Radiation Studies and the Soviet Scientists in the Second Half of the 1950’s

Hiroshi ICHIKAWA*

Abstract

In those days when Yasushi Nishiwaki visited the Soviet Union, Soviet scientists stood at the crossroads in understanding radiation effects on the living body: their perspective was changing from that of a mere follower of Western studies to that of a radical critic. Looking for a disregarded context in which research on radiation effects emerged as a major topic in Soviet science, this paper aims to explain the indigenous needs for such research in the Soviet Union as well as its early development by shedding light on radiation casualties at a nuclear development center, Chelyabinsk-40 (later, -65) and hazard studies conducted there in the early years. This paper shows that, even before the fierce debate began in UNSCEAR in the summer of 1958, there had already been an internal drive within the Soviet Union for expanding research on radiation effects on humans and other organisms.

Key words: The Soviet Union, Radiation, Biology, The Lysenkoites, Nuclear development, The Academy of Sciences USSR

1. Introduction

In June 1957, Yasushi Nishiwaki visited Moscow and gave a lecture warning of increases in radioactive fallout from the nuclear tests. Shortly before his talk, he also wrote an open letter to the Soviet political leader of that time, Nikita Khrushchev, with the request for his statement announcing the Soviet’s readiness to accept the ban on nuclear testing if the Western countries stopped theirs.¹ Nishiwaki’s visit to the Soviet Union coincided with the moment when Soviet scientists stood at the crossroads in understanding radiation effects on the living body: their perspective was changing from that of a mere follower of Western studies to that of a radical critic. In 1959, following the serious debates on radiation effects at the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), some Soviet scientists assembled their

* Hiroshima University, The Graduate School of Integrated Arts and Sciences. E-mail: ichikawa@hiroshima-u.ac.jp

critiques as a book. Entitled *Soviet Scientists on the Danger of Nuclear Weapon Tests*, this coedited volume covered a wide range of topics in great detail. Among them were: the mechanism of internal exposure; skepticism about the "averaging method" adopted in Western studies; difference in effects among various countries due to diversity in diet; the formation of radioactive carbon in the air and its effects; and the concentrations of radioactive particles and their long-term effects.

The timing of their criticism was, however, crucial for understanding the context of this drastic shift in Soviet scientific opinions on radiation hazards. Only in the summer of 1958 did the Soviet scientists begin to present their critical views on the Western risk assessments regarding radiation protection. Their work criticized the reports and recommendations made by the International Committee on Radiation Protection (ICRP). This was despite the fact that ICRP had been in operation since 1950, and UNSCEAR since 1954. Toshihiro Higuchi has explained the reason for this delay, arguing: "Another reason why the Soviet Union fell behind the Western countries in taking part in the international risk assessment activities was that a reconstruction of knowledge was then going on in the Soviet Union starting with the radiation effect problem." Even in those days the Soviet genetics was dominated by the Lysenkoite doctrine that denies gene theory. On the other hand, the leading Soviet atomic scientists made every effort to establish a research center for biological and genetic studies competing with the Lysenkoites. Independently from Higuchi, the author has also made a similar argument that the subject of radiation effects on human heredity had to be linked to the "normalization" of the biological sciences in the Soviet Union at the time when Lysenkoism was still rampant. Moreover, he has pointed out that the "normalization" of

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2 Pod obsch. red. A. V. Lebedinskogo, *Sovetskie Uchenye ob Opasnosti Ispytanii Yadernogo Oruzhiya* (Ed. by A. V. Lebedinskii, *Soviet Scientists on the Danger of Nuclear Weapon Tests*). M.: Atomizdat 1959; Andrei Lebedinskii (1902–1965) says in the opening of this book, "A number of scientists failed to overcome the political pressures, which are given by the United States policymakers. Therefore, the scientists are taking some biased approach to the solution of problems. As a result, some biological disciplines even became the battlefields."  
3 A biochemist, Norair Sisakyan (1907–1966: Later, Chief Academic Secretary of the Academy of Sciences), who attended Nishiwaki in his visit to the Soviet Union and was dispatched to Japan soon after Nishiwaki's return home) testifies in a Presidium meeting of the Academy on the influence of some Japanese scientists in this regard, saying, "Last fall, during my stay in Japan, I had a chance to talk with many Japanese radiobiologists who are extremely concerned about the presence of high radioactive contamination of some food products, for example, in rice, which is a staple of the diet for almost all the population in the East. The content of strontium rises to 260 strontium units." (Arkhiv Rossiskoi Akademii Nauk [The Archive of Russian Academy of Sciences: Hereafter, A RAN], Fond (F.) 2106, Opis (Op.) 1, No. 22, p. 2.).  
4 Toshihiro Higuchi, "'Kaku niyoru Heiwa' ni Chikyû-Kanyakō-teki Genkai ha Aruka?: Hōshaisi-Kōkabutsu no Anzensei-Shingi-Katei to Anzenhoshō-Kokka Amerika no Chiteki-Hegemoni no Kōzô to Hen-yō (Is There a Global Environmental Limit in 'Nuclear Peace'?)." The Japan Association for the International Relationship Kokusai Seiji (International Politics), No. 163, Nov. 2011, p. 35 (in Japanese).  
5 Hiroshi Ichikawa, "Ruisenko-Haken ni Kōshite: Sorenpō-Kagaku-Akademi Shibeshi-Shibu Saibōgaku-Ildengaku Kenkyū-Jo no Setsuritsu wo Megutte (Against Lysenkoites' Hegemony: On the Establishment of the Institute for Cytology and Genetics of Siberian Branch of the USSR Academy of Sciences)." Bulletin of
biological sciences was one of the targets of the de-Stalinization efforts launched by the leading Soviet scientists immediately after the death of the dictator Iosif Stalin.\(^6\)

Such a view, however, might lose sight of some crucial points. The assumption behind this view—the convergence of the interests between political power, seeking to mobilize scientific knowledge against the US and UK initiatives in the field of radiation studies, and scientists attempting to normalize biological sciences—may be an oversimplification in light of the current tide in Soviet studies.\(^7\) Indeed, in spite of intense opposition among scientists, and their subsequent weakening, the Lysenkoites managed to maintain their dominance in the Soviet biological sciences until the downfall of Khrushchev in 1964.\(^8\) An even more important point is that “cooperation” between the Kremlin and scientists might have been a double-edged sword because of the difference in timescale between the transient nature of governmental policies and the long-term commitment required for scientific research. Indeed, Andrei Sakharov, who was mobilized to level criticisms against the Western methods for radiation risk assessment, grew very skeptical of the wisdom of the nuclear weapons development in his own country.\(^9\)

Therefore, we must look for another context in which research on radiation effects emerged as a major topic in Soviet science. This paper aims to explain the indigenous needs for such research in the Soviet Union as well as its early development by shedding light on radiation casualties at a nuclear development center, Chelyabinsk-40 (later, -65) and hazard studies conducted there in its early years. First, we shall take a close look at the serious situations in Chelyabinsk-40 to see how research on radiation effects was

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\(^7\) One general characteristic of recent studies in the history of the former Soviet Union is the tendency to give increasing support to the understanding of its society based on the concept of ‘centralized pluralism,’ which Alec Nove, an economist, first introduced (See, Alec Nove, The Soviet Economic System, George Allen & Unwin, 1977, p. 56). Also in the history of science, the traditional totalitarian model depicting the scientists as passive victims of the party-state control is being replaced by a more pluralistic viewpoint. Thanks to the study of formerly classified documents in various archives, the totalitarian model which had been applied to the understanding of the Soviet society for a long time is expected to rapidly lose its popularity and to be replaced by a more pluralistic view. We can mention some remarkable historians of science belonging to the new trend; Nikolai Kremenstov, the author of Stalinist Science (Princeton University Press, 1997), Slava Gerovitch, the author of From Newspeak to Cyberspeak: A History of Soviet Cybernetics. The MIT Press, 2002) and Alexei Kojevnikov, the author of Stalin’s Great Science: The Times and Adventures of Soviet Physicists (Imperial College Press, 2004)


\(^9\) Ibid., p. 607–608.
needed to solve practical problems from the very beginning of the Soviet nuclear project. Second, we shall examine the process and features of the indigenous and original research on radiation effects in the Soviet Union at the initial stage of its development. Finally, we shall focus on the course of events unfolding within the Soviet Academy of Science, which then had an overwhelming influence and a very high authority among the Soviet scientists, in order to examine the reality of the Lysenkoites’ hegemony in the circle of scientific leaders. This inquiry will be limited to the period from the establishments of the first nuclear facilities to the summer of 1958, when the heated debate began in UNSCEAR.

2. The Soviet Nuclear Weapons Development and Radiation Exposure

To develop the atomic bombs as soon as possible, the Soviet government hastily built two huge industrial complexes, one for producing plutonium and the other for uranium enrichment, as well as one large scientific research center, a vast test site and other facilities in a very short time. In those early days, administrators, scientists and engineers involved in that project, working under enormous pressure to achieve maximum success in the shortest possible period, made various errors and oversights due to haste. One of the most serious consequences was careless handling of radioactive materials.

2.1. Radiation Exposure in Chelyabinsk-40 in Its Early Years

Angelina Gus’kova (1924–), a specialist of radiation medicine, has offered rare insights in radiation hazards at Industrial Complex No. 817 (codenamed as Chelyabinsk-40, later renumbered -65) built for plutonium production. She read a paper prepared jointly with G. D. Baisogolov on the problem of cure for heavy radiation sickness at the International Conference on Peaceful Uses of Atomic Energy held in Geneva in 1955. According her witness, during the first decade of its operation, from 1948 to 1958 a total of 42 persons suffered from serious radiation sickness. Seven of them died. Two-thirds of the exposure incidents happened at Works No. 25 in Plant B where plutonium was separated; one-fifth at Works No. 20; one-tenth at Plant A with the graphite-moderator type nuclear reactor; and one-twentieth at various construction sites.

The most serious incident occurred on June 17, 1948. Reactor A at Industrial Complex No. 817, the first Soviet full-scale reactor for plutonium production, was fully

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loaded with fuel blocks in every operating channel and reached the critical state three days later. However, after a brief moment of joy, the reactor broke down on the next day. Radioactive products equivalent to approximately 300 doses (one dose: 1 coulomb/1 kg) were released into the air, while a hole on the graphite base was clogged up with slag. The heat expansion of graphite and uranium had prevented the smooth cooling water supply. Igor’ Kurchatov (1903–1960), leader of the Soviet nuclear weapons development, nevertheless ordered its continuous operation as “an exceptionally dangerous, but only one feasible solution,” without fundamental repair or cooling of the clogged hole. Immediately after the reactor began to operate again on July 12, however, slag built up in another hole. In order to remove it, many workers had to work under dangerous conditions with radioactive particles: I. P. Frolov, for example, was exposed to radiation up to 26 roentgen; B. S. Petrov, 46 roentgen; M. N. Pichugin, 53 roentgen; and L. I. Zakharov, 108 roentgen.13

It was not until the end of 1948 Kurchatov and other leaders of the Soviet nuclear weapons development decided to fix the problem. On January 20, 1949, the operation of the reactor was suspended, with a total of 39,000 blocks of uranium fuel unloaded. It took almost two months before the reactor resumed its operation on March 26. Ironically, after the repair, the operation of the reactor had to be limited. This was because operations had to be kept to lower levels to keep the temperature of graphite below 330 centigrade in order to avoid expansion from heat. During the repair work, workers involved in the reactor operation were exposed to radiation at a high average annual rate of 93.6 rem (936 mSv) in 1949.14

At Plant B, where a large amount of radioactive materials were treated in the process of plutonium separation for fission bombs, workers also risked their health due to serious radiation hazards. Levels of exposure were dangerously high especially when much of the reactor’s equipment was upgraded for better efficiency. This also happened when a great deal of the fissile materials were replaced due to a series of erosion events in 1950 and 1951. Eventually, a scientist working at the plant named Boris Nikitin died from acute radiation sickness in 1952 at the age of 46. Four years later, in 1956, Aleksandr Ratner, who actually played a leading role in the plant, also fell to victim at the age of 50. The total number of persons suffering radiation injuries at work during the first two decades since the opening of the plant amounted to 2,089 of approximately 11,000

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14 A. K., Kruglov, Kak Sozdavalas’ Atomnaya Promyshlennost’ SSSR (How was the Atomic Industry created in the USSR?). Moskva, TsNII ATOMINFORM, 1995g. pp. 72–80; From 1948 to 1952, in the Soviet Union, radiation exposure below 30 rem was considered permissive (see, Sozdanie Pervoi Sovietskoi Yadernoi Bomby. ... in footnote 12., p. 116.)
persons working at this plant then.\textsuperscript{15}

The most serious incident at Plant B happened on March 15, 1953. A crane broke down, and highly-concentrated plutonium solution fell out of a container. This nearly reached criticality. Two workers in charge of the disposal of radioactive wastes, whose family names were Ershov and Timazeev, died from serious radiation exposure.\textsuperscript{16} Even when no accident happened, exposure levels remained alarmingly high. The annual average doses received by a worker of Plant B reached 48.0 rem in 1949, 94.0 rem in 1950, and 113.32 rem in 1951. Radiation hazards even spread outside the nuclear complex. Since the very beginning of its operation, low-level radioactive wastes, which were somewhat diluted but untreated, were discharged into the Techa River.\textsuperscript{17}

Many scientists and administrative staff involved in the construction and operation of Industrial Complex No. 817, including Kurchatov, director of the complex Efim Slavskii (1898–1991), and others, were also heavily exposed to radiation.\textsuperscript{18} To facilitate the investigation and treatment of those exposed to radiation as well as the development of protection measures, a field hospital opened in 1949, followed by the establishment of a field branch of the Institute for Biophysics of the USSR Ministry of Health (and the Soviet Academy of Medical Sciences) in 1952.\textsuperscript{19} The medical doctors, researchers and medical workers there, however, were ordered by the authority to keep absolutely silent about their secret tasks. It was strictly forbidden for them even to record the facts and the numerical data concerning radiation sickness. Therefore, they had to use the other words indicating radiation sickness, like “myasthenia-vegetative syndrome” and others.\textsuperscript{20}

2.2. The East Ural Radioactive Trace

On September 29, 1957, at 4 pm, problems arose with the cooling system of a concrete container, with the capacity of 300 m\textsuperscript{3} holding 70–80 tons of the nitric-acid acetate solution of high level radioactive waste. The solution overheated and exploded. Approximately 10 percent of the contained radioactive material (\textsuperscript{90}Sr, \textsuperscript{90}Y, \textsuperscript{92}Zr, \textsuperscript{95}Nb, \textsuperscript{144}Ce, \textsuperscript{144}Pr, \textsuperscript{106}Ru, \textsuperscript{106}Rh, \textsuperscript{137}Cs etc.), equivalent to 20 million curies, was released into the air and carried northeast by the wind. The Central Laboratory of Industrial Complex No. 817 was ordered to take primary responsibility for investigating casualties. Also mobilized were the medical corps of the complex; the field branch of the Institute for Biophysics, the branch of the Institute for Radiation Hygiene of the USSR Ministry of

\textsuperscript{15} Sozdanie Pervoi Sovietskoi Yadernoi Bomby ... in footnote 12, p. 116; Pod red. Petros'yantsa i dr. ... in footnote 13, p. 332; It was also reported that 36–43 percent of all the workers were exposed to radiation equivalent of 100–400 rem (Sozdanie Pervoi Sovietskoi Yadernoi Bomby ... in footnote 12, p. 116).
\textsuperscript{16} Ibid., p. 154.
\textsuperscript{17} Kruglov, Kak Sozdavalos' ... in footnote 14, p. 101.
\textsuperscript{18} Sozdanie Pervoi Sovietskoi Yadernoi Bomby ... in footnote 12, pp. 161, 162.
\textsuperscript{19} Ibid., p. 147.
\textsuperscript{20} Ibid., p. 159.
Health, the Institute for Applied Geophysics, and the Institute for Geochemistry of the
Soviet Academy of Sciences. Estimates later indicated that, in total, 6,600 to 8,300
people were likely to have been exposed to radiation. At first, the USSR Ministry of
Medium-machine Building and the Ministry of Health answered an inquiry made by the
chairman of the Sverdlovsk Oblast Executive Committee with reassurance, stating:
“There is no sign of any serious pollution in the territory of the Oblast.” Such optimistic
and irresponsible attitudes of the government, however, led to a serious delay in taking
countermeasures. Only in April of 1958, almost six months after the accident, was the
first such measure—numerical control on the number of livestock and that of diseases
among the inhabitants—finally taken in the Kamensk region. Belatedly, further actions
followed: the disposal of the contaminated crops; the prohibition of consuming food
raised in the polluted area; and the evacuation of the inhabitants from the highly
radioactive zone. External exposure doses received by the residents had been
continuously measured until 1963. What is interesting is that those who were engaged in
the measurement of exposure doses actually invented their own method of gauging
exposure. This indicates the seriousness of the internal radiation exposure caused by the
accident. First, the magnitude of the transfer of radionuclides from soil to crops was
estimated. Then the average daily diet for every age group of the inhabitants was
calculated. With these calculations in hand, experts made estimates about the annual
average intake of radionuclides into the human body.

3. Indigenous Development of Research on Biological Effects of Radiation

Here we will trace the progress in the indigenous and original studies on radiation
effect made in the Soviet Union until the summer of 1958.

3.1. Valentin Khokhryakov and His Team

For many years in his professional career, Valentin Khokhryakov (1928–), a scientist

21 Institut Promyshlennoi Ekologii Ural’skogo Otdeleniya Rossiiskoi Akademii Nauk [pod red. V. N.
Chukanova], Vostochno-Uralskii Radioaktivnyi Sredstvo: Sverdlovskaya Oblast’ (Institute for Industrial Ecology,
the Uralian Branch of Russian Academy of Sciences [Ed. by V. N. Chukanov], The East Uralian Radioactive

22 Institut Promyshlennoi Ekologii Ural’skogo Otdeleniya Rossiiskoi Akademii Nauk [pod red. V. N.
Chukanova], Vostochno-Uralskii Radioaktivnyi Sredstvo: Problema Reabilitatsii Naseleniya v Territorii Sver-
drovskoi Oblasti (Institute for Industrial Ecology, the Uralian Branch of Russian Academy of Sciences [Ed. by
V. N. Chukanov], The East Uralian Radioactive Trace: The Problems of Rehabilitation in the Territories of
Sverdlov Oblast). Ekaterinburg, 2000g. pp.; Zhores Medvedev once said, "Despite the tragic nature of the
disaster, the existence of such an extensive zone of contamination containing radioactive materials at different
levels of concentration offered a unique opportunity for scientific research in such areas as radioecology,
radio genetics, radiobiology, radiotoxicology." Zhores Medvedev, trans. by George Saunders, Nuclear Disaster
in the Ural (New York, W. W. Norton & Company, 1979), p. 22; This remark by Medvedev, however, has been
not supported by any official document of the Soviet and Russian authorities.
in the field branch of the Institute for Biophysics at Cheryabinsk-40 (later, -65), supervised the development of methods to measure radiation effects on human bodies as well as that of means of protection from exposure. At first, his team concentrated their efforts on measuring external exposure to $\beta$- and $\gamma$-rays and estimating their effects. As early as in the 1950s, however, they discovered surprisingly large amounts of plutonium from inside the bodies of dead workers at the complex. Specifically, they used the $\alpha$-ray spectrometer to detect this type of radiation emitted by americium-241 and some plutonium isotopes in the ashes of bones of the dead. Such measurements were conducted twice in the decade from 1949 to 1959.

3.2. “Session for the Peaceful Uses of the Atomic Energy” in 1955

In August 1955, the International Conference on Peaceful Uses of Atomic Energy was held in in Geneva. A month earlier, July 5–7, the Soviet Academy of Sciences hosted a large domestic session as a preparatory event to that in Geneva. What is noteworthy here is that one of the sections was dedicated to biological sciences. In his presentation, the section’s organizer Leon Orbeli (1882–1958), a leading physiologist, emphasized the importance of research on biological effects of radiation in the nuclear era, saying: "No matter whether research and utilization of atomic energy is carried out for peaceful or other purposes, this energy has some effects on the human being and any living body." Of particular importance were a number of new findings reported during the session. P. F. Minaev found that radiation exposure triggered a shift in the chicken’s nerve center to some excitement and some morbid fluctuations. Orbeli also refers to a similar research...
result treating with ovulation of frogs irradiated with gamma-ray.\textsuperscript{28} A. G. Pasynskii made another report, stating: “When radioactive ray goes through the water, a large amount of free radicals (especially, OH radicals and O$_2$H radicals) are generated. And, some chemical reactions, especially some oxidizations are brought about by means of the interaction of those radicals and the matters in the solution.”\textsuperscript{29} Orbeli and Aleksandr Kuzhin (1906–1999) also confirmed his findings.\textsuperscript{30}

3.3. Medical Scientists and Others

In the following year, from January 30 to February 4, 1956, the USSR Ministry of Health held the First All-Union Conference on Medical Radiology. A total of 232 papers were presented at the meeting, which a review article described as providing “the research results made by the Soviet scientists concerning effects of ionizing radiations onto organism, the uses of atomic energy to biology and medicine, radiation measurements and hygienic problems of radiology.”\textsuperscript{31} M. N. Livanov discussed in detail radiation effects on nerve activities, a topic which Western scientists largely overlooked in those days.\textsuperscript{32} A. A. Bagdasarov and L. S. Rogachev reported on their practices in the medical treatment of patients suffering acute and chronic radiation sickness.\textsuperscript{33} An authoritative medical doctor, Avgust Letaved (1893–1984) also made an urgent appeal to advance basic research as an aid for establishing standards on permissible doses.\textsuperscript{34}

\textsuperscript{28} Orbeli, “Deistvie Radiatsii ...” in footnote 26, pp. 10–11.
\textsuperscript{29} A. G. Pasynskii, “Deistvie Ioniziruyushchei Radiatsii na Rastvory Belkov i Belkovykh Kompleksov (The Effect of the Ionizing Radiation on Protein Solution and Protein Complex).” \textit{ibid.}, pp. 85–105; This kind of ionization and oxidization had been already reported by Nikolai Timofeev-Ressovsky (1900–1981) and others as early as mid-1930’s.
\textsuperscript{34} A. A. Letaved, “Gigienicheskie Problemy v Radiologi (Hygienic Issues in Radiology),” Ministerstvo zdravoохранeniya SSSR [A. V. Lebedinskii—otvetstvennyi redactor], \textit{Tezisy Plenarnykh Dokladov Vsesoyuznoi Konferentsii po Meditsinskoi Radiologi} (Ministry of Health, USSR [A. V. Lebedinskii—editor-in-chief], \textit{The Theses of the Plenary Presentations at the Conference on Medical Radiology}), Moscow, Medgiz,
Soviet research made further progress by the time when another major conference—the All-Union Scientific and Technical Conference on the Applications of Radioactive and Non-Radioactive Isotopes in National Economy and Scientific Research—was held on April 4 to 12, 1957. During this week-long conference, attended by more than 3,000 participants representing 1,016 organizations, a total of 444 scientific reports were presented. One of the major topics was the problem of what was later called global fallout, the radioactive debris scattered worldwide due to atmospheric nuclear testing. V. P. Shvedov and L. I. Gedeonov reported on the pollution of the biosphere around Leningrad due to this globally circulating contaminant. V. M. Klechkovskii and I. V. Guryakin reported on the contamination of soil with radioactive fallout and the absorption of radioactive strontium by different parts of plants. In addition, G. G. Tinyakov and M. A. Arsen’eva presented the result of their research on the cytogenetic consequences of radiation effects as observed in the spermatozoa formation of the apes. Most of these presenters later contributed to the book published in 1959, *Soviet Scientists on the Danger of Nuclear Weapon Tests*.

What is interesting about Soviet radiation studies in those days is that the dangers of radiation sicknesses were openly talked about in public. A famous hygienist, M. N. Pobedinskii published a popular reference book entitled *Radiation Sicknesses* in 1957. This book was among the first that introduced the Soviet people to the tragedies of Hiroshima and Nagasaki.

4. The Academy of Sciences: Its Late Start and Catch-up

On March 29, 1957, with the aim of making a breakthrough in the fields of radiation biology, biophysics, and chemical and physical research of isotopes, the Presidium of the Soviet Academy of Sciences made a decision during its session to establish a new, large-
scale and integrated research center for studies in those three fields. In discussions for this resolution, Pietr Kapitsa (1894–1984), an outstanding physicist, enthusiastically appealed to his colleagues in the Presidium, so much so that he declared: “I think that I must bluntly say, entirely unashamedly, that the future war would be decided by the biologists, by no one else, if it broke out indeed or not! No physicists can now decide, but the biologists will decide what will be the consequence of nuclear war! We have been timidly left behind here. Yes, we were timid! We must not consider this problem in the same way with another. We need this type of institute for genetics, an institute for radiation genetics.”

On April 26, less than a month after the Presidium session, the Institute for Radiation and Physical-Chemical Biology of the Academy of Sciences of USSR was founded, somewhat formally on the documents, with Vladimir Engel’gardt (1894–1984), a famous biochemist, as acting director. The Chief Directorate of Atomic Industry also took part in its foundation, taking charge of the site selection for the institute and also of designing the buildings together with the Academy of Sciences.

Besides that institute, another large scientific research center was to be established in the Siberian Branch of the Soviet Academy of Sciences, the foundation of which had been decided at the Presidium session on June 21, 1957. According to a speech in July 1957 by Mikhail Lavrent’ev (1900–1980), the main organizer of the Siberian Branch, the Institute for Cytology and Genetics of the Siberian Branch was to hire more than 400 persons in the vast space of 5,000 m². Nikolai Dubinin (1907–1998) known as a leading anti-Lysenkoite biologist was appointed as director-organizer.

The backwardness of Soviet science in this research field, however, continued to be a serious problem. When the Presidium of the Academy held a meeting on November 29, 1957, Chief Academic Secretary Aleksandr Topchiev (1907–1962) read his report on his attendance at the International Conference for the Application of Radioactive Isotopes into Scientific Research held on September 9–20 in Paris. In it, he complained: “Radiometric apparatuses, dosimeters, and other electronic physical apparatuses made in our homeland do not meet the necessary level in their variety, quality and, very often, technical performance for scientific research treating with isotopes and nuclear radiation. Due to the lack of protective equipment and clothing for the workers working with isotopes and radiation, many laboratories of various ministries and agencies are currently closed by the orders of the State Sanitary Inspectorate.” Even later, on December 6, Gleb Frank (1904–1976), a leading biophysicist of the time, admitted these dismal situations in his address at a Presidium meeting, stating, “We are left so far behind in the

41 Ibid., p. 79.
broad front of research for the analysis of the molecular structures of the living tissue.”

The decision to establish the Institute for Radiation and Physical-Chemical Biology, however, was not implemented for more than a year due to the lack of some necessary prerequisites. According to the speech given by Engelgardt when the Presidium met on May 16, 1958, to discuss causes of that delay, the space for the new institute, especially that for radiation protection blocks, could not be secured. Besides this, in the same meeting, V. S. Rusinova pointed out some difficulty in decision-making in the Academy’s Department for Biological Sciences, which she complained was shouldering a heavy burden of obligations onto the members of the Bureau of the Department. The vice president of the Academy, Konstantin Ostrovityanov (1892–1969), however, reminded the Presidium members of “a kind of opposition, as seen symbolically in the various fields of biology, against the new direction in which a wide range of physical and chemical methods must be adopted.” It was needless to say that the “opposition” meant maneuvers staged by the Lysenkoites.

Immediately after his recovery to an improved relationship with the political powers from his temporary decline in the spring in 1957, Trofim Lysenko (1898–1976) sent a letter dated April 19 to Aleksandr Nesmeyanov (1899–1980), president of the Academy. In it, he condemned “the situation in which scientific research activities that are carried out or are to be carried out with the application of isotopes and nuclear radiation, I don’t know why, are now conducted by outsiders of the Institute for Genetics.” He demanded that Nesmeyanov should “remove the fictitious leaders away.” He also added: “In the Institute for Genetics, genetic studies on radiation effects are well organized. They are being carried out on the basis of Michurin biology.” On October 8–14, his institute held a large-scale scientific conference, gathering a total of 375 participants from 250 scientific organizations and higher education facilities. In it, Nikolai Nuzhdin (1904–1972), Lysenko’s right-hand man, delivered a speech, proclaiming that “The chromosome theory and the gene hypothesis turned out to be bitterly contrary to the materialist view.” As a maneuver, or perhaps in triumph, the conference organizers invited a number of anti-Lysenko biologists such as Dubinin and Ivan Shmal’gauzen (1884–1961), their sympathizer Kapitsa, some philosophers including Mark Mitin (1901–1987), Aleksandr Maksimov (1890–1976), and Abram Deborin (1881–1963) among others.

Later, in 1959, Chairman of the Academy’s Siberian Branch, Lavrent’ev remembered
The formidable days at the beginning of the Siberian Branch of the Academy of Sciences: “The establishment of a scientific center in Novosibirsk had been considered as the most harmful attempt in many ways. The young persons were persuaded not to come here.” We had great difficulty in securing the necessary persons. I would like to frankly tell you when A. N. Nesmeyanov told me about the conversation with Nikita Sergeivich. He said, “No one will go to you.” A. V. Topchiev was also present at this conversation. This conversation worried us so much. Having taken the advantage of this conversation, you censured us, as if you fingered a wart.

It is noteworthy, however, that although the Lysenkoites harassed other scientists with their persistent attacks against the foundation of another scientific center independent from their research centers in order to maintain their monopoly in biological sciences, they did not oppose the development of radiation effect studies in and of itself. Later, in January 1959, some members of the Commission on Biology of the Party’s Central Committee, all of them Lysenkoites, were dispatched to Novosibirsk to inspect research activities in biological fields in the Academy’s Siberian Branch. While they questioned the leaders of the Branch and applied strong pressure on biological research activities there, they insisted that they did not want a monopoly on biology. One of them, Mikhail Ol’shanskii (1908–1988), said: “It is not proper to entrust biology exclusively to only one possible direction.” Nuzhdin, also a member, said: “There are two directions. And I have some sympathy for each of them.” Pavel Genkel, yet another member, said: “No one is prepared to remove the director away. ... It does not sound good, although not the worst, that Nikolai Petrovich is concentrating all his efforts to only one direction.” Here the Lysenkoites demanded pluralism in scientific research and revealed their ambition to make their entry into the field of radiation biology.

5. Conclusion

This paper has shown that, even before the fierce debate began in UNSCEAR in the summer of 1958, there had already been an internal drive within the Soviet Union for

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52 “here” means the Siberian Branch of the Academy of Sciences of USSR.
53 In this case “you” means the Commission on Biology of the Central Committee of the Soviet Union Communist Party.
54 Khrushchev.
57 Ibid., p. 5.
58 Dubinin.
expanding research on radiation effects on humans and other organisms. Some Soviet scientists and medical scientists had been involved in the disposal of radioactive wastes, the rescue and treatment of persons exposed to radiation, the development of measurement methods and radiation protection, and other activities in Chelyabinsk-40, where a series of radiation exposure incidents repeatedly occurred, and also in relation to the East Ural radiological disaster in September 1957. Taking the opportunity to raise the issue along with global fallout, the research results accumulated by the Soviet scientists, thus appeared on the stage of international politics.

From the very early days of research activities in the Soviet Union, there emerged some unique developments. There was scientific interest in a wide range of topics that few Western scientists investigated in a systematic way, such as internal exposure, radiation effects on the nerve activities of animals, and external damage to the tissue caused by some unpenetrated radioactive rays. Well before 1955, when the Soviet Academy of Sciences held the “Session for the Peaceful Uses of the Atomic Energy” in conjunction with the beginning of peaceful uses of atomic energy, biological effects of radiation already had been considered in the Soviet Union as an independent, important area of scientific inquiry. In addition, the 1955 session saw some serious critiques leveled against such kind of risk analysis practiced in the West as ignorance or underestimation of internal exposure, difference in radiation effects due to diversity in diet and the formation of radioactive carbon in the air and its effects, traps of the “averaging method” and others.

This paper has also demonstrated that the Lysenkoites’ opposition was directed not to radiation studies per se but to the foundation of the new research centers outside their sphere of influence for fear that these institutions might undermine their monopoly in the biological sciences. Following the heated debates in UNSCEAR in the summer of 1958, Lebedinskii, the Soviet chief delegate to the committee, became active in publishing counterarguments against the Western view on radiation effects in international journal *Atomic Energy.*60 Ovsei Leipunskii (1909–1990) and Andrei Sakharov (1921–1989) also contributed to that journal.61 In this way, the Soviet scientists rapidly prepared their major counterarguments against the prevailing ideas in the West regarding biological effects of

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radiation. These radical critiques crystalized into the 1959 book, *Soviet Scientists on the Danger of Nuclear Weapon Tests*. As has been seen in this paper, however, these counterarguments, at least in part, had been prepared in the indigenous research tradition in the Soviet Union based on their own experiences with radiation hazards.

Finally, it must be noted that another current—a very optimistic view toward radiation hazards—also emerged in the Soviet Union as early as by the end of the 1950s, suggesting that not all Soviet scientists in those days agreed with radical criticisms leveled against Western studies on radiation effects. As is well known, such optimism later became mainstream even in the Soviet Union. In his lecture entitled “Atoms Serve Human Beings,” delivered in 1959 before the All-Union “Znanie (Knowledge)” Society, Gleb Frank stated:

... artificial radioactive isotopes created the technical possibility of usage of the unprecedented, extremely powerful artificial radiation sources or, as we shall see later, the usage of these elements for analytical purposes which had been unexpected. ... Artificial radioactive elements which are produced in large quantities at nuclear reactors, although they are often treated simply as by-products or wastes, have gained a firm position in all fields of science, technology and national economy. ... Chemical changes, caused by exposure in a living organism, can lead to some harmful consequences. The effects of such harmful radiation are, however, associated with professional harms such as a careless work with radiation or the improper quality of protective devices. However, some damages to the animals’ organs and tissues by radiation can also benefit the human beings. ... In this way, the radioactive atoms serve the men by making possible to manage the living nature and to create new sorts of microbes and new varieties of agricultural plants useful for economy and industries.62

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