

Some pages of the history of the Russian astronomical science:
 Two hundred and seventy fifth Anniversary of the Russian Academy of
 Sciences (RAS) and Hundred and sixtieth Anniversary of the Central
 (Pulkovo) Astronomical Observatory of the RAS

V.K. Abalakin

Central (Pulkovo) Astronomical Observatory, St.Petersburg, Russia

The Academy of Sciences in Saint-Petersburg has been established by the order of Peter the Great through the Edict of the Governing Senate published on February 8, 1724.

The idea to establish the Academy of Sciences appeared by Peter the Great by the end of XVII century and formed itself finally during the Emperor's voyages abroad which particularly had caused also the creation of the first Russian astronomical observatory in Saint-Petersburg.

The creation of the Academia Petropolitana had coincided with the period of development of the Science in the modern sense of the word, based on rapid accumulation of the actual information on natural phenomena given by experiments and their mathematical interpretation; the creation itself had been dictated by necessity of the Peter the Great's reforms to be implemented for the complete renovation of Russia on basis of the common development of education and scientific activities which constitute the vital conditions for the existence of any state.

By this time the letters had been sent to Paris, London, and Berlin, composed by Peter the Great who excellently understood the meaning for the Academy's activities to be on the world level, with proposals to enlarge the scientific links and with invitations to foreign scientists to come to Russia "... for creating a scientific society...". So, the most talented mathematicians like Leonhard Euler, Nicholas and Daniel Bernoulli, and Christian Goldbach, an astronomer and geographer Joseph-Nicolas De l'Isles, a physicist Georg Krafft, and others had been invited.

The first scientific meeting, the Conference, of the Imperial Saint-Petersburg Academy of Sciences had taken place on November 13, 1725, after many invited scientists had arrived in the Russia capital, the first solemn public meeting of the Russian Academy of Sciences having taken place on January 7, 1726. By the Edict of the Empress Catherine the Great the Household Physician Lawrence Blumentrost had been appointed as the first President of the Saint-Petersburg Academy of Sciences.

Due to the Russian conditions at that time the Academia Petropolitana was in the first years not only the scientific institution but also the educational one: in accordance with the project approved by Peter the Great the academic university and gymnasium were organized by the Academy, the lectures being delivered by the Academicians. Therefore, the Saint-Petersburg Academy of Sciences had risen from the first years to the highs of the European Science. Edition of its main publication entitled "Commentarii Academiae Scientiarum Imperialis Petropolitanae" had begun in 1728 at the Academic Printing-Office and had immediately won the world recognition being in great demand.

The scientific activities of the Academy of Sciences had run in three “Classes”: the mathematical, the physical, and the humanitarian ones. The mathematical Class included four Chairs: the Chair for Theoretical mathematics and Astronomy, that of Geography and Navigation, and two Chairs of Mechanics as well; the physical Class had been formed by four Chairs, too: the Chair for Theoretical and experimental physics, that of Anatomy, that of Chemistry, and that of Botany; the humanitarian Class consisted of three Chairs: the Chair of Oratory and Ancient chronicles, that of the Ancient and new history, and that for Law, Politics, and Ethics.

At the disposal of the Academy of Sciences there were placed the *Kunstkammer* with its utmost rich collections in whose building the first Russian astronomical observatory and the unique Globe from Gottorp, Schleswig-Holstein in Germany, being a forerunner of the nowadays planetaria, were placed, the Library with many private book collections among which there were also the books that belonged to Peter the Great, the Scientific Archives, and the Academic Printing-Office which had published the first issue of the “Saint-Petersburg Journal”, being the only Russian newspaper at that time. In 1725 – 1728 the Physical Salon equipped with the first-rate at that time devices had been established in the Academy of Sciences which had got the Botanical Gardens (the so-called Medicine Kitchen-garden), the Salon of Mineralogy, and the Tool workshop as well.

The mathematical and natural sciences had acquired the most intense development due to that of industrial branches, to exploration and utilization of new natural resources of the country, and to needs of navigation, meteorology, geography, and cartography. The geographic and astronomical and geodetic investigations resulted in 1745 in publication of the first scientific “Russian Atlas” containing the general map of Russia and 19 maps of its several regions. The particular role in multilateral explorations of the giant Russian Empire with respect to its geography, geology, ethnography, and geodesy had played numerous expeditions organized under leadership of the scientists of the Saint-Petersburg Academy of Sciences. It should be noted that for the first time astronomers had applied the most refined methods of Geodesy to solving the problems related to precise determination of coordinates of cities, towns and some villages of Russia. It is already in 1740 that De l’Isles had used the Moon’s observations made with a portable transit instrument to determine the longitude of the town of Beryozov; Islenyev who was a pupil of Euler and Lexell determined systematically since 1770 the longitudes of observation sites making use of the observations of transits of the Moon and nearby stars made with the telescope of his quadrant.

Development of investigations in Mathematics and Mechanics in the Academy of Sciences is unchangeably related to the name of a great scientist Leonhard Euler who when entering the Academy of Sciences staff had promised to provide his learned works for publication in the “*Commentarii*” at least for 25 years. His fundamental work dealing with the study of the motion of a material particle in the gravitational field produced by two attracting fixed centers has been applied recently, in the XX century, to the accurate modeling of the Earth’s gravity field which has been used in construction of the theories of AES motion.

Due to the academic gymnasium and university a generation of young Russian scientists entered the scene who begun to play more and more significant role in the activities of the Academy of Sciences.

In 1742 a scientist with the encyclopaedic scope of knowledge and research range had entered the Academy of Sciences; it was Mikhail Vasilyevich Lomonosov who due to his multifaceted scientific activities had constituted an entire separate period in build-up and development of Science in Russia. What concerns Astronomy he had discovered the dense atmosphere of Venus using his astronomical observations of the planet made during the Venus' passage across the Sun's disc in June 1761.

The first Russian astronomical observatory in Saint-Petersburg mentioned above which was, according to de Lalande's statement, one of the most magnificent in Europe had greatly contributed to the development of astronomical research work done in the Academy of Sciences. When establishing the Saint-Petersburg astronomical observatory Peter the Great didn't restrict himself by practical applications of Astronomy to geographic explorations only: the instruments the Observatory had at her disposal at that time and those ordered later give an obvious evidence of the fact that the Observatory's destination was to participate in a wide scope of astronomical investigations.

Nevertheless, the Saint-Petersburg astronomers had recognized soon the inefficiency of the Observatory caused by its being located in a big growing city, and because of its traditional architecture, i.e. a tower erected atop the building, although by 1760 the Observatory under the directorship of A.-N. Grischow had acquired two first-rate instruments manufactured by the famous British master Bird; they were the mural quadrant with the circle with the radius equal to 8 feet and the transit instrument having the focal length of 5 feet. The only Western institution disposing of the instruments of the same high quality was the glorious Royal Greenwich Observatory. There appeared, therefore, definite proposals to transfer the Observatory to another place more favorable for scientific astronomical observations. The Academy of Sciences returned, however, in 1827 only to consideration of the old project for the Observatory transfer off the capital limits which had been composed by Director A.-N. Grischow, and entrusted to the famous physicist G.Th. Parroth to draw up the plan and cost estimate of construction and equipment of the future observatory under assumption that it will be situated on a land parcel offered for this end by Count A. Kuschelew-Bezborodko. Meanwhile the continuation of triangulation operations related to the measurement of the Northern part of the meridian arc in Russia had been approved by Nicholas the First in the Spring of 1830, and Vasily Yakovlevich Struve, the young Director of the Dorpat Observatory, had been appointed by the Tsar to be the leader of all this work. After his return from the service trip to Munich, Germany, having as a goal the orders for instruments necessary for these operations V.Ya. Struve had reported to the Tsar about the results of the trip, and the Tsar had given his command for the fourfold increase of the annual budget funding of the Dorpat Observatory and his orders for construction of a new observatory on the Pulkovo Hill in the southern suburbs of Saint-Petersburg as well. Already in October 1833 the Tsar's Decree on the erection of an observatory in accordance with the project composed by the Academy of Sciences had been announced; this initial project of the future observatory had nevertheless been rejected by V.Ya. Struve who after having been acquainted with it had declared it to be "in rude disagreement with the destination of the new observatory and with the scientific glory of our Fatherland as well".

Later on a special academic Commission with Admiral A.S. Greig in the Chair had considered two projects of the new observatory which were presented on February 24, 1835, by architects A.P. Bruellow and A. Thon, the choice being made in favour of the Bruellow's

project.

The solemn act of the Observatory's first stone laying had taken place on June 21, 1835; in Summer 1839 the construction had been completed, and the instruments ordered by V.Ya. Struve and manufactured in accordance to his ideas arrived from abroad (from Germany). The inauguration of the Nicholas Central Astronomical Observatory known to the world scientific community as *Imperialis Primaria Rossiae Specula Academica* had taken place on August 19, 1839, including the Thanksgiving prayers in the Observatory's Round Hall and the Consecration act of the Observatory building, in presence of many Russian astronomers and all members of the Saint-Petersburg Academy of Sciences as well as of foreign diplomats accredited by the Russian Imperial Court.

As V.Ya. Struve had said, "Pulkovo Observatory represents the realization of the clearly recognized scientific idea in such a perfection that is only possible by unlimited financial means donated so generously by its High Founder". Already in the first decades Pulkovo Observatory had justified in a full measure the hopes which were put on it, serving in self sacrificing way to the achievement of the goals defined by its "Statutes":

- a) making permanent and as perfect as possible observations contributing to the general progress in Astronomy;
- b) making the appropriate observations which are necessary for geographic exploration in the Russian Empire as well as for scientific travels;
- c) moreover, the Observatory has to support by all means the perfection of the Practical astronomy in adjusting its methods to Geography and Navigation and in providing practical exercises in geographic determinations of site positions.

In accordance with the goals set the principal problem of Pulkovo Observatory consisted in compiling the precise absolute catalogues of star positions based on the observations mentioned above and made with four out of five major instruments installed in Pulkovo. The observation programme was designed for many years, being repeated every two decades. So, the series of famous Pulkovo absolute catalogues of stellar right ascensions and declinations had been created for the epochs 1845.0, 1865.0, 1885.0, 1905.0, being prolonged by the later ones compiled for the epochs 1930.0 and 1955.0. The Pulkovo catalogues entered with the maximum weights the fundamental catalogues of star positions and proper motions that were compiled later in Germany and the U.S.A. implementing in this way the astronomical quasi-inertial frame of reference which constitutes the coordinate basis for all space-time measurements and serves to the solution of practical problems of Astronomy, Geodesy, Navigation, and Cosmonautics. Due to this outstanding contribution of Pulkovo Observatory the American astronomer Gould had called the Observatory the "astronomical capital of the world".

In the framework of the enormous geodetic program geodesists of three nations - Russia, Sweden, and Norway - under the leadership of V.Ya. Struve had undertaken and completed the measurement of the meridian arc extending from the town of Hammerfest in Norway to the estuary of Danube, entering the history as the "Russo-Scandinavian meridian arc measurement".

The unusually rich scientific activities and the bright spiritual life of very gifted scientists of Pulkovo Observatory constantly followed the development course of the world science and culture despite of rather frequent periods filled over with the agony of catastrophes caused by wars and the Great Terror of the Soviet Power in Russia. Many decades after V.Ya. Struve who had got before the science of his age more than by three quarters of the century through his discovery of the interstellar light absorption a new scientific direction – the astrophysical one – had arisen in Pulkovo Observatory, being fortified by acquisition by Otto Struve of the greatest 26-inch refractor in the world and dealing with research in physics of the Sun, the Moon, and major planets of the Solar system, of the stars and nebulae. Following the traditions laid by V.Ya. Struve the Pulkovo astronomers were marching ahead of their age by design and construction of unique astronomical instruments, among them the reflecting telescope BTA with the primary mirror of 6 meters (D.D. Maksutov, B.C. Ioannisiani) and the radio telescope RATAN-600 with the circular aerial of variable profile (S.E. Khaikin, N.L. Kaidanovsky), the Stratosphere Solar Observatory (V.A. Krat, V.N. Karpinsky, V.M. Sobolev) and many others should be mentioned.

In recent years of the economic ruin under conditions of the overwhelming poverty the creative thought of Pulkovo astronomers does not get weaker and does not die: the scientific investigations continue in cooperation with astronomers from many C.I.S. countries and abroad following many directions – Astrometry, Astrophysics, Radio astronomy; many cardinally new instruments equipped with the CCD-arrays are designed and manufactured, new daring space projects are being proposed (the Space astrometric system “STRUVE” and the Interplanetary solar stereoscopic observatory “STEREOSCOPE” are among them).

The story of the highest scientific institution of Russia and of one of its oldest research institutes constitutes a significant part of the story of science of Russia itself. It could not be presented in final terms because it is continuous in its development, in its life and remains not completely written for ever. One could hope, however, that this modest review will give to the reader a true and complete idea about its course and about its mile-stones as well.