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## The teachers and mentors of Nikolai Ivanovich Pirogov – the genius anatomist and surgeon of the world medicine

I. V. Gaivoronskii<sup>1,2✉</sup>, T. S. Spirina<sup>1</sup>, I. A. Goriacheva<sup>2</sup>, I. F. Hendriks<sup>3</sup><sup>1</sup>St. Petersburg State University, St. Petersburg, Russia<sup>2</sup>S.M. Kirov Military Medical Academy, St. Petersburg, Russia<sup>3</sup>Leiden University Medical Center, Leiden, The Netherlands

**Abstract.** The paper considers the influence of life circumstances and people of different professions on the development of Nikolai Ivanovich Pirogov's personality as an outstanding scientist, anatomist and surgeon. As a child, Nikolai Ivanovich lived in quite a prosperous family to pay for the worthy education for their children. Respectable teachers of medicine were invited to the Pirogovs' house such as G.M. Berezkin and A.M. Klaus. But the most significant figure for Pirogov as a child was the family doctor Efrem Osipovich Mukhin who was a Professor of anatomy and physiology at the Imperial Moscow University. So at the age of 14 Nikolai Ivanovich became a student of that University being under the influence of such scientists as Yu.Kh. Loder, M.Ya. Mudrov, and F.A. Hilderbrandt. In 1828 Pirogov finished the Faculty of Medicine and entered the Imperial Moscow University of Dorpat where he studied under the famous surgeon, Professor I.F. Moyer who became his mentor and favourite teacher. Further improvement of skills and mastery acquisition took place at the University of Berlin in 1833 under the influence of the anatomist F. Schlemm, the physiologist I.M. Muller, the preparator Mrs. Vogelsang, the surgeons K. Grefe, I. Dieffenbach, J.N. Rusta, and K.I.M. Langenbeck. Also, Nikolai Ivanovich was lucky to cooperate and learn from the famous French scientists like Velpo, Lisfranc, Larrey, Jaubert, Amyusse. Life circumstances such as complicated relationships with colleagues due to the challenges in organizing medical care during wars and epidemics dramatically influenced Pirogov's development as a medical scientist. Thus, the well-deserved immortal fame of the medical science genius Nikolai Ivanovich Pirogov obtained was owing to his teachers, mentors and the environment. As demonstrated by N.I. Pirogov's life, both a person and their teachers look for one another especially when the student reveals their talent, desire for knowledge, skills, and the ability to work hard. The authors devoted this paper to the people who influenced the scientific views development of N.I. Pirogov, an outstanding scientist, surgeon and anatomist.

**Keywords:** Pirogov Nikolay Ivanovich, teachers, mentors, the genius of world medicine, anatomist, surgeon

**Conflict of interests:** the authors declare no conflict of interests.

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## HISTORY OF MORPHOLOGY

Original article

## Учителя и наставники Николая Ивановича Пирогова – гениального анатома и хирурга мировой медицины

И. В. Гайворонский<sup>1,2✉</sup>, Т. С. Спирина<sup>1</sup>, И. А. Горячева<sup>2</sup>, И. Ф. Хендрикс<sup>3</sup><sup>1</sup>Санкт-Петербургский государственный университет, Санкт-Петербург, Россия<sup>2</sup>Военно-медицинская академия им. С.М. Кирова, Санкт-Петербург, Россия<sup>3</sup>Медицинский центр Лейденского университета, Лейден, Нидерланды

**Аннотация.** В статье рассматривается влияние жизненных обстоятельств и людей разных профессий на формирование личности Николая Ивановича Пирогова как выдающегося ученого, анатома и хирурга. В детстве Николай Иванович жил во вполне благополучной семье, способной оплачивать достойное образование своих детей. В дом Пироговых были приглашены уважаемые преподаватели медицины, такие как Г.М. Березкин и А.М. Клаус. Но самой значимой фигурой для Пирогова в детстве был семейный врач Ефрем Осипович Мухин, профессор анатомии и физиологии Императорского Московского университета. Так в 14 лет Николай Иванович стал студентом этого университета, находясь под влиянием таких ученых, как Ю.Х. Лодера, М.Я. Мудрова и Ф.А. Гильдебрандта. В 1828 году Пирогов окончил медицинский факультет и поступил в Императорский Дерптский университет, где учился у известного хирурга, профессора И.Ф. Мойера, который стал его наставником и любимым учителем. Дальнейшее совершенствование

навыков и приобретение мастерства происходило в Берлинском университете в 1833 г. под влиянием анатома Ф. Шлемма, физиолога И.М. Мюллера, препаратора г-жи Фогельзанг, хирургов К. Грефе, И. Диффенбаха, И.Н. Руста и К.И.М. Лангенбека. Также Николаю Ивановичу посчастливилось сотрудничать и учиться у таких известных французских ученых, как Вельпо, Лисфранк, Ларрей, Жобер, Амюссе. Жизненные обстоятельства, такие как сложные отношения с коллегами из-за проблем с организацией медицинской помощи во время войн и эпидемий, сильно повлияли на становление Пирогова как ученого-медика. Таким образом, заслуженная бессмертная слава гения медицинской науки Николая Ивановича Пирогова снискалась благодаря его учителям, наставникам и среде. Как показала жизнь Н.И. Пирогова, человек и его учителя ищут друг друга, особенно когда в ученике раскрывается его талант, стремление к знаниям, умения, способность трудиться. Авторы посвятили данную статью людям, оказавшим влияние на формирование научных взглядов Н.И. Пирогова, выдающегося ученого, хирурга и анатома.

**Ключевые слова:** Пирогов Николай Иванович, учителя, наставники, гений мировой медицины, анатом, хирург

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“Your teacher is not the one who teaches you,  
but the one from whom you learn!”.

Richard David Bach  
American writer, philosopher and essayist

## Introduction

Starting to consider the life of a great Russian scientist N.I. Pirogov, first, we must note the role of his family. Thanks to family education, little Nikolay began to comprehend the basics of science. And, later, no matter what difficulties appeared in his way (ruination, death of the head of the family, lack of livelihood etc.), all family members continued to support him [12, 13].

Nikolay Ivanovich was born into a rather prosperous family (Fig. 1). While his father, Ivan Ivanovich, was alive, the family lived in full wealth. During his childhood, Pirogov was regularly exposed to new knowledge through books. Teachers were invited to the grown-up Nikolay for home instruction. Later, the training continued at the private school of Vasily Stepanovich Kryazhev, one of the best in Moscow of that time.

## Family friends, who impressed the young boy

The family had many acquaintances among the educated people of that time [8, 12, 13]. So, thanks to one of those family friends, Grigory Mikhailovich Berezkin, little Pirogov became interested in medicinal herbs and compiling herbariums. Having become a student Nikolay Ivanovich purchased about 500 herbarium sheets from one of the fellow students for a lot of money.

One more friend of the Pirogov family was the old smallpox vaccinator Andrey Mikhailovich Klaus. He told the Pirogov children many interesting stories from his medical practice and introduced to them the rules of hygiene. It was then, for the first time that Nikolay Ivanovich saw a microscope.

The first significant person from the medical environment for the future great scientist was Efrem Osipovich Mukhin (1766–1850) (Fig. 2). Mukhin was also a family friend and successfully

treated Nikolay Ivanovich's brother Amos for rheumatism.

Having seen how the instructions and recommendations of the Professor alleviated his brother's sufferings, little Nikolai began to copy Efrem Osipovich. His favourite game was playing doctor.

Mukhin as a scientist was a famous Doctor of Medicine and Surgery, the Dean of the medical faculty of Moscow University, and the author of numerous scientific papers. One of the most famous works of that time, which was of practical importance as a textbook for students, is [An anatomy course composed by a Doctor of Medicine and Surgery, corrected and multiplied for pupils of the 1st grade studying medical and surgical science.][3, 4].

As Aleksey Sergeevich Kiselev rightly noted in his book: ‘...This clear example is one of those random circumstances that can decisively influence a person's course of life already in early childhood...’[2] Thanks to E.O. Mukhin, at the age of 13 Pirogov became a first-year student at the medical department of Moscow University [12].

## Pirogov and his teachers

At the university, Pirogov had a chance to be instructed by well-known scientists such as Yu.Kh. Loder, M.Ya. Mudrov, F.A. Hildebrandt, and, of course, E. O. Mukhin. In addition to the direct training Mukhin was the benefactor of Nikolai Ivanovich. He was constantly interested in the achievements of the talented student; he always helped in word and deed. Pirogov, of course, was very grateful to E.O. Mukhin. Later, in the ‘Diary of an old doctor’ he wrote the following phrase: ‘... how did I thank him? With nothing. A bad feature, but it never occurred to me ... Now I am ready to punish myself and want to bow at Mukhin's feet, but he had long since gone’.



Fig. 1. / Рис. 1.



Fig. 2. / Рис. 2.



Fig. 3. / Рис. 3.

Fig. 1. Portrait of young Nikolay Ivanovich, about 18 years old, artist A.D. Khripkov. © From the collection of the Military Medical Museum, St. Petersburg.

Рис. 1. Портрет юного Николая Ивановича Пирогова, в возрасте около 18 лет, художник А.Д. Хрипков. ©Из коллекции Военно-медицинского музея, Санкт-Петербурга.

Fig. 2. Portrait of Efrim Osipovich Mukhin, pen-ink-drawing, 1830, artist Aleksander Florov.

Рис. 2. Портрет Ефрема Осиповича Мухина, гравюра, 1830, художник Александр Флоров [https://ru.wikipedia.org/wiki/Мухин,\\_Ефрем\\_Осипович](https://ru.wikipedia.org/wiki/Мухин,_Ефрем_Осипович). In public domain. В публичном доступе.

Fig. 3. Portrait of Johann Christian Moier, lithography on paper, 1827, artist A. I. Klinder, (1802–1874).

Рис. 3. Портрет Ивана Филипповича Мойера, литография на бумаге, 1827, художник А.И. Клиндер, (1802–1874). [https://ru.wikipedia.org/wiki/Johann\\_Christian\\_Moier](https://ru.wikipedia.org/wiki/Johann_Christian_Moier). In public domain. В публичном доступе

Nikolay Ivanovich of course was wrong; he thanked his teacher without realising it by becoming a great doctor himself. After all, a student's achievement is the best reward for a teacher.

While studying at Moscow University, Pirogov, in his opinion, also met different kinds of teachers, for example Professor Matvey Yakovlevich Mudrov. Subsequently, Pirogov criticized Mudrov's lectures, and stated the discrepancy between theory and practice. He noted that Mudrov constantly spoke about postmortem material in his lectures and called for work with cadaveric material, but he himself did not take a proper part in the autopsies. As another example mentioned was Professor F.A. Hildebrandt, who, in Nikolay Ivanovich's point of view, 'became a Professor out of the blue'. Although Hildebrandt was a skilful practitioner and lithotomist, he was a poor teacher, spoke through his nose and mostly in Latin. Everybody could hardly understand him. One way or another, studying at Moscow University became the foundation on which then a castle of thoughts and skills of the great surgeon increased majestically.

Another stroke of luck waited for Pirogov at the University of Tartu (now in the Republic of Estonia), with its lecturers and its own special scientific atmosphere. Thanks again to the initiative and support of the dean Efrim Osipovich Mukhin Nikolay Ivanovich could study at that university.

As A.S. Kiselev notes in his book, '...The most famous person in Dorpat, who had a huge influence on young Pirogov, was the Professor of surgery Johann Christian Moier...' [2] In Dorpat Johann Christian Moier (1786–1858) became the same benefactor for Pirogov as Mukhin was at Moscow University (Fig. 3). The entire Moier family was very close to Pirogov.

Moier was a surgeon, a Professor, the dean of the medical faculty and later the rector of the Imperial Dorpat University. He also was a state councillor. From 1817 till 1834 he was the dean of the Medical faculty, and in 1834–1835 academic year he became the university rector. Having retired on 9 March 1836 Moier handed over the Department of Surgery to Nikolay I. Pirogov.

Of significant influence on N.I. Pirogov's experience was the cooperation with the



Fig. 4. / Рис. 4.



Fig. 5. / Рис. 5.

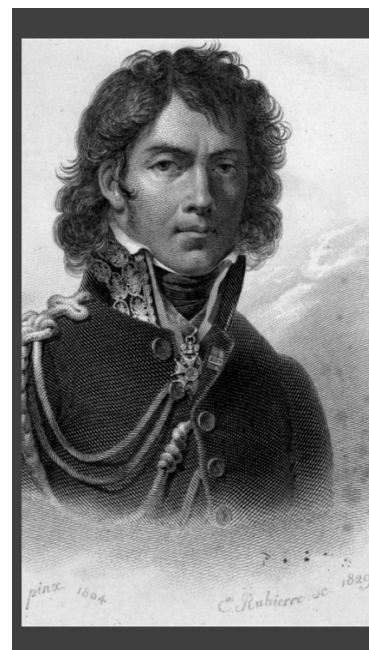


Fig. 6. / Рис. 6.

Fig. 4. Portrait of Friedrich Schlemm, pen-ink-drawing, 1850, artist Von Kreyher.

Рис. 4. Портрет Фридриха Шлемма, гравюра, 1850, художник фон Крейхер.

[https://commons.wikimedia.org/wiki/File:Friedrich\\_Schlemm.jpg?uselang=ru](https://commons.wikimedia.org/wiki/File:Friedrich_Schlemm.jpg?uselang=ru). In public domain. В публичном доступе

Fig. 5. Portrait of Konrad Johann Martin Langenbeck, pen-ink-drawing, 19th century, artists the brothers Rosca.

Рис. 5. Портрет Конрада Иоганна Мартина Лангенбека, гравюра, XIX век, художники братья Роска.

[https://commons.wikimedia.org/wiki/File:Konrad\\_Johann\\_Martin\\_Langenbeck.jpg?uselang=ru](https://commons.wikimedia.org/wiki/File:Konrad_Johann_Martin_Langenbeck.jpg?uselang=ru). In public domain. В публичном доступе

Fig. 6. Portrait of Dominique Larrey, gravure, 1804–1829, artist Girodet and engraver E. Rubierre.

Рис. 6. Портрет Доминика Ларрея, гравюра, 1804–1829, художник Жироде, гравёр Э. Рубьер.

[https://commons.wikimedia.org/wiki/Dominique\\_Jean\\_Larrey\\_-\\_engraving](https://commons.wikimedia.org/wiki/Dominique_Jean_Larrey_-_engraving). In public domain. В публичном доступе.

anatomists Friedrich Schlemm (1795–1858) (Fig. 4) and the naturalist-physiologist Johannes Müller (1801–1858) in the Charité university hospital in Berlin. Pirogov was taught the intricacies of dissection under the guidance of a skilled teacher, Mrs. Vogelsang, who then worked in the mortuary of the Charité university hospital. In the past, she was a midwife, and later took up anatomy.

Pirogov highly appreciated the experience of Mrs. Vogelsang and believed that she had reached perfection in determining and explaining the structure of internal organs and also the structure of the muscle and nerves. During these studies, N. I. Pirogov received invaluable lessons not only in the field of anatomy, but also in the field of surgery.

In Berlin, he attended lectures by the famous surgeons Karl Graefe (1787–1840), Johann Dieffenbach (1792–1847) and Johann Nepomuk Rust (1775–1840). Pirogov was somewhat critical of them, because he observed that Professor of Anatomy, Friedrich Schlemm, was more than once to raise his voice during complex operations. Pirogov criticized Rust for not considering

the subjective causes of diseases guided only by superficial knowledge about the patient.

Professor Schlemm immediately recognized Pirogov as a specialist in anatomy, became interested in him and readily supervised his experimental work [1]. He appreciated Pirogov's curiosity and diligence. Friedrich Schlemm was, according to Pirogov's definition, '...a first-class specialist: his delicate anatomical preparations (vessels and nerves) were characterized by precision and purity of finish...' He was not only a skilled expert in anatomy, but also performed outstanding operations, passing on to Nikolay Ivanovich his amazing technique and his deep knowledge in certain areas of anatomy [11, 14].

Another major figure in the development of Pirogov as a surgeon was Konrad Johann Martin Langenbeck (1776–1851) (Fig. 5).

In 1807 he founded his own Institute of Surgery and Ophthalmology, in 1804 he received the position of an ordinary Professor at the University of Göttingen and the title of general surgeon of the Hanoverian army [9, 10]. In 1828–1829 he was engaged in the construction of his own anatomical theatre. In the years 1806–1813,

Langenbeck published in Göttingen the "Library of Surgery and Ophthalmology" in four volumes. Pirogov often assisted Langenbeck during his operations, thereby improving his skills and developing his skills in surgery. The rule that Nikolay Ivanovich adopted from the famous surgeon was "...The scalpel should be as a bow of a violin in the hand of a surgeon, just moving back and forth without pressure..."[12] Thus, Pirogov received knowledge from physicians in Germany in terms of practical medicine. The teachers in Berlin and Göttingen influenced Nikolay Ivanovich dramatically as a surgeon, but also made him think about the application of anatomy to surgery. He was passionate about the importance of anatomy for surgeons [7]. At the age of 26, Nikolay Ivanovich became a teacher of higher education. He was appointed the Professor of Surgery at the University of Dorpat. Then Medico-Surgical Academy appeared in his biography with the hard but victorious activity of the great reformer of anatomy and surgery.

Nikolai Ivanovich was not satisfied with just a maintained career, he tirelessly continued to improve himself. In 1838, Pirogov got the opportunity to get personally acquainted with the French scientists – Velpeau, Lisfranc, Larrey, Jaubert, Amyusse and others in Paris [12, 13]. Of all the well-known French surgeons, the meeting with Jean-Dominique Larrey became the key and modelling of his perception (Fig. 6) [5].

Larrey was a famous French military surgeon, an outstanding innovator of military field surgery. It was he who inspired the young Professor for great deeds in the field of military surgery. Dominique Jean Larrey was court physician of Napoleon and his chief surgeon of the army from 1797 to 1815. Remaining a military doctor, he simultaneously became Professor at the Val de Grasse Medical School in 1796. In 1812, the first three volumes of Larrey's 4-volume work 'Memoirs of Military Surgery and Military Campaigns' were published. These works made an unforgettable impression on N.I. Pirogov. Separately, it should be noted that the literary inclinations of Nikolai Ivanovich also developed partly under the influence of famous people. It is worthwhile mentioning among them his fellow student and friend B.I. Dahl, who wrote the 'Explanatory Dictionary of the Living Great Russian' and the artist Fyodor Moller, who, in turn, was familiar with N.V. Gogol. Pirogov's life coincided with the so-called 'Golden Age of Russian Literature' which dated roughly from 1820 to 1880. Pirogov himself stood at the cradle of the 'Golden Age of Medicine'.

The life course of the great scientist was not easy: there were also tragic events, such as the deaths of his loved ones, wars, envy and misunderstanding of colleagues. But life honoured Nikolai Ivanovich with a reward to meet on its path excellent scientists and great minds of that time. They were representatives of various scientific schools in Russia and abroad, who played

key roles in his development, but N.I. Pirogov was able to see and develop the most advanced, most in demand in medicine of that time. As a creative person, he proposed and implemented a number of original technologies in the field of anatomy, surgery, forensic medicine, etc., which were previously reported in various articles.

## Conclusions

In conclusion, something should be mentioned about two more Pirogov's teachers, namely life itself and Nikolay Ivanovich himself. Sometimes, there are circumstances, random situations that later serve as determinants for the occurrence of new solutions and discoveries. This is a large estate in childhood, which only contributed to a favourable environment for learning; a family well-being in childhood, which made it possible to form the basis of initial knowledge and skills from the medical field; the St. Petersburg market on Sennaya Square with chopped frozen carcasses, which prompted the idea of creating cuts of frozen bodies; wars with a huge number of seriously wounded and dead people, which provided an extensive opportunity to improve the practical skills of a surgeon; and outbreaks of cholera that claimed the lives of hundreds of people and required the search for new methods of therapy. Thus, often life itself dictated and directed the talented scientist, cultivating in him unbridled ability to work, tempering his character, formed the little boy Nikolai, who loved to play doctor, into a legendary personality.

Secondly, Pirogov was the biggest critic for himself [7, 8] He was well versed in world literature, mastered the necessary languages, and was therefore aware of the new developments in medicine. He never took for granted what he took in, so he experimented a lot on animals, on test subjects and on himself. He did a lot of comparative research. He was a scientist through and through, always looking for improvements in order to serve people. He was loved by his students and tried to develop the best of them. He was not only a teacher to his students but also to himself.

Nikolai Ivanovich Pirogov became a great anatomist, surgeon, organizer of military medicine, an extraordinary teacher and mentor. He is rightfully considered a genius of world medicine.

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#### Информация об авторах

✉ Гайворонский Иван Васильевич – д-р мед. наук, профессор, зав. кафедрой нормальной анатомии Военно-медицинской академии им. С.М. Кирова, ; ул. Лебедева, 6, Санкт-Петербург, 194044, Россия; i.v.gaivoronsky@mail.ru  
<https://orcid.id/0000-0002-7232-6419>  
 Горячева Инга Александровна – канд. мед. наук, доцент кафедры нормальной анатомии Военно-медицинской академии им. С.М. Кирова; smoriarti@yandex.ru  
<https://orcid.id/0000-0003-3064-7596>  
 Спирина Татьяна Сергеевна – канд. биол. наук, доцент кафедры морфологии Санкт-Петербургского государственного университета; scox1@rambler.ru  
<https://orcid.id/0000-0002-1188-7204>  
 Ингрид Фоккиена Хендрикс – магистр искусств, доктор наук, исследователь в области истории медицины, член исполнительного комитета Медицинского центра Лейденского университета; ingefhendriks@gmail.com  
<https://orcid.org/0000-0001-5522-785X>

#### Information about the authors

✉ Ivan V. Gaivoronsky – Doct. Sci. (Med.), Professor, Head of the Department of Normal Anatomy of S.M. Kirov Military Medical Academy; Ul. Akademika Lebedeva, 6, St. Petersburg, 194044, Russia; i.v.gaivoronsky@mail.ru  
<https://orcid.id/0000-0002-7232-6419>  
 Inga A. Goryacheva - Cand. Sci. (Med.), Associate Professor of the Department of Normal Anatomy of S.M. Kirov Military Medical Academy; smoriarti@yandex.ru  
<https://orcid.id/0000-0003-3064-7596>  
 Tatiana S. Spirina - Cand. Sci. (Biol.), Associate Professor of the Department of Morphology, St.-Petersburg State University; scox1@rambler.ru  
<https://orcid.id/0000-0002-1188-7204>  
 Ingrid Fokkiena Hendriks – Master of Art, Doctor of Science, Researcher medical history, Department of the Executive Board, Leiden University Medical Center; ingefhendriks@gmail.com  
<https://orcid.org/0000-0001-5522-785X>

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