narodnoe khoziaistvo*], an article appeared under the title "The Mobilization of Science." Because it was signed with the initials L. Sh. and Lev Shapiro was the head of Narkompros's section for the mobilization of scientific forces, it likely represented an official view from within Narkompros. It emphasized several points that were to become shibboleths of Soviet science: the need to bring science closer to production, the need for more collective forms of scientific research, and the requirement for centralized state regulation and direction of scientific research. The latter was especially acute in a country such as Russia, where qualified scientists were few in number and dispersed in their concerns and in their institutional affiliations.[29] Although no direct reaction by scientists to this article has been found, a close reading of their articles and statements over the next several years indicate that leading spokesmen for the scientific community had strong reservations about these principles.[30] Many, if not most, favored increased application of science to problems of the economy, but those in scientific research feared a neglect of more fundamental questions. The trend in world science toward more collective forms of research in large institutes and laboratories was undeniable, but prominent spokesmen like Alexander Fersman qualified the desirability of trend by indicating that much of the work of synthesis in science was still the task of individuals. Their creativity depended on fostering an environment that encouraged individuality, openness to debate, and critical thinking by individuals.[31] Regarding the third point in the article, state direction and planning of science, organized groups of scientists throughout this early period reiterated the need for scientists themselves to determine the direction of science, the need for freedom to organize autonomous groups that would work closely with the government but would not be subsumed within it.[32]

In April 1918, Lenin outlined some of his preliminary thinking about science and the needs of the economy. His notes were sketchy but constituted his first written attempt at a plan for the reorganization of industry and the economy of Russia. He wanted VSNKh to ask the Academy of Sciences to appoint scientific and technical specialists to a series of commissions that would develop detailed plans for the more rational distribution of industry, closer to sources of raw materials. With the lessons of World War I acutely in mind,

particularly the consequences of the blockade that cut Russia off from Germany and from easy access to the allies, Lenin also outlined the need to develop more self-sufficiency in raw materials and manufactures that had earlier been imported. Lenin also highlighted a plan for the rapid electrification of Russia.[33] The academy and other scientists quickly picked up on these general points and in response began proposing research programs and new scientific institutes. Already in April, KEPS began to organize new sections that later evolved into institutes in the applied sciences: sections to find and study rare elements, new sources of fuel and raw materials like iron; a section on optical technology (an area in which Russia had been dependent on the German industry); and so on.[34]

By April the Academy of Sciences was eager to show the government its interest in conducting work in such areas of applied science, now that the government had demonstrated its willingness to provide funds and encouragement. Despite this rapprochement between scientists and the Soviet state, evidence of conflict is also abundant in the years 1918–19. Between April and July 1918, the secretary of the Sovnarkom, N. P. Gorbunov, began to conduct talks with large numbers of scientists about the needs of the economy and Russian science. In June alone Gorbunov turned to the academy twice to express Lenin's desire for their views about the tasks of Russian science, in response to which KEPS drafted a memorandum, "On the Tasks of Scientific Construction." While Lenin and Gorbunov were following a technocratic model in seeking to involve scientists and other specialists in government commissions and as consultants on a variety of practical problems, Narkompros and the local education department of the Petrograd regional government in April began to take a different direction, an approach aimed at changing the institutional structure of science. Narkompros's direction increasingly alarmed not only scientists, but Gorbunov and Lenin as well. Narkompros began to work out plans and pressure for the reform and democratization of scientific institutions. (The head of the Education Department of Petrograd, M. P. Kristi, even went so far as to propose in this period the abolition of the Academy of Sciences as a "completely unnecessary survival of a false class epoch and class society."[35]) In March 1918, Narkompros abolished the section for the mobilization of science and replaced it with the Scientific Section (NO), which had two responsible workers: L. G. Shapiro and its new head, a young astronomer, V. T. Ter-Oganesov, who began to work on a reform plan for Russian science.

Until August, the Scientific Section of Narkompros was the only government bureau whose primary responsibility was the supervision of Russian scientific institutions and the development of science policy. It was created by Narkompros with the specific charge to make the reform of scientific institutions its first priority. The assistant commissar of education, M. P. Pokrovskii, who took a dim view of academics and professors from the old regime,[36] was apparently one of the first to suggest, at a meeting of the collegium of Narkompros on April 24, 1918, that this reform take the general direction of creating an association of Russian science, to which the Academy of Sciences would

be transferred.[37] According to the diary of the vice president of the academy, Steklov, by late March and early April 1918, Ter-Oganesov began to talk to academy members about the creation of a "federation of scientific societies."[38] By June 1918, L. G. Shapiro was already discussing the details of such a reform project with Sergei Oldenburg.[39] Ter-Oganesov reported to Narkompros that the association would include "representatives of scientific societies and institutions and would be a body to which the government could turn for the solution of problems in all branches of knowledge."[40] Although the advocates of this plan spoke of it as creating a kind of "parliament of scientific opinion," they also intended it to be directed and coordinated by the government and closely linked to the tasks of economic development.

Members of the Academy of Sciences at first treated this plan cautiously. They began to propose their own plans. For example, in June 1918 Fersman sent Narkompros a plan that called for the creation of a "Union of Scientific Organizations." Bastrakova denies that this was a counterplan, but her own analysis of differences between the Narkompros project and academy project suggests otherwise. The plans differed both in terms of internal organization and, most significantly, in terms of the new body's relationship to the state. The Narkompros project made it clear that its association would be subordinate to the government. The academy project, however, foresaw that the Union of Scientific Institutions, would receive financial support from the state but remain independent and self-governing; only science and its workers were considered competent to establish the form and direction of their work and their relationship to the government.[41]

Beyond the assertion of independence, there is a further hint that scientists, particularly in the academy, were disturbed by the Narkompros plan and concerned about the fate of the academy should it be subsumed in the proposed association. Gorbunov, who had been conducting extensive talks with scientists since April, wrote a letter to the Central Committee of the Communist Party in July protesting that the Narkompros reform plan "would harm an institution of worldwide prestige and hinder active cooperation between scientists and the Soviet government."[42] What provoked this sharp reaction and apparently also hardened the opposition of the academy was a new variant of the Narkompros plan produced in the summer of 1918 that clearly threatened the existence of the academy and the continuance of its traditions. In January 1919, the president of the academy, Karpinskii, wrote directly to Narkompros warning of the dangers contained in its reform plan. In this same period, Lenin apparently had several conversations with Lunacharskii, telling him that reform of the academy must await a "quieter time" and warning him against breaking any "valuable china" in the academy. Members of the academy, Lenin indicated, had shown a cooperative attitude toward the Soviet government, and Narkompros's plans threatened to disrupt that relationship. What probably happened is that prominent members of the academy, increasingly alarmed by what they were hearing from officials in Narkompros, attempted to find patrons for their interests by appealing to prominent Bolsheviks outside Lu-

nacharskii's bailiwick. Gorbunov was readily available and was close to Lenin. He was also a young chemical engineer (who received his degree in 1917), someone who was impressed by the authority of scientific greybeards, with whom he established good working relations in subsequent years.[43] The concern of academy members may have been what motivated Gorbunov's offer to the party's Central Committee, judging from another instance in which scientists sought to reach Lenin's ear.

On August 15, 1919, Sergei Oldenburg wrote to the well-known physicist P. P. Lazarev, who at that time was conducting field studies in the Ukraine. He pleaded with Lazarev to use his influence with the prominent Bolshevik engineer L. B. Krasin to gain Lenin's help. (Krasin headed the state's Commission for Supply of the Red Army and used this important position to aid Lazarev's research with supplies and other forms of assistance.) Krasin, a longtime associate of Lenin, was in frequent contact with the Soviet leader during the Civil War, and Oldenburg hoped that he might intervene on the academy's behalf. As Oldenburg wrote Lazarev,

> A black cloud from Moscow, they say, is hanging over the Academy: Artem'ev and Ter-Oganesov [officials of Narkompros] have some kind of plan for the complete liquidation of the Academy simply by decree. No one and nothing, of course, can abolish science while even one person is still alive, but it is easy to disorganize it. Talk with Krasin, ask him to speak with Lenin, who is an intelligent man and understands that the liquidation of the Academy of Sciences would bring shame on any government.[44]

Whether Krasin spoke directly with Lenin about this issue is unclear from the record, but in 1919 Lenin intervened to stop the Narkompros plan. He called in Lunacharskii several times to express his concern, telling him, according to Lunacharskii's account published in 1925, "It is not necessary to let the Academy be devoured by a few Communist-fanatics." Lunacharskii says that he defended the need to adapt the academy to existing governmental institutions and prevent it from remaining "a state within a state" but agreed with Lenin that the Narkompros plan was not appropriate or timely.[45]

Lenin obviously was not opposed to an eventual reform of the academy that would bring it more tightly under Soviet control, but he opposed such attempts in the middle of a civil war when he considered the cooperation of the academy important to Soviet goals. Beyond that, Lenin did not fully trust former "left Bolsheviks" like Lunacharskii and Pokrovskii because of their longtime association with the radical cultural policies of the Proletkult movement, and this probably heightened his concern about their aims regarding the academy.[46] For their part, the leaders of the academy proposed a different reform plan to Narkompros in 1919. Their plan was based on the recommendations of a commission created within the academy to reexamine its charter and propose changes. In creating such a commission, the Academy of Sciences had responded to pressure from Narkompros, but in July 1919, Narkompros rejected the academy's plan as too mild and "not conforming with the spirit of the times."[47]

In general, by 1920 the Academy of Sciences had become a more open and democratic institution than the old Imperial Academy of Sciences, and it remained relatively autonomous from the Soviet government, although completely dependent on it financially. By 1920 ten full members were elected under the new rules to replace twelve academicians who had died since 1917, most of them at an advanced age. Many of the new members were young; Fersman, for example, was only thirty-five when he was elected a full member in 1918, and A. F. Ioffe was not yet forty, when elected in 1920. (Ioffe, who was elected unanimously by the academy, was its first Jewish member, and his election, proposed by more than twenty scientists within and without the academy, would have been impossible in late Imperial Russia.) A number of these new members were proposed by universities and scientific institutions outside the academy, but one recent Soviet historian believes that the scientific community as a whole, although it gained the right to do so, generally did not participate in the affairs of the academy, even in the election of new members.[48]

While making compromises with the Soviet government, the scientific community was able to defend effectively many of its interests during this period. This was in part because of divisions within the Soviet leadership over how to deal with the scientific-technical intelligentsia, in part because of the government's preoccupation with the Civil War, and in part because the system of scientific research became more diversified and decentralized during this period, despite official rhetoric about the need for centralized direction and coordination. The mixed public-private system of scientific research that replaced its predecessor allowed scientists a good deal of self-governance and flexibility for promoting and protecting their interests. The small size of the scientific community meant that the government's expansion of the scientific network created many opportunities for ambitious entrepreneurs among established scientists to organize their own institutes and play an important role as consultants and advisors to the government. Most of the established scientists who chose to be active organizers in this period remained prominent leaders in their respective fields for the remainder of their lives. In that sense, the Civil War period was formative for the history of Soviet science for many decades to come, and it was the Civil War cohort of scientists that dominated Soviet science for the next three decades.

One of the first steps toward the diversification and decentralization of the network of scientific research was taken during the fall of 1918 when Narkompros lost its monopoly of supervision over scientific institutions. In June of 1918, N. P. Gorbunov, after several months of talks with the scientific community, wrote a letter to the Bolshevik Central Committee severely criticizing Narkompros for its lack of accomplishment in mobilizing science for Soviet goals. He was particularly critical of its inability to organize effectively

a system of scientific advisors for industry. Gorbunov sent forward a plan of his own: that a special section of VSNKh be created to organize a scientific network to serve industry. He proposed taking away from Narkompros a whole series of scientific institutions, including the Academy of Sciences, and placing them under this special section of VSNKh. The essence of Gorbunov's proposal was accepted by the Soviet government although his suggestion that the academy be transferred to this new body was not included in the project's final form. On August 16, 1918, the new Scientific-Technical Section of VSNKh (NTO) was created by a Sovnarkom decree. Gorbunov was appointed its head.[49]

The Soviet historian Bastrakova believes that such an institution as the NTO met not only the needs of Soviet industry, but also the desires of many prominent Soviet scientists. She cites a similar proposal made at about the same time for an All-Russian Association of Experimental Research that would create a network to aid the economy. This proposal was sponsored by the mathematician A. N. Krylov, who had been a prominent advisor to the tsarist military and then to the Red Army, and by the geologist F. Iu. Levinson-Lessing, a well-known Petrograd scientist. Because the proposal has not been published, it is difficult to judge how similar it was in all details to the proposal for the NTO. One difference, however, which has been noted by the Soviet historian Kol'tsov, is significant. The association proposed by scientists was an independent organization of scientists that would advise VSNKh but would remain autonomous from the government.[50]

Once created, the NTO moved much more quickly than Narkompros to directly involve prominent Russian scientists in its work. In contrast, the scientific section of Narkompros was run by a small staff of young Soviet bureaucrats who had some scientific training but who kept the bulk of the scientific community at arm's length, refusing to approve any kind of representative organization of scientists to advise them.[51] Gorbunov, on the other hand, moved quickly to create within the NTO two commissions of scientists with which he worked closely, one centered in Petrograd, headed by the prominent chemist N. S. Kurnakov, and the other located in Moscow, headed by M. M. Novikov, the rector of Moscow University (later expelled from the USSR for his role in the academic strikes of 1922). By 1919, over two hundred prominent scientists and technical specialists were involved in the work of the NTO.[52]

This is not to imply that scientists were able to dictate terms to the leadership of the NTO. For example, in the summer of 1919 the Petrograd Scientific Commission sent the NTO a list of proposed research topics for the NTO to fund. Gorbunov refused, telling the scientists that their topics were too theoretical and did not meet the needs of Soviet industry. At the present time, he indicated, resources were too scarce to sponsor such topics, although he did not rule out their funding in more peaceful times. One Soviet historian indicates that by the end of 1918, the NTO had begun to function virtually as an

independent commissariat of science. It acquired the former tsarist laboratory for military research, the former Bureau of Weights and Measures, the Committee on Inventions, the laboratories that once belonged to the Ledentsov Society, the industrial labs that had belonged to private industry, and so on. It was also responsive to proposals from scientists and other experts to organize new institutes, as long as they were in the area of applied science or technology. By 1920, the NTO supervised some sixteen specialized institutes and labs, most of them organized over the previous two years. These included the Central Aerodynamic-Hydrological Institute (TsAGI), which became the main research center for the aviation industry; the automotive lab that developed into the principal research body for the development of an indigenous truck and automobile industry; an Institute for Food Research, another for fertilizers, one for chemical preparations, and so on. During the Civil War period, most of these institutes were small (with an average size of twenty to twenty-five employees), but they provided a nucleus for future expansion.[53]

During the Civil War period more than forty new scientific research institutes were created, more than half of the seventy that existed by 1922. Besides those under the jurisdiction of the NTO, a number were organized in various commissariats, such as the Commissariats of Agriculture and Health. The former palaces of the Romanovs, the mansions of the nobility and the upper bourgeoisie were often turned over to such research complexes. Although severe shortages of virtually everything needed for research greatly hampered work, many scientists were clearly impressed by the rapidity with which so many of their proposals were accepted and instituted by various branches of the government. Applied research became centered in the NTO and in commissariats that supervised branches of the economy outside of industry. Institutes in areas of more fundamental research generally remained under the Academy of Sciences or were created by Narkompros and placed under its jurisdiction. (For example, the X-ray Institute and the Optical Institute, in which much fundamental research on the structure of matter was conducted under the auspices of A. F. Ioffe, were created in this period and placed under Narkompros.)[54]

Thus, for scientists the period of War Communism did not see the creation of a monolithic or highly centralized system of scientific research, but one that remained flexible and largely decentralized. While the opportunities grew for scientists to display initiative and realize a number of projects that they had only dreamed about before 1917, the leaders of the scientific community remained, with good reason, concerned about long-range Soviet plans for science, and they were determined to keep as much corporate autonomy and room for maneuver as possible. Most projects put forward by scientists during this period contained a demand for autonomy, demands that were always rejected in principle by Soviet authorities.[55] Scientific workers were also the last major professional group to be organized into a Soviet-controlled union, something that did not occur until 1923. Throughout the Civil War period, a significant

element of the scientific community included members of an independent union that lobbied for their interests and attempted to improve living and working conditions.

Living and Working Conditions, 1918–21

The independent union referred to above was initiated by prominent members of the Academy of Sciences during 1917, before the Bolshevik takeover. At the time, the president of the academy, Karpinskii, headed up something called the Permanent Conference of Representatives of Scientific Institutions and Higher Education, which was intended as a kind of lobby with the Provisional Government for the professional interest of scholars. This body appears to have been quiescent during the first year after the Bolshevik takeover but was reactivated by a conference held in October-November of 1918. (It is probably not coincidental, in light of its later activity, that its reinvigoration came within a month or so after the beginning of the Red Terror. The terror, which was often directed indiscriminately at middle-class elements, as well as remnants of the old regime, led to the arrest and detention of many professional people.)[56] This conference created an organization known as the Union of Scientific Institutions and Higher Education, with an elected directorate that included Karpinskii, Oldenburg, the prominent engineer Osadchii, Steklov, Fersman, and other important scientists. It enjoyed the patronage and strong support of the writer Maxim Gorkii, a critic of the Bolsheviks who soon after the February 1917 revolution had begun to work with prominent Petrograd scientists on a number of projects for the popularization of science. Gorkii remained close to the scientific intelligentsia until he left the Soviet Union for Italy in the early 1920s.[57]

The union's primary activity as the Civil War gained momentum in late 1918 through 1920 appears to have been measures to protect scholars from hunger and from arbitrary arrest by the Soviet government. For example, in 1919 the union asked the Commissariat of Food for ration cards for its members; it also organized the purchase of food on the free market in the Ukraine for shipment to Moscow and Petrograd; and it requested all member institutions to send lists of their members to protect them from arbitrary searches and arrests. When members of these institutions were arrested, the union asked member institutions to send detailed information about the circumstances of arrest so that it could intervene with the Cheka or other appropriate Soviet bodies.[58] A recent Soviet historian has characterized the union as oppositional in mood, though not openly anti-Soviet;[59] it appears, however, to have been tolerated during the Civil War period, perhaps in large part because of the prominence of its leaders and Lenin's policy of appeasing the scientific community, as long as its members did not work against the Soviet government.

The controversy over the existence of this independent union came to a head only after the Civil War, when in 1921–22 it opposed Narkompros's plan to

reform higher education and severely restrict the autonomy of the universities. In a letter to Lenin of June 8, 1921, the assistant commissar of education, Pokrovskii, asked for the immediate liquidation of this independent body, maintaining that it was "trying to extend university autonomy to limits which it has never before enjoyed in Russia."[60] Here he differed with the commissar of education, Lunacharskii, who conceded the oppositional nature of the union but counseled a more patient approach of negotiation and conciliation. The standard Soviet policy in this period was to abolish independent unions of professional groups such as engineers, physicians, and scientists and incorporate them in separate subsections of Soviet-controlled, mass unions that included all workers in a particular branch of the economy, such as health workers, engineering-technical workers, and cultural-education-scientific workers. Such a mass union for the latter group, the All-Russian Union of Cultural-Educational Workers (*Vserabotpros*) had been created in 1919–20 but held little attraction for prominent professors and scientists. In 1921, Vserabotpros created a separate section for scientific workers (SNR), but it was another two years before the independent Union of Scientific Institutions and Higher Education ceased to exist and, under pressure from Soviet authorities, part of its leadership agreed to join the directorate of SNR.

Partly because of the Red Terror, partly because of the increasing deterioration of the economic situation, living and working conditions for scientists began to worsen in the fall of 1918. The Soviet government reacted slowly to their complaints. Lenin and the central government waited well over a year after September 1918 before responding with firm measures of support, and even then, frequent personal intervention by Lenin was required to prevent abuses by local officials. To be more specific, on September 25, 1918, the permanent secretary of the Academy of Sciences first wrote Narkompros about deteriorating conditions for members of the research community. Oldenburg asked for prompt measures to improve their food, to free them from being drafted for compulsory physical labor, and to protect their apartments from being requisitioned by local authorities.[61] The same month Maksim Gorkii whose newspaper *Novaia zhizn'* had opposed the October Revolution and had continued to criticize the Soviet government until it was closed down in the summer of 1918, traveled from his home in Petrograd to meet personally with Lenin. One of his purposes was to discuss the role of the scientific intelligenstia in the revolution. Gorkii had strong doubts about the ability of the proletariat to create a civilized society on its own. Lenin at that time made no concessions but pointed out the hostile attitude of the scientific intelligentsia to the Bolshevik revolution and simply asked Gorkii to convince them to cooperate more. Given Gorkii's past and future record of active intervention for arrested intellectuals and professional people, it seems likely that this flurry of complaints in September and October 1918 was linked to the Red Terror and it effects on the scientific intelligentsia. Soviet secondary works, however, do not spell out the link explicitly or detail the effects of terror on scientists.[62]

On October 4, 1918, Lunacharskii met with Oldenburg to discuss the con-

cerns of scientists, and they talked at that time about the creation of a special commission "to ease the situation of intellectual workers."[63] Such a commission was not actually created until early 1920, toward the end of the Civil War. Hunger, however, reached its height in Petrograd during the winter of 1918–19. In place of bread many residents of the city were reduced to eating oats intended for horses. The use of terror by the regime was particularly unrestrained in Petrograd in the year between the fall of 1918 and the fall of 1919 as the Civil War gained momentum. At this time, some scientists, especially the more elderly and sickly, began to die of exhaustion and starvation. How many scientists were arrested or executed is more difficult to establish, but this year was undoubtedly the most difficult for members of the scientific intelligentsia living under Soviet rule.[64] In Petrograd, Gorkii and his companion Maria Andreeva organized an unofficial committee to aid the intelligentsia. They organized a cafeteria for the hungry, and under their direction a volunteer group of nurses visited the elderly and ill among the intelligentsia, bringing food and medicine. This unofficial committee was viewed with great suspicion by Dzerzhinskii and the Cheka, which periodically harassed it and arrested individuals whom the authorities viewed as anti-Soviet. Gorkii's unofficial committee, which included a number of prominent natural scientists, became the basis for the Petrograd Commission for Improving the Living Conditions of Scholars, given official status by the Soviet government in early 1920.[65]

On February 19, 1919, at the urging of Lunacharskii, the local Petrograd government wrote the president of the academy offering him Red Army rations sufficient for one hundred scholars. Considering that by the end of 1920 some six thousand rations were being distributed to the scientific community of Petrograd, this first offer seems woefully inadequate. One of the problems, of course, was strong opposition within the Communist Party to giving preferential treatment to such "bourgeois specialists." This issue came to a head at the Eighth Party Congress, held in March 1919, when Lenin's policy of preferential treatment for "bourgeois specialists" who worked loyally for the Soviet regime was officially adopted as party policy.[66] It took many more months for that policy to be instituted.

The trend during much of 1918 and early 1919 was in the opposite direction. For example, a policy of wage leveling is reflected in Soviet wage scales published in this period. That policy aroused strong opposition from the scholarly community, since it reduced the pay of professors and other professional researchers close to the level of ordinary workers.[67] The Sovnarkom and the Council on Labor and Defense began to discuss pay scales for specialists, including scientists, beginning January 2, 1919, and continued to do so through much of the spring and summer of 1919. On May 22, 1919, the Sovnarkom created a special commission headed by Lenin that was charged with revising such pay scales upward, to raise the material status of specialists above that of other occupational groups. By August these revised pay scales were being promulgated not only in the RSFSR but in the Ukraine and other Soviet-

controlled areas.[68] Yet in a period when money had lost much or all of its value, such reforms were more symbolic than real.

Besides pay scales, scientists and other scholars had a number of additional complaints. Some scientists and scholars were drafted for physical labor and their apartments commandeered by local authorities. In March 1919, Karpinskii wrote Narkompros to complain about attempts by the commandant of the building in which most members of the Academy of Sciences lived to requisition their apartments. This remained a problem as late as October 1920, when Gorkii complained that scholars in Petrograd were still being deprived of part of their living quarters. On October 21, 1920, Lenin wrote a letter to a department of the Petrograd regional government. He stated that to allow a scholar an extra room for a study or laboratory was scarcely a sin and urged more leniency in this regard.[69] The documentary record does not show whether Lenin's letter, which was a politely worded request rather than an order, was honored or disregarded.

For scientists in Petrograd, as for other middle-class professionals, one of the most dangerous periods during the Civil War came in 1919 when the White general Iudenich approached Petrograd with his army. The first period of approach by Iudenich's army occurred between May and August; the second between the end of October and the end of November. On June 4, the Cheka began general searches of the middle-class districts in Petrograd with the help of workers' detachments, comprising some 20,000 men. Large caches of arms and documents were reportedly uncovered and many arrests of "bourgeois elements" took place. Those arrested, according to a recent Soviet source, included a large number of professors, engineers, artists, and other professionals who were held as hostages. Gorkii wrote a letter to Lenin protesting these arrests, but Lenin defended their necessity and indicated that those members of the intelligentsia who were working loyally for the Soviets were being treated generously and had nothing to fear.[70]

Large numbers of middle- and upper-class families had already fled Petrograd by the spring of 1919, either emigrating or searching for some quiet corner in the countryside where food would be more plentiful and the risk of being caught in the fighting less. Other large cities like Moscow were also affected by this exodus, although Petrograd seems to have suffered the greatest depopulation. Where did professionals such as natural scientists tend to congregate if they left Petrograd or Moscow? Large numbers went to three places in particular: the Ukraine, where food was thought to be easier to find; the Crimea, where many prosperous scientists had summer dachas and where the dangers of Civil War seemed less; and Siberia, particularly Tomsk, the site of Siberia's only university and its one technological institute. Some also ended up on other Siberian towns like Omsk, Irkutsk, and Vladivostok. Although the Civil War soon reached these regions, all three experienced a kind of cultural renaissance. In Siberia, a new university was created in Irkutsk, a new privately supported polytechnic in Vladivostok, an Institute of Agriculture and

Industry in Omsk, and an Institute for the Study of Siberia in Tomsk. The latter institution had been discussed in 1917 but was only created in 1919 with the influx of intelligentsia from European Russia to the region.[71] It began with sixty members and was intended to study the natural history, geography, industry, ethnography, history, and economy of Siberia; in other words, it was to function as a kind of Siberian academy of sciences. The Siberian Institute was short-lived; it was closed down in 1920 with the establishment of Soviet rule in Tomsk. Some of the institutions created in this period, however, did survive, particularly the new higher educational institutions. A Siberian geological committee, also created during the Civil War, carried out important field explorations of coal, iron, and other mineral deposits despite the dangers from partisan detachments and banditry. At the end of the Civil War, this body remained, but as a branch of the Soviet-controlled Geological Committee in Petrograd.[72]

The Ukraine and the Crimea experienced similar cultural growth, despite often chaotic conditions. During 1918 a group of Ukrainian intellectuals, together with the geochemist V. I. Vernadskii, a member of the Imperial Academy of Sciences, founded the Ukrainian Academy of Sciences in Kiev. Vernadskii, who had moved from Petrograd to Ukraine in 1917 at his doctor's orders (he was diagnosed as suffering from tuberculosis), was named the first president of the Ukrainian academy and spent a great deal of effort trying to raise money for this new institution from the many governments that came and went in the Ukraine during 1919 and 1920.[73] One of his associates, the engineering professor S. P. Timoshenko (who later emigrated to the United States and taught for many years at Stanford), recalled that the Bolshevik government was more forthcoming with aid for the new academy than either the Petliura government or the Volunteer Army when they were in power in Kiev.[74] Vernadskii's own memoir about these years, however, indicates that, after traveling to the headquarters of the White government in Rostov and talking with its officials, they recognized the need for the academy and gave it financial support.[75] How much money actually reached the academy in Kiev from the Volunteer Army is uncertain, since lines of communication were frequently cut during the Civil War in the Ukraine. The academy lived largely on whatever handouts it could get from any of the existing governments.

The memoirs of Vernadskii and Timoshenko agree on one important point: the alienation they felt from all sides fighting in the Civil War. As much as both men disliked the Bolsheviks, they felt little attraction toward the Whites. Vernadskii wrote in his unpublished diary on December 29, 1919, "Both the Volunteer Army and the Bolsheviks did a mass of unclean deeds; and in the final analysis one was no better than the other."[76] Vernadskii argued with other scientists in the Ukrainian academy about whether or not the Bolsheviks would last. Vernadskii's view was that the popularity of Bolshevism was fading and their government would not last.[77] Yet he wavered on this question, noting at another point in his diary that if the Bolsheviks would stop their use of terror, the population would support them in large numbers.[78] A month earlier, he had already noted a loss of support for the Volunteer Army, which he criticized in his diary for being too selfish and class oriented, not thinking about the good of Russia as a whole.[79]

Fewer prominent natural scientists actively cooperated with the various White armies and governments than cooperated with the Soviets. Those who fled Bolshevik-controlled areas associated themselves primarily with cultural and educational activities rather than with active support of the White cause. Vernadskii, however, notes in his diary that he personally felt safer under the Volunteer Army than under the Bolsheviks or Petliura's Ukrainian nationalist regime because of his connections with the former tsarist government (strained though his relationship with that regime had been) and his high position in the Provisional Government.[80]

For scientists the Civil War was not an entirely unproductive period, although conditions tended to be somewhat better for theoreticians than for experimentalists, who suffered more from the shortages of supplies and equipment. Many who had been politically active before the war retreated into their scientific work. The winters in particular were difficult. A number of institutes simply closed down for a period of months. In other institutions the top floors were sealed off, and the staff huddled in a single room on the ground floor around small pot-bellied stoves that were dubbed "little bourgeois" (*burzhuyky*), drinking tea made from carrots and other vegetables or eating a thin gruel made from oats, trying to conserve their energy.[81] Finally, in December 1919, the central government issued a decree aimed at dealing with many of the complaints of the scientific intelligentsia. Based on a draft written by the assistant commissar of education, Pokrovskii, the decree ("On Improving the Situation of Scientific Specialists") was approved by the Sovnarkom on December 23, 1919. Yet at first it only applied to 500 scholars and 50 "literati," whose place on the list was to decided by a three-man commission composed of Pokrovskii, the Bolshevik engineer L. Ia. Karpov from VSNKh, and V. N. Iakovlev, a representative of the Commissariat of Supply. Those lucky enough to be placed on the list were exempted from compulsory military service and labor service not connected with their scientific work. They were also made eligible for a special ration, the so-called academic ration.[82]

Gradually, over the next year or so, the list of persons eligible for these rations was extended. Early in January 1920, a special Petrograd Commission for Improving the Living Conditions of Scholars (Petrokubu) was established, headed by Maksim Gorkii. It was based, as earlier noted, on the unofficial committee that Gorkii had organized as early as 1918 but that had suffered from the harassment of the Cheka and Petrograd regional government and party. In March 1920, Gorkii asked Lenin for 1,800 daily rations for scholars in Petrograd alone. Two weeks later, Lenin granted this request. In August, Gorkii asked the Sovnarkom to increase the allocation of academic rations in Petrograd to 2,000, and by 1921 over 6,000 daily rations were being distributed to Petrograd scholars and their families. But the continued flow of such supplies required frequent intervention by Lenin and the central authorities. For ex-

ample, in October 1920, acting on a complaint of Gorkii, Lenin wrote the Petrograd authorities, demanding that they stop requisitioning supplies intended for Petrokubu. "This means that Petrograd has no right to requisition and appropriate, *without the permission of the center!*"[83] Lenin's intervention was requested several more times during 1920, in order to secure sufficient fuel for the Academy of Sciences' building and to stop the continued requisitioning of scientists' apartments by local authorities. Lenin's personal intervention was even required to obtain heated and guarded railway cars to take the academy's invaluable manuscript collections back to Petrograd from Saratov where they had been evacuated earlier in the Civil War.[84] One recent Soviet historian sees this as evidence of Lenin's concern for the well-being of the scientific community. Although Lenin's involvement becomes increasingly evident toward the end of the Civil War, it also reveals the degree to which the head of the Soviet state had to intervene directly to prevent abuses by local officials and see that the decrees of the central government were properly enforced.

Lenin and the Sovnarkom began to give more attention to the needs of the scientific intelligentsia toward the end of 1919 and the beginning of 1920 than they had for the preceding year or so. The memoir by Lenin's secretary, V. D. Bonch-Bruevich, suggests that his increased concern was sparked by I. P. Pavlov's request to leave the country.[85] Some time toward the end of 1919, the Noble prize–winning physiologist wrote the Soviet government asking permission to leave Russia so that he could continue his scientific work abroad. Bonch-Bruevich and Lenin thought this would be a serious blow to Soviet prestige abroad, where hostile propaganda emphasized the uncivilized nature of the Bolshevik regime and the decline of science and education under its rule. When Lenin saw the letter he blamed the Petrograd regional government for not looking after the needs of such eminent scientists. Bonch-Bruevich was instructed to write Pavlov, assuring him that the Soviet government would provide everything he needed to continue his work. Then Lenin told his secretary to telephone the chairman of the Petrograd soviet and inform him that he would be held personally responsible for Pavlov's safety and the well-being of his laboratory, his helpers, and his lab animals. Pavlov's answer to Bonch-Bruevich's letter was a detailed description of the difficult conditions in which Petrograd scientists were forced to live and work. Lenin instructed his secretary to reply that the government would take prompt measures to improve the situation of scientists. Bonch-Bruevich again wrote Pavlov requesting that he postpone his emigration from Russia, promising that the government would move rapidly to help scientists.

Lenin's secretary also advised the head of state to summon Gorkii to Moscow as soon as possible and place him at the head of a special society to help scholars and literati. Bonch-Bruevich knew of Gorkii's private efforts to provide help, and despite past differences with Gorkii, Lenin accepted his secretary's proposal. Thus, according to this account, Petrokubu was born in January 1920.[86] Yet as far as Pavlov was concerned, working and living conditions did

not improve sufficiently. Although Pavlov remained in Petrograd, Lenin was required to sign a special decree a year after the events described above that established a commission of the Petrograd soviet "to create in the shortest possible time the most favorable conditions for assuring the scientific work of Academician Pavlov and his coworkers."[87] Gorkii was made head of this special three-man commission, which included M. P. Kristi from the Petrograd education department and another official of the Petrograd soviet.

By 1921, with the end of the Civil War, the scientific community began to survey the state of science in Soviet Russia. In a memorandum from the Academy of Sciences to the Sovnarkom and in articles and letters to their friends, prominent scientists saw reason for both hope and pessimism. In a protocol approved by the General Assembly of the Academy of Sciences in November 1920, the Academy warned of the grave situation in which Russian scientists found themselves. This protocol was sent to Lenin and the Sovnarkom in early December and resulted in a meeting between Lenin and prominent members of the scientific community in January 1921. There he assured them that measures would be taken to improve their living and working conditions. But on May 17, 1921, the academy again complained that little had been done:

> In the beginning of December 1920 the Russian Academy of Sciences turned to the Sovnarkom with a memorandum, referring to the critical situation in which Russian science and Russian scientists find themselves and pointing out those measures which must be taken without delay to avoid the destruction of science and scientists in Russia. A conference chaired by the Commissar of Education, with representatives from the Sovnarkom and various bureaus, acknowledged the correctness of suggestions made by the Academy; the Chairman of the Sovnarkom, meeting with representatives of the Academy and other scientific institutions, acknowledged the urgency of this whole business and instructed the Small Sovnarkom to examine it immediately. It seemed that government decisions and measures would be forthcoming when, for unknown reasons, everything came to a standstill. In the meantime, the situation has become more difficult, new developments, new sufferings among scientists and a sharp deterioration in their condition demonstrates convincingly how critical the situation is. The Russian Academy of Sciences considers its duty before the people and the nation to point out the destruction which threatens science and culture in Russia in the near furture if the immediate measures which it has pointed out, the importance of which have already been acknowledged by the government, are not taken.[88]

If immediate measures were not taken, the letter continued, Russian scientists and their families should be allowed to go abroad "where their health and lives will be preserved for scientific work." Thus the academy accompanied its demands with a veiled threat of a large-scale emigration of Russian scientists. They probably knew from Pavlov's experience that Soviet leaders would want to avoid such an embarrassment, especially as they sought diplomatic recognition and respectibility in Western Europe and America. Although the full

protocol sent by the academy to the government has not been published, it is clear from published excerpts that the measures demanded by scientists included such things as an improvement in food, fuel, and other supplies. publication of a large backlog of scientific books and papers, reestablishment of scientific exchanges of information and personnel with the West, and so on.

Despite the tone of imminent peril of the academy's protocol, Russian scientists had a good deal to be proud of in their accomplishments over the previous four years. On the positive side was the growth of scientific institutions: since 1917 a number of new universities had been founded, mostly on the initiative of local intelligentsia; dozens of new research institutes, although mostly small, had also been founded with the help of various branches of the Soviet government, creating a system for supporting science that had existed only in nucleus form before 1917. For natural scientists who disliked the proletarianization of Soviet universities, the new network of research institutes provided a refuge into which they could withdraw in the years to come and devote their time exclusively to research, a possibility that was largely absent under the tsarist regime.

Prominent natural scientists like Alexander Fersman, while hailing the creation of such institutes, also believed that they might contain some dangers. Fersman, for example, warned against overspecialization, fearing that institutes composed exclusively of specialists in a single field could lose the broader view of a problem. He therefore recommended that such scientific organizations be composed of a variety of scientists who could communicate their differing knowledge and points of view to each other. Fersman also feared that too much emphasis on collective research might work to the disadvantage of individual creativity. "I see the future of scientific creativity in the harmonious combination of these two paths [individual and collective research]; and it will be destructive if either one of them triumphs by itself. . . . For different natures, for different minds there cannot be and must not be identical forms of creativity, and woe to that organization which would wish to impose such," Fersman warned. "Let collective creativity develop and let the individual mind work freely."[89]

The Academy of Sciences was heartened by the dispersion of scientific institutions and societies away from Moscow and Petrograd, the centers of science before the revolution, into provincial areas. The new universities were mostly in such areas, as was the new Ukrainian Academy of Sciences, which set the precedent for other provincial academies that were eventually established in various Soviet republics. Further aiding the spread and popularization of science was the creation of dozens of new societies for regional studies during the revolutionary and Civil War periods. Such groups dated back to the nineteenth century and had usually been centers for the local intelligentsia to study the ethnography, archaeology, and natural and human history of a particular region.[90] Not only did the number of such societies grow after 1917, but their emphasis shifted more toward the study of natural productive resources and local demography and economy, including statistical studies of such subjects.

Although these *kraeved* organizations were composed mostly of amateurs, the Academy of Sciences saw them as bases for the spread of scientific research and a scientific worldview. In 1919, the academy created the Central Bureau for Regional Studies to provide assistance to such local groups, which often established museums, study circles, lecture series, and so on. The first National Congress of Scientific Societies for the Study of Local Life was held in Moscow in 1921, and by 1922, the membership of such organizations was estimated at forty thousand.[91]

Besides the creation of many new institutions, scientists were heartened by their ability to protect the autonomy of such a venerable organization as the Academy of Sciences. For example, V. I. Vernadskii, who went abroad in 1922 to work at the Radium Institute in Paris, wrote in March of 1923 to his longtime friend I. I. Petrunkevich, the former zemstvo activist:

> Let me touch on the state of science in Russia. It seems to me that here [in the West] they do not recognize the huge cultural task that has been accomplished, accomplished in the face of sufferings, humiliations, destruction. Scientific work in Russia has not perished, but on the contrary is developing . . . scientific work in Russia has been preserved and lives a *vast* life thanks to a conscious act of the will. It has been necessary and will be necessary to fight for it every day, every step . . . I tell people [here] how this has been accomplished and how much has perished. People have died. . . . but not a single scientific organization has perished in these years. They have suffered much—and in the Ukraine, perhaps in connection with the chauvinistic policy of the Ukrainian Bolsheviks, the universities in particular [have suffered], but their scientific life has been preserved. The Russian Academy of Sciences is the single institution in which *nothing* has been touched. It remains as before, with full internal freedom. Of course, in a police state this freedom is relative and it is necessary to defend it continually. Much new has been created in Moscow and Petersburg, *de facto* much, although by comparison with the plans of 1915–17, little. And curiously enough, much has been created in the provinces.[92]

Vernadskii, no friend of Bolshevism, gave credit for what had been accomplished primarily to the scientific intelligentsia itself, and although it is clear that much of the initiative and effort to preserve and develop science did come from scientists, such accomplishments could not have taken place without the active support and cooperation of the central Bolshevik authorities. This was particularly true of Lenin and the Sovnarkom, Lunacharskii and Narkompros, Gorbunov and VSNKh, and the heads of many other central commissariats, such as the commissar of health, Semashko, who needed science and who protected the natural scientific community against their more zealous colleagues in the Communist Party and local soviets. In fact, one of the major conflicts that surfaced during the revolution and Civil War and remained an important issue in later years was the tension between egalitarianism and a technocratic approach. One was a popular movement to do away with privilege, among whose representatives scientists were frequently counted by the

masses and more by local party and Soviet activists. The other was the more technocratic approach favored by central Bolshevik authorities like Lenin, who believed in the necessity of expertise and who established institutional means for consulting experts, providing in return protection and certain privileges. The community of natural scientists proved to be cohesive in exploiting to their own advantage such conflicts within the Soviet government and Bolshevik Party to prevent the centralization of science and protect the relative autonomy of many of their institutions.

When one compares the aims and accomplishments of the Soviet government toward science and the aims and accomplishments of scientists themselves, scientists appear to have had the advantage by 1921. As early as 1918, the Soviet government aimed at creating a centralized system of scientific research, planned and controlled by the government, not by scientists. Scientists preferred a diversified and decentralized system controlled by their own autonomous organizations. Although they did not achieve such control, by 1921 scientists enjoyed considerable influence in a diversified and decentralized system of government research organizations, in which there was little planning or central coordination, a system that was much more the product of institutional conflicts (for example, between Narkompros and VSNKh) than it was of Marxist-Leninist ideology. In terms of the historiographical debate over the relative importance of ideology versus pragmatism during the period of War Communism, this case study provides much evidence for those who argue the pragmatism of Soviet decisions. If ideology had an influence, it was primarily the ideology of the leaders of the scientific community, not Bolshevik ideology.

NOTES

1. Alfred J. Rieber, *Merchants and Entrepreneurs in Imperial Russia* (Chapel Hill, N.C., 1982).
2. S. Fediukin, *Velikii Oktiabr' i intelligentsiia* (Moscow, 1972); M. S. Bastrakova, *Stanovlenie sovetskoi sistemy organizatsii nauki, 1917–1922* (Moscow, 1972), p. 156.
3. Bastrakova, p. 124.
4. S. Reznik, *Nikolai Vavilov* (Moscow, 1968), p. 104.
5. Letter of Vernadskii to Fersman, dated Feb. 9, 1918, in *Aleksandr Fersman. Zhizn' i deiatel'nost* (Moscow, 1965), pp. 419–20.
6. A. K. Kol'tsov, *Lenin i stanovlenie akademii nauk kak tsentra sovetskoi nauki* (Moscow, 1969), p. 44. In 1918 the prominent engineer and Moscow professor Grinevetskii authored a pamphlet that expressed similar views, but here I am concerned with the views of natural scientists rather than engineers.
7. V. P. Leikina-Svirskaia, *Russkaia intelligentsiia v 1900–1917 gg.* (Moscow, 1981), p. 95.
8. TsGA RSFSR, f. 2306, op. 19, ed. khr. 220, 1.27, cited in Bastrakova, p. 59.
9. I. I. Mochalov, *Vladimir Ivanovich Vernadskii, 1863–1945* (Moscow, 1982), p. 187.
10. Letter of A. P. Karpinskii to A. V. Lunacharskii March 24, 1918. The text of this letter is published in *Organizatsiia nauki v pervye gody Sovetskoi vlasti, 1917–1925. Sbornik dokumentov* (Leningrad, 1968), pp. 113–15.

11. "Vospominaniia akademika S. F. Oldenburga o vstrechakh s V. I. Leninym v 1887 i 1921 godakh," in *Lenin i Akademiia nauk*, pp. 88–94. The great impression Lenin made on Oldenburg is corroborated by the memoirs of his friend V. I. Vernadskii and by Lenin's secretary, V. D. Bonch-Bruevich. Vernadskii's comment is to be found in Arkhiv Akademiia nauk, f. 518, op. 4, ed. khr. 45, 1. 12 and Bonch-Bruevich's in *Lenin i Akademiia nauk*, pp. 25–26.
12. Kol'tsov, p. 34.
13. Seven were in the physical and mathematical sciences, four in chemistry, four in the earth sciences, and five in biological sciences. AAN SSR, f. 410, op. 1, ed. khr. no. 94, 1. 4, cited in N. M. Mistriakova, "Struktura, nauchnye uchrezhdeniia i kadry AN SSR (1917–1940 gg.)," in *Organizatsiia nauchnoi deiatel'nosti* (Moscow, 1968), p. 214.
14. Bastrakova, p. 22.
15. L. V. Ivanova, *Formirovanie sovetskoi nauchnoi intelligentsii 1917–1927* (Moscow, 1980), p. 273.
16. A. Sinetskii, *Professorsko-prepodavatel'skie kadry vysshei shkoly SSSR* (Moscow, 1950), p. 30–35.
17. *Nauchnye kadry RSFSR* (Moscow, 1930), p. 7.
18. Ibid.
19. Leikina-Svirskaia, pp. 90–91.
20. Ivanova, p. 39.
21. See the letter of A. Stebut to S. F. Oldenburg, dated Feb. 19, 1918, and published in *Organizatsiia nauki v pervye gody Sovetskoi vlasti (1917–1925)* (Moscow, 1968), p. 106.
22. *Vestnik Akademii nauk*, 1967, no. 8, pp. 69–70.
23. The report of this meeting is contained in TSGA RSFSR, f. 2306, op. 19, ed. khr. 3, 1. 86, cited in Ivanova, p. 37.
24. Kol'tsov, p. 41.
25. George Leggett, *The Cheka: Lenin's Political Police* (Oxford, 1981), pp. 306–8.
26. See the article by Lunacharskii in *Novosti dni*, April 5, 1918, p. 1, and a more detailed account of Narkompros's negotiations with the academy in *Izvestiia*, April 12, 1918, p. 3. The Sovnarkom decree, signed April 12, 1918, was first published in *Izvestiia*, April 19, 1918.
27. *Ekonomicheskaia gazeta*, July 21, 1931, p. 3.
28. V. A. Ulianovskaia, *Formirovanie nauchnoi intelligentsii v SSSR, 1917–1927* (Moscow, 1966), p. 59.
29. *Narodnoe khoziaistvo*, 1918, no. 1, pp. 3–6.
30. See, for example, Alexander Fersman in *Nauka i ee rabotniki*, 1921, no. 1, p. 3ff.
31. Ibid.
32. Kol'tsov, pp. 99, 111, 123–24, 133.
33. "Nabrosok plana nauchno-tekhnicheskikh rabot," April 18–25, 1918, reprinted in *Lenin i Akademiia nauk*, pp. 44–47.
34. See the documents in *Organizatsiia nauki v pervye gody*, pp. 113–23.
35. Published in *Vestnik proveshcheniia soiuza kommun Severnoi oblasti*, 1919, nos. 6–8, pp. 15–23, cited in Bastrakova, pp. 97–98 and Kol'tsov, p. 61.
36. Sheila Fitzpatrick, *The Commissariat of Enlightenment: Soviet Organization of Education and the Arts under Lunacharsky* (Cambridge, 1970), p. 75.
37. Bastrakova, p. 212, cited TsGA RSFSR, f 2306, op. 1, ed. khr. 35, 11. 95–96.
38. AAN SSSR, f. 162, op. 3, ed. khr. 171, 11. 41, 51–51 ob., st. 56, cited in Bastrakova, p. 100.

39. TSGA RSFSR, f. 2306, op. 19, ed. khr. 18, 1. 198, cited in Bastrakova, pp. 100–1.
40. Bastrakova, pp. 100–101.
41. Ibid., pp. 104–8.
42. TsGABKh SSSR, f. 3429, op. 60, ed. khr 20, 11. 207, 207 ob., cited in Bastrakova, p. 213.
43. See, for example, Fitzpatrick, pp. 71–72.
44. This letter is published in *Lenin i Akademiia nauk. Sbornik dokumentov*, p. 61.
45. *Novyi mir*, 1925, no. 10, p. 110; Kol'tsov, p. 63.
46. On the Proletkult during this period, see, for example, V. V. Gorbunov, "Iz istorii bor'by Kommunisticheskoi partii s sektanstvom Proletkul'ta," in *Ocherki po istorii sovetskoi nauki i kul'tury* (Moscow, 1968), pp. 29–68, and Fitzpatrick, pp. 89–109, 178–80, 185–87, 238–41, 269–70.
47. Kol'tsov, p. 177.
48. Ibid., p. 181.
49. Bastrakova, p. 166–67.
50. Kol'tsov, p. 158.
51. Bastrakova, p. 158.
52. Ibid., p. 158; *Organizatsiia nauki v pervye gody*, pp. 78–96.
53. *Organizatsiia nauki v pervye gody*, pp. 93–94.
54. Ivanova, p. 360; Bastrakova, p. 162.
55. See Kol'tsov, pp. 99, 111, 123–24, 133.
56. Leggett, pp. 102–20.
57. See *Gor'kii i nauka. Stat'i, rechi, pis'ma vospominaniia* (Moscow, 1965); and L. V. Zarzhitskaia, "O novykh pis'makh M. Gor'kogo. (K voprosu o sokhranenii kadrov uchenykh v pervye gody Sovetskoi vlast)," in *Ocherki po istorii sovetskoi nauki i kul'tury*. pp. 101–12.
58. Ivanova, pp. 210–11.
59. Ibid., pp. 211–12.
60. Ibid., p. 216.
61. AAN, f. 2, op. 1–1917, no. 41, 11. 306–307 ob., cited in Kol'tsov, p. 138.
62. M. Iunovich. *M. Gor'kii—propagandist nauki* (Moscow, 1968), pp. 77–78.
63. Kol'tsov. p. 139.
64. See V. D. Bonch-Bruevich, "Iz vospominanii," *Lenin i Akademiia nauk*, p. 67; Kol'tsov, p. 138; *Nauka i ee rabotniki*, 1921, no. 3, pp. 34–38.
65. Bonch-Bruevich, p. 67.
66. See Kendall Bailes, *Technology and Society under Lenin and Stalin: Origins of the Soviet Technical Intelligentsia, 1917–1941* (Princeton, 1978), p. 59.
67. Ivanova, pp. 178–79.
68. Ibid.
69. V. I. Lenin, *Polnoe sobranie sochenenii*, 5th ed., pp. 312–13.
70. Fediukin, p. 58.
71. See documents in *Organizatsiia nauki v pervye gody*, p. 191.
72. Most of the information for this section is taken from an article by a Siberian geologist entitled "Scientists in Siberia" and published in a journal edited by Maksim Gorkii, Alexander Fersman, and other Petrograd intellectuals: *Nauki i ee rabotniki*, 1921, no. 1, pp. 7–23.
73. Mochalov, pp. 213–25.
74. Sergei Timoshenko, *As I Remember* (Princeton, 1968), p. 166ff.
75. V. I. Vernadskii, "The First Year of the Ukrainian Academy," in *Annals of the Ukrainian Academy of Arts and Sciences in the U.S., Inc.*, 1964–68, vol. 11, nos 1–2. (31–32), pp. 13–22.
76. Archive AN SSSR. f. 518, op. 2, khr. 11.
77. Diary entry of April 19, 1919, AAn SSSR, f. 518, op. 2, ed. khr. 11.

78. Diary entry of November 30, 1919, AAN SSSR, f. 518, op. 2, ed. khr. 11.
79. Diary entry of October 14, 1919, AAN SSR, f. 518, op. 2, ed. khr. 11.
80. Diary entry of December 29, 1919, AAAN SSR, f. 516, op. 2, ed. khr. 11.
81. Kol'tsov, pp. 134–38.
82. This decree is published in *Organizatsiia nauki v pervye gody Sovetskoi vlasti (1917–1929)*, pp. 339–40.
83. Kol'tsov, p. 144.
84. Ibid., p. 148.
85. Bonch-Bruevich, p. 68–69.
86. This account is partially corroborated by documents in the following collections: *Organizatsiia nauki v pervye gody Sovetskoi vlasti*, p. 340–41; *V. I. Lenin i A. M. Gor'kii (Pis'ma, vospominaniia, dokumenty)* (Moscow, 1961).
87. "Postanovlenie SNK o sozdanii uslovii, obespechivaiushchikh nauchnuiu rabotu akademika I. P. Pavlova i ego sotrudnikov," signed January 24, 1921, and published in *Izvestiia*, on February 11, 1921. See *Lenin i Akademiia nauk*, p. 88.
88. "Pis'mo Rossiiskoi Akademii nauk v SNK s srochnom priniatii mer dlia uluchsheniia polozheniia uchenykh i nauki v Rossii," dated May 17, 1921, and published in *Organizatsiia nauki v pervye gody*, p. 342–44.
89. Fersman, p. 6.
90. Leikina-Svirskaia, pp. 90–91.
91. Alexander Vucinich, *Empire of Knowledge: The Academy of Sciences of the USSR (1917–1970)* (Berkeley, 1984), pp. 80–81; see also N. V. Grave, "Kraevednye uchrezhdeniia SSSR," in *Priroda*, 1926, nos. 1–2, pp. 127–28; B. A. Lindener, "Issledovatel'skaia rabota Akademii nauk SSSR v sovetskoi obstanovke," *Nauchnyi rabotnik*, 1925, no. 3, pp. 9–24; N. Ia Marr, "Kraevedcheskaia rabota," *Nauchnyi rabotnik*, 1925, no. 1, pp. 10–18; and articles about the creation and activity of particular *kraeved* organizations in *Nauki i ee rabotniki*, 1921, no. 2, p. 30; 1921, no. 5, p. 35.
92. V. I. Vernadskii to Ivan Il'ich Petrunkevich, March 10, 1923, Vernadsky collection, Bakhmeteff Archive, Columbia University.