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The East-West Collaboration across the Iron Curtain against Polio Epidemics: Soviet Engagement with Global Health and Poliomyelitis Vaccine Development in 1956-1964

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Abstract

The eradication of polio has often been portrayed as an "American story" since the heroes who invented the first polio vaccines, the primary weapon against the disease, were American medical scientists and health administrators. The main protagonists of the story are Jonas Salk and Albert Sabin, the developers of the IPV and oral poliovirus vaccine. This paper revisits the story of polio vaccine development from a Soviet perspective, focusing on an international collaboration initiated by Soviet scientists who crossed the Iron Curtain and visited the United States in the 1950s and 1960s. In 1955, Mikhail Chumakov, the head of the newly established Soviet Institute of Poliomyelitis, led a small group of Soviet medical scientists to the United States to learn about the Salk polio vaccine. The delegation gained more than just knowledge about American polio vaccine development, but they also established a regular channel for communication and collaboration between Soviet and American medical scientists that led to the national immunization program against polio in the USSR. The vaccine used for the Soviet mass immunization campaign was the Sabin live-attenuated polio vaccine that would ultimately be chosen as the weapon for global polio eradication. This paper suggests that the Soviet science diplomacy in the field of global medicine was shaped by the Soviet scientists' experience of cooperating with their American counterparts for the Soviet polio vaccination campaign. In other words, the experience of international collaboration on the polio vaccination campaign influenced Soviet science diplomacy in the Cold War era.

Keywords

Soviet science diplomacy, health diplomacy, global health, Cold War, poliomyelitis, Mikhail Chumakov, Albert Sabin, East-West collaboration

Introduction

The eradication of polio has often been portrayed as an "American story" since the heroes who invented the first polio vaccines, the primary weapon against the disease, were American medical scientists and health administrators (Oshinsky, 2005; Offit, 2007; Hampton, 2009; Jacobs, 2015). Jonas Salk and Albert Sabin, the American medical scientists who invented the injected poliovirus vaccine (IPV) and oral poliovirus vaccine (OPV), are often portrayed as the main protagonists of this story. In addition, polio was a severe but relatively rare disease compared to other diseases that were more deadly and wide-spread such as smallpox. Polio became a global health issue before its

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worldwide epidemics began, partly due to the American determination to create a nation free of polio at home. More recently, however, research on the history of polio eradication has taken a global turn, retelling the story as a part of the grander narrative of the emergence of global health in the post-WWII and the Cold War era (Abraham, 2018; Seytre & Shaffer 2005; Vargha, 2018). This paper takes a similar approach and revisits the story of polio vaccine development from a Soviet perspective, focusing on an international collaboration initiated by Soviet scientists who crossed the Iron Curtain and traveled to the United States as scientist-diplomats. In early 1955, Mikhail Chumakov, the head of the newly established Soviet Institute of Poliomyelitis, led a small group of Soviet medical scientists to the United States to learn about the Salk polio vaccine. The delegation gained more than just knowledge about American polio vaccine development, but they also established a regular channel for communication and collaboration between Soviet and American medical scientists that led to the national immunization program against polio in the USSR. The vaccine used for the Soviet mass immunization campaign was the Sabin live-attenuated polio vaccine that would ultimately be chosen as the weapon for global polio eradication in the 1970s.

The US-USSR collaboration for polio vaccine development and worldwide distribution transpired around a time of change in the Soviet Union. The new Soviet leadership headed by Nikita Khrushchev pursued a more open engagement with the West than it had under Stalin's leadership, while striving to win allies in Asia, Africa, and Latin America. Global health was the ideal field for the USSR to expand its global influence, showcase superiority of its science and socialist socio-economic system, and engage in nonconfrontational competition—which could potentially turn into non-political collaboration—with the West. In 1955, the Soviet Union rejoined the World Health Organization, which it had withdrawn from in 1949. Once it regained its membership and presence within the Organization, the Soviet Union proposed its own eradication program in 1958, targeting smallpox, a deadly infectious disease that killed millions annually around the world, that had been eradicated in the Soviet Union by the 1940s. According to Bogdan Iacob (2022, p. 287), socialist Eastern European countries made significant and distinctive contributions on global disease control and eradication through their collaboration with the WHO. These contributions included "principles such as the integration of epidemiological programs into national health services, mass vaccination and the state's role in ensuring affordable care," which were pursued to alleviate post-colonial states' dependency on the West and to challenge colonialism's medical legacies (Ibid).

This paper argues that Soviet eradication proposal was shaped by the Soviet scientists' experience of cooperating with their American counterparts for the polio vaccine development. In other words, the experience of international collaboration on the polio vaccination campaign influenced Cold War-era Soviet science diplomacy in the field of global medicine. This paper expands the concept of science diplomacy to global health and health diplomacy and highlights the role of scientists as diplomat. The recent COVID-19 pandemic has brought international relations scholars' attention to science/health diplomacy, a niche subject of diplomacy studies. Liu (2014, p. 219) states: "Within science diplomacy, the use of health research as a platform has some unique aspects: since it improves human lives, everyone can benefit from any of its successes and, unlike the output of a conference of mathematicians, everyone can understand the impact of the scientific goals and results." However, attempts by international relations scholars to narrow down the definition of 'health diplomacy' as distinct from science diplomacy or global health have emphasized states as the main decision-makers and limited the goals to soft power or national security interests (Morrison & Twigg, 2019; Fazal, 2020; Lee, 2021; Kirgizov-Barskii and Morozov 2022). Such state-centric view of science/health diplomacy ignores the crucial role and influence of scientists as informal diplomats and overlooks the interconnection between national interests and common global goals that merges science and diplomacy together. This is also a reason so-called vaccine nationalism is perceived as a rational state behavior in a pandemic situation. However, this paper challenges this idea and suggests that collaboration rather than competition was pursued even in the Cold War era. The paper begins with a discussion on the significance of polio in the Thaw-era Soviet Union before delving into the story of the collaboration between the medical scientists of the United States and the USSR.

Polio and Soviet health diplomacy in the Khrushchev era

Poliomyelitis, also known as polio or infantile paralysis, is an infectious disease caused by the poliovirus. It is transmitted person to person via the fecal-oral route, often through contaminated food or water. It mainly affects children under the age of 5. Its symptoms are similar to those of the flu, including sore throat, fever, headache, fatigue, nausea, and stomach pain. Most patients infected with the virus do not experience any visible symptoms; however, one in 200 infections may lead to irreversible paralysis usually in the legs if the virus invades the nervous system. Around 5–10% of paralyzed patients die from respiratory failure caused by muscle stiffness.[1] To date, there

is no cure for polio, but the introduction of polio vaccines in the 1950s has contributed to the steady decline of the number of polio cases globally.

Polio has been infecting humans since ancient times. However, its occurrences were relatively rare until the 20th century. Polio epidemics began in the early 1900s mostly in industrialized Northern Europe and the United States, where hygiene had improved greatly the turn of the century. This significantly reduced the chance that children would acquire antibodies through exposure to the virus at a very young age, when they were less susceptible to severe paralysis. The first polio epidemic in Europe was recorded in Denmark in 1911 followed by a series of violent epidemics (WHO, 1955, p. 63). In 1952, the number of recorded polio cases reached 131.7 per 100,000 population. By the early 1950s, polio epidemics occurred every summer in industrialized European and North American countries, affecting millions of children. In the United States, the number of polio cases increased steadily from an annual average of 6.9 cases per 100,000 in 1931–1935 to 19.2 per 100,000 in 1946–1950 and 26.2 per 100,000 in 1951–1953 (Ibid, p.79). At the height of the polio epidemic in the United States that occurred in the summer of 1952, around 58,000 cases (37 cases per 100,000 population) were reported; 21,000 cases were paralytic and around 3000 died. In comparison, the disease remained relatively rare in Asia, Africa, and Latin America until the 1960s, but the number of polio occurrences in these regions began to show a gradual increase by the late 1950s (WHO Regional Office for the Eastern Mediterranean, 1959).

In the Soviet Union, polio cases were first recorded in the 1930s with sporadic occurrences reported in the Baltic republics of Latvia, Estonia, and Lithuania as well as in Kazakhstan and Siberia. Yet, at the Third International Congress on Poliomyelitis held in 1954 in Rome, Konstatin Vinokurov from the Soviet Institute of Neurology, claimed that "[poliomyelitis] is, of course, very scarce in our country, very luckily, we don't have epidemics of it, but still it exists" (quoted in Sabin, 1981, p.552). The number of outbreaks in the Soviet Union, however, increased from the late 1940s to the mid-1950s from 2.8 cases per 100,000 population in 1954 to 8.7 cases by 1957. Polio epidemic in the Soviet Union reached its peak in 1958 with 22,000 cases or 10.66 cases per 100,000 (Horstmann, 1991, p. 501). In the summer of 1955, a year after Vinokurov made the claim that the Soviet Union was unaffected by the disease, Moscow experienced the most severe outbreak of poliomyelitis. In the following September, the Soviet state established a special scientific institute dedicated to the study of poliomyelitis, with the goal of achieving "near eradication" of the disease. With the establishment of the institute, the number of newly published books on poliomyelitis increased from 5 volumes in 1948 to 22 by 1957, and 46 by 1958. Vinokurov (1956) himself wrote a short pamphlet for parents informing them of common polio symptoms and possible treatment options in 1956. By then, not only the number of polio cases increased in the Soviet Union, but also the virus spread across its vast territory with outbreaks reported in every republic. Polio came to "symbolize a destructive threat to communist and modernist projects" in socialist Eastern Europe (Vargha, 2018, p. 5). By the mid-1950s, as polio epidemics became a serious health issue in the Soviet Union, post-WWII economic recovery was well underway. In addition, Khrushchev's rise to power after Stalin's death brought a thaw in the political and cultural life of Soviet citizens who enjoyed a greater degree of freedom and openness than before. Soviet science and technology also achieved remarkable advances, elevating the country's international profile. Overall, newfound optimism was in the air.

At the 22nd Communist Party Congress held in 1961, Khrushchev asserted that living in communism was no longer a distant dream but, based on "strictly scientific estimates," the Soviet society would "have built communism in 20 years" (Kommunisticheskaia Partiia Sovetskogo Soiuza. XXII s'ezd 1962, p.195, p.313). The Soviet leader also emphasized that "a happy childhood for every child [was] one of the most important and noble aspects of communist construction" (Ibid, p.544). The Stalinist myth of happy childhood continued to play a significant role in constructing an image of the ideal Soviet citizenry and a vision of a communist future. Idealized images of Soviet children and youth continued to portray the Party leadership as the benevolent guide toward communism for the indebted and grateful population, recreating the idea of the unified Soviet family in which the Party played the role of parents and the people, the role of children (Peacock, 2014, p.22). In addition, Soviet children and youths of the Khrushchev era were portrayed as proactive, hard-working, and innovative future builders of communism. Young Pioneers and Komsomols were not only astute students and motivated athletes, but also conscious international socialist activists who campaigned for national independence of colonized countries against the imperialist West. Margaret Peacock (2014, p. 19) notes that in the context of the Cold War, children "carried the weight of its nation's future on its shoulders" for the image of an ideal childhood created by both the Soviet and American states "provided a handy way of understanding the gifts that each system had to offer its population and the world." Polio that threatened the happy childhood of Soviet children was thus perceived as a threat to the communist future, while protecting Soviet children from the disease was deemed the responsibility of the Soviet parent-state.

Furthermore, in competing against the West and its capitalist modernity, the Soviet Union proposed an alternative modernity that featured a centralized planned economy, universalized welfare and healthcare system, and

scientific administration. To demonstrate superiority of socialist modernity, the Soviet government boasted its public medical service provided to all citizens free of charge. Addressing the Soviet Communist Party at the 21st Congress, Khrushchev (1959 January 27, 1959, p.60) claimed:

> In the capitalist countries nobody has concerns for the working man, for his health and life. All medical services, big and small, are paid for by the individuals. When we were in Finland, a worker told us…when he came down with appendicitis and needed an operation…he had the choice of paying a lot of money or dying. […] In the Soviet Union, the people enjoy free medical services. They have at their disposal a broad network of hospitals and polyclinics.

Then in 1961, Khrushchev again emphasized:

> The socialist state is the only state which undertakes to protect and continuously improve the health of the whole population. This is provided for by a system of socio-economic and medical measures. There will be an extensive program designed to prevent and sharply reduce diseases, wipe out mass infectious diseases and further increase longevity (Kommunisticheskaia Partiia Sovetskogo Soiuza XXII s'ʻezd 1962, p.542).

The Soviet state took pride in the socialist health system, thanks to which, according to Khrushchev, both the national death rate and life expectancy had steadily improved (Ibid, p. 106). To continue the progress, the Soviet leader demanded more hospitals, outpatient clinics, sanatoriums, and medical research facilities made available especially in the rural areas and Eastern regions of the unions.

The Soviet socialist health system was adopted as a benchmark of Soviet health diplomacy, a new form of public diplomacy adopted by the Thaw-era Soviet leadership. The Thaw era also signaled a change in Soviet diplomacy more generally. The Soviet government reoriented its foreign policy towards engagement rather than isolation, increasing contact with the Western powers and pursuing alliances with developing nations in Asia, Africa, and Latin America. To check Western influence and win the hearts of developing countries, the Soviet Union made efforts to increase its role in global health, rejoining the World Health Organization in 1955 from which it had withdrawn in 1949. Following the Soviet reentry, other socialist countries, except China and North Korea, rejoined the organization as well. Consequently, Soviet scientists and medical professionals were well-represented in the WHO and its expert committees with 22 Soviet specialists serving as WHO staffs by 1958 (Cueto et al., 2019, p.66). Among Soviet specialists working for the WHO included Nikolai Grashchenkov, a renowned neuropathologist, who served as the Deputy General-Director of the WHO from 1958 to 1961. From the beginning of its engagement with the WHO, the Soviet Union reaffirmed its commitment to the WHO's efforts to eradicate communicable diseases not only through providing medical supplies and expertise but also by sharing its experience of building a nationalized public health system. As early as the inception of the WHO, Soviet representatives proposed that "nationalization of health services" was one of the "most progressive methods" to promote the highest level of health for all peoples, which was the WHO's Constitutional agenda. They strongly urged the organization to "authoritatively recommend" the member states to adopt nationalized health services system similar to that of the Soviet Union. According to Nikolai Vinogradov, the Soviet Deputy Minister of Public Health who headed the Soviet delegation to the 1948 World Health Assembly, "the efficacy of this new form of health service has been proved by thirty years' experience of the successful development of health services in the Soviet Union" (WHO, 1948, p.42).

Upon returning to the World Health Organization, the Soviet delegates again emphasized the importance of a state-managed, centralized, universal health care system, and the possible Soviet contribution in helping developing nations to achieve this. To support the Soviet claim as a health pioneer and experienced modernizer, delegates from Eastern Europe and Central Asia expressed their indebtedness to Soviet aid for modernizing their republican medical services. The Minister of Public Health of the Kazakh SSR, Sibugatulla Karynbaev, attending the 1958 World Health Assembly, claimed that the economic and social advancements Kazakhstan had achieved under the Soviet leadership had completely transformed the republic' public health and medical sciences from backward and ineffective to modern and lifesaving. He asserted that the experience and insights Soviet medical professionals gained from successfully modernizing Kazakhstan's health care service would prove useful for improving medical conditions in the South and East Asian regions (WHO, 1958, p.182). As a matter of fact, the Soviet Union and socialist Eastern European countries sent medical experts who had previously worked on building a socialist health system in Central Asia as well as in North Korea and North Vietnam to work for the WHO aid programs (Iacob, 2022, p.270). At the 1959 World Health Assembly, the Soviet Union also requested to be accepted in the WHO's Regional Committee for South-East Asia, arguing that Soviet Central Asia was an "inseparable part of the geographical region of South-East Asia" and was granted full membership to the Regional Committee. This membership to the Regional Committee allowed Soviet Central Asian republics to build a closer collaborative relationship with neighboring Asian countries in the field of global health.

To demonstrate the efficacy and viability of the alternative socialist health care system, the Soviet Union also

committed to the WHO's disease eradication programs. At the 11th World Health Assembly, Viktor Zhdanov, the Deputy Minister of Health of the Soviet Union, called for an international collaboration in the eradication of smallpox. The Soviet government believed that controlling infectious disease was linked to modernization. If successful, the smallpox eradication program would not only showcase the Soviet commitment to global health but also demonstrate the efficacy of a nation-wide, state-managed and locally administered vaccination program promoted as the hallmark of the socialist health system. With the vaccine already available, Zhdanov argued that this could be achieved in a relatively short time and at a relatively low cost. He asserted that "at the present juncture that the Soviet Union has as its disposal large numbers of trained personnel and scientific institutes which are concerned with research into and control of infectious and parasitic diseases" (WHO, 1958, p. 80). Against the skepticism of the European delegates who questioned the feasibility of the Soviet proposal, the Soviet delegation argued that the proposed program would not only rescue humanity from the horrendous disease but also help developing nations build their own modern national health systems to monitor and control infectious diseases. The Soviet proposal for smallpox eradication came at time when the WHO was engaging with malaria eradication initiated and extensively supported by the United States. The United States perceived disease eradication as a means of modernization that would guide the developing countries to follow the path of industrialized nations (Cueto et al., 2019, p. 87). A state-managed national health system with epidemiological capacity would help developing nations achieve the "medical equivalent of political self-determination" (Iacob, p. 265).

To convince the World Health Assembly of the feasibility of the Soviet-initiated eradication program, Zhdanov mentioned the success of the international collaboration of the Expert Committee on Poliomyelitis (WHO, 1958, p. 80). Poliomyelitis was in the spotlight as a serious global health issue with several high-profile international conferences organized by the Pan-American Health Organization (PAHO) and the World Health Organization dedicated to its reduction. By 1958, both the IPV and OPV were made available as weapons against polio epidemics. The question of which vaccine offered a more effective option under which circumstances was the subject of ongoing debate among international medical scientists. The Soviet medical scientists and health administrators were closely involved in this debate. From 1958 to 1960, the Soviet Union launched a massive vaccination campaign, inoculating almost the entire Soviet population against polio. This mass national vaccination campaign helped build credibility for the OPV, which offered a more feasible alternative to the IPV for developing countries. Victor Zhdanov and other high-ranking Soviet medical administrators were involved in the vaccination campaign, some personally witnessing how international collaboration centered around two virologists—Mikhail Chumakov and Albert Sabin—crossed the Iron Curtain and yielded scientifically and diplomatically beneficial results.

US-USSR Medical exchanges and scientist-diplomats

The introduction of vaccines in the 1950s brought a breakthrough in the fight against poliomyelitis. The first polio vaccine was developed by an American biologist and medical researcher, Jonas Salk, in 1953. Salk's vaccine was made from killed polio virus and was administered by injection. Clinical trials using the Salk vaccine began in 1954 on 1.3 million schoolchildren across the United States. In the spring of 1955, the result of the trials was announced; the vaccine was "safe, effective, and potent" (quoted in Oshinsky, 2005, p. 203). In the context of the Cold War East-West rivalry, Salk's success was portrayed as a triumph of American science and the vaccine was referred to as "America's gift to the world" (Ibid, p. 215). The then US President Eisenhower promised to give the Salk vaccine formula to "every country that welcomed the knowledge, including the Soviet Union" (quoted in Ibid, p. 216). The president also assured that no American child would be denied of the vaccination due to the cost of the vaccine, hinting at the possibility of a federal intervention in a nation-wide polio vaccination drive. This announcement came at an unfortunate moment when hundreds of children contracted paralytic polio after being vaccinated with contaminated Salk vaccines in an incident today known as the Cutter Incident.

The news of the American success—and failure—traveled fast across the globe, reaching the communist East. While the socialist press criticized the Cutter Incident and launched an attack on the American government for making the children guineapigs of the capitalist medical system and the free market economy, the socialist East European states acted promptly to acquire knowledge about the Salk polio vaccine from the Americans (Vargha, 2018, p. 84). On January 18, 1956, a Soviet mission led by the Russian virologist, Mikhail Chumakov, arrived in the United States to learn about the Salk vaccine. Chumakov was the head of the Poliomyelitis Institute established in 1955 under the Soviet Academy of Medical Sciences. Before he was placed in charge of the experimental polio vaccine development, Chumakov had served as the director of the Institute of Virology. He had worked on identifying the pathogen of infective Crimean hemorrhagic fever and developing vaccines for tick-borne encephalitis and measles. His medical research as an epidemiologist allowed him

to travel widely across the Soviet Union from Crimea to the Far East and exposed him to paralytic poliomyelitis cases. Chumakov had personally exposed to the disease when his wife contracted polio while breastfeeding their child in 1952 (Legeydo, 2021). In 1953, Chumakov co-authored the book entitled *Poliomyelitis-Infantile Paralysis* (*Poliolielit-Detskii Spinnomozgovoi Paralich*), which was considered as one of the most authoritative early resources on the disease written in Russian during the Soviet era.

Chumakov's delegation included Marina Voroshilova, a renowned virologist and Chumakov's wife; Anatoli Smorodintsev, a senior virologist specialized in influenza and influenza-like diseases; and Lev Lukin, the most junior member of the delegation who was trained as an epidemiologist. The Soviet medical scientists were guided by a commissioned officer and interpreter from the US Public Health Service. They visited the University of Pittsburg to meet Jonas Salk to gain knowledge about his inactivated polio vaccine. They also visited the Children's Hospital Research Foundation located in Cincinnati to meet albert Sabin who developed a live virus polio vaccine that had not yet been as widely tested as the Salk vaccine. The visit allowed the Soviet and American scientists the opportunity to exchange a broader spectrum of medical knowledge and information. The Soviet scientists made presentations on the current state of poliomyelitis-related research in the Soviet Union and shared their previous works on hemorrhagic fever and influenza. They engaged in quite an open conversation on the accomplishments and inadequacies of Soviet virological research. On one occasion, Chumakov even mentioned the difficulties Soviet scientists faced in procuring monkeys for medical experiments to explain why they relied on "human fetal tissues obtained from therapeutic abortions" (Public Health Service, 1957, p. 7). The Soviet delegation also brought virus strains, including a polio virus strain which Soviet scientists speculated was a novel type (Strain AB or type 4), and donated a copy of *Problems of Pathogenesis and Immunology of Virus Diseases* (*Voprosi Patogeneza i Immunologii Virusnikh Volezney*) to the National Institutes of Health. The volume contained the most recent and authoritative research findings in the field by scientists of the Institute of Virology in Leningrad. The American hosts and scientists who interacted with the Soviet delegation overall shared the opinion that the Soviet scientists were "highly competent virologists, thoroughly familiar with [American] published scientific work," and that they evaluated information presented to them by American scientists in an "objectively critical, but friendly, way" (Ibid, p. 15).

The Soviet delegation's visit to the United States accomplished more than a one-off exchange of poliomyelitis-related knowledge. The Public Health Service (1957, p. 16) reported that the Soviet delegates were eager to establish a regular channel for scientific exchanges between the USSR and the United States, suggesting an open exchange of published materials and visiting fellowships. In addition, the Soviet scientists "repeatedly declared their belief in the value of freedom of scientific thought and exchange of ideas as the cornerstone of international and national science" and suggested that "the situation in the Soviet Union today [was] such as to warrant mutual understanding and close relation between the scientists of the two nations" (Ibid, pp.15–16). The American hosts shared this enthusiasm. The Public Health Service report on the visit suggested (Ibid):

> We, too, have benefited from the visit of this delegation […] For one thing, the Soviet delegation paved the way for our mission to the Soviet Union to visit their scientific institutes and virologic centers. Most important, their visit may have initiated exchange of scientific information, virus strains, vaccine, and so forth, which would benefit both countries. Finally, the favorable impression created by these scientific delegates, who served as *ambassadors of good will* on behalf of the Soviet scientists will probably result in a reawakened interest of American research workers in Soviet scientific literature, which according to the visitors, is entering a period of new vigor and productivity (my italics).

In February 1956, a science mission from the United States composed of five American scientists working in microbiology, epidemiology, and preventive medicine traveled to the Soviet Union. During their visit, the scientists visited medical institutions based in Moscow such as the Soviet Ministry of Health, Academy of Medical Sciences, Central Institute of Epidemiology and Microbiology named after N. F. Gamaleya, Institute of Organization of Public Health and History of Medicine named after N. Semashko, and Neurology Clinic of Botkin Hospital. In addition, they toured institutions located in Leningrad, Kharkov, Kiev, and Rostov including the State Institute of Experimental Medicine (Leningrad), State Institute of Vaccines and Sera named after Mechnikov (Kharkov), Institute of Infectious Diseases (Kiev), and Anti-Plague Institute (Rostov). American scientists were given a guided tour and attended conferences. The American scientists were also invited to friendly teas organized by VOKS, the Soviet public diplomacy organization. The Soviet hosts shared their research with the American scientists and informed them about the Soviet healthcare and medical training system. The American scientists were introduced to a number of male and female researchers from different gender and ethnic backgrounds, including Zinaida Yermolyeva, a Soviet microbiologist of Don-Cossack origin who headed the Department of Microbiology of the Central Post-Graduate Medical Institute, and Antonia Shubladze, an epidemiologist originally from Tashkent, who headed the Laboratory of Viral Encephalitis of the Institute of Virology. In fact, the Public Health Service report observed that several

laboratories were staffed by a female majority in the Soviet Union. The Soviet state saw the United States visit as an opportunity for showcasing gender and ethnic equality alongside scientific achievements in Soviet society.

Overall, the American scientists were cordially received by their Soviet counterparts. The American delegation concluded that "it would be arrogant, stupid, and even dangerous for the United States to ignore Soviet medicine and research" (p.90). John R. Paul, a poliomyelitis specialist, who briefly headed the mission, commented that "in the next 10 or 15 years, numerous very important results, and ideas in the field of applied microbiology will come from the Soviet institutes which we visited, and that of these the scientific world will have to take more notice than has heretofore been the case (Paul, 1957, p. 156). The American virologist was particularly impressed by the massive immunization programs for epidemic control, which he thought was "only one of the Soviet medical programs from which we have something to learn" (Ibid, p. 155). Upon returning home, the American scientists recommended the US government to take all appropriate steps "to develop channels of communication between the medical scientists of the Soviet Union and the United States by exchange of literature, materials, and personnel" (Ibid, p. 90). The US-USSR medical missions paved the way for continuous communication between the scientific communities of the United States and the USSR. In the summer of 1956, the director of the National Institute of Health (NIH) and the head of NIH Office of Research Planning visited the Soviet Union, touring the Soviet Academies of Sciences and Medical Science, the Ministry of Public Health, and the Institute of Poliomyelitis. In return, the US Department of Health, Education and Welfare invited high-level Soviet medical officers who visited the US National Academy of Science, American Cancer Society, and the Rockefeller Foundation. In addition, reciprocal scientific missions followed in a wide range of medical fields, including physiology and developmental physiology, pediatric research, maternal and child health, pharmacology, neurology, cardiology, and psychology. Exchange of scholarly publications and research materials between the two countries also became more regular and systematic.

The 1956 missions also instigated a lasting collaboration and personal friendship between Mikhail Chumakov and Albert Sabin that ultimately laid the foundation for global polio eradication. Around the time Chumakov's delegation arrived in the United States, Sabin was seeking an opportunity to conduct a large-scale field trial and a distribution opportunity for his live polio vaccine. However, the prospect of conducting a large-scale trial in the United States was rather grim due to the Cutter Incident. American public opinion turned against the idea of mass immunization branded as a form of "socialized medicine" (Oshinsky, 2005, p. 241). In the context of the Cold War, "socialized medicine" was perceived as synonymous with government control over individual's bodily freedoms. The US authorities would not launch another mass polio vaccination campaign, while pharmaceutical companies would not risk investing in a polio vaccine that was deemed more dangerous than Salk's vaccine. When Sabin received the request from the Public Health Service for a tour of his laboratory for the Soviet delegation, Sabin organized a conference and a demonstration of his polio vaccine, in addition to a private dinner hosted by the Dean of the Medical School of University of Cincinnati (Sabin, 1956a). He also invited the Soviet delegates to his home. Sabin, whose family was originally from Russia, appealed to them that he would be thrilled to visit Russia, to which Chumakov reciprocated with a promise of an official invitation. Sabin found the Soviet scientists "well-trained, sincere, and very capable" and their visit "highly worthwhile" (Sabin, 1956b). Even before he received a formal invitation from the Soviet Ministry of Health, which arrived only in late May, Sabin contacted the Office of the Surgeon General, US Public Health Service, and the Department of State to receive the approval for the trip to the Soviet Union in late February soon after the Soviet delegation left the country. Between February and June when Sabin arrived in Russia, the two scientists exchanged virus strains—including the poliovirus strains used in Sabin's vaccine—experiment results, and friendly greetings.[2]

Mikhail Chumakov, who was impressed by both Sabin's vaccine and hospitality, weighed between the inactivated polio vaccine (IPV) and the live-attenuated polio vaccine (OPV) before deciding which vaccine to adopt in the Soviet Union. The Soviet scientist leaned in favor of the OPV because it could be administered orally unlike the IPV which was injected. This made the OPV much easier and cheaper to administer than IPV. In addition, compared to the IPV which required at least three injections for maximum immunity, the OPV offered stronger and longer-lasting immunity with a smaller dose. Another advantage of the OPV was the possibility of achieving passive vaccination. The OPV caused bowel infection which resulted in the excretion of attenuated virus. This could potentially protect the unvaccinated population by exposing them to weakened live polio virus through contaminated food or water. Therefore, overall, the OPV was considered a better option for the Soviet medical system that implemented centrally coordinated and locally administered national immunization programs for infectious diseases control. Yet, the efficacy and safety of the live-attenuated polio vaccine had not yet been confirmed. As a result, Chumakov wrote a positive assessment of Salk vaccine when he returned to Moscow; however, he also hinted at the possibility of the Soviet public health system adopting the OPV to the American

delegation that visited his Laboratory in February. In May, Chumakov convinced the Ministry of Health to invite both Jonas Salk and Albert Sabin to the All-Union Congress of Hygienists, Epidemiologists, Microbiologists and Infectionists held in Leningrad from June 20–28, 1956. Only Sabin traveled to the USSR, which provided him with the opportunity to further collaborate with the Soviet scientist.

Sabin toured various medical institutions based in Moscow and Leningrad, giving lectures and demonstrations on his live-attenuated vaccine. He also read his paper on "Present Status of Living Attenuated Poliovirus Vaccine" at the All-Union Congress of Hygienist where he interacted with scientists from other socialist countries including North Korea and China. During his visit, Sabin was introduced to prominent Soviet scientists and high-ranking science administrators including the Soviet Deputy Minister of Health, Viktor Zhdanov, and Nikolay Grashchenkov who was then serving as the head of the Scientific Advisory Board of the Ministry of Health. Grashchenko invited the American scientist to his home. Just as Chumakov and his delegation did, Sabin played the role of a 'scientist-diplomat,' connecting the scientific communities of the two nations. Upon returning to the United States, he wrote to Detlev Bronk, the chairman of the National Science Board of the National Science Foundation and the president of the Rockefeller Institute for Medical Science, to pass on the words of Nikolay Grashchenkov who expressed "the great desire of Soviet scientists and the Soviet government for an exchange with the USA in all fields of scientific activity, not only on the professional level but also at the level of post-graduate study" (Sabin, 1956c). To convince Bronk of the sincerity of the Soviet scientist-official's intent, he emphasized how Grashchenkov personally valued his own experience of studying in England and America and believed that it was important to provide similar opportunities for younger Soviet scientists. Sabin's letter to Grashchenkov regarding Bronk's encouraging response, was also filled with expressions of gratitude and friendship toward his Soviet counterparts (Sabin, 1956d). Sabin also pulled strings to invite his Soviet friends to present their research in high-profile international conferences such as the International Poliomyelitis Congress held in Geneva in 1957, and the International Congress on Tropical Medicine and Malaria held in Lisbon in 1958. Sabin also provided regular updates on the progress of his live polio vaccine with Soviet scientists with whom he made acquaintances and collaborated with Chumakov's poliomyelitis team.

Meanwhile, the Soviet authorities established institutions for manufacturing the Salk vaccine by 1957 and conducted a clinical vaccine trial involving 12 million children between 1957 and 1960 (Chumakov et al., 1964). However, by late 1960, they reached the conclusion that while the vaccine did reduce the rate of polio outbreak among the immunized population, it contributed little to the effort to completely eradicate the disease. In addition, for the Soviets "the fact that 1500 monkeys are needed in the production of every million doses of killed-virus vaccine [had] already created great difficulties in the supply of monkeys for the ever-expanding manufacture of this wasteful preparation" (Smorodintsev et al., 1960). In the spring of 1958, the Soviet authorities decided to conduct a clinical trial of Sabin's live vaccines involving 2500 healthy school children from Leningrad including Chumakov's own children.[3] The trial used the attenuated strains provided by Sabin and mass-produced in Leningrad (Ibid). The result of the Sabin trial, on the other hand, was successful enough to encourage the Soviet government to launch a national immunization program against polio across the union in January 1959. Mikhail Chumakov was placed in charge of the program. The goal was to completely eradicate poliomyelitis in the Soviet Union by vaccinating the entire susceptible Soviet population (aged from 2 months to 20 years) by 1960 (Chumakov et al., 1964). It was crucial that all cities, provinces, and republics would run their vaccination campaigns simultaneously in a coordinated effort to minimize the possibility of the attenuated poliovirus contained in the vaccine to revert to a pathogenic form. To make rapid simultaneous vaccination possible, Chumakov's team developed the vaccine in the form of dragée-candy (*antipoliodrazhe*). Sabin was also involved in the immunization effort, collaborating with Chumakov on vaccine testing and advising the Ministry of Health on producing a vaccine administration manual for republican Ministries of Health (Zhdanov, 1960). Reporting on the progress of the anti-polio immunization program, Chumakov wrote to Sabin in December 1959 that "your vaccine had been winning new victories in our country" and suggested that he recommended Sabin be elected an honorary member of the Soviet Academy of Medical Sciences (Chumakov, 1959).

Between 1959 and 1962, the Soviet authorities immunized 91.3 million people, mostly with OPV containing dragée-candies. Children less than one were given diluted droplets. In 1964, Chumakov's team reported that 93–100% of the inoculated children in the age group 1–15 years and 87% of children less than 1-year old developed antibodies to all three types of poliovirus that caused paralysis by 1962 (Chumakov et al., 1964, p. 51). In conclusion, Mikhail Chumakov wrote: "We believe complete eradication of poliomyelitis is possible in the Soviet Union if we do not slacken our efforts to strengthen immunity in children. The Soviet health services are on the way to solve this important problem" (p. 52). The trials and mass immunization campaign were also conducted in other socialist Eastern European countries including Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Romania and in the People's Democratic Republics of China, Korea, and Vietnam.[4]

The Soviet national immunization campaign was launched at a crucial moment in the history of polio eradication when the efficacy and safety of both the inactivated and live-attenuated poliovirus vaccines were debated by world scientists. Because the Salk vaccine was expensive to produce and required repeated injections, it was difficult for some developing countries to adopt the vaccine for their national immunization campaigns. The live vaccine, produced in the form of dragée-candies by the Soviets, seemed to offer a cheaper and more feasible alternative if polio were to become a serious epidemic in these countries. In 1959 and 1960, the World Health Organization and the Pan-American Health Organization organized the International Conferences on Live Poliovirus Vaccine to discuss the results of OPV field trials conducted around the world. Mikhail Chumakov, Anatoli Smorodintsev, and Marina Voroshilova attended both conferences, while Victor Zhdanov joined the second conference. During the 1960 Conference, the Soviet scientists reported on the preliminary results of the ongoing mass immunization campaign in the USSR and presented papers on how the Soviet medical authorities planned and executed the all-union mass vaccination campaign. The scientists suggested that a systematic, large-scale, national vaccination program may offer a way to completely eradicate poliomyelitis, as the Soviet Union had previously eradicated smallpox and E.coli bacteria through national vaccination campaigns (PAHO and WHO, 1960). In conclusion, they turned to the fruitful international cooperation that drove the development of the OPV and expressed their hope that this cooperation would serve as a "promising beginning to regular international cooperation…with a view to the possible elimination of some infectious diseases or a sharp reduction in their number" (ibid, pp. 587–8).

The Soviet success persuaded developing countries that national immunization campaigns using the live poliovirus vaccine may offer a less costly and more convenient way to protect their population from the disease if a polio epidemic were to erupt in their countries. At the 14th World Health Assembly held in 1961, the Nigerian delegation requested the WHO's recommendation on whether to revise Nigeria's polio vaccination policy "in view of the development of the Sabin live-attenuated oral vaccine and of the remarkable results obtained by its use in Latvia, Estonia and other parts of the Soviet Union" (WHO, 1961, p. 238). By 1964, countries in Africa, Asia, and Latin America including Mali, Togo, Bolivia, Cuba, Panama, Ceylon (Thailand), United Arab Republic, and Lebanon launched national vaccination programs using the Sabin vaccine with the hope of completely eradicating poliomyelitis. Most of these countries received the vaccines manufactured from the Soviet Union as a form of international medical aid. In addition to the socialist satellite countries in Eastern Europe and People's Republics in East Asia, the Soviet Union distributed the Sabin polio vaccine to India, Pakistan, and Japan. In total, 153,733 doses of the Sabin vaccine manufactured in the Soviet Union were distributed outside the USSR by 1964.

Conclusion

On January 27, 1958, the American and the Soviet governments signed the Agreement of Exchanges in the Cultural, Technical and Educational Fields later came to be known as the Lacy-Zaroubin Agreement. It was the first official agreement of its kind negotiated between the two rivaling powers of the Cold War. It promoted exchanges of science and technology as well as culture and sport on a regular basis through co-sponsored conferences, festivals, concerts, and exhibitions, and exchange programs for students, youths, and scholars. To make these exchanges possible, the both sides also discussed the possibility of opening direct air flight routes connecting the United States and the USSR. The Agreement was partly a result of the scientific and technological exchanges that had preceded the diplomatic discussions leading up to the signing of the Agreement. Even before the Agreement, four delegations of medical scientists, including an all-female women doctors' delegation, had made reciprocal visits to each other's country (Lacy, 1958). The first of such post-World War II visits was the 1956 Soviet mission of polio specialists headed by Mikhail Chumakov, which paved the way for the collaboration between the American and Soviet medical scientists for the development and worldwide distribution of oral polio vaccination. As Boris Semonov (1994, p.219) notes, even though the vaccine was first developed by Albert Sabin, it was Chumakov's work and their collaboration that "laid the foundation for the concept of the eradication of poliomyelitis in the world." In 1972, Sabin donated his vaccine strains to the World Health Organization, so that it could continue combating the disease. Since the WHO launched a global initiative to eradicate polio in 1987, the number of polio occurrences has declined significantly, with thousands of cases reported per day in the 1980s to a few sporadic cases reported per year today.

The Soviet and the American medical scientists' partnership made the story of polio eradication a story of international communication and collaboration across the Iron Curtain. The experience of international collaboration in the medical field also contributed to the shaping of Soviet science diplomacy in the Cold War era, whose flagship program included the launch of global smallpox eradication through the partnership with the World Health Organization. Yet, the collaboration between the Soviet and American medical scientists for the development of the live polio vaccine had been a forgotten story partly

because it received very little publicity during the Cold War period. Even though the Soviet authorities promoted the national polio vaccination campaign through extensive propaganda efforts, the US-USSR scientific collaboration received little or no attention. The *Pravda,* for example, mentioned very little, if anything, about the Soviet delegation's visits to the United States or the US delegation's visits to the Soviet Union. However, the story of the Chumakov-Sabin collaboration has been rediscovered recently during the COVID-19 pandemic. It serves as an example and a reminder that international scientific and medical collaboration may not only yield scientific advancements that can benefit all, but also open a communication channel for diplomatic discussions even in the face of political hostility.

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Notes

1. For more background information on polio, see: World Health Organization, (2022). *Poliomyelitis*, https://www.who.int/news-room/fact-sheets/detail/poliomyelitis.
2. According to Pyotr Chumakov, a son of Mikhail Chumakov and Marina Voroshilova, it was his mother who first persuaded Sabin to provide the Soviet scientists the virus strains used in the vaccine. See Aleksandr Mel'nikov (2016, October 22).
3. Pyotr Chumakov suggests that Mikhail Chumakov contacted Anastas Mikoyan, then the First Deputy Chairman of the Council of Minister, to persuade him of the need to conduct the trials for the poliovirus vaccine. According to him, Mikoyan was persuaded because he had many grandchildren and thus was deeply worried about the polio epidemic. See Mel'nikov (2016, October 22).
4. The number of vaccine doses distributed to China and Pakistan was relatively small, with each receiving nine and five doses respectively. See Chumakov et al. (1964).

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