A MEDICAL REVIEW OF SOVIET RUSSIA.*

V.—THE MEDICAL PROFESSION, SOVIET SCIENCE, AND SOVIET SANITATION.

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PART II.

SOVIET GOVERNMENT AND SCIENCE.

Not being a student of politics, I have sought to omit reference to political questions, but as everything in Russia it under the strictest political control, it is not possible to do this entirely. Previously¹ I stated that the Soviets had done what they could, with their limited means, to foster the growth of science in Russia when this did not conflict with their political principles. This was my opinion from personal observations in Russia in 1922-23, and this remains my opinion in 1927, after two more years in the country. The political revolution has fallen, however, with crushing weight on many of the foremost doctors, and there are some who think that the Soviet régime *per se* has had a deleterious effect on science, in addition to the former economical chaos. A Russian scientist of international reputation (exiled in 1922) wrote me:

"My feeling is that the Soviet authorities have done what they could with their unlimited means of destruction to kill science and inhibit its growth because free and independent thinking is in direct conflict with the Soviet political principles."

An equally pessimistic view was expressed by a younger scientist of Leningrad in 1926, who, while admitting the Soviet efforts to benefit science, said that the psychological conditions were not conducive to scientific work—that the scientists themselves had been thrown into too prominent a social light, and that they were too dependent upon politics, the will of students, etc., and too uncertain as to the future. A world-famous physiologist complained in 1924 that the breadth of view necessary to scientific production was seriously threatened by the insistent emphasis upon allegiance to Marxian dogma in the present state of politics.

The life of the scientist has been harassed in general in the same way as that of other *intelligentsia* except for those whose eminence has brought them special privileges. I refrain from detailed discussion of this, just as I would from a discussion of the internal politics of any other foreign country. Many scientists seem to enjoy a special immunity, however, from political interference, and to have more freedom of speech and other privileges than any other class, including even the high politicians.

Numbers of the older physicians are unable to adjust themselves to the present political and social changes and would like to go abroad (chiefly to America).[†] State patronage is not new to the Russian physician, but many have been exiled or imprisoned by one régime or another. One doctor told me that he objected to living in Soviet Russia because he did not like the present uncultured students and people with whom he had to associate, although he was getting sufficient money to carry on his scientific work. Another reason for discontent is the inability to travel, not only on account of the lack of money, but because it is a tedious undertaking to obtain permission to leave Russia, and even more difficult for a Russian to get a visa for entering other countries. It is also economically next to impossible, as since April, 1926, a Russian must pay 220 to 440 R. (£22 to £44, depending upon his category) to the Soviet Government for permission to travel outside of Russia.

Among the younger physicians, however, there is much

less dissatisfaction. This is to be expected from the change in the social status of the students. It is chiefly youths from those classes which have reason to be interested in the Soviet Government (workmen, peasants, and Communists) who have the opportunity to receive a medical education—or, in other words, the class from which opposition might come, the "bourgeoisie," were largely excluded from the universities two years ago.* The present system of education seems to ensure, for the immediate future at least, that all university graduates shall be in agreement with the existing form of government. The future professors and doctors must come from the classes who now have the opportunity for education—the so-called "Red" professors. Although some of the old professors fear expulsion from their chairs when a sufficient number of supporters of the new régime have been prepared to take their places, it does not seem likely from the past policy of the Soviet Government that they will expel an efficient professor for other reason than counter-revolutionary political activity. Even during the disorder of the revolution only a few were expelled.

A serious grievance is the difficulty of giving the children a technical or university education. In the Moscow universities in 1925 I was told there were 100 vacancies for the "bourgeoisie," and in Leningrad in the technical schools 80. Other sources of education are precluded by the absence of any but Government-owned universities.[†]

The circumstances following on the war and revolution have caused not a few to feel, as an author of a scientific treatise wrote, that "this is more the record of a broken and shattered life than of a profitable completion of physiological work." There are others, however, outside the Communist party, who look forward with more optimism to the future, and say that they have no political grievances, and that the Government is doing all it can to help them in their work. Typical of this group, an eminent non-partisan pathologist told me:

"The conditions in Soviet Russia are much better than they were in Tsarist Russia for scientific work. As Soviet finances increase more money is being given. The Narkompros (Minister of Education) is active in making scientific work more intensive and practical, as the Communists say that socialism can exist only with science. I think that scientists will be able to work entirely independently of politics, and will not be hampered in any way by political considerations. I know of many monarchistic professors who are now receiving large amounts of money to carry on their scientific work. As we have never had democracy in Russia, I cannot say what effect it would have upon science, but I think science will prosper more under the Soviet régime than under the Tsarist Government. My chief difficulty is learning to deal with the new type of student."

The director of one of the famous research institutes in Russia, also not a Communist, told me that the Soviet policy towards science in his institute had been constructive rather than destructive, and especially so during the past two years. Science is accorded a large place in the proletarian press, and scientific books are given an increasingly wide circulation in order to bring science to the door of the peasant and workman. More genuine respect is accorded scientists by the Government than to the members of any other profession I know of. The Soviet regard for science was shown by the celebration of the two hundredth anniversary of the Academy of Sciences in Leningrad (September 5th to 10th, 1925). The event was given full, first-page accounts in the Government newspapers. The delegates from all over the world were guests of the Government, and received more cordial and hospitable treatment than even political visitors to Russia. Among other privileges they were given free use of the railroads and hotels all over Soviet Russia.

Some excellent laboratories and new lines of research have been started by the Soviet Government. There are probably more scientific workers now than formerly, though

* Previous papers on medical and scientific work in Soviet Russia by Dr. Horsley Gantt were published in the BRITISH MEDICAL JOURNAL in 1924: I, A Review of Medical Education in Soviet Russia, vol. i, p. 1065; II, Hospitals and Health Conditions, vol. ii, p. 336; III, Scientific Work, vol. ii, p. 533. The first part of section IV, on "Change in type and incidence of disease," was published on August 14th, 1926, p. 303; Part II of this section was commenced on October 23rd (p. 747) and concluded on October 30th (p. 802). Part I of Section V was published on January 29th, 1927 (p. 198).

† I found this dissatisfaction also among many German physicians in 1923.

* See Lunacharsky, *The New University*, Moscow, 1924. Although many "bourgeois" students were expelled in 1924, most of these are being gradually readmitted; during the past year official opinion has become more liberal, and more emphasis is being placed on merit.

† A majority of the university students receive free tuition and a stipend that is sufficient to live on. Students are divided into categories (Communists, workmen and peasants, or their sons, bourgeoisie, etc.), and the amount they receive depends on this categorical classification; 10 to 20 per cent. of the medical students (40 per cent. of other students) are Communists. Those from the former "bourgeois" classes instead of receiving a stipend must pay for tuition, unless they interest themselves in party politics. The percentage of workmen and peasants has risen from about 10 per cent. before the war to 93 per cent. in 1922.

they may not be so well prepared, and scientific work is being done in many new places. Among the best which the Soviet régime has initiated are the physiological laboratories for testing the effects of mineral waters and food at the various sanatoriums and health resorts, the Roentgenological Institute in Leningrad, and the Biochemical Institute of Bach in Moscow. They are models of their sort, and would be a credit to any country.* The most necessary equipment was bought (from Germany) in 1924, the first for ten years. Funds are being gradually increased, although in many places they are hardly back to the pre-war level. For example, the University of Moscow received 20,000 roubles in 1923, 200,000 in 1924, and 6,000,000 roubles will be given soon to carry out the first extensive repairs since the revolution.

The Soviet Government has not assumed a uniform attitude towards all laboratories, but has concentrated its efforts on the best. Some have received little or nothing for the past ten years; for instance, the Pathological Department of the First University of Moscow (the largest one there) has had almost nothing for eight years, and now receives only 160 roubles a month. However, these examples are rare, and will soon be things of the past. This laboratory has now been voted a large amount for the next five years. On the whole, work is progressing in spite of material difficulties. In one new institute in Moscow, for example, which I visited in November, 1926, I found the laboratory installed in a former stable; and the operating cloths covering the dog, and the caps and gowns which the doctors wore, were made of costly linen from one of the Tsar's palaces, having embossed on it the now forbidden and obsolete double eagle of imperial days. This conscription of stable and palace for the sake of the laboratory is typical, it seems to me, of the present scientific spirit in Russia.

In spite of the Soviet good intentions and efforts blunders have been made, which might be expected from a Government composed largely of workmen and peasants led by men who have inherited prejudices fostered by an oppressive Tsarism. For example, one might question some of the attempts to blend the political with the scientific, such as the following proposition of the State Scientific Council (Gosudarstvennyi Ootchenii Soviet) to the universities: that they shall submit applications for intended research eighteen months in advance to the committee, which will then decide whether the work is of value to the proletariat, and distribute problems among the laboratories to prevent parallel work. However, this ruling has never been put into effect.

The scientists themselves are left entirely to work out their scientific problems as they desire, as they did formerly. So far as I have been able to ascertain from two years' laboratory work in Soviet Russia, distribution of Soviet funds to laboratories and appointments to scientific positions are made according to merit rather than to politics. I have seen during the past year that some of the scientific laboratories whose heads are directly opposed to Soviet politics have received the greatest amount of money and equipment.

Politics does not often interfere with a doctor's having the position to which his abilities entitle him, except for administrative places, which are frequently given to party members. The heads of public health departments are usually Communists, and generally, judging from my experience, efficient organizers. In most of the scientific institutes there is a political commissar with certain administrative powers.

Present Conditions of Research Work.

From 1918 through 1922, as a result of the general state of the country, research work was done under appalling conditions and science kept alive at the cost of enormous energy and heroic sacrifices of the individual workers. During 1924 and 1925 the living conditions of the scientists, though still precarious, greatly improved, and the Soviet Government rendered considerable financial aid to science. Some laboratories have returned to normal, many new ones have been formed, and there are a few new institutes which

surpass anything of their kind heretofore produced in Russia.

The spirit of research is prevalent, and is being fostered. Science will suffer during the next decade or so chiefly from the emigration of former scientists, the lack of preparation in the pupils of the war and revolution periods, the lack of adaptation between the professor and the present type of student, and from other inevitable adjustments to the new social conditions. The bringing of science under central control and Soviet patronage, though it may give a slight political colouring, is putting it on a much more stable financial basis than it was in old Russia.* The present position of science is, in my opinion, one of the most hopeful signs in Soviet Russia.

It is encouraging to hear the following ideals of the Soviet Government. It shows not only their interest in science, but their opinion of its relation to Soviet politics. As the future of science in Russia depends largely upon the Soviet attitude, I quote rather fully from the greeting sent to the Academy of Sciences on the day of its jubilee, September 5th, 1925—an event which was eagerly celebrated by the Soviet Government. It is signed by L. Kamenef and the president of the Central Executive Committee, Soviet Russia, M. Kalinine, and runs as follows:

"The October revolution has removed the social relations which had impressed their character upon scientific work and hindered its development. The social order founded on private ownership, exploitation, and national oppression provokes military collisions and retards the subduing of the forces of Nature by man. . . . The radical reorganization of social relations . . . cannot be solved without a development of science in all its branches. The Socialist Society is creating for scientific thought conditions of true liberty. . . . Lenin's estimation of the services of science is the basis of the policy of the Soviet State.

"During the first hard years which followed the revolution, the Soviet power, forced to defend its existence . . . could not lend assistance . . . to the scientific work. Nor could it ensure to the scientific worker such conditions of life as are necessary for the productiveness of his work. . . . Science is international. . . . Only by the joint efforts of the scientists of all nations, and only by a constant and unremitting international intercourse between all scientists, can the development of science be promoted. The Government of the Union is ready to support all endeavours bending toward an active and wide international co-operation of all scientific workers."†

One can judge of the sincerity of these statements by the increased efforts recently made, and also by comparison with the official treatment of religion and the Church. This organization, which is considered a menace by the Soviet Government, has been as openly denounced as science has been advocated.

Scientific Work for Foreigners.

I shall add a few words from my personal experience concerning the opportunities for foreigners to do scientific work in Russia. During 1925-26 I have found the conditions quite favourable for research work; they have steadily improved. Clinically Russia has always been behind, and there is little inducement to do hospital work, except perhaps in a few special subjects. The greatest facilities are for physiological and to a less extent pathological work. Many admirable schemes have arisen in public health work and social hygiene under Dr. Semashko, which are well worth studying. The therapeutical effects of climate, mineral waters, baths, etc., are being carefully worked out in many parts of Russia.‡

The professors and instructors are cordial and hospitable to foreigners, and are eager to explain their work, and to be helpful. This Russian trait lessens the time necessary to become acquainted with the work of the laboratories. The Russians themselves very modestly attribute it to their habit of garrulousness. The extreme difficulty of the

* For example, formerly the laboratory of Professor Pavlov at the Institute of Experimental Medicine supported itself partly by selling the gastric juice of the experimental dogs; now, in spite of the economic crisis in Russia, it receives the full amount that it needs.

† The fact that Lenin endorsed science has had a great influence, especially as Leninism has assumed somewhat the character of a State religion in Russia. In nearly every Government building (which includes most important buildings) is a room called "Lenin's Corner" (*Ougolok Lenina*) containing all the writings of Lenin and his picture surrounded by his aphorisms. One of these says: "Without science there is no communism" (*Bez nauki nyet kommunizma*). I have seen this several times in laboratories and public buildings. The rooms are decorated in red and black, and there is an atmosphere of reverence which is strongly suggestive of the former chapels. It was due to Lenin's influence that Professor Pavlov was retained in Russia after the revolution.

‡ Details of some of the research work will be given in another article.

* The new Brain Institute, opened in 1926 under Dr. Fursikov, for which 200,000 roubles have been given in Moscow, appears promising.

Russian language is obviated to some extent by the fact that nearly all educated Russians speak fluently either French, German, or English.

Although there are some irregularities in the curriculum compared with other countries, the informality and spirit of helpfulness make work pleasant. German methods and ideals as well as instruments have been most conspicuous, but the English language is being more and more studied in preference to German and French, and English and American literature has rapidly gained favour since the war, and now vies with German for first place.

After the stage of reciprocal suspicion is past, the Soviet officials seem kindly disposed towards a foreigner doing scientific work. He is admitted everywhere, and allowed to see almost everything. During the whole of 1925-26 I was never hampered nor had any special restrictions placed upon me. I found the officials usually willing to help. Foreigners working in the laboratories are not only treated with official respect, but they are exempted from certain taxes and given especial privileges.

There is one unfortunate obstacle in the way of foreigners entering Russia for research work, and that is the length of time necessary to obtain a visa. This seems to be greater for English and Americans than for other nationalities.* This is explained by the fact that political relations between the Government of Soviet Russia and those of other nations have been permeated on both sides by suspicion and ill feeling, sometimes almost equal to a state of war. As the president of the Society for Cultural Relations (Mme Kameneva, the sister of Trotsky) expressed it to me, the Soviet Government must judge each case on its merits, and assure itself that those who are admitted are at least not unfriendly and will not give false or exaggerated reports of Russian conditions. I hear, however, from Dr. Semashko's office (through Dr. Scheffel) that no one desiring to do scientific medical work in Soviet Russia has ever been refused a visa.

REFERENCE.

¹ See BRITISH MEDICAL JOURNAL, September 20th, 1924, p. 533.

ATMOSPHERIC CONDITIONS IN COAL MINES.

ALIKE in its hygienic aspect as relating to the comfort and well-being of workers, and on its economic side as bearing on the question of efficiency, Report No. 39,¹ by Dr. Vernon and Mr. Bedford, to the Industrial Fatigue Research Board, is an important contribution to the study of industrial environment. The research it describes was directed to the investigation of the influence of atmospheric conditions on the working capacity and accident rate of coal-miners. Since the usual method of testing working capacity by a simple measurement of output cannot be applied to men hewing coal under widely varying conditions of ease or difficulty, it was decided to adopt two tests, a rest-pause test and a tub-filling test, as best calculated to discount these disturbing factors. The rest pauses referred to are the short voluntary rests from work which men engaged in heavy industries take every few minutes. Their duration and frequency afford a measure of the fatigue experienced. Involuntary rests, due mainly to waiting for tubs, were also taken into account. The tub-filling test is self-explanatory, but it may be observed that the tubs or trams have a mean capacity of 10 cwt., and that they are filled by both hewers and trammers, of whom the latter do haulage also.

The cooling power of the air was measured with kata-thermometers at 5½ ft. to 6 ft. above floor level. The dry and wet bulb temperatures were taken with Edney sling hygrometers, whirled at about 280 revolutions per minute. The number of men watched for an average period of 96 minutes each, at mean wet kata cooling powers ranging from 18.6 to 6.4, was 138. Their voluntary and involuntary rests were separately noted and their tub-filling times recorded. The resulting data are the actual working time per hour in minutes, the tub-filling time in minutes, and, dividing the former figure by the latter, the working

capacity or rate of production, as exhibited in the following tables.

TABLE I.—Working Capacity Based on Voluntary and Involuntary Rests.

Mean wet kata cooling power.	Working time per hour in minutes.	Tub-filling time in minutes.	Rate of production.
18.6	52.7	8.0	$52.7 \div 8.0 = 6.59 = 100$
14.6	53.3	8.6	$53.3 \div 8.6 = 6.20 = 94$
12.9	51.0	8.5	$51.0 \div 8.5 = 6.00 = 91$
10.8	50.0	9.2	$50.0 \div 9.2 = 5.43 = 82$
9.0	48.9	9.1	$48.9 \div 9.1 = 5.37 = 81$
6.4	37.6	9.6	$37.6 \div 9.6 = 3.92 = 59$

TABLE II.—Working Capacity Based on Voluntary Rests Only.

Mean wet kata cooling power.	Rests in minutes per hour.	Tub-filling time in minutes.	Rate of production.
18.6	4.6	8.0	$55.4 \div 8.0 = 6.93 = 100$
14.6	5.1	8.6	$54.9 \div 8.6 = 6.38 = 92$
12.9	5.7	8.5	$54.3 \div 8.5 = 6.39 = 92$
10.8	5.5	9.2	$54.5 \div 9.2 = 5.92 = 85$
9.0	7.8	9.1	$52.2 \div 9.1 = 5.74 = 83$
6.4	10.6	9.6	$49.4 \div 9.6 = 5.15 = 74$

Table I, which includes both voluntary and involuntary rests, shows that at 18.6, with the highest cooling effect, the men worked 52.7 minutes to the hour, while at 6.4, the lowest, they worked only 37.6 minutes. Similarly, under the coolest conditions tub-filling took 8 minutes, under the warmest 9.6. The rate of production under the warmest conditions was 41 per cent. less than under the coolest. Table II, which deals with voluntary rests only, works out in the same sense as Table I, though the effect of adverse atmospheric conditions is not quite so marked.

The separate influence of air movement, which is a factor in cooling power as read from the kata-thermometer, was tested by selecting two groups of men, working at the same wet kata reading, but at mean air velocities of 15 and 51 feet a minute respectively. The low-velocity group showed rest pauses of 9.6 minutes an hour and a tub-filling time of 9 minutes. For the high-velocity group the corresponding figures were 7.8 and 8.6. The wet kata reading therefore in such cases does not tell the whole tale. It underestimates the importance of air velocity. It is, however, far more accurate than any other available index, such as the "effective temperature" recently determined in the laboratory of the American Society of Heating and Ventilating Engineers, Pittsburg, which includes a dry bulb temperature factor. For subjects of experiment at Pittsburg, doing light work and sweating little unless at high temperatures, the "effective temperature" index was significant; but the colliers of the report, doing heavy work and almost invariably streaming with perspiration, reacted to wet bulb temperatures only.

It was found that better facilities for air movement were afforded on the long-wall system of mining, in which the whole of the coal is hewn at once over a broad face, than on the pillar-and-stall system, in which headings are driven into the coal and supporting pillars left for subsequent removal. An important item is the distance of the brattice, or partition fixed between the intake and return airways, from the working face. The nearer the brattice to the face the greater the air velocity at the face and the lower the wet bulb temperature. Too great proximity, however, producing a continuous draught on the bare backs of the colliers, may cause rheumatism.

The results obtained were examined also in their relation to accident rates in coal mines and the general health of miners. The view is expressed that on the data available adverse atmospheric conditions increase the accident rate and impair general health, but that further research is required to confirm these findings, which, are, in the meantime, more or less provisional.

* In my case it was necessary to wait four months for the visa after having the recommendations of Professor Pavlov and both American and English medical authorities. For every other country of Europe, excepting three to which I did not apply, I received the visa the same hour that I asked for it.

¹ H.M. Stationery Office. Price 1s. 3d.