

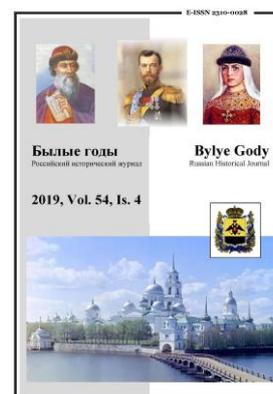
Copyright © 2019 by International Network Center for Fundamental and Applied Research

Copyright © 2019 by Academic Publishing House Researcher s.r.o.



Published in the USA
Co-published in the Slovak Republic
Bylye Gody
Has been issued since 2006.

E-ISSN: 2310-0028
Vol. 54. Is. 4. pp. 1546-1553. 2019
DOI: 10.13187/bg.2019.4.1546
Journal homepage: <http://ejournal52.com>



The First Russian Mineralogist – Nikolai Ivanovich Koksharov (1818–1892)

Sergey N. Rudnik ^a, Irina V. Voloshinova ^a, Anton B. Mokeev ^{a,*}, Andrey I. Leyberov ^a

^aSaint-Petersburg mining university, Russian Federation

Abstract

This article is devoted to the study of the biography of the outstanding Russian scientist Nikolai Ivanovich Koksharov. He was one of the largest Russian mineralogists. For his contribution to the development of this field of mining engineering, N.I. Koksharov earned the title «father of Russian crystallography». This inscription was even placed on his grave as a tribute to the scientist, whose name is forever inscribed in the history of Russian science. Nikolai Ivanovich became the founder of a new scientific field in Russia, replacing the old method of qualitative description of minerals with mathematically accurate crystallographic study, chemical analysis, and physical research. Worthily continuing scientific research in the field of mineralogy of another brilliant Russian scientist M.V. Lomonosov, N.I. Koksharov reached unprecedented heights in his scientific career, becoming in 1855 a member of the Russian Academy of Sciences. Nikolai Koksharov is known to us not only as a researcher, but also as a talented teacher and manager of a higher educational institution. Nikolai Ivanovich served as director of the Mining Institute in the period 1872–1881. He was also the director of the Mineralogical Society and the editor-in-chief of many volumes of the Notes of the Mineralogical Society. N.I. Koksharov was also a member of 60 Russian and foreign scientific societies and institutions, including ten Academies (Russian, Paris, Berlin, Bavarian, Roman, Turin, Danish, New York, Philadelphia and many others). His name is known far beyond the borders of Russia, and his scientific developments are actively used in many countries of the world.

Keywords: Nikolai Koksharov, Mining Institute, Academy of Sciences, mineralogy, crystallography, chemistry, mining engineer, researcher, director.

1. Introduction

The second half of the XIX century is considered the time of a new qualitative breakthrough in world history. This was a period of rapid development of various industries in Russia, especially mining. The scale of coal and oil production has increased, and metallurgy has been rapidly developing. Russia actively participates in world economic conferences. As a result of this, business ties are developing with the leading powers and new markets are being developed. In all the leading countries of the world, geological services and systematic exploration work appear. The Russian Empire also paid great attention to the search for minerals, which were to become the necessary resource base for further powerful industrial growth. These circumstances necessitated an increase in trained engineering personnel in these sectors of the economy. In Russia there was only one higher education institution of the mountain profile – the St. Petersburg Mining Institute – the most important center of mining engineering. The biography of Nikolai Ivanovich Koksharov is one of the best examples of the successful development of scientific thought in Russia during this period. In addition, as Director of the Mining Institute, N.I. Koksharov demonstrated excellent managerial skills by improving the training system of qualified mining engineers. All these historical features indicate to us the relevance of developing this topic. The experience and achievements in domestic science and pedagogy of the

* Corresponding author

E-mail addresses: amokeev@yandex.ru (A.B. Mokeev)

past years should become an incentive for the further development of these areas in the present and future of our country.

2. Materials and methods

The main source of information for writing this article was archival documents of the Russian State Historical Archive in St. Petersburg (RGIA), namely fund No. 44 – «Headquarters of the Corps of Mining Engineers» and fund 40 «Reports of the Minister of Finance for the Mining Department». When writing the article, a comparative historical method was used. In the process of studying this topic, various paperwork documents of this fund related to the process of organizing mining education and the development of mining science were compared. As a result, it was possible to reliably establish the general facts and particular details of the work of mining technical schools, as well as to trace the development of this issue. The memoirs of Nikolai Ivanovich Koksharov were also used, which revealed the details of his biography and the features of the development of mining science of the 19th century.

3. Discussion

In Russian historiography, the biography of the outstanding scientist Nikolai Ivanovich Koksharov has been studied more than once. But at the same time, it was considered only fragmentarily. Mostly the focus was exclusively on the results of his scientific work, but not his entire life path. First of all, it is necessary to highlight general works on the history of the development of mining in Russia in the 19th century. In such works, the development of mineralogy and crystallography in Russia is studied. N.I. Koksharov made a great contribution to the formation of these areas of mining science. Therefore, the authors of such works point to his scientific developments, and also emphasize the high status of the scientist. In this regard, it is necessary to name such authors as Grigoryev Dmitry Pavlovich ([Grigoryev, Shafranovsky, 1949](#)) and Shafranovsky Ilarion Ilarionovich ([Shafranovsky, 1962](#)). The famous Soviet mineralogists in their works revealed important points from the biography of N.I. Koksharov, but not his entire biography.

After the death of the scientist, several small essays were written dedicated to his memory. In their content, these essays also do not constitute a detailed exposition of the biography of Nikolai Koksharov, but only confine themselves to an account of the basic facts of his life and scientific activity. Among the authors of such essays, it is worth highlighting the name of Prendel' Romul Alexandrovich ([Prendel', 1893](#)). This famous Russian scientist was also involved in crystallographic research. In his essay on N.I. Koksharov, he paid tribute to the scientific contribution of his colleague. Of course, it is worth mentioning another author who wrote an essay in memory of N.I. Koksharov. It was Vernadsky Vladimir Ivanovich – the outstanding Russian scientist of the 20th century, a naturalist and public figure, the creator of many scientific schools ([Vernadsky, 1915](#)).

In the Soviet period, several scientific works devoted to the history of the Russian Mineralogical Society were published. These works also talk about the biography of N.I. Koksharov. It is necessary to highlight the research work of Povarennykh Alexander Sergeevich ([Povarennykh: 1956](#)). Soviet historian Rafienko Lyudmila Sergeevna investigated the biography of mining engineer N.V. Vorontsov. In her book, she also revealed episodes from the life of N.I. Koksharov ([Rafienko, 1989](#)).

The scientific activity of N.I. Koksharov was considered in Russian historiography, but his work as director of the Mining Institute was very rarely studied. Only at the beginning of the 21st century the first scientific studies devoted to this important aspect of his biography appeared. It is necessary to highlight the work of a team of authors led by Afanas'ev Vladimir Georgievich ([Afanas'ev et al., 2010](#)).

It is necessary to continue studying the biography of N.I. Koksharov. All these circumstances determine the relevance of the study and the novelty of the work. Through the use of archival documents, the authors of this article expand their knowledge of an outstanding researcher.

4. Results

Nikolai Koksharov was born on November 23rd 1818 in a small village close to Ust-Kamenogorsk in Altai Republic. His father, founder of the dynasty, Ivan (Konstantinovich) Koksharov (1775–1840) was a son of Ural mine foreman. He graduated from Saint Petersburg University, after that he did military service first in Altai and then in Ural region where he was running a mine in Beryozovsky for twenty years. Thanks to excellent service to nation he achieved the rank of a nobleman. He achieved fifth class mining rank. Being an outstanding manager, he made great impact on developing of mining in Ural region. In the middle of his lifetime he married Princess Glaphira (Stepanovna) Eristova, granddaughter of Princess Maria (Gavrilovna) Eristova, nicknamed by folks Beryozovsky Princess ([Russkii biograficheski slovar, 1903: 67](#)). The story of how the ancient noble family from the Caucasus turned out to be in Ural region remains quite mysterious. The voices say that Prince Stephan Eristov (Maria Gavrilovna`s husband) was somehow related to the Decembrists, the reason why he was sent to exile. For his son, Ivan Koksharov was the example of toughness and demand, while Glaphira (Stepanovna) Koksharova (born Princess Eristova) and grandmother Maria Gavrilovna taught him respect and attention towards people. Koksharov`s memoirs describe that, from the early childhood, his father showed him the mines, while his father`s - plants and factories. Minerals,

extracted in the mines, had soon caught his eye. Copying his father, he had quickly learnt distinguishing them and started his own collection (Shaphranovsky, 1964: 8).

Being a son of mining engineer, in 1830 he was admitted to Military school of mines. The long-way relocation of twenty-year-old Koksharov from Ural region to Saint-Petersburg was quite impressive. He was accompanied by the so-called golden caravan, made of carriages loaded with chests with gold and guarded by armed soldiers headed by a mining engineer. In the Military school of mines he developed and strengthened his devotion towards mineralogy. He goes on collecting samples and adds some interesting items, purchased from mining pharmacist Kemmerer, expert in mineralogy, to his already significant collection. Later on he will write with affect about his collection: «In order to preserve my treasures from my mates, I asked Kemmerer to store my closet with the collection in his pharmacy. From time to time I came over to him to see my minerals» (Koksharov, 1890: 615).

The student was really impressed by papers on crystallography, in particular, colorful illustrated French edition of Mining School in Paris by R.-J. Gaiui called *Traite de Mineralogie*. Table of edges of crystals, atlas of crystal forms inspired young mineralogist to create a similar system for Russian minerals as well. While a student, he already cultivated the idea about his future life's work called *Papers for Russian Mineralogy* (Mineralogical Almanac, 2006: 15).

Russian mineralogy was developing intensively not only by scientist but also by common people, miners. They found copper, silver and iron ore and minerals along Pechora River, in Ural region and Siberia. Russian miners found the way for mineral extraction in the most distant areas, such as Altai region and East Siberia. It was them who discovered numerous new mining areas of iron and copper ore, mica, salt and mineral paints in Central Russia as well as in the distant areas. The achievement of the 17th century was the discovery of silver ore mines in Siberia, semi-precious stones in the Ural region and Siberia, oil and graphite in Siberia. During emperor Peter the Great's time, when the industry and military industry were strengthened, mining kept on developing rapidly as well. Metal smelting reaches a significant growth. In Russia, first of all in the Ural region, there was a huge number of new mining ore areas opened. Much progress in the studies of Russian mineralogy was made later on in the 18th century, when the non-explored areas of Russia received special interest from the scientists (Vernadsky, 1915: 335).

The pioneer of the new age in Russian mineralogy was the brilliant scientist M.V. Lomonisov (1711–1765). His papers as, for example, *Basics of Metallurgy and Mining*, *Layers of the Earth*, *Birth of Minerals Caused by Earthquakes* contain numerous theories of the origin of minerals caused by geological history and origin. Being a brilliant theoretician, he conducted lots of experiments as well. In his laboratory he studies metals, salt and other minerals. Unlike many scientists of his time, the brilliant scholar realized that there is a little chance to study natural history without experiments. He perfectly combines theory and practice, studies facts in nature and in laboratory, conducts physical and chemical tests. There are the features he wished the mineralogy to be based on. Last days of his life he devoted to his papers called *Russian Mineralogy* (Grigoriev, Shaphranovsky, 1949: 6-9).

By the end of the 17th century mineralogy had a new era, due to great success of mining. Numerous resources in mineralogy, collected and classified by travelers and naturalists, created first quality-based and then accurate descriptive-based mineralogy. Huge collection of facts demanded more detailed descriptions, as well as a new pattern, capable to include the growing number of facts. At that time chemical classification remained quite primitive. All minerals were divided in four groups: ground, salt, flammable and metal. Particular attention was paid by external features, based, mostly on shape (*hábitus*) of minerals, color, gloss, sharpness and weight. It is curious, that all that features were described in details, but only verbally. As, for instance, for a crystal they didn't apply geometry, was illustrated only by six figures: a column, a table, a lentil-shaped, a pyramid, a 20-gon and an octagon. The relative weight of minerals was described by such terms as light, medium, heavy, quite heavy. The pattern of colors was also barely verbal. There were eight dominating colors: white, grey, black, blue, green, yellow, brown and red. Each of them had a number of specially described hints. However such descriptions of quality of minerals were not always caused by the lack of accurate calculations. A.G. Werner (1750–1817), the famous German mineralogist and geologist, for example, opposed accurate weighting in mineralogy. Werner, however, contributed a lot to development of quality-based descriptive mineralogy. Despite its shortcomings, quality-based descriptive mineralogy was at its time a huge step forward and played the significant role in the progress of Russian science. It enabled to study minerals and their features in details (Koksharov, 1876: 8).

The 18th century there was a start of more accurate study of geology of several countries. In Russia the trend was followed by scientific expeditions with the participation of P.S. Palass, V.F. Zuev, P.Y. Rychkova, I.I. Lepekhina and E. Laksman. Natural treasures of Volga, Ural, Altai, Baikal region as well as the ones of West and East Siberia were discovered at that time. Many countries achieved huge number of new papers on geology and mineralogy. In that way it seemed evident that the science of Earth should be divided into several branches. It turned out that the number of objects, such as petrified shells, plants and rocks, early studied by mineralogists as part of mineralogy, are not in fact minerals. That caused the sub-division of common mineralogy into mineralogy as it is and geology (*geognosy* and *geogeny*). Later on *geognosy* (i.e. descriptive geology) gave birth to *geomagnosy* (i.e. science studying rocks) and *paleontology* (studies fossils) (Shaphranovsky, 1962: 40-41).

Until the end of the 19th century all sciences studying minerals were so historically close that could be hardly distinguished. Crystallography was for a long time limited to studying natural crystals – i.e. minerals.

At the end of second half of the 19th century mineralogy started its major transformation. The article by N.I. Koksharov called Subject of mineralogy, its brief history, crystals as parts of inorganic world showed the view of the scientist on the content of mineralogy and its tasks. He underlined that before nowadays practice usually anticipated science. That is the reason why the facts about minerals usually concerned their use and processing methods, while their natural features remained out of sight. The most ancient branch of geology was not actually mineralogy, but the study of natural resources. The date of birth of scientific crystallography, as well as stratigraphy is considered 1669 – date of issue of Danish naturalist Nicolas Steno`s paper called – Solid Naturally Contained within a Solid. This paper (1638–1686) gives origin to the studies on dislocation of the Earth`s crust and transgressions. N.Steno also, for the first time, gave a precise definition for crystallization process. He noted that a crystal grows not from inside (like plants do) but when the tiny items are placed on the crystal`s surface. That items are transported from inside by some liquid. The discovery of the first law of crystallization – the law of invariant angles is also to the credit of Steno. The law was proved based only on rock crystal, while the invariant angles were mentioned as note to the drawings. At that time his paper didn`t draw any attention. It was M. Lomonosov, who, one of the first, started measuring angles of crystals. Using diamond crystals and saltpetre he restored Steno`s law of invariant angles (Grigoriev, Shaphranovsky, 1949: 10).

Mineralogy in all meanings of the word was the moto of Mineralogical Society founded in January 19th 1817. The society played an important role for further development of mineralogy and united all the scientists studying minerals, rocks and natural resources.

Nikolai used to enjoy student summer trips, supervised by the professors, to Saint-Petersburg suburbs, Borovichi and Finland. During one of that trips to Finland Koksharov met N. Nordensheld, who they went together to Oriervi copper mine, mineral mine of Pargos island, Kimito mine etc. As Koksharov writes in his memoirs: We could stay for hours in Pargos or other mines with a hammer, extracting crystals from the rock. While N. Nordensheld helped with explanations and instructed the young scholar. He was interested, however, not only in mineralogy. Led by G.P. Gelmersen, experienced naturalist, Koksharov was involved in studying geology and collected a great number of fossils. On return to school, materials collected were identified, classified and sent to museum.

By the time of getting a degree, Koksharov had a challenge about the future job. His brilliant capacities and scientific gift caught the eye of K.B.Chevkin, head of mine engineers. At that time paleontology went on the first stage. Chevkin evidentially tried to direct Koksharov towards paleontology and disapproved his passion for mineralogy. What do you still find in mineralogy – he said – while paleontology is much more important. Koksharov`s doubts about job were also caused by the dispute between two scientists of School of mines. G.P. Gelmersen, geologist, following the old school, identified geological items from the view of mineralogy and physical features, not even considering paleontology. Based on his studies, he attributed the number of formations close to Novgorod to Old Red Sandstone (ORS). While E.Eikhvald, paleontologist, after having examined the fossils, noted that Gelmersen was wrong and the formations dated back to Devonian system. Gelmersen, who considered himself the first geologist, took it as personal insult. In order to solve the problem, opponents addressed authoritative geologist Leopold von Buch (1774–1853), who, in turn, confirmed Eikhvald was right. That dispute, discussed a lot among scientists, drew the attention of brilliant English geologist R.I. Murchison. Murchison applied to Russian government to arrange an expedition to study the geology of European part of Russia. The idea was to compare the sediments collected in England to the formations described by Gelmersen and Eikhvald. When approved, Murchison asked two other scholars to join the expedition. They were Édouard de Verneuil, a French paleontologist, and Alexander von Keyserling, naturalist, then well-known zoologist, geologist and traveler. In Spring 1840 all of them reached Saint-Petersburg (RGIA. F. 44. Op. 3. D. 365. L.12).

At that time Koksharov, who just graduated from school of mines, was called by K.V.Chevkin. Nikolai graduated from school of mines, second by votes, got the rank of military engineer. Chevkin announced to the new graduate that he will accompany Murchison on his trip along Russia. Chevkin, however, once again underlined which path he would like him to follow. Koksharov cites him in his memoirs: My friend, you have a good chance to see how the famous scientists conduct their research in geology. Keep your eyes open and do not loose what could be useful for your research in geology and paleontology. Pay much attention on fossils that now play the major role for geology. Then be polite towards famous foreign guests (Koksharov, 1890: 620).

The order about the expedition issued on May 25th 1840 was called to mining engineer 2nd lieutenant Koksharov to be stationed to accompany geologists Murchison and Verneuil in their trip along Russia. It said that Koksharov was sent to complete the geological and paleontological collections from the countries our knowledge is not complete about. You are invited to use this chance to get to consult the geognostic research, in particular coal formations, so well-documented by Murchison, headed by famous geologists themselves.

You have the main duty to collect accurately for military school of mines the samples of rocks and, in particular, fossils of the countries you are going to visit. When collected specimen of ore and fossils, they

have to be immediately sent to the base, accurately packed and classified with report and their exact placement attached (Koksharov, 1890: 622).

In its first year the expedition was studying the suburbs of Saint-Petersburg, Volkhov river banks, Valdai hills, Ilmen lake area, as well as Vologda and Arkhangelsk regions till Pinega area. Koksharov's report was published in Mining Magazine in 1840 entitled Notes on Geology of Several Regions of Russia. It was his first published paper. In this report twenty-two-year-old author disagreed with Murchison's conclusions about the formation of old red sandstone. Later on Murchison sends him a letter when he acknowledges young scientist was right.

After that Koksharov was sent to Yekaterinburg to work for the mint. As Nikolai used to say, that occupation didn't bother him so he could use the spare time for mineralogy and for his collection, at that time containing lots of rare and unique samples. He travels all over Yekaterinburg and suburbs to purchase minerals from local merchants and miners. In winter he travels to Murzinka.

In 1841 he was called from Saint-Petersburg to join the second expedition led by Murchison. That year the goal was to study geology of Russia from Saint-Petersburg to Perm. The second step of the expedition led to Yekaterinburg and then all over Ural area from Bogoslovsky factory to the southern part of the Ural Mountains. The inspection of northern part of the Ural Mountains ended at Kachanar Mountain. In his memories Koksharov notes that, while travelling along Ural region, he hopes to find Ural diamonds. The lack of success in that led him to bitter conclusions when he doubts authenticity of Ural diamonds. This view is clearly illustrated by his typical phrase written down by professor R. Prendel: I don't believe that those small diamonds, they pretend to be from the Ural Mountains have the origin there. Russian nature is so powerful that all the precious stones are giants (Vernadsky, 1915: 331-338).

Murchison highly appreciated the participation of the young scholar. Later on, when in 1845 he issued Geological Map of Russia he added to the signature, along with his own name, the name of young Russian scientist (with the participation of lieutenant Koksharov).

With the help of Chevkin, in 1842 Koksharov was sent abroad to study mineralogy and crystallography. Young Russian scholar draws attention of famous at that time German mineralogist Weiss. Once Weiss was showing the audience a very rare greenockite, that was not well-known to the audience but which I was familiar with. Which mineral greenockite visually similar to – but certainly has nothing in common with? – Weiss asked. I saw nobody answering and I said: to corundum. The old man remained impressed by my answer. From that time he paid special attention to me and started asking more questions than he did before.

In 1846 Nikolai comes back to Russia. He gets a job as a tutor at Mining University. Due to his rank he earns only 200 rubles a year. As he writes later on in his memoirs: I must confess I was very poor. I could buy an oilskin sofa for three rubles at Andreevsky market. It contained all my clothes, books and other belongings. Then I bought a table, two chairs (one ruble and a half) and a pillow. I also bought tea and sugar and that was my breakfast together with bread a baker offered me. I was sleeping on the sofa covered with my grey army coat (Koksharov, 1890: 626-627).

Professor G.A. Iossa helped his ex-student a lot, when Koksharov, upon return from Berlin University in winter 1846 was extremely poor. The young scholar went to live in the attic of the same house as Iossa. That winter was very cold and the young man was too poor to buy firewood. When Iossa got to know about that, he convinced Koksharov to study and have lunch in his flat and return home just to sleep. Recommended by professor Iossa, Koksharov started teaching mining and metallurgy at Mining School of Institute of Technology. Soon after that he became teacher of geography in the military schools. Consequently Koksharov, together with V.V. Bek, developed the textbook on physical geography. At that time Nikolai gets a job as caretaker of the Observatory and from 1849 to 1852 substitutes its director (1849–1852), professor Kupffer.

As his economic conditions slightly improved, he had the chance to get back to his life goal, i.e. studies in mineralogy. The first object of his research was a new mineral, discovered in the collection of P.R. Bagration and that is why named bagrationite. A big black crystal of that mineral, extracted from white diopside, was carefully measured on one-circle goniometer in Russian Academy of Science. Koksharov at that time owned a less precise Wollaston measuring device; he later purchases Mitscherlich goniometer. The article about bagrationite, published in the Mining Magazine, immediately got everybody's attention. None less impressive was his article about the crystals of Ural magnetite, where Koksharov discovered some rare shapes (RGIA. F. 44. Op. 3. D. 365. L. 17).

The popularity of Koksharov as mineralogist grows so that in 1847 he was for a year lecturing mineralogy and geology at Saint-Petersburg University as stated by Ministry of Culture, to substitute professor E.K. Hoffman, at that time lecturing abroad. From the same year he was assigned teaching first geology then mineralogy at Mining Institute. In 1848 Koksharov publishes the description first discovered in the Ural Mountains crystals of brookite (Koksharov, 1849: 434-440).

This discovery was followed by articles on such complicated matter as crystallization of minerals of chlorite group. All that confirmed his fame of brilliant Russian mineralogist and crystallography expert.

In the same year Koksharov joined Mineralogical Society. The next 44 years of his life he devoted to the Society. Koksharov also reformed the magazine of Mineralogical Society that, before the new statute was introduced, for several years had been published in German. From 1866, after Koksharov was elected

director of Society, the magazine started being issued mainly in Russian, under the title of Notes of Imperial Mineralogical Society of St Petersburg (second edition).

The number of papers on geology kept growing so rapidly that all of them could not be included in the Notes. That was the reason why in 1868 the Society headed by Koksharov started issuing special digests called Papers for Russian Geology. The papers for that digest, due to the reports, were selected in the following way: first the naturalists' reports, then, if funds allow, other articles on geology. These digests collected important materials on geological structure and natural resources in different areas of Russia. The editions of Mineralogical Society of that time could be interesting from different point for all researchers. Some articles are still up-to-date. All these papers were necessary not only for Russian geology, but also for further exploration of natural resources. All of them later on built up the base for geological map of European part of Russia (RGIA. F. 44. Op. 3. D. 365. L. 12).

In 1853 Koksharov prepares for publishing his life work called– Papers for Russian Mineralogy. The first volume issued already impressed readers in Russia and abroad. On one side, it impressed the readers by the amount of work done as well as the accuracy of results. From another side, it contained surprising quantity and diversity of the material observed. A number of minerals from Siberian and Ural area were mentioned by Koksharov for the first time in Russia (in the first volume there were such minerals as Ural brookite and yellow cancrinite from the Tunkin Mountains in East Siberia). The first volume of Papers was awarded half of Demidiv price from the Academy of Science. Every year Demidov contributed 25 thousand rubles to the fund of the prize. According to his will, the award should be also granted in the next 25 years after his death. During that time 58 brilliant Russian scholars got the prize. There was a full award, at the amount of 5 thousand rubles, and a half-award. From 1832 to 1865 Saint-Petersburg Academy of Science granted 55 full awards and 220 half-awards (RGIA. F. 40. Op. 2. D. 99. L. 58).

In 1857 N.I. Koksharov is sent abroad for the second time, to the conference of natural science scholars and doctors at Bonne, with the goal to inspect the mineralogy collections from Germany, France and England. The way he was received by foreign colleagues showed that Papers for Russian Mineralogy made a big impression in the scientific world. Thanks to Koksharov, the fame of Russian minerals was spread in all Europe.

In 1858 Koksharov gets the rank of guest academician, then in 1866 he is elected ordinary (permanent) academician on crystallographic geognosy at Academy of Science, where he was a member from 1855. Nevertheless, Koksharov remains just a modest scholar, with his passion on measurements of crystals in mineralogy. He regularly issued the new volumes of his Papers as their number by the end of his life reached 11. One of the news in Russian mineralogy is the discovery of euclase, a rare mineral that, before discovery, was known only in Brazil. The discovery was made by chance. Koksharov found three perfect samples of that crystal in one of the boxes, purchased from an Ural merchant. Soon the district, where euclase originate from, got world fame, as there were other precious stones found, such as rose topaz, corundum etc. Koksharov's interests were not limited only by researches. At the same time he did a great job like a teacher, lecturing in a number of universities and high schools. For example, he teaches mineralogy at Mining Institute (1847–1855), Institute of Railway Engineers (1862–1866), Forest Technical Institute and Landmark Institute (1851–1862) etc. The result of his lectures found the way in Lectures on Mineralogy (1863) that had a great success among students. Lectures had the second edition in 1908; 16 years after the death of Koksharov, and in 1865 were translated into German (RGIA. F. 44. Op. 3. D. 365. L.14).

In August 1866 Koksharov suggests that mineralogist Franz von Kobell, a member of Bavarian Royal Academy of Science and professor of Munich University, must be awarded for his Tables for Identifying Minerals. Franz von Kobell described a big number of minerals and kobellite was named in his honor. Von Kobell, besides that, must have been the first German photographer, as in 1839 he showed daguerreotypes of some buildings in Munich (some of them were preserved). Consequently, by the law of Emperor Alexander II, Kobell received an award of Saint Stanislav (2nd class) (Vernadsky, 1915: 337).

Nikolai Ivanovich travelled a lot abroad. In 1876 during the international fair in Philadelphia he was awarded a golden medal. The authority of Koksharov was enormous and he was requested a lot as an expert. In 1883 Spanish Embassy claimed that they would like Koksharov to be sent to the fair opened in May 1st to study the collection of Spanish minerals. He was supposed to be present at the national fair of rocks and ceramics in Madrid one year ago, but the fair didn't take place. He also frequently travelled to Ural region (RGIA. F. 40. Op. 2. D. 99. L. 78).

Despite a big number of schools and institution Koksharov cooperated with, there were only three that were his priority: Mining Institute, Mineralogical Society and Academy of Science. For about 40 years, from 1855 till his 1892 (the year he died) he remains the leading expert in Russian mineralogy and crystallography. From 1866 to 1873 he was director of the Museum of Mineralogy of the Academy (Afanas'ev et al., 2010: 97-98).

He was really bounded to Mining Institute (ex-military school of mines), where he began his professional path. Koksharov was lecturing there not for a long time, from 1847 to 1855. From 1857 he becomes a member of Committee of Scientists of the college, in 1868 is nominated a member of Mining Committee and then, in 1872 becomes the director of Mining Institute from (till 1881). In 1873 Koksharov takes an active part in the celebrations in honor of 100th anniversary of Mining Institute that he later on describes in an article he dedicated to the event.

In 1865 was nominated director of Mineralogical Society, being one of the most active members and hard-working authors of Notes of Mineralogical Society. In the same year Koksharov was announced director of honor, the rank other directors of the Society never reached before. Thanks to Koksharov, the amount of Russian minerals and their deposits studied by Society members has significantly increased.

Since Mineralogical Society was ahead in all geological researches in Russia, the question where to store all the collections (rocks, ore, minerals etc.) became an important issue. Since the square meters the Society owned was quite limited, and the collections in future were expected to increase, the solution should have been found. N.I. Koksharov started negotiating the question with Mining Institute management (i.e. its director G.P. Gelmersen and inspector V.G. Eropheev). Mineralogical Society, before it was established in the Mining Institute, changed location a number of times. Once it occupied the flat on river Moika embankment (Khlebnikov's maison), then was relocated to one of the maisons of Krivopishin on Bolshaya Sadovaya street, close to Sennaya square. After that it was situated on the corner of 6th street on Vasilievsky island and the Neva embankment (Panasha's maison) and some other places (RGIA. F. 40. Op. 2. D. 99. L. 48).

In spring 1869 during one of the assemblies of the Society Koksharov announced that Mining Institute is ready to host Mineralogical Society in one of its buildings. In summer 1869 Society relocated. The assembly in September 16th 1869 already took place in the building of Mining Institute where it is located nowadays. Opening the assembly Koksharov said: Today we start in the new building in Mining Institute. Mineralogical Society already owed that institution a lot, in particular, for the geological and paleontological collections, put together by the researches, send by the Society to explore the geology of Russia. Today Mining Institute hosts us again. The management of Mining Department and Ministry of Finances not only granted great and spacious location, but also continues to provide us help and support. Among us there are colleagues from the management of Mining Institute... That's why I suppose, dear sirs, I will share your feelings if I express to that gentlemen my sincere gratitude on behalf of all the Society (Vernadsky, 1915: 337).

Celebration in 1897 of 50th anniversary of Mineralogical Society was at the same time the event to honor its director. During the Gala Assembly Koksharov was granted the rank of member of honor of Saint-Petersburg University as well as the title of Doctor of mineralogy and geognosy of Kiev University.

In August 24th 1881 Emperor Alexander III dismissed Koksharov from the post of director of Mining Institute. While dismissed Koksharov kept getting 3000 rubles pay, 1200 dining rubles, as well as extra 1500 rubles a year, till the time he remains member of Mining Ministry and instead of the flat he was granted due to his rank. Moreover Koksharov is to be paid 1715 rubles 50 cents per year extra, as a rent for teaching activity (RGIA. F. 44. Op. 3. D. 365. L. 15).

In 1891 Nikolai Koksharov left the position of director of the Society, while, till his death, he remained its director of honor. Mineralogical Society had its golden age while Koksharov was its director. He contributes a lot to activities and future development of the Society. Due to his energy he got the funds for geology researches in Russia, issues of Papers on Geology of Russia (1869), issue of the new edition of Society Papers (1866) (Russkii biograficheskii slovar, 1903: 69).

5. Conclusion

In 1887 Koksharov celebrates 50th anniversary of service and research. He was sent numerous congratulations from all over the world, from scientific associations, academies and just colleagues. Let all precious stones, dear to all Russian mineralogists, such as topaz, phenakite, alexandrite, corundum and other minerals, you devoted your precious studies to, be gathered in a wreath, that will honor your half-century contribution to science.

«Your mathematically accurate descriptions of Russian minerals enable to consider you the founder of Russian mineralogy. You deserve fame and honor to establish a new era for your beloved science in your Homeland. You, while born in the heart of Asia, have the honor to be considered member of nearly all European academies». – That was one of the congratulations the foreign colleagues sent.

Mineralogical Society gave Koksharov a golden medal, for that occasion created by metal artist S.A. Grilikhes. On one side of the medal there was Koksharov's profile, on the another side there was a dedication: To N.I. Koksharov, director of Imperial Mineralogical Society, author of Papers for Russian Mineralogy, on behalf of Imperial Mineralogical Society 1837–1887 (Munster, 1888: 24).

Among Koksharov's works (155 in total), apart for the descriptions of minerals there were articles on common matters on mineralogy and crystallography, experiments descriptions, reviews and obituaries. But there were only a few of them, compare to the number of works on Russian minerals.

Koksharov collected and summarized all his researches on mineralogy. Nearly all his articles were published in Papers for Russian Mineralogy. Unfortunately the last volume in Russian language was the 6th one (1852–1878), as for German, 11 volumes were published (1853–1892). The great number of Russian minerals, studied and described by Koksharov in Papers lives the reader speechless. It is sufficient to note that the index of the 11th volume names 400 different minerals. Even nowadays Papers remain an indispensable manual on Russian mineralogy.

A big number of minerals was discovered in Russia for the first time: such as: euclase, brookite, yellow cancrinite, wollastanite, chalcophinite, chalconite. The brilliant scientist discovered also new minerals and their species: ilme norutile, crinochlor, kotschubeite, waluewite, bagrationite, mursinskite etc. The main

value of Koksharov's works were the results of goniometric measurements that even nowadays remain one of the most accurate and precise in mineralogical crystallography. Besides Papers for Russian Mineralogy, there were also Lectures on Mineralogy, almost dedicated to crystallography, that were extremely popular. ([Rossiiskoe mineralogicheskoe obshchestvo glazami sovremennikov, 2014: 138](#)).

The time of research of Koksharov was the same when they got a lot of new resources from numerous new mines were discovered in Ural, Altai and Baikal region, that were actively been explored. The scientists had the task to make all that discoveries contribute to science. And the task was fulfilled. N.I. Koksharov died in December 21st 1892 at the age of 74 and was buried in Alexander Nevsky Monastery in Saint-Petersburg ([Russkii biograficheskii slovar, 1903: 70](#))

References

- [Afanas'ev et al., 2010](#) – *Afanas'ev V.G., Posina L.T., Sevastianov P.L., Voloshinova I.V., Pliukhina T.V.* (2010). Ocherki istorii Gornogo instituta (1773-1917) [Essays on the History of Mining Institute (1773-1917)]. St. Petersburg, pp. 97-98. [in Russian]
- [Grigoriev, Shaphranovsky, 1949](#) – *Grigoriev D.P., Shaphranovsky I.I.* (1949). Vydayushchiesya russkie mineralogi [Brilliant Russian Mineralogists]. Moscow, Leningrad, pp. 6-9. [in Russian]
- [Koksharov, 1849](#) – *Koksharov N.I.* (1849). O bagrationite, novom ural'skom minerale [About Bagrationite, a New Ural Mineral]. *Mining Magazine*. Vol. 1. St. Petersburg. pp. 134-140. [in Russian]
- [Koksharov, 1876](#) – *Koksharov N.I.* (1876). Predmet mineralogii, kratkaya ee istoriya, kristally kak nastoyashchie individuumy neorganicheskoi prirody [The subject of mineralogy, its brief history, crystals as real individuals of inorganic nature]. *Notes of Mineralogical Society Association*. Vol.10. St. Petersburg. pp. 137-150. [in Russian]
- [Koksharov, 1890](#) – *Koksharov N.I.* (1890). Vospominaniya [Memories]. *Russkaya Starina*. Vol. 66. St. Petersburg. pp. 613-630. [in Russian]
- [Mineralogicheskii Al'manakh, 2006](#) – *Mineralogicheskii Al'manakh*. Vol. 10. p. 133. [in Russian]
- [Munster, 1888](#) – *Munster A.* (1888). Pyatidesyatiletanii yubilei akademika N.I. Koksharova i kratkaya ego biografiya [50th Anniversary of Academician N.I. Koksharov and His Brief Biography]. *Notes of Mineralogical Society Association*. St. Petersburg. Vol.24. pp. 13-15. [in Russian]
- [Povarennykh, 1956](#) – *Povarennykh A.S.* (1956). Mineralogicheskoe obshchestvo v techenie pervykh sta let svoego sushchestvovaniya [Mineralogical society during the first hundred years of its existence]. Essays on the history of geological knowledge. Moscow. [in Russian]
- [Prendel', 1893](#) – *Prendel' R.* (1893). Pamyati N.I. Koksharova [In memory of N.I. Koksharov]. Odessa. [in Russian]
- [Rafienko, 1989](#) – *Rafienko L.S.* (1989). Gornyi inzhener N.V. Vorontsov [Mining engineer N.V. Vorontsov]. Perm'. [in Russian]
- [RGIA](#) – Rossiiskii gosudarstvennyi istoricheskii arkhiv [Russian State Historical Archive].
- [Rossiiskoe mineralogicheskoe obshchestvo glazami sovremennikov, 2014](#) – Rossiiskoe mineralogicheskoe obshchestvo glazami sovremennikov (2014). [Russian Mineralogical Society through the eyes of contemporaries]. Collection of articles edited by Yu.B. Marin. St. Petersburg. pp. 137-140. [in Russian]
- [Russkii biograficheskii slovar, 1903](#) – Russkii biograficheskii slovar [Russian biographical dictionary]. Vol.9. St. Petersburg. pp. 67-70. [in Russian]
- [Shaphranovsky, 1962](#) – *Shaphranovsky I.I.* (1962). Istoriya kristallografii v Rossii [History of Russian Crystallography]. M., pp. 10-12. [in Russian]
- [Shaphranovsky, 1964](#) – *Shaphranovsky I.I.* (1964). Nikolai Ivanovich Koksharov [Nikolai Ivanovich Koksharov]. Moscow, Leningrad. [in Russian]
- [Vernadsky, 1915](#) – *Vernadsky V.I.* (1915). Koksharov Nikolai Ivanovich. Materialy dlya biograficheskogo slovarya dlya deistvitel'nykh chlenov Akademii nauk [Koksharov Nikolay Ivanovich. Materials for the biographical dictionary for full members of the Academy of Sciences]. Petrograd. pp. 331-339. [in Russian]