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Vsevolod Ivanovich Romanovsky, 1879 – 1954

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Всеволод Иванович Романовский
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Introduction by Translator

This is the only book devoted to Romanovsky. I have not found an entry on him in the *Dictionary of Scientific Biography* and Wilks (1962) had not mentioned him, although his initials, S. S., had been interpreted as *Statistician Supreme*. Cramér (1946/1999; I have only seen his Russian translation of 1948) referred to three of Romanovsky's papers [47, 48; 55] and Stuart & Ord (1943/1994) mentioned papers [33; 46]. All this is strange since Romanovsky published many papers abroad, corresponded with most respected Western mathematicians, since his monograph [170] was translated in 1970 and Kendall & Doig (1962, 1965, 1968) listed 88 of his papers.

Romanovsky's trip abroad (§ 5.2) was very successful and his correspondence with Pearson and Fisher is now published (Sheynin 2008). The correspondence with Fisher (his last letter was written in October 1939) proves that that difficult genius highly esteemed the Russian scientist. One of Romanovsky's statement formulated on 28 October 1929, in his letter to Fisher from Paris (Sheynin 2008, p. 374), merits special attention (note his bad English):

GPU [the Chief Political Administration, the forerunner of the KGB], *the most dreadfull and mightfull organisation in the present Russia* […].

However, Matvievskaya & Bogoliubov have portrayed Romanovsky as a perfect citizen who never thought of at least silently questioning Stalinist bestiality. I suspect that some of his and/or of his students and followers pertinent statements are buried in some archives.

Romanovsky's scientific appraisal of Fisher was somewhat restricted. Indeed, there is much to say about Pearson as the founder of mathematical statistics. Romanovsky himself [120, p. 409] stated that

Galton and Pearson are considered as the founders of the modern mathematical statistics. […]

Fisher, as he continued, had recently created the statistical theory of estimation. Likewise, Eisenhart (1974, p. 447) decided that Pearson was

The founder of the twentieth-century science of statistics.

Kolmogorov (1947, p. 63) recognized Pearson's merits as a co-founder of mathematical statistics:

The modern period in the development of mathematical statistics began with the fundamental works of […] *Pearson, Student, Fisher* […].

See my own opinion below. I (2010) collected the statements of many authors about Pearson, and I repeat here the judgement of Bernstein (1928/1964, p. 228):

Pearson fulfilled an enormous work in managing statistics. He also has great theoretical merits, especially since he introduced a large number of new concepts and opened up […] *important paths of scientific research. The justification and criticism of his ideas is one of the most central problems of current mathematical statistics*.

I believe that exactly that theory of estimation mentioned above by Romanovsky heralded the birth of mathematical statistics, see Sheynin (2007). See also the general appraisal of Fisher by Zabell in Note 9.12.

Romanovsky created a school *out of thin air* (end of § 9). I specify: yes, indeed, both chronologically and geographically, but not scientifically. He was a representative of the Chebyshev school (as the authors justly stated) and appropriately advocated rigour in mathematical considerations and connection of theory and practice. Furthermore he eagerly followed the work of his contemporaries whereas Chebyshev was *a pathological conservative* (Novikov 2002, p. 330), see also Sheynin (2017, § 13.3). So Romanovsky's school was a continuation of the Chebyshev school and, as such, deserves a high praise.

I still have to say that one of the authors, Bogoliubov, was extremely careless as shown in my Notes. His explanation of many of Romanovsky's formulas was incomprehensible, part of his statements was either wrong or helpless etc.

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Introduction

The life and work of the remarkable mathematician Vsevolod Ivanovich Romanovsky is connected with Tashkent, Petersburg, Warsaw and Rostov-Don. He was among those who established the Tashkent University and organized higher education in Central Asia.

A representative of the Petersburg mathematical school, our most eminent expert in the theory of probability and mathematical statistics[0.1], Romanovsky is also remembered as a gifted teacher. He had educated many scientists who essentially contributed to the development of mathematics. His name has firmly entered the history of our national mathematics but the biography of this outstanding scientist and lovely man is not yet compiled. This booklet is the first attempt to trace, in detail, his life and work.

We have benefited from the materials of the Central Statistical Archive of Uzbekistan (CSAU), the State Historical Archive of the Leningrad Oblast (SHAL), the State Archive of the Rostov Oblast (SAR)[0.2] and from the recollections of Romanovky's relatives, his students and collaborators. It is our pleasant duty to thank sincerely all those who had helped us.

Chapters 1, 3 and 10 are written jointly by both of us; chapters 2, 4, 5 and 6, by Matvievskaya and chapters 7 – 9, by Bogoliubov.

Chapter 1. Childhood and Years of Study

Vsevolod Ivanovich Romanovsky was born 22 November/5 December 1879 in Verny (now, Almaty). Some information about his father, who was exiled to Turkestan for participation in the Polish disturbances, and served in the army until 1875, is being kept in the archives[1.1]. Thus (we provide the dates in the old style) a card of 14 July 1875 states (SHAL, f. 14, inv 3, c. 38220, p. 17):

The bearer of this card, who serves in the 12th Turkestan combat battalion, a non-commissioned officer from the volunteers, Ivan Berngardovich Romanovsky is dismissed from service by the order of the day for the army of the Semirechye Oblast No. 56 of 29 April 1875 in accordance with his request and in compliance with article 20 of the statute […]. *He is not keeping his military rank and has the right to live wherever he wishes.*

After retirement I. B., as his son testified, had worked in the forestry. In 1878 he married O. A. Salagaeva from the Semirechye Cossacks (SHAL, see above):

On November 1, 1878, the gentleman by birth Ivan Berngardovich Romanovsly wedded, in his first marriage, to the girl, the Cossack daughter Olga Alekseevna Salagaeva from the […] *village* […] *in the* […] *church.*

The birth of their first son Vsevolod is documented in an extract from the register of births of the cathedral in Verny (Ibidem, p 21):

Vsevolod was born in 1879, on 22 November, and baptised on November 28. His parents are the gentleman by birth Ioann Berngardovich Romanovsky, a catholic, and his lawful wife Olga Alekseevna, an Orthodox believer. Godparents: Cossack sergeant of the Sarakan village Efrem Ioannov Rudakov and a daughter of a petty bourgeois Anastasya Ioannovna Romanenkova.

Later the family moved to Tashkent. Two younger sons, Gavriil and Vladmir, were born there in 1888 and 1890 but died in infancy. In those times Tashkent was the largest city of Turkestan. Russians had conquered that territory [in 1867] after which it underwent a new period of economic and political development. On 15 June 1865 the military under general M. G. Chernyaev occupied Tashkent. The civilian and military administration was accommodated there and cultural and educational activities began to develop [235, p. 297].

First educational facilities were opened for both Russian settlers and local population. In 1870 there appeared the newspaper *Turkestanskie Vedomosti* and its supplement *Turkestanskaya Tuzemnaya* [Indigenous] *Gazeta* in Uzbek and Kirghiz. A public library opened in 1871 and, in 1876, a museum for keeping historical, archeologic and ethnographic artefacts of the territory. The first scientific establishment in the city, the Tashkent astrophysical ad meteorological observatory, appeared in 1870 [313]. Scientific expeditions investigated the poorly known Turkestan in 1853 (G. N. Potenin), in 1856 and 1869 – 1870 (P. N. Semionov-Tyan-Shansky), in 1857, 1858, 1866 – 1867 (N. A. Severtzev), in 1868, 1869 – 1870 (A. P. and O. A. Fedchenko) etc. Especially important for the history of the cultural life of the territory was the Turkestan study group of the lovers of archeology founded in 1895 and the Turkestan branch of the Russian Geographical Society which began its work in 1896.

But to return to Romanovsky. He lost his father at the age of twelve:

In 1892, on March 11 in Tashkent died Ivan Berngardovich Romanovsky. He was buried on March 13 in the Tashkent city cemetery.

He apparently was the victim of a cholera epidemics which occurred in Central Asia. The *Turkestan Vedomosti* stated that in 1892 it especially raged in Tashkent[1.2]. The family had been experiencing incessant financial difficulties.

In 1895 Romanovsky entered the Tashkent non-classical (secondary modern) school which had opened a year previously. It was situated in the private house […] [235, p. 227]. Only in 1898 when Romanovsky moved up to the graduation class it was transferred to a new building […]. In those years it was one of the best good-looking edifice in the whole city. Spacious rooms, high ceilings, large windows, wide corridors, parquet floors, hot-water heating, well outfitted rooms [for separate subjects] and a good library so that that school satisfied the highest requirements.

After graduation Romanovsky obtained a certificate which stated that he entered the school on 28 September 1895 and, having an excellent behaviour, was educated until 5 June 1899 and completed the course of the main department. During the final examinations Vsevolod Romanovsky showed the following success (SHAL, p. 5)[1.3]:

God's law, 5; Russian, English and French languages, 5; arithmetic, 5; algebra, geometry, trigonometry, 4; history, geography, natural history, 5; drawing and technical drawing, 4.

Next year Romanovsky studied in the additional class of that same school and acquired the right *to enter the higher special school after* *only an examination.* And in the autumn of 1900 he became a student of the Petersburg Technological Institute. Very soon, however, he realized his mistaken choice of the course of his life. According to his own words, he had been attracted to pure mathematics. And so, he decided to enter a university. A school-leaving certificate was therefore needed but it was only given to graduates of gymnasiums.

After four months in Petersburg, Romanovsky therefore returned to Tashkent. To pass the examinations for that certificate he had to cope with the required subjects, which had not been studied in the non-classical school: logic, German, Latin and Greek languages. He studied until spring and got the certificate on 1 June 1901. It stated that he was *examined in April and May of 1901 in the Tashkent boys' gymnasium* (SHAL, f. 14, inv 3, c. 38220, p. 5). His marks confirmed his excellent knowledge of all subjects[1.4] except the ancient languages which were marked as satisfactory.

On 30 June 1901, upon obtaining that certificate, Romanovsky sent a letter to the rector of Petersburg University in which he asked to be admitted as a student of the first year at the mathematical department of the physical-mathematical faculty (Ibidem, c. 1, p. 1 rev):

I obtained my school-leaving certificate in the Tashkent gymnasium and have no such rights, but owing to various circumstances my mother […] *has to live this year (and intends to continue living) in Petersburg. Therefore, I would wish to study at the same place and live together with my mother. Our means are insignificant and living separately would have been very difficult financially the more so since we have no relatives in any university city whereas my cousin, Olga Borisovna Pospelova is living in Petersburg.*

O. A. Romanovskaya confirmed her son's application. And in 1901 Romanovsky began his study in that mathematical department. The Petersburg mathematical tradition goes back to the legendary Euler. M. V. Ostrogradsky worked there and Chebysev's contributions laid the foundation of one of the most prominent mathematical schools of the 19th and 20th centuries, of the Petersburg mathematical school which is often named after its founder.

Vsevolod Ivanovich had not seen Chebyshev among the living, but his influence had still been felt, his *spirit* was alive the more so since all the leading professors were his students and collaborators. The lectures were read by A. N. Korkin (1837 – 1908), D. K. Bobylev (1842 – 1917), Yu. V. Sokhotsky (1842 – 1927), K. A. Posse (1847 – 1928), I. L. Ptashitsky (1854 – 1912), A. A. Markov (1856 – 1922), D. F. Selivanov (1855 – 1932), D. A. Grave (1863 – 1939), N. M. Günter (1871 – 1941)[1.5].

In August 1901 Romanovsky became a student and successively studied for a year. However, something apparently turned out unfavourably since he had to return to Tashkent. On 3 August 1902 he sent an application to the rector (SHAL, f. 14, inv 3, c. 38220, pp. 10, 2):

I have the honour to ask […] *to discharge me from the university entrusted to you because of some circumstances at home and to send me a certificate about my behaviour and my success at the examinations for the first two terms as well as my documents. My* *address is: Tashkent,* […] *street, the Olga Romanovskaya house, for V. I. Romanovsky*.

A resolution of 12 August to discharge [him] followed and the certificate is dated 4 October 1902. The reason for the discharge is not stated. According to L. V. [E. E.!] Romanovskaya, the widow of the scientist, his decision was occasioned by his trip to France and an attempt to study in Paris. This attempt failed owing to the lack of means.

Already on 13 November 1902 the *former student* was once more in Petersburg and applied to be reinstated (Ibidem, pp. 24, 37):

After leaving the university on 4 October of this year because of circumstances at home, I have the honour to ask […] *for admittance once more as a student of the physical-mathematical faculty since those circumstances do not hinder me anymore from continuing my education. I have passed all the necessary examinations for moving up to the second year and I am therefore asking you to enter me as a student of that second year.*

On 20 November, after paying for the education during the autumn of 1902, Romanovsky once more became a student of the Petersburg University. His remarkable mathematical abilities showed themselves even in his student years. His paper [1] appeared in 1904. Korkin much influenced him [272] and mentored him in the theory of partial differential equations. He devoted many years to the development of the theme suggested by Korkin and to closely related issues.

After attending Markov's lectures on the calculus of probability he ever more became interested in that discipline although his direct teacher was Ptashitsky who invariably supported him in his difficult way towards science.

The university offered much but required serious work and Romanovsky had been indeed working very intensively. This, as well as the variety of his scientific and literary interests of the young man is testified by numerous *Notes about the read* (CSAU f. 2283, inv 1, c. 172 – 174). Among these notes are bulky summaries of mathematical books in French, German, English and Italian written in the 19th century and considered classic and the newest investigations.

These summaries are interspersed with his own reasoning and proofs of theorems mostly belonging to the theories of numbers and functions. There are also summaries of many contributions on logic, psychology and philosophy as well as reasoning about the inner nature of man, religion, altruism and love. Indicative is a note about music dated 7 January 1903:

Music is philosophy of sorrow and joy, suffering and happiness.

Then follows his recollection of a mysterious music which he distinctly heard formerly at night. Notes in his diary show Romanovsky's deep interest in the Orient, in its poetry and philosophical teachings. Among books which he read and summarized in the autumn and winter of 1901 we find

W. Jerusalem, *Die Urteilungsfunktion*,

Lebon, *Psichologia Narodov i Mass* (G. Le Bon, *Psychologie der Massen*, 1895; Psychology of Nations and Masses),

S. Jevons, *The Principles of Science*,

Zemmel, *Ob Otnoshenii Selektivnogo Uchenia k Teorii Poznania* (On the Relation of Selective Teaching [or Learning or Doctrine] to the Theory of Knowledge),

Nietzsche, *O Predrassudkakh Filosofov* (*Von der Vorurteilen der Philosophen*; On the Prejudices of the Philosophers). 1. Teil, *Jenseits von Gut und Bose*.

During these months he also summarized in detail the book of the celebrated Orientalist and traveller over Central Asia

A. Vamberi, *Ocherki iz Zhisni i Nravov Vostoka* (H. Vámbéry, *Reise in Mittelasien*; *Skizzen aus Mittelasien*; Essays about the Life and Morals and Manners of the Orient). [Name of author: Armin (Hungarian) or Hermann.]

Once more, interspersed between the summaries was Romanovsky's reasoning about mathematics. In the beginning of 1902 he began reading

G. Münsterberg, *Osnovy Psichologii* (Principles of Psychology) in German.

This book apparently interested him very much. In the autumn of 1902 and winter of 1903 he continued to summarise it (CSAU inv 1, c. 172, pp. 44 – 80; c. 173, pp. 79 – 88 [fund not stated]) and wrote down his thoughts about psychology and the theory of knowledge, about life and mathematical and artistic creativity.

Summaries of mathematical works which Romanovsky compiled during his student years are unusually thorough, very detailed and carefully rewritten (?). As a rule, he summarised foreign books in their original languages. This *inner* work had to influence his formal results and, first of all, his progress in compulsory disciplines and the estimation of his first scientific investigations by specialists. His paper [1] mentioned above was published in a reputable journal. Below, we will see that this thoroughness developed during the university years and the aspiration for mastering the heart of problems lasted all his life.

The time spent in the university was not calm. The first Russian revolution ripened and burst out in those years and the Petersburg University became a centre of its herald, of the students' unrest. Romanovsky did not remain aside from the public movement which is documented by his application of 14 August 1903 to the rector of the university (SHAL f. 14, inv 3, c. 38220, p. 23):

On 27 March of this year I was transferred from student to lecture-goer until the autumn term of this year for participation in a student gathering. I was therefore unable to sit for the examinations in the third year programme and was obliged to remain in the second year for the second time.

I have no means and my only relative is my mother who cannot help me, she herself rather expects help from me. It will be therefore very difficult for me to spend an unnecessary year at the university whereas I have thoroughly learned the programmes of the second year. Taking into account all that, I am most humbly asking your excellency to enlist me once more as a student of the university and to move me up tentatively to the third year. Then, when moving up to the fourth year, I will pass the examinations for the second and the third year;

alternatively, this autumn I will take the examinations for moving up to the third year.

A resolution shows that the application was satisfied and, from 31 August 1903 he again became a student. However, the participation in the gathering was not forgotten: he was deprived of the students' privileges. Restoration of that right only occurred in the end of 1904 by the solicitation from the rector. It was supported by the assistant minister of people's education Lukianov. He wrote to the administrator of the Petersburg educational region (Ibidem, p. 8):

[Lukianov mentioned eight students from various faculties of the Petersburg University including Romanovsky and continued:] *All of them were punished for their entire further university life* […] *for participation in the unrests which had occurred in the university. Taking into account* […] *their perfect behaviour as well as their most excellent success in science, I, for my part, see no obstacles to the satisfaction of the rector's application.* […]

In 1905 Romanovsky graduated with a diploma of the first degree and obtained a leaving certificate which testified that he had completed the full programme of sciences. Success in science and scientific work[1.6] were a good reason for leaving him at the university to prepare for professorship. Ptashitsky approved his leaving composition and as secretary of the faculty (SHAL f. 14, inv 1, c. 15026, p. 31a) left a remark on Romanovsky's request of 15 March 1906:

It is resolved [by whom?] *to apply for leaving him for two years beginning from 1 March 1906.*

This resolution was approved by the faculty on 17 March after which the rector of the university presented a request to the administrator of the educational region (SHAL f. 14, inv 1, c. 10011, p. 1)

About the leaving of Vsevolod Ivanovich Romanovsky for two years beginning on 1 March 1906 at the university, chair of pure mathematics as being elected by the physical-mathematical faculty to prepare himself for professorial and teaching work without a grant.

This last reservation meant however that, practically speaking, Romanovsky's life in Petersburg would have been impossible. In September, when the matter was resolved, he therefore asked the rector to fix him a monthly stipend of 50 roubles until the end of the year.

A correspondence with the minister ensued and the application was satisfied. In the future the faculty regularly repeated such applications. However, Romanovsky was compelled to combine the study with work: he taught mathematics in the school of practical chemistry.

Other scientists were left at the university as well: the mathematician Ya. V. Uspensky (1883 – 1947), who became an academician and moved to the US after 1929; and the physicist D. S. Rozhansky (1876 – 1940). Left somewhat later, in 1908, was V. I. Smirnov, the future academician [298]. All of them sat for their master examination at the same time.

The record of the proceedings of the faculty sitting of 7 December 1907 states (SHAL f. 14, inv 3, c. 15026, pp. 55, 56, 56a, 58):

Allow V. I. Romanovsky to sit for the master examination.

And, on 25 January 1908:

Ikskiul, Smirnov, Davidov, Nemilov, Dogel[1.7] *and Romanovsky sat an examination for the master degree*.

It was held on February 15 and 25 and March 28. Uspensky and Rozhansky were examined together with Romanovsky. The record of the examination states:

Romanovsky was examined for the degree of master of pure mathematics. The following issues were proposed:

1. Integration of equations with partial derivatives of the first order.

2. Theory of symmetric functions. Discriminant. The Jacobi symbol [Jacobian?] *and its properties.*

3. Irrational numbers and continuous magnitudes in the theory of probability[1.8].

4. Solution of linear difference equations.

5. Doubly periodic functions of the third kind.

Ptashitsky and Bobylev positively estimated the knowledge of the examined.

11 March 1908 (SHAL inv 3, c. 15096, p. 58 [fund not mentioned])

V. Romanovsky was examined for the degree of master of mechanics.

The record of the examination lists the following issues:

1. On the Coriolis acceleration

2. On the Archimedes law[1.9].

The answers *were considered satisfactory* (SHAL inv 3, c. 15083, p. 19 [fund not mentioned]) as again testified by Bobylev and Ptashitsky.

Romanovsky had to combine scientific work and preparation for the examination with teaching. In 1906 – 1908, when working in the […] school, he got acquainted with his future wife, E. E. Kozhemyakina who had been completing her education there. In March 1908, after the period of Romanovsky's university life had ended, the faculty asked to extend that period for one more year and the administration of the Petersburg educational region allowed it (SHAL inv 1, c. 10011, pp. 18 – 20).

However, Romanovsky was unable to stay: It was stated in his documents that family circumstances compelled him to return to Tashkent. Later he wrote (SAR f. 524 inv 3, c. 829):

Financial neediness and the impossibility of obtaining a suitable occupation in Petersburg compelled me to take the position of a teacher in Tashkent.

And Romanovsky began teaching mathematics and physics in his old non-classical gymnasium. At the same time he intensively attempted to complete his master dissertation in the theory of integration of partial differential equations. He finished this work in December 1909 and sent it for publication to Warsaw [3]. Also in 1909 he participated in the work of the 12th Congress of natural scientists (SAR Ibidem).

A chance for moving to Warsaw appeared in 1910 together with a prospect of professorship in the university after the defence of his master dissertation. Ptashitsky's [appropriate] recommendation was supported by Professor D. F. Selivanov and academician V. A. Steklov[1.10].

Chapter 2. Romanovsky in the Warsaw University

2.1. The University. In the beginning of the twentieth century Warsaw had two institutes of higher education, the Polytechnic Institute and the University. Even at that time, the Warsaw University, which became an important centre of Russian scientific investigations, had a long history. An ukase (decree) of Aleksandr I established it in 1816. It was closed after the Polish rebellion of 1830 – 1831 and an institution of higher education was only opened in 1862, just before the rebellion of 1863, and named *Glavnaya Shkola* (Main School). As all the Russian universities, it had a medical, a physical-mathematical, a law and a historical and philological department. Teaching was in Polish.

In 1869, on its basis the Warsaw University was opened instead. It had a statute mostly corresponding to the university statute of 1863 but changed and supplemented in accordance with local conditions. It essentially restricted the university autonomy and envisaged teaching in Russian. The scientific degrees of Russian universities were compulsory for the teaching personnel. Its first rector was the celebrated philologist and Slavonic scholar P. A. Lavrovsky (1827 – 1886), professor of Kharkov University.

Varshavskie Universitetskie Izvestia (Proc. Warsaw Univ.) had been published since 1871. All the former faculties of the Glavnaya Shkola remained, but soon the teaching of mathematics essentially changed. Morduhai-Boltovskoi [261] who knew the history of the University in detail, stated that in the Glavnaya Shkola the attention was mostly directed to the theory of probability, descriptive geometry and the theory of numbers. In his opinion, this was occasioned because the instructors were *not scientists, but rather experts in those disciplines*.

He mentioned Baer who had previously worked in the Polish Bank and was well versed in the theory of probability and insurance[2.1]. He [261, p. 29) continued:

The same concerns Pencharsky who was deeply knowledgeable and for many years had been teaching descriptive geometry and the theory of shadows. His listeners got a lasting impression of the trimming of his lectures by their style and perfect diagrams but he did not publish anything.

Other mathematical disciplines were included in a general course named *Special chapters of integral calculus*. Apart from those mentioned above, the teaching personnel included Fronzkevich, Zaionchkovsky, Kvetnevsky and Babchinsky. After the creation of the university only two instructors were left, Pencharsky and Zaionchkovsky. Essential difficulties were encountered, but new instructors had been gradually taken on.

In 1871/1872 the renown mathematician Mikhail Arkadievich Andreevsky (1849 – 1879) began working there. In that time he was *still young*, *but craved for scientific activity* [261, p. 30]. Then, in 1872/1873) there appeared Nikolai Nikolaevich Alekseev (1828 – 1881), one of the founders of the Moscow Mathematical Society and the journal *Matematichesky Sbornik*, an adjunct of the Academy since 1879.

Activity had been gradually enlivening. In spite of the shortage of the teaching personnel mathematics became taught according to the programmes of other universities. Courses which had been compulsory were introduced (differential equations, calculus of variations, difference equations etc.)

The choice of the courses began to be determined not by the availability of the appropriate experts but by the role of the disciplines in the sphere of scientific work [261, p. 30].

During this period when scientific activity had been wakening up, the remarkable mathematician N. Ya. Sonin (1849 – 1915) moved from Moscow to Warsaw. He worked in the university for twenty years and achieved very much in creating there an important mathematical centre. At first, he became a docent and read compulsory courses in algebra, differential equations and calculus of variations. Teaching had been renewed. When reading lectures he attempted

To move somewhat the elements of those courses, apt to harden and become stationary, and thus to attract his listeners, even from the beginning, to scientific thought (Ibidem, p. 31).

New special courses were introduced (theory of determinants, deductive geometry (?), the Galois theory, etc.). The requirements for candidate dissertations were toughened. An important novelty was the introduction of practical mathematical studies. In 1871 they were considered *inappropriate* for universities; Andreevsky thought that it was sufficient for the student to learn the general theorems, but in 1879 Sonin had already introduced systematic studies of analysis. Other instructors (Baranetsky, Baskakov, Nazimov[2.2]) supported him.

In 1890, N. N. Zinin who graduated from the Petersburg University and was recommended by Chebyshev and Korkin became *acting docent* of the chair of pure mathematics and Sonin's student and assistant. Also in 1890 a young master of pure mathematics of the Moscow University, V. A. Anisimov (1860 – 1907) was taken on on recommendation of N. V. Bugaev, P. A. Nekrasov and N. E. Zhukovsky. He was a scientist [259]

With a wide view of mathematics and that special ability to expound his thoughts clearly and simply which is so characteristic of the Moscow school of mathematics.

He was occupied with the analytic theory of linear differential equations [315, pp. 444 – 445]. A gifted teacher, Anisimov, educated many successful mathematicians. His was the idea of creating, in the faculty [261]

A mathematical seminar which should assist closer contacts between the professors and their listeners.

In 1894 G. F. Voronoy (1868 – 1908) began working in Warsaw. He was a remarkable mathematician and an outstanding representative of the Petersburg school of the number theory [312]. From 1886 to 1905 P. O. Somov (1852 – 1919), the son of the academician O. I. Somov, had been a member of the chair of mechanics.

Thus, by the end of the 19th century a formidable group of scientists had been formed in Warsaw. They taught on the highest contemporary level and adopted the traditions of the Petersburg and Moscow mathematical schools[2.3]. About 1900 I. R. Braitsev (1870 – 1947) and Morduhai-Boltovskoi (1876 – 1952) joined that group.

In 1905 – 1908, when student unrest coupled with strikes and demonstrations had been occurring in Warsaw, the University and the Polytechnic Institute remained closed. Zinin, Voronoy, Braitsev and Morduhai-Boltovskoi among others were sent to Novocherkassk where the Donskoy Polytechnic Institute had been created. Anisimov died in 1908, as well as Voronoy, in 1909, after his return to Warsaw. The physical-mathematical faculty needed reinforcement.

In 1908 S. D. Cherny (1874 – 1965) was elected extraordinary professor of astronomy and geodesy. He graduated from the Kiev University, passed his master examination and, in 1908, defended his master dissertation in Petersburg. In 1909 Morduhai-Boltovskoi transferred from the Polytechnic Institute and became extraordinary, and in 1911, ordinary professor.

In 1909 D. I. Goryachev (1867 – 1949), a student of Zhukovsky, began reading a course in mechanics as an extraordinary professor. In 1912 he defended his doctor dissertation in Moscow University and became ordinary professor. A. R. Kolly (1874 – 1918) read a course in experimental physics and V. V. Kurilov (1867 – 1921), a course in chemistry. In 1909 they both became ordinary professors.

V. P. Velmin (1885 – 1974) who graduated from Kiev University as a student of D. A. Grave became acting docent at the chair of pure mathematics. In April 1909 he passed the master examination and moved to Warsaw. He was engaged in the theory of numbers and algebra. In Warsaw, he read a course called *Introduction to the theory of algebraic numbers*.

A position of a second docent of the chair of pure mathematics had appeared in 1911 and Romanovsky intended to fill it.

2.2. The move to Warsaw. That new position was established on the application of the physical-mathematical faculty. It was considered at the sitting of the University Council on 30 March 1911 and its record stated [223, 1912, IX, p. 19]:

Resolved: To petition the administrator of the region to establish a new position of docent […].

However, the discussion about the candidate for the new position began much earlier, see the documents of Romanovsky's personal records in SAR[2.4]. It is stated there that even in 1910 Morduhai-Boltovskoi requested Ptashitsky in Petersburg to recommend a worthy claimant. The latter replied (SAR f. 524, inv 3, c. 829, p. 14):

I allow myself to recommend […] *Romanovsky, and Selivanov and Steklov support my choice.* […] *An able, knowledgeable, diligent and very honest man.*

Romanovsky agreed [to try] and submitted three manuscripts for consideration (*Ibidem*): **1)** *A generalization of the Fourier integral;* **2)** *A note about symmetric functions*; and **3)** *On the Bertrand paradox*. The members of the chair of pure mathematics, Morduhai-Boltovskoi, Braitsev and Velmin attentively read them and formulated their opinion in writing (Ibidem).

Morduhai-Boltovskoi concluded that the first MS contained a very interesting and unnoticed result and expressed his wish to see it published *after correction of some defects in the exposition*. Braitsev stated that the author [of the same MS] took the same way as Riemann did in a similar case. He emphasized the novelty of the result and noted Romanovsky's *considerable wit* and *elegancy of his method*.

The second MS, as Morduhai-Boltovskoi thought, was

Less important than the first but better polished. A strict system of exposition was possibly inherited from the celebrated teacher of Romanovsky, the late Korkin, and marks a good instructor.

Braitsev remarked that essentially new results were lacking, but the work

Testifies in favour of the diligence and assiduity of the beginner. He was able to complete the solution of a system of linear equations and to offer it in an elegant form.

About the third MS Morduhai-Boltovskoi wrote that

It concerned a particular issue but proved the author's wit and resourcefulness. He ended by stating that his personal correspondence with Romanovsky *convinced me* [him] *in his ability and knowledge*.

On 28 September 1910, after a discussion at the faculty and a secret ballot Romanovsky was unanimously elected (Ibidem, p. 17). At the same time the faculty applied to the Council of the University with a request to *ballot Romanovsky* […] *as acting docent at the chair of pure mathematics* [223, IX, p. 71]. The record of the sitting of the Council of 30 September stated that this application was confirmed and that the ballot had occurred at that date (Ibidem, p. 75).

A correspondence with the director of the Tashkent non-classical gymnasium ensued (SAR f. 524, inv 3, c. 829, p. 15). In a letter to the rector of the Warsaw University he objected to the *transfer* of Romanovsky in the course of an academic year. He, Romanovsky, is teaching the graduating class. Describing the difficulties connected with *the remoteness of Tashkent from cultural centres* and mentioning *the deficiency in educated men in the city*, he continued:

As a former student of our school Romanovsky cannot be wholly indifferent to the inconveniences in its life; he is *badly hesitating,* but the administration of the school will not hinder him and is asking to recommend a good mathematician in his stead.

On 13 November 1910 the sitting of the physical-mathematical faculty resolved to petition for appointing Romanovsky for that position from 1 August 1911 (SAR, Ibidem, p. 15a).

The ninth issue of the *Varshavskie Universitetskie Izvestia* for 1912 reported that 26 May 1911 the Council of the University at its sitting adopted the suggestion of the administrator of the Warsaw educational region […] *about the appointment on 1 August 1911 of Romanovsky, the teacher of mathematics and physics of the Tashkent non-classical gymnasium, who had passed the examination for the degree of master of pure mathematics at the Petersburg University, to the new post of acting docent* […] [223, IX, p. 60].

2.3. The Physical-Mathematical Faculty and Its Instructors. The defence of the dissertation. That faculty was separated into two departments (mathematical and natural scientific) and had eleven chairs: pure mathematics, mechanics, astronomy and geodesy, physics, chemistry, mineralogy, physical geography, botany, zoology, technical chemistry and agronomical chemistry. It had 520 students.

The dean of the faculty was an eminent zoologist-embryologist Pavel Ilich Mitrofanov (1857 – 1920) who had been teaching in the University since 1896. Apart from the abovementioned instructors of exact sciences there had been the outstanding virologist D. I. Ivanovsky (1864 – 1920) and botanist V. F. Khmelevsky (1860 – 1920). The Tashkent born V. N. Milovanov was the junior astronomer-observer.

Morduhai-Boltovskoi was in the leading role in the chair of pure mathematics and the collaboration with that gifted scientist and teacher doubtless largely influenced Romanovsky. The scientific interests of the former had been mostly determined by the directions traditional for the Petersburg mathematical school: by integration in a closed form. He devoted his master dissertation and a number of contributions to that theme (*Integration in a closed form of linear differential equations; Integration of transcendental functions*).

In Warsaw, he became very interested in the theory of transcendental numbers and geometry. Later a prominent place in his scientific investigations had been occupied by constructive issues and problems of the deductive geometry [304]. Already then Morduhai-Boltovskoi who was widely knowledgeable in humanities and perfectly mastered many languages including Greek and Latin began to engage in the history of mathematics. It became his strongest passion. His students recalled that he had often stated that the work in the history of mathematics occupied nine tenths of the efforts spent on scientific work [304, p. 157].

He was especially interested in the issues connected with the history of the main mathematical notions. Therefore he studied the Euclidean *Elements* and its fate in the Middle Ages and Modern Times. His investigations became the basis of the commentaries on [his] Russian translation of the *Elements* (1948 – 1950).

Along with other contributions (which included the first Russian translation of Newton's mathematical works) this great work placed Morduhai-Boltovskoi among our most prominent historians of mathematics. At the time when Romanovsky came to Warsaw, Morduhai-Boltovskoi already had a large pedagogic experience. He published a *Systematic collection of elementary exercises in differential and integral calculus* (lithographic edition, 1904; Petrograd, 1914 – 1915, two volumes), a course of lectures in definite and multiple integrals, analytic geometry, etc.

He was in earnest abut teaching and attentively considered methodology. In 1911 he opened a mathematical room with various models, tables, mathematical instruments, accessories for mechanical drawing. Models were demonstrated during lectures and student reports in seminars. He was the representative of the University at the First All-Russian Congress of Teachers of Mathematics (Petersburg, winter of 1911 – 1912). [Concerning his interest in mathematical notions (see above) see Samorukov & Stepanova (1993).]

Romanovsky also invariably considered teaching as the most important occupation in his life and the work in Warsaw fostered the development of his teaching gift. And just as previously under Voronoy

The programmes of the physical-mathematical faculty mostly coincided with those of the Petersburg University. However, they were conducted by a very small number of instructors who had to bear a heavy teaching load [312, p. 299].

Sometimes lectures read in different courses had been therefore combined. They were published lithographically.

A Society of natural scientists had been attached to the University. It published *Protokoly Zasedaniy* (Records of Sittings) and its statutes (one of whose authors was Sonin) were approved in 1888. The Society had two departments, a biological, and a physical-chemical. Sonin had been the president of the latter and then the vice-president of the Society [261, pp. 31 – 32]. It was very active; its members, apart from professors and instructors, were students, the listeners of the Warsaw Women Courses et al [278, 1912, vol. 22, No. 3 – 4; vol. 23, No. 1 – 2].

The sittings of the Society were very lively. The participants attentively heard out the reports, discussed them and criticized one another. Morduhai-Boltovskoi rendered a great service to the Society. He regarded its activity with much interest ad often read reports there.

From 1911 a mathematical seminar directed by Morduhai-Boltovskoi was attached to the faculty. At that time Professor N. M. Nesterovich (1891 – 1956) was a student of the University and he wrote later [268, p. 12]:

Almost from the very beginning of his independent pedagogic work Morduhai-Boltovskoi felt that the officially envisaged forms of contact between professors and their students were inadequate. His courses had always been saturated with ideas; his lectures abounded with remarks and indications of interesting problems, threw new light on, or showed embryos of new ideas in old problems. All that naturally stirred up the interest of his listeners.

However, it was impossible to satisfy during lectures all the inquiries, and Morduhai-Boltovskoi began to look for new forms of contacts between professors and their listeners. The answer was found in the form of a mathematical seminar.

The *Kratkiy Otchet* (Short Report) […] of the Warsaw University for the 1912/13 academic year [223, 1913, No. 6, pp. 56 – 59] listed the goals of the seminar:

1. *To supplement the contents of the lectures by new chapters going beyond the programmes, to be achieved by lectures of the professors and reports made by students*.

2. *To interpret the themes of the candidate and other independent works*.

3. *To inform the listeners about the results of the works of students and professors.*

4. *To demonstrate models, instruments and tables of the mathematical room.*

At the seminar, the great erudition of Morduhai-Boltovskoi ensured exhausting bibliographic indications for the students. They became possible to orient themselves in the richest University library and were induced to read foreign literature. Its first three years of work (the lectures of the professors and the communications of the students) had been lithographically published. Among these communications were the reports of Nestorovich and M. F. Subbotin (1893 – 1966) who later became an eminent astronomer and corresponding member of the Soviet Academy of Sciences.

From the very beginning of his work in Warsaw the teaching load of Romanovsky had been very diverse. Thus, the *Obozrenie* for the 1911/12 academic year [270, p. 7] indicates that the acting docent Romanovsky will teach geometry*: read descriptive geometry for students of all years,* 1 *hour weekly, and conduct practical classes in analytic geometry for the first-year students* (2 *hours*). In addition (Ibidem, p. 8), he *will read* **1)** *the theory of probability for the fourth-year students,* 1 *hour weekly*; **2)** *calculus of variations, same*; **3)** *calculus of finite differences for the third- and fourth-year students,* 1 *hour weekly in the autumn term. He will also conduct practical classes in integral calculus for second-year students*, 1 *hour, and for third-year students*, 1 *hour in the autumn term.*

At the same time Romanovsky continued his investigations [3]. That work, as he stated there, was concluded on 16 December 1909. Almost at the same time there appeared another contribution [5] which was concluded on 4 February 1911. The faculty submitted these contributions to the Council of the University on 24 January and 13 October 1911 [223, 1912, No. 6, p. 18; 1913, No. 3, p. 35].

On 22 September 1911 Romanosky submitted his dissertation for a master degree in pure mathematics to the faculty. The abbreviated records of the Council for 1912 published in *Varshavskie Universitetskie Izvestia* mention:

On 15 April 1912, during a public sitting of the physical-mathematical faculty acting docent V. I. Romanovsky defended the dissertation […] *On the theory of integrating partial differential equations of the second and third order with two independent variables. After hearing out the remarks of the official opponents, Prof. Morduhai-Boltovskoi, instructor Braitsev and acting docent Velmin and the explanations offered by Romanovsky, the faculty resolved: to consider the defence of the dissertation satisfactory and Romanovsky, worthy of the degree of master of science in pure mathematics.*

The faculty has the honour of submitting this decision to the Council for its approval [223, 1913, No. 8, p. 42].

At its sitting of 26 April 1912 the Council approved this decision (Ibidem).

Romanovsky's dissertation was the result of his first scientific investigation which he began when being guided by Ptashitsky and which concerned the general theory of partial differential equations. Rather unusually, he continued to be interested in their theory almost to the end of his scientific activity in spite of his main scientific work which had been directed elsewhere.

The dissertation concerned the equations of the third order which generalize the Monge – Ampère equation

$$M + Hr + Ks + Lt + N(rt - s^2) = 0$$

where *M, H, K*, … are functions of *x, y, z, p, q* and

$$r = \frac{\partial^2 z}{\partial x^2},\ s = \frac{\partial^2 z}{\partial x \partial y},\ t = \frac{\partial^2 z}{\partial y^2}.$$

Integration of this equation leads to the system

$$Hdy + Ndq - (K \pm \sqrt{G})dx = 0$$
$$Hdp + (K \mp \sqrt{G})dq + Mdx = 0$$
$$dz - pdx - qdy = 0$$

Applying a similar method, Romanovsky determines the type of the equations of the third order whose integration leads to a system analogous to the written above. At first, however, he similarly investigated the equation of the second order.

The basis of the investigation was formed by two memoirs of Ampère in which he considered in general the integration of equations in partial derivatives. Ampère's deduction of the characteristic equations as well as the extension of his method on a more general type of equations of the second order requires a certain restriction on the general integral. Romanovsky stated that his perfection of the method of Ampère consisted in that the form of the integral is not restricted.

In his testimonial Morduhai-Boltovskoi (1912) admitted as a positive result that neither the foreign, nor the national literature contain such a thorough investigation of the theory of equations of the third order in partial derivatives.

The author was brave indeed since he considered a subject which had until now frightened mathematicians by the complicated calculations with which they would have to deal when attempting to move somehow ahead. Surmounting in many cases such difficulties, sometimes owing to his uncommon diligence, in other instances, by skilfully and wittingly chosen notation, the author obtained many valuable results. In their totality they constitute a system harmoniously corresponding to the theory of the Monge – Ampère equation taken in the state in which it exists in the known work of Imshenetsky.

Romanovsky continued to study this problem during the later years. Anyway, he published a paper [5] in which he developed a number of propositions from his master dissertation. In 1914 – 1915 he published three more papers which seem to be all there is. At the same time however Romanovsky begins to study the number theory. In general, all his initial attempts and reconnaissance reveal him as an ardent follower of the Chebyshev school, the subjects are the same.

In 1912 he published a short memoir [4] in which two goals were formulated: to show to what extent is the Jakob Bernoulli theorem applicable to reality and to develop some expressions concerning the law of large numbers. This memoir was the introduction into a new sphere, into the region of the theory of probability. In his Warsaw period Romanovsky thus paid attention to both his teachers, Korkin and Markov. We know that Markov won.

Romanovsky indicated what he understands as the law of large numbers.

If the probability of some event is p and remains constant during the trials which are repeated a sufficiently large number n of times, the event will occur approximately pn times. This approximation we will call the law of large numbers and thus move away from the usual notions […][2.5].

In his next investigations Romanovsky developed his [previous] ideas and did not abandon his work on the theory of differential equations either. Thus, in 1912 – 1914 he developed Ampère's ideas about the integration of some types of these equations with partial derivatives of the second order [5; 10], then studied the transformations of linear equations with partial derivations of the third order and bilinear equations with partial derivatives of the second order [11; 12]. In 1915 he considered the integration of involutory systems, i. e. of such systems of differential equations with partial derivatives of the first order [14][2.6].

Romanovsky intended to submit his investigations of the integration of involutionary systems as a doctor dissertation. To these investigations he added his work published somewhat earlier about two theorems concerning determinants. The first of them was a generalization of the Scholz theorem[2.7].

The second theorem: given, a matrix consisting of λ lines and $(n + 1)$ columns

$$
\begin{array}{cccc}
a_{10} & a_{11} & a_{12} & a_{1n} \\
a_{20} & a_{21} & a_{22} & a_{2n} \\
\text{-----} & \text{-----} & \text{-----} & \text{-----} \\
a_{n0} & a_{n1} & a_{n2} & a_{nn}
\end{array}
$$

Let D_i be a determinant derived from that matrix by omitting column i (?) and D_{kl}^2 – the determinant derived by omitting line g and columns k and l (?). Let also i, k, l be numbers from 0, 1, …, n satisfying the conditions $i < k < l$ and $D_i \neq 0$. Then identically

$$D_i D_{kl}^2 - D_k D_{li}^2 + D_l D_{nl}^2 = 0, \; g = 1, 2, \ldots, n.$$

Romanovsky applied this formula for simplifying the conditions of the involution of systems.

In July 1912 he was appointed extraordinary professor of the chair of pure mathematics [223, 1913, No. 6, p. 6]. The *Obozrenie* for 1912/13 [271] indicated that he *conducted practical classes in analytic geometry for first-year students* (1 *hour*) and reads **1)** Integration of differential equations for third-year students, 3 hours weekly. **2)** Calculus of probability for fourth-year students, 1 hour weekly. **3)** calculus of variations for fourth-year students, 1 hour weekly.

He also conducts classes in integral calculus for second-year students (1 hour) and for third-year students (1 hour in the autumn term) [270, p. 7].

In the 1913/14 academic year the calculus of finite differences was added together for students of the third and fourth year, 1 hour weekly [271, p. 1].

At the same time Romanovsky carried out investigations in various directions. Thus, he [6] issued from the presumption proved by Jakob Steiner (1796 – 1863) that all the geometric constructions by compasses and ruler can be also accomplished by ruler and a given constant circle with a known centre.

Romanovsky proved a theorem which he considered in some sense as an inverse proposition: any geometric construction which can be achieved by a ruler ad compasses can also be done by compasses and a straightedge arbitrarily situated in another plane and all the straight lines except this one can be defined by two points belonging to them; possibly no other points are given.

Note that any construction by compasses and ruler can be reduced to some combinations of constructions of the expressions $a \pm b$, ab^8/c, $a^2 \pm b^2$, ab where a and b are given segments[2.8]. The author explains the method of constructing these expressions by compasses and a straightedge. He issues from the solution of a number of elementary problems in construction.

The editorial office remarked that the author was unaware of a more forceful result published by L. Mascheroni (1750 – 1800): any construction possible by compasses and ruler can be also achieved by the compasses alone if the problem is thus stated[2.9]. The remark continued:

But since the author independently and wholly originally managed to repeat almost all of Mascheroni's constructions, we publish his investigation which will certainly interest many readers [6, p. 311][2.10].

We note that an analysis of Mascheroni's constructions became the theme of a report of Napoleon at a sitting of the Institut de France (whose member he was).

In 1912 Romanovsky became an effective member of the Society of natural scientists [278, 1913, No. 1, p. 5] and on 27 April 1913 he read a report at the sitting of its department of physics and chemistry [10] and Morduhai-Boltovskoi [278, vol. 24, p. 20] offered some remarks. At that time he published papers on number theory and the theory of equations with partial derivations in three other sources. In 1912 he began to work actively in the mathematical seminar. His lecture (cf. [8]) *On the Steckel formula for the number of the Goldbach numbers* provoked much interest. Indeed, the yearly report of the University [223, 1913, No. 6, p. 59) indicated that

It intended to familiarise students with a chapter of pure mathematics which was not yet mentioned at the mathematical seminar. Students can foster progress in that chapter even by simple calculations especially now, when calculations are essentially simplified by a comptometer and tables.

In 1914 Romanovsky was elected member of the library commission of the University. It should have monitored, for two years, the replenishment of the library and the expenses. That commission consisted of four members, one from each faculty, and four candidates. The candidate from the physical and mathematical faculty was D. N. Goriachev.

On 29 April 1912 Romanovsky married Elena Evgenievna (Evmenievna) Kozhemiakina. She was born on 25 May 1890 in Tsarskoe Selo. Her father served there for a long time as a cavalry sergeant-major in a cuirassier regiment. There, she graduated from a parish school, then from the Vladimir school in Petersburg and therefore became a *people's teacher*. Her musical education was fine and she began teaching music in the Petersburg commercial school. Soon, however, she moved to the rural area being (in her own words) carried away by *youth romanticism*. She thought that there she will be more useful [245]. For three years in a village of Novgorod province, in a seminar for teachers, she had been teaching music and playing the violin to future people's teachers and was in charge of a chorus.

The passion for the people's art of singing which originated in those years determined her activities. She began to consider the songs of the people as a subject worthy of special study. In 1912 before moving to Warsaw, E. E. had been teaching music in a girl's gymnasium in Cherepovets.

In Warsaw she became acquainted with the music life of the Polish capital and studied the work of Mozart, Beethoven, Haydn and

Tchaikovsky. Her biographer, Kovbas [245, pp. 8 – 9] indicated with a reference to Romanovsky that she had then memorized almost all the Beethoven piano sonata and played very much, *played good and fascinatingly*. Romanovsky thought that

Technically her music had not been especially distinguishable but the depth of her emotion was amazing.

The life of the young couple was difficult since the salary of university instructors was not large. For example, in 1913 the board of administration of the University was compelled, after *taking into account the poor salary of the docents*, to grant them an allowance [223, 1913, No. 9, p. 54]. Thus, 600 roubles were given, in the physical-mathematical faculty to each of the following docents: Grigorovich-Berezovsky, Romanovsky and Velmin.

In 1913, after the birth of a daughter, financial difficulties compelled Romanovsky to send the family to Tashkent. This step allowed to make both ends meet but disturbed the usual routine of life. He went to Tashkent during his vacation and on some festive occasions but the financial situation remained undetermined and depressed him. He had to correspond with the administration about his salary, travelling allowance (?) etc. Thus, an extant archival document of 3 March 1914, 3 pp. long (SAR f. 524, inv 3, c. 829, pp. 45, 45 rev, 49), is his request about some official privileges which he lost because of the move from Tashkent:

Financial neediness and the impossibility of filling a suitable position in Petersburg compelled me to agree to become a teacher in Tashkent.

There, bylaws on the official privileges for those working in remote regions of the state were valid and Romanovsky asked for their renewal since he

Passed to activities for which [he] *was prepared and could be more useful for the state than as a school teacher*.

His request was granted. Meanwhile, history sped up and the fates of individuals had been speedily losing their relative significance. The killing of the heir apparent to the throne of Austria-Hungary in Sarajevo became a catalyst of war in Europe. War between Austria-Hungary and Serbia led to the mobilization of the Russian army. On 1 August 1914 the German ambassador to Russia categorically demanded a cancellation of that measure which was denied. Germany answered by mobilizing its army after which mobilization was announced in France. That was the beginning of WWI.

Military operations soon crossed the borders of the Russian empire which at once told on the life of the Warsaw University, both on the studies and on the fate of its instructors. *Kratkiy Otchet o Sostoyanii i Deyatelnosti Varshavskogo Universiteta* (The Short Account of the State and Activity of the Warsaw University) in 1914 says (SAR f. 524, inv 3, c. 829, pp. 45, 45 rev, 49):

In the past year 1914 the work of the mathematical seminar which is closely linked with the mathematical room could not have been going on as widely as in the previous years. Because of the military events the autumn term had been only resumed on 1 December. […] *The mathematical seminar was able to function only during the spring* *term which was more favourable for scientific work. The themes of the studies were purely scientific and intended to bring the students to independent investigations or of a methodical nature with a sharp stress on their connection with purely scientific work.*

Still more convincing are the records of that period in Romanovsky's personal diary[2.11]. They contain testimonies of the difficulties experienced then by the University and most valuable material for characterising its author as a scientist and a human being.

The diary begins with a description of the first bombardment of Warsaw by German planes on the night of 13/14 February 1915. Two bombs were dropped. The record of 15 February expressively describes his impression of the […] street which he saw after his lectures:

Many pedestrians and people in carriages and cars. Between the […] *and* […] *streets there are hardly any undamaged windows. Holes from splinters and bullets left from the bombs. In many places they pierced the iron curtains of shops. No windows remained in Braitsev's flat but no one was hurt* (*two students are living there*)*. The signboards are pierced or knocked down, their paint is gone.*

The second bomb was dropped in the […] *square. I have not seen the results. It is written that four more bombs were dropped on the bridges but they all fell in the Wisla.*

Next day he wrote:

The day before yesterday was serene and calm. German planes. They were fired at by shrapnel and very soon they flew away. Three bombs were dropped. One worker was killed and another worker with wife wounded and died. Six children became orphans, the eldest is fourteen.

The following entries show how quickly the tension had intensified. Rumours about setbacks on the battlefield and outbreaks of epidemics had been spreading.

26 February 1915. *Frosty and serene days. Each day our planes fly over Warsaw, but not German. All the time patrols are walking the streets and demanding documents from soldiers to explain their appearance here. A week ago, at 9 o'clock in the evening, Warsaw was dark, all the lights were turned off. The inhabitants were afraid of the zeppelins but it occurred that all through the night troops and their supply trains had been passing through Warsaw. All of them apparently to East Prussia.*

Yesterday the female listeners of the courses jabbered that two soldiers had died from plague. No more talk about typhoid or cholera cases. Yesterday at night cannonade was again heard from afar.

11 March 1915. *Yesterday a German plane flew over Warsaw and dropped a few bombs, happily no results. We heard how it was fired at, but the three warning shots*[2.12] *were not heard even in my room on the sixth floor. They were certainly even less heard on the street. Peremyshl is left, the situation in East Prussia is not very well, we ought to wait for the zeppelines.*

15 March 1915. *The day before yesterday again a few bombs from the sky with no results.*

17 March 1915. *Yesterday four or five bombs dropped on* […]. *The results are unknown. Cannonade was heard at night from afar.*

5 April 1915. *About four days on end the lights are out from ten o'clock over all Warsaw. Probably waiting for the Germans. On Thursday, when returning home at 9 o'clock in the evening I stopped on the* […] *avenue to have a look on the Wisla together with other people. It turned out that the flares were sent up from somewhere afar, probably from* […]. *A strange impression: a dark and wide street, a small group of people waiting intensively and a bright star of the mysterious flare on the remote dark sky, slowly falling and dying out.*

There is poetry in war which makes death not only not terrible but sweet. Shocks are accompanying it but just endure them and they feel like a rebirth. Life in all its depth cannot be felt before wars and this feeling has incomparable strength and attraction[2.13].

9 April 1915. *Yesterday three bombs. It is said that one of them fell on the* […] *Square, another hit an office, pierced the roof and a bookcase with documents, burst and started a fire which was easily extinguished. No accidents with people had occurred.*

13 April 1915. *Today there is an endless mass of young soldiers, apparently of recruits, in* […]. *In black dress uniforms covered by ammunition. Extreme youths, some of them are just boys. Yes, all are 21 years old, but some of them are undeveloped, have not acquired manliness. There is still much childishness in them. And they are going to the war. Sorrow is felt and a sensation of weeping.*

Yesterday in […] *the Germans had dropped bombs. The headquarters of the commander of local troops is there.*

The situation became ever more complicated and the University was evidently unable to remain in Warsaw.

Chapter 3. Rostov-Don

3.1. The evacuation of the Warsaw University. In the summer of 1915 the University was evacuated to Moscow. However, its belongings (the richest library, the outfit of laboratories and clinics, personal libraries of the professors) which would have required not less than 300 carriages [280, p. 38] were almost entirely left behind.

At first, the fate of the University remained unclear. In Moscow, it only became possible to resume teaching at the historical-philological and the law faculties and at the mathematical department of the physical-mathematical faculty. It was evident that the University had to be moved, but where to? Invitations came from Saratov, Kazan, Perm, Ekaterinoslav (Dnipro), Ekaterinodar (Krasnodar) and Rostov-Don. The last-mentioned invitation was the most persistent. A positive solution of this problem was very important for the people's education and cultural life in general of that large city in which until then there had been no institutions of higher education. On 11 August 1915 the local paper *Priazovsky Krai* described the situation [282, p. 279]:

Rostov is living some kind of abnormal life. Everything here had been striving for economic success. The city gets satiated with commercial enterprises and capitals. A merchant city which grew rich by leaps and bounds. A wide commercial scope with a brilliant and tempting prospect. Economically, many people call Rostov the second

Moscow for the Priazovsky-Kavkazsky territory. However, the second Moscow lacks that which has the first one: it lacks a seat of culture, lacks a breeding-ground for higher knowledge. Not everything is favourable for education. It follows that Rostov has an unusually poor cultural and social life.

It is necessary to remark that this situation earnestly troubled the city intellectuals. In 1912 Rostov petitioned the government for the establishment, in the city, of a People's University[3.1] and offered a plot of land for erecting its building and 2 *mln* roubles from the city means [281, p. 4].

Concerning the aims of such enterprises the *Otchet o Deyatelnosti Rostovskogo-na-Donu Narodnogo Universiteta* (Report about the Activities of the Rostov-Don People's University) for 1913/1914 stated [273, p. 1]:

The idea of a people's university had since long ago been occupying the minds of the Rostov society. Public lectures which have been organized from time to time were always read to packed audiences. Each time this testified to the birth of a burning desire for scientific knowledge among wide strata of the population […].

Scientific education is the privilege of the well-to-do classes. Nevertheless, we cannot indifferently condone the idea about the complete inaccessibility of science for the people's lowest strata. If these strata cannot be given access to the courses of higher science according to the programmes of universities, then we should find measures and methods for at least partly bringing them closer to science.

In 1913 and 1914 professors B. I. Syromiatnikov, N .N. Poliansky and M. N. Sobolev invited from Moscow, Petrograd and Kharkov and local teachers read a series of lectures in the People's University on history, history of culture, economics, law, natural science which enjoyed popularity. However, with the beginning of WWI the activity of that university sharply lowered.

The advocates of people's education have therefore enthusiastically perceived the idea of such a large Warsaw University settling down in Rostov at least for some time. Especially active was the chief physician of the Rostov city hospital N. V. Pariysky (1858 – 1923) who raised this issue before the city council. Once his proposal was approved he continued his efforts in Petrograd and Moscow. Voices of the opponents of such, as they thought luxury inadmissible for the city as a university became also heard. The advocates of the university labelled them in the press as *obscurantists, black ravens and spiteful diehards* [282, p. 281].

On 7 August 1915 representatives of the administration of the Warsaw University came to Rostov for acquainting themselves with the situation. They were totally prejudiced against the move to that city. A local newspaper (Ibidem, p. 282) reported that along the way they

Had to hear a lot of fearful stories about our city as a city of merchants of the lowest kind in which even the entire intellectual stratum became servants of the rouble. […] *In a word, during the travel from Moscow to Rostov our city was characterized in such a* *way that the newcomers who never saw it arrived here with a feeling of burning fear. Even when they were friendly met in the front rooms of the administration of the railway, when they arrived in cars to the best hotel and began to inspect the best city premises earmarked for the university, they had still feared the smudgy Rostov. Only little by little, as they contacted various strata of the population, the ice of mistrust and preconception wholly thawed out.*

Sincere joy and loud greetings sent to the professorial group and the excellent buildings of the hospital, the commercial school, club etc. fascinated the guests.

In any case, the delegation was convinced in that the conditions offered by the municipal representative council were quite acceptable. They guaranteed the accommodation of the university institutions, professors and students.

On 12 August in Moscow, the University Council met for an urgent sitting. After a discussion the following decision was reached (Ibidem, p. 278):

The Council unanimously with one abstention considered it desirable to move temporarily the Imp. Warsaw University to Rostov-Don on the conditions stipulated by the decision of the Rostov-Don municipal representative council of 10 August and resolved to petition accordingly the minister of people's education.

Faculty sittings followed and it was decided to begin the teaching as soon as possible depending on the suitability of the buildings earmarked for the University and desirably by 1 November.

At the same time the Higher Women Courses which were attached to the University also moved to Rostov-Don. In essence they were the women department of the University.

Money from Rostov was spent for buying books for the University library which should have been stocked anew. Later it had also been replenished by donations from other universities, scientific institutions, libraries and individuals.

3.2. Work in the Don (Rostov) University. Defence of a doctor dissertation. After a gap occasioned by the move the records in Romanovsky's diary resumed on 4 October. His first impressions were dismal:

As compared with the usual state of affairs, the home front is mostly living by still clearer and nakedly expressed instincts of moneygrubbing and struggle for narrow personal prosperity. When all this is at once recalled in the mind and when I see the soldiers marching to their deaths I want to weep or rather to howl.

It is seen in that diary that before the studies had begun and the University had only been adjusting itself to the new conditions, the instructors attempted to assist the local Military Industrial Committee.

The entire faculty decided to offer its power to the Committee but only some of us will work and apparently not in the near future: chemists, zoologists, botanists and mineralogists[3.2].

He retells *outrageously curious cases about the central Military Industrial Committee* which displays bureaucracy, *squanders money everywhere and raises the appetite of various businessmen.*

But when to begin the teaching? For a long time this problem remained unclear. On 10 October after the sitting of the Council of the Higher Women Courses Romanovsky wrote down:

The main point is that we still do not know where and when will we begin the teaching. There are many listeners of the Courses, especially on the medical faculty, but it is not known whether it will open this year. There is a plan to open a commercial department as well, and we dream that here, in the commercial Rostov, it must blossom.

The same indefiniteness is felt in his record of 21 October:

Will we ever begin teaching? The wounded were again accommodated in the commercial building and a place in the Commercial school is promised to the Kiev Polytechnic school. Nevertheless, the University Commission hopes to arrange somehow the matter. Once more, however, I think that the teaching will not begin.

The feeling of being unsettled and the indefiniteness about the prospects of the faculty created an uneasy situation. Romanovsky provides a clear psychological characteristic of his colleagues which had to choose a new dean. *Many reckonings and politics, agitation and partiality*, as he wrote, were connected with that event. Romanovsky had most expressly outlined the figure of V. V. Kurilov who had a claim to become the dean:

Kurilov is cunning, mercenary and does not enjoy confidence, but he is very active and energetic, cleverer than each of us.

Romanovsky is therefore *strongly inclined* to support Kurilov, but ought to lend an ear to his colleagues who are decisively against that claimant. He agrees that Kurilov's activity in the Military Industrial Committee (he allegedly *got going a plant for processing oil into something else and another plant for producing explosives and other substances*) was not completely irreproachable:

He is charged with analysing [some substances], *which is done by his assistances but calls them his own and gets paid accordingly.*

And Romanovsky adds: *Kurilov was always notable for moneygrubbing.*

The voting of the Council on 24 October resulted in the choice of Shchelkantsev. *He is not as active or energetic as Kurilov, but honest in all respects.* And Romanovsky added:

Although I voted against him, I feel sorry for Kurilov. His broad and energetic nature strongly wished to become the dean.

However, on 29 October he encountered Kurilov by chance and heard out his complaint about the faculty's ingratitude and assurance that he

Had not at all aspired to become the dean and *thought of refusing that position once he were electe*d.

And Romanovsky wrote in his diary:

All that talk […] *left an impression that he is unusually cunning and crafty. His activity seems enormous, but isn't it all just publicity*?

He characterized professor Chernov as an unsociable and *wild* man. On the other hand, Romanovsky seems to have been in very kind relations with Morduhai-Boltovskoi and Velmin. They visited each other and talked friendly which was invariably recorded in Romanovsky's diary. Thus, on 6 October he wrote:

I visited the Boltovskoi family in the hotel […]. *His boys are marvellous, especially the two youngest. The father clearly loves and often kisses them, especially the middle child* (?).

Many notes about the meetings and walks with Velmin. Romanovsky's relations with Braitsev had become somewhat complicated because of the latter's work in which he found serious defects. The ensued explanations deeply distressed him. He wrote in his diary:

My relations with people are stupid and childish. I speak not out of spite or to spite, but others feel my words otherwise and I can become almost an enemy of Braitsev against whom I have nothing at all. I wrote him about my doubts and about my readiness to acknowledge my mistakes if he proves them. All the confusion occurs because scientific matters ought to be only solved from the viewpoint of truth but various personal and everyday relations get involved.

During faculty sittings, sometimes *scandalous*, the invariably calm and restrained Romanovsky attempted to reconcile the debaters in any possible way. But the tension oppressed him and gave rise to dismal ideas.

These two years, or more definitely two winters will shorten my life. Melancholy from which I can only be rescued by work or wandering.

He missed his family, impatiently awaited letters from wife and complained about circumstances which obliged them to live apart. Record of 21 October:

Today I received a letter from Lenochka. It is difficult for her to be alone. I myself feel here wretchedly. I would have abandoned everything, but what can I do if more than five hundred should be saved before the New Year and I should think about each kopeck?

I trusted various promises and reassured Lenochka whereas actually I should be satisfied that the salary is still paid. How satisfied I would have been had I even 50 roubles monthly to spend in whichever way. Books could have been bought and presents made for Lena and Leliushka. Yesterday I sent Lena music which costed 13 roubles and ordered books for about six roubles and now I have to keep a watchful eye on my daily expenses so as to reach successfully the next 20th.

Attempts to better the position by selling the house in Tashkent were apparently unsuccessful, and he had no money for returning the family to Rostov. After a month he wrote:

As long as I am busy with something, it is easy and good. But when I finish and before I undertake something new – weight of cares and anguish. I recall Lenochka – and our separation and loneliness weigh even more. Only a thought about Leliushka brings forth regret that I do not see her and an involuntary smile and some rays of joy. This tiny creature is still entirely joy and light without any shadows. Oh, to see both of them sooner!

Intense work saved him from melancholy, disorder and forced inaction. During that time Romanovsky completely busied himself with mathematical statistics. Each day he scrupulously recorded in his diary how much time had he spent on this work. His records show that he left not less than half an hour daily for the study of the Persian language.

On 14 October, after seven hours of work, he wrote:

Math. statistics takes all my time. Only in the evenings I read a little something alien and newspapers. It is necessary to occupy myself with other works of a purely mathematical kind but I have no time. Today an idea occurred to me that the teaching of mathematical statistics which I wish to begin will only be fruitful rather than remain suspended in the air when it is connected with definite and urgent scientific and practical needs. But how to achieve this?

Two days previously he wrote:

I thought today that it would be good to be able to go to Petrograd on a business trip for studying the works of Pearson but it is fearful to ask! How to live there since the inhabitants there have nothing to eat[3.3]*? It is better to postpone this measure and to do without Pearson for the time being*.

On 3 November he was already able to summarize:

I wrote four chapters of mathematical statistics and left it for some time. It is necessary to compile lectures for the first-year students.

Meanwhile the period of forced inaction in the University and the Higher Women Courses had been ending. On 7 November he recorded:

In the morning I was at the sitting. The mathematical department was compiling a temporary timetable of lectures. We will read them in the evening in the building of the Commercial School. I will gladly begin, the lectures are the beginning of normal life. They will begin on 11 November.

However, that beginning did not start at once. Here are his notes.

11 November. *The class in the Commercial School is small, badly illuminated by a single lamp near the ceiling. It is dark like in a vault The blackboard is small and ruled. A horribly bad room. Students and girl-students crowd around me. They thirst after infinitely various information. All of us are as though in a forest. We, professors, know not more than they.*

12 November. *Two hours – introduction into analysis. I began to prepare my lectures for lithographing them. I came today to the Commercial School at four o'clock but not a single girl-student, listeners of the second year, had arrived. Only one is here but she is afraid to go alone. And how can I read in a large empty hall. Will the Courses continue? Hardly. The rector is against reading lectures to students and these girl-students together but there is no time for separate lectures since they are only read in the evening. The Courses should certainly wait until premises will be found, which means not before 1 December. But then, what for the Courses will pay us? Wherefrom will I get money for various payments before the New Year? How will I manage to go to Tashkent for Christmas? And will it be possible to go if there is no time? How to find* [to compensate] *the four weeks if the lectures will only begin on 1 December? Depression!*

I came out, slowly went along the streets and considered the situation which was about to happen. I found only one possibility to *come out of my depressed condition: I went home and began to write down my lectures. This calmed me.*

13 November. *Two hours – introduction to analysis, two hours lectures and 2½ hours of attending a sitting of the Council. Today I have read for the first time to the listeners of the Courses. The Council resolved to ask the administrator of the educational region by wire to allow temporarily the reading of lectures to students and girl-students together. Perhaps everything will still be managed.*

Indeed, everything was managed and the usual life of an educational institution had begun. On 16 November Romanovsky remarked:

I thought that 4 hours of lectures will be tiresome, but I read them easily, without any fatigue. Lectures, examinations, sittings of the Council and, in the evening, I prepare myself for the teaching, work on the manuscript of the <u>Introduction to Analysis</u> *and the compulsory half an hour for the Persian language. Time is always lacking*.

In spite of the expected, it turned out by the end of November that the first quarter of the payment for the Courses will be given. This gladdened him much:

So there will be money and I can go to Tashkent for Christmas. I often, almost all the time think whether it will be possible to send Lena and Leliushka to Rostov, but am afraid of the expenses. If the Courses continue quite favourably it will be better to repay the loans and endure another winter apart. My trip will cost less than their move.

Next day was his birthday and Romanovsky wrote:

I am pleased with one circumstance: I thought all the time that I am older than 36, but today, after calculation, I saw that I am still 36. I can still reckon to live with Lenochka and see Leliushechka as a big girl. It is not late for scientific activity either and this is pleasant as well.

A few more days were filled by teaching and sittings and then the time came to prepare for the trip. A joyful record:

8 December. *2 hours lectures and nothing else. Yesterday and today I buy presents since I go to Tashkent on Friday. I thought for a long time how to go and decided to travel through Baku. I will gain 1½ or 2 days although it will cost about 10 roubles more. I wish to arrive sooner. I am frightfully tired and already lost my mental equilibrium which is most annoying. I will be at home for two and a half weeks and rest. And finally see Lenochka and Leliushechka. I am only dispirited since I will miss a whole month for typing my dissertation, but nothing can be done. You cannot keep up with everything. And I would have not wished it at all had it not been important for my own. To see them, hear them, to be gladdened by the joy of Leliushka when she receives my presents – all this is much more needful and better than to type my work a month earlier or later.*

And finally the last note before the festive occasion.

10 December. *1 hour – preparing for the lectures, 5 hours lectures. Already tomorrow I will go! And perhaps arrive home in the evening of Wednesday. If only the sea does not delay me. Let it roll and pitch the boat, but does not delay, then I will be at home on Wednesday.*

The holiday month passed quickly and 11 January 1916 work began again. The records in the diary become short. The *Introduction to Analysis*, mathematical statistics and the dissertation occupy the main place in the daily routine together with lectures and preparation for teaching. Meanwhile the University had been gradually growing roots in the new place. The efforts of the professors and instructors resulted in the establishment in Rostov of a number of educational institutions including the Higher Woman Courses with three faculties and a commercial department, the Archeologic Institute and the Woman Medical Institute. The People's University resumed work.

In 1917 the Warsaw University was renamed and became the Don University which meant that it will remain in Rostov forever. The teaching by the chair of pure mathematics continued and its scope remained as it was previously. Instructors had to bear a large teaching load. Apart from professors Morduhai-Boltovskoi, Romanovsky, Goriachev, docent Velmin and assistant S. A. Khvialkovsky, a graduate of the University, Subbotin, was drawn in. In 1917 he passed his master examinations and filled the position of privat-docent.

In 1918 another graduate, N. M. Nestorovich, was invited for preparation to professorship. Later, he taught in secondary schools of Novograd-Volynskyi. Also in 1918 Braitsev moved to the newly established university in Nizhny Novgorod. Life in Rostov was not easy. Professor M. G. Khaplanov who then began to study recalls [307, pp. 150 – 151]:

The difficulty of getting things going in a new place, the worsening, year after year, situation of the Tsarist Russia in the battlefronts of WWI and in the country, the years of the civil war which is known to become especially sharp in the Don region, – all this led to an acute deterioration of the scientific and pedagogic work in the university.

However, in spite of the difficulties the members of the chair had not interrupted the intensive scientific work. The results had been published by the University (in 1916 they were printed in Kharkov). Romanovsky [14] developed the methods of integrating systems of [differential] equations in partial derivatives which had a common integral depending on an arbitrary function of one variable and on a finite number of arbitrary constants. It was the first work of such kind published in Russian and he defended it as a doctor dissertation.

In 1918 in Rostov-Don there also appeared a lithographic edition of his work [19]. Studying as previously differential equations in partial derivatives and number theory he gradually turned to problems connected with the theory of probability and mathematical statistics. Thus, his papers [15; 16].

Later, in 1935, when discussing the work of that chair, Morduhai-Boltovskoi wrote:

Romanovsky works on prime numbers but does not abandon differential equations in partial derivatives (which was the subject of his master dissertation). Undoubtedly, the Rostov mathematicians became interested in reports bearing on the second rather than the first subject. Much later, only in 1920, these reports led to Morduhai-Boltovskoi's note on the Morgan method and to the first large work of Prof. P. S. Papkov based on that note. He wrote it in 1924, just after *graduating from a university and published it in 1930 in the* <u>*Trudy*</u> *of the* <u>*Assotsiatsii Nauchno-Isssledovatelskikh Institutov*</u> (Association of Scientific Institutions).

At that time Romanovsky became interested in mathematical statistics in which he is now a most eminent specialist [280, p. 103].

His lectures became even more successful which was reflected in his diary notes although in his peculiar modest way.

26 January. *Today I read an introductory lecture in mathematical statistics for the fourth-year students. In the oratorical sense it was not very well, but apparently I was able to convince my not numerous and middle-aged* [solidny] *listeners in that the statistical methods of studying phenomena are important and of fundamental value. Indeed, harmonious applause followed, the first one in my practice.*

4 March. *Today, when I concluded my lecture on the introduction to analysis, my young female listeners suddenly burst into applause. I was extremely surprised: I read as usual and the subject was hardly very interesting: extraction of roots from complex numbers*[3.4]. *I stopped* (*I was about to leave*) *and asked:* <u>*What for*</u>*? Then I saw their embarrassed, vivid and pretty young faces and added:* <u>*I think that it is something like a prank*</u>. *They were apparently disappointed and I myself later understood that I should not have said so. But they, in their embarrassment, looked very much like playful schoolgirls.*

Although they are little foolish creatures, they are ever more winning my sympathy. The year is already ending, but they always are still filling the room, listen attentively and are interested, they obviously strive with all their strength to comprehend. They are punctual, arrive in time, sit calmly. But take the first-year [male] *students: not more than a variable ten out of a hundred attend lectures (all the lectures, not only mine). Some students attend one lecture, other students attend another one. Sometimes they come at the end of a lecture, hear it inattentively. It is felt that they have little knowledge and comprehension but are much self-confidently critical, are not diligent etc*.

In spite of successful work which, as it seemed, absorbed all his strength and attention, Romanovsky invariably felt himself in Rostov as a guest. This is expressively seen in his diary notes of 1915.

28 October. *There was not a single year which I spent outside Tashkent without a longing for Turkestan. From the time when I moved to the University I lost my peace. Each autumn I am prepared to leave the University for the sake of being in Turkestan. Today the thoughts about Tashkent and my life here had broken up with a special force. What do I achieve by my professorship? Financially I am less provided for than when I had been a teacher of a non-classical gymnasium in Tashkent. Only the other aspect is left, but it is not essential since it is weighed down by the great number of lectures. And now in addition I am threatened by secretarial work. If elected secretary, I will be totally deprived of time. I achieve trifles but lose much more: I have no peace, am almost always sick at heart. Each time I leave Tashkent and have to live elsewhere I feel wretched.*

Only the duty to serve education and to serve willy-nilly poorly compels me to sit here. To find a suitable position in Turkestan where

I will be able to apply my special knowledge, where I will have only one definite duty with somewhat less dealings with people! To be torn away from my own place and, besides, to be occupied in the Russian and especially in the Warsaw professorial manner, weighed down by lectures, worried about each kopeck, with no time or financial possibility for working properly. When lectures begin, there will be not less than 25 hours weekly. And after so many of them you will not work or even concentrate your attention when reading a newspaper.

If secretarial work is added, I will completely become a pack horse. And this is professorship! And after all that I must live apart from my family since I have unfortunately run into debt which cannot at all be matched with the professorial salary. That's the burden, that's the misfortune and what for? For the bombastic professorial title? It really torments me.

23 November. *I hour – introduction into analysis, 1 hour – insurance*[3.5]*, 4 hours – lectures. In the morning I went to doctor Landa for a general examination. He examined me for a long time and here is the result. All the internal organs are completely in order with the exception of the heart. The second valve does not entirely close the opening and there is therefore a murmur. But it is only in the very beginning of decomposition or something like that which I did not understand and I can still live very long. This last statement gladdened me. However, I should not overstrain myself or walk for a long time or climb up to high floors and then everything will be well.*

I cannot wander a mountainous locality. This grieves me to the innermost of my heart and I will never agree with that restriction: it is possible to wander at least a little and slowly. So bad to have a defect even if it is slight and not dangerous in the most essential organ. I had never any special trust in the human machine, and now I shall trust it still less.

And in addition: the need to restrict my walking on foot. I feel this restriction as an encroachment on my soul. How much poetry and beauty did I see and experience during my walking over Chirchik[3.6] *and in the mountains. It deeply grieves me, it is death alive.* […]

16 October. *51/2 hours of mathematical statistics and* 1/2 *hour Persian language. Today it rains almost the whole day. Noisy streams along the roadways. In many places little footbridges are thrown across them, apparently built for such occasions. It was pleasant to see: the streams are alive, noisy and recall mountain streams.*

25 April [1916] […] *Today I bought two books: the verses of* [K. A.] *Lipskerov Sand and Roses devoted to the Orient and Turkestan and F.* [E.] *Korsh, Persian Lyric* [Moscow, 1916]. *Both are wonderful and awakened in me as acutely as apparently never before the regret why I had not chosen Oriental studies as my way. I stood on it, but when I was a schoolboy natural science, physics and mathematics turned up and gained a victory over my linguistic inclinations which were directed just towards the East. I love the East and in particular Turkestan, miss and long for them whereas my work is remote from them.*

For me, literature of the Orient is fearfully attractive but I ought to reconcile myself sorrowfully with the inevitable. In spite of my *attempts to study the Sart*[3.7], *Persian and Arabic they will remain unattainable. At the same time everything in them is my own and nice and influences my soul.*

Books helped to stifle the troubled thoughts.

17 February [1917]. *2 hours lectures, 1 hour preparation. Today I received the journal* <u>*Vokrug Sveta*</u> (Around the World) *and five books of Mayne Reid. He excited me indeed. I recalled my childhood and the effect which he had then on me.*

20 February. *1 hour – Bruns*[3.8]. […] *1/2 hour Persian language. For the fourth day I am reading Mayne Reid. I read* <u>*The Quadroon*</u>[3.9] *and now I am reading* <u>*The Desert Home*</u>. *The previous charm is gone but he often moves me and I clearly perceive how he affects boys. I read and often gladly think how much will be Leluishka pleased when she grows up*[3.10]. *He is simple, noble, brisk, humane – wonderful for adolescence.*

3 March. *1 hour end of year examinations, 4 hours Council of the University. Sat in the evening with Jack London,* <u>*A Daughter of the Snows*</u>.

The deep inner concentration peculiar to Romanovsky always gave him strength and mental equilibrium. This is seen in his early student records and in some diary records of 1916.

13 March. *6 hours mathematical statistics. Today, at about 8 o'clock* [in the evening] *I went for a walk. The sky was cloudless, stars, warm spring air impregnated with freshness and caresses of the earth and nature. Curious feelings possessed me. Everything suddenly touched and excited me. Darkness and warmth of the spring night, the stars and the sky – under these conditions I would have walked for an infinitely long time, calm and joyful, devoted to things which are so remote from my usual life. And I recalled my daughter and Lenochka: to take them to walk with me. As though some ancient appeal had awakened in my soul. I felt there a bird of passage which should take wing and fly thousands of miles to entirely other countries.*

How far it is from mathematics, lectures and the University! And it is felt as a mysterious treasure weakly and unclearly twinkling in the darkness. What does it represent and how to seize it?

26 March. *3 hours lectures, 1 hour preparation. During the preparation an accordion began playing in the street. A waltz was heard, rhythmic, polyphonic and melancholic. And, as it sometimes happens with me when I hear a remote music, a yearning stirred up in my soul. It concerned as though not my present life, but perhaps my previous existences. A yearning which leads to tears, but musical and full of charm.*

Unclearly recalled some remote and fantastic times. And as though the irretrievable voices which are heard no more began to invite me somewhere. A surprising feeling: it always discloses some secret depths and cuts off all the real. I am therefore doubled: one is always living, simple and understandable, the other gets up only now and then as though from lethargy, dark, curious and still semiconscious.

All those who knew Romanovsky tell about his unusual love of animals. Some records of 1915 – 1916 help to understand his feelings and thoughts.

25 October 1915. *61/2 hours of mathematical statistics and 1/2 hour of Persian language. The day before yesterday our hosts had a feast for the entire Judicial Chamber. To avoid an invitation I went to the circus to see the lions and tigers. Splendid beasts! 6 lions and 4 tigers but a terrible sorrow is felt for them. Where are their deserts and jungles, where is their freedom and life in accordance with their instincts? Their beastly pride was only revealed in their imperturbable calmness with which they sat, each on his post, until the crack of the whip forced them, one after another, to perform their numbers: to jump through a hoop and over a barrier, to ride on a great ball, swing on a board, gather in groups etc.*

Sometimes they behaved slowly and solemnly just as such big, strong and pretty beasts are supposed to. One lion was angry, growled, did not want to obey but still obeyed. But one tiger was almost ready to perform hurriedly everything required by the tamer, an English woman. The poor beasts! Before the end the tigers were chased from the cage onto the circus ring and the tamer gave each lion a large chunk of raw meat and how greedily they seized them! Pain and hunger certainly broke them down, so how sorry and pitiful it was for them.

8 December […] *I was going from a cinema and suddenly paid attention to the cabmen's horses. Most of them were downcast and have a sorrowful and vague look. And I suddenly became surprised: people have absolutely no sympathy for them. No one thinks how they are living, what do they, with their large, wonderful and pretty eyes, feel in their souls. Furthermore, a great majority of people will think that the idea of penetrating into the soul and life of a horse is senseless and stupid. Actually, however, you do not pity a beast – you do not pity a human being either.*

And indeed, the smartly dressed and pretty public deigns to notice each other only since it satisfies its external, perceptual requirements by looking at each other. Not only does not it glance deeper into a passer-by, it is unable to glance deeper into themselves. And a great woe, sorrow and grief is taking place in spite of everyone apparently feeling himself pleasant and jovial.

What is the meaning of these signs of consciousness? I have glanced at the horse's eyes and something boundless and ancient, perhaps eternal, spread in my soul as some mournful appeal. But what for? It is clear that life, as you are leading it during the few earthly days is only a short episode of a long and complicated history which is spread in the depths God knows where in boundless times. It is grievous, that we are blind here, but this history is also a great consolation since from our earthly viewpoints all the life, both ours and of the animals, plants and stones is only a pitiful nonsense.

Even for those who had been close to Romanovsky, it will probably seem sudden that during that period of his life full of troubles and intensive creative work he wrote many verses mainly devoted to Central Asia. The following lines describe his feelings about the heart of Asia, Samarkand:

Registan[3.11]*. Enamel. Pediments in gold.*
The shouts of the slaves. Blood in furrows.

The saklyas[3.12] *of the poor and the mausoleums of the nobility,*
The style of the contrast is great and simple.

However, in those months the Warsaw and Rostov-Don period in Romanovsky's life had been approaching its end. As usual, he had been going to Tashkent during festive periods and in 1918 he was cut off from Rostov by the frontline of the civil war. A new page began in the scientist's biography, inseparable from the history of the Tashkent University.

Chapter 4. The Tashkent University. The Time of the Formation

4.1. The People's University. While working in Warsaw and Rostov-Don, Romanovsky had not only not broken off his connection with Tashkent, he continued to feel himself a *Turkestanian*. Just as many representatives of the local Russian intellectuals, he was worried about the level of culture and industrial development of that vast and rich region, and, first of all, about the people's education. He therefore actively supported the pre-war idea of establishing a higher educational institution in Turkestan.

This idea had not met any objections in principle among the government circles either since the need to prepare professionally certified officers for governing the region as well as hydraulic engineers, agronomists, technologists and other specialists became quite clear. However, many saw the problem much wider. They thought that higher education in general and especially in the marginal territories of the country ought to become the breeding ground and the leading light for preparing speakers in native tongues, bearers of knowledge and champions of law and culture among the local working masses [275, p. 24].

This problem became urgent in the summer of 1916 when the government was known to plan the creation of ten new medical faculties in various cities including Tashkent. While supporting that decision, public opinion considered it only as the first step on the way to establish in Turkestan a higher educational institution which would combine the features of a university and a polytechnic institute. The instructors and the students, physicians, engineers, members of scientific and cultural societies (the Turkestan societies of agriculture and of natural scientists and physicians, the Pushkin society and the Turkestan branch of the Russian Geographic Society) supported this decision in press. Thus, on 27 September 1916 the general meeting of the last-mentioned society resolved to petition about the establishment, in the first place, of a medical faculty, then of a higher polytechnic of a new type with departments on engineering (separated into hydro-technical and cotton sections), agronomy, mining, oriental studies and law[4.1].

It was stressed that that institution which should also become the centre of scientific studies will be active in the complex study of the territory. The reporter, the engineer Davidov [233, p. 7] stated:

It is necessary to remember that Turkestan will provide the more gifts the better it is studied. Just as sometimes a railway, after being constructed in an uninhabited territory, enlivens it and makes it quite profitable[4.2]*. So also a university or a polytechnic school in Turkestan* *will become an engine of culture and foster a rapid and bright flourishing of the territory.*

The Turkestan society of zealots of higher education which was established in 1914 *for assisting the propagation and development of the institution of higher education* took upon itself the initiative to organize such an institution. Things got going after the February revolution of 1917. A special university commission was established and attached to the Tashkent city Duma. It considered the material assurance of the project (selection of a plot of land for the university building etc.). In November 1917 the chairman of that commission went to Petrograd for securing the support of the capital's educational institutions. His trip was successful.

The Petrograd Technological Institute passionately participated in the compilation of the plan for the establishment of the university. It was supposed to open, with the help of that Institute, a technological faculty of the university with three departments: mechanical, hydro-technical and chemical [275, p. 25]. Considering that faculty as a branch of their institute, its Scientific Council decided to send to Tashkent 18 professors and instructors who will be later replaced by *local scientific and technical specialists* (Ibidem, p. 26).

Petrograd scientists were prepared to help with the creation of a historical-philological faculty of the university and the most prominent Russian Orientalists (S. F. Oldenburg, N. Ya. Marr and V.V. Bertold actively supported that idea. They thought that the Tashkent university will be entrusted with the task of a special not only scientific but also national-political importance, that is, a comprehensive study of the territory in the historical, philological, ethnographic, archeologic and juridical respects with a special attention to the investigation of the history, culture and languages of the Orient (Ibidem, p. 27). The Petrograd University was to assist in organizing that faculty.

It was also supposed that the physical-mathematical faculty will be among the faculties first opened in Tashkent and that it will be the basis for the establishment of three other faculties, medical, agricultural and technical. Serious help from Moscow University was expected.

Romanovsky, who became a known scientist and was an urgent supporter of the speediest organization of the first institution of higher education in Turkestan, had been thoroughly thinking about the development of natural and exact sciences in the territory. His paper which he finished writing on 23 October 1917, was published in the organ of the Turkestan teacher union [20]. He wrote (pp. 12 – 13):

Turkestan is a territory of ancient developed cultures, rich and peculiar, full of widest and wonderful possibilities. It was rich and splendid in the Tamerlan time who ruled Persia from Samarkand, victoriously went through India from north to south and waged a successful war against China. This richness and splendour was based on chance: on the military power and statesmanship of the great conqueror and soon disappeared after his death.

But a new flourishing will appear to perish only with the death of the human mind because it will be based on and summoned, supported *and developed by that mind. For humanity, the mind united with nature is the greatest and most beneficial union which ensures all the future of Turkestan, of the whole Earth and its nations. And the first step to create that union for the good of Turkestan is being prepared by the supposed opening of the Turkestan University in Tashkent.*

When describing the great role of science in the peaceful life of a nation and in times of war, Romanovsky (Ibidem, p. 14) adduced topical examples which were near to the heart of his contemporaries:

In our time scientific discoveries duly applied on an industrial basis create or destroy entire branches of industry and at the same time lead wide social groups to prosperity or decay, misery and degradation. It becomes therefore evident *that for each nation a proper organization of the scientific education and investigation is a problem of life and death*.

The future of Turkestan is therefore most closely linked with its higher school. He (p. 21) indicates *three great and wonderful problems* which in his opinion the future university in Tashkent ought to solve: the preparation of teachers and investigators and the study of the territory. It should also *combine pure and applied science* by organizing scientific studies *in a systematic connection with the industrial life of Turkestan*. This, as he thought, is *a new and great aim* of the university. In addition, the university *ought to take care of the raising of the general level of the scientific education* of the society and therefore popularise science.

Romanovsky (p. 22) ends his paper by stating that

The main and immediate measure, as I think, ought to be the creation of a Turkestan university with a physical-mathematical, and a technical faculty. Indeed, at present the cycle of exactly these sciences is the basis for achieving prosperity of nations and countries. Only when the material life in the territory is ensured and means and prosperity appear, it will be possible to open other faculties of the Tashkent University as well. Until that time, if no means are available for that aim, and if they can be only opened at the expense of the two abovementioned faculties, their opening will have an imprint of Utopia and impracticality, inadmissible when institutions of higher education important for the state are being created.

However, the events of 1918 brought to a standstill the apparently moving process of the establishment of the Tashkent University. The Turkestan society of the zealots of higher education still had to make much effort for achieving the set goal. Its most important aim consisted in continuing the talks with the institutions of higher education in Petrograd and Moscow about the help in compiling the programmes and the formation of *the brains of the future university, the professorial college*.

According to the statutes of the Society adopted in 1918 [306], it had to establish connections with state, territorial and local government institutions and help to provide the university with *buildings, money and personnel*. In the complicated circumstances of 1918 it was difficult to hope that the university conforming to the adopted programme will be opened in the near future. The Society therefore decided to make the first step without delay, to open, by applying *the existing means* a People's University in which general courses on the level of the secondary school will be read and the students will be prepared to be educated according to the programmes of a higher educational institution. It was also supposed that the People's University will become a scientifically-pedagogic and cultural centre and assist in the solution of the problems of people's education in general.

Exactly then Romanovsky arrived in Tashkent and began to participate actively in the work which had already begun and became one of the organizers of the university. In his unpublished *Vospominaniya o Pervykh Dvukh Godakh Sushchestvovaniya v Sredney Azii Gosudarstvennogo Universiteta* (Recollections about the first two years of the existence of the state) *university in Central Asia* (CSAU f. R-2283, inv 1, c. 62, pp. 1 – 6)[4.3] he wrote:

Local intellectuals had conceived the idea of creating a university in Tashkent even in the pre-revolutionary time, and even before the imperialist war. However, all the plans of implementing it remained buried in the maze of the Ministry of Internal Affairs. Only the revolution of 1917 gave a new fresh impetus to the idea of the university.

The Society of the zealots of higher education in Turkestan which existed already during the war decided to implement this idea at its own peril. In the very beginning of 1918 it convened a number of meetings of its members and all those who sympathised with its plans for working out concrete measures concerning the creation a university in Turkestan. The chairman of the Society was M. I. Sosnovsky. During one of the first meetings, after a unanimous decision to open a university in Tashkent by local means was made, a group for working out a statute of the university was created. According to the initial intentions it should have been a People's University, that is, a school for popularizing higher knowledge among the population and for providing the possibility to deepen their school knowledge or knowledge acquired by themselves for those who wish it.

The group consisted of A. V. Popov, a docent of the Petrograd University and a historian; Yu. L. Poslavsky, an economist; Romanovsky, a professor of the Don University and a mathematician who happened to be in Tashkent by chance; and doctor A. P. Shishov, an ethnographer, one of the eminent scientific figures in the pre-war Turkestan. These four people gathered in the apartment of Shishov […] *and worked out the first statute of the People's University in Tashkent.*

It was compiled in accordance with the instructions of the Society and represented a peculiar copy of the statutes of the Shaniavsky People's University in Moscow[4.4] *and a People's University in Petrograd. It was peculiar in that local features and conditions had to be taken account of.*

It was stated there that the Council was the absolute manager of the scientific-pedagogic, administrative and economic life of the university which was thus granted essential autonomy. The teaching was supposed to begin in five faculties (literary-philosophical; social-economic; natural-historic; technical; and agronomic). The initial staff of each faculty was soon determined and charged with establishing the studied subjects and their scope and choosing all the rest instructors.

Before the officials of the university were chosen it was governed by a board of administrators whose elected members were Popov, Romanovsky and R. R. Shreder (1867 – 1944), the head of the Turkestan experimental agricultural station. Later he played an important part in the development of the agricultural science in Central Asia. The members of the Turkestan statistical-economic society G. N. Cherdantsev (1885 – 1958) and S. A. Kohen (died in 1920) actively participated in the organization of the university.

Romanovsky also wrote (CSAU c. 52, p. 2):

The statutes thus worked out were adopted by the meeting of the Society of zealots. There also the rector and the scientific secretary of the university, the deans and secretaries of the faculties (natural-scientific and mathematical, economic, and historic-philological) were elected. Popov was elected rector and Cherdantsev elected secretary. He later became a most eminent and respected figure of the new university. Romanovsky became dean of the first abovementioned faculty and Kohen, the dean of the economic faculty. He was a very prominent statistician, young and very energetic, who achieved much for the Tashkent University. He tragically perished in 1920 from a bandit's bullet. I do not remember who was elected as the dean of the historic-philological faculty.

After that inner formation an outward formation became necessary; it was needed to acquire a certain relation with the Soviet regime in Turkestan. At the same meeting it was therefore decided to send a delegation (the rector and the deans of the faculties) to Uspensky, the people's commissar [the minister] *of education of the then established Turkestan Republic for notifying the Soviet regime that the university wishes to maintain a complete contact with it. As a result, the Soviet regime took the university under its patronage and gave it means and two buildings. One is occupied by the present physical- mathematical faculty and the Planning Institute, and the other, the previous premises of the office of the inspector of people's schools in the Turkestan territory,* […] *for the office of the university.*

On 16 March 1918 the order of the Council of people's commissars of the Turkestan Republic ordered the people's commissar of education to organize a university in Tashkent and in a few days it was officially opened. Romanovsky wrote (Ibidem, pp. 2 – 3):

The Tashkent People's University was formally opened on 20 April at a grand sitting of the Tashkent Council of the workers' and soldiers' deputies […]. *Lectures began on 23 April and continued all summer without interruption. In autumn that University became just a university, it indeed became a higher school with all the aims of a university as such.*

Information about the opening of the People's University and about its structure was published in the *Izvestia* of the Turkestan branch of the Russian Geographic Society. It stated:

The University has **1)** *The highest level serving the scientific inquiries of that strata of population which is sufficiently prepared for* *hearing scientific-popular lectures and lectures on the methodology of science* […]. **2)** *The lowest level for educating which begins with literacy of the wide masses of people, both children and adults. It is represented by a number of schools spread over all the districts of the city and children playgrounds.* **3)** *The Muslim level which consists of nine native Muslim schools in various districts of the old city for the initial education.*

The highest level was subdivided into five faculties: literary-philological; social-economic; natural-mathematical; agricultural; and technical. Apart from general scientific courses lectures were there read on *Turkestan studies* (the ethnography of the Uzbeks – N. S. Lyikoshin), ethnography of the Kirghiz (A. A. Divaev); hydrology of Turkestan (E. M. Oldekop); geography of the Turkestan animals (N. A. Zarudny); plants of Turkestan (G. A. Balabaev); economic geography of Turkestan (S. A. Kogen); the Uzbek language (Lyikoshin and Abdusatarov)). The lectures were supposed to last four months during which the People's University worked as summer courses.

The structure of the University apparently became somewhat more complicated. A historical essay of 1927 compiled by Professor P. A. Baranov (1892 – 1962), later a corresponding member of the Soviet Academy of Sciences, also mentions a middle level which served for preparing practical specialists [297, p. 4]. Courses were there read for instructors of committees on land and water, forest technicians, electricians, agricultural courses lasting a year, pedagogic (attached to the Muslim Teacher Institute), cooperative, on pre-school upbringing, foreign languages, motorcar matters, mechanical drawing etc.

Baranov stated that the lowest level consisted of 11 schools of the type of initial institutions, 8 playing grounds, 11 Muslim schools of the general type and 2 professional schools. Courses of shoemakers, dressmakers etc. were attached to the schools of the lowest level. While recalling those times Romanovsky wrote (CSAU f. R-2283, inv 1, c. 62, p. 5):

It is very interesting and important to note in addition that during the first year of its existence the Tashkent University had been not only a centre of higher education in Turkestan but an organizer and instructor of the city primary and secondary schools. For some time all of them obeyed it; they opened and were organized under its direct control. Only after a year when the net of Tashkent schools had essentially developed it became directly governed by the People's Commissariat of Education.

The University was also in charge of the Turkestan public library, Turkestan people's museum and the conservatoire.

In July 1918 a Territorial Congress of the Workers of People's Education took place in Tashkent and the employees of the People's University had participated in its sittings. When the prospects of the work of the University had been discussed most participants were inclined to think that in the future it should also unite all the cultural activity among adults and children. This opinion was represented in the statutes of the University which were published at the same time [293]. There, in particular, we find (p. 152):

The Tashkent People's University aims to disseminate widely scientific education and applied sciences in the Turkestan territory, to attract the sympathy of the people to science, knowledge and arts and to satisfy all the cultural needs of the territory in connection with the requirements of the new life. The University is an institution which ideologically covers all the pedagogic, instructive, cultural etc. institutions of the Turkestan Federal Republic without exception. […]

The People's University is directly in charge of the highest level of the united people's school, of all the institutions serving adults, adolescents and children on the middle and the lowest levels […] *as well as of laboratories and model pedagogic institutions which aim to create the united school, and finally of the cultural institutions of the territory which service the cultural life of the masses.*

There were opponents of this viewpoint who thought that such aims will harm the higher education.

Suitably qualified representatives of the Tashkent intellectuals had been drawn in the People's University as instructors. Notable students of the territorial lore which had devoted many years to investigate Turkestan were connected with the University. Among them were A. A. Semenov (1873 – 1958), later a most eminent Orientalist and academician of the Tadjik Academy of Sciences; A. A. Divaev (1856 – 1932), an ethnographer and student of the folklore, an expert in Oriental languages; N. G. Mallitsky (1873 – 1947), a geographer, historian, ethnographer and linguist.

Teachers of secondary schools began reading lectures in the University: of the Tashkent military school (N. A. Zarudny, an eminent zoologist-ornithologist; I. I. Tikhanovsky, a physicist; I. F. Gorsky, a mathematician); of the non-classical gymnasium (V. N. Milovanov, an astronomer; A. P. Rostkovsky, a chemist); of the teachers' seminary (N. K. Betger, a biologist); of the girls' and boys' gymnasiums (A. N. Pankov et al).

Many of them were highly qualified. Thus, Gorsky wrote *Nachala Vysshego Analiza* (Elements of the Higher Analysis), second edition of 1918. Milovanov, an inhabitant of Tashkent, who worked in the Warsaw University and returned to his home city, graduated from the Tashkent gymnasium, then from Kazan University with a diploma of the second order. He was left at the university observatory as an assistant, then moved to Warsaw. He actively participated in the work of the Turkestan branch of the Russian Geographical Society, wrote an investigation about the scientific achievements of the astronomers of the Ulugbek Samarkand school (15th century). Later he headed the Tashkent observatory and, in the autumn of 1921, moved to Moscow for work in an astrophysical observatory.

Astronomy was read at the University by N. F. Bulaevsky (1882 – 1961)[4.5] and the former gymnasium teacher A. N. Rosanov who was an astrophysicist at the Tashkent observatory. In 1916 – 1917 he headed it. Bulaevsky provided interesting information about some instructors of the Tashkent People's University in his *Zametki* …[4.6]. There, he described in detail the astronomical studies which had been carried out in Central Asia after the revolution and the appropriate work of Rosanov, Milovanov, V. V. Stratonov, Subbotin and other scientists who were connected with the Tashkent University.

Mathematics and physics were read by the teachers of the gymnasium and the non-classical gymnasium. Mathematics: O. Bolberg, P. V. Blagoveshchensky, Gorsky, A. I. Barubin, V. G. Zacharov, P. Florentiev, E. A. Cherniavsky. Physics: Milovanov, Baev, Tikhanovsky, D. S. Topornin, V. S. Yakovlev.

Other scientists who had participated in the origin and development of science in Central Asia also worked in the People's University: V. P. Dronov, a botanist; E. M. Oldscop, a geophysicist and a co-founder of the Central Asia geophysical school; L. V. Oshanin, an anthropologist; S. F. Mashkovtsev, a geologist; N. A. Keiser, a zoologist.

The chief physician and surgeon of the city hospital, V. F. Voino-Jasnetsky (1877 – 1961) was an extremely vivid figure. He graduated from the St. Vladimir University in Kiev in 1903, worked as a military and zemstvo surgeon. In 1915, he defended his doctor dissertation on *Regional anaesthesia* in Warsaw University and in 1920 became professor of the Tashkent University. In 1921, after the death of his wife, he took holy orders and in 1923, monastic vows under the name Luka. Soon he was ordained as a bishop.

After this *misdemeanour* he was discharged from teaching but continued to work as a surgeon and intensively studied. In 1934, there appeared the first edition of his celebrated work, *Ocherki Gnoinoy Khirurgii* (Essays on Purulent Surgery) later honoured by a Stalin prize. However, his sermons led to repressions: many times he was imprisoned and had to live many years in exile. But even under most difficult conditions he continued to be a priest and a doctor. He was freed in the beginning of the Great Patriotic War[4.7] and in 1941 – 1943 he managed the diocese in Krasnoyarsk and at the same time headed a hospital. Then he became Simferopol archbishop but continued to operate until losing his eyesight in 1956 [242; 277].

The organizers of the People's University understood that the efforts of the local intellectuals when equipment was lacking

Cannot create a real higher school which prepared highly qualified specialists acquainted with the new methods of investigation, literature etc.

This compelled them *to regard their work as the creation of a basis for a university worthy of Central Asia* [300, p. 6]. Even in April 1918 a delegation was sent to the centre[4.8]. It consisted of the orientalist Semenov and engineer I. G. Belov who should have activated the previous petition about the opening of an institute of higher education in Turkestan, about the equipment of its laboratories, stocking it with scientific literature and drawing in qualified professors and instructors. Soon however Tashkent became cut off from the centre by the frontline and the delegation lost connection with it although the work of organizing the Turkestan University had not ceased in Moscow.

4.2. Romanovsky and the faculty of natural science and mathematics. Romanovsky wrote in his recollections (CSAU c. 62, p. 3):

To provide an idea of the university as it existed before the autumn of 1918 I list the disciplines which were taught at the faculty of natural science and mathematics: algebra (*Bolberg*), *analytic geometry and differential and integral calculus* (*Zacharov*), *trigonometry* (*Gorsky*), *astronomy* (*Bulaevsky and Rosanov*), *descriptive geometry* (*Zacharov*), *mechanics* (*Baev*), *history of mathematics* (*Tikhanovsky*), *higher algebra* (*Florentiev*), *application of algebra to geometry* (*he also*), *geometry* (*Blagoveshchensky*), *main ideas of analysis* (*Romanovsky*), *physics* (*Milovanov*), *light* (*Tikhanovsky*), *botany* (*Balabaev*), *the doctrine of liquids and gases* (*Jakovlev*), *electricity* (*Topornin*), *geology* (*Nuzhny, an engineer*), *biology* (*Liushin*), *ethnology of Central Asia* (*Mallitsky*), *zoology* (*Zarudny*), *general zoology* (*Tatarenchik*), *general hygiene* (*Karpov*)[4.9], *meteorology and hydrology* (*Oldscop*), *microbiology* (*Oshanin*), *photography* (*Jakovlev*), *organic chemistry* (*Milovanov*).

The mean number of listeners was 15 – 20; in some cases there were up to 30 – 35 of them, in other cases, only 3 – 5. The reader can infer that the scope of the faculty was rather wide and the programme, sufficiently diverse which shows how great the inhabitants of Tashkent had thirsted for knowledge. The number of the workers at the faculty testifies that there were many who desired to answer the questions of the listeners and that the local scientific stratum of the population had been passionately supporting the faculty. In all, about 400 hours of lectures had been read from 23 April to 15 August 1918.

The records of the twelve sittings of the faculty during the spring and summer of 1918 (CSAU f. 368, inv 7, c. 1, pp. 1 – 13) provide a complete idea about its work. It is seen there that Romanovsky was always present although some of the sittings were quite poorly attended, guided them and actively participated in each undertaking connected with the organization of the pedagogic process. He recorded the first six sittings in his small, accurate and pretty hand.

The first sitting at which Romanovsky was elected dean of the faculty took place on 25 March and the botanist Georgiy Andreevich Balabaev was elected secretary but in May the physicist Ivan Ivanovich Tikhanovsky replaced him. The programmes of several courses were heard out and approved. Voyno-Jasenetsky submitted a programme on the anatomy and physiology of man, Rostkovsky, on chemistry, Belebeev, on morphology and systematisation of higher and flowering plants, Oldekop[4.10], on climatology and hydrology of Turkmenistan, Pankov, on geography and history of the study of Turkestan.

The lectures of some courses for the lowest and middle cycles of education apparently encountered some difficulties. Indeed, the records specially mentioned suggestions about invitations of one or another lecturer. The new candidates for those instructors which had to be approved by the Council of the university had been discussed very attentively. The outfitting of the faculty by scientific aids, laboratory instruments, books etc. became a special worry. During the first sitting the members of the faculty asked the Council to support them in this respect. In particular, it was

Decided to ask the Council to find a place for the comet-finder since it became possible to get it from the Tashkent observatory.

The programmes submitted by the instructors were discussed at the next three sittings in the first half of April and new members of the faculty were elected. The following programmes were approved: Mallitsky, on ethnology of Turkestan; Zarudny and Tatarenchik, on zoology; Oshanin, on microbiology and its relation to the health of man; engineer N. G. Nuzhny and Nikolaev, on geology; Karpov, on general hygiene; Jakovlev, on photography; Tikhanovsky, on meteorology and light; Bulaevsky and Rosanov, on astronomy.

The records reflect a thorough discussion of the programmes on mathematical subjects compiled by V. G. Zakharov, O. Bolberg and Cherniavsky. Thus, coincidences were noted in the programmes of Zacharov and Bolberg on analytic geometry, algebra, application of algebra to geometry, equations of higher degrees, the theory of limits, and trigonometry. The courses were distributed between them and the number of hours for each indicated.

Concerning the programme for the arithmetical principles of algebra for the lowest cycle of education (E. A. Cherniavsky),

The faculty thought it desirable to shorten it somewhat (*to omit the rules of mixing and alloying*) *and to introduce some changes* (*to transfer to a later time the information about algebraic notions and to pay attention to the solution of problems*).

The earnestness of such discussions is seen in the record of 8 April about the programme of A. I. Zarubin. Romanovsky wrote (CSAU f. 368, inv 7, c. 1, p. 3 rev):

The programme (*Zarubin*) *of geometry for the lowest cycle was heard out. It is too elementary and suitable rather for children of younger age. Zarubin was asked to remake it for another audience which is partly acquainted with some geometric ideas*.

Here we undoubtedly see Romanovsky's general approach to the teaching of mathematics in universities and his aspiration to ensure its due level from the very beginning.

Later (on 1 and 13 May) the programmes on geometry (Gorsky and P. V. Blagoveschensky), on the application of algebra to geometry (P. Florentiev) and on history of mathematics (Tikhanovsly) were discussed just as attentively. The record stated (Ibidem, pp. 7 – 7 rev):

Being concerned about the drawing in as many as possible valuable instructors, the faculty decided: if two equally worthy instructors compete for a new course, and one of them is already reading some course here, the new course will be offered to the other competitor.

Accordingly, the systematic course in geometry was offered to P. V. Blagoveshchensky. For facilitating the mastering of a supposed course, it was decided that the instructors ought to submit beforehand summaries of their lectures. The record of 8 April adds (Ibidem, p. 3 rev):

The listeners should be offered beforehand a summary of each lecture rather than a summary of all the lectures before the beginning of the course. This will be easier for the instructors, and such summaries will be more detailed and therefore more useful for the listeners than in the other case.

Later some of these courses were published in the usual way or lithographed. The programmes had been published in the newspaper *Narodny Universitet* (The People's University).

The registration of listeners imputed to the dean and the secretary of the faculty began in mid-April. On 22 April Romanovsky reported that more than 15 people had registered for most subjects of the higher cycle and, according to the decision of the Council, it was resolved that the courses will begin on 23 April.

This report disagreed with the Council which thought that the subjects of the lowest cycle should be distributed among the primary schools. The faculty members agreed with Romanovsky.

Many problems about the contents of the lectures appeared after they had begun. Not enough prepared listeners were found for some courses and after some time the interest of the listeners was sometimes lost. A questionnaire was therefore distributed [among listeners] about which there is a record of the sitting of 3 June 1918. It, the questionnaire, had in particular asked:

Which subjects do you attend and why? *And which would you like to attend in addition? Are you satisfied with the teaching*? *If not, in which subjects had you noted any defects and what kind of defects*? *Why, in your opinion, do these defects occur*? *How much do they depend on the instructor*? *And, in your opinion, could these defects get rid of*?

At the same time problems with the organization of the studies had appeared. The diligence and accuracy peculiar to Romanovsky were reflected in the *Decisions about the reading of lectures* (CSAU f. 368, inv 7, c. 1, p. 10). The beginning and end of the lectures were precisely stated (ten minutes past 5, 6, 7 and 8 o'clock and 6, 7, 8 and 9 o'clock in the evening). Then,

1) *A lecture is considered as taken place if not less than 7 people were present*; **2)** *If there are less, the instructor waits 10 minutes*; **3)** *If after these 10 minutes there are still less than 7 people, the lecture is considered as not taken place*, **4)** *If a lecture had not taken place three times in succession, the appropriate course is considered as discontinued*.

Still earlier it was established that listeners may attend the sittings of the natural-scientific and mathematical faculty (*but their number should be* [not more than] *a half of the number of the instructors*).

The introduction of these rules allowed to put the lectures in order and to specify the programmes. This was very difficult since the attendance was absolutely voluntary and the preparedness of the listeners varied.

Soon some courses (for example, theoretical mechanics, cytology, electricity) had to be discontinued because the number of listeners was too small. Romanovsky himself declined lectures on mathematical statistics and began to read the course *Main notions of modern analysis*. The records of the faculty sittings show that problems important for the development of entire scientific directions had also been solved there. Thus, the idea of V. P. Drobov about the establishment of a botanical garden attached to the University (record of 1 May) was actively supported and on 13 May a commission for compiling its plan was elected. That plan was successfully implemented[4.11].

On 1 July the officials and instructors of the faculty were elected anew by a secret ballot. Romanovsky was re-elected dean by 20 votes against 1 with 2 abstentions. In the autumn of 1918 the People's University became a higher educational institution and the earnest arrangement of work in the natural-historic and mathematical faculty allowed a pass without difficulties to teaching according to the new programmes.

4.3. The establishment of a higher school. Bulaevsky [222, pp. 48 – 49] recollected this event:

In the summer of 1918 the organizers of a university in Tashkent had been reading popular lectures and preparing for the beginning of regular courses of lectures. The local government organs wholly sympathized with the idea of establishing a university. Uspensky, the people's commissar of education, came to one of the sittings of the initiative group and stated that the [local] *government quite sympathizes with the idea of creating a higher educational institution in Tashkent and will consider it as a government establishment, ensure its upkeep, pay the lecturers etc., grant its self-management* (*at first it was thought to create it as a public institution*) *under an indispensable condition: the students of both sexes of any age, nationality etc. ought to be admitted without any examinations or verifications.*

Later the commissar admitted the possibility of checking the students' knowledge so that the lecturers could be convinced in that the listeners understood him and really wished to study. Thus the Tashkent University began to live but soon these principles had been certainly changed[4.12].

It seems that Uspensky was a doctor [of science? A physician?]. *The* [local] *government sent him to the Centre and I do not know what happened to him after that*.

Romanovsky actively participated in the organisation of that university. Even in June 1918 he was elected to represent the natural-historic and mathematical faculty of the People's University in the specially created ad hoc committee. The following archival pencil note was probably written at that time. There, he vividly formulated his views about the aims of a university (CSAU f. R-2283, inv 1, c. 172, p. 227):

The aims of the university: **1.** *A wide scientific education* (*information about the main facts and methods in a coherent systematic form about the established theories and the most important topical aims of science*). **2.** *Preparation of scientific investigators.* **3.** *Development of science.*

Fulfilment of the first aim requires instructors who are widely conversant with the appropriate field, possess a talent of description, and are on the level of modern science; *a library stocked with literature and in the main features widely representing the sphere of sciences taught in the university; laboratories, study rooms, museums.*

For the second aim: the mastery of the methods of investigation, of the experimental and the abstract methods, a deep and detailed *knowledge of the chosen field up to its boundaries, beyond which its yet unsolved problems are situated, and a precise and critical knowledge of these problems. These are the most important features of an investigator.*

For acquiring and developing them the university needs teachers who should themselves be investigators working on the frontline of science, possessing the methods of the appropriate field and precisely knowing its [previous] *development and problems, critically knowledgeable about its literature; libraries and periodical literature* (*for working on primary sources, for being acquainted with scientific methods by studying the original* [contributions] *and for being in general acquainted with modernity*); *laboratories outfitted as fully as possible and in accordance with the latest requirements and aims of science* (*for mastering the methods of experimental study and solving the current problems of science*); *societies and groups; lively scientific work in the university on the solution of topical and urgent aims of science.*

For the third aim the university requires investigators and means for their work (*libraries, laboratories etc.*).

A university is the more valuable the more and the better it solves the second and the third aim. They constitute its essence[4.13].

In his *Recollections* Romanovsky describes that period in the history of the University (Ibidem, c. 62, p. 4):

In the autumn of 1918 the [People's] *University was reorganized into a regular higher school. The natural-scientific and mathematical faculty was subdivided into two departments, mathematical and natural with a four-year period of study in each. At that time the Turkestan territory was cut off from the centre of Soviet Russia, from the north by the bands of rebelling Cossacks*[4.14] *and from the south by the bands of the White Guards Ashhabat government aided by the English.*

Under such conditions the University was certainly unable to expect help from the centre and should have managed by its own means. At first this was quite possible since during the autumn of 1918 only the first-year courses in all of its faculties had been working.

The first autumn sitting of the faculty which considered the organisation of the natural-scientific department was held on 3 November (Ibidem, f. 368, inv 7, c. 1). Present were Romanovsky, Tikhanovsky, Gorsky, Bulaevsky, Voyno-Jasenetsky. They discussed and adopted a plan of lecturing in that department. It was supposed to introduce the following courses: higher mathematics, general physics (an experimental course), general chemistry, crystallography and crystal physics, general biology, anatomy of man, morphology and anatomy of plants.

A sufficiently wide course in higher mathematics was supposed to last two years. During the first year analytic geometry and differential calculus were read, and during the second year, higher algebra and integral calculus including the simplest cases of integrating differential equations.

It was decided to begin studies on 11 November. Until then the faculty members had elected the dean (Romanovsky), the secretary

(Tikhanovsky) and representatives in the governing bodies of the University (Tikhanovsky, N. G. Nuzhny, Bulaevsky, Gorsky) and approved the programmes for the mathematical department. There, lectures were read on the Introduction to analysis and differential calculus (Romanovsky), analytic geometry (V. G. Zakharov), higher mathematics (I. F. Gorsky), experimental physics and the mechanical section of physics (Tikhanovsky), descriptive astronomy (Bulaevsky).

Instructors had been found gradually. Voyno-Jasenetsky read the anatomy of man, Drobov, botany, Nuzhny, crystallography and after his death at the end of 1918, S. F. Mashkovtsev. R. R. Shreder offered to read a course in genetics and later he also read biology. N. A. Keiser and A. A. Mell were approved as the faculty laboratory assistants for the department of natural science.

The records of the sittings testify to the difficulties occasioned by the lack of premises and financial means as well as to the difficult life of the instructors. In December, for example, a special statement was made about the need to provide them with kerosene (CSAU f. 368, inv 7, c. 1, p. 17).

It became necessary to pay much attention to the programmes, to adjust them to the level of the listeners' knowledge. After an inrush of students in the summer of 1918 there occurred a large number of dropouts in the University as a whole. It was occasioned by the lack of their preparedness so that the programmes for the mathematical department were thoroughly reviewed, the subjects distributed over the years and *the number of hours for the lectures and classes indicated*. The same minute work was done for the department of natural science. In March 1919 the problem of a small number of listeners had to be specially considered there.

Among the causes of the dropping out, along with a poor preparedness, were the transfer to other faculties (for example, to the *ProletCult* faculty) and the difficulty of learning after an eight-hour working day[4.15].

As dean of the faculty Romanovsky had been solving all the problems connected with the organization of the studies. To such problems he added the problem of the library to which he attached great importance. In the beginning of December, during a sitting, the secretary stated that it was necessary to organize a reading room from which literature could not be checked out. The acquisition of books, bookcases etc. had been often discussed at faculty sittings. The library created by that time became the foundation of the later established mathematical room which is now named after Romanovsky.

Much efforts were made for establishing a physical room which was in charge of Tikhanovsky and a room of natural science and history (in charge of Keiser). The problem of an astronomical observatory was raised. In a report of 29 December Bulaevsky suggested that a room in one of the buildings of the [city] observatory be given to the University and united investigations be organized. He [222, p. 48] describes how he was able to obtain

A permission for the students of the University to use the equipment of the observatory for their practical work. He also allowed them to *use a room in his apartment which is considered to be occupied by an instructor of astronomy in the University.*

In the beginning of 1919 there ensued a difficult time for the newborn University due to the January White Guard rebellion headed by Osipov. Bulaevsky [221, pp. 330 – 331] wrote:

After the rebellion was suppressed it became known that some listeners of the University had actively participated in it. Although many other listeners participated in its suppression, there happened to be violent opponents of the University led by the former people's commissar of education Uspensky. Nevertheless, soon everything was favourably settled.

In February 1919 a train with Bolshevik troops under P. A. Kobozev (who later became for some time the director of the Moscow geodetic institute) was able to break through to Tashkent. Under his influence the entire work of the Turkestan government had become more proper which influenced the University. Kobozev himself became its instructor in the technical faculty.

The studies at the natural scientific and mathematical faculty took their normal course. In March there occurred the problem of the end of the first and the beginning of the second academic year. It was decided to end the year on 1 June and to examine *those listeners who desire it*. The problem of the beginning of the second year was more complicated since there was an acute shortage of both listeners and instructors. After discussing the plans which were submitted by the faculty members the sitting of 15 April 1919 resolved:

The opening of the second year for both departments seems possible if a sufficient number of listeners is present.

But the problem about instructors also awaited a solution. The record of 19 May indicates that in particular it was necessary to fill the vacant positions of instructors in the real variable theory and mechanics. The faculty members therefore concluded that new instructors had to be taken in. All those who were able to teach mathematics were so taken. During the sitting of 21 May Romanovsky suggested to approve hydrologist l. K. Korevitsky (1890 – 1950) as an assistant to conduct classes in differential and integral calculus. He was quite successful; he mastered mathematics but was not specially educated. It seems however that not all of those whom Romanovsky thought possible to conduct test lectures in mathematics and mechanics (A. E. Voznesensky, M. B. Nemet, L. K. Davidov et al) were just as successful so that he had to take the main load upon himself. This is expressively stated in the records of the faculty sittings. Thus, on 23 January 1920 it was stated (CSAU f. 368, inv 7, c. 2, p. 2):

Heard out: on the teaching of algebra and conducting classes in the integration of differential equations. Resolved: to charge both courses to Romanovsky[4.16].

The best prepared students had been also drawn in to work. Among them was D. G. Grebeniuk (1885 – 1967), later a professor of the University, known as an investigator of the theory of polynomials least deviating from zero and its application for approximately solving differential and integral equations. In April 1919 he was elected student representative at the Council of the University and in March 1920 appointed senior assistant of the head of the physical laboratory.

In December 1919 the Turkestan People's University was officially named *state university* which conformed to the nomenclature adopted in the Russian Federal Republic [237, p. 7].

4.4. The Moscow group of the Turkestan University. With the widening of the University it became ever more obvious that the local instructors will be indeed unable to manage the problems of a higher educational institution. Hope was set on the help from the centre for which the University delegation cut off from Tashkent by the frontline pleaded in Moscow. The delegation was sent (Romanovsky)

Already in 1918 at a moment when it became possible to reach the centre by breaking through Cossack bands in the vicinity of Orenburg.

It had been working for two years in Moscow and Leningrad [Petrograd] and Romanovsky explains the government decision to organize a higher educational institution by

Its efforts and responsiveness of the centre to the cultural needs of a remote territory.

Already in November 1918 an organizing committee of the Turkestan State University began its work. It was established after a few conferences of the Moscow and Leningrad [for the second time: Petrograd] universities, the Petrov [a place name] (now Timiryazev) agricultural academy and invited specialists who had been previously working in Tashkent [300, p. 7]. Its chairman was the eminent hydraulic engineer and power engineering specialist I. G. Aleksandrov (1875 – 1936). [Its recommendations] were approved by the People's Commissariat of Education of the Russian Federal Republic and the Turkestan University was recognized as a republican higher educational institution.

The staff of professors and instructors began to be formed immediately. As it was accepted, they were chosen by an all-Russian competition. In January 1919 faculties beginning with the physical-mathematical were established. Its dean became the renowned astronomer, professor of Moscow University V. V. Stratonov (1869 – 1938) who had been working in the Tashkent observatory in 1895 – 1904 and [for some time?] been its director [222, pp. 141 – 143; 225, pp. 359 – 360].

In August 1919 the general sitting of the professors and instructors [in Moscow] elected a governing body of the Turkestan University and its rector, the soil scientist N. A. Dimo (1873 – 1959), later an academician of the Uzbek Academy of Sciences, and his deputy, a professor of the Petrograd University and an eminent Orientalist A. E. Shmidt (1871 – 1939).

On 4 December 1919 a sitting of the physical-mathematical faculty adopted a *Plan* for the beginning of its activity. It was supposed that during 1920 – 1922 it will start working in three stages: the chairs concerned with the students of the first and second, then with those of the third year and lastly with the remaining chairs will be established no later than in the autumn of 1922.

At the end of 1919 the railway connection [of the centre] with Tashkent was renewed and the move of the instructors to the place of their work became topical. It was decided to send at first a delegation from the Council of the University [what about the Council in Tashkent?] to ascertain the situation in Tashkent. It was headed by pro-rector Shmidt. […]

[A commandant's office for dispatching the University's special trains decided what was impossible, possible, and what was necessary for the passengers to take along. The weight of the taken scientific literature was not restricted.] The group of the representatives of the physical-mathematical faculty included zoologists, professors D. N. Kashkarov (1878 – 1941), A. L. Brodsky (1882 – 1943) and instructor N. A. Bobrinsky; instructors of botany M. G. Popov and I. A. Raikova (1896 – 1981), of soil science M. A. Orlov, of geography S P. Arzhanov, of chemistry S. S. Medvedev, of physics N. N. Zlatovratsky (1877 – 1933), a son of the writer-narodnik (populist), of geophysics R. R. Zimmerman. As an instructor of astronomy, the young but already well-known astronomer E. K. Epik (1893 – 1985), who graduated from Moscow University and worked there, went to Tashkent. Later he moved to his homeland, Estonia [225, pp. 347 – 348]. D. V. Zharkov was elected [instructor] of the chair of mechanics. He was recommended by N. E. Zhukovsky and S. A. Chaplygin. Instructor for the chair of mathematics was V. M. Komarevsky, who then became deputy dean and headed the group which moved to Tashkent. […]

The delegation of professors and instructors sent to Tashkent should have been guided by the instruction of the Council of the University which determined its aims and authority. They had to determine the conditions of life and work, secure premises [flats] for the instructors, *take steps to draw in local scientists*, establish the time of the beginning of the studies, examine the order of the beginning of the work of separate chairs. […]

The text of the instruction shows that its compilers had not supposed that two courses of the University were industriously working in Tashkent, and the initial programme had to be essentially corrected.

The train left Moscow on 19 February 1920. The trip was extremely difficult because of the winter, the frost and snow-drifts and aggravated by the lack of fuel [coal?], obstacles and sabotage by the opponents of the Soviet regime. Nevertheless, on 7 March the train safely arrived in Samara […], and on 10 April in Tashkent. Romanovsky wrote (CSAU f. R-2283, inv 1, c. 62, p. 4):

The trip lasted two months and in those times of dislocation and hunger it was a heroic feat. The train was enthusiastically met in Tashkent with a high hope that help from the centre will not nevertheless cease and that the future university will be consolidated.

On 16 April, under Romanovsky, a united conference of the Moscow and Tashkent groups of the natural scientific and mathematical and the agricultural faculties of the Turkestan University was held. Reports of Romanovsky and Komarevsky about the organization of the faculty in Moscow and Tashkent [in Tashkent and Moscow; of which faculty?] were heard out. The method of replenishing the staff of the faculty envisaged by the Moscow instruction was disputed. The record states:

No common opinion about their problems had been reached. The conference recognized the need of an approval of the Tashkent group by Moscow. A part of those present thought that such approval ought to be organized immediately by sending the appropriate applications to Moscow whereas the others insisted that the approval ought to be shelved until the whole Moscow group of the Tashkent State University comes to Tashkent after which the approval will be done here.

The same topic was discussed on April 20 in a sitting of the Council of the natural scientific and mathematical faculty[4.17]. The instructors of the Tashkent group were present and the record stated:

Heard out: the decision of the united conference of 19 April of the presidiums of the Tashkent and Moscow group […].

Resolved: to agree with that decision with the exception of its § 3. This section was adopted in the following way:

Before being sent to Moscow for approval, the local applications of those who desired to fill the positions of professor, instructor, assistant or laboratory assistant will be considered by the local mixed committees of separate faculties consisting of the members of the local and Moscow faculties. Those committees can compile their opinion.

At that sitting Komarevsky was asked to read lectures and conduct classes in algebra and trigonometry and Zharkov was asked the same about mechanics.

On 27 April 1920, after a number of conferences of the Council members, the governing body of the University and the Moscow delegation it was resolved to

Create a single Turkestan State University by merging the groups.

That decision recognized the arrangement adopted by all the universities of the country about the filling of positions. An all-Russian competition was announced for professorial positions; instructors were approved by the faculties after considering their scientific works and biography and a test lecture. Assistants and laboratory assistants were drawn in on the recommendation of a professor and submission of an autobiography and scientific works. Specially indicated was the need

To take into account local men who had worked for two years and, owing to some circumstances, were unable to participate in a competition.

The complications of the period of merger were reflected in [222, pp. 89 – 90]:

A group formed in Moscow arrived in Tashkent. It should have represented the Tashkent University. In the time when a university had been created in Tashkent two years previously, a quite independent Tashkent University was created in Moscow, complete with the teaching staff, dean [deans] *and rector, but not yet students.*

This group was engaged in organizational problems, it procured equipment, books, instruments. All chairs had been already filled and some instructors were taken in from those in Tashkent. However, the Moscow group considered itself the owner of all the premises *occupied by the Tashkent group, of the equipment and students* [owner of students?]. *They considered the teaching staff as though self-styled and insisted on its admittance in its midst only after voting of each separately following his personal application.*

The Tashkent group did not agree, and friction ensued. Finally, it had to yield and its members were balloted. I cannot remember whether some instructors were eliminated since I was absent all summer when the talks were held. In any case, Romanovsky did not desire to be the dean of the faculty.

On 9 May Komarevsky reported to Moscow the situation in the national-scientific and mathematical faculty (CSAU f. 368, inv 7, c. 2, pp. 14, 14 rev):

A most urgent arrival of the faculty, composed as completely as possible, in Tashkent is necessary, otherwise its entire organisation will be here in a critical condition. Local forces are absolutely insufficient whereas only zoology is represented in the delegation by a responsible chair. The teaching should begin in the autumn term and it is desirable to open the faculty consisting of all four courses because

1) *The opening of special laboratories attached to the University is caused by the need, which became here clear, of as active as possible participation in scientific work.* (*The latter is directly required of the university by the local authorities*.)

In addition, the delegation considers that the present moment in the life of the university is extremely favourable for creating a tradition of not only educational but mostly scientific work.

2) *The mathematical department of the local university already has courses for students of the two first years and when merging with it the problem of the third course will formally occur.*

3) *If the senior courses are opened, students from educational institutions in Central Russia and Siberia who got stuck in Tashkent* (*there are such*) *as well as local researchers of nature without special education can be taken in.*

This letter also mentions the lack of textbooks, the need to transfer the local territorial museum to the university, to acquire the collection of the late N. A. Zarudny[4.18] etc.

Detailed information about the chair of pure mathematics and a characteristic of its instructors is contained in Komarevsky's letter which he sent to Moscow on 17 April (CSAU f. 368, inv 7, c. 2, pp. 15 – 16 rev):

1. *Professor Vsevolod Ivanovich Romanovsky. Graduated from Petersburg University in 1908. Was professor of the Warsaw University which was evacuated to Rostov-Don. Worked much and is still working on the problem of systematic statistics*[4.19] *and integration of involutory systems. He alone reads all the courses in the mathematical department except analytic geometry.*

2. *Zacharov. Reads courses on analytic geometry in the mathematical department and technical faculty. He developed these courses and probably will not agree to read other courses. He was a teacher of the non-classical gymnasium.*

3. *Gorsky. Reads an abbreviated course in higher mathematics and a course of mathematics in the workers' faculty. A very good teacher of a secondary school where he teaches. Unable to read other courses*[4.20].

4. *Nemet. Not long ago began to read a course of differential calculus since Prof. Romanovsky is overburdened. Romanovsky believes that he is poorly learned and a bad teacher.*

In addition, practical classes had been conducted by the so-called assistants, Korevitsky and Davidov. The latter was ill all the time and is apparently only kept on the list of the staff. The former, as Romanovsky characterises him, is a great lover of mathematics. It seems that he conducted his classes in differential calculus not badly. He had not graduated from a higher educational institution (*but apparently was a student of some polytechnic school*).

There is no mathematical room. The library has very little textbooks. It is necessary to bring here as many as possible textbooks and certainly all the books which were acquired by the chair of pure mathematics.

For a better understanding of the situation in Tashkent, I adduce the texts of the letters of Komarevsky to Stratonov which he sent in June 1920. The first (CSAU f. 368, inv 7, c. 2, pp. 20 – 28) was written in reply to Stratonov's letter of 26 May.

[…] *My general report which characterized the situation of the local physical-mathematical faculty and the reports about separate chairs were sent with Semenov. He was also asked to throw light on the conditions of life in Tashkent and justify our agreement with the local forces.*

We have thus taken all the steps for informing you about everything which we found here. Apart from these final reports the representatives of our group had sent letters [to whom?] *whenever a favourable chance had occurred, and Shmidt several times attempted to wire you. I think that now you have the reports from Semenov. I am briefly answering your questions.*

Life in Tashkent is much easier than in Moscow. Salaries are not lower but rather higher. Pluralism is flourishing. Nothing is sold for ration cards but everything can be obtained in the Oriental market. The prices are rapidly rising, but in general the conditions of life can be equalled to those in Moscow in 1917. Life is here possible which is proved by the fact that only A. A. Semenov went to Moscow with the report whereas all the rest of the delegation decisively refused to go.

It is only difficult with apartments since the tightening[4.21] *is brought to the highest degree, but it is possible to have separate rooms and we all have settled.*

We found here a university which had been existing for two years and is provided by some premises and laboratories. Among the teaching staff there are many able people but in general without our arrival they would have been unable to run the university. Therefore, it is now the most favourable moment for uniting the Moscow and the local organizations. There are so many things to do that there is no question about competition.

A literal application of the instruction would have been reduced to suggest the local figures to strike out all their work and turn it over to alien and unknown people. They refused to comply although stated that they were entirely prepared to give up their place to more worthy representatives of the Moscow group *if such people will come. The situation was aggravated by the interference of Dvolatsky who declared that the local committee of education* *will take its own measures* *if we will not come to an agreement and the local students compiled lists proscribing some professors*[4.22]*. The situation was still more serious since the physicians under Sitkovsky from the very beginning were keeping to an independent and extremely opportunistic policy. And a moment had come when we, the representatives of the physical-mathematical faculty, had to decide whether to make peace with the local university at all costs or face the disintegration of the delegation and a horrible scandal which would have ruined everything for a long time both here and in Moscow.*

We retreated and an agreement with the local group was carried unanimously. So we had proceeded to work together with the local university and it went on harmoniously. Whether our peace is bad or good I do not know but I do know that only a quarrel would have meant a ruin for both the local university and the Moscow organization.

On the basis of that same agreement some members of our group including me privately decided to begin teaching in the local university. This was necessary for maintaining the prestige of the delegation. It seems that we have thus quite achieved our aim since the main role in the life of the university is beginning to be played by our delegation. We have found here a place to live and work. […]

Come here if inly possible. Along with the bad, you will find much of good.

The next letter is dated 30 June 1920.

[…] *As an addition to my reply to your letter of 26 May received on June 26 I inform you about the following.*

The organisation of the university in Tashkent is proceeding extremely intensively. We were able to acquire a large part of the building of the military school, and even before our arrival the university had at its disposal three (small) *buildings. However, the premises for seven faculties are certainly lacking, but even that insufficient housing will be very difficult to distribute and outfit before the autumn term.*

The library here contains up to 20 thousand volumes but it is quite disordered. If our books are added, the arrangement will also require great work. The situation with the teaching staff is:

Mathematics. Professor Romanovsky and instructors Komarevsky and Zacharov. It is necessary to take in one more mathematician since beginning with autumn the mathematical department will work with students of the first three years.

Physics. Instructors Zlatovratsky and Tikhanovsky. The latter is a very bad teacher[4.23] *but until now he is in charge of the physical room with some equipment. The most urgent problem is about a professor of physics.*

Mechanics. *Instructors Zharkov and Voznesensky. The latter went away on holiday and perhaps will not return. If Kolosov comes, the chair will be quite provided.*

Astronomy. *Instructors Epik, Milovanov and Bulaevsky. Your arrival is desirable.*

Geophysics. *Ev. Mikh. Oldekop can certainly be professor. Instructor Zimmerman.*

Chemistry. *According to your letter we may expect the arrival of all those professors who were elected in Moscow. Here, we only have Medvedev. A great shortage of the teaching staff for physics and chemistry is felt.*

Botany. *V. D. Drobov can be professor and he had submitted such an application (morphology, a general course, systematisation). The chair is provided with the arrival of Blagoveshchensky.*

Zoology. *The local and the arrived personnel fully provide the chair.*

Geology. *Here we have a good geologist Mashkovtsev and Mukhin has arrived. The chair is provided.*

Mineralogy. *The teaching will be probably provided when Uklonsky comes.*

Geography. *It is absent here. Arzhanov can read an elementary course.*

Anthropology. *This is a subject for senior students. Here, we have no one but Bunak will possibly come. In any case this is not a main chair.*

Geodesy. *Bulaevsky, and Lebedinsky will come.*

Soil science. *For the time being M. A. Orlov will ensure the teaching.*

You will see that if at least those whom you have ascribed to the first group will arrive, the teaching can be organized. Only with physics in the absence of a professor the situation can become tragic. Please pay main attention to this point.

It is absolutely necessary to send here all the books and all the equipment on the second special train.

In general, from autumn the university ought to transfer officially to Tashkent.

After the delegation had left Moscow, the remaining members of the faculty elected new professors[4.24] and instructors, discussed the acquisition of books for the library and equipment for the laboratories, suggested programmes of educational courses. These problems were discussed during sittings chaired by Stratonov. The most important point was the selection of instructors. By 1920 not all of those who had been elected in 1918 – 1919 were still prepared to move to Tashkent. Out of 102 professors and 91 instructors only 43 professors and 43 instructors decided to go[4.25] and many hesitated. Thus, during the sitting of 5 February the application of the renowned scientist V. I. Masalsky, who expressed his desire to fill the position of chair of geography in Tashkent was discussed and enthusiastically supported, but on 26 August he refused this position. Also refused to move: the professor at the chair of mathematics L. K. Lakhtin and the professor at the chair of theoretical mechanics G. V. Kolosov, as well as the faculty dean, Stratonov. Those who left were asked to find a suitable replacement for themselves.

The final membership included the professors A. V. Blagoveshchensky and I. I. Sprygin (botanists); S. N. Naumov, M. I. Prozin and E. V. Rakovsky (chemists); N. I. Lebedinsky ad M. A. Levitskaya (physicists); V. G. Mukhin (geologist); N. A. Dimo (soil scientist), E. F. Poyarkov (biologist). Among the instructors there were scientists who later became widely known by their research in Central Asia, for example the botanists E. P. Korovin and P. A. Baranov (1892 – 1962), geologist A. S. Uklonsky, zoologist G. P. Bulgakov, soil scientist M. A. Orlov.

A. N. Nikolaev, recommended by Lakhtin was elected to the chair of mathematics. In 1901 he graduated from Moscow University and taught in secondary schools in Riga, Mitau [present Jelgava] and Zolotonosha, then, in 1918 – 1920, in the Second Moscow Polytechnic Institute.

In August all the members of the Moscow group began the move to Tashkent. Five special trains were dispatched with 65 carriages of equipment and literature [297, p. 11]. In the autumn a new period in the history of the Turkestan University began. It consisted of six faculties: physical-mathematical, medical, social-economic, technical, historical-philological and the workers' faculty.

On 11 September 1920 Lenin signed the decree of the Council of the People's Commissars on the approval of the university. On 29 September a general sitting of the Tashkent and the Moscow group was held and their unification was approved. A united administration included G. N. Cherdantsev from the local group and N. A. Dimo from the Moscow group. Soon however this administration was replaced by a single administration. A. F. Sol'kin (1895 – 1941) became rector. He had been a student of the technical faculty and participated in the establishment of the Soviet regime in Turkestan[4.26]. In May 1921 the rector was re-elected and that position was filled by A. L. Brodsky. In 1924 the University was named Central Asian State University (CASU).

4.5. The physical-mathematical faculty of the Central Asian State University. During the following years the teaching at the physical-mathematical faculty went on against the background of many reforms which almost incessantly had been changing the structure of the university. Thus, already in 1921 the faculty was closed along with the historical-philological faculty. It was labelled *un-functional*, i. e., not suited for preparing the students for direct practical work. Instead, a pedagogic faculty had appeared which however existed only for one year and a Council of the faculties of several institutions including the institutes of pure and applied mathematics, of astronomy, physics, chemistry, geology, zoology, geography etc[4.27]. They should have serviced various faculties and had apparently justified their existence. Indeed, they continued to exist after the reopening of the physical-mathematical faculty [300, pp. 12 – 13, 30 – 31].

In 1927, Baranov [300, p. 24] wrote about the situation at the faculty in those times:

During the first years of its existence the faculty suffered from an incessant threat of closure, from an actual closure for an entire academic year, and a constant reformation of the curriculum. […] *These circumstances extremely complicated and worsened the conditions of work with the students. Only during the latest years the faculty had been able to graduate them. In 1924/1925, 1925/1926 and 1926/1927 there were respectively 5, 8 and 32 graduates.*

An essential role in the life of the faculty had been played by the first scientific institution of the Turkestan territory, the Tashkent Astronomical and physical observatory which was established in the 1870s and had much contributed to the study of Central Asia [313]. The university acquired the astronomical observatory which had become independent. Its first head was Ya. P. Gultyev, then (until moving to Moscow) Milovanov and Lebedinsky, professor of geodesy. Its staff included the instructor of physics Zlatovratsky and the astronomer Epik. The latter became the life and soul of the observatory whereas Milovanov attempted to put into practice his ideas, see Bulaevsky [222, p. 90] who continues:

Under Epik's leadership the work of the observatory started to enliven as much as it was possible given the financial and administrative difficulties of the time when new literature, equipment etc. remained unobtainable. He was an Estonian and soon repatriated himself and turned up in Tartu. In Tashkent he remained less than a year.

In 1922 the observatory was transferred under the authority of the then created Moscow astronomical institute which was at first headed by Stratonov, then by V. G. Fesenkov (1889 – 1972). Subbotin, a former student of Romanovsky, became the director of the Tashkent observatory. He left an essential trace in the history not only of that observatory where he had been carrying out important scientific work until his departure in 1930, but of the physical-mathematical faculty as well where he became a leading professor.

Baranov [300, p. 24] who described the difficulties of the physical-mathematical faculty (see above) at the same time indicated that the level of the education of the students was high:

In a certain respect, the defence of the diplomas had been a festive occasion for the young faculty and the university: each work was a serious scientific study and a part of them is already published in the Bulletin SAGU [*Bulletin* CASU].

Indeed, during those years many scientists whose names became widely known had graduated from the university and, in particular, from its physical-mathematical faculty. Among them were the biochemist of plants, academician A. N. Belozersky (1905 – 1972), mathematicians A. I. Markushevich (1908 – 1979), academician of the Academy of pedagogical sciences [its vice-president in 1967 – 1975], S. V. Starodubtsev (1914 – 1967), T. N. Kary-Niyazov (1897 – 1970), S. Kh. Sirazhdinov (1920 – 1988), T. A. Sarymsakov (1915 – 1995), U. A. Arifov, S. A. Azimov (1914 – 1988), academicians of the Uzbek Academy of Sciences, and corresponding members of that academy I. S. Arzhanykh (1914 – 1980) and V. I. Gubin (1917 – 1975).

Yu. M. Slonim, doctor of physical and mathematical sciences, who entered the CASU in 1925, recalls that many students had been studying during their first year, but only 10 – 12 remained after that. [She or the authors explain:] In Tashkent, there was only one higher technical educational institution and many of those who attempted to enter it, had been first entering the university to ease the education.

Among those who remained were such strong students as Markushevich, M. F. Shulgin, A. P. Domoryad, Subbotin. Kary-Niyazov and G. D. Djalalov were also among those students and, a year before them, M. I. Eidelnant (later a renowned specialist in the theory of probability and mathematical statistics[4.28]) and Trofimov, the founder of heliophysics in Uzbekistan.

Apart from mathematics and physics there were lectures in chemistry, biology (Professor A. L. Brodsky), geology (Professor V. G. Mukhin), genetics (Slonim). S. N. Naumov, a professor of chemistry, was the dean.

Chapter 5. The Pre-War Time

5.1. The Romanovsky family in the 1920s – 1930s. Romanovsky invariably remained the life and soul of the physical-mathematical faculty. He taught passionately and spent much time compiling programmes. His elementary treatises on mathematical statistics and correlation were published three times [25; 37; 130] and twice [32; 64] respectively. Many times he read a course in the introduction to analysis which was published twice [29; 124].

Romanovsky united the instructors of mathematics and physics attracting them to scientific work by the physical-mathematical group which he had established. In 1923 it became the physical-mathematical section of the Society of the lovers of natural science attached to the university and was its perpetual chairman. A. N. Nikolaev [269] described his activity there:

Romanovsky reads interesting reports or communications at almost each sitting. Those who attend are always well informed about his work. He shares his thoughts with his colleagues but gladly hears out their opinion as well and attentively listens to their reports, submits his comments and stresses the interesting thoughts of the reporters, develops them and indicates possible generalizations.

Romanovsky’s pedagogic work produced good results. There were many good and promising, as he saw, mathematicians among the graduates.

In Tashkent, Elena Romanovskaya also found a wide field for creative activities. In 1920 she began to work in a musical educational institution, the first one in Central Asia, the People’s conservatoire, and taught there the theory of music. Her interest in the people’s songs, which had been born earlier, drew her closer to the investigators of the local musical folklore. With time, the recording and studying of the Uzbek folk music became the matter of her life. Together with V. A. Uspensky (1879 – 1949) and N. N. Mironov (1870 – 1952) she is justly considered the founder of the study of the Uzbek musical folklore [235; 243; 244].

The life of the Romanovsky family had been then going on normally and everything was quite well, but in 1925 there occurred a horrible shock: the death of their only eleven-years-old daughter. To endure this distress both man and wife became completely absorbed in work.

Elena entered the musicology faculty of the Leningrad conservatoire which was then established by the remarkable composer and scientist B. F. Afanasiev (1884 – 1949). After graduating in 1929, she began teaching in the Tashkent musical school, the former People's conservatoire, and, from 1934, in the Higher musical school (from 1936, the Tashkent conservatoire). For many years she had been head of that institution as its director and [or?] scientific deputy director. It had played a most important part in the development of the musical culture of Uzbekistan. She had been also working in the Tashkent scientific institute of art criticism and participated in several expeditions over Uzbekistan. She was able to write down many Uzbek folk songs and instrumental melodies which were later studied and published [219].

Her life and work is described in the contributions of musicologists (M. S. Kovbas et al) and her works are published as well [277]. Her students and colleagues (Kovbas, G. S. Bysgo, I. A. Akbarov et al) mention not only her erudition, industry, pedagogic talent and great authority among specialists, but her remarkable spiritual qualities. Mathematicians, who very often visited the hospitable Romanovsky house, in which mutual understanding and peace of mind reigned supreme, also used to recall her modesty, tactfulness, unselfishness, constant readiness to help people and surprising charm.

5.2. Scientific trip abroad. Mathematical statistics. In 1925 Romanovsky secured a professional business trip abroad which was important for his scientific work. He became possible to get personally acquainted with the most authoritative specialists in mathematical statistics, Pearson[5.1] and Fisher whose work he had been studying even as a student as testified by his handwritten notes from his archive.

Karl Pearson (1857 – 1936) was an English mathematician, biologist and philosopher. From 1884 to 1911 he had been professor of the London University College, then director of the Laboratory of Eugenics attached to that university. He developed the theory of correlation and applied it when studying the problems of heredity and evolution. He also proposed statistical tests and a criterion for checking the correspondence of experimental data with some law of distribution.

Pearson introduced curves of distribution (the Pearson curves) for describing natural phenomena and applied the method of moments for solving practical problems. In 1902 he founded the periodical *Biometrika* whose incessant reader was Romanovsky and where some of his papers had appeared from 1923. The fate of Pearson's scientific heritage in the Soviet Union was greatly influenced by Lenin's crushing criticism (in his *Materialism and Empirio-Criticism*) of his Machian views[5.2]. However, Lenin could have hardly appreciated

Pearson as a scientist since he was not sufficiently [not at all] versed in mathematical statistics.

Another scientist who had essentially influenced Romanovsky was Ronald Fisher (1890 – 1962), a mathematician and geneticist, an author of many contributions on mathematical statistics[5.3]. Romanovsky appreciated Fisher's studies in a review of his book, *Statistical Methods for Research Workers*[5.4], 1925:

The book is a remarkable phenomenon […]. *Fisher indeed describes modern methods of mathematical statistics, efficacious and deeply practical on the one hand and based on rigorous stochastic theory on the other hand.*

Romanovsky thinks that

The exposition […] *is always consistent, comprehensive and rich in subtle and original remarks and is fresh as a primary source. Indeed, its subject matter is almost completely Fisher's own creation, checked in practice by him or his students and what is borrowed is deeply thought out and recast.*

The connection between Romanovsky and Pearson, Fisher and other foreign scientists was not interrupted. This is shown by many reprints of their works sent to him and extant in his library. The inscriptions on them testify to their deep respect of their Russian colleague.

After 1930 a struggle for *materialistic dialectic in mathematics* had begun and attacked mathematical statistics with all its might (see for example [258; 263]) it became difficult to maintain such ties.

In 1931 – 1932 many changes were made in the arrangement of accounting and statistics which began to be considered as a most important vehicle of the planned economy. [I leave out a few helpless and partly wrong lines. Instead, see Sheynin (1998).]

Romanovsky [81] discussed this problem in a booklet in which some general considerations which guided him in those times were formulated. In particular, two directions of the development of statistics and the need to apply statistical methods in the planning of a socialist economy were mentioned:

On the one hand the methods of statistics are developing as their application to exact and natural sciences. This requires an essential mathematical arsenal whose study is completely beyond the possibilities of higher economic educational institutions since they have, and are unable to have the necessary time. […]

The other direction is mainly connected with economic studies. Here, the methods and their mathematical foundation are simpler but I think that here also we will encounter such problems which require serious mathematics[5.5]*. However, until now this direction should naturally remain in the hands of economic higher educational institutions.*

Then, I ought to indicate one more branch of statistics which, as it seems, is still little dealt with in our country and to which we ought to pay attention. I have in mind the application of statistics in technology and industry: control of products, examination of the quality of mass production, comparison of the products manufactured by different methods, establishment of guarantees in mass production etc.

The application of statistics in this direction is intensively developing in the USA and Western Europe. Special manuals are already available there. It is evident that for a country which is building up socialism and especially needs technology and industry this new branch of statistics should be really studied. A special course ought to be included in the programmes of higher economic educational institutions if they are training inspectors and rationalizers of mass industrial production.

5.3. Thirty years of scientific and pedagogic work. In 1936, in Tashkent that date was celebrated. On August 15 the government of the republic awarded Romanovsky the title of its Honoured Science Worker. A special issue of the *Trudy* of the CASU was devoted to that jubilee [294]. Among the authors were renowned foreign specialists in the theory of probability and mathematical statistics, university professors B. Hostinsky (Brno), E. L. Dodd (Texas), R. von Mises (Istanbul), J. Neyman (lecturer, London University), P. R. Rider (Washington), M. Fréchet (faculty of science, Paris), as well as Moscow scientists N. F. Derevitsky, A. A. Konius, V. P. Levinsky, E. E. Slutsky et al.

That issue also contained materials about Romanovsky's scientific biography. Then, N. N. Nazarov [264] described his work in mathematical analysis and A. N. Nikolaev [269] submitted an essay on his scientific and pedagogic work. Romanovsky himself [125] appreciated the mathematical investigations in Uzbekistan during the years of his pedagogic and scientific work:

In the Middle Ages Central Asia had been the homeland of several greatest mathematicians. The most renowned among them was al-Khwarizmi, the creator of algebra[5.6]*, al-Biruni, the great philosopher and mathematician*[5.7]*, al-Hudjandi who studied the most difficult problems of the number theory, the celebrated Encyclopaedist Avicenna (Ibn Sina) and others. A brilliant follower of their tradition was the eminent Uzbek astronomer Ulugbek. He was one of the last scientists if not the last one who studied mathematics. After him mathematics in Central Asia ceased to develop.*

Before the revolution only very elementary treatises on arithmetic, architecture and land surveying had been left in the higher Muslim schools, madrasa, from the mathematics of the Middle Ages and even the teachers there made them out with great difficulties. And only after the revolution a real flourishing of the culture and science including mathematics had begun. […]

Best developed became the studies devoted to the theory probability and mathematical statistics. They were mostly theoretical but especially in mathematical statistics many works were of the applied, practical direction: the application of the statistical methods to hydrology, meteorology, cotton-growing, silkworm breeding, agronomy, biology etc. Among them we ought to mention especially the works of Eidelnant on field experiments, the rate of growth of the yield of cotton and forecasts of such yields, as well as the works of Professor L. K. Korevitsky on the regime of rivers in Central Asia and the pertinent methodical problems.

Already in the mid-1930s the studies carried out by Romanovsky placed him among the first-rate Soviet specialists in the theory of probability and mathematical statistics. When analysing the stochastic methods, Khinchin [309, pp. 45 – 46][5.8] wrote:

The third prominent centre of creative work in this field is Tashkent. The leader of mathematicians in the Central Asian University, Romanovsky, is a most outstanding world authority on mathematical statistics. Whereas Bernstein and his associates and the Moscow stochastic school mainly concentrated their efforts on the theory of probability, the entire scientific world of mathematical statistics is attentively following the work issuing from the Soviet Central Asia. It is rather difficult and unnecessary to draw a clear boundary between the two abovementioned sciences, but the border is mainly determined by the fact that probability theory is mostly interested in theoretical regularities of mass phenomena whereas mathematical statistics creates practical methods for scientifically mastering these phenomena. It is self-evident that any antagonism between these two branches of the essentially indivisible science of mass phenomena is out of the question. On the contrary, they most indispensably supplement one another.

Romanovsky is one of the most productive Soviet scientists and the remoteness of his city from the old scientific centres does not hinder his uninterrupted close ties with scientists the world over working in this sphere. It is difficult to name any considerable area in current mathematical statistics in whose development Romanovsky did not actively and moreover weightily and authoritatively participate.

To remind, this was written in 1937.

Almost a decade later Gnedenko [230, p. 171] characterized the scientific and pedagogic work of Romanovsky:

During the latest 25 years all the mathematical life in Tashkent had been connected with Romanovsky, a student of Markov. […] *He organized the Tashkent physical-mathematical society, was the permanent head of the Physical-mathematical institute attached to the Tashkent University, and during the first years of* [after] *the revolution actually alone endured the burden of teaching in the physical-mathematical faculty. He did everything in his power and had spent much efforts and displayed pedagogic tact when preparing scientists from the Uzbek milieu.*

And here is Gnedenko's opinion [231, pp. 209 – 210] about the mathematical work of Romanovsky:

When investigating mathematical statistics, Romanovsky had for some time worked under a certain influence of the Pearson school. However, when selecting methods of work, he followed Chebyshev. Being Markov's student, Romanovsky adopted from him the traditions of the Chebyshev school and among them a mathematical rigour of considerations and a logical scrupulousness of constructions. This, indeed, was lacking in the work of the English statisticians.

For almost twenty years of work Romanovsky's investigations covered literally all the parts of mathematical statistics (*curves of distribution, theory of sampling, distribution of statistical measures, tests of randomness, disclosure of latent periodicities etc.*)*. His studies* *of the distribution of the coefficients of correlation and regression for samples from normal populations are classical. At the same time Romanovsky actively propagandized statistical methods. He wrote a number of books and thus essentially assisted the upsurge of statistical culture and interest in statistics. Among his books we especially note his elementary course* [25; 37; 130] *and the fundamental treatise* [121]. *Romanovsky also actively propagandized statistical methods.*

The numerous works of Romanovsky in the theory of probability had been devoted to the extension of the main Lyapunov [central] *limit theorem on the many-valued random variables, Markov chains and construction of important patterns of dependent random variables which generalized those chains. I shall not describe here his capital results pertaining to the so-called bicyclic chains which he was the first to introduce. We only indicate two of his fundamental memoirs devoted to Markov chains with a finite and a continuous number/set of states.*

Romanovsky connected the study of the former chains with matrices and had to develop in detail separate issues of the theory of matrices. His is nowadays one of the main methods in the theory of Markov chains which is widely applied by many specialists for further studies. Romanovsky connected the latter case of Markov chains with the theory of integral equations.

One of the main methodological principles of the Chebyshev school was the connection of theory with practice. In his entire scientific work Romanovsky had been keeping to this principle. A close connection of his theoretical studies with their application to the problems of agriculture, economics, technology, military matters is characteristic of all of his works. Not only did he apply the results of his investigations, he used his solutions of practical problems for developing the theory.

Chapter 6. The Uzbek Academy of Sciences

6.1. The establishment of that academy and of the Institute of mathematics and mechanics. By the decision of the Soviet government of 27 September 1943 the republican Academy of Sciences was established during the very peak of the Great Patriotic War. The basis of that academy was the Uzbek branch of the Soviet Academy of Sciences which existed since 1940. At that time Romanovsky became its effective member and one of the organizers of the Institute of mathematics and mechanics created in November 1943 which was later named after him.

From the first days of its existence the leading part in the work of the republican Academy of Sciences was played by Romanovsky's students, graduates of the physical-mathematical faculty of the Tashkent University. Its first president was Kary-Niyazov, a mathematician and a historian of the science of Central Asia, the author of the first mathematical textbooks in the Uzbek language, a student of the work of the Samarkand astronomical school of the 15th century and its head, Ulugbek.

In 1947 T. A. Sarymsakov, another student of Romanovsky, replaced him. Later, for a long time S. Kh. Sirazhdinov, a most eminent representative of the scientific direction created by Romanovsky[6.1] and academician of the Uzbek academy had been its vice-president.

The head of the Institute of mathematics and mechanics (later the Institute of mechanics became independent) until his untimely death in 1947 was Romanovsky's student and talented young mathematician, Professor N. N. Nazarov. Romanovsky himself was its director in 1950 – 1952.

In the beginning the staff of this institute only consisted of twelve people but in 1946 it was widened and three departments were organized: theory of probability and mathematical statistics (headed by Romanovsky), of mathematical analysis and mechanics (Nazarov) and theoretical geophysics which investigated synoptic meteorology, a subject of special importance during the war period. Professors V. A. Bugaev and V. A. Dzhordzhio worked there and guided the geophysicists at the Uzbek Academy of Sciences, at Tashkent University and in the Hydrometeorologic Service[6.2].

In 1948 a collective of scientists, workers of the Uzbek Academy of Sciences, Romanovsky, Sarymsakov, Bugaev and Dzhordzhio were awarded the State prize[6.3] for the application of the statistical-stochastic method in meteorology. The essence of their studies consisted in that the evolution of some meteorological events was considered as a discrete chain of the Markov type. The dynamics of the formation of the climate obtained a quantitative expression[6.4].

6.2. The All-Union Conference on Mathematical Statistics. In the autumn of 1948 that conference took place in Tashkent. It was organized by the Steklov mathematical institute of the Academy of Sciences and the Institute of mathematics and mechanics of the Uzbek Academy of Sciences. Apart from local people the participators included scientists from Moscow, Leningrad and Kiev and staff members of the higher educational institutions. The chairman of the organizational committee was Romanovsky and the secretary, M. I. Kamalov. Its members were Kolmogorov, Gnedenko, Smirnov and Sarymsakov.

The conference lasted from 27 September to October 2, the sittings were very populous (up to 200 people) and the reports were devoted to the directions of the development of mathematical statistics. They were later published [302]. The conference was thought to discuss widely the state of mathematical statistics and to transform it in the spirit of the time during which the *celebrated* ideological decisions of the Party's Central Committee had been adopted. They had to continue the previous discussions on literature, art and science with very grievous consequences for the society and especially tragic for genetics which was devastated under the slogan of struggle against weismannists-mendelians. It mightily hurt mathematical statistics as well since geneticists had applied statistical methods for justifying their theoretical deductions.

The participants of the conference had to condemn unconditionally the development of Pearsonian and Fisherian ideas[6.5] as *an admiration for all foreign* and demand the most possible approach of statistical investigations to practice. It was declared that to take after the system of Pearson or similar systems meant *to abandon consciously any attempt to discern the causes of non-normal distributions or to manage these causes*. Those scientists who had been working in the undesirable directions were accused of idealism. It was not at all accidental that, in the opinion of a reporter (N. A. Brodachev [Borodachev?] [302, p. 200])

The roots of these directions in the statistical science originate from people of such a philosophical direction definitely hostile to materialism as Pearson and Poincaré [literal translation]. *They are so often and unflatteringly mentioned in* [Lenin's] Materialism and Empirio-Criticism *and their example illustrates the criticism of the often repeated formula* […] *that a certain foreign scientist is indeed keeping to the fundamentally wrong philosophical position but that this does not allegedly tell on his purely scientific results. The opposite is at once seen here: the philosophical arguments in favour of symbolism, of the conditional essence of human knowledge, of man as the creator of natural laws, of the statement that the laws of nature are much more the product of human mind than of the facts of the outside world* (*Pearson*).

These statements are completely represented in the scientific notions of the Anglo-American Pearsonian statistical school. The refusal of attempts to discern the essence of phenomena or processes which lead to some distributions is obviously occasioned not by the difficulties of that problem but by the conviction that its very formulation is useless and unjustified. For us, Soviet scientists, that approach is unacceptable and we ought to look for other ways.

Romanovsky's situation was naturally extremely delicate. For many years he had collaborated with Pearson and Fisher and it was also aggravated for example because he maintained relations and corresponded with one of the *heroes* of the discussion about genetics, academician V. S. Nemchinov who had developed his, Romanovsky's, ideas [238].

Romanovsky made two reports [169; 166]. The first one, as it seems, had done away with suspicions of the alienation of his studies from practice. These reports were accompanied by discussions whose participants acknowledged the significance of his results and indicated the importance of the Tashkent school of mathematical statistics. However, reproaches, serious at that time, for his keeping to the Anglo-American direction were also made and, as it was required, he had *repented* of his *ideological mistakes*.

Chapter 7. Studies in Mathematical Statistics

In Russia, statistical studies began in the last quarter of the 18th century. In 1889 [in 1839] A. Obodovsky, professor of statistics at the Main Pedagogic Institute, published his *Theory of Statistics* […] and D. P. Zhuravsky, the scientific secretary of the statistical department [at the time, manager of an estate], published his statistical study [in 1846].

The development of mathematical statistics in Russia is connected with the Chebyshev Petersburg school. His student, Markov (1856 – 1922) essentially contributed to the theory of probability. His most important result was the creation of the theory of the so-called Markov chains. In mathematical statistics Markov developed the method of least squares[7.1].

The works of Russian mathematicians ensured the appearance of a new direction of mathematical statistics which synthesized the successes of the representatives of the English and German schools. Romanovsky belonged to this direction and made much to establish it in science[7.2].

He began to study problems connected with mathematical statistics about the year 1910. In 1912 he published his work [4] considered above. Later he [16] communicated his results on the generalization of the Pearson curves. Still later his work became connected with Tashkent. Already in 1919 – 1920 he began reading a course in mathematical statistics [25]. He also worked in the field of the theory of probability and in his earlier work (1921 – 1929) he paid special attention to the connection between these two directions of mathematics[7.3].

He is interested in the precision of statistical observations. When studying the notion of reliability of the observations of a certain magnitude he [24] remarks:

In most cases when observing or measuring a certain magnitude it is thought of either determining its true value if it exists[7.4]*, or its value which can be regarded as its typical or normal value. For example, we can measure a certain physical magnitude, say gravity in a certain point of the Earth's surface. We may suppose that its true value exists but that each measurement is accompanied by a number of random errors.* (*Systematic errors which always lead to deviations from the true value in one and the same direction are usually diligently eliminated and, when treating the data, only the random errors are considered*[7.5]). *Therefore, after obtaining a series of measurements, we define values which are more or less deviating from the true value.*

Statisticians often if not always have to do with magnitudes whose true values cannot exist. Thus, when a number of observations provides, for example, the coefficients of births in a given country, we encounter a problem: how to determine not its true value, but such a value, that can be considered typical or normal (pp. 15 – 16).

He remarks that the arithmetic mean is most often considered as such.

In 1925 Romanovsky [44] studied the contributions on the theory of correlation which had appeared after 1915 and offered explanations and forecasts. He begins by analysing the works of Chuprov which he appreciates very highly:

They are characterized by the depth and generality of ideas which make them one of the most outstanding if not the most outstanding works in theoretical statistics (p. 2).

Chuprov, as Romanovsky indicated, established the main notions basic for the construction of the theory of correlation and introduced a new chapter, the theory of the stability of correlation which opens up new possibilities for mathematical statistics. He himself also studied the theory of correlation. Thus, during the Third All-Russian Congress of Statistics of 1921 he read three reports at the section of theoretical statistics [29; 28; 27].

In the first he proved three theorems [their description is unintelligible]. The second was devoted to terminology[7.6]. The coefficient of correlation only estimates the degree of linear connection between the studied magnitudes and in 1905 Pearson introduced the so-called correlation ratio but only justified it empirically. Romanovsky stated that he did not know about any attempts to base it on some general principles which will allow a deeper penetration in the sense of the estimates achieved by means of that ratio and tried to *improve the situation* [28, p. 29].

In the third report Romanovsky described some points of the theory of association of attributes founded on the theory of probability and showed that that entire theory can be thus simply and rigorously justified. British scientists empirically established and developed that theory by mathematical statistics.

His reports were heard out very attentively and provoked ardent interest among theoreticians of statistics. The participants of the Congress were convinced that the results of Romanovsky were extremely important for mathematical statistics. Since these reports were purely theoretical the editorial staff of the *Vestnik Statistiki* in which they were about to be published decided that for *a better understanding of the significance of the offered contribution* it will be useful to accompany this unusual for a popular journal publication by short explanations.

Their author [311, p. 43], Chetverikov, enthusiastically characterized them. He stated that after Chuprov Romanovsky was also reforming statistics in the direction which provides *immense prospects*. He remarked that Chuprov had begun his work ten years ago, in Petersburg [and is now living in Dresden], and continued:

In remote Tashkent which is separated from the scientific life in the West similar ideas are born, analogues goals are formulated and the same methods are being applied.

He (p. 44) ends enthusiastically:

This is why Romanovsky's reports, in spite of their extremely abstract manner of exposition, are actually topical and vitally important for statistics. Their import is right now necessary for the development of our science. Such studies are similar to electrical current which at the same time moves the lathes and provides light for the work.

According to Chetverikov's suggestion a commission (he himself, T. I. Semenov, E. E. Slutsky, B. S. Yastremsky) was set up for considering the manuscript of Romanovsky's book [37]. Complying with its report the section on theoretical statistics of that Congress resolved [301a, p. 17][7.7] to

Petition the state publishing house [which one?] *to publish that contribution, valuable in every respect, simple but rigorously compiled, and to bear in mind the urgent need in books of such kind which will ensure its wide dissemination*.

Romanovsky's paper [24] is important for understanding his work in mathematical statistics. There, he summarized the results of the development of that science[7.8] and actually sketched a plan of his later work. The paper begins by a statement that some most important and interesting phenomena in the science of the first two decades of the 20th century was the development of the statistical method and its application to most various branches of knowledge from the social and economic field to astronomy, biology, physics, technology, pedagogy etc.

This, as he remarks, gave the cause for the renowned French mathematician Borel to state that in the future investigations will be only made by the statistical method[7.9]. Romanovsky (p. 5) adds that there appeared

A peculiar statistical concept of phenomena which take place in the society but not in a single individual. Its beginning was ensured by the work of the greatest physicists of the 19th century, Helmholtz, Maxwell, Boltzmann and William Thomson (*Lord Kelvin*)[7.10].

This concept is very important since it (p. 13)

Unites natural science and humanities and provides a single, closed in itself picture of the world in which no essential difference between phenomena in nature and in human societies, between those in the living and the dead [dead and living?] *nature. In that picture all the phenomena are subjected to a single proposition* […] *which is a corollary of the application of the theory of probability to chaotic random phenomena*[7.11] *taking place in the world.*

When explicating the essence of the statistical Weltanschauung Romanovsky issues from the main proposition of the inaugural discourse of F. Exner when he became rector of Vienna University. He devoted it to the laws of nature in natural science and humanities. Romanovsky indicated that in the former case we find the laws of the phenomena, i. e. the definite one-valued connections between them whereas in the latter case this is impossible[7.12].

The cause of that difference is that the natural phenomena are repeated a very large number of times but that in the latter case there are no such repetitions. Indeed, these phenomena flow too slowly and it is impossible to find a number of them sufficient for detecting the laws of such repetitions[7.13].

Romanovsky formulates a few methodological conclusions. At first, he separates elementary laws from the laws characterising systems. Thus, the laws of the collisions of gas molecules and those governing the behaviour of gases. This separation is however not absolute: some laws can at the same time belong to both types.

The laws of the second type can be determined *either from those of the first type when they are known or established by direct study of the system* (p. 14). Romanovsky indicates that science progresses in either way or in both ways simultaneously. He provides several examples of laws which were established statistically but could have been determined stochastically as corollaries of more elementary phenomena. One of his examples was the Mendelian law of heredity[7.14] (*one of the most surprising and grand biological discoveries in the sense of its corollaries*).

Then Romanovsky considers social phenomena. The laws which govern them

Are determined almost exclusively by the second way. Along with the application of precise methods of study that way led to the development of the statistical method of investigation.

Romanovsky believes that the second law of thermodynamics allows us to declare that the world moves from less to more probable states. But the most probable is the chaotic state of the elements of which all the phenomena are consisted. Some scientists (Helmholtz, N. A. Umov et al) consider organic matter as a struggle [literal translation] against the dissipation of energy. Then Romanovsky lists the problems which have been generated by the idea about the living nature (above) and indicates that their importance for us and for our Weltanschauung is obvious. However,

The determination of the answers to those problems is the duty of the future whereas we can only formulate the problems themselves.

The most important is the transformation of energy (?). Therefore, we ought to introduce the notion of the more complicated social energies which can be reduced to the elementary forms of the energy of the dead nature according to the complexity of the social phenomena. He is unable to classify social energies but introduces some definitions[7.15]:

By social energy we understand the various special kinds of the ability of various human formations to produce work with the aim of achieving positive or negative social results.

Human formation he understands as the various social or state institutions, societies, groups etc. which undoubtedly influence the present and future human society. He only discusses positive social energy which *transforms the society in the positive sense.*

And (pp. 18 – 20)

Social energy understood and manifested in all possible ways must obey the second law of the dissipation of energy. This dissipation is the result of a gradual transition of the organized harmonious processes into the most probable chaotic process. It is observed as an incessant tendency of the social energy to dissipate, to transform into ever less valuable forms. From this point of view the various social and state institutions have one and the same main goal: to prevent that steady dissipation by picking up all those social formations or phenomena which introduce most valuable forms of social energy and increase the stock of the free energy of the society. And when all the state and social institutions are transformed, and their work is necessarily suspended as it occurs during great revolutions, it leads to that economic dislocation, to that decline of the welfare of the nation, which always accompany such revolutions and with which it is so difficult to struggle just as with any irreversible process[7.16].

Thus, for developing his philosophy of the statistical method Romanovsky comes to conclusions which still had been possible in the beginning of the 1920s, but became dangerous already by the end of that decade. For him, this paper was the philosophy of his life and scientific work. He himself became one of those who worked on the formation of the ideas of mathematical statistics and who thought to transform the world with its help. Romanovsky was therefore unable to stop at a pessimistic note and went on to the issues of the future of the society which had endured such a horrible war and gone through all the difficulties of the post-war economic dislocation.

He quoted the opinion of the English sociologist Kidd[7.17] who believes that the interests of the living are only significant if they are included in the interests of the invisible majority, the yet unborn future generations. His principles and the sense of the Western civilization are only another expression of the principle of the struggle with the dissipation of energy in general and social energy in particular:

A property acquired and developed by any individual during its life is not hereditary. A given nation can obviously be appraised from the viewpoint both of the number of its valuable psychophysical unities and of their multiplication and dissemination among its members. These two facts are of great social and historical significance. The periods of progressive increase of the number of those valuable elements and its successful distribution in the nation are the periods of the progress of its civilization. The periods of their quantitative decrease and chaotic scattering in the nation are the periods of the degeneration of the nation and decline of its culture.

No reasonable social policy aimed at the progress and development of the nation is possible if it disregards or does not take into account the action of those biological factors of each culture (p. 22).

It follows, Romanovsky continues, that eugenics is a science aimed at a precise study of these factors and is extremely important. It was initiated by those same scientists who laid the foundation of mathematical statistics, Galton and Pearson[7.18].

Romanovsky ends his essay by applying statistical principles for the solution of two problems, about the eternal repetition of things and on the end of the world. Many philosophers, and first of all Nietzsche think that the world, developing right up to eternity, ought to repeat its single history infinitely many times in all its details. However, the methods of mathematical statistics can easily prove that the probability of that statement is infinitely low.

Concerning the second problem we ought to take into account the abovementioned circumstance, the dissipation of energy conditioned by the transfer of the world from less to more probable states. Here, however, a question emerges: does this transfer occur mathematically precisely or not? In its essence, that transfer is formed by random phenomena and therefore cannot be a precise mathematical law[7.19]. In addition, the occurrence of states essentially different from the most probable state is unlikely but possible.

Then Romanovsky (p. 26) indicates atomic energy as a possibility of eliminating the gloomy corollaries of the second law of thermodynamics:

With the decay of atoms colossal stocks of energy are freed and can at least partly revive the world. In addition, we do not know how the atomic energy of the elements is accumulated. Principles which will never allow the world to die are possibly acting exactly here. In any case, the laws which should be subjected to the results of the action of such principles ought to be statistical.

And here is the end of his paper (pp. 26 – 27):

My fugitive and imperfect sketch of the statistical Weltanschauung […] *allows us to see that the world outlook is a colossal synthesis of our ideas about the world, is one of the deepest philosophies of the world. If realized consecutively and precisely, this philosophy can provide and possibly provides the most general phenomenology of the world.* […] *I think that it can be considered in a precise geometrical way.* […] *Indeed, already Galileo remarked that the world is written in a mathematical language.*

When explaining his concept of the *statistical Weltanschauung* Romanovsky had compiled the plan of his future studies by placing mathematical statistics in its both aspects, theoretical and practical, in the first place. He is so full of these problems that he considers some branches of mathematics only as an auxiliary material for statistical studies. In particular, we will detect these thoughts when analysing his stochastic investigations.

During the 1920s Romanovsky intensively studied and analysed the work of foreign and national scientists who had introduced new thoughts and ideas into mathematical statistics. He creatively remakes and improves his lectures and communicates to his listeners all the appropriate novelties of the world scientific thoughts.

Thus, after analysing the works of Chuprov he turned to the studies made by Student (Gosset) in 1925 and two papers of Oskar Anderson of the same year about the so-called variance-difference method[7.20]. It was proposed by the English scientist Cave (1904). Romanovsky also turned attention to the proposal of Smith (1922) which concerned the correlation of magnitudes observed by interconnected trials. Smith studied the biological problem of determining the correlation between the indications of parents and sons or between brothers (or sisters). Romanovsky thus showed (?) that the theory of correlation had already mastered new methods of solving new problems.

Fisher undoubtedly strongly influenced Romanovsky, who published a paper about him [58] or, more properly, about his paper (1921). Romanovsky described it in detail. As always, he attempted to acquaint hiss readers with the very *kitchen* of the latest studies. A remarkable note accompanied his paper:

The editorial staff does not share either the main suppositions of Fisher, who belongs to the Anglo-American empiricists' school or Romanovsky's attitude to the constructions of Fisher. This paper is nevertheless published since it is necessary to acquaint our readers with all directions of the scientific statistical thought.

It seems that that staff already felt the approaching *cold period* and just in case attempted to dissociate from *inconvenient* ideas.

Fisher became known to statisticians since he (1915) derived the law of distribution of the empirical coefficients of regression in samples from an indefinitely large normal statistical population. He stated that the main problem of mathematical statistics was the reduction of numerous initial materials to a few magnitudes of equal value. This is achieved by the construction of a hypothetical infinite general population whose random sample is comprised of the observed statistical facts. Romanovsky remarks that

Fisher says that the notion of an infinite general population is concealed in all the propositions in which mathematical probability is discussed. He determines that population as a logical conceptual result of the studied conditions.

A number of problems emerge when reducing observations and Fisher indicates **1)** Specification: choice of the form of distribution of the hypothetical general population; **2)** Estimation: determination of free statistical magnitudes for determining or estimating, by issuing from the observations, the parameters of the general population; **3)** Distribution: determination of the laws of distribution of the statistics derived from observations when a great number of samples similar to that which provided the data is considered.

Romanovsky continues:

When the forms of the distribution of the studied arguments and of the hypothetical general population are chosen, it becomes necessary, by issuing from the observations to construct summary statistics which will determine more or less precisely the unknown parameters of the distribution of our arguments in the general population.

Even in comparatively simple cases the problem of the distribution of those statistics presents essential difficulties. Romanovsky [58, p. 231] notes that a systematic treatment of such problems had only begun quite recently:

Solutions of problems about the distribution of the mean square deviations for random variables connected by a normal correlation, of the correlation and regression coefficients and some other magnitudes which are determined by samples from a normal general population were found only most recently.

Romanovsky indicates the works of Student, Pearson and Fisher as well as his own not yet published studies in this field. Then he goes on to the criteria for estimating statistics and indicates that according to Fisher they can be derived for the determination of some unknown parameter which characterizes the general population. Fisher lists three types of such criteria: of consistency, effectivity and sufficiency.

Romanovsky singles out Fisher's remark about the Pearsonian method of moments which is one of the applications of the criterion of sufficiency[7.21]. Then he dwells on the analysis of the criterion of effectiveness and of the determination of effective statistics. By following Fisher when determining an effective statistics corresponding to the studied parameter, Romanovsky applies the method of maximum likelihood and considers its use for the case of one parameter.

Then he takes up the general case of several parameters, studies the equation of maximum likelihood and proves it (?). Next comes the proof of a theorem which, as he states, is very important for the entire Fisher doctrine[7.22]: if some statistics was derived by the method of maximum likelihood and, for a sample of a large size, has a near-normal distribution, it is effective.

When studying small samples and sufficient statistics he estimates the inner precision[7.23] of the curves of distribution of statistics, Romanovsky [58, p. 261] indicates that

Sufficient statistics are a perfect vehicle for deriving the parameters of distribution, but they do not exist always. It is therefore important to find a means for estimating statistics given their distribution in random samples.

Romanovsky's work on mathematical statistics during the end of the 1920s and the 1930s which alternated with his stochastic studies can be separated into three groups: textbooks and educational aids; popular-scientific contributions; and scientific investigations. True, this classification is tentative since he invariably remained a scientist. His studies, especially those published in the 1920s, are written in his peculiar manner. We feel there pedagogic skill and the deep knowledge of a historian of science. He begins by explicating the history of the problem, then formulates those main propositions which he intends to study. As a rule, he issues from a general formulation of problems and goes over to the particular study.

Thus, in 1942 [not in the 1930s!] [142], when considering inductive conclusions in statistics, he begins by a number of general propositions (p. 3):

The main value of statistical conclusions consists in that they allow a more or less precisely establishment of the properties and laws of those (?) phenomena by observations or trials. The basic method here is sampling which has been deeply and widely developed in mathematical statistics, especially recently, from the beginning of this century and is still very intensively developing.

From the possible general patterns of sampling that of an infinite general population, constant during the trials or observations and random samples of a definite finite size from it is intensively and even almost exclusively developed. The theory of sampling from a general population which varies in time or depending on some other factors is extremely important but still in a rudimentary state.

Samples from constant finite general populations are studied rather minutely and especially those which follow the pattern of a replaced ball. They can obviously be considered as samples from a constant infinite general population with discrete indications having a finite number of values if the frequencies of those values are the same as those in the general population.

Then Romanovsky considers random finite samples from constant infinite populations. This case is important when mathematical statistics is applied for solving various problems of natural science. He pays attention to the estimation of the unknown parameters which define the distributions of the studied indicators of the general populations.

Estimation of such parameters by issuing from trials had long since interested statisticians. Many appropriate methods were proposed and the French mathematician Jordan analysed and appreciated them. Romanovsky considered three methods: the classical method of posterior probabilities; the method of the Fisherian confidence probabilities; and the Neyman method of confidence intervals. He also explicates his own results generalizing the law of large numbers and free from prior probabilities[7.24]. He begins by proving the inverse theorem of Bernoulli and proposes a sufficiently simple solution of a problem connected with an objective estimation of the unknown characteristics of the general population by issuing from observations.

Romanovsky's important merit consists in that he laid a precise foundation for mathematical statistics[7.25]. For the first time he analytically derived the laws of distribution of the *t* and *z* criteria of the empirical coefficients of regression and other characteristics (1938). Earlier, in 1929, he developed the theory of the chi-squared criterion[7.26]. He also considered problems connected with the testing of the hypothesis of two independent samples to belong to the same normal population [65].

In a number of works of 1939 – 1942 Romanovsky introduced some new notions and criteria which essentially simplified the solution of statistical problems. Thus, he [127] showed that the criterion θ which he had introduced was very useful and simpler than the tests proposed earlier[7.27]. He [134] considered the practice of the calculation of the transitional and other probabilities for Markov chains given the results of observations and appraised his results from the viewpoint of mathematical statistics.

In a long paper he [139] systematically studied the main notions and problems of mathematical statistics which was very important methodologically and scientifically. Actually, his paper is a programme for further investigations. He attempted to clarify somewhat the sufficiently entangled set of problems and methods of mathematical statistics. This aim was very advisable since those problems were extremely varied, their classification was difficult and the methods applied for their solution had also essentially varied.

In his works [86; 87; 92] Romanovsky studied periodograms. Their classical theory allows to analyse a number of random variables when they are formed by a superposition of several periodic oscillations and pairwise independent perturbations. He deeply investigated the circumstances accompanying an assumed independence between random perturbations and for the first time applied the saddle-point method for establishing the asymptotic behaviour of the distribution of probabilities.

The practical direction began to prevail in his subsequent work [95; 97; 119; 144[7.28]; 161; 171; 177; 189 and others]. This had not really depended on his wish: it was necessary to solve some urgent problems formulated by the industry, then the war demanded the solution of new problems. In his work on applied mathematical statistics Romanovsky competently answered most various practical questions. He also studied artillery firing [190] and the treatment of geodetic measurements [197]. The paper [200][7.29] appeared at the same time. Nevertheless, he had not abandoned theoretical studies of mathematical statistics which he connected with the theory of probability and practical problems. His work [206] which ended the *industrial* cycle of his studies appeared posthumously.

Chapter 8. Studies in the Theory of Probability

This theory remained in Romanovsky's field of vision from the very beginning of his scientific life. An active follower of Chebyshev and the Petersburg mathematical school and a student of Markov, he paid attention to problems which allowed him to develop and improve the ideas of his great teachers. He found ever new applications of the theory of probability to mathematical statistics and he wrote about it in his paper [35]:

The main importance of the theory of probability for statistics consists in that it constructs the abstract notion of probability which is the limiting notion for relative frequency by issuing from a few and simple prior considerations, and after that, since it offers a number of rigorous mathematical theorems which serve as the foundation for explaining and deepening the notion of the stability of the relative frequencies[8.1] (p. 2).

Romanovsky thoughtfully regarded the verity of those mathematical theories which interested him, and in the first place of the theory or calculus of probability. As Markov's student, he rather often applied the latter term[8.2] and he [35] offered a programme for later studies and justification of mathematical statistics[8.3]. He followed the well known practice of French scientists who used to begin their studies by wide and deep essays on the history of the studied problem. For understanding what was done previously, he studied the works of his predecessors and contemporaries and thus determined his own place in the history of science[8.4]. He [35, p. 4] wrote:

As soon as we encounter its main notions and magnitudes, the theory of probability becomes one of the least understood branches of mathematics. Some consider it, just as the entire mathematics, as a hypothetically deductive science. For some the law of large numbers is the same as the theorems of Bernoulli and Poisson etc. and represents a generic name of some deductive theorems which have no relation with reality[8.5]. *For others it is a purely empirical law which cannot be proved by any deductions*.

The dual attitude to the theory of probability had also been expressed in its different names. For some it is the calculus of probability, the totality of analytical methods and propositions which are analytically derived from a few definitions and axioms. For others, it is the theory of probability which, like the theories of magnetics or light, constructs a system of conclusions which are based on true facts and has a real value.

Then Romanovsky goes on to the measurement of probabilities. He briefly describes the development of the notion of equal probability and indicates the role of Keynes in its understanding. He devoted a special section to the frequentist theory of probability whose origin was due to Ellis (1843)[8.6]. Pearson supported, but Keynes opposed it.

Another section is devoted to the analysis of the law of large numbers by Keynes who was interested in it from the viewpoint of the main statistical problems. He considered its interpretations by a number of scientists and noted that the Mendelian principle (?) provided the law of large numbers a new field. Keynes believes that that law ought to be renamed the *law of stability of statistical trials*.

Romanovsky thinks, however, that the present name ought to remain as a general appellation of many theorems of the theory of probability but that a new law should be inserted and named, for example, the main law of statistics[8.7]. Romanovsky many times returns to the problems indicated by Keynes who believed that the classical theory of probability contained too much vagueness. Condemning this direction (?) developed by Laplace he decisively prefers the methods of studying unknown probabilities proposed by Lexis, Bortkiewicz and Chuprov[8.8] and believes that this direction is more soundly based.

And yet another section of Romanovsky's paper is devoted to the analysis of the investigations of Mises. An engineer by education, professor of applied mathematics in Berlin University and founder of the *Z. f. angew. Math. u. Mech.*, in 1919 he published the paper *Fundamentalsätze der Wahrscheinlichkeitsrechnung*. There, he consecutively constructed an axiomatic frequentist theory of the theory of probability written in the precise mathematical way and based it on two axioms[8.9]. The first can be called the requirement of limit frequencies, the second, the requirement of irregular associated indications. He introduced collectives[8.10], sets satisfying both axioms. These definitions and propositions which constitute the basis of the theory of probability are abstractions and idealize experiments. Their relation with experiments is the same as between geometry and them.

Romanovsky (p. 27) states that

We may suppose that for sufficiently continued trials there existed some probabilities which lead to stable relative frequencies and this fact conforms to the first axiom. The second axiom is justified (!) *by observing that the constancy of the relative frequencies in a large number of trials is not disturbed if we select only a part of the trials when the manner of selection is not connected at all with the considered indications. Furthermore, the ratios of two indications should not change even if all the trials, in which they are absent, will be disregarded.*

This definition of probability has nothing in common with the Laplace definition[8.11]. Romanovsky (pp. 27 – 28) continues:

The classical theory is an abstraction and idealises a narrower and more definite experiment as compared with that on which Mises and before him many English scientists base/based his/their theory. This difference can also explain the difference between the theories. In the classical theory of probability we mostly have trials concerning various games [of chance] *in which complicated results are more or less easily reduced to a few simple cases*[8.12].

The empirical fact of the stability of complicated combinations in repeated games led to the conclusion: elementary cases ought to be repeated an equal number of times and are therefore equally possible. And the genius of the founders of the classical theory instinctively based the definition of probability on this fact. Equal possibility does not therefore yield to any logical conditions since its origin is experimental, is an abstraction of experiment.

However, the foundation provided by games for the theory of probability with its ever expanding knowledge is too narrow. In a great majority of cases in which we may speak about probabilities the simple elementary equally possible cases do not exist and the main facts, which are abstractly represented by the axioms of Mises and which are also basing the classical theory probability, remain.

To embrace these cases as well it is only needed to extend the foundation of the theory of probability and give up that extreme importance which had been and still is attached to the cases of equivalent value which is what Mises is doing. And the new deeper and wider basis of the theory of probability naturally changed its construction which we indeed find in Mises' theory. These changes consist in a more abstract and wider definition and a greater axiomatizaton of the explication.

Mises indicates that the theory of probability has three main fields of application: games, statistical phenomena and physical problems[8.13]. Simplest are the relations of the theory to physics: some distributions are hypothetically suggested and the conclusions made are experimentally checked.

Mises understands the law of large numbers either as some empirical fact which underlays the first axiom, or the known analytic law expressed by the Poisson theorem. In the later case Mises indicates two possible laws. The first represents the known Chebyshev theorem[8.14] which Markov had called the generalized Bernoulli theorem and from which the Bernoulli and Poisson theorems are derived as its particular cases. The second law is the generalized inverse Bernoulli theorem.

After analysing the Mises foundation of the theory of probability Romanovsky concludes that his ideas can be considered as the completion of the efforts of many English scientists who had attempted to free the theory of probability from the notions based on the study of games and instead to attach to it such a basis which will be closer to reality, to experiment. Romanovsky (p. 32) believes that the new theory should get rid of

Excessive formalism[8.15] *and perhaps from some excessive generality attached to it by Mises. In a simpler way, suited to current needs of the calculus of probability it will certainly not only explain the main ideas of the theory of probability but better justify and more correctly apply it to statistical studies.*

In the second part of his paper Romanovsky analyses the main theorems of Mises and their conclusions.

Ideas which had been developed by Kries in the end of the 19th century and Smoluchowski (1872 – 1917), a theoretician of physics, in the beginning of the 20th century, adjoined the Mises' problems. Smoluchowski considered the theory of probability as the arsenal for solving physical problems and therefore began his analysis by studying the formation of the kinetic theory by Clausius and Maxwell.

Romanovsky stresses that the theoretical importance of the results of Mises consists in that he reduced the theorems of the calculus of probability to a few general analytic propositions and that their practical importance is the better justified and more precise application of the theorems of that calculus to statistics. He also remarks that the theorems of Mises do not include the results of Markov for trials connected into chains.

These remarks are very interesting. Romanovsky agreed with a number of Mises' methodological aims and repeatedly referred to them although some scientists (Kolmogorov, Khinchin et al) doubted them[8.16].

For him, the doctrine of Markov chains became the most important field of studies in probability. We saw that when analysing various formulations of the main problems of the theory of probability Romanovsky was especially interested in those which had or could have had some relations with the problems of mathematical statistics. He thus considered the theory of probability as an important mathematical vehicle well suited to their solution. However, as Romanovsky repeatedly stressed, not each specialist in statistics had agreed with the use of mathematics in statistical calculations. The very development of mathematical statistics therefore (?) became another problem so that Romanovsky diligently studied the literature on the theory of probability which he intended to apply in deliberations about that development. He [35, p. 15] paid much attention to the problem of moments:

Among the brilliant results with which Chebyshev and Markov had enriched the calculus of probability and with which a new epoch in its development had begun[8.17] *is a remarkable theorem formulated by the former and rigorously proved by the latter. We will call it the Chebyshev – Markov theorem which Markov formulated thus:*

If the totality of all possible values of some real magnitude x together with their probabilities is changing in such a manner that for each natural m the expectation of x^m *tends to the limit*

$$\frac{1}{\sqrt{\pi}}\int_{-\infty}^{\infty} x^m \exp(-x^2)dx,$$

then the probability of the inequalities $t_1 < x < t_2$ *with or without the extreme values* $x = t_1$ *and* $x = t_2$ *ought to tend to the limit*

$$\frac{1}{\sqrt{\pi}}\int_{-\infty}^{\infty} \exp(-t^2)dt$$

for any t_1 *and* t_2.

This theorem provides the solution of a particular case of the problem called the problem of moments and first formulated by Stielties (1894 – 1895). Nowadays this problem is becoming most important since the method of moments, as it is known, is the main method of studying statistical distributions and after the works of Chuprov its importance is increasing since it plays the basic role in the theory of the stability of statistical series[8.18].

Romanovsky indicates that the Chebyshev – Markov theorem is one of the most important particular cases of the problem of moments. Already Markov himself indicated that his methods can be applied for solving the problem of moments for two other kinds of distributions. Many scientists had later studied this problem and in particular Romanovsky indicated the work of Polya [1923] who solved it almost completely.

However, both the Chebyshev – Markov theorem and the generalized theorem of Polya only provide the sufficient condition for the existence of a definite limit distribution. Bernstein (1890 [1880] – 1968) published a paper [1922a] in which he communicated a generalization of the Chebyshev – Markov theorem with conditions necessary for the existence of the limit Gauss distribution. However, these conditions are not sufficient and in their absence the limit theorem will not necessarily hold. Nevertheless, his result is essentially interesting for mathematical statistics and can be applied in such problems in which the normal distribution of the studied frequencies can be supposed.

Without dwelling on the very interesting theorems contained in the same paper of Bernstein, Romanovsky (p. 22) only analyses his concluding theorem which, *as justly remarked by its author, can base the theory of normal correlation*. Bernstein was a contemporary of Romanovsky and they both had been interested in very similar problems. And in probability both adjoined the direction which was developed by Chebyshev and Markov so that Bernstein's paper had indeed attracted Romanovsky.

Then Romanovsky considered two papers of Pearson, one of them about the probability of hypotheses, the other provided a generalization of the [Bienaymé] – Chebyshev inequality.

As mentioned above, Romanovsky contributed very much to the theory of Markov chains. For many years until 1929 [71], these chains had been remaining a most important theme of his studies. In his monograph [170] he summarized these investigations and dedicated it to the memory of the *great scientist* Markov. In his Introduction he indicated that

Here, many issues are considered which other scientists to do not touch at all: bicyclic and polycyclic chains, Markov – Bruns chains, correlational, complicated chains, statistical application of chains etc.

Much attention is paid there to the *illustrious Russian mathematician Markov* whose works and ideas *are still insufficiently appraised in the Russian literature*.

The most essential feature of this book, in the opinion of its author, was the development of the matrix method of studying chains. He thought that that was the main and the most powerful method for developing the theory of discrete Markov chains.

He began by a stochastic definition of the state of some system in any moment under the condition that it remains indefinite in the future. Such a change of states of a system is a particular case of a stochastic process in general and is called homogeneous Markov chain with a finite number of states and discrete time or, in Kolmogorov's terminology, Markov chains in the narrow sense. Romanovsky [170, p. 11] wrote:

Kolmogorov's terminology is more concrete than Markov's and free from some shade of subjectivism which is concealed in the notion of trials. However, we ought to take into account that trial in the theory of probability denotes the realization of conditions under which some event can take place, and does not necessarily include any subjective element. It can denote an objective observation of realized *conditions independent from the human will. And the term* <u>*event*</u> *is more general than* <u>*state of the system*</u>.

After describing possible Markov chains and coming up to the notion of a stochastic process Romanovsky explicates the theory of stochastic matrices (P) which he applies when describing the theory of discrete Markov chains (pp. 31 – 32):

The final transitional probabilities of a system for chains C_n with a regular law are

$$P_\beta = \frac{P_{\beta\beta}(1)}{\sum_n P_{nn}(1)},\ \beta=1, 2,..., n$$

and are only dependent on the final state of the system[8.19].

In other words, in this case for a moment of time sufficiently remote from any initial moment the behaviour of the system becomes almost independent from its state in the initial moment and almost coincides with the behaviour of a system with independent stochastic states whose probabilities are determined by the abovementioned equalities. This fact (*which can also be established by issuing from another viewpoint* [170, c. 31 – 32]) *was one of the main causes for Markov's choice of the chains C_n as the first and most important object of study in the realm of dependent trials and dependent magnitudes*.

In his subsequent chapters Romanovsky studies chains C_n depending on various features of the system and their representation in the properties of its law (of the matrix P). And it will be more convenient to issue from the properties of a matrix although this is not necessary: following Kolmogorov we may issue from the properties of the system.

After explicating Kolmogorov's concept the author offers a classification of chains based on it. He ascribed the first type to indecomposable chains without non-essential classes or with one essential class. This type is separated into two subtypes: acyclic and cyclic chains. The second type contains decomposable chains C_n with one or more essential and one or more non-essential classes. This subdivision was founded on some properties of the system.

Romanovsky assumed the same classification after issuing from the main properties of the matrix of transitional probabilities. He also suggested another subdivision of chains based on the differing behaviour of the transitional and absolute probabilities $P_{\alpha\beta}^{(k)}$ and $P_{kl\beta}$ with indefinitely increasing k. In this case he separated regular (nonnegative and positive regular, completely regular) and irregular chains. He scrupulously studied acyclic and cyclic chains and devoted a special section to polycyclic chains.

Romanovsky also studied bicyclic chains [137], separated them into two types, indicated three main problems and provided general indications about cyclic processes. Problems connected with characteristic functions of discrete Markov chains had been studied by the founder of this (?) theory and a number of his followers including Romanovsky. He wrote that when investigating homogeneous chains with a finite number of states and discrete time it was not sufficient to study the various properties of the transitional and absolute probabilities; we should also include a number of other issues.

First of all, we ought to investigate the probabilities of repetitions and their properties and the connections between them both for finite and infinitely increasing time, i. e., to study the limit properties and connections.

Romanovsky devoted special attention to the study of the theory of correlation. In his monograph on the theory of Markov chains [170] a special chapter described cyclic correlation. He indicated that after Markov's work of 1912 [of 1916] his own contribution [128] was the first study in which chain correlation was more or less considered. It was then that he noticed that Markov paper and understood that the notion of chain correlation which he thought to be absolutely new was in essence contained there although not indicated by Markov[8.20]. Furthermore, in 1912 [in 1916] Markov negatively regarded the theory of correlation and had not studied it. Only by the end of his life he (in the 1924, posthumous publication) acknowledged it and described it on a few pages[8.21].

Romanovsky indicated that the chapter on chain correlation essentially repeated his earlier work [128]. Both in that chapter and in other parts of his monograph he applied his matrix method which he developed and adjusted for studying problems in the theory of probability and mathematical statistics. He began his investigation [which one?] with the simplest case, a chain correlation of two random variables. He considered the properties of the chain which depend on those of their laws and the connections between these laws but are independent from the values of the variables themselves.

Then he introduced those values and considered the moments (?) to find the limit distributions of the necessary sums. These sums are also the sums of those values which they take during some elementary interval of time. After describing some more complicated cases Romanovsky turned to the Markov chain correlation and to a certain extent simplified Markov's explication. He indicated that the Markov case can be extended and went on to consider two types of chains of correlation closely connected with each other. Then he turned to chains which Markov called non-genuine and which are called the Markov – Bruns chains. Both those authors considered such chains in detail but from different viewpoints.

Romanovsky became interested in the problem of Bruns even in the beginning of the 1920s and during many years repeatedly returned to his ideas and similar ideas of Markov. Following the latter Romanovsky provides solutions of that problem in the simplest case and then analyses the general case. He showed that that case was a special case of a simple discrete Markov chain which provides a simple means for constructing chain trials and in addition possesses special and interesting properties. He also proved that the trials which had been considered by Bruns and Markov are trials connected into a chain but not of the type C_n. In this sense they are not genuine chains.

The Markov – Bruns chains can also be studied for random variables. In 1932 [where exactly?] Romanovsky published a very general theorem which served to detect a remarkable property of magnitudes connected into a Markov – Bruns chain. And in his monograph he also considered the theory of complex chains first studied by Markov (1911). In two papers Romanovsky [134; 138] investigated statistical problems connected with Markov chains. There, as well as in many other cases, he was the pathfinder. He [170, p. 393] wrote:

The main and most important statistical problem which can be formulated about the C_n *chains is the calculation of their transitional probabilities by trials when we have grounds to admit the connection between the studied phenomena which can be described by the pattern of unknown chains* C_n. *The two next important problems are the discovery of the unknown resulting probabilities in a* C_n *chain and a decision whether the considered chain is simple or complex*.

Romanovsky studied these problems and introduced the notion of toughness of chains. He [149] indicated that cyclic processes are very often encountered in nature so that their study is fundamentally important and noted [170, p. 393]:

An important aim of this study is the discovery of the laws of distribution of the frequencies of the cycles in polycyclic chains. This problem is wide and varied and nowadays we are only able to begin studying it in simplest cases.

When investigating the application of Markov chains Romanovsky paid special attention to the practice of statistics. He began by considering solely possible and incompatible events. Suppose [170, p. 407] that

Their occurrence in an unrestricted number of trials is random if these trials are independent with regard to them and each has a definite constant probability. This concept of randomness is restricted and tentative. It should be thus understood when, for example, we discuss randomness in the distribution of the digits 0, 1, 2, …, 9 *in a table of random numbers. It can be essentially widened when considering for example trials in which the probabilities of the studied events change from one trial to another but independently from the results of the preceding trials or even* [when considering] *dependent trials*.

However we consider simplest applications of Markov and Markov – Bruns chains and understand randomness of events in the restricted sense mentioned above. In other cases it is more proper to consider independent homogeneous or non-homogeneous etc. (?) *trials or the corresponding stochastic processes.*

Romanovsky also analyses some applications of Markov chains to Russian philology. Markov himself had studied the alternation of consonants and vowels in Russian verses and prose[8.22] and Romanovsky [134?] similarly studied Sholokhov[8.23] and proved that a more satisfactory approximation to a chain connection is some bicomplex rather than a simple chain as Markov and he himself had earlier thought. In geophysics, Markov chains had also been applied by his associates and students. In his last years Romanovsky again turned to probability theory [195; 198].

Chapter 9. Studies in Other Fields of Mathematics

We have studied Romanovsky's work in his main scientific direction but that does not exhaust his activity. His work in geometry, algebra and number theory in the initial period of his scientific life was also considered above. Now we attempt to communicate some information about his work on mathematical analysis, as well as on history and didactic of mathematics which constituted an important part of his general oeuvre.

9.1. Mathematical analysis. We saw that during the initial period of his scientific work Romanovsky successfully investigated mathematical analysis when studying the Monge – Ampère equation. After moving to Tashkent where his main attention had been attracted by mathematical statistics he had not abandoned mathematical analysis. This fact was conditioned, first, by the connection of the ideas of the theory of differential and integral equations which interested him with the problems of the theory of probability and mathematical statistics; second, by his pedagogic work [even] in Warsaw and Rostov-Don. In Tashkent he read a course in mathematical analysis and another course on the introduction to analysis compiled by himself.

In Tashkent, Romanovsky's first works in analysis were concerned with discovering a mathematical vehicle suited for solving problems in probability theory and mathematical statistics. For his paper [30] such a vehicle was harmonic analysis connected with the theory of Fourier series and the theory of series in general. In 1924 Romanovsky studied the theory of interpolation and published a paper [39], one of those which belonged to his doctor dissertation [13]. He was unable to defend it since a government decree abolished scientific degrees[9.1].

In this dissertation Romanovsky formulated the problem of integrating involutory systems of the first class and solved it by an original method. There also he proved two theorems in the theory of determinants and published them separately, see Chapter 2. Later Romanovsky developed the ideas from his dissertation in two papers [33; 94] on involutory systems of equations of any class with partial derivations of any order. The method which he described in his dissertation was logically completed and he proved that it can be applied for solving involutory systems with any number of independent variables.

Integration of involutory systems of any class is based on the following proposition: some compatible equations are joined to the given system of such equations in a manner ensuring that the common system is solvable with respect to the derivatives of the highest orders. Then the integration of the initial system is reduced to the solution in total differentials. The selection of the adjoined equations requires a solution of a system of equations in partial derivatives of the first order.

Romanovsky had thus completely solved the problem about formally integrating involutory systems of any class. His method of solution can be brought to the end (?) and it is simpler than the less general methods earlier proposed by some eminent mathematicians (Sophus Lie, Weber, Ricière et al)[9.2]

For some years beginning in 1923 Romanovsky formulated and solved unconnected problems of mathematical analysis which had a single aim: the creation of an arsenal for solving problems of the theory of probability and mathematical statistics. Three of his appropriate contributions [44; 45; 90] were devoted to the Chebyshev parabolic interpolation[9.3].

Romanovsky [88] studied the theory of integral equations in connection with Markov chains and their application. He therefore needed to solve equations of the type of

$$u(x, y) = f(x, y) + \lambda\int_a^b \varphi(t, x, y)u(t, x)dt$$

and worked out their complete theory. He applied the Fredholm method and in particular dealt with a case of special importance for studying Markov chains

$$\int_a^b \varphi(t, x, y)dt = 1\,.$$

Later Romanovsky [116] described a new method of solving linear equations of the type

$$z_{m,\,n} = a_{0n}z_{m-1,\,n} + a_{1n}z_{m-1,\,n-1} + \ldots + a_{kn}z_{m-1,\,n-k}$$

and

$$z_{m,\,n} = a_{0n}z_{m-1,\,n} + a_{1n}z_{m-1,\,n-1} + \ldots + a_{kn}z_{m-1,\,n-k} +$$

$$b_{0n}z_{m-2,\,n} + b_{1n}z_{m-2,\,n-1} + \ldots + b_{k_2 n}z_{m-2,n-k_2} +$$

$$b_{0n}z_{m-p,\,n} + b_{1n}z_{m-p,\,n-1} + \ldots + b_{k_p n}z_{m-p,n-k_p}\,.$$

Here, $z_{m,\,n}$ is an unknown function taking integral values $m = 0, 1, 2, \ldots$, the coefficients are given functions of n taking finite values for each studied n and numbers $k_1, k_2, \ldots, k_p$, and p are positive integers. The author's method was founded on matrix calculus and representation of both equations (?) as multivariate vectors.

The papers mentioned above have not exhausted Romanovsky's contribution to the solution of problems of mathematical analysis. This means that the scope of his interests had been very wide.

9.2. Didactics of mathematics. All his creative life Romanovsky had been not only a scientist but a pedagogue of the higher school [and non-classical gymnasium]. In this latter capacity he had to solve two problems. First, to educate a large number of students in higher mathematics bearing in mind that many of them were poorly conversant with elementary mathematics. And second, to train specialists in the theory of probability and mathematical statistics so that they will be able to apply their acquired knowledge in various branches of social life[9.4] and technology. Consequently, he published courses and educational aids in higher mathematics and mathematical statistics.

The earliest work in the first group was a course in the introduction to mathematical analysis which he had read in the Warsaw, Rostov and the Central Asian universities. It was published in 1918 [19], then in a revised form [124] and in a posthumous edition [208]. It was very original both in contents and method of explication. Romanovsky indicated that he had essentially widened his work and especially important among the additional material was the section on infinite series and infinite products.

There, the tests for convergence provided by Raabe, Kummer, Gauss and logarithmic tests are included as are other issues about series[9.5]. Then, the proof of the transcendence of the exponential, logarithmic, trigonometric and circular (?) functions. There is a chapter on the elementary theory of functions of a complex variable and the main properties of the exponential, logarithmic, power and trigonometric functions of a complex variable.

Romanovsky was induced thus to widen his course by his wish to provide his listeners sufficiently full information about some mathematical issues which can be needed later, and in the first place this concerned the theory of series. He [208, p. 16] wrote:

In a university, without deserting the applied disciplines which nourish and invigorate it, or its applications, analysis should nevertheless be explicated as a theoretical discipline, rigorously and systematically. This requirement is all the more essential for the introduction into analysis which is the foundation of the differential and integral calculus. I attempted to satisfy it as fully as possible and to achieve better consistency and stricter rigour along with clarity and simplicity.

Romanovsky therefore paid the most possible attention to the theories of functions and series. He preferred to pay somewhat more attention to the introductory sections about which many instructors had simply forgotten or abandoned due to lack of time. His other educational contributions [37] and [60] also possess a similar methodical advantage. This latter introduces the reader into the notions of mathematical statistics[9.6]. We must not forget that in the 1920s many specialists denied this discipline.

Romanovsky's publications [121; 209] included sections on the *Elements of the theory of probability and mathematical statistics* [how else?] and *Efficient methods of mathematical statistics* devoted to various issues of pedagogy[9.7].

Many of his papers and newspaper articles, for example, those which were compiled for the Warsaw University [17; 18], are about the programmes in the introduction into analysis and in the differential calculus. He described the aims of the Tashkent University as well [20; 101; 131; 135; 150; 151]. And in his scientific papers Romanovsky remained a pedagogue, he attempted to describe his ideas in an understandable way.

9.3. History of mathematics. History of science and of mathematics in particular was a special direction of Romanovsky's scientific activity. In this connection he was very close to the French mathematical school. When reading the classical works of French mathematicians of the 19th century we easily notice that they diligently described the history of the issue in their preambles and such introductions often became brief historical monographs. Furthermore, such introductions written by Cauchy and Poncelet [and Laplace] are real literary works.

Such was Romanovsky's creative method especially during his initial period in Tashkent. Contributions studied in Chapter 7 can be considered as work in the history of science. Very interesting in this connection is Romanovsky's paper [26] in which he (p. 5) notes:

The unusual development of the statistical method and its applications to most various branches of knowledge is one of the most important and interesting phenomenon in the history of science of the latest 25 – 30 years since that method is already applied not only for studying social and economic phenomena; it has been applied in astronomy, physics, biology, psychology, pedagogy etc. […][9.8].

Above, we saw that, when studying phenomena in the history of science Romanovsky also applied facts from the social history of mankind and considered them as examples confirming his propositions on *the statistical Weltanschauung* which reveals the connection between natural and social phenomena. In human societies it is impossible to find laws which had already been discovered in the phenomena of nature, but still there is no essential difference between them[9.9].

Romanovsky develops the doctrine of social energy which in essence is the base of his history of science (more precisely, social history of science). *Social benefits* [changes] which he is discussing can be either positive or negative. [One more repetition of a passage from Chapter 7 follows.] He certainly wrote about the revolution which the nation had to endure at that time, about Lenin's experiment which had already clearly exposed all the negative properties of the appeared authoritarian regime[9.10].

In these deliberations we see an attempt to appreciate the occurring social phenomena which was based on the past and in turn served as the base for sculpting the future. He states that no reasonable and aimed at progress social policy is possible without taking into account the influence of genetic factors. Later Romanovsky naturally had not developed these thoughts.

For creating an effective concept of mathematical, or, as it was called then, theoretical statistics[9.11], Romanovsky deeply historically investigated such ideas and methods which can found this new branch of mathematics. First, he analyses the ideas of the creators of science, then discusses the work of his contemporaries. Not without interest he called Galton and Pearson, the same scientists who had developed the elements of genetics, the founders of mathematical statistics[9.12].

In [35], a paper quoted above, Romanovsky is also seen as a historian of science. He traced the development of some important ideas of the theory of probability and mathematical statistics and analyses the work of Keynes, Chuprov, Mises, Smoluchowsky, Bernstein et al. Romanovsky's historical papers of the 1920s became a peculiar introduction to the later investigations carried out by himself and his students and followers. Indeed, he thoroughly studied the world state of theoretical statistics and the theory of probability in the beginning of the 1930s.

This enabled him to go on investigating *on the international scale* and to create, in essence out of thin air, a powerful scientific school, an event which had not often been occurring in the history of science.

Romanovsky also devoted a number of papers to the history of mathematics in Central Asia and to the work of some of his students. They all [the work of his students] are initial sources [as though his own] since their content had been conditioned by the scientific and organizational activity of him himself.

Chapter 10. The Latest Years of Life. His Students and Followers

The instructors of high school can be (really tentatively) subdivided under three heads: investigators; pedagogues; and educators. For those of the first category teaching becomes a barely interesting and peculiar compulsory addition to their beloved pursuit. History knows many scientists who had left a deep trace in science but were bad teachers and did not leave any scientific posterity.

Nevertheless, there had been and are scientists who essentially contributed to science and at the same time were/are excellent pedagogues and educators. To them we ought to ascribe the representatives of the Petersburg mathematical school, to those who had been educated by Chebyshev and his students [why not Chebyshev himself?]. Romanovsky also belonged there. A student of A. N. Korkin and Markov and thus a representative of that same school, he was at the same time the founder of the Tashkent mathematical school. He was not only an eminent scientist but a remarkable pedagogue who had educated many well-known mathematicians.

His pedagogic activity was mainly connected with Tashkent University one of whose founders he was. As a teacher he had been finally shaped during the years when that university, the first institution of higher education in Central Asia, had been forming, when plans of its structure and the programmes of natural and mathematical sciences were developed. Romanovsky directly participated in the compilation of both these plans and programmes.

Romanovsky [20] described in detail his viewpoint on science, education and the prospects of the development of both these subjects in Central Asia. The aims of the proposed university were *great and beautiful* and their solution promises a *glorious future* for the university and the entire Turkestan. He (pp. 12 – 13) wrote [a long passage is repeated from §4.1].

For the territory, the importance of the university, as Romanovsky (p. 14) believes, is mainly connected with its role as the centre of the development of science which is playing a great role in the life of a society both in peace and at war:

We have entered such an epoch of the world's history when the success of nations in developing science and industry[10.1] *will determine their fate. In our time, scientific discoveries transferred to the industrial soil and duly applied can lead wide social groups to prosperity and progress or to decomposition, misery and degeneration*.

Therefore, he concludes, for each nation a proper organisation of scientific education and investigations is a question of life and death. A university, as he reasons, must play an important role in the development of the economy of Turkestan by educating qualified personnel. He (pp. 15 – 16) writes:

In the future, still more than nowadays, the prosperity and power of nations and countries will certainly be determined by their industrial development. This is why, for attaining prosperity of Turkestan, we ought to take care of its industrial and economic development. This requires wide and various technical forces and a thorough study of its natural resources.

We need agronomists, civil engineers, mining, mechanical, hydraulic and electrical engineers. Consequently, we need teachers, that is, professors and their assistants of the appropriate technical departments of the higher school. Those teachers belong to two types, to representatives of general disciplines (mathematics, theoretical mechanics, physics, chemistry, mineralogy, geology, botany, zoology etc.) *and of special disciplines* (*various technical sciences which are studied in one or another department*)*. The training of teachers of both types is a most important aim of a university, of a polytechnic school or of various special higher educational institutions*.

To ensure the development of industry in Turkestan this aim ought to be especially borne in mind: the territory must have its teachers who had understood local problems and were scientifically trained at the place where they will be working.

When discussing his viewpoint about the organization of scientific work at a universe Romanovsky (p. 16) provides extremely clear characterization of the two types of university workers, a pedagogue and a researcher:

Universities and polytechnic schools need both teachers and investigators. The latter develop their disciplines, make discoveries. These two types are not always combined in the same individual. Gauss was a genial mathematician but he did not like teaching and avoided it. Newton read lectures perhaps only two days yearly and mainly devoted them to the explication of his own discoveries. To each of them science is obliged for greatest discoveries but neither had direct students and they did not leave any schools (*as they are called*).

Inversely, a perfect teacher can be unproductive in original scientific work. Changing the usual Russian requirement of an indispensable unity of teaching and investigating required of a university professor, we ought to provide the possibility of freely devoting themselves to creative work for those who are not inclined to teaching but had revealed their gift of investigation. Therefore, chairs of investigation ought to be allowed.

And so, the education of teachers and investigators are, in Romanovsky's opinion, two most important aims of the future university. The third, no less important aim is a theoretical and applied study of the territory (p. 18):

True science never was and cannot be taken away from the topical problems of place and time. […] *Science, torn away from life can easily become scholastic sketchiness. However, being near to reality it always draws ever new problems from it, opens up new fruitful fields of study*.

For this reason he believes that for a university it is necessary to unite purely scientific and technical departments (pp. 17 – 18):

If we adjoin the technical faculty with civil engineering, mechanical, hydraulic engineering, mining and agronomical departments, to the physical-mathematical faculty with its mathematical and natural-scientific departments we will have a centre of forces whose influence on the material and spiritual development of Turkestan cannot be even approximately estimated. Pure and applied sciences will then develop as next-door neighbours and their proximity will be extremely valuable for both[10.2].

Technical sciences will always be near that source from which follows all their life, follow their discoveries and applications. Indeed, progress in industry is impossible without progress in pure sciences since technology is based on the abstract work of theoreticians of science, on their discoveries as though entirely remote from real life. […] *On the other hand, abstract and pure science will always be acquainted with the requirements and aspirations of technology and industry which freshens and enlivens their problems*.

A university, as Romanovsky believes, must unite pure and applied science by organizing scientific investigations in a planned connection with the industry of Turkestan. He calls this *a new and grand* problem whose solution is of *main state importance*.

He also indicates other aims of a university and its physical-mathematical faculty. They include the training of school teachers and care about an elevation of the level of scientific education of the society. One of the methods of achieving this latter goal is popularization of science.

In his pedagogic work, Romanovsky invariably guided himself by these considerations of 1917 and practice confirmed them. His pedagogic gift and wisdom favourably influenced the success of his students. A special and difficult problem of the Tashkent University was the education of national personnel. As a preliminary, students had to learn the complete school programme but during the first years after revolution only a few of them were able to attain that aim.

The pedagogic approach to the students of Central Asian higher educational institutions should have naturally been quite different from the usual approach in such Russian institutions which was based on long-standing traditions. The University had no experience, its staff was quite new and had come from various cities and its students had not been well mathematically prepared. Understandably, Romanovsky had to spend much time on perfecting the courses which he read. But at the same time, in the 1920s and 1930s, he published a number of works popularising science and a few *Elementary Introductions*.

Among those contributions his *Introduction into Analysis* [19; 208] occupies a special place. It is a peculiar book which reflected his pedagogic mastery. [The beginning of the following quotation from pp. 15 – 16 of the latter source was provided in § 9.2; here is its end:]

All more or less important theorems are enlightened by sufficiently detailed examples. Simple and various exercises for applying the studied material and problems which require some creative work and ingenuity are appended to each chapter. These problems are often developing the explicated text or [require] *additional methods and theorems. Brief indications are supplementing difficult problems.*

Some more complicated sections of this book were *intended for abler listeners. They can also provide material for studies in student mathematical groups.*

The reading of various courses led Romanovsky to the development of his own approach to the taught material: he searched for the general features of various directions of science, for the lectures on some section of mathematics to provide enough information to simplify the material of the next courses. This approach was reflected in his scientific creative work and incessant search for the required solution on the junction of various directions.

During long years of work in the Tashkent University Romanovsky had trained many teachers who were able to disseminate the acquired mathematical culture. And many teachers of teachers had also gone through his school and became instructors of mathematics in higher educational institutions. Many of his students had devoted themselves to science and left there a certain trace, many others became well known as perfect pedagogues: they developed the Uzbek mathematical terminology, compiled textbooks in that language, singled out gifted young mathematicians from remote rural areas and assisted them in their future education.

The first Uzbek mathematician was Tashmuchamed Niyazovich Kary-Niyazov (1898 – 1970). He was self-educated in the real meaning of that expression. He began his education in a Russian – Uzbek [elementary] school in Fergana and at the same time educated himself. In 1915 he finished that school and in a few years mastered the disciplines of the secondary school and of the first year of the physical-mathematical faculty [of the Tashkent University]. In 1926, after passing the necessary tests for the first year he became a second-year student [of that university][10.3].

In 1929 Kary-Niyazov graduated from the university and became its instructor and professor in 1931. In 1931 – 1932 he was rector of the Tashkent (then, Central Asian) University and in 1943 a co-creator of the Uzbek Academy of Sciences and its first president.

Kary-Niyazov was the author of the first textbooks on mathematical analysis and analytical geometry in the Uzbek language. The former was compiled under the direct influence of Romanovsky's appropriate course. Romanovsky's influence had also apparently affected Kary-Niyazov′s interest in the history of science which became the decisive direction of his creative work. A considerable part of his contributions is devoted to various issues of the history of science and culture of Uzbekistan and in 1952 his book *Astronomicheskaya Shkola* (Astronomical School) *Ulugbeka* of 1950 won him a State prize.

One of the most talented Romanovsky's student was Nikolai Nikolaevich Nazarov (1908 – 1947), see [265]. He was born in Ashkhabad into the family of N. S. Nazarov, a teacher of physics and mathematics, later a docent of the Central Asian University. Already in childhood N. N. had manifested his mathematical gift which attracted Romanovsky's attention. At the age of twelve he passed the mathematical examination for the secondary school and, on Romanovsky's request was taken on the mathematical department of the Tashkent People's (soon State) University.

Nazarov graduated in 1924. Romanovsky highly appreciated his diploma thesis *Approximate Calculation of Double Integrals* (published in 1925). It became the cause of the invitation of 1926 to postgraduate study in the Physical-Mathematical Institute (later, the Steklov Mathematical Institute) of the Academy of Sciences in Leningrad.

In his archival autobiography he states that after the university he *had at first been working under Romanovsky, then, for two years beginning in 1926 as a probationer*[10.4] *of the Physical-Mathematical Institute under Professor Yu. A. Krutkov and academician Ya. V. Uspensky*.

Many archival letters and other materials (CSAU f. R-2283, inv 1, c. 139 et al) testify that Romanovsky had attentively followed Nazarov's success. And the latter seeked his advice and informed Romanovsky about his scientific work. After returning to Tashkent in 1929 Nazarov began working in the university as an assistant, from 1932 as docent and from 1925 professor and chair of mathematical analysis until his death in 1947. From 1943 to 1947 he was the first director of the Institute of Mathematics and Mechanics of the Uzbek Academy of Sciences.

Nazarov's investigations were devoted to the theories of orthogonal polynomials, theory of differential and integral equations, interpolation, theoretical mechanics and aerodynamics. Best known is his contribution to the theory of non-linear equations, and in particular, of the Hammerstein type. His doctor dissertation which he defended in 1938 and published in 1941 was entitled *Non-linear integral equations of the Hammerstein type*.

In 1947 he was (unsuccessfully) nominated for corresponding membership of the Uzbek Academy of Sciences. In this connection [of nomination] Romanovsky wrote [where?]:

The work of Nazarov is almost exclusively devoted to analysis and is distinguished by notable analytic mastery. It is subdivided into three main directions: theories of orthogonal polynomials and of differential and integral equations and interpolation. The largest part of his contributions concerns the theory of non-linear integral equations which he himself had to a large extent developed. His doctor dissertation was devoted to these equations. […]

It is one of the fullest monographs in the world devoted to the theory of non-linear equations of the Hammerstein type and one of the *best and most important works of its author. There, he introduced new and important notions about singular solutions and branching points of the solution of the considered equations and provided a method of the continuation of the solutions onto the entire real axis of the parameter which enters the Hammerstein equation.*

In Nazarov's other works in non-linear equations we see the development of various issues which were broached in his doctor dissertation and the solution of a number of new problems; a complete solution of some non-linear integral equations which are importantly applied in the theory of non-linear oscillations, new theorems about the spectrum of non-linear equations and a study of the methods of their solution.

Nazarov was an excellent pedagogue. He read many various courses both in the Tashkent and Samarkand universities, in pedagogic and technical institutions in Central Asia, consulted engineers, mentored the scientific work of students and postgraduates. More than twenty candidate dissertations mentored by him were defended.

His life tragically came to an end. A remarkable sportsman-mountaineer, he participated in 1947 in an expedition to Pamir for investigating a mountain lake, but caught a chill and died from pneumonia. For Romanovsky, the death of this young talented scientist whom he had accustomed from childhood to mathematics was a serious blow.

Tashmuchamed Alievich Sarymsakov (1915 – 1995) was one of Romanovsky's first students. He achieved serious success in scientific and social life, see [293a] [there is no such source]. He was born in a settlement in the Fergana Oblast , finished a Russian secondary school in Kokand in 1931 and the same year entered the preparatory course in the Central Asian State University and again that same year he began studying at the physical-mathematical faculty of that university.

When attending the lectures of Romanovsky, Nazarov and other experienced teachers the able youth even as a student displayed interest in scientific studies. After graduating in 1936 he continued studying as a postgraduate. In his dissertation *The Distribution of the Roots of the Integrals of Differential Equations of the Second Order and the Asymptotic Solution of Some Algebraic Equations* he applied stochastic methods for the solution of some problems of mathematical analysis.

He defended his dissertation in 1938 and became a docent and the next year, 1939, chair of general mathematics in the university and at the same time deputy dean of the physical-mathematical faculty. During the war Sarymsakov was a military meteorologist, prepared his doctor dissertation and defended it in 1942. It was entitled *On the Theory of Homogeneous Stationary Processes with a Countable Set of Possible States* and based on the studies in the field of Markov chains. He extended the Romanovsky matrix method onto countable Markov chains with a continuous set of states and managed to transfer a number of classical theorems of the theory of probability (the law of large numbers, central limit theorem, law of iterated logarithm etc.)

onto Markov chains with a countable number and a continuous set of states. Soon after the defence he became professor.

A complex work fulfilled jointly by geophysicists – weather forecasters and mathematicians, in which the theory of Markov chains was applied to the solution of an important geophysical problem was mentioned in § 6.1. As stated there, a group of scientists including Sarymsakov were therefore awarded a State prise.

For a number of years Sarymsakov had been developing the theory of Markov chains and investigating the theory of integral equations but later his interests became mainly directed to topology and functional analysis. He published numerous papers and a number of monographs:

Topological Boole Algebras (1963, co-authors M. Ya. Antonovsky and V. G. Boltyansky); *Topological Semifields and the Theory of Probability* (1969); *Semifields and the Theory of Probability* (1981); *Ordered Algebras* (1983, co-authors Sh. A. Ayupov, G. Kh. Khadzhiev, V. I. Chilin); *Introduction to the Quantum Theory of Probability* (1985); and *Topological Semifields and Their Applications* (1969).

For many years Sarymsakov read lectures and mentored postgraduates in Tashkent University, headed mathematical chairs and in 1943 – 1944, 1952 – 1958 and 1971 – 1983 was its rector. From 1943 he had been effective member of the Uzbek Academy of Sciences, in 1943 – 1946, its vice-president and president in 1946 – 1956. For a long time he had also been an employee of the Institute of Mathematics[10.5] of the Uzbek Academy of Sciences and carried out essential public work, occupied leading state positions, was a member of the Uzbek Supreme Soviet. He died in December 1995.

Romanovsky's student Sagdy Khasanovich Siradzhinov (1920 – 1988), see [297], left a bright trace in the science of Uzbekistan. He was born in Kokand into a family of an artisan and his essential mathematical aptitude was revealed at an early age. He finished school in Kokand in 1936, entered the workers' faculty of the Central Asian State University and in 1938 became a student of its physical-mathematical faculty.

Meeting Romanovsky proved most important for him since he obtained a mentor and teacher of life. After noticing the talented student Romanovsky in every possible way assisted in developing his abilities and carefully mentored his first scientific studies. Romanovsky made an exception for him: he lifted the strict rule prohibiting students the use of books from the faculty's mathematical room[10.6].

Sirazhdinov solicitously preserved the memory for his teacher, recalled his admonitions and statements that a scientist should not be a narrow specialist enclosed within the borders of his subject, he ought also to be an intellectual in the best sense of that word. Sirazhdinov recalled that Romanovsky had taught him to be close to nature, to his native land and had given the utmost encouragement to his long walks in the mountains which he himself liked very much as well.

In 1942, at the peak of the war, Siradzhinov graduated from the university and after hearing a course in synoptic served in the army until 1945 as an engineer – weather forecaster. After the war he became a postgraduate and studied under Romanovsky at the Institute of mathematics and mechanics.

His first investigation touched on some problems of classical analysis connected with the theory of probability and mathematical statistics. In 1947 he defended his candidate dissertation *On Some Problems of the Theory of the Hermite Multivariate Polynomials*. Then Siradzhinov continued his investigations and instructed at the [Tashkent] university.

In the autumn of 1948 the Second All-Union Conference on Mathematical Statistics was held in Tashkent which was the first post-war mathematical conference. The choice of its venue was certainly influenced by the authority of the Romanovsky scientific school which was already recognized at home and abroad. Kolmogorov, Gnedenko, Smirnov and other most eminent specialists participated in preparing the Conference[10.7].

The scope of the reports was sufficiently wide. Among their main subjects were statistical quality control and statistical methods of weather forecasting. Also discussed were the directions of the development of mathematical statistics in the nation. In the corridors, animated discussions were held about the state of science in Uzbekistan. Romanovsky turned Kolmogorov's attention to Siradzhinov and the latter agreed to Siradzhinov's long stay in Moscow.

In 1949 Siradzhinov had indeed entered the doctorate at the Steklov Mathematical Institute and studied under Kolmogorov. As proposed, he studied the development of matrix methods of the theory of Markov homogeneous and non-homogeneous chains. However, in 1950 – 1951 Kolmogorov (perhaps not without Romanovsky's prompting) became interested in statistical quality control and drew in his students. From that time Siradzhinov, who was already acquainted with this theme, gave it much consideration. As proposed by Kolmogorov and supported by M. V. Keldysh[10.8], this theme was even approved as the aim of Siradzhinov's dissertation. However, the last-mentioned had not abandoned his work on Markov chains the less so since there he had already managed to obtain important results.

In 1953 Siradzhinov defended his doctor dissertation *Limit Theorems for Homogeneous Markov Chains*[10.9] and in 1955 published it. In 1954 – 1956 he was a member of the chair of the theory of probability at Moscow University, then returned to Tashkent. That year, 1956, he became professor of the Central Asian State University and chair of the theory of probability and mathematical statistics. In that capacity he remained until the end of his life.

A wonderful lecturer, he spent much time on teaching since he considered the education of qualified mathematicians as a most important aim of his life. In 1957 Siradzhinov was appointed director of the Institute of Mathematics and Mechanics (already named after Romanovsky) and remained in that position until 1966. Also in 1957 he was elected corresponding member of the Uzbek Academy of Sciences and its effective member in 1966.

In 1966 – 1970 Siradzhinov was rector of the University and in 1970 – 1983, vice-president of the Uzbek Academy of Sciences. Many times he was elected deputy of the Uzbek Supreme Soviet and in 1967 – 1980 became its president. Pedagogy, organization of science and state activities required much time and energy but he had not interrupted his scientific work. His numerous publications were devoted to the theory of probability (theory of Markov chains, limit theorems for sums of independent random variables), mathematical statistics (statistical quality control), mathematical analysis (application of the theory of probability to some problems of classical analysis) and stochastic number theory. His students had been successfully working in those directions under him and indeed he had educated many mathematicians who had been developing the traditions of the Tashkent school of the theory of probability and mathematical statistics which were laid by Romanovsky[10.10].

Siradzhinov was much interested in the history of mathematics and attached essential importance to the search for the heritage of the eminent scholars of the medieval Near and Middle East. From 1966, on his initiative, the Institute of Mathematics and Mechanics had begun a systematic study of that subject. Siradzhinov himself contributed much to the study and popularization of the mathematical works of al-Khwarismi, al-Biruni, Avicenna (Ibn Sina), Ulugbek and other classics of the Oriental science. Their works translated into Russian and Uzbek and collected papers and monographs about them had been published under his editorship. He himself was the author of many such papers and books. And the selected works of Romanovsky [208; 210] as well as a reprint [209] of his monograph [120] were published owing to Siradzhinov's efforts.

Among the well-known mathematicians whom Romanovsky had educated, the corresponding member of the Uzbek Academy of Sciences and Honoured Science and Technology Worker of the Uzbek Republic, the doctor of physical-mathematical sciences, Professor Ivan Semenovich Arzhanykh (1914 – 1980) can be named, see [214]. He was born in Kiev Oblast of the Ukraine and invariably liked Ukrainian literature, knew by heart and often read aloud verses written by Shevchenko. In his early youth he participated in the construction of the railway line Turkestan – Siberia, then worked on a state farm and in a tannery.

Arzhanykh finished a secondary school in Alma Ata (Almaty), went to Tashkent and all his life (except during the war) lived in Uzbekistan. In 1931 he entered the physical-mathematical faculty of the Central Asian State University, listened to Romanovsky's courses and considered him as his teacher. However, it was Nazarov who influenced him the most.

In 1934 a group of Tashkent students including Arzhanykh was sent for continuing their studies to Leningrad which was a help to Uzbekistan. He studied there in the mathematical-mechanic faculty of the university and successfully graduated as a mechanician in 1935. Upon returning to Tashkent Arzhanykh began teaching in the university and intensively carried out scientific studies. His first papers appeared in 1937 and in 1938 he defended his candidate dissertation entitled *The Secular Equation and Its Role in the Study of the Qualitative Features of the Integrals of the Equations of Mechanics*.

There, as also in a number of contributions of 1937 – 1939 Arzhanykh considered the general problem of the equilibrium of the motion of mechanical systems. Romanovsky highly appreciated his dissertation (CSAU f. 2283, inv 1, c. 116, p. 3):

It represents an exceptional phenomenon and is far beyond usual candidate work.

Many people recall that in general Romanovsky considered that young scientist unusually talented and expected his essential success. As a testimony of his attitude was his copy of a book in mechanics which he presented to Arzhanykh in 1938 and which is kept in the library of the Institute of Mathematics and Mechanics. The inscription on the book shows that he acquired it in Petersburg in 1903, so that it was certainly dear to him as a remembrance of his student life.

As soon as the war had broken out Arzhanykh voluntarily joined the army in the field. His younger brother Konstantin, also a talented mathematician, came along and was killed. He himself participated in battles, was badly wounded (lost his right hand [arm?]) and was demobilized.

Arzhanykh returned to Tashkent and actively started to work both as a teacher and a scientist. From 1943 he was chair of aerohydrodynamics and at the same time headed the department of mathematical analysis in the Institute of Mathematics and Mechanics. The intensity of his work is seen in his publications: from 1945 to 1956 there appeared more than a hundred of them. In 1956 he successfully defended his monograph *Integral Equations of the Main Problems of the Field Theory and the Theory of Elasticity* (1954) as a doctor dissertation.

In 1960 Arzhanykh was elected corresponding member of the Uzbek Academy of Sciences. He transferred to the Institute of Mathematics and Mechanics and continued as director of the department of mathematical analysis. He had also been much busy as a pedagogue: he read lectures in the University, mentored many postgraduates. For many years he had been in charge of the city seminar on differential equations and mechanics.

Arzhanykh's scope of scientific interests was very wide. He fruitfully worked in various branches of mathematics connected with differential and integral equations and their application as well as in analytic mechanics, theory of electricity, hydrodynamics, quantum mechanics and published about 280 contributions, seven of them monographs.

All Romanovsky's collaborators and students cordially gave him high praise, noted his pedagogic and scientific gift and his wonderful humane qualities. When recalling him Sarymsakov wrote [where?]:

His activity as a scientist had not been exhausted by publication of contributions. His talent was active and civic. He always consulted someone or most various institutions both scientific and industrial which turned to him for advice. He thought that the higher was the *rank of a scientist, the more he knows about life, the greater ought to be his responsibility for that life.*

Romanovsky believed that the idea of justice is initially installed in science and had not at all tolerated any infringement of it. He hated vanity, careerism, self-confidence. He taught us to be extremely patient in our scientific searches, prepared us for constant work. By personal example he showed us how to regard the world and the people. Sincerely believed that he, who had not comprehended the science of the morally proper, will only be harmed by any other science.

Some delicate conscientiousness lived in his soul and his disposition was astonishingly calm and gentle: for a quarter of a century no one ever heard him to raise his voice on anyone. […] *His life was extremely rich and full and exactly this apparently helped him to keep calm under any adversities and troubles of life. I remember an expression from Russian classical literature: A large river flows tranquilly. And Vsevolod Ivanovich was just such a large, full-flowing and tranquil river, a river of knowledge and humaneness which nourished many people.*

Romanovsky died on 6 October 1954. His is the name of a street in Tashkent and of the Institute of Mathematics and Mechanics of the Uzbek Academy of Sciences.

The Life of Vsevolod Ivanovich Romanovsky
Chronology

1879, 5 December born (22 November, old style) in Vernoe (Alma Ata, Almaty)
1895 – 1900 learned in Tashkent non-classical gymnasium
1900 entered Petersburg Polytechnic Institute
1901 passed examination in a school-leaving certificate in Tashkent (classical) boys' gymnasium [necessary for entering university]
1901 – 1906 student of Petersburg University, physical-mathematical faculty
1906 – 1908 prepared (himself) for professorship at same university
1906 – 1908 instructor of mathematics, Petersburg School of Practical Chemistry
1908 passed master examinations
1908 – 1911 instructor of mathematics and physics, Tashkent non-classical gymnasium
1911 acting docent, Warsaw University
1912, 15 April defended master dissertation
1912 extraordinary professor, Warsaw University
1915 moved to Rostov-Don together with same evacuated university
1915 – 1917 professor of university in Rostov-Don
1917 defended doctor dissertation *Integration of Involutory Systems of the First Class*
1918 professor, Tashkent People's University
1920 dean, physical-mathematical faculty, Central Asian State University (CASU)
1923 chairman, physical-mathematical section, Society of lovers of natural sciences, CASU
1920 – 1930 professor, social-economic faculty, CASU
1933 – 1936 director, Institute of Physical-Mathematical Investigations, CASU
1935 – 1937 organizer, mathematical competitions in Tashkent
1935 doctor of physical-mathematical sciences, academic status conferred
1936 Honoured Science Worker of Uzbek Republic, honorary title conferred
1936 – 1939 dean, physical-mathematical faculty, CASU
1937 deputy, Supreme Soviet of Uzbek Republic, elected
1943 effective member, Uzbek Academy of Sciences, elected
1948 State prize awarded
1950 – 1952 director, Institute of Mathematics and Mechanics, Uzbek Academy of Sciences
1952 member of presidium and president, physical-mathematical class, Uzbek Academy of Sciences
1954, 6 October died

Bibliography
V. I. Romanovsky

Abbreviation: CASU = Central Asian State Univ.
C. r. = *C. r. Acad. Sci. Paris*
Doklady = *Doklady Akademii Nauk SSSR*
Doklady Uzbek = *Doklady Akademia Nauk Uzbek Republic*
Giorn. = *Giorn. Ist. Ital. Attuari*
Izvestia = *Izvestia Varshavsk. Universiteta*
Izvestia AN = *Izvestia Akademii Nauk SSSR*
MS = *Matematich. Zbornik*
Protokoly = *Protokoly Zasedaniy, Obshchestvo Estestvoispytatelei, Varshavsk. Univ.*
Soz. Nauka = *Sozialistich. Nauka i Tekhnika*
Trudy Institut = *Trudy Institut Matematiki i Mekhaniki*
Vestnik = *Vestnik Statistiki*

S, G, n = Downloadable file n in English on my site www.sheynin.de which is being copied: Google, Oscar Sheynin, Home

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Reviews of Romanovsky's Contributions

Review of [3]. See [260].
Reviews of [36]. **Yastremsky B.** *Vestnik Irrigatzii*, 1924, book 19, No. 10/12, pp. 247 – 251. **Kryamichev M.** *Narodnoe Khozyastvo Srednei Azii*, 1924, No. 4, pp. 222 – 224. **Slutsky E.** *Vestnik*, 1925, No. 1/3, in a paper on pp. 103 – 124.
Review of [75]. **Kaucky J.** *C. r.*, 1930, t. 191, pp. 919 – 921.
Review of [162]. **Smirnova N. V.** *Sovetskaya Kniga*, 1948, No. 5, p. 19.
Review of [197]. **Chebotarev A. S.** *Trudy Moskovskiy Inst. Inzhenerov Geodezii, Aerofotos'emki i Kartografii*, 1953, No. 15, pp. 21 – 27.

Compiler of Bibliography R. A. Ibragimova
Additions (?) by M. B. Nalbaldyan

Translator's additions to and commentary on Bibliography

The compilation of the bibliography required a lot of work; even Romanovsky's newspaper articles and reviews of his works are included. Still, I have included eight more items mostly from the Bibliography provided by Sarymsakov (Appendix) and corrected a few mistakes. In some cases the years of publication stated by Sarymsakov differ by one year but I had not changed them. Then, slight changes of the order of the items would have made the Bibliography easier to read, and I added the missing cross-references.

Additions partly gleaned from the Bibliography (*very incomplete*)
appended to Sarymsakov (*see Appendix*)

[1a] Some problems in the calculus of probability. *Protokoly*, 1915.
[2a] Sur les chaînes discrètes de Markoff. *C. r.*, t. 189, 1929, pp. 450 – 452.
[3a] Sur les chaînes biconnexes continues de Markoff. *C. r.*, t. 190, 1930,

pp. 695 – 697.
[4a] Le principe ergodique et les probabilités en chaîne. *Actual. Sci. Industr.* No. 737, 1938. Co-authors E. Hopf, B. Hostinsky, O. Onicescu.
[5a] On the Goldbach numbers. *Bull.* CASU, No. 23, 1945. (See also [8].)
[6a] On the limit distribution of sample characteristics. Ibidem, pp. 17 – 18.
[7a] On limit distributions for stochastic processes with discrete time. *Trudy* CASU, No. 4, 1946.
[8a] Theory of errors. *Bolshaia Sovetskaia Enziklopedia*, Second edition 1955, vol. 31, pp. 500 – 501.
G. P. Matvievskaya (*Istoriko-Matematicheskie Issledovania*, vol. 2 (37), 1997, pp. 68 – 78) reprinted [20] as a newly found manuscript.

Comments on the Bibliography

On [30]. I have found John Sylvanus Thompson who was not a mathematician. He had a son. John Jr.

On [60]. The mentioned additions and additions of other authors were made after Kaufman's death and essentially changed the exposition. They are listed in the book itself.

On [66]. The provided bibliographic description was unclear and so it remained in the translation.

On [67]. The mentioned series 5 should have likely been 5a.

On [106]. See Crathorne (1934).

On [159]. This item and a number of other items concern artillery firing. I suspect that in turning to this subject Romanovsky followed the damned trash of Gnedenko & Khinchin (see its translation of 2015) and that consequently Romanovsky was not sufficiently acquainted with his subject. In turn, Gnedenko undoubtedly followed the wrong opinion of Kolmogorov. Indeed, overrunning my objection, Gnedenko (Gnedenko & Sheynin 1978/2001, p. 211) insisted that problems concerning artillery firing had essentially contributed to the development of probability theory.

On [197]. Chebotarev properly criticized some Romanovsky's statements; for that matter, the latter should have completely abstained from the theory of errors. On the other hand, Chebotarev allowed himself to declare some astonishingly stupid statements.

On [203] and [204]. The numbers of the *Trudy* do not match.

On [204]. Mendeleev introduced a test for harmonious observations which actually preceded a much later measure of the asymmetry of distributions. He (as other scientists and as Markov supported) also introduced an admissible deviation between two means of observations. See Sheynin (2017, §§ 10.9.3 and 10.8.4).

On [206]. In one case the page numbers coincide with those in [205] which is doubtful.

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Other authors. The list of the authors

all entries are in Russian

Additional abbreviation: IMI = *Istoriko-Matematich. Issledovania*

Comment: *Uspekhi Matematich. Nauk*: from 1960, this periodical is being translated as *Russ. Math. Surveys*

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Notes

0.1. An obvious exaggeration.

0.2. There are dozens of references to archival sources. With a few exceptions I only left those which directly concerned Romanovsky. Abbreviations: f = fond (fund), inv = inventory; c = case; and the usual p and pp.

1.1. First of all we bear in mind SHAL f. 14, inv 1, c. 10011 and inv 3, c. 38220. Authors.

1.2. The causes of death had first been noted in London since 1629 and the ages at death had always been important for insurance. True, until the second half of the 19th century insurance was corrupted by moneygrubbing practice.

1.3. In Russia, 5 was (and still is) the highest, and 2, the lowest mark (1 meant complete ignorance). Ostrogradsky, however, is quoted as conferring to God the highest (at his time) mark in mathematics, 12, and to estimating his own knowledge by 10.

1.4. There were only two such subjects.

1.5. See Youshkevich [315].

1.6. See [1].

1.7. The catalogue of the Library of the Russian Academy of Sciences mentions a Russian translation of 1861 of Gauss' *Theory of Motion* by *student Dogel*.

1.8. What exactly did this mean?

1.9. These requirements were very much below those which concerned mathematics.

1.10. In 1919 – 1926 Steklov was vice-president of the Russian Academy of Sciences.

2.1. This occupation did not unquestionably testify to his knowledge of the theory of probability.

2.2. *This year I decided to use the first part of Gauss' excellent memoir* [i. e., the memoir of 1823] *for instruction in the theory of least squares* (beginning of Nazimov 1889).

2.3. At that time the Moscow school was dominated by Nekrasov and likeminded scientists. On Nekrasov see Sheynin (2003).

2.4. The authors are thankful to M. B. Nalbaldyan, docent of the Rostov University, for supplying this material.

2.5. I leave out (do not translate) about two pages of long quotations from Romanovsky's memoir [4]. His considerations are difficult to understand; he never returned to the elements of the theory of probability; and, anyway, his conclusions are at least incomprehensible. I refer readers to Khinchin (1961/2004) with a commentary: first, my translation was corrupted; for example, *Machian* became *Machist*. Second, an editor of my translation appeared suddenly and did not communicate with me. It was Siegmund-Schultze who had the cheek to tell me previously that I should stick to events in Russia and leave Mises for the Germans (why not for the Jews, for me in particular?).

Definite remarks. 1) A check of the applicability of a theorem is meaningless; instead, the applicability of its premises is recommended. 2) Romanovsky (just like many other commentators) paid no attention to Bernoulli's explanation: for *Bernoulli trials* he proved that statistical probability was not inferior to theoretical probability and in his examples he stated the same for the case in which the latter did not exist. This, indeed, was the sense of his theorem. Much more is contained in Sheynin (2017, §§ 3.2.3, 5.2 and 10.7-7).

2.6. I left out incomprehensible formulas.

2.7. Same.

2.8. The b^8 is doubtful.

2.9. The last restriction was not needed.

2.10. In 1672 Georg Mohr preceded Mascheroni.

2.11. The Diary for 1915 – 1916 is kept by Romanovsky's widow L. V. [actually, E. E.; same mistake made above] Romanovskaya. Authors.

2.12. This remains unclear.

2.13. Cf. Pushkin *Pir vo Vremia Chumy* (Feast during the Plague) which was based on John Wilson *The City of the Plague*. London, 1816: *There is ecstasy in combat*.

3.1. That university was indeed established, see below.

3.2. Which faculty?

3.3. This seems rather doubtful.

3.4. For an introduction to analysis this theme is extremely unusual.

3.5. This sudden and sole mention of insurance is strange.

3.6. Tashkent Oblast, Uzbekistan.

3.7. Sarts: settled inhabitants of Central Asia. At that time they spoke Uzbek.

3.8. I was unable to establish the Bruns chains. This certainly was the duty of the authors. In 1882 – 1911 he published not less than fourteen papers.

3.9. Romanovsky mentioned three books (one of them somewhat below). Here are the years of their first editions: 1856; 1852; 1902.

3.10. In this respect Romanovsky adjoined his daughter to the boys.

3.11. Registan, heart of Samarkand.

3.12. Caucasian mountain hut.

4.1. See *Protokoly* [Records] of the *Turkestan Kruzhok Lyubitelei Archeologii* [Circle of Lovers of Archeology], 1917, vol. 13, No. 1, p. 2 of Scientific chronicle. Authors

4.2. Quetelet (1869, t. 1, p. 419) recommended to study the changes brought about by the construction of telegraph lines and railways.

4.3. Their complete text is kept in the library of the Tashkent Astronomical Institute and [221] is their abridged version. Authors

4.4. A. L. Shaniavsky (1857 – 1905) established the Moscow City People's University by donating his own money and the money of his wife. Anyone could have entered, but no diploma was given. The University existed from 1908 to 1920.

4.5. Bulaevsky translated the papers of Gauss from Latin and German into Russian from Gauss (1957) and partly from Gauss (1958).

4.6. See Note 4.3.

4.7. This is the official Soviet name of the German – Soviet part of WWII.

4.8. *Centre* is mentioned many times. It could have meant either Petrograd or Moscow. The choice of either city was complicated since the Soviet government moved from Petrograd to Moscow (and Moscow thus once more became the capital).

4.9. This discipline had apparently been the predecessor of ecology.

4.10. The spelling of that name was not checked (either Oldscope or Oldecope).

4.11. A new botanical garden did not amount to *an entire scientific direction*.

4.12. Yes, entirely changed. Admission to higher educational institutions had been all but prohibited to those of *alien* origin. See also Rostovtsev (1919, p. 5):

From the point view of Lunacharsky and the ProletCult all culture is essentially a class-product. All the old culture, from top to bottom, is the product of the bourgeoisie, it reflects the life, the soul and the world's concept of the bourgeoisie only. The new proletarian world […] *has to create* […] *its own special new culture*.

In 1921 fifteen professors of the Petrograd University declared that applicants ought to be chosen only according to their knowledge [317, p. 137]. In all probability, *they* acted on Markov's initiative.

The ProletCult faculty is mentioned below.

4.13. The statistical method was not mentioned.

4.14. There had been a long-standing feud between the Cossacks and the new settlers on their land. It was resolved in the Bolshevist way by victimizing the former.

4.15. See Note 4.12.

4.16. The second course was apparently always his.

4.17. Did faculties really have councils?

4.18. Nikolai Alekseevich Zarudny (1859 – 1919), who was also mentioned above, was a zoologist. He studied the fauna and especially the birds of Central Asia. His collection was nationalized and moved to the Tashkent University. That name is very often mentioned in the text which apparently means that at least unofficially the name *Central Asian State University* had been dropped. The authors applied both names indiscriminately. Finally, in 1955 Sarymsakov (see Appendix) mentioned that same name, *Central Asian* … A similar situation is encountered here with the name of the Institute of Mathematics and Mechanics. In passing (§ 6.1) the authors stated that the Institute of Mechanics became independent, but when? And the new name, Institute of Mathematics, occurs almost at the same time as the original name.

4.19. I do not understand that term.

4.20. Workers' faculties existed from 1919 to the mid-1930s. They prepared their listeners to enter higher educational institutions. Gorsky read trigonometry, see beginning of § 4.2, and higher mathematics (§ 4.3).

4.21. The authorities reduced the space per person in living accommodation by allowing other people to live there. Apartments became communal.

4.22. Proscriptional lists in ancient Rome: lists of outlawed people. Here, perhaps lists of professors out of the reach of the Moscow group.

4.23. Tikhanovsky was many times mentioned above but never in the negative sense.

4.24. But how about the All-Russian competition?

4.25. The coincidence of those numbers seems doubtful.

4.26. That was the Bolshevist way of governing. Had Sol'kin at least graduated from a university?

4.27. Such a measure seems extremely unusual.

4.28. Eidelnant (1905 – 1976) was head of the department on the theory of probability and mathematical statistics in the Uzbek Institute of mathematics. He himself studied the forecast of yields and statistical quality control.

5.1. The correspondence of Romanovsky with Pearson (Sheynin 2008) testifies that they had hardly met personally.

5.2. Not *greatly influenced* but led to the suppression of everything done by Pearson. On Soviet statistics see Sheynin (1998). And Lenin's criticism was *crushing* only from the viewpoint of dialectical Marxism.

5.3. Fisher was the main creator of mathematical statistics as a new discipline, see my Introduction. On his merits in genetics see Note 9.12.

5.4. I have translated some pertinent materials concerning Romanovsky, see **S, G,** 6. **1)** Three of his reviews of Fisher. **2)** The Resolution of the Statistical Conference (see § 6.2); **3)** The Publisher's Preface to Romanovsky's translation of one of Fisher's book.

5.5. Yes, serious mathematics became needed. Exactly in those years econometrics was officially born.

5.6. Al-Kharizmi considered linear and quadratic numerical equations (Youshkevich 1961, p. 192).

5.7. Concerning al-Biruni's treatment of observations see Sheynin (1992).

5.8. At the peak of the Big Terror Khinchin attempted to show that the successes of Soviet mathematics were due to the favourable attitude of the Soviet regime towards scientists. He was possibly somehow compelled to utter that horrible rubbish.

6.1. I say a few words about that school in my Introduction.

6.2. The Authors are thankful to a long-standing employee of the Uzbek Institute of mathematics, candidate of geographical sciences O. N. Chernysheva for the information about geographical studies of that Institute. [Where are these studies described? O. S.]

6.3. These prizes were called after Stalin, then named *Lenin prizes*. For some time they were apparently called, perhaps unofficially, *State prizes*.

6.4. Climate is the long-term regime of the weather and the authors' statement is at least unclear.

6.5. It is hardly sensible to unite the ideas of Pearson and Fisher.

7.1. This is rubbish, see Sheynin (2006). I omit the next lines (about half a page) which are also either rubbish, or dubious, or at least do not sufficiently explain the provided description.

7.2. This new direction was mathematical statistics. However, I have reservations about the generally alleged unification, or merging of the two schools (Sheynin 2017, § 15.3). And the appearance of mathematical statistics had to wait for Fisher.

7.3. *It is rather difficult and unnecessary to draw a clear boundary* […], see Khinchin (beginning of § 5.3).

7.4. The true value of a magnitude, as defined by Fourier in 1826 is the limit of the arithmetic mean of its measurements. His statement was forgotten but the same definition had been independently from one another repeated by many authors. Markov, who had not offered any definition, remarked that the existence of a true value ought to be postulated (Sheynin 2007). Romanovsky was apparently the only author who followed Markov (or stated the same independently). Note the heuristic similarity between this definition and the Mises definition of probability.

7.5. This is nonsense. Romanovsky was therefore ignorant of the theory of errors.

7.6. Where is that terminology? The texts of all the three reports were published in *Vestnik* (see below) and Chuprov (Sheynin 1990/2011, p. 72) commented on them and, somehow, on a fourth unpublished report in a letter to Chetverikov:

[…] *these four reports certainly represent a prominent Leistung* [achievement]. […] *Rom. thought it all out in Tashkent, all by himself, and probably even without literature.* […] *The objective scientific importance of the results* […] *is greatly undermined by my contributions* […]. *I shall be sending you two copies of my* [future] *reprints: one for you, the other one for Rom.* […]

Did Chuprov and Romanovsky correspond?

7.7. There is no such item.

7.8. Concerning mathematical statistics see my Introduction.

7.9. An obvious exaggeration.

7.10. Also, in a sense, Darwin.

7.11. Chaotic movement is mentioned several times but certainly not in its present sense.

7.12. Quite possible but in the statistical sense.

7.13. This is hardly true.

7.14. Nowadays, three Mendelian laws are recognized: those of dominance; segregation; and independent assortment. In a hardly known paper Bernstein (1922b) discussed the serious problem of matching biometry and the Mendelian laws. Here is one of his statements:

The part similar to the main postulate of mechanics, to the principle of inertia, is played by the law which we may call the Darwin law of stationarity. If the existence of some simple trait does not either enhance or lessen the individual's adaptation to *life* (*including fertility and sexual selection*), *the rate of individuals possessing it persists* (*in the stochastic sense*) *from generation to generation*.

7.15. Here is a definition due to John Ikerd and formulated a few decades later:

Social energy is the energy expended in maintaining positive productive human relations. Humans […] *invariably degrade and deplete the quality of their social relations* […] *a sort of social entropy* […].

7.16. It is meaningless to struggle with an irreversible process. This was perhaps just what Romanovsky had in mind.

7.17. Apparently Kidd (1902).

7.18. See my Introduction.

7.19. It can be a precise law, see Note 7.12.

7.20. The correct dates of Anderson's papers are 1923 and 1926.

7.21. An explanation is lacking.

7.22. See Fisher (1921).

7.23. This is unclear. Perhaps analysis of variance was somehow meant.

7.24. Free from prior information can be dangerous:

Applications of the theory of probability can be greatly mistaken if only based on numbers. Gauss, 1841; *Werke*, Bd. 12, pp. 201 – 204.

7.25. See my Introduction.

7.26. Supposedly [69] and [119]. And a comparison with Fisher (1924) is lacking.

7.27. Paper [127] is not readily available.

7.28. Contribution [144] is barely useful, see Note 7.5.

7.29. The title of paper [200] is incomprehensible.

8.1. This statement is written in the Mises spirit.

8.2. The title of all Markov's pertinent lithographed publications contained the term *theory of probability* (see Markov 1951). Later, apparently following Poincaré (1896) he started to apply *calculus of probability*.

8.3. Again and again: where is Fisher?

8.4. Romanovsky's historical studies and statements were partly defective, cf. Note 8.9.

8.5. Mathematics has no necessary connections with reality.

8.6. I have not established Ellis (1843). And the references to Pearson and Keynes are not documented.

8.7. The central limit theorem can be thus named.

8.8. Incomprehensible.

8.9. Mises insisted that his theory of probability was not mathematical but general scientific and, quite consistently, he *actually* had not axiomatised it. Here is Khinchin (1961/2004, pp. 405 – 406):

Mises never established any system of axioms, [his] *basic theoretical propositions cannot* […] *be called axioms* […].

Khinchin explains: Mises had not excluded *such notions as trial, observation*. […]

8.10. It was Fechner who introduced collectives (Sheynin 2017, § 10.9.2).

8.11. The classical definition of probability is due to De Moivre (Sheynin 2017, § 4.3). Actually, it is rather a formula for calculation.

8.12. There are very complicated games of chance as well, and eminent mathematicians beginning with Jakob Bernoulli have been studying them.

A few lines below Romanovsky reasons about equal possibility and this is Khinchin (1961, 2004, pp. 420 – 421) who considers its role:

The idea of equal probability appears not as a formal logical base of the doctrine of mass phenomena, it is rather the sole method of theoretically forecasting the probability of events in single concrete situations.

8.13. Mises forgot applications to biology, insurance and the theory of errors.

8.14. Poisson somehow became Chebyshev.

8.15. See Note 8.5.

8.16. Why bother with these petty scribblers?

8.17. A new epoch only began in the 1920s with the work of P. Lévy, cf. Sheynin (1995, § 5).

8.18. The main method is that of characteristic functions. Krein (1951, pp. 8 – 9) noted that the method of moments had *not yet become useless*. And it was (Soloviev 1997/2008, p. 355) who stated that the method of moments was

Considerably improved since Markov's time, [it] *is still used* […] *for solving such problems in which the moments of random variables are derived much easier than their distributions*.

8.19. The system *forgets* its initial state. The formula just above as well as the notation C_n is not explained.

8.20. I was unable to find it.

8.21. More correctly: Markov just did not deny correlation anymore. I am duty bound to quote a regrettably unsubstantiated statement of Bernstein (1928/1964, p. 231):

Excluding biological applications, most of its [of the correlation theory] *practical usage is based on misunderstanding*.

8.22. See Petruczewycz (1983). But why Markov had not provided any natural-scientific applications of his chains? Here is his general answer in a letter to Chuprov of 7 December 1910 (Ondar 1977/1981, p. 52);

I shall not go a step out of that region where my competence is beyond any doubt.

8.23. Romanovsky studied a text from Sholokhov's *And Quiet Flows the Don* (as that book is called in one of its translations). Most serious doubts had been expressed about its authorship and here are only a few arguments. **1)** A 23-years old debutante was unable to write it. **2)** No posthumous papers were found after Sholokhov's death. **3)** In one place (I forgot where exactly) he mentioned Lopakhin and a cherry alley which was an almost exact borrow from Chekhov. Explanation: the real author of some texts paid by Sholokhov gave notice: beware!

General explanation: the real author of the book, F. D. Kriukov, a soldier in the White army, died in 1920. His manuscript was found but his authorship was *undesirable*. So Sholokhov, remote from literature, was persuaded to become the author. An unfortunate choice!

9.1. Reference [13] is wrong. And the *Chronology* of Romanovsky's life as well as a statement in § 3.2 mention the opposite: Romanovsky did defend his dissertation. Finally, Sarymsakov (see Appendix) stated that in 1935 Romanovsky became Doctor of physical and mathematical sciences honoris causa.

9.2. In Russian, the spelling of his name was Рикье. My rendition is tentative.

9.3. I have omitted more than two pages of incomprehensible formulas.

9.4. In the Soviet Union social statistics had one main task: to corroborate numerically Marxist propositions, so that statistical quality control was certainly admissible. See Sheynin (1998).

9.5. It is interesting to know what Romanovsky had to say about divergent series.

9.6. See my Introduction.

9.7. Explanation is lacking.

9.8. In those times the history of the application of the statistical method in natural science was barely known. See Sheynin (2017, § 10.8).

9.9. However, see Note 7.15.

9.10. Here is Chuprov in a rare source of 1919 (Sheynin 2011, p. 35):

In October 1917, just as during all his stormy life, Lenin strove for power for power's sake without thinking either about Russia or the Russian proletariat […]. *As always, he was indifferent to the fate of the people*.

9.11. This is a mistake. The scope of theoretical statistics is wider since only it covers the collection and preliminary treatment of statistical data. Below, theoretical and mathematical statistics are mentioned indifferently.

9.12. Again, Romanovsky's merits are exaggerated. In connection with eugenics Fisher should have been named first and foremost. His appropriate deserts *were comparable* with his merits in statistics (Bartlett 1978, pp. 356 – 357). See also Hotteling (1951), and Zabell (2001, p. 389) briefly and masterly stated:

Fisher transformed the statistics of his day from a modest collection of useful ad hoc techniques into a powerful and systematic body of theoretical concepts and practical methods. This achievement was all the more impressive because at the same time he pursued a dual career as a biologist, laying down, together with Sewall Wright and J. B. S. Haldane, the foundations of modern theoretical population genetics.

10.1. Agriculture is not mentioned either here or below.

10.2. But how about number theory?

10.3. It follows that Kary-Niyasov had spent about ten years for mastering school and the first year of the university.

10.4. Probationers disappeared, but when?

10.5. See Note 6.2.

10.6. Many years later A. M. Popova recalled this episode. She had been in charge of that room. Authors

10.7. In § 6.2 Sarymsakov was mentioned instead of the mysterious *other* scientists.

10.8. At that time Keldysh, the future President of the Soviet Academy of Sciences (1961 – 1975), was professor of Moscow University.

10.9. So the theme of the dissertation was changed.

11. Appendix by Translator

T. A. Sarymsakov

Uspekhi Matematicheskikh Nauk, vol. 10, No. 1 (63), 1955, pp. 79 – 88

Vsevolod Ivanovich Romanovsky. Obituary

Romanovsky, an eminent mathematician of our country, Deputy of the Supreme Soviet of the Uzbek Republic, Stalin Prise winner[11.1], effective member of the Uzbek Academy of Sciences, Professor of the Lenin Central Asian State University (CASU), passed away on October 6, 1954.

He was born on December 5, 1879, in Almaty and received his secondary education at the Tashkent non-classical school [Realschule] and finished it in 1900. In 1906 he graduated from Petersburg University and was left there to prepare himself for professorship. After passing his Master examinations in 1908, Romanovsky returned to Tashkent and became teacher of mathematics and physics at that non-classical school. From 1911 to 1917 he was docent, and then professor at Warsaw University. In 1912, after he defended his dissertation, *On partial differential equations*, the degree of Master of Mathematics was conferred upon him. In 1916 Romanovsky completed his doctor's thesis but his defence under war conditions proved impossible. The degree of Doctor of Physical and Mathematical Sciences was conferred upon him in 1935 *honoris causa*.

From the day when CASU was founded and until he died, Romanovsky never broke off his connection with it and remained professor of its physical-mathematical faculty. For 34 years he was chair of general mathematics and of the theory of probability and mathematical statistics; for a number of years he was also dean of his faculty. From the moment of its establishment in 1943 Romanovsky was effective member of the Uzbek Academy of Sciences, member of its presidium and chairman of its class of physical and mathematical sciences.

His teaching activities at CASU left a considerable mark. Owing to the lack of qualified instructors in mathematics he had to read quite diverse mathematical courses, especially during the initial period of the university's existence. Romanovsky managed this duty with a great success and presented his courses on a high scientific level.

He undoubtedly deserves great praise for organizing and developing higher mathematical education in the Central Asian republics [of the Soviet Union] and especially in Uzbekistan. He performed the considerable and noble work of training and coaching scientific personnel among the people of local nationalities.

Modernity of the substance of the courses read; aspiration for coordinating the studied problems with the current scientific and practical needs of our socialist state; and, finally, the ability to expound intelligibly involved theoretical problems, – these were the main features of V. I. as a teacher. Add the simplicity of manner and his love for students and you will understand that he could not have failed to attract attention to himself and to his subject. Indeed, more than 60 of his former students are now working in academic institutions and research establishments.

Romanovsky always combined teaching with research, considerable both in scale and importance. He published more than 160 writings on various fields of mathematics and their overwhelming majority belonged to the theory of probability and mathematical statistics. He busied himself with other branches of mathematics as well, mostly with differential and integral equations and some problems in algebra and number theory, either in the first period of his scientific work (contributions on the first two topics) or in connection with studies of some issues from the theory of probability and mathematical statistics.

The totality of Romanovsky's publications in probability and statistics (which embrace almost all sections of mathematical statistics) unquestionably presents a considerable contribution to their development in our country. Accordingly, he became an eminent authority on these branches of mathematical science not only at home but also far abroad.

Among Romanovsky's most fundamental and important studies in probability is his work on Markov chains (which he began in 1928) and their generalizations (correlation chains and polycyclic chains) and on generalising the central limit theorem on the multidimensional case. He was the first to study exhaustively by algebraic methods the limit behaviour (as $n \to \infty$) of the transitional probabilities which describe the change of state during n steps for homogeneous Markov chains with a finite number of states [104].

In the same paper and in later work [128; 137; 149; 195; 170] Romanovsky was engaged in proving a number of other limit theorems for the same type of Markov chains. This research also became the starting point for many other studies of Markov chains and their various generalizations by algebraic methods. In [74] he applied the method of characteristic functions and extended the central limit theorem onto sums of independent random vectors.

In statistics, Romanovsky's work covers an extremely wide range of problems. It is hardly possible to point out any large section of this discipline, either modern or classical, in whose development he had not actively and authoritatively participate. Especially great is Romanovsky's merit in widely popularizing methods of mathematical statistics in our country as well as in elevating the mathematical level of statistical thought. Here, his course [176] published in 1924 and 1939 and his books [64; 121; 162; 160] played a very large part.

I shall now briefly describe some of his important studies in mathematical statistics, Depending on the form of the theoretical law of distribution and on the organization of observations, there appear various methods of an approximate estimation of the different characteristics of the parent population. The most prominent research in our country in this sphere was done by Romanovsky.

A large cycle of his writings [48; 49; 56; 55; 47; 62; 65; 68] concerned with the theory of sampling was generally recognized. In substance they adjoin the studies of the British school of statistics but advantageously differ from them by rigour of their methodological principles. In addition, when choosing methods for solving his problems, Romanovsky exclusively used those which were developed by the Chebyshev school. To be sure, he perfected and adopted these methods for achieving new goals. That Romanovsky followed Chebyshev can partly be explained: he belonged to the latter's school and attended the course in probability theory read by the celebrated Markov. He kept in his studies to that mathematical rigour which distinguished his teacher, Markov, and used the theory as the main tool for logically and irreproachably justifying mathematical statistics. Such a substantiation was indeed lacking in the constructions of British statisticians whose works served Romanovsky as a starting point for choosing his problems. The theoretical underpinning of mathematical statistics is one of his merits which promoted its development in our country.

Romanovsky was the first to offer an analytical derivation of the laws of distribution of the well-known criteria, of the Student – Fisher *t* and *z*, of empirical coefficients of regression and other characteristics [121]. He also provided a more general theory of the Pearson chi-squared test [69] and studied problems connected with the check of whether two independent samples belonged to one and the same population.

Among Romanovsky's work on probability and statistics which deserve serious attention I also mention [127; 139; 142; 134]. In the first of these, he shows that the θ test which he himself introduced in 1928 [65] is much easier to apply to all the problems in which the Fisherian *z* test based on the tables of that scholar is made use of; that it leads to the same qualitative solutions; and that it often solves these problems more precisely than the latter. In addition, its construction is simpler.

The second writing [139] is very interesting methodologically. There, Romanovsky attempts to review systematically the main statistical constants and problems. Given the variety and detachment of those latter and the availability of a diverse set of methods applied by statistics his endeavour was absolutely necessary.

The third paper provided an elementary and simple solution of a topical statistical problem connected with an objective estimation of unknown characteristics of parent populations by means of observation. In the last-mentioned work he calculated transitional and other kinds of probabilities for Markov chains and offered their statistical estimates given the appropriate probabilities.

The classical theory of periodograms enables to analyse a number of random variables under the assumption that several periodic oscillations and additional perturbations independent from one trial to another are superposed. Romanovsky devoted a series of important studies [87; 86; 92] to the circumstances which occur when admitting dependence between random perturbations.

Romanovsky systematically and intensively carried out his scientific work for half a century. Especially from the 1930s onward he had been paying more attention than before to problems directly connected with practical needs, e. g., in [86; 87; 98; 146]. And during the last period of his life he was much engaged in the important problem of contemporary statistics, in the statistical quality control [161; 187; 189; 169 etc.].

Among contributions not connected with probability or statistics I mention [76; 80; 122; 100]. The first three of those, although originating from problems connected with Markov chains, provided findings of independent mathematical interest.

Before concluding this brief review, it is necessary to indicate that, not restricting his efforts to publishing scientific contributions, Romanovsky unceasingly counselled, verbally and in writing, most diverse productive establishments and scientific institutions and answered questions which had been arriving from all quarters of our country. And until his last days he combined scientific studies with active social work. He was permanent chairman of Tashkent Mathematical Society and an active member of the Society for Dissemination of Political and Scientific Knowledge. The people and the government of Uzbekistan estimated his merits at their true worth. Three times he was elected Deputy of the Republic's Supreme Soviet and decorated with three orders of Lenin and an Order of the Red Banner of Labour; he became honoured Science Worker of Uzbekistan and in 1948 he won a Stalin prize.

The sum total of all his scientific work and teaching activities was the mathematical school which he created in Tashkent.

Bibliography

[I do not append it, see the Bibliography in the main text. However, six items provided by Sarymsakov were not mentioned there, and I listed them separately above. I changed the numeration of the items indicated by Sarymsakov. Now, they conform to the main Bibliography above.]