

Geneticist Iosif Rapoport: the Scientist vs. the State

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"Intellectuals are engaged in the pursuit of truth, while others are merely engaged in earning a livelihood."

A. Director

The life story of Iosif Rapoport is important as an illustration of the history of scientific ideas, theories, discussions, and achievements. But beyond that, the dramatic twists and turns in the history of genetics in the USSR make us think about the relationship between science, power, and society. Rapoport and his colleagues, some of whom paid with their lives for their commitment to the truth, worked under extreme conditions for a long time. Rapoport's story also reminds us of the liability of some scientists, who have learned to build and exploit "special" relationships with authorities, but have ceased to be scientists. The history of genetics in the USSR highlights the essential conditions, which were not present in the USSR, under which scientists can pursue the truth without risking their lives and freedom.

The lessons of this story, once learned, can still be useful today to promote simple rules that prevent both collusion and confrontation of scientists with politicians and bureaucrats. Society should promote conflict-of-interest avoidance, especially avoiding the conflicts caused by dependence on governmental bureaucracy. Utmost prudence in liaising with the government should counter the dangerous incentive for scientists to compete for bureaucrats' favor instead of competing in the search for empirical proofs and theoretical evidence. The same simple rules empower ordinary people to follow in Rapoport's footsteps and to contribute to scientific progress routinely.

Early Work

Born in 1912 to a secular Jewish physician, Rapoport studied at the Faculty of Biology of the Leningrad University (now St. Petersburg University).

He was admitted to the university in 1930. From the second year of his studies, he focused on genetics. After graduating from the university, he took a complementary course in genetics. As one of the best graduates, he was assigned to a position at the Institute of Experimental Biology of the Academy of Sciences. The head of the institute was one of the leading geneticists of the time, Nikolai Koltsov (Koltzoff). Koltsov was the first to suggest that the carrier of hereditary information—the chromosome—is a giant molecule.¹ Koltsov's principal works have been reviewed by Morange.² Nikolay Timofeev-Ressovsky was among Koltsov's students.³ Future Nobel Prize laureate Hermann Joseph Muller also worked at the institute for some time.⁴

Rapoport first worked as a graduate student, and then, after defending his "candidate" (Ph.D.) dissertation in 1938,

he worked as a senior research fellow (in the USSR, there was a two-level gradation of Ph.D.s—"candidates" and "doctors"; "doctor" corresponds to *Doctor habilitatus* in Germany and some other countries). The defense of his "doctoral" dissertation was scheduled for the end of June 1941. However, immediately after the beginning of the war against Nazi Germany on June 22, 1941, Rapoport voluntarily enlisted in the army, giving up his legal exemption from enlistment.⁵ In the spring of 1943, the young officer was sent to Moscow to take field commanders' courses at the General Staff Military Academy. Rapoport's colleagues had exploited this opportunity to organize his doctoral dissertation defense that took place on May 5, 1943.⁶

Soon after the war, Rapoport succeeded in publishing the results of his pioneering research on chemical mutagenesis.⁷ He was later nominated for the Nobel Prize for this research.

The First Campaign of the Great War inside Soviet Biology

Historically, in Russian biology there was a competition between two schools. One school, composed of disciples of the successful selectionist Michurin, relied on the theory of Lamarck. Their opponents were focused primarily on theoretical and experimental studies of genetic transmission. Both schools were competing for resources granted exclusively by the communist leaders who could, in principle, be neutral and not interfere in the discussion or conflict.

However, the attitude of the authorities to the positions of both schools was not symmetric. Genetic biologists used to stress the vulnerable scientific basis of the selectionists' ideas, which the leaders of the regime could not verify themselves. In turn, "selectionists" accused geneticists of being "reactionary," "bourgeois," "pseudoscientists," and "collaborators of fascists"—using the same conceptual apparatus and vocabulary as the Soviet authorities themselves.⁸

It is also important to stress that, as true scientists, geneticists could not promise rapid and sharp growth in crop production, which was desperately needed in agriculture destroyed by the communist experiment. The communist reform of collectivization turned new collective farms into a pump to siphon resources from agriculture to subsidize the accelerated growth of the military industry.^{9,10} The promise of "selectionists" to provide such rapid growth was highly desired by the authorities, as it could justify the cruel experiment with agriculture.

In ancient times, a centralized irrigation system organized by the state increased the soil productivity, justifying the most extreme forms of authoritarian rule, as in ancient Egypt.¹¹ The very possibility of "scientific" means for rapid and sharp growth in crop production resulting from public investment provided legitimacy for the coercive centralization by the Bolsheviks.

Not surprisingly, the authorities increasingly supported

the Lamarckian selectionists led by Trofim Lysenko against the genetic biologists led by Nikolai Vavilov and Nikolai Koltsov. According to the practice of Stalinist dictatorship, the defeated were expected to be arrested and “discarded.”

It is noteworthy that when the official persecution of Koltsov started in 1939, Rapoport was the only institute employee who attempted to defend his mentor. During a general meeting of the Institute staff, every speaker condemned Koltsov. Rapoport was the only one to declare that all the accusations against Koltsov were unfounded. He even proposed to name the Institute after him.¹² Surprisingly, Rapoport was not arrested or even dismissed. It was rare but not unique for the Soviet regime to spare a courageous person. A similar pattern can be observed with the Nobel Prize laureate Pyotr Kapitsa.¹³

As a result of this “biologic war,” Koltsov was dismissed from the leadership of the Institute of Experimental Biology in 1939.⁸ In 1940, Vavilov was arrested and Koltsov was commanded to testify against the arrested colleague (already doomed to death). Koltsov refused to testify but soon died.¹⁴ The official cause of death was a heart attack. Koltsov’s wife committed suicide immediately after his death and was buried with her husband.² Vavilov died in prison in 1943. The arrests of geneticists continued in 1941. At least two, Georgii Karpechenko and Gregory Levitsky, were executed.¹⁵

Another distinguished and internationally known Russian geneticist and Koltsov’s disciple, Nikolay V. Timofeev-Ressovsky, reasonably declined an “invitation to a beheading” in 1937 and stayed in Berlin.^{16,17}

Rapoport the Warrior

As mentioned above, Rapoport volunteered during the very first days of the war and started his service as an infantry platoon commander. For most of the war, Rapoport was the commander of an infantry battalion (62nd Elite Infantry Division) and then a paratrooper battalion (7th Paratroopers’ Division). One can get an impression of Rapoport’s courage and unique way of acting from just two episodes when Rapoport violated orders.

The first took place in the course of the operation of crossing the river Dnieper to conquer Kiev in 1943. In direct violation of orders, Rapoport shifted the location of his battalion one kilometer to the south. He replied to the commander of the regiment, “I won’t send my soldiers against machine guns. We will capture the enemy position from the flank.” The commander threatened Rapoport with a court-martial, to which Rapoport replied, “You can do so if I am still alive.”¹⁸ His battalion crossed the Dnieper and captured the enemy positions with minimal losses. To compare, the official data for the number of Red Army soldiers killed (“irrecoverable loss”) during the fording of the Dnieper and the battle for Kiev stands at 417,323.¹⁹ The bridgehead captured by Rapoport’s battalion was used by the regiment to cross the Dnieper, and then the entire brigade crossed. The rapidly expanding bridgehead was perceived by the German command as the main threat, which made it possible for the Red Army to break through to Kiev from the north in early November 1943.²⁰

Rapoport probably had very little doubt that in case of an unsuccessful crossing, he would have faced, at best, prompt execution by a firing squad. A more probable alternative was

death after prolonged torture in order to “unveil his connections with the enemy.”

In another episode, Rapoport’s leadership turned out to be a significant factor in the capture of Budapest: he launched an offensive with his battalion and occupied Mezőkomárom, in direct violation of the order not to move forward but to entrench.²¹ The success of that attack enabled the Soviet Army to break through the German defensive line. The next day the regiment commander preferred “to forget” his order.²¹

The Second Campaign against Genetics in the USSR

The second assault on genetics in the late 1940s was a prime example of scientific competition under totalitarian rule. A totalitarian government exercises control over politics, economy, science, and culture, and widely interferes in private and family life. The struggle for limited resources usually degenerates into a zero-sum game. Competition in every area, from private (for housing provided exclusively by the state) to scientific (for resources), often took the form of total war. The “selectionists” group led by Lysenko succeeded in lobbying the authorities’ decision on the “pseudoscientific” nature of genetic research.

According to this political decision, the very existence of genes was declared counter-scientific (it did not pass political fact-checking). The officially approved lynching of the geneticists was publicly performed at a session of the Academy of Agricultural Science in August 1948. The principal argument at the Academy of Agricultural Science session was Lysenko’s announcement of Stalin’s support for his position. After that, the discussion degenerated into the repentance of geneticists in the faint hope of avoiding reprisals. The success of the attack, which led to the purge of scientists in the field of biology, showed that investment in political lobbying under unlimited power is much more effective than any scientific achievement.

At this point, Rapoport stood up to defend genetics. It meant that he literally challenged the decision approved by Stalin.⁵ It is noteworthy that the organizers of the infamous session prudently did not invite him and he entered the hall with someone else’s pass. Officials referenced the fact that V.M. Molotov, Stalin’s inner circle member who oversaw science on behalf of Stalin, established Lysenko’s correctness. Rapoport countered that Comrade Molotov did not understand genetics.^{4,22} The Big Brother (in the dystopia of George Orwell) is wrong because he is not an expert in biology!

After Rapoport, several other scientists spoke out in a milder form in defense of science (A.R. Zhebrak, B.M. Zavadovsky, P.M. Zhukovsky, and V.S. Nemchinov). It is possible that it was the open opposition, along with the first stiff protests of scientists from abroad, in particular, Hermann Muller,^{23,24} that prevented the mass arrests of scientists following the public proclamation of the “reactionary character” of genetics. One of the exceptions was Vladimir Efraimson from Kharkov University, who spent 7 years in prison.¹⁵ But all geneticists were fired from their jobs.

Major General Petr Grigorenko, a World War II hero and dissident, had noticed that civil courage stands much higher than military courage.²⁵ We can state, therefore, that Rapoport’s defending genetic studies in 1948 required even more courage than his behavior during the war.

Rapoport was expelled from the Communist Party. Under the USSR's one-party regime, the Party was the pivotal, basic state structure. The Party hierarchy of governing bodies was the main hierarchy of government. The admission of an ordinary person to the Party, as a rule, did not mean real solidarity with Party ideology. Party membership (acceptance through an informal invitation) was a kind of moral reward. So, the admission of Rapoport to the Party at the WWII front was analogous to a small award for military achievements. More significantly, however, Party membership was also key to any career advancement. See for example, Mikhail Voslensky's book on the Nomenklatura.²⁶ Expelled from the Party, Rapoport lost his job and the opportunity to continue research in biology for 9 years until 1957.

For most of this period, Rapoport worked in geological exploration,^{6,27} specifically determining the geological age of the samples.²⁸ His colleagues were impressed by his proposal, which has since been implemented in oil exploration in Russia, to use Foraminifera microorganisms as an indicator of oil deposits.²⁷ Rapoport was offered a new scientific career. However, the situation at Rapoport's work remained unstable. As soon as information about his past as a geneticist and his behavior in 1948 was discovered, human resources officers would get rid of him.²⁹

Comeback to Genetics

Rapoport continued to pursue his academic goals throughout his expulsion from academic institutions. He followed foreign publications that reached Soviet libraries and worked out theoretical approaches for further research.

In 1956 he managed to publish a preprint, "Phenogenetics of a critical link in a malignant tumor."^{5,28,30} Later, one of the directions of his work was the search for anti-tumor applications of strong mutagens.³¹

Partial credit for Rapoport's coming back to academia and genetics is due to the 1956 Nobel laureate in chemistry, Sir Cyril Hinshelwood. Hinshelwood recommended Rapoport to another Nobel laureate of the same year—Nikolai Semenov, director of the Institute of Chemical Physics of the USSR Academy of Sciences. Semenov insisted on inviting Rapoport to "his" institute and consistently defended his decision before the authorities.³² Initially, Rapoport was accepted as a senior research fellow. Then, he headed the group of chemical genetics for several years. In 1965, a department with four laboratories was established. This department finally created a framework for Rapoport's fully productive scientific work. He headed the department until his death in 1990 at age 78, after being hit by a car while returning home from the institute.

It should be emphasized that Communist Party membership was key to any career advancement.²⁶ It was extremely difficult to get an appointment to a position related to the leadership of dozens of people without being a Party member. The appointment of Rapoport to head a large department was extremely atypical. His appointment required significant additional efforts by the institute's leadership.

From 1957 to 1965, one of Rapoport's main research areas was a comparative analysis of chemical and radiation mutagenesis.⁶ In 1962, Rapoport participated in experiments

in space biology aimed to determine the effect of high-energy protons on the mutation rate.^{5,33} Unfortunately, we were unable to find publications regarding this research project and its possible follow-up. The most probable reason is that radiation mutagenesis was in the sphere of interests of the military, inclined to the maximum classification of scientific results, while chemical mutagenesis was associated with agriculture and medicine.

Nobel Prize for Communist Party Membership

There are people who show courage and steadfastness in extreme situations, but behave differently in everyday life. The natural desire for glory and recognition (sometimes well-deserved) can do what cruel enemies and the threat of death cannot. In 1962, Iosif Rapoport was nominated for the Nobel Prize for the discovery of chemical mutagenesis (with Charlotte Auerbach of the University of Edinburgh). Representatives of the Nobel Committee questioned the communist authorities in advance asking for their approval. Their behavior was explained by their sincere concern for Rapoport: in 1958, the Soviet writer Boris Pasternak was harassed by the communist authorities for being awarded the Nobel Prize in Literature. The logic of the authorities was standard for any unlimited ruler: No subject (slave, serf) can receive a promotion of his socio-economic status without the approval of the master, the autocrat; any violator, even if unintentional like Pasternak, must be punished.

In the case of Rapoport, the authorities were quite supportive. They simply demanded that Rapoport enlist in the Communist Party. Rapoport was a member of the Party from wartime until his expulsion in 1948, so it seemed that the issue was almost resolved. However, Rapoport refused outright: joining the Party meant for him implicit admittance of the justness of his expulsion in 1948, and consequently an admittance of his own wrongdoing. Alternatively, he suggested the omnipotent authorities reinstate him in the Party and apologize for the expulsion.³² He understood perfectly well that his suggestion was absolutely unacceptable for the "infallible" Party. On the Party officials' repeated persuasion, he replied: "I don't want to restore my membership for 60 thousand dollars."⁵

This time, there was no threat of arrest or execution. But he did not receive the highly regarded mark of international recognition because of refusing to pay what seemed to be a minor price.

Discussion

Persecution of intellectuals who were not deemed loyal enough, or just were seen as demonstrating some extent of independence, was quite common for regimes claiming total control over their people. Persecution of independent intellectuals in Europe during the Catholic Church's hegemony, such as Galileo and Bruno, is well documented and widely known. Less famous are the cases from the history of the Islamic world. These cases may be even more numerous than in medieval Europe, as the rise of aggression and intolerance of Islamic rulers, since the "Sunni Revival" believed to have begun in the 11th century caused the decay of science and a widening gap from Western civilization.³⁴

A similar pattern was also common in the history of China from the first emperor and the builder of the Great Wall, Qin Shi Huang-ti, who burned books and persecuted holders of “wrong opinions” or “false teachings,” to the infamous “Cultural Revolution.” Li Su, the prime minister of Qin Shi Huang-ti, explained the need for harsh moves to secure total unification of views and opinions:

Yet there are those who cherish their private learnings.... To cast disrepute on their ruler they regard as a thing worthy of fame; to accept extraordinary views they regard as high [merit]; and they lead their followers to create slander.... It is expedient that these be prohibited. Your servant requests that the official historiographer burn all historical records except [of] those...who hold the position of official scholars.... Those who criticize the present with examples from the past are to be executed with their relatives. The functionaries who discover but do not denounce these people will be considered equally guilty.³⁵

The situation is not as grave these days, but even routine private tutoring causes suspicion from the Communist rulers of China.³⁶

In stark contrast to A. Director’s idealistic but naïve belief cited in the epigraph,³⁷ not all intellectuals by occupation are engaged in the pursuit of truth. Some researchers do not wish to confront political pressure, even if it is mild and not comparable to the pressure that was exerted on Rapoport and his colleagues.

In the 1970s, the economist Ronald Coase noted unanimous support for the First Amendment (principle of free speech) among American intellectuals:³⁷ he mentioned free speech as “the only area where *laissez-faire* is still respectable.” However, he made a reservation regarding public education. Government money comes accompanied by regulations and restrictions, making the situation far from favorable. And the situation in educational institutions affects the freedom of discussion. Nevertheless, Coase believed that even intellectuals who are in favor of restrictions on free entrepreneurship and property rights are not ready to surrender free speech.

Freedom of discussion is a cornerstone of science. It is not a virtue to mock an uneducated opponent who doubts the generally accepted scientific results. The very possibility of expressing an opinion without censorship, even if it is wrong and misleading, is the best protection against the future necessity to challenge an ignoramus vested with unlimited power. We must contain ourselves in the former case (of an uneducated opponent)—not for the sake of scientific truth, but for the sake of a long-term *opportunity to protect truth* from real danger. If you help to destroy unrestricted freedom of discussion, a socially ingrained habit of freedom will not protect you from the dictates of an ignorant tyrant. You will not have enough strength to withstand a totalitarian monster.

It was not only the “good guys” (geneticists) who suffered in the history of the genetic studies’ eradication in the USSR. Many of the “bad guys” (selectionists) could have significantly accelerated the advancement of modern epigenetics by disputing with Koltsov’s disciples using conventional scientific means.³⁸ Instead, because of the wrongdoing of Lysenko his followers, epigenetics was discredited all over the world; it took scientists several decades to realize that epigenetics was a real science.³⁹

The combination of specific conflicts of interest of government-colluding, government-dependent scientists on one side, and the decline of free scientific discussion at university campuses over the U.S. on the other, still awaits thorough investigation, though both phenomena have been developed for decades, at least since the “Sputnik programs.” The consequences of vastly expanded public funding of science terrified Dwight Eisenhower, the President who was responsible for the initiation of the process. In his 1961 farewell address,⁴⁰ Eisenhower warned not so much of the danger of the “military-industrial complex” but of the capture of science by government and the capture of political decision-making by experts: “...a government contract becomes virtually a substitute for intellectual curiosity” and then “we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite.”

The reader could track back the subsequent stages of the offensive against freedom of scientific discussion in U.S. universities by reading Coase,³⁷ Mises,⁴¹ Stigler,⁴² D’Souza,⁴³ Rubin,⁴⁴ and Pipes.⁴⁵ Very unfortunately, large-scale freedom suppression was recently seen in Western democracies during the COVID-19 crisis. Free speech was under attack and scientists that did not play along with the governmental narrative were censored.^{46,47}

Being placed under the same pressure and facing the same challenges, most people (including the authors) would not stay as firm and strong as Rapoport. Under pressure, people will probably fail to protect their values and betray their own best scientific achievements like the majority of “repented” geneticists in the USSR of the 1940s. But if scientists are aware of actions that are obviously dangerous to science and to their moral character, there is probably no need for the heroic efforts of people like Iosif Rapoport.

Conclusion

Political institutions, as well as intra-academic rules, influence each other and shape the incentives of scientists, who are not perfect, unbiased intellectual machines. Poor institutions and rules make building special relationships with unlimited government and suppressing dissenting opinions advantageous, and the shortest way to succeed in science.

Rapoport’s pattern of behavior and his life experience are inspiring, but most people will likely fail to replicate it. We cannot rely on the personal heroism of a few; we must strengthen rules and institutions to preserve the culture of scientific discussion. Everyone should avoid undeclared conflicts of interest. Every scientist should be aware of the danger of silencing or suppressing dissenting opinion as “misleading” or “fake.”

Not following simple but strict rules of academic freedom, we will arrive at the “brave new world” and become defenseless. How can we stay there without losing the very appearance of moral human beings? There is no way we can.

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