

# Nikolai V. Timoféeff-Ressovsky in Berlin-Buch (1925–1945)

Manfred Rajewsky, Dana Lafuente and Michael Bader

At the end of June 1925, after traveling by train from the Belorussky station in Moscow, a young Russian scientist arrived in Berlin, accompanied by his wife—a scientist like him—and their two-year-old son Dmitri. Nikolai Vladimirovich and Elena Alexandrovna Timoféeff-Ressovsky had married in 1922 and, at the invitation of the eminent brain researcher Oskar Vogt, director of the Kaiser Wilhelm Institute (KWI) for Brain Research, they were coming to his institute to do research. They had been suggested and especially recommended by Nikolai Konstantinovich Koltsov, director of the Moscow Institute of Experimental Biology,<sup>1</sup> with the support of the People's Commissioner (Minister) of Health, Nikolai A. Semashko. At that time an agreement for scientific exchange and cooperation existed between the German and Soviet governments, enabling the stay of Nikolai and Elena Timoféeff-Ressovsky in Berlin for a limited period.

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Abridged version with minute stylistical changes (Dana Lafuente and Michael Bader) from: Manfred Rajewsky: Nikolai V. Timoféeff-Ressovsky (1900–1981), in: *Geneticists in Berlin-Buch*, published by the Max Delbrück Center for Molecular Medicine (MDC), May 2008.

Professor Emeritus Manfred F. Rajewsky, M.D., cell and molecular biologist with a focus on cancer research, was the founding director of the Institute of Cell Biology (Cancer Research) at the West German Cancer Center Essen, University of Essen Medical School. He died on July 26th, 2013.

Manfred Rajewsky—Deceased.

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<sup>1</sup>Nowadays N.K. Koltsov Institute of Developmental Biology, RAS (IDB RAS).

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M. Rajewsky · D. Lafuente (✉) · M. Bader  
Max Delbrueck Center for Molecular Medicine in the Helmholtz Association,  
Robert-Roessle-Street 10, 13125 Berlin, Germany  
e-mail: d.lafuente@mdc-berlin.de

M. Bader  
e-mail: mbader@mdc-berlin.de



Nikolai V. Timofëef-Ressovsky in the early 1930s in the doorway of the genetics vivarium, an annex of the former Kaiser Wilhelm Institute (KWI) for Brain Research Berlin-Buch, now the Oskar and Cécile Vogt Building. In the course of the renovation in the nineties of the last century, the vivarium was demolished. Source: Prof. [H. Bielka](#), Berlin

Prior to that, Vogt had acted as adviser to the Russian government concerning the establishment of an institute for brain research and the medical treatment of Lenin and later the autopsy of his brain. During this time he had become acquainted with the high scientific quality and originality of Koltsov's circle in the field of theoretical and experimental genetics, particularly with regard to the basic principles of ontogenesis, the role of mutations and population genetics. Koltsov was one of the most important figures in Russian biology during this period (Babkov 2002). Already in 1911 he had founded the world's first department of experimental biology at the Moscow City People's University named after A. L. Shanyavsky, out of which the Institute of Experimental Biology evolved in 1916. This institute was the origin of and, over a long period, home to the Russian school of genetics, population genetics and evolution biology, with its brilliant theorist Sergei Sergeevich Chetverikov. Vogt soon recognized the great significance of the

Russians' groundbreaking work for future investigations of gene characteristics and how these are influenced by other genes (gene interactions) and environmental factors, in particular with regard to identifying and influencing genetic diseases of the central nervous system. He therefore decided to integrate genetic research into his Berlin Institute for Brain Research and to recruit highly talented young scientists from Koltsov's circle to work there. At Vogt's behest, Timoféeff-Ressovsky was to establish a laboratory for genetics which was to become the nucleus of a new genetics department in the new institute building opened in Berlin-Buch in 1930. Several greenhouses ("the genetic vivarium") constituted part of the Department of Genetics. The task of building up and heading the department was assigned to Timoféeff-Ressovsky, who remained a Soviet citizen and formally was still a staff member of the Moscow Institute of Experimental Biology, but without a university diploma or PhD. In 1936 his department in the KWI for Brain Research attained autonomous status with its own budget. In 1938 Timoféeff-Ressovsky was named a scientific member of the Kaiser Wilhelm Society. The scientifically extraordinarily productive and successful chapter of his life which had begun with his arrival in Berlin ["...the most wonderful years of my life" (Rokityanskij 2005)] continued. Looking back, by far the largest part of his genetic research work forming the basis of his international acclaim was done during the years prior to World War II. In the field of history of science, many published accounts have dealt with his outstanding scientific work and the vicissitudes of his life (Babkov and Sakanyan 2002; Berg 1990; Bielka 2003a, b; Crow 1993; Deichmann 1995; Granin 1990; Glass 1990; Hossfeld 2001; Ivanov and Liapunova 1990; Korogodiin et al. 2000; Laubichler and Sarkar 2002; Medvedev 1982; Paul and Krimbas 1992; Ratner 2001; Rokityanskij 2005; Satzinger and Vogt 1999; Timoféeff-Ressovsky 1995, 2000; Tyuryukanov and Fedorov 1996; Vogt 1998; Vorontsov 1993; Winkler 2001).

[...]

Since a visit of the American geneticist Hermann Joseph Muller (Wunderlich 2008) in 1922, the Department of Genetics to which Nikolai and Elena Alexandrovna Timoféeff-Ressovsky belonged in Koltsov's Institute of Experimental Biology was headed by Chetverikov. His research group had received special lines of the fruit fly *Drosophila melanogaster*, which since 1910 were being used in Thomas Hunt Morgan's research group in the U.S. to crossanalyze chromosomal hereditary mechanisms on the basis of Mendel's Laws of Heredity. In contrast, Chetverikov and his team carried out cross-analyses using these lines to explore the emergence of species during evolution. The results were groundbreaking for the later so-called "synthetic evolution theory". Aldous Huxley characterized it as the "new synthesis", the fusion of genetics with classical evolutionary doctrine. At that time Chetverikov founded *Drozsoor* (from Russian, which means "joint shouting of drosophilists"), an extraordinarily productive discussion group which met regularly and in which Timoféeff-Ressovsky took part. He, like all of the other participants, remembered these discussions all of his life and later used them as a model for his discussion groups in Berlin. In his recollections, Timoféeff-Ressovsky also remembered as exceptional the intensive two-year internship under Koltsov, which every student had to complete. They (the students) later often said that this had been the best time of their lives.

During these years Timoféeff-Ressovsky also had his first contacts with the famous Russian biologists Nikolai I. Vavilov and Vladimir I. Vernadsky, whom he always highly admired and venerated. While still at the Moscow Institute, Timoféeff-Ressovsky published the results of his first experiments on the reversibility of spontaneous gene mutations (reverse mutations), using *Drosophila funebris* as an example. This research topic interested him, because he held the hypothesis—which later proved to be true—that mutations as the basis of evolutionary changes may not only be of a destructive nature. The research on this problem was then continued and extended in Berlin on the model of x-ray-induced mutations in *Drosophila melanogaster* immediately after Muller in 1926 had shown that x-rays could induce a high yield of mutations in *Drosophila* (Nobel Prize 1946) (Wunderlich 2008). In 1932/33 Muller was visiting professor with Vogt and Timoféeff-Ressovsky in Berlin-Buch, and from 1932 to 1936 he was member of the Board of Trustees of the KWI for Brain Research. During his Berlin period (1925–1945) Timoféeff-Ressovsky published 140 papers (among them (Möglich et al. 1944; Rajewsky and Timoféeff-Ressovsky 1939; Timoféeff-Ressovsky 1927; Timoféeff-Ressovsky and Timoféeff-Ressovsky 1927; Timoféeff-Ressovsky 1934a, b; Timoféeff-Ressovsky et al. 1935; Timoféeff-Ressovsky 1939; Timoféeff-Ressovsky and Timoféeff-Ressovsky 1940; Timoféeff-Ressovsky 1940; Timoféeff-Ressovsky and Zimmer 1947), which formed the basis of his world renown and which brought him the nomination for the Nobel Prize in Physiology and Medicine by Boris Rajewsky in 1950.



[Elena Alexandrovna Timofeef-Ressovsky](#). Photo: private

Not to be overlooked is the contribution of his wife, the outstanding geneticist Elena Alexandrovna Timoféeff-Ressovsky. She, too, was influenced by the Koltsov/Chetverikov research group, and with her precise, systematic approach and her balanced, unflappable way of working and her insight into human nature, she was an ideal counterpart to his quite impulsive, sometimes even chaotic nature. In the year of Elena Alexandrovna's death (1973) he was to say (Satzinger and Vogt 1999; Elena Alexandrovna Timoféeff-Ressovsky 1995): "She was a completely remarkable woman in every aspect. There are remarkable women, but they are quite rare in the world. But completely remarkable women are even rarer. My wife was such a completely remarkable woman. We worked in the same laboratory for 53 years, with four hands and two heads, and we were married for 51 years. During this time we were only separated for 21/2 years (during my imprisonment)."

Corresponding to the cosmopolitan nature of the Timoféeff-Ressovskys (and Vogt's Kaiser Wilhelm Institute for Brain Research), their Berlin apartment—first in Steglitzer Strasse (today Pohlstrasse) and, after the construction of the new building of the institute, in the gatehouse of the Berlin-Buch park premises—was always open to guests from all over the world. It was the place of social gatherings and many rounds of discussions, which often took place up into the wee hours and usually were dominated by the deep voice of the host. Besides colleagues and scientist friends, artists were frequently among the guests, especially during the twenties. Like the education of the two sons—the second son Andrei was born in Berlin in 1927—the hospitality of the Timoféeff-Ressovskys mainly rested on the shoulders of Elena Alexandrovna Timoféeff-Ressovsky. She was, besides Cécile Vogt, wife of Oskar Vogt and scientific member of the Kaiser Wilhelm Society, at that time the only female scientist at the KWI for Brain Research who combined her research activity with marriage and motherhood.

Overall considered, all of Timoféeff-Ressovsky's seminal work in experimental mutation research (mostly on *Drosophila*) was directed toward the nature of genes and mutations and their significance in evolution biology and population genetics. First, using mature spermatozoa, he confirmed the linear relationship between x-ray dosage and mutation rate and showed that the relationship between gender-related lethal mutations/visible mutations remained constant with increasing dosage, and that dose effectiveness, dose fractioning and irradiation at the same dosage level and at temperature differences in the range of 10–35 °C did not influence the mutation frequency. His classic phenogenetic studies explore the influence of the remaining genome ("genotypic milieu"), the external environmental conditions ("external milieu") and physiological variables ("internal milieu") on the expression of mutants. They were predominantly carried out on mutant *venae transversae incompletae (vti)* of *Drosophila funebris*. Along with Vogt, Timoféeff-Ressovsky distinguished between the penetrance, expressivity and specificity of mutated genes (Laubichler and Sarkar 2002). He found that these selected indicators of gene expression could to a certain degree vary from each other independently and that the "genotypic milieu", e.g. with respect to the influence of vti expression, can be differently active in geographically differently localized lines of a species. This all affected the way from the gene to the phene (phenogenetics), population genetics,

e.g. the splitting of a species population into smaller (territorially isolated) sub-populations (microevolution processes), the generation of phenotypical characteristics in general and the genetics of ontogenesis.



Nikolai V. [Timofëeff-Ressovsky](#) (standing on the right) with his colleagues ([Natascha Kromm](#), sitting on the left) in the dry and heated greenhouse of the genetics vivarium. Source: Prof. [H. Bielka](#), Berlin

In the thirties it was especially important to elucidate whether recessive lethal mutations in fact represent the far most frequent kind of mutations or whether in reality innumerable other mutations are also present which do not appreciably impair the ability of an organism to survive until it reaches a reproductive age. In extraordinarily elaborate series of experiments Timofëeff-Ressovsky was able to show that xrays induce approximately twice as many mutations of the last-mentioned kind, i.e. without immediate recognizable effect, as lethal or sub-lethal mutations. The evolutionary significance of mutations also became clear when Timofëeff-Ressovsky analyzed the survivability of different mutations of *Drosophila funebris* at the same temperature in different combinations with other mutations. His results showed that the survivability of the mutant combination was sometimes just as good as that of the most effective mutation alone, in other cases it was just as poor as the least effective mutation alone, and in other cases it corresponded to a mean. The mutant combination could also be more effective than the most effective individual mutation or, however, less effective than the least effective. The American geneticist Bentley Glass, who in 1933 worked for half a year with Timofëeff-Ressovsky in Berlin-Buch, wrote the following about these experiments: “From the standpoint of clarifying the selective process upon the raw material of evolution, the mutations, this investigation is one of the most important ever made by anyone” (Glass 1990). In 1934, apart from “The experimental production of mutations”, still today considered a classic survey and in which he—by the way—already used the term “genetic engineering”, Timofëeff-Ressovsky published his most comprehensive work on phenotypical gene manifestation during

the pre-war period “The link between the gene and the morphological character” (Timoféeff-Ressovsky 1934a). In his publication “Genetics and Evolution” (Timoféeff-Ressovsky 1939), which appeared in 1939 and like the aforementioned publication was also met with much acclaim, he summarized for the first time his notions on the genetic mechanisms in the processes of microevolution. In 1940, together with his wife, he reported the results of his population-genetic studies on temporal and spatial distribution in the open landscape (park area in Berlin-Buch) and on the action areas of different species of *Drosophila* (Timoféeff-Ressovsky and Timoféeff-Ressovsky 1940; Timoféeff-Ressovsky 1940). The above-named studies, including further experimental data, formed the basis for the models of microevolution which were developed as a consequence of Timoféeff-Ressovsky’s research.

Due to his spectacular research work, his lectures in Germany and in other countries and, not least, his originality and his personal charisma, Timoféeff-Ressovsky soon became acquainted with leading geneticists and also with many physicists and biophysicists, who particularly appreciated him. He exchanged ideas or worked with a number of German scientists including e.g. the cytogeneticist Hans Bauer, the plant geneticist Georg Melchers, the geneticist and zoologist Alfred Kühn, the biophysicist Boris Rajewsky, the crop and radiation geneticist Hans Stubbe and the virologist Gerhard Schramm, and also the physicist and Nobel laureate Erwin Schrödinger, the physicists Karl Günter Zimmer, Max Delbrück, Robert Rompe,<sup>2</sup> Pascual Jordan and Friedrich Möglich (student of Max von Laue) and the chemist (Auer Society).

Outside of Germany he regularly took part in the famous seminar circle of the physicist Niels Bohr in Copenhagen along with the six-years younger Max Delbrück, as well as with Paul Dirac, Pierre Auger, Francis Perrin and William T. Astbury, and the biologists Muller, Theodosius G. Dobzhansky, Vavilov, Boris Ephrussi, Vernadsky, Cyril D. Darlington, John B. S. Haldane, Adriano Buzzati-Traverso, Torbjörn O. Caspersson and Åke Gustafsson. Supported by the Rockefeller Foundation and together with Ephrussi, he headed a small international group of eminent scientists (geneticists, physicists, chemists, cytologists, biologists and mathematicians), who before the beginning of World War II met regularly off-season in Dutch, Belgian and Danish seaside resorts to hold discussions about the most current research problems in biology. Correspondingly, in Timoféeff-Ressovsky’s department in Berlin-Buch an international atmosphere prevailed, with visits, lectures and guest stays of foreign researchers, among these not seldom scientist friends from Timoféeff-Ressovsky’s Moscow period, like Koltsov, Vernadsky, Vavilov, Alexander S. Serebrovsky, Yuri A. Filipchenko, Grigory A. Levitsky, Georgy D. Karpechenko, Solomon G. Levit and Chetverikov. Even the genetics department itself was multinational, although it had a certain ‘Russian propensity’, because e.g. Timoféeff-Ressovsky’s wife Elena Alexandrovna Timofeef-Ressovsky, the geneticist Sergei Romanovich Tsarapkin and the technical assistant Natascha Kromm worked there.

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<sup>2</sup>See hear “Creating a Physical Biology: The Three-Man Paper and Early Molecular Biology”, Phillip R. Sloan, Brandon Fogel (eds), Chicago and London press 2011.



The increasing mutual interest and collaboration between biologists and physicists in the twenties and thirties did not develop by happenstance. These were dictated by the general issue whether the laws of physics and biology were compatible, more specifically, whether life processes and structures obey well-known physical laws, including the quantum theory. For Timoféeff-Ressovsky, the paramount issue was the molecular nature of the gene with its exceptional stability, and connected to that, the molecular mechanisms of mutation. As Delbrück recalled in his Nobel lecture in 1969 (Delbrück 1970), the nature of the gene was at that time an issue of speculation: “From the hindsight of our present knowledge one might consider this (‘that genes had a kind of stability similar to that of the molecules of chemistry’) a trivial statement: what else could genes be but molecules? However, in the mid-thirties this was not a trivial statement. Genes at that time were algebraic units of the combinatorial science of genetics, and it was anything but clear that these units were molecules analyzable in terms of structural chemistry. They could have turned out to be submicroscopic steady-state systems, or they could have turned out to be something unanalyzable in terms of chemistry, as first suggested by Bohr ...”.



Kolyusha\* hurrying from his apartment to his laboratory, drawn by [Oleg Zinger](#). \* diminutive form for [Nikolai V. Timoféeff-Ressovsky](#).

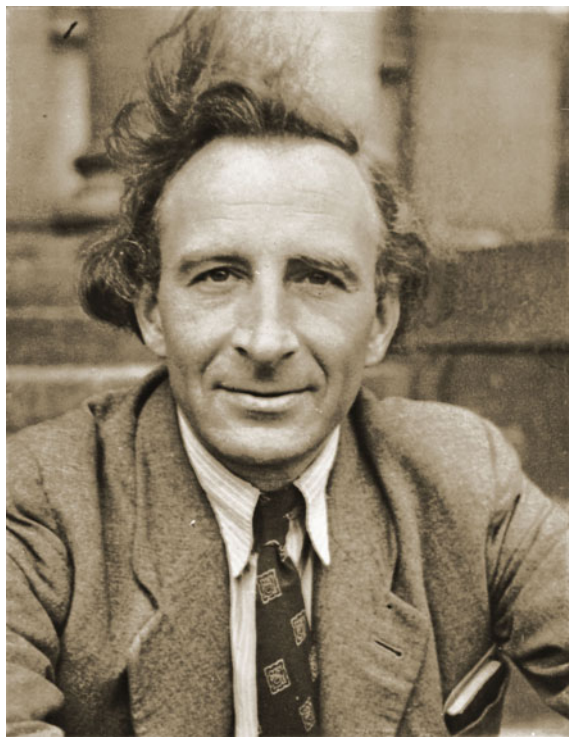
Source: Prof. H. Bielka, Berlin

In intensive discussion rounds which took place between 1932 and 1937 and in which Muller also took part in 1932 and 1933, Timoféeff-Ressovsky became Delbrück's most important teacher in genetics and quantitative mutation research. In Delbrück's words (1969) (Delbrück 1970): “Our principal teacher in the latter area (biology) was the geneticist, Timoféeff-Ressovsky, who, together with the physicist K.G. Zimmer, was at that time doing by far the best work in the area of quantitative mutation research.” Timoféeff-Ressovsky began his research on the



mutagenic effect of x-rays in 1928/1929, first in an x-ray laboratory in building V of the Hufeland Hospital in Buch and then continued with it from 1930 on in the “x-ray pavilion” of the new KWI for Brain Research, an annex to the connecting corridor between the institute and the hospital (Bielka 2003a, b). His first radiation-genetic publications date back to 1929–30. In 1935 the classic work “On the Nature of Gene Mutation and Gene Structure” by N. V. Timoféeff-Ressovsky, K.G. Zimmer and M. Delbrück appeared in *Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen* (Timoféeff-Ressovsky et al. 1935). It also became known as the “three-man paper” or the “green pamphlet”. In a masterly way, this publication summarized the results of experimental, quantitative mutation research up to that time and the model hypotheses that had been developed on the mutation process and on gene structure. The most important conclusions were, first, that a spontaneous mutation must be due to a rare and single-step (in analogy to the principles of quantum mechanics) stable molecular alteration via atomic rearrangement; and second, that mutations induced by ionizing rays are correspondingly dose-dependent, more frequent atomic rearrangements of the same kind (cumulative, direct one-hit events without threshold value, in the sense of target theory) (Timoféeff-Ressovsky and Zimmer 1947), triggered by ion pairs or small ion clusters. The possibility of an indirect triggering of a mutation through radiation-induced, short-term free radicals and/or chemical mutagens could not yet be taken into consideration at that time because these mechanisms were not discovered until years later. By contrast, first estimations—which later proved to be untenable—were already presented as to the size of a gene (derived via the volume of the mutation-triggering spatial target area). This and the notion that genes are molecules with stable atomic structure in which energy-conductive processes in turn lead to stable structural changes (mutations) of the same kind, has contributed considerably to the development of molecular genetics.

According to the activity report of the genetics department for 1937/1938 (minutes of the Board of Trustees meeting of the KWI for Brain Research from December 1938, Archives of the History of the Max Planck Society) (Satzinger and Vogt 1999), Timoféeff-Ressovsky had also at that time attempted to determine by x-ray structure analysis a crystal structure of chromosomes and to produce electron diffraction images of salivary gland giant chromosomes of *Drosophila*. The results were not published, but in principle these approaches corresponded to the later application of similar methods elucidating the structure of DNA in the 1950s. The significance of the seminal works of the Berlin-Buch research group on the nature of genes and mutation was emphasized by Schrödinger (Nobel Prize for Physics in 1933 for his contribution to quantum theory, together with Dirac) in his book “What is Life?” published in 1944 (Schrödinger 2001), and in part even served as basis for this excellently written text. Schrödinger’s book strongly influenced the development of biology after the end of World War II. The international reputation of the work of Timoféeff-Ressovsky and Delbrück (who emigrated to the U.S. in 1937 and there became one of the fathers of molecular genetics) grew even more.



Nikolai V. Timoféeff-Ressovsky, 1943. Photo: private

From 1937/1938 on Timoféeff-Ressovsky's department had a powerful Philips neutron generator (linear accelerator with voltage up to 600,000 volts) at its disposal, with the aid of which radionuclides could be produced. Neutrons cause higher ionization densities in tissue than x-rays, and also in the case of neutrons the mutation rate was proportional to the radiation dose up to a saturation value, and a threshold value was not detected. Again, one ionization was postulated as a hit. Incidentally, even back then Timoféeff-Ressovsky had expressly pointed to the danger of radiation damage—including genetic damage—to humans through ionizing radiation, especially with respect to medical personnel in radiation diagnostics and therapy.

Apart from genetic and mutation research, Timoféeff-Ressovsky's department also experimented with radionuclides from about 1940 on. They were produced with the aid of the department's own neutron generator and purified by his colleagues Hans-Joachim Born (student of Otto Hahn) and Zimmer. The measurements were primarily carried out by Elena Alexandrovna Timofeeff-Ressovsky, Born, Joachim Gerlach<sup>3</sup> and Paul Max Wolf<sup>4</sup> (Auer Society), using the radioactive

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<sup>3</sup>See [https://www.mdc-berlin.de/37810095/en/about\\_the\\_mdc/history/biography/karlzimmer](https://www.mdc-berlin.de/37810095/en/about_the_mdc/history/biography/karlzimmer).

<sup>4</sup>See Footnote 3.

tracer methods developed by Georg von Hevesy in the thirties. They pertained to the absorption, distribution, storage and excretion of radioactive isotopes of phosphorus, chlorine, arsenic and manganese in the mouse (in the case of radium 224 also the retention time, circulation time, in humans). After the end of the war alleged human experiments in the genetics department were an issue of controversy—quite unfairly so, because the doses used were very low and completely harmless. Experiments were also conducted on rabbits with thorium 234. It accumulated in the lymphatic system and later was used as a contrast agent (Thorotrast) in radiation diagnostics, but due to negative long-term effects (thorotrastoses, malignant thorotrastoma) it has no longer been used since the 1950s.

However, worthy of mention are also cell and molecular biological studies, which were important to establish basic methodology. An example of this is described in one of Timoféeff-Ressovsky's letters to his friend Boris Rajewsky dated March 17, 1941: "Dear Boris Nikolaevich!... Sometime ago you ran the risk of promising me schnaps, if we should succeed in radioactively labeling chromosomes or filterable viruses. I herewith have the pleasure of informing you that the latter has been successful: By biological means we have incorporated radioactive phosphorus into the tobacco mosaic virus (by breeding tobacco plants on a radioactive phosphorus-containing nutrient solution and propagating the mosaic virus on such radioactive plants). It is quite amusing! Kind regards from house to house, Yours (signature)".

As the Nazi period continued, especially with the beginning of World War II and the German attack on his fatherland on June 22, 1941, a shadow fell on Timoféeff-Ressovsky's life. The war and the responsibility for his family, staff and department increasingly became a psychological burden to him. Muller had left Berlin-Buch after the first attacks of SA troops on the KWI for Brain Research in 1933. Vogt was attacked by the Nazis because of his pacifist and cosmopolitan attitude (among other reasons because he employed women, including Jewish women, at his institute) and had received his dismissal in 1934 for political reasons. However, thanks to the support he received from Gustav Krupp von Bohlen and Halbach and Max Planck, president of the Kaiser Wilhelm Society, he remained acting director of the institute until April 1, 1937. Vogt complained at that time that the atmosphere at the KWI for Brain Research had drastically worsened due to denunciations of staff members. His successor Hugo Spatz actually intended to shut down the genetics department, which he considered to be an "alien element" in the institute. He finally had to consent to an agreement between the Kaiser Wilhelm Society and the responsible ministry, according to which the department was to remain preserved with a simultaneous budget increase. However, as far as the administration and the budget were concerned, the department was to be independent of the KWI for Brain Research. The continued existence of the genetics department was then ultimately secured in 1938 when Timoféeff-Ressovsky was named scientific member of the Kaiser Wilhelm Society at the KWI for Brain Research.

In 1932 Timoféeff-Ressovsky held a much acclaimed plenary lecture at the 6th International Congress of Genetics in Ithaca, New York, USA, in the presence of

many world-renowned geneticists, among them Vavilov, Morgan and Muller. Following the conference, he was invited to work at the laboratories of the Carnegie Institution in Cold Spring Harbor for several months. Finally, in 1936 he was offered a position at the Carnegie Institution, which he rejected after much reflection. In his correspondence with Miroslav Demerec (Satzinger and Vogt 1999) he based this decision on his responsibility for his scientific and technical staff in Berlin-Buch and the fact that his sons attended the French secondary school in Berlin, and he did not want to ask them to make this adjustment. Another reason for his refusal was that in comparison to Germany, scientists had a lower status in the U.S., which Muller had pointed out to him.

In May 1937 Timoféeff-Ressovsky turned to the Soviet embassy in Berlin with the request of extending his and his family's permit to stay in Germany. This was rejected. Although this decision was very difficult for them, the Timoféeff-Ressovskys decided against returning to the USSR under the conditions prevailing there. Upon his request Timoféeff-Ressovsky had also been urgently warned beforehand by his teacher Koltsov via the Swedish embassy ("... of all the methods of suicide, you have chosen the most agonizing and difficult. And this not only for yourself, but also for your family.... If you do decide to come back, though, then book your ticket straight through to Siberia!") (Glass 1990). Vavilov, at that time president of the Academy of Agricultural Sciences of the USSR, also pointed out via Muller that only arrest and hard punishment awaited him under Stalin's rule with its waves of purges in the period of the repression of genetics and geneticists by Trofim D. Lysenko and Isaak I. Prezent. After Timoféeff-Ressovsky became a scientific member of the Kaiser Wilhelm Society, the German Minister of Science Bernhard Rust suggested to him in July 1938 that he assume German nationality. Timoféeff-Ressovsky politely refused ("I was born a Russian and see no possibility of changing this" (Paul and Krimbas 1992)). He always remained a Russian patriot (according to his assistant Natascha Kromm: "More than a patriot—a chauvinist" (Paul and Krimbas 1992)) and during the war repeatedly remarked that he was sure of Russian victory, for which he was admonished by the secretary general of the Kaiser Wilhelm Society.

For Timoféeff-Ressovsky it was especially depressing and hard to grasp that the best Russian geneticists—many of them his teachers—were arrested one after another as a consequence of the official damning of genetics in favor of the Lysenko doctrine during the waves of purges between 1929–1931 and 1936–1940. Most of them perished in prisons and labor camps. Chetverikov was denounced in 1929, arrested and banished to Sverdlovsk (today Yekaterinburg); he died in 1959. Koltsov lost his position as institute director and died in 1940. Vavilov died of starvation in prison in 1943. Karpechenko, Levitsky and Levit also died in prison. Timoféeff-Ressovsky's younger brothers Vladimir and Dmitri were likewise arrested and lost their lives, as did many of Elena Alexandrovna Timoféeff-Ressovsky's relatives. Another blow of fate followed in 1943. Timoféeff-Ressovsky's older son Dmitri had—without informing his parents in detail—at age 18 become a leading member of a young anti-Nazi resistance group which also helped prisoners of war, among them two

French pilots and East European and Western foreign workers, by providing them with hiding places and medication.

A provocateur blew their cover in 1943, and about 50 people were arrested as a consequence. Natascha Kromm had to watch from a window in the gatehouse in Berlin-Buch how Dmitri was arrested on the street. Afterwards a number of leading German scientists tried to intervene for Dmitri, but without success. The head of the Reich Security Central Office, Ernst Kaltenbrunner, wrote Timoféeff-Ressovsky in an official letter that Dmitri could not be rescued because he had worked against the Führer and the Reich. Dmitri was sent in August 1944 to the Mauthausen concentration camp, transferred later to the affiliated Melk camp and apparently perished there in 1945 a few days before the war ended. After a last sign of life in December 1944, his parents hoped for months that they would see their son again alive; Elena Alexandrovna Timoféeff-Ressovsky never gave up this hope until her death on Easter Sunday 1973. Still in July 1944 the Gestapo had offered—through Professor Julius Hallervorden, a department head of the KWI for Brain Research—to keep Dmitri in prison instead of sending him to a concentration camp, in case Timoféeff-Ressovsky declared his willingness to head the Nazi sterilization program for people of Slavic descent (Babkov and Sakanyan 2002; Bielka 2003a). Timoféeff-Ressovsky refused this categorically.

During the last years of the war the situation for Timoféeff-Ressovsky, who already was under severe psychological pressure, became increasingly perilous. Although he was a world famous geneticist, he was considered to be an “enemy alien”, since he had a “consular” passport (issued outside of his native country) of the USSR. Moreover, he was neither a member of the Nazi party nor any of its organizations, and was often the target of suspicion in connection with the anti-Nazi activities of his son and his hardly reserved way of expressing his political views. Despite this, the Timoféeff-Ressovskys continued to aid many people who were in need. They hid individuals at home and in the institute who were threatened because they had Jewish relatives and helped forced laborers and prisoners of war to get jobs as temporary workers in the genetics department. The Timoféeff-Ressovskys’ quick-witted, spontaneous willingness to help becomes very clear in a report of Professor Bernhard Hassenstein (Winkler 2001). He describes how Timoféeff-Ressovsky issued him a certificate (not based on fact) during his last visit in Berlin-Buch on February 10, 1945, without explaining it in more detail.

For Timoféeff-Ressovsky himself this was very risky, but for Hassenstein it was possibly life-saving in the coming chaotic period at the end of the war, which Timoféeff-Ressovsky foresaw. “Berlin-Buch, February 10, 1945 C e r t i f i c a t e This is to certify that Mr. Bernhard Hassenstein is working as a laboratory assistant in the Department of Genetics of the Kaiser Wilhelm Institute at Berlin-Buch. Signature and department seal”: “At that time I had no idea that Timoféeff-Ressovsky had saved the lives of many people in a similar fashion. Even though I never needed this certificate, it is one of the most deeply moving documents of my life.”

Fighting on the Eastern Front was getting closer and closer to Berlin, and for that reason, already in 1944 the evacuation began of entire departments of the KWI for Brain Research to the western part of Germany. However, this did not apply to Timoféeff-Ressovsky's genetics department. He had decided to hold out, because he believed that he as a Russian could best negotiate with the approaching Soviet military units to preserve the department and the safety of the staff. He stuck to this decision, although many friends and colleagues urged him to evacuate to the West. Among these was also Boris Rajewsky from Frankfurt am Main, who went to see him in Berlin-Buch with the same intention right before the end of the war, but without success. It would be wrong to believe that Timoféeff-Ressovsky was sure of his course. On the contrary, he had been in a desperate state of mind for months—abstracted and hardly approachable (N. Kromm, personal communication).

In Berlin during the last weeks before the end of the war, continual bombardments, destruction and chaotic conditions prevailed. Berlin-Buch, which had been comparatively spared, was overrun on April 21, 1945 by a first wave of attack of the Soviet Army and then occupied. Following a conversation with General A. P. Savenyagin, deputy to the People's Commissioner for Internal Affairs of the USSR and responsible for certain areas of Soviet research, Timoféeff-Ressovsky was named acting director of an institute of genetics and biophysics, his former Department of Genetics, by a department of the Soviet Secret Service NKVD responsible for atomic research. With that, the institute came under the authority of the Soviet Military Administration. Besides that, the Soviets put him in the post of mayor of Berlin-Buch. A Soviet guard was stationed on the institute's premises to preserve law and order.

Five months later, however, in the night from the 14th to the 15th of September 1945, Timoféeff-Ressovsky was "requested" by another department of the NKVD to come to an approximately one-hour meeting and was transported away in a black limousine. A follower of Lysenko, Nikolai I. Nuzhdin, had denounced Timoféeff-Ressovsky. His Russian colleague, the geneticist Tsarapkin, was also arrested. The institute equipment was dismantled and taken to the USSR. Elena Alexandrovna Timofeeff-Ressovsky remained in Berlin-Buch with her son Andrei and like everyone in Berlin-Buch, did not receive news that her husband was still alive until two years later when word came from a secret research station in Sungul in the southern Ural Mountains. Soon afterwards, Elena Alexandrovna Timofeeff-Ressovsky and Andrei were allowed to join him there. In the meantime she had first been out-of-work in Berlin-Buch, supported by Care packages sent by American colleagues. However, from May 1946 on she was employed as an assistant to Hans Nachtsheim in the Institute of Zoology of the University of Berlin. Andrei Timoféeff was able to begin studying physics at the same university.

[...]

**Acknowledgment** This work was done with financial support from Program of the Russian Foundation on Basic Research (projects 15-04-01023 and 15-34-20639), partly from Program of UB RAS (project 15-2-4-21) and the Federal Special Scientific and Technical Program in support of leading scientific schools (SS-2840.2014.4). I would like to extend special thanks to Professor

Volker Wunderlich and Barbara Bachtler for their manifold support and constructive criticism in writing this manuscript as well as to Professor Ute Deichmann, Dr. Gudrun Erzgräber, Professor Heinz Bielka and Professor Erhard Geißler for their suggestions of important references. I would like to thank all of the above named for valuable conversations and the Berlin colleagues for visits to buildings in Berlin-Buch and help in the selection of illustrations. The personal memories of my aunt Natascha Kromm (1911–2006) regarding the period between 1930–1945 in the Timoféeff-Ressovsky research group have also found consideration. I dedicate this text to her, my parents Olga (Natascha's sister) and Boris Rajewsky, who were good friends of the Timoféeff-Ressovsky family, and to my nephew Nikolaus Rajewsky at the new Timoféeff-Ressovsky Laboratory for Medical Genome Research on the Berlin-Buch campus.

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Korogodina, V.L.; Mothersill, C.E.; Inge-Vechtomov, S.G.;

Seymour, C.B. (Eds.)

2016, XX, 558 p. 138 illus., 78 illus. in color., Hardcover

ISBN: 978-3-319-48837-0