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# Life of Alexander Onufrievich Kowalevsky (1840–1901)[1]

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**SUMMARY** A short description of the life of the famous Russian embryologist and zoologist Alexander O. Kowalevsky is presented, including some rare photos of the scientist.

## INTRODUCTION

Alexander O. Kowalevsky made substantial contributions to the comparative embryology and physiology of invertebrates. In many respects, he was the first to establish these areas as scientific disciplines. Kowalevsky also was a leader in the institutionalization of Russian biology through his work in promoting and directing biological stations such as the Biological Station at Sevastopol (founded in 1871) and the Special Zoological Laboratory at the Imperial Academy of Sciences at St. Petersburg (founded in 1893). In different ways, he also played an important role in the careers of several Russian scientists. Although he had very few of his own pupils, Kowalevsky's work attracted a number of intellectual disciples (Fokin 2006; Fokin and Groeben 2008).

Alexander O. Kowalevsky (Figs. 1–5) was born on November 7, 1840. His father Onufriy I. Kowalevsky owned a rural estate in Polessje (Shustjanka estate in the Vitebsk province, nowadays Republic of Belorussia). Two years later another son was born, Vladimir (1842–1883), who would become a renowned paleontologist. Both brothers spent all of their childhood on the estate, never leaving it. Until the age of 16 they were tutored at home. Their parents envisaged a practical career for the children and their education was organized correspondingly (Dogiel 1945; Pilipchuk 2003; Fokin and Groeben 2008).

In 1855, Alexander O. Kowalevsky entered the 3rd year of the Corps of Engineers of Communication Routes in St. Petersburg. Apparently, he was not motivated to pursue this kind of career because 3 years later in 1858, he left it for the Natural Sciences Department of the Physical-Mathematical Faculty of Imperial St. Petersburg University. From that moment onwards, his entire life was devoted to zoology, although Kowalevsky also paid attention to chemistry at the beginning of his studies (Makarova 1957; Fokin 2002a).

At first, Kowalevsky attended the lectures of outstanding professors of that time—botany was taught by L. S. Cienkowsky (1822–1887)[2] and zoology by S. S. Kutorga (1805–1861).[3] However, a year later (1859), Kowalevsky left the University to continue his studies abroad. Later in life, when he wrote a petition for admittance to a Master's examination, Kowalevsky explained what happened: "In 1859, when lectures on botany and organic chemistry had stopped, due to the fact that Mr. Cienkowsky and Mr. Mendeleev went abroad, and when the attendance of lectures of Mr. Puzyrevsky[4] was impossible due to the large number of students attending, I decided to leave St. Petersburg University in order to continue my studies abroad" (Fokin 2002a).

At the end of 1859, Alexander O. Kowalevsky arrived in Heidelberg. Heidelberg University was considered one of the best universities in Europe. Kowalevsky spent about 2 years there. At first, he mostly studied chemistry with Robert Wilhelm Bunsen (1811–1899) and his assistant Georg Ludwig Carius (1829–1875). Later, he studied zoology under the supervision of Heinrich George Bronn (1800–1862) and Heinrich Alexander Pagenstecher (1825–1889). However, Kowalevsky was not formally a student at the University. He must have made private agreements with the professors in order to attend their classes (Fokin 2002a).

In November 1861, Alexander O. Kowalevsky moved and enrolled as a student at Tübingen University. He attended numerous lectures and laboratory classes for two terms. His teachers were well-known scientists, professors: Hubert von Luschka (1820–1872; anatomy), Friederich Eduard Reusch

[1] The correct spelling according to the Russian language is Kovalevskiy or Kowalevskiy; for female—Kowalevskaya.

[2] One of the founders of protistology and microbiology in Russia.

[3] Effectively the founder of zoological researches at Imperial St. Petersburg University, and an outstanding teacher.

[4] Pavel A. Puzyrevsky (1831–1871), professor of geology and mineralogy at Imperial St. Petersburg University.

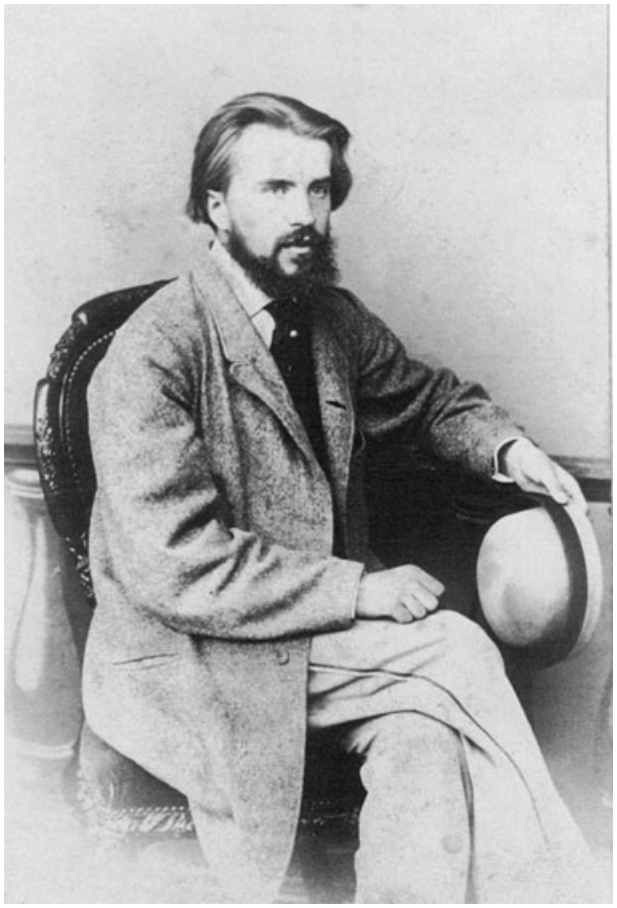

**Fig. 1.** Alexander O. Kowalevsky. Heidelberg, middle of 1860s.

(1812–1891; general physics), Hugo von Mohl (1805–1872; botany), F. Quisted (1809–1889; geology), and Franz von Leydig (1821–1908; zoology and histology). Kowalevsky worked primarily in the laboratory of Prof. Leydig (Fokin 2002a).

Late in the summer of 1861, Alexander O. Kowalevsky went back to Russia, where he passed the examinations and got a St. Petersburg University diploma for his research "The Anatomy of *Idothea entomon*". At the end of 1863, he went back to Tübingen. He stayed there for several months, continuing his zoological studies under Prof. Leydig. From Tübingen Kowalevsky moved to Naples, where his own scientific research finally began.

Kowalevsky spent the following 2 years at the Mediterranean Sea (in Naples) and completed his famous research entitled "Developmental History of the Lancelet (*Amphioxus lanceolatus*)".

In 1866–1867, Kowalevsky (Fig. 1) was the conservator and private docent of the Zoological Cabinet at Imperial St. Petersburg University under the supervision of Prof.

**Fig. 2.** Alexander O. Kowalevsky. St. Petersburg, middle of 1880s.

K. F. Kessler (1815–1881)[5] and defended his doctoral thesis "On the Development of *Phoronis*". During this time, he started to publish numerous articles on the embryology of worms, bryozoans, echinoderms, and ascidians. As a result, Kowalevsky was awarded the first Baer Prize together with E. E. Metschnikoff (Fig. 6) in 1867.

In 1868 Kowalevsky was elected professor at Imperial Kazan University. At that time, he was only 28 years old (Fokin 2010). However, he spent less than a year in Kazan before going back to work in Naples again. Before, in 1867–1868, he worked once more at the Mediterranean Sea on different embryological topics in Trieste, Naples, and Messina. In August of 1869, during the Kazan period, Kowalevsky made some faunal investigations of the Caspian Sea. At the end of 1869, he transferred to Kiev University of St. Vladimir and was awarded the Baer Prize for the second time. The money provided him with an opportunity to go first to Italy and then to the Red Sea, together with his family.[6]

[5]A well-known Russian ornithologist and ichthyologist, and founder of the St. Petersburg Society of Naturalists.

[6]In 1867, Kowalevsky married Tatiana K. Semenova (1845–1913). His first daughter Olga died at the end of 1869 at 1.5 years old. However, he started this trip with his second daughter Vera, who had at that time less than 1 year old.

**Fig. 3.** Alexander O. Kowalevsky (in the center) with his family. From the left: Vera, Tatiana Kirillovna, Vladimir, Lidia. Odessa, 1889.

**Fig. 4.** Alexander O. Kowalevsky with daughter Lidia. Sevastopol Biological Station, middle of 1890s.

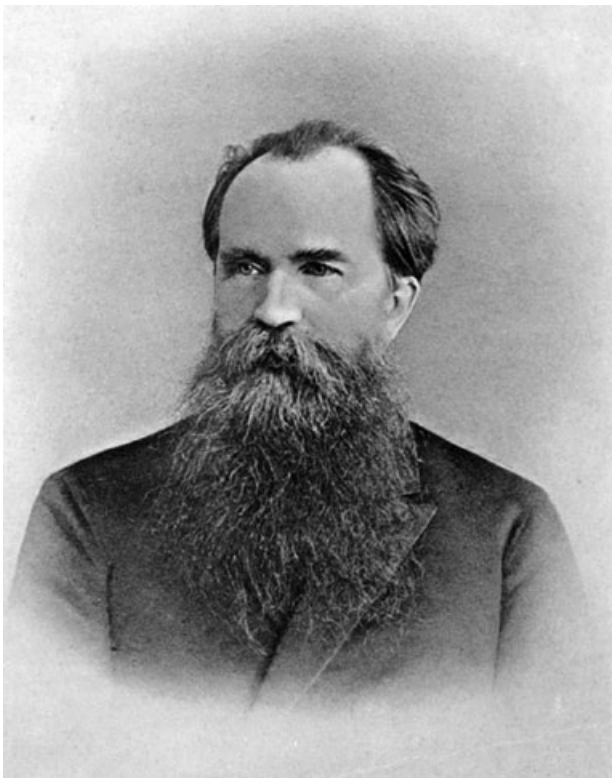

**Fig. 5.** Alexander O. Kowalevsky. St. Petersburg, 1901.

Kowalevsky was constantly working, manifesting so called "workaholic" pattern. He studied the embryology of ascidians and salps, investigated *Balanoglossus* and cellular division in basket stars, and described the dwarf males of *Bonelia*. It was a kaleidoscope of objects. At the Red Sea, he discovered the famous crawling ctenophore *Coeloplana metschnikowii.*

At the end of 1873, Kowalevsky transferred to Novorossiyskiy University (Odessa). He spent the next 16 years there, enjoying a relatively stable period of intense pedagogical and scientific work alongside of an established family life. At the time the Kowalevskys (Fig. 3) had two daughters, Vera (1870–1928) and Lidia (1873–1942) and one son—Vladimir (1871–1914) (Fokin 2002b).

The Kowalevskys spent most of the summer season each year abroad, in France, Switzerland, or Italy. As a result, Kowalevsky studied the embryology of various marine or terrestrial invertebrates from a diversity of geographical locations. He worked several times in Villefranche-sur-Mer, Marseille, Banyuls-sur-Mer, and Roskoff (Fokin 2008). In the early 1880s, he also participated in research on Phylloxera, a harmful vine pest that had appeared in southern Russia at that time.

**Fig. 6.** Elia E. Metschnikoff. Paris, middle of 1900s, with hand lettering to Vera Chistovich.
All photos from the private archive of S. I. Fokin.

In 1883, Prof. Kowalevsky was elected as a corresponding member of the Imperial Academy of Sciences, again together with E. E. Metschnikoff. During this time, his interests were shifting toward the study of excretion processes in different invertebrates. The morphological and physiological researches conducted by Kowalevsky in post-1883 period until his premature death, laid the basis for the comparative physiology of invertebrates.

In 1889–1890, Alexander O. Kowalevsky and his family went to Naples again. Previously he had been there in 1864–1866, 1868, 1870–1871, and 1887. Instead of having to work in a self-made laboratory within a two-by-two flat in Santa Lucia (as he had done up to 1871), visiting zoologists now had at their disposal the well-equipped Naples Zoological Station, organized by the painstaking efforts of Prof. Anton Dohrn (1840–1909). Kowalevsky spent half of a year there studying excretionary organs in crustaceans and mollusks as well as ascidians' development. He also made the acquaintance of a Russian scientist who worked in Germany, Wladimir T. Schewiakoff[7] (1859–1930), who would later (1895) become the husband of his youngest daughter Lidia.

In 1890, Prof. Kowalevsky was elected a member of Imperial Academy of Sciences and in a year's time moved with his family to St. Petersburg. Because of financial considerations, he also had to be a professor at St. Petersburg University, where he was at the head of the Anatomical-Histological Cabinet (until 1894). At that time (end of 1893), he founded a Special Zoological Laboratory at the Academy of Sciences, the first Russian center of experimental zoology (Fokin 2011). He also supervised the construction of a special building for the Sevastopol Biological Station (1894–1897) (Fig. 4), the center for the biogeographical, morphological, and ecological studies of the animal living in the Mediterranean basin.

Alexander Onufrievich died in the prime of his scientific and social activity. He appeared to be in perfect health and was full of plans for a prospected long-term journey to Java. Nothing seems to have foreshadowed the cerebral hemorrhage that occurred on November 6, 1901. Three days later, Kowalevsky died without regaining consciousness (Fokin and Groeben 2008). He was 61 years old. Kowalevsky was buried at the Novo-Devichie Orthodox cemetery in St. Petersburg, where his tomb remains today.

What was Kowalevsky like as a person? He was not tall, but rather short, with brown hair and quite attractive features. Especially in his youth when Kowalevsky (Fig. 1) wore his hair a la V. G. Belinsky and I. S. Turgenev[8] with a similar beard. The huge, bushy dark blond beard of Prof. Kowalevsky (Figs. 2 and 3), so familiar to everyone, appeared later in the 1870s. Many people who knew him always spoke of his bright, wonderful, and kind eyes. Their gaze was always affable, like his smile. With age, probably due to illness caused by repeated looking through a microscope, his eyes became hazy, which gave them an absent-minded and thoughtful look (Dogiel 1945).

Kowalevsky dressed casually, he did not like ties, in large part because he did not like anything official. The people who knew him, especially his students, were always impressed by his extraordinary modesty, tactful behavior, and lack of arrogance or self-confidence. However, Prof. Kowalevsky's speech was not flawless and he was not a good lecturer according to students (Davydoff 1961).

In everyday life, Kowalevsky seems to many to be a well-balanced man; however, he was actually very impressionable and easily agitated. This fit well with his penchant for hurrying from place to place: he did not walk, but ran, earning him the nickname "Mr. Bustle" at the Sevastopol Biological Station.

Kowalevsky's eldest daughter Vera (Fig. 3) recalled that although he was very shy and hesitant with strangers, her father

[7]The common way of Russian spelling is Vladimir T. Sheviakov.

[8]Famous Russian writers.

was quite extroverted in his family life, and this extroversion was always of a positive character (Kowalevsky-Chistovich 1926). However, on occasion, he did display emotional outbursts in public. In November 1888, the Novorossiysk Society of Naturalists celebrated 25 years of Prof. Kowalevsky's scientific activity. He was so excited by a mass of greetings, addresses, and thunderous applause—something the organizers had not warned him about—that Kowalevsky literally ran away from the room in an attempt to escape. He did not sleep for the next three nights because he was so moved by all that had happened.

Any meeting that Kowalevsky had with his superiors was a source of worry, and he continued to be nervous before lectures his entire life. Twice, in 1878 and 1880, because of some issues related to the life of the University (student riots and the administrative response to it). Kowalevsky had some form of nervous breakdown and had to go abroad to recover his health. Despite all this, the family lived together wonderfully and the relationships, both between the parents and the children, were very tender. Kowalevsky had a similar relationships with his brother and, later, with his nice—Sofia Vladimirovna Kowalevsky. The children saw only love, affection, and mutual concessions. The children's studies at the gymnasium went relatively well but they were not looked upon very strictly by Kowalevsky. He did, however, think it very important that his children study and learn foreign languages.

Understandably, Kowalevsky dreamed that his children, and especially his son, would choose the field of natural science. They began to help him in his work very early on, and his youngest daughter (Lidia) did plan to be zoologist (Kowalevsky-Chistovich 1926; Fokin 2000).

Kowalevsky was completely alien to envy: he loved talented people and those passionate about their work. Indeed he not only loved them, but also actively helped them by all means possible. He devoted a lot of his own time and energy to see others develop and progress. The invitation of Imperial St. Petersburg University to the distinguished histologist A. S. Dogiel, and the multiple forms of assistance provided to the famous Russian protozoologist, W. T. Schewiakoff, are attributed to Kowalevsky (Makarova 1958; Fokin 2001). He also helped V. V. Zalensky become an academic, in part because Kowalevsky greatly valued him as a zoologist.

The relationships of Alexander O. Kowalevsky and E. E. Metschnikoff (Fig. 6), who first met in 1865, deserve separate mention. Although they were friends for nearly 40 years, and Kowalevsky's achievements in science were not insignificant in comparison to the Nobel prize awarded E. E. Metschnikoff. Meantime, their friendship exhibited (from Kowalevsky's side) a certain psychological dependence. Kowalevsky constantly asked Metschnikoff for advice on research and on everyday occasions and his attitude to his friend, who was 5 years younger, was full of not quite justifiable piety (Poljansky 1955). Let say that from Kowalevsky's side this sense was almost a love, Metschnikoff, however answered Kowalevsky only with signs of jealousy, due to a character that was very complex and not at all as bright as Kowalevsky's (Fokin 2006).

Kowalevsky's energy and perseverance in matters of science, in contrast with his lack of suitability to everyday life is impressive. During his short life, even by the standards of the day, he spent nearly 12 years working "in the field" literally searching Europe and Asia for biological objects of study and sometimes prosecuting his brilliant research in the places deprived of any signs of civilization. Moreover, Kowalevsky was able to find a common language with fishermen, fishers of coral, and Arab natives whom he interacted with to collect specimens for investigation.

Kowalevsky visited the Mediterranean, Black, Red, Marmara, and Caspian seas during his scientific life, as well as working at the Atlantic coastline (France) and on Onega Lake (Russia). During his investigation, he explored a variety of representatives from major invertebrate groups and lower vertebrates (e.g.,) Cnidaria, Ctenophora, Oligochaeta, Polychaeta, Echiurida, Mollusca, Brachiopoda, Arthropoda, Echinodermata, Ascidia, Phoronida), in addition to scrutinizing representatives from all of vertebrate classes (Dogiel 1945).

Although Kovalevsky devoted a large part of his life science and family, it was not a monotonous and uncultured life. The memories of his children and his correspondence suggest that he was by no means indifferent to literature, art, and other aspects of his surrounding life. But everyone who knew him closely acknowledged the primacy of science for him (Fokin 2001, 2002b, 2006).

The most complete list of Kowalevsky publications (Pilipchuk 2003) includes 156 items. Of these, very few were rather large: 20–80 pages. Quite a number of the publications are in German and French. Kowalevsky was not a gifted artist and the main figures in his publication, especially during the second part of his scientific career, were made by other persons, such as W. T. Schewiakoff (Fokin 2000).

The memory of Prof. Alexander O. Kowalevsky is immortalized on a memorial plate in the Department of Invertebrate Zoology of St. Petersburg State University. His portrait made by N. D. Kuznetsov (in the middle of the 1890s) is located in the Department of Histology and Cytology of St. Petersburg State University; a copy of the portrait is in the small hall of the Academy of Science building in St. Petersburg. There is a sculptural image of Alexander O. Kowalevsky in the main corridor of St. Petersburg State University, and low busts (one stone and one bronze) can be found at the

Sevastopol Biological Station (now the Institute of Biology of the Southern Seas of the National Academy of Sciences of Ukraine, Sevastopol).

The name of Alexander O. Kowalevsky is remembered among biologists worldwide for his achievements as an outstanding zoologist and evolutionist, and he holds a distinctive position in the history of science as one of the founders of the comparative embryology and physiology of invertebrates.

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1867. Entwickelungsgeschichte des Amphioxus lanceolataus. Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. VII, 11, № 4:1–8.

1871. Embryologische Studien an Würmern und Arthropoden. Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. VII, 16, № 12: 15–29.

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1884. Zur Entwicklungsgeschichte der Lucernaria. Zoologischer Anzeiger. 7: 712–717.

1890. Ein Beiträge zur Kenntnis der Exkretionsorgane. Biologisches Centralblatt. 9: 33–47.

1892. Einige Beiträge zur Bildung des Mantels der Ascidien. Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. VII, 38, № 10: 1–20.

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1896. Etude sur l'anatomie de l'Archeobdella peledina. Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg. 5 : 263–274.

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