

# THE SYSTEM OF EPIDEMIC CONTROL IN THE USSR:

## Short Essay on its History

Elena S. Izmailova

Institute for History of Science and Technology,  
Russian Academy of Science, Moscow (Russia)

Consideration of public health history in Russian and Soviet periods offers an intriguing case of relationship of public health measures and political conditions. The control of infectious diseases in the former USSR was a complicated task. The country covered a vast geographical area and included every climatic zone, from the tropical to the polar. The population was multiracial and multinational, with different traditions and life-styles. Russia occupied the first place for mortality due to infectious diseases among European countries mainly due to their wide propagation in the borderlands of the Russian Empire (1). Despite these averse conditions, the eradication of some of these diseases and control of others were successfully accomplished by the Soviet state, a result that owed a lot to the system of epidemic disease control established in Russia after the revolution.

The characteristic feature of disease control in the USSR was a focus on preventive rather than curative medicine. The comprehensive control system established after 1917 had an unquestionable effect within 20 years and markedly contrasted with the minimal impact of the patchwork service that existed before the revolution. The absence of any central agency in Tsarist Russia meant that the disease control was mostly in the hands of local authorities, such as Zemstvo (county) and city councils, supported by philanthropic and voluntary organisations (2). The priority was to deal with epidemic crises, neither long-term preventive strategies nor any people education (3). Meanwhile rural medicine was making its first steps in Central Russia after agrarian reform of 1861 (4), and there was no medical service in Russian colonies (5).

The principles of the public health system were radically changed under the "Dictatorship of the Proletariat". Several changes immediately followed. First, free medical care was introduced and maintained even in the difficult conditions of the Civil War (1918-1922) (6). Second, the sanctity of patient confidentiality was abandoned as it was said that the "interests of the society are more important than the interests of a person". A medical manual said: "If maintaining the patient's medical history in

confidence contradicts to the interests of the collective, a doctor should not bind himself with confidentiality. If a doctor diagnoses an infectious disease, he must immediately inform authorities" (7). Third, a single state medical agency, the People's Commissariat of Public Health, was established in July 1918 and the control of infectious diseases became one of its main priorities. A state decree "On the measures to fight epidemics" was issued in 1918: epidemics were considered by Bolshevik government as one of the main threats for the new state order (8). The new disease control system enjoyed an important advantage: it was supported and controlled both by public health authorities, and directly by the Party apparatus, since local Party authorities were obliged to support measures carried out in their areas (9). In the next year Lenin issued a decree "On compulsory smallpox vaccination". This was a beginning of compulsory vaccination and infectious patients' treatment (10). To accomplish this goal a network of sanitary stations was established at various levels, from the District up to the Republic and soon covered the whole country. There were three types of stations: (i) general purpose sanitary stations, (ii) anti-plague stations, which also dealt with other highly infectious diseases such as cholera, smallpox, tularemia, anthrax and brucellosis; and (iii) anti-malaria stations (11).

In this paper I would like to consider the history of formation and development of the last two parts of this system, namely, plague and malaria control stations that formed the basis of the system of epidemic disease control in the USSR. The network development of stations began immediately after the Civil War. During the war the incidence of both plague and malaria was relatively low when compared to typhus, which ravished both the army and the civil population. Between 1918 and 1922, 6.5 million cases of typhus and 3.2 million of typhoid fever were registered (12). While typhus was relatively easily controlled by observing general sanitary and hygienic norms, the problems of plague and malaria suppression were more intractable. They threatened post-war reconstruction and their incidence rose due to the resettlement of the population and large-scale industrial construction in areas with endemic foci, such as in the Eastern regions of the USSR (Central Asia, the Caucasus, Siberia).

### **Plague control**

Plague, anciently known in Russia, has always been considered as a great disaster in this country (13). The pandemic was originated on the Russian land, Caffa-Feodosia in Crimea in 1347. The last appearance of plague on the European ground took place in Moscow (the famous plague of 1771) with a mortality rate as high as 25 %. After the beginning of Russian colonisation of Central Asia in the 1860s, danger of permanent plague return from India and Afghanistan to the metropolis appeared (14). In 1897 "His Majesty Appointed Commission for Plague Fighting" was created to prevent plague propagation in the Russian Empire (15). It was the first state body with such a power in the history of epidemics, including in its staff ministers of justice, transport, finances, internal and military affairs. The Commission's activity combined both administrative measures and support of scientific research. Among the first measures of the Commission were the interdiction of pilgrimages to Mecca, under the pretext of plague epidemics in the East; organisation of quarantines in threatened places and publication

of information about plague propagation (16). The Commission supported the creation in 1898 of "Alexander I" laboratory producing vaccine and sera that was opened on an isolated island in the Finnish Gulf near Saint-Petersburg. Several expeditions were organised to study plague foci in India, Mongolia and the Trans-Baikal region.

The beginning of the Commission's activity coincided with the outset of the bacteriological epoch in medical research that was celebrated in Russia by the opening of Pasteur stations in several cities in 1886 (17). The first Pasteur station was opened in Odessa and later it played a significant role in liquidation of a plague outbreak of 1901-1902 under the guidance of Prof. Visokovich and Prof. Gamalea (18). This body became the archetype of permanent plague control stations whose necessity in threatened areas was obvious (19). In the same year some anti-plague stations were created in the south-east of the country. These stations were rather important not only in plague control, but also they performed outstanding work on studies of natural plague foci in different regions of the country. In 1913 Dr. Deminskii, at the cost of his own life, discovered plague relations with animal disease reservoirs in the Caspian area. Two years earlier, Prof. Zabolotny had demonstrated the role of wild ground squirrels in plague transmission in the Trans-Baikal region (20). In addition to these two plague foci, Prof. Tikhomirov found another one in the mountains of Kirgizia (21). All these studies taken together played a crucial role in the development of public health in plague control. It was established that internal natural plague foci provided the greatest threat in the Russian Empire while in European countries plague propagated mostly from ports.

Despite all these activities over 5,000 persons died in the plague between 1899 and 1913 (22). Failure of plague control measures stemmed from several reasons. First, Russian doctors were often faced with the opposition of local population to the western medicine methods such as serotherapy and vaccination. For instance, in 1914 during a plague outbreak in the settlement Kharanor (South Siberia) doctors were arrested. Inhabitants blamed physicians in for plague propagation, refused to accept vaccination, and threatened to kill them. The situation remained tense until the detachment arrived (23). Quarantine was usually ineffective (24). Also people resisted sanitation measures by hiding many cases of plague. Patients feared the isolation hospital that was perceived as merely a place to die. During a Manchzhurian plague epidemic many rich infected Chinese, living in Russian territory, paid people to go to hospital instead of them (25). Numerous requests that the "Alexander I" laboratory move from Saint-Petersburg to plague areas were made by physicians as often there were damaging delays in the delivery of sera and vaccines during epidemics. All that was ignored by public health authorities.

The Bolshevik authorities overcame these obstacles in a short time taking into consideration mistakes made by "His Majesty Appointed Commission". First of all, they significantly increased financial support. A decree "About Provision of Workers Participating in Plague Epidemics Fighting" helped to conquer sabotage of the Bolshevik government's activities by physicians. In 1918 the laboratory "Alexander I" was transferred to Saratov, in the Caspian plague area, and after some time became a coordination and training centre (26). The existing network of plague control stations had been destroyed during the Civil War; however, it was restored in 1922 and additional new

stations were created (27). In the 1920s several expeditions were organised under the supervision of Prof. Zabolotny to study plague foci in Central Asia and Kazakhstan. They found that plague was not transmitted into Central Asia from the neighbouring countries and epidemics arose from independent foci in those regions (28).

The characteristic feature of Soviet public health was extreme authoritarianism. Vivid description of authoritarian methods used in outbreak liquidation was provided by Lev Zilber. He headed the anti-plague expedition in Azerbaijan in 1930. Soon after arrival to the epidemic place expedition staff realized that it was impossible to arrest plague propagation by usual quarantine measures. The local Moslem population refused to accept vaccination and hid plague corpses. Following local sorcery traditions they dissected the corpses and handed their internal organs out to the relatives of dead person. In such a situation the expedition staff made a decision to burn the village and to treat all the district by chlorpikrin, a highly toxic pesticide (29). These measures were carried out by army and state security service forces. Chlorpikrin doses used in this plague-fighting campaign had been so high that there was no vegetation three years afterwards (30).

Permanent plague outbreaks occurred in the 1920s in Central Asia (31). However, these epidemics were beyond any control because of political and national instability in this region. The plague control service was organised in Central Asia only in 1935 after the Central government intervened to suppress local political unrest (32).

In 1931, the organisation of the plague control service was completed. Laboratories were reorganised to become the basis of plague control stations and each had branches in endemic areas. The personnel of each plague control station had to include an epidemiologist, a microbiologist, a zoologist and a parasitologist. Staffing was achieved by the obligatory assignment of university graduates; dodging such directives was punished by imprisonment (33). Border controls, internal surveillance and the prompt measures led to a sharp decrease in the incidence of plague in the 1930s (34).

During the Civil War period disease-fighting campaigns were a matter of state security, later it became an important part of Soviet propaganda of "achievements of Soviet life style". All information on plague outbreaks became classified in the 1930. Indeed, official figures show no cases of human plague in the USSR since 1937 (35). Unofficial sources indicate that there were isolated cases in the areas with intensive epizootic reservoirs, but confirm the absence of major epidemics (36). Soviet researchers pointed to the importance of underground circulation of *Yersinia pestis* bacilli among rodents, resulting into mild infectious entertaining the disease, with cyclic outbursts occasioning casual infections among humans in contact with the rodent. In the rodent sanctuaries, plague is transmitted by fleas (of a species different from those who transmit the disease between humans).

Once human plague came under control, the aim of the control stations shifted towards the liquidation of potential reservoirs of infections in nature. Rodent extermination was carried out in the north-western Caspian region in 1933-1937 over the territory of 310.000 sq.km (37). Such unique large-scale work was possible only after mass collectivisation that allowed the use of a lot of man-power free of charge. The extension of the network of plague control stations was prompted after the discovery

in the post-war period of new plague foci. Presently the plague control service on the territory of the ex-USSR includes 6 research institutes, 27 plague control stations and 52 branch stations. Besides direct involvement in plague control, these institutions were also responsible for research and made outstanding studies of the biology of plague bacillus, anti-plague sera and vaccines, and the unique study on rodent ecology and classification of their ectoparasites.

### **Malaria control**

The model of public health development in plague control was replicated also in the case of malaria-fighting campaigns. There was no malaria control service before 1917, despite high incidence of the disease and its human toll. There was no state support for malaria research and control measures (38). The situation was quite paradoxical because a wide program had been elaborated for malaria control before the 1917 Revolution.

Success of malaria control in the second half of the XIXth century was indistinguishable from colonial policy in the North Caucasus and Central Asia. Russian colonisation of the North Caucasus began soon after the natives (Cherkess) were evicted to Turkey. A lot of Russians migrated to the Caucasus from Central Russia, attracted by fertile lands. They ignored rules and agriculture traditions of the indigenous people. Russians settled in river valleys and created there irrigation systems whereas natives had always left for the high mountains during the malaria season. The first wave of Russian colonisation (1866-1880) failed mostly because of terrible malaria outbreaks (39). Most of the Russian settlers died and the rest returned to the motherland (40). In Central Asia malaria was the main cause of high mortality in the troops and among railway line workers (41).

Having summarised this situation the Commission on Malaria Research was appointed under the guidance of VIII Pirogov Congress of Russian physicians. The Commission organised several expeditions on malaria research supported by the zemstvo of Voronezh province and voluntary organisations (42). In 1911 the Commission proposed an eclectic plan of anti-malaria campaign for the whole country. This plan included: (i) quinine treatment by Koch's method; (ii) swamp draining by the Italian method; (iii) extermination of mosquito larvae by waterbasins treatment with oil and paraffin; (iv) anti-malaria measures in railway stations that included local soil bonification and employing the native people in the railway service; (v) education of the population and publication of popular literature on malaria in indigenous languages; (vi) registration of all malaria patients and ensuring of free medical care.

These suggestions were completely ignored by the authorities as was the idea to create an institute of tropical medicine, like those elsewhere in Western Europe. The single malaria station established in 1913 in Batum was closed six months later because of financial difficulties. Malaria was not considered by government as threatening as plague. Treatment of malaria, widespread mainly in colonies, was not provided for non-Russian population. Moreover several measures proposed by the Malaria Commission contradicted the policy of "Great-Russian chauvinism". The head of Caucasus railways

refused to employ natives in the railway service because of "impossibility to turn the indigenous into civilisation from their barbarity" (43).

The Soviet Malaria Control Service was initiated in 1921 following a decree of the People's Commissariat of Public Health that required the obligatory registration of malaria patients. The same year both the Institute of Malaria, Parasitology and Tropical Medicine headed by Prof. Martzinovsky (44) and ten similar institutes were subsequently created in each of the main endemic areas. In a couple of years the network of anti-malaria stations was created. The creation of a network of malaria control stations was started in 1923 and by 1940 these numbered 1236 (45). The Bolshevik public health authorities completely fulfilled the malaria control program of Pirogov Commission although they never mentioned it in their reports, carefully trimming the past.

The number of malaria cases started to decrease in the mid-1920s and policy shifted from crisis management to long-term control. Both therapy and prophylactic measures were deployed (46). The use of treatment was limited by quinine shortages; the drug was reserved for malaria patients and was only used as preventive for people engaged in economically important work. Matters changed somewhat in the 1930s when the production of the quinine analogues - plazmotzid and akrikhinin – was started. At the same time epidemiologists argued that anti-malaria campaigns should accompany different types of agricultural and industrial activities, especially irrigation.

Nevertheless a peak in the incidence of malaria came in 1935, when 9 million cases were reported. Such a sharp increase of malaria mortality was a direct consequence of Stalin's collectivisation policy. Collectivisation campaign was accomplished in a very short time without any consideration of its economic, social or demographic impact, or indeed epidemiological consequences. Terrible malaria outbreaks took places in the Volga region, the Northern Caucasus, and Central Asia, where conditions for swamping and mosquito propagation were accelerated by poorly designed irrigation systems (47). The increase in the infection propagation was exacerbated by famine and subsequent population migration, that resulted in the loss of forty million working days in 1934-1935 (48). The Eighth Congress of Soviets declared malaria an intolerable "industrial disaster" that jeopardised the plans of industrialisation and collectivisation. An accelerated development of the anti-malaria service was brought about. Since 1936 the funding of the anti-malaria campaign was increased fourfold and at the same time courses for the advanced training of physicians were held at the specialised institutes, such as Moscow Institute of Malaria, Parasitology and Tropical Medicine (49). The medical treatment of both fresh malaria cases and anti-relapse treatment of former patients was introduced (50). Soviet authorities were obliged to combat a fire which they had kindled. These efforts succeeded in significant decrease in malaria mortality by 1940, when the number of cases fell to three million.

The experience of the above-mentioned anti-malaria campaign was taken as a basis in the USSR for the World Health Organization (WHO) program of pestilence eradication adopted in the 1950s. The program was accomplished in unexpectedly short time, not only because innovations, such as DDT spraying and new drug (bigumal) were used. Alongside this, an enormous amount of tradition survey work was carried out on malaria foci, which allowed measures appropriate to different type of foci to be used (51).

Following this campaign and the consolidation of earlier gains, quartan malaria was declared eradicated in 1950, falciparum (or "tropical malaria") in 1957, and tertian malaria in 1960 (52).

Having completed their task, malaria control stations were converted into the parasitological departments of sanitary stations in 1957. Despite its various climatic conditions and widespread endemic malaria, the USSR was one of the first countries in the world to achieve the (WHO) goal of malaria eradication. This position was acknowledged by WHO's choice of Tashkent in Uzbekistan for its 1961 International Conference on tropical medicine. At that meeting, Dr. Bruce-Chwatt, the head of the WHO malaria control section, claimed that the Soviet achievement was due both to brilliant organisation of anti-malaria campaigns and the wide network of medical care centres (53). Since then malaria has remained under control.

In conclusion, it can be argued that the Communist system proved to be extremely efficient in controlling and eradicating infectious diseases, in areas of intense transmission. No doubt that this system was due to two factors: compulsory measures of prophylaxis and treatment, registration of cases and control of epizootics and eradication campaigns at the regional level, on the one hand; on the other hand, the development of research stations, located close to the foci of infection and integrated in a well-funded academic network, was also instrumental - Soviet parasitology accumulated an impressive number of data concerning the eco-epidemiology of rodents.

The success of the Communist regime illustrates the importance of the political component in Public Health and the dilemma between persuasion and constraint. Public Health benefits from the strong organization of a central power, determined to impose a program for the alleged benefit of collectivities. The dismantlement of the network station across the new borders in Central Asia is likely to be followed by a massive resurgence epidemics in some areas. Soviet parasitologists' works had contributed to show that virus circulation persists underground among other rodent populations, and that plague and other rodent-based epidemics will explode again as soon as human attention is diverted.

The efficiency in eradicating infectious diseases might be also explained by general economic development, and by the new post-war control technologies. However, more important was the political priority given by the Soviet government and the strong state apparatus to the suppression of the infectious diseases tightly related with Soviet state order expansion. This system allowed degrees of surveillance, intervention and control that Western public health could only dream about.



## REFERENCES AND NOTES

*Acknowledgments: I acknowledge with pleasure the help in manuscript preparation provided by Anne-Marie Moulin, Michaël Worboys and Jean-François Pays.*

- 1) About the epidemiological situation in Russia in XIXth and early XXth century see Vasiliev K.G., Segal A.E. *History of Epidemics in Russia*. (1960), Moscow, Medgiz. (in Russian), Skorokhodov L.Ya. *Materials on the History of Medical Microbiology in Pre-Revolution Russia* (1948), Moscow, Medgiz. (in Russian).
- 2) About financial sources of epidemic-fighting campaigns before the revolution see Favr V.V., *The Experience of Malaria Research in Russia* (1903), Kharkov (in Russian), *Materials of Malaria Commission under the Pirogov Society of Russian Physicians* (1911), Moscow, (in Russian), Bertenson I., *Essay about Fighting Diphtheria in Russia*, *Vestnik Evropi* (1882), p. 832-844 (in Russian).
- 3) Konstansov S.V., *On Tasks and Role of Bacteriological Plague Control Station in Chita*. *Vestnik Obzhchestvennoy Gigieni, Sudebnoy I Prackicheskoy Meditzini* (1912). N. 12, p. 1892 (in Russian), Metelkin A.I., "Plague Control Service in Russia before the October Revolution." *Zhurnal Mikrobiologii, Epidemiologii I Immunobiologii*. (1959), v. 5, p. 119-121 (in Russian).
- 4) Osipov E.A., Popov I.V., Kurkin I.I. *Russian Medicine of Zemstvo*. (1899), Moscow, (in Russian). Skorokhodov L.Ya., *Short Review of History of Russian Medicine*, (1926), Moscow, (in Russian).
- 5) Likhachev V., *The Report for His Majesty and Sanitary Description of Volga Region*, (1898), Saint-Petersburg, (in Russian). Malkovsky P.I., "Existing State Order and Next Sanitary Task in Irkutsk", *Sibirskii Vrach*, (1914). N. 13, p. 711-712 (in Russian).
- 6) Semashko N.A., *Public Health Service in New Conditions* (1922), Medgiz. Moscow.
- 7) Semashko N.A., *Essays on the Theory of Organisation Of Soviet Public Health System* (1942). AMN SSSR. Moscow.
- 8) Referring to epidemics of typhus Lenin stressed the importance of disease-fighting campaigns in his speech in the VII Congress of Soviets (1919): "Either louses win socialism or socialism wins louses." *Complete works of Lenin V.I.* (1959), v. 39, p. 410.
- 9) For description of Party apparatus and troops participation in the liquidation of epidemics see: Kaminskii G.N., *Public Health in the USSR*, (1935), Biomedgiz, Moscow, (in Russian) and Zilber L.A., *Strategy of Scientific Research, Priroda*, (1966), v. 12, p. 55-62, (in Russian).
- 10) Tsarist public health authorities made three attempts to introduce compulsory smallpox vaccination during XIXth and early XXth century, but these endeavours had no success. For history of smallpox vaccination in Russia see: Gamalea N.F., *Smallpox Vaccination Institute. Works of Gamalea N.F.*, (1953), v. 5, p. 223-230 (in Russian). Soloviev M.N., "150 Years of Smallpox Vaccination and its Results." *Vrachebnoe delo*, (1947). N. 6, p. 513-518 (in Russian).
- 11) Boytzova A.A., "On the History of Sanitary Stations." *Gigiena y Sanitaria*, (1955), v. 10, p. 32-36 (in Russian).
- 12) Zhdanov V.M., *Fighting the infections* (1960), Znanie. Moscow (in Russian).
- 13) Vasiliev K.G., Segal A.E. *History of Epidemics in Russia*, (1960), Moscow, Medgiz (in Russian). Derbek F.A., *History of Plague Epidemics in Russia from the State Foundation up to our Day* (1905), St. Petersburg (in Russian). Alexander J.T., *Bubonic Plague in Early Modern Russia*, (1980), Hopkins Univ. Press, Baltimore and London.
- 14) Likhachev V., *The Report for His Majesty and Sanitary Description of Volga Region* (1898), Saint-Petersburg (in Russian), *Materials and Protocols of Meetings of "His Majesty Appointed Commission for Plague Fighting"*, 1900, 22 January.
- 15) *Materials and protocols of Meetings of "His Majesty Appointed Commission for Plague Fighting"*, 1897, 28 January.

- 16) *Materials and protocols of Meetings of "His Majesty Appointed Commission for Plague Fighting"*, 1898, 24 and 28 January. The interdiction of pilgrimages was cancelled in 1900. *Materials and protocols of Meetings of "His Majesty Appointed Commission for Fighting Plague"*, 1900, 12 January.
- 17) Levtova K.Z. "First Pasteur Stations in Russia." *Feldsher I Akusherka*. (1960), n. 3, p. 33-36 (in Russian).
- 18) *Materials and Protocols of Meetings of "His Majesty Appointed Commission for Plague Fighting"*, 1902, 19 June, 16 July, Belikovskii V.A., Gamalea N.F., Burda M.K., *Plague in Odessa*. V.1, 1903, v. 2., 1904 (in Russian).
- 19) Pasteur station in Chita, besides rabies treatment, also carried out plague research.
- 20) Zabolotny D.K. Communication about Plague Epidemiology on the Meeting of Astrakhan Physician's Society (27 December). *Izdatelstvo Obzchestva Astrkhanskikh Vrachey* (1912). Astrakhan. P. 74-77 (in Russian).
- 21) Tikhomirov I.I., "Epidemiological Relation between Winter Plague Epidemics in Kirgizia Steeps and Mice Epizootic." According to Data of Epidemiological Research Made in 1913. *Arkhiv Biologicheskikh Nauk*. (1926). V. 26. N. 1-3, p. 95-102.
- 22) Nikolaev N.M., "Plague Control in the South-East of Russia in 1918-1923." In *Works of the Plague Control Service Network*. Saratov, (1965). P. 32-48 (in Russian). Golubinsky E.P., Zhovty I.F. and Lemesheva L.B., *Plague in Siberia*, (1987), Irkutsk (in Russian).
- 23) Legkov K.I., "Fruits of People's Darkness". *Meditsinskiy Zhurnal Zabaikalskogo Obzchestva Vrachey*. (1922). N. 1, p. 84-90, (in Russian). Suknev V.V., *Plague in Trans-Baikal Region*, (1923), Chita (in Russian).
- 24) *Rules of Realisation of Measures to Prevent Plague and Cholera Propagation in Russian Empire* (1904), Moscow (in Russian).
- 25) Bogutzkii V.M., *Medical Report about Anti-plague*, Bureau Activity. Kharbin (1911) (in Russian).
- 26) Anisimov P.I., Gorkova A.V. and Kuraev I.I., "The 60th Anniversary of the "Microbe" Institute". *Problemy Osobo Opasnykh Infektziy*, (1978), v. 6, p. 45-60 (in Russian).
- 27) Nikolaev N.I. and Nikolaev N.M., "Avant-garde of the Soviet Public Health Service in Combating Plague." *Problemy Osobo Opasnykh Infektziy* (1968), v. 4, p. 3-15.
- 28) Zabolotny D.K., Organisation and Results of Study of Endemic Plague Foci. *Arkhiv Biologicheskikh Nauk*, (1922), v. 21, p. 21-45.
- 29) Carrying out of these measures did not foresee resettling of people and any reimbursement of owners for property.
- 30) Zilber L.A., *Strategy of Scientific Research*. Priroda. (1969), v. 12, p. 55-62 (in Russian). Zilber L.A., *Operatziya Ruda*. Nauka I Zhizn. (1966). N. 12, p. 55-60.
- 31) Grekov A.D. "Short Information about Plague-Control Centre in Tashkent." *Proceedings of the First Anti-Plague Meeting*. Saratov. 31 May-3 June 1927, p. 41 (in Russian).
- 32) Tikhomirova V.A. "The achievements of the Turkmenian Plague Control Station over 20 Years." In the *Proceeding of the Turkmenian Plague Control Station*. (1958), p. 45-49 (in Russian). Gold E.Yu., Ladny I.D., Prof. Nikanorov, *An Outstanding Soviet Epidemiologist*. Sovetskoe Zdravookranenie, (1976), v. 12, p. 66-69 (in Russian).
- 33) *Official Annals of the People's Commissariat of Public Health* (1940), v. 2, p. 10.
- 34) Nikolaev N.M. "Plague Control in the South-East of Russia in 1918-1923." In *Works of the Plague Control Service Network*, Saratov, (1965), p. 32-48, (in Russian); Skorodumov A.M., *Plague in Siberia* (1934), Irkutsk.
- 35) Pavlovskii E.N., *Natural Nidality of Transmissible Disease*. (1964), Nauka, Moscow.
- 36) Isolated plague cases are reported in plague foci even in the countries with good control service. See, for example, Reed W.P., "Bubonic Plague in the Southern United States. A Review of Recent Experience." *Medicine*. 1970, v. 29, p. 480.
- 37) Shishkin A.K., "Activity of the Rostov-on-Don Research Institute". In the *Works of the Rostov-on-Don Plague Control Institute*, (1957), p. 3-16 (in Russian). Mironov N.P., "On Frequency of Ground Squirrel

- Extermination with the Aim of Liquidation of Plague Foci." In the *Works of the Rostov-on-Don Plague Control Institute*, (1957), p. 17-50 (in Russian).
- 38) Numerous scientists' applications concerning the malaria problem were completely ignored by the public health authorities. The decision not to apply for the state support any more was accepted by IX Pirogov Congress of Russian physicians. *Proceedings of IX Pirogov Congress* (1904), v. 1, p. 217.
- 39) Impressive description of malaria outbursts among Russian settlers in the Caucasus one can find in Shingarev I., *Dying Village* (1901), St. Petersburg (in Russian).
- 40) Rozov. "History of Colonisation of South Black Sea Coast." *Trudy Kavkazskogo Selskokhoziaystvennogo Obzhchesva*, 1890, n. 1, 2 (in Russian), Startzev. "Mugan Steep." *Newsletter "Kavkaz"* (1892), n. 55 (in Russian).
- 41) Kushelevskiy V., *Materials on Medical Geography and Statistical Description of Fergana Region*. Noviy Magelan (1890-1891), v. 3 (in Russian). Volkov, "Malaria Epidemics of 1896 among Merv Region Population and Forces of Merv's Garrison." *Voенно-Meditzinskiy Zhurnal*, (1897), v. 8 (in Russian).
- 42) Materials of Malaria Commission under the Pirogov Society of Russian Physicians (1911), Moscow (in Russian).
- 43) Cited from Favr V.V. *The Experience of Malaria Research in Russia*, (1903), Kharkov, p. 168.
- 44) Bychkov I.Ya., "Malaria Control Legislation in the RSFSR", *Tropicheskaya Meditsina i Veterinaria*, (1931). V. 19, p. 24-27 (in Russian). Lipkin G.N., "On Some Results of Malaria Control and the Aims for 1936". *Voенno-Sanitarnoe Delo*. (1936). V.41, p. 3-11 (in Russian).
- 45) Plotnikov N.N., "Achievements of the USSR in Fighting Infectious Diseases." *Sovetskaya Meditsina*. (1967). V. 111, p. 155-158 (in Russian).
- 46) Materials of Adler Malaria Expedition of Caucasus of Regional Committee of Public Health. Malaria on Black Sea Coast of North Caucasus. (1926). Rostov-on-Don (in Russian).
- 47) Isaev L.M., "Aims and Organisation Structure of Malaria Control During Cotton Harvesting", *Bulleten po Borbe s Malariaey* (1934). v. 31, p. 25-30 (in Russian). Chinnoy N.I., "On Mechanisation of Land-based Treatment of Water Basins Infected with Anopheles Larvae", *Bulleten po Borbe s Malariaey* (1934), v. 3, p. 31-35 (in Russian). Kaminskii G.N., "Public Health in the USSR" (1935), *Biomedgiz*, Moscow (in Russian).
- 48) Prokopenko L.I. *Fighting Malaria in the USSR*. A Dr. Med. Sci. Thesis. (1962). Moscow.
- 49) Nemirovskaya A.I., Rashina M.G., Kamalov N.G., Lisenko A.Ya., Shulman E.S., "Higher Education in Parasitology in the USSR." *Meditsinskaya Parasitologia i Parazitarnie Bolezni* (1967), v. 51, p. 553-569 (in Russian).
- 50) *Official Annals of the People's Commissariat of Public Health* (1940), v. 3, p. 19.
- 51) Dukhanina N.N., "Peculiarities of Malaria Eradication Campaign in the USSR and Foreign Countries." *Voprosy Bakteriologii, giguieni parazitologii y virusologii*, (1962), p. 117-118, (in Russian). Sergiev P.T., Rashina M.G., Dukhanina N.N., "Eradication of Malaria in the USSR: History and Analysis". *Vestnik AMN* (1961), v. 41, p. 19-29 (in Russian).
- 52) But we know now that the clinical distinction between three day and four day fever does not allow to diagnose the different types of *Plasmodium* infection: respectively *Plasmodium falciparum*, *Plasmodium vivax* and *Plasmodium malariae*. A 3 day fever can be caused by any of the three species...
- 53) Bruce-Chwatt R., "The Role of WHO in Malaria Eradication". *Meditsinskaya Parasitologia i Parazitarnye Zabolevania* (1962), v. 11, p. 14-42 (in Russian).

**LES SCIENCES HORS D'OCCIDENT  
AU XX<sup>E</sup> SIÈCLE**

**SÉRIE SOUS LA DIRECTION  
DE ROLAND WAAST**



**VOLUME 4**

# **MÉDECINES ET SANTÉ**

**ANNE-MARIE MOULIN**  
ÉDITEUR SCIENTIFIQUE

**CRISTOM**  
éditions

**LES SCIENCES HORS D'OCCIDENT  
AU XX<sup>e</sup> SIÈCLE**

20<sup>TH</sup> CENTURY SCIENCES:  
BEYOND THE METROPOLIS

**SÉRIE SOUS LA DIRECTION  
DE ROLAND WAAST**

**VOLUME 4**

**MÉDECINES ET SANTÉ**  
MEDICAL PRACTICES AND HEALTH

**ANNE-MARIE MOULIN**  
ÉDITEUR SCIENTIFIQUE

---

**ORSTOM Éditions**

L'INSTITUT FRANÇAIS DE RECHERCHE SCIENTIFIQUE POUR LE DÉVELOPPEMENT EN COOPÉRATION  
PARIS 1996