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# The Role of Eighteenth Century Russian Expeditions in the Development of Natural History

**Edouard I. Kolchinsky**

*St. Petersburg Branch of the Institute for the History of Science and Technology of the Russian Academy of Sciences, Universitetskaya nab. 5/2, 199034 St. Petersburg, Russia; Email: ihst@ihst.nw.ru*

**Most of the eighteenth century investigations on natural history in Russia were carried out by the St. Petersburg Academy of Sciences, which was founded on the 28th of January 1724 by order of Czar Peter the First (1672–1725). Foreign scientists prevailed in it for more than a hundred years. With their enthusiasm, they managed to inspire some young Russians, who wrote the first works in the Russian language about plants and animals in Russia. The education and the scientific research of Russian scientists often went on simultaneously, favouring rapid growth of their potential. Most of them did not carry out their research in museums but rather in botanical gardens and in the field.**

**At that time, the components of natural history were zoology and botany together with "geognosy." A special role in its development in eighteenth century Russia was played by expeditions that lasted for extended periods of time. Taking nature as a single whole created according to God's plan, the participants put forward a number of brilliant ideas, which today relate to the fields of biogeography, ecology, ethology, and genetics.**

**Investigations of flora and fauna, carried out on enormous territory, which had been inaccessible for the scientists, extended taxonomy, biogeography, ecology and palaeontology knowledge. Botany and zoology were enriched with thousands of new species. Collected material and conclusion made on its base didn't confine to the limits of a single science and demanded differentiation of natural history into separate disciplines. A very important step was taken towards overcoming of the ideas of naive transformism, which paved the way for the ideas of gradualism and selectionism.**

***Il ruolo delle spedizioni russe del XVIII secolo e lo sviluppo della Storia Naturale*:**
**Nel sec. XVIII la maggior parte delle ricerche russe di Stona naturale furono condotte dall'Accademia delle Scienze di San Pietroburgo, fondata il 28 gennaio 1724 per volontà di Pietro Primo (1672–1725).**

**Vi prevalsero, per più di cent'anni, scienziati stranieri Il loro arivo in Russia contribuì a sviluppare rapidamente le differenti branche della Biologia in questo paese. Essi ispirarono, con il loro entusiasmo, alcuni giovani ricercatori russi, che scrissero i primi saggi di botanica e zoologia pubblicati in russo. La prima attività di ricerca degli scienziati nazionali si affiancò spesso a quella di insegnamento e ne favorì il rapido sviluppo culturale in quel campo.**

**In quel periodo la Storia naturale era costituita dalla Botanica, dalla Zoologia, insieme con la "Geognosia". In questi campi, nella Russia del Settecento svolsero un ruolo speciale importanti e lunghe spedizioni. I loro partecipanti, che consideravano la natura come un sistema unitario dipendente da un progetto divino, ebbero**

**numerose originali intuizioni, collegate oggi a settori della biogeografia, ecologia, etologia e genetica.**

**La specializzazione delle scienze naturali era appena agli inizi e gli scienziati si occupavano di diversi campi, che sono oggi ormai distinte branche della Biologia. Molti di loro, piuttosto che nei musei, fecero ricerca negli orti botanici e direttamente nell'ambiente.**

**Gli studi sulla flora e la fauna, condotti su un territorio vastissimo, fino allora inaccessibile agli scienziati, sviluppò il sapere nella tassonomia, biogeografia, ecologia e paleontologia. La Botanica e la Zoologia si arricchirono di migliala di nuove specie. II materiale raccolto e i risultati degli studi che permise non si confinarono ad una sola area disciplinare, ma sollecitarono la differenziazione della Storia naturale in diverse specializzazioni. Si fece inoltre un importante passo verso il superamento delle concezioni di un ingenuo Trasformismo, che pose le basi per le teorie del Gradualismo e Selezionismo (Trad. MLTG)**

## Natural History in Russia During the First Third of the Eighteenth Century

Until the beginning of these expeditions, the accumulation of knowledge about animals and plants in Russia was motivated only by the needs of agriculture, hunting, fishing and medicine. Recommendations for breeding and medical treatment of domestic animals and game birds were partly worked out on the basis of material obtained through practice and partly derived from the works of ancient authors. Descriptions of wild and cultivated plants were given in translated and semi-original herbals and medical guides giving the locations of vegetation, useful properties, and methods of cultivation.

The dissemination of scientific knowledge was greatly stimulated by Peter the First. By his orders, pharmaceutical gardens were created, herbals, medical guides and herbaria were bought for the Medical Chancellery, books on medicine and botany were translated into Russian, and gardens and parks were laid out. A pharmaceutical garden organised in St. Petersburg in 1714 and attached to the Medical Chancellery played a special role in the history of Russian botany. Soon its tasks were considerably extended. Collections of living plants were gathered here for further cultivation. He also laid the foundation for zoological and anatomical-physiological researches in Russia. A collection of anatomical preparations of Frederick Ruysch (1638–1731) and the zoological collection of Albert Seba (1665–1736) were bought for the first Russian museum, the Kunstkamera. The Kunstkamera was also enriched with anatomical, teratological, zoological, botanical and palaeontological exhibits gathered in Russia (Bacmeister 1776; Belyaev 1800).

Peter the First also initiated investigation of the Russian flora and fauna. A German physician, Gottlieb Schöber (about 1675–1739), made the first trip to investigate the flora in the lower regions of the Volga and in the northern Caucasus ( 1717–1720). However, only a part of his work was published after his death (Posselt 1997). The manuscripts of Daniel Gottlieb Messerschmidt (1685–1735), who had started his trip in 1719 and returned only in 1727, met the same fate. Among the materials collected by him, the collections of birds and mammals of Siberia were the most impressive. Messerschmidt was the first to describe many species, for example, the koulan (*Equus hemionus*), and to give characteristics of faunal complexes of separate regions of Siberia, supplemented with observations on the animals' way of life and seasonal changes. His manuscripts contained a catalogue of 149 minerals, 1290 plant species, including 359 growing only in Russia, and brief descriptions of 257 animal species. Unfortunately, most of Messerschmidt's unique collection was lost during a shipwreck in 1729. Nonetheless, his manuscripts were used by many naturalists.

It was not until the second half of the twentieth century that his diary in five volumes was published in Berlin (Messerschmidt 1962–1971). Another great work of his, as yet unpublished, about the three kingdoms of nature, is kept in the Archive of the Russian Academy of Sciences in St. Petersburg.

Beginning in 1721, Johann Christian Buxbaum (1694–1730), a botanist at the Medical Collegium, actively participated in the creation of the pharmaceutical garden and investigated vegetation around St. Petersburg. He became the author of the first work on botany published in Russia (Buxbaum 1728). Accompanying a diplomatic delegation to Turkey and travelling in the Caucasus, the lower regions of the Volga River, and southern Siberia, he gathered unique collections of plants, animals, and fossils. Materials collected during the expeditions formed the basis for a great work (Buxbaum 1728–1740) in which he described about five hundred species of plants, including 11 new genera and 225 new species. He was also the first professor of natural history in Russia.

Zoological collections and herbaria of the Kunstkamera formed the basis for the first botanical-zoological researches in Russia. Johann Amman (1707–1741), Johann Georg Gmelin (1709–1755), Georg Wilhelm Steller (1709–1746), Josias Weitbrecht (1702–1747), Johann Cristian Wilde (?–1749) and Johann Georg Du Vernoi (1691–1759) prepared "A Catalogue of the Museum of the Academy of Sciences" (Musei …, 1742, 1745). It says that the zoological collection then consisted of 212 mammals, 892 birds, 798 reptilians, 89 amphibians, 456 fishes, and others. In 1735, Amman founded the Academic Botanical Garden on Vasilievsky Island, and Johann Georg Siegesbeck (1685–1755) published the first catalogue of the Pharmaceutical Garden (Siegesbeck, 1736). Naturalists also wrote books on ethnography, economics, philology, and other topics (Étrangèr et al. 1872).

## The Great Northern Expedition

The examination of the flora and fauna of Russia and contiguous Asiatic countries dominated further researches of the eighteenth century. These researches furthered the goals of domestic policy, investigation of the country, and the predominant interests of European science as well. Published diaries by the participants of expeditions, their correspondence, and their reports and letters to the chancellery of the Academy and to the Senate show the courage of the scientists. In addition to the conditions of a harsh, continental climate, they faced difficulties of a socio-political and economic nature. The places they visited were often ruled by gangs of robbers and were subject to dangerous epidemics. Lack of food, long delays in payment, absence of necessary instruments, and inadequate means of travel were intensified by the carelessness of local officials and by endless holidays when people (including those attached to the expeditions) drank to excess.

Nevertheless, the Great Northern (Second Kamchatka) expedition of 1734–1743, headed by Captain Vitus Ionnasen Bering (1681–1741), carried out the first regular and detailed investigation of Siberia and the northern part of the Pacific Ocean. Indeed, about a thousand participants completed a whole complex of tasks, such as:

(1) Charting the Siberian Coast from the mouth of the Pechora River to the Bering Strait to find out if it were possible to go directly from the Atlantic to the Pacific Ocean by moving along the coast of Siberia.
2) Reaching the northwest coast of America.
3) Searching for a shipping lane to Japan and investigating the Kurile Islands.
4) Thorough investigation of the inland territories of eastern Siberia.

Several sea and land groups were organised. Description of the coast of the Northern Ocean (Sea) was made by five groups headed by lieutenants Dmitry Yakovlevich Laptev (1701–1767),

Peter Lassinius (1700–1735), Stepan Gavrilovich Malygin (1702–1764), Fedor Alekseevich. Minin (1708–1765), and Dmitry Leont'evich Ovtsyn (1708–1757). Bering himself, together with Aleksei Il'ich. Chirikof (1701–1748) headed the group assigned to go to America. The unit that was to examine the Kurile Island and the shipping route to Japan was headed by Captain Martyn Petrovich Shpanberg (ca. 1700–1761). At first the academic group consisted of the astronomer Louis Delisle de la Croyère (1690–1741), the naturalist Johann Georg Gmelin (1709–1755) (Fig. 1), and the historian Gerard Friedrich Müller (1705–1783). Later Steller and Johann Eberhard Fisher (1697–1771) joined them. Among the junior staff we should mention Aleksej P. Gorlanov (?–1759) and Stepan Petrovich Krasheninnikov (1711–1755) (Fig. 2). The latter, together with Steller, started natural history investigation of Kamchatka. Steller, who accompanied Bering to America, was the first to examine the natural history and the life of native peoples in Alaska and the Aleutian Islands. On the way back, the ship on which he travelled was wrecked and the crew had to spend the winter on an uninhabited island. De la Croyère, who was travelling on the ship commanded by Chirikov, died of scurvy.

The major result of Gmelin's participation in the long-term expedition to Kamchatka was the publication of a book in Latin about the flora of Siberia (Gmelin 1747–1779). The third and forth volumes were prepared for publication by his nephew Samuel Gottlieb Gmelin (1744–1774), Joseph Gottlieb Koelreuter (1733–1806), and Joseph Gärtner (1732–1791). The fifth volume, devoted to the cryptograms has not yet been published. Gmelin's book provides descriptions of 1,178 species of plants and illustrations of 294 species. Among them, according to Franz Joseph Ruprecht (1865:4), more than fifty percent were described for the first time. Carl Linné said that Johann Gmelin discovered as many plants as all the other botanists put together. For many decades, this book was the most complete and fundamental plant geographical review of Siberian vegetation.

The publication of this book coincided with the beginning of discussion about the limits of species variability and the possibility of new species arising. The material collected by Gmelin showed the influence of abiotic factors on intraspecific variability. He paid attention to the high level of geographical variability of the species living in isolated regions, where migration seemed impossible (Gmelin 1747) and supposed that there had been independent creation of these species in different places. In his travel notes, Gmelin (1752) also wrote about the influence of habitat on the structure, functioning, and way of life of organisms. He described his unsuccessful attempts to acclimatise annual plants brought from Siberia in the gardens of St. Petersburg and Germany, where they usually failed to live long enough to flower and bear fruit. In his opinion, the fact that Kalmyk sheep lost the characteristics of their breed when reared in Russia was an example of species adaptation to local geographical factors influencing superficial characters such as the colouring of the integument and the size of the body. Gmelin dedicated his academic address "About new plants which arose after God's creation," which he delivered at Tübingen on the occasion of his assuming a professorial chair, to the problem of species stability (Gmelin 1749). In it he supported creationism, admitting that only varieties could arise after the creation, as a result of hybridization.

First-rate works on the Siberian flora were written by Steller, but almost none of these were published. In the scientific community, Steller is known first of all as a pioneer in research on the fauna of Kamchatka, Alaska and the Aleutian Islands. Unfortunately, on his way back from one of his long trips he was wrongfully arrested and died in Tumen' in 1746. All his works were published posthumously, including the first work on the Russian fauna of "Sea animals," with classical descriptions of sea cow (*Hidrodamalis gigas*, syn. *Rhytina stellere*), otter (*Enhydra letrus*), fur-seal (*Callorhinus ursinus*), and sea-lion (*Eumetopias jubatus*). In these works, Steller provided a com-

plex

FIGURE 1. ????Johann (OR Samuel) Georg Gmelin

FIGURE 2. Stepan Petrovich Kraseninnikov

FIGURE 3. Peter Simon Pallas

description of the animals, specifying the adaptive significance of their behavioural traits, the influence of climate and food on the size of the animals, and the colour and length of the hair (Kolchinsky 1997, 1998). In the introduction to the work on sea animals, Steller wrote about the influence of climate on the variability of organisms (Steller 1751). Therein he admitted that animals entering new conditions sometimes abruptly change their appearance and can be taken for new species. However, in his opinion, acquired characters can not be inherited and are quickly lost upon return to the previous habitat.

Publication of the other major works by Steller was delayed for decades, even centuries. Many of them were published only as abstracts (Litvinov 1909; Lipsky 1913). Only at the end of the eighteenth century were they published in part, by Peter S. Pallas (1731–1811) in the German language (Steller 1781, 1793). His book *The Description of the Land Kamchatka* had been published some time earlier in Germany (Steller 1774). It still raises questions because of some passages in common with a book of the same title by Stepan P. Krasheninnikov (1755). On the instructions of the president of the Academy, Count Kirill Razumovsky (1728–1803), Krasheninnikov prepared a comprehensive work about Kamchatka and included in it passages from manuscripts by Steller. Krasheninnikov's was the first scientific book on natural history written and published in the Russian language. Over the next fifteen years, it was translated into English, Dutch, German, and French and became famous all over the world. It displays the botanical interests of the author, who provides detailed information about numerous plants. He paid special attention to specific components of Kamchatka forests, the distinguishing of dominant species, estimation of their health-giving properties, and perspectives on economic use. In 1966, a travel journal by Krasheninnikov was published, which proves his participation in collecting materials for Johann Gmelin.

In 1747–1749, Krasheninnikov, at that time the head of the Academy's botanical garden that had been set up by Johann Amman, grew the seeds of similar species that had been gathered in different regions (America, China, Kamchatka, and the surroundings of the river Don) to display the influence of climate on their variability (Krasheninnikov 1748). In 1750, Linné asked Krasheninnikov to correspond with him concerning botany, highly esteeming his research on the Siberian flora and his diligence in searching for rare herbals (*Materials* 1900:598).

## Academic Expeditions of the Second Half of the Eighteenth Century

Traditions of elaborate research on flora and fauna were significantly developed among the academic expeditions of the last third of the eighteenth century. Over a span of seven years (1768–1774) vast territories from the coast of the Northern Ocean to Transcaucasia and the coast of the Black Sea, from the Ukraine to Transbaikalia, were examined by Peter Simon Pallas (1741–1811), Samuel Gottlieb Gmelin (1745–1774), Johann Gottlieb Georgi (1729–1802), Johann Peter Falck (1733–1774), Ivan I. Lepehin (1740–1802), and Johann Anton Güldenstädt (1744–1781). They all were encyclopaedically educated, because every day they had to write down various data concerning different fields of knowledge, to make numerous collections of plants, animals and minerals, ethnographical items, archaeological artefacts and archive materials, to pack samples and to keep travel journals.

A specific type of a scientist conditionally called "a universal travelling naturalist" (Borkin 2001:24) finally formed in Russia at that period. Travellers were uprooted from their customary conditions, often for years, and every day while travelling they were forced to solve complicated problems and clear constantly arising obstacles (Kolchinsky, Smagina 1997, 1999). The roads were awful and they had to travel thousands of kilometres along them, in sleighs in winter, in carts or on rafts in summer. They often had to cross deep, stormy rivers, and during the winter, not infrequently, their sleighs would break through the ice. They had to spend nights in cart-wagons, tents, or earth-houses. But day after day they moved ahead, in the heat or frost, or downpours.

This scientific enterprise was without precedent in the calibre and significance of the results — information about nature, natural resources, methods of management, and economics. "The new general map of Russia" was composed in 1776 using the data gathered by these expeditions.

Like previous expeditions, they were unable to avoid casualties. I.P. Falk, a follower of Carl Linné and the eldest among naturalists, committed suicide in Kazan by shooting himself in a fit of deep melancholy. A group headed by S.G. Gmelin was robbed; Gmelin himself was taken prisoner by a local khan Usmei Amir Amzoi, who demanded money for his freedom, and soon died. The astronomer Georg Moritz Lowits (1722–1774) who was captured by peasants on the order of the impostor Emelian Pugachev (from around 1740 to 1775), who pretended to be the Russian Czar, was first impaled and then hanged. Assistants of astronomer Wolfang Ludwig Kraft (1743–1814) died from cholera. Student Zrakovsky from Güldenstädt died from dropsy. In Pallas' group, taxidermist Shumsky died from scurvy, another companion was taken with fever, the third showed signs of mental disorder, and the hunter was crippled by a horse. It was not by chance that Pallas returned to St. Petersburg absolutely grey-haired. He was only 33, but he looked like an exhausted old man with sore eyes and intestines. The data on flora and fauna obtained under such severe and sometimes tragic conditions impressed foreign scientists. At the beginning of the nineteenth century, Georges Cuvier (1769–1832) wrote, "These Russian were of more use than the English and the French" (Cuvier 1841:189).

The expedition headed by P.S. Pallas turned out to produce the most significant results. Pallas travelled to the lower regions of the Volga, to the Urals, Western Siberia, Altai and Transbaikalia. The first results were a travel journal that was published in three volumes in German (Pallas 1771–1776). The book was later reprinted several times in Russia and elsewhere. It was not just a dull listing of the species and their external characteristics. There were also data about their natural habitats, their seasonal and geographical variability, migration, food, and behaviour. This approach justifies our considering the work as the origin of biogeography and ecology.

In a number of articles, Pallas wrote about the possibility of domesticating species discovered by him and their use in agriculture. Pallas proved himself a first-rate botanist. One need only look

at three of his botanical works, one about *Astragalus* (Pallas 1800–1803) where of 116 species, he described 29 as new; a second on the family Chenopodiaceae (Pallas 1803), and most especially his general monograph about the plants of Russia (Pallas 1784–1788). Due to lack of funds, only two parts of this Latin-language work, containing the descriptions of 281 species and wonderfully illustrated, were published (71 species were published for the first time, among them 25 still keep their names and 46 are considered synonyms).

The results of Pallas's second great trip to the lower regions of the Volga River, the northern Caucasus, and the Crimea were published in German at the beginning of the nineteenth century. In 1795, a volume by Pallas on the plants and animals of the Crimea was published in French.

In the last years of his life, Pallas prepared a fundamental work about the fauna of Russia in which he described more than 900 species (Pallas 1811–1831). Until the beginning of the twentieth century, it remained the basic work on the animals of Russia. It is especially important that Pallas described regions of Russia that had not yet been modified by human influence and were inhabited by species that became extinct just a few decades ago (for example, the wild horse in the European part of Russia); this contribution has imperishable value for contemporary science.

Even before he went to Russia, Pallas used comparative anatomical methods of research and tried to discover ties and relations among different groups of organisms. Pallas rejected unilinear arrangements of organisms (the so-called *scala naturae*) and suggested that one should be guided by the entirety of their structure and development in searching for their "true affinity." He was the first to suggest a multi-branched scheme for arranging plants and animals, contrary to the views dominant in taxonomy at that time (Bonnet 1764). A hundred years later genealogical meaning was attached to this scheme. However, Pallas himself did not interpret it from an evolutionary point of view. On the contrary, it was meant to oppose the ideas of morphological transformation, directional functional improvement of organisms, and the appearance of adaptive characteristics (Sytin 1997:20).

The addresses delivered by Pallas at the Grand Meeting of the Academy of Sciences in 1777 and 1778 were of great importance for the development of the theoretical basis of natural history. In the first of these, he suggested an original hypothesis about the long history of the Earth's structure, the origin of mountains, and the gradual transformation of the surface under the influence of volcanic eruptions, erosion, and water. The address laid the foundations for historical geology. In the second address, he presented his views on the problem of transformation of species (Pallas 1780). His arguments as they related to biological creationism were repeatedly quoted by Georges Cuvier (1769–1832), Charles Lyell (1797–1875), and Jean-Louis-Roudolphe Agassiz (1807–1873) in their respective opposition to evolutionary theory. Pallas' arguments were based on: (1) the difficulties of interspecific hybrids appearing in nature and their sterility; (2) variability being limited to external characteristics and under the influence of habitat; (3) the disappearances of changes as a result of interbreeding with the original forms or upon return to the previous climatic conditions; (4) stability of characteristics in some species inhabiting vast territories with different climates; (5) absence of transitional fossilised forms; and (6) stability of many species under domestication and the impossibility to get new breeds by means of special care.

Providing much data about the stability of species, Pallas illustrated mechanisms that hinder interbreeding. He pointed out that there is a low probability that interspecific hybrids will arise in nature because of differences among species in behaviour and reproductive periods. Even having arisen, hybrids are usually sterile and without posterity. And new characteristics disappear due to the interbreeding of modified organisms with the original population. Stability of species, according to Pallas, is supported by certain "generative forces" that counterbalance the modifying influence of climate and food and oppose degradation. He was convinced that "all the species which we

know and study arose simultaneously" (Pallas 1780:101).

At the same time Pallas mentioned numerous facts concerning the great variability of domesticated animals and cultivated plants, and the possibility of overcoming hybrid sterility by means of cultivation. He pointed to high potentials for hybridisation in forming breeds of domesticated animals and cultivated plants, and he put forward the hypothesis of the origin of various domesticated animals (dog, sheep, goat) from wild ancestors. He provided descriptions of fossilised remains of rhinoceros, gigantic ox, and mammoth, and formulated the hypothesis of catastrophes as the cause of their extinction. At the same time, his arguments against the inheritance of acquired characters contributed to the elimination of misinterpretations about the causes of evolution, and thus, in fact, cleared the way for Darwinism. And, it was no coincidence, that Darwin referred to this address in arguing in favor of the theory of natural selection.

His follower Vasilij F. Zuev (1754–1794) accompanied Pallas on all his expeditions. He carried out a number of his own zoological researches on ichthyology and entomology and gathered rich collections of plants, fishes, birds and insects (Zuev 1787). J.G. Georgi displayed his ability as a botanist in the academic expeditions. He published his personal diary in two volumes, providing one of the first attempts in Russia to give a floristic description of a relatively small territory, the Lake Baikal region (Georgi 1775). Among the 658 species treated, about 20 were described for the first time. The multivolume work by Georgi about nature in Russia and the ethnography of its peoples summarised systematic-floristic researches of Russia in the eighteenth century (Georgi 1800). Approximately 3,500 plants were described there, which was ten times as many as had been known before this research.

A leader of the Astrakhan group, Samuel Gmelin, published a three-volume diary about traveling in the lower regions of the Volga River, Azov, Persia, and the Caucasus (Gmelin 1770–1774). The fourth volume contained the diary of Karl Ludwig Gablitz (1752–1821), who had accompanied Gmelin in Persia. Later, Gablits became known as the author of the first natural history description of the Crimea. Prepared in 1789 by order of Count Grigorij Potemkin (1739–1791), it was first published in Russian at the beginning of the nineteenth century (Gablits 1803), and subsequently translated into German, French and English. It contained descriptions of about 500 species of animals and plants from Crimea. The diary of Johann Anton von Güldenstädt, acknowledged as the first systematic research on the flora and fauna of the Caucasus, was published by Pallas after its author's untimely death in 1781 (Güldenstädt 1781, 1791).

From the end of 1760 to the beginning of 1770, I.I. Lepehin headed the expeditions that carried out complex investigations of the Volga regions, the Urals, the north-west of Russia and the Baltic region. Their materials, published in the form of diaries, include valuable data about flora and fauna, plant cultivation and cattle breeding. Publication of the four volumes took almost forty years and was completed only in 1805. However the first, second and third volumes appeared in German translation in 1774–1783, and in 1784 some extracts were published in French. Approximately 600 animals and 300 plants are named there. Some of them are described in detail, others just mentioned. Later Lepehin played an important role in developing Russian biological terminology, guiding the work of naturalist-academicians in compiling the "Dictionary of the Russian Academy."

The scientific career of Nikolaj Ozeretzkovsky (1750–1827) started in the expedition of Lepehin. Later on he himself headed the expeditions to Onega and Ladoga lakes (1785), and Lake Seliger (1805). He was the author of many works on natural history (Ozeretskovsky 1792), and contributed much to the popularising of biological knowledge and developing Russian scientific language in the field of biology. Ozeretskovsky also translated books by Geoges Louis Leclers de Buffon (1787–1788) into Russian.

Prompt analysis of the data obtained in the expeditions was provided by the scientists working in the Natural Laboratory of the Kunstkamera and the Botanical Garden of the Academy. The garden grew very rapidly. A catalogue compiled in 1737 by Amman accounted for 1,100 species. The last catalogue of the garden was compiled in 1806 and included 2,236 species, indicating that the collection had doubled in size during the 70 years of its existence. During the short period when he headed the Natural Laboratory and Botanical Garden, Joseph Görtner (1732–1791) compiled a dictionary of plants in six languages. In the books by J.G. Gmelin, S.G. Gmelin, articles by J.A. von Güldenstädt and Erich Gustav Laxman (1737–1796), and the travel diary by Messerschmidt, which he edited, Gertner neatly followed binominal nomenclature of plants, thereby contributing to the introduction of the methods of Linné into practical nomenclature in Russia. Accompanying the director of the Academy, Vladimir G. Orlov (1743–1831), on his trip to the Don and Volga Rivers, Görtner made a unique collection of fruit and seeds. It was the beginning of his long-term work on creating a new branch of botany, carpology, which is the science that studies the morphology, anatomy and taxonomy of fruit and seeds. At that time, Joseph Koelreuter also started his famous experiments on plant hybridisation.

## Conclusions

The limited length of this report allows us only briefly to describe some aspects of the foundation of natural history in Russia. Investigations of flora and fauna, carried out throughout an enormous territory that had been inaccessible to scientists, extended the knowledge of taxonomy, biogeography, ecology, and palaeontology. Botany and zoology were enriched by thousands of new species. Specimens collected and conclusions drawn from a study of those specimens were not confined within the limits of a single science, and this quickly led to the differentiation of natural history into separate disciplines. Later, at the beginning of the nineteenth century, approximately ten independent museums based on these collections appeared, containing zoological, botanical, and mineralogical items. In the USSR, these museums were turned into prominent research centres. Moreover, a very important step was taken towards overcoming the ideas of naïve transformism, thus paving the way for ideas of gradualism and evolution by natural selection.

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