

In memory of Victor Zhdanov

Victor Zhdanov was a scientist of international reputation, a virologist with wide interests, who made seminal contributions in virology, molecular biology, and epidemiology. He was one of the founders of the international community of virologists.

Zhdanov was born in the Ukraine on February 13, 1914. After graduating from medical school in 1936, he worked for 10 years as an army doctor in the Zabaikalye and Turkestan military districts. His military service had a deep influence on his life; here, he became familiar with field epidemiology and learned to stand up for his ideas against the army bureaucracy. At this time, his main interest was in the etiology and epidemiology of hepatitis A. He presented this research in his doctoral thesis, entitled "Infectious hepatitis", which he defended in Moscow in 1946.

After his demobilization in 1946, Zhdanov was invited to become Chief of the Epidemiology Department of the I. I. Mechnikoff Institute of Epidemiology and Microbiology in Kharkov; two years later he became Director of the Institute. During this period he published the first of a series of papers on virus classification that led to his election to the International Committee on Taxonomy of Viruses as a life member.

In 1950, Zhdanov was invited to Moscow to accept a position as Chief of the Epidemiology Department in the U.S.S.R Ministry of Health; he was soon promoted to Deputy Minister of Health. During his 11 years in health administration, Zhdanov worked to control the spread of infectious diseases through improved hygiene and mass vaccination programs. Largely through his efforts, the vaccination of millions of children led to the control of influenza, measles, and poliomyelitis in the U.S.S.R. As chief of the Soviet delegation to the World Health Organization's (WHO) World Health Assembly, Zhdanov first proposed the Smallpox Eradication Program that eventually led to the eradication of smallpox worldwide.

To provide a rapid means of disseminating new findings in virology, Zhdanov founded the journal *Problems in Virology* in 1956; he remained its editor and an active contributor until his death.

Zhdanov's years in health administration were marked by constant struggles with party officials on the Central Committee, who neither understood nor supported his initiatives and succeeded in blocking many of them. Unsatisfied and disillusioned with administrative work, Zhdanov left the Ministry of Health in 1961 to devote himself to scientific research. He accepted the post of Director of the D. I. Ivanovsky Institute of Virology, a position he was to hold for the rest of his life.

The study of virology in the Soviet Union began to lag behind the rest of the world because of its isolation and its lack of financial support. To strengthen contacts with western scientists, Zhdanov traveled to the United States in 1968, where he visited a number of virology laboratories and spent three months at St. Jude Children's Research Hospital in Memphis, Tennessee and collaborated with David Kingsbury on the replication of paramyxovirus.

In the following years, Zhdanov shifted the focus of the Ivanovsky Institute towards molecular virology. New laboratories were established to investigate viral molecular structure and biosynthesis, oncogenesis, and later, genetic engineering. New equipment appeared in the Institute. The staff grew to more than 600. Zhdanov thus became the founder of molecular virology in the Soviet Union.

Zhdanov was particularly interested in the process by which viruses penetrate their host cells. He doubted the theory then accepted by most virologists that all viruses enter cells by endocytosis. In 1956, in studies carried out with the author, formation of syncytia in parainfluenza virus-infected cell monolayers was found to be caused by a virion protein (the "fusion protein") which was shown to be responsible for cell invasion.

With Albert Bykovsky and Konstantin Ilyin, he described a new oncogenic virus isolated from tissue culture cells of human origin. He proposed that persistent virus infections could arise as a result of integration of DNA provirus into host cell DNA and even extended this concept to RNA-containing viruses.

Much of Zhdanov's research was devoted to viral hepatitis. He became interested in the pathogenesis of hepatitis B, which led him to the development of an integrative theory of virus persistence. Under his guidance, hepatitis D (delta virus hepatitis) was studied, and during an outbreak of an unusual hepatitis in the eastern U.S.S.R. involving a collaboration between scientists at the Ivanovsky Institute and from the United States, hepatitis E was discovered.

Zhdanov devoted a great deal of attention to the fundamental and applied problems of influenza. Influenza virus was used at the Ivanovsky Institute as a model for studying replication and assembly, virus interaction with host cell receptors, virus-host adaptation, and the functions and structure of the matrix protein. The Ivanovsky Institute housed a WHO Collaborating Center for Influenza – consequently, all influenza strains isolated in the U.S.S.R. were available at the Center for study. In the fall of 1977, an unusual influenza virus strain had been isolated, its antigenic structure resembling that of strains circulating 20 years earlier. Zhdanov immediately made the virus available to the other WHO Collaborating Centers, where vaccines were developed; the strain, A/USSR/77/090, was eventually responsible for the pandemic of 1977.

One of his favorite intellectual occupations was to contemplate the evolution of the organic world and of viruses as one of the forms of life. He believed that the viruses possessing the unique mechanism of penetration and exit from the cell could enrich the gene pool of the earth. He reasoned that evolution of viruses continues in our times, and showed the shortcomings of the existing criteria of virus classification which disregards evolutionary approaches.

One of Zhdanov's outstanding features was his ability to translate scientific ideas and achievements into new ways for diagnostics and treatment of virus diseases. However, throughout his career, Zhdanov grew increasingly frustrated with the bureaucratic obstacles that stood between research and the commercial production of diagnostic tests and vaccines in the U.S.S.R.

Zhdanov's work was hindered by interference from party officials, who kept him and his research under strict surveillance. One of his three deputies was always a representative of the KGB and was responsible for the organization of a net of informers at the Institute. For many years, Zhdanov was not allowed to go abroad, and some of his trips were cancelled at short notice.

Because of his belief in the value of international cooperation, Zhdanov maintained

close working associations with scientists in the West, even during the World War. Joint influenza research projects were done with Walter Dowdle, Robert Webster, Edward Kilbourne, and Nancy Cox; joint viral oncogenesis research projects were done with John Moloney and Fred Rapp; joint viral hepatitis research projects were done with Daniel Bradley and James Maynard, to mention but a few.

In 1968, Zhdanov organized the First International Congress of Virology, together with Joseph Melnick, Peter Wildy, and Nils Oker-Blom, in Helsinki. In 1970, Zhdanov was elected President of the International Association of Microbiological Societies. He was an honorary member of several foreign medical associations, including the American Association of Preventive Medicine (1960), the Belgium Society of Tropical Medicine (1963), the Hungarian Scientific Medical Society (1970), and the Polish Society of Microbiologists (1973). In addition, Zhdanov served on the boards of several international journals, including *Intervirology* and *Archives of Virology*.

Zhdanov's service to WHO extended over the entire course of his career. From 1957 until his death, he was a member of the WHO Expert Advisory Panel on Viral Diseases; he also served on several standing committees, including the International Committee on Bacteriological Nomenclature and the Permanent Committee for Microbiological and Immunological Documentation.

The last years of his life Zhdanov devoted to the AIDS problem. He openly rejected the absurd version about the creation of HIV by American scientists employed by the Pentagon and published his version of HIV origin in spite of hard political pressure.

This was a time when health officials declared that the country was protected against an AIDS epidemic because the groups most at risk – homosexuals, prostitutes, and drug users – were not present in the Soviet Union. However, Zhdanov was aware that epidemics know no geographic frontiers: "It would be an unforgivable mistake to think that the AIDS pandemic will bypass our country. . . . We must take measures to prevent the introduction and spread of AIDS while it is not too late". He insisted that the government identify infected persons in high risk groups, screen blood from all donors, and establish education programs. After delay due to bureaucratic skepticism and reluctance, some progress was finally achieved. In 1986, the U.S.S.R. Minister of Health, E. Chazov, invited Zhdanov to serve as a consultant for the development of a National AIDS Program. From this came the following activities: (1) strict checks for HIV in foreign citizens coming to the U.S.S.R., (2) deportation of HIV-infected foreign citizens, and (3) punishment by law of infected persons who knowingly infect others.

Zhdanov recognized that the Ivanovsky Institute should focus on AIDS, and he initiated the construction of a diagnostic test development center. He realized that conquering the AIDS pandemic would require a global effort. He believed that a coordinated international research program, a more active international AIDS control policy, and a systematic exchange of information between countries were needed. In 1987, the U.S.S.R. Minister of Health asked Zhdanov to write a proposal for the WHO Director General, outlining a more active AIDS control program. As a result, he was invited to Geneva in April 1987 to collaborate with Jonathan Mann, the new chief of WHO's Global Program on AIDS. Shortly thereafter, the World Health Assembly adopted a resolution for a new Global Program on AIDS, largely incorporating Zhdanov's initiatives. Fatefully, at the height of Zhdanov's AIDS activities, he had a heart attack and died after a short illness. Virologists from more than 30 countries attended a memorial conference in September 1988.

Zhdanov was a scientist of keen and inquisitive mind and extraordinary flexibility of

thought, a declared enemy of dogmatism and bureaucracy. He was an amiable, warm and charming person, highly appreciative of the other's talent, a reliable, humorous and attentive friend. He died when his country stood at the threshold of "perestroika", a concept he had fought for all his life, full of creative potency and original ideas, with a passionate desire to save mankind from the menace of cruel disease.

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