Programs for Medicine and National Health in the USSR

Stuart Mudd, *President of the American-Soviet Medical Society* and
Professor of Bacteriology, Medical School, University of Pennsylvania

OPPORTUNITY FOR OBSERVATIONS IN 20 medical institutions and for acquaintance with some 200 professional persons was afforded Robert L. Leslie, Mrs. Mudd, and myself in the course of a visit to the Soviet Union between the middle of August and the middle of September 1946. Arrangements for the trip were initiated by Dr. Leslie in behalf of the American-Soviet Medical Society and the *American Review of Soviet Medicine*. Our official hosts were Vladimir Kemenov, president, and A. Karaganov, vice-president, of VOKS, the Society for Cultural Relations With Foreign Countries, and their courteous staffs. Medical facilities were made open to us, particularly through V. V. Parin, secretary-general of the Academy of Medical Sciences of the USSR and vice-president in charge of the Medical Section of VOKS, and N. N. Priorov, vice-minister of Public Health of the USSR.

The warmth, friendliness, and openness of our professional colleagues in discussing matters of common interest were intensely gratifying. We found the Soviet scientists, who were eager to have us see, understand, and appreciate their work, far better acquainted with the technical literature of western Europe and America than our scientists are with Soviet material. The standard journals were seen in Soviet institutional libraries and were obviously read with understanding.

The attitude of our Soviet colleagues was not a result of lack of realization that the political atmosphere was surcharged with tensions: our lay press is also available in Soviet libraries, and their press is outspoken with respect to political issues. Their attitude is determined, we believe, by tragic and personal experience of suffering, loss, and deprivation caused by the war, by a profound need for peace and security in which to rebuild their country and to provide the necessities and the niceties of life, and finally, by a realization that the scientists' world is, indeed, one. And, of course, Soviet scientists have the very human desire to know their colleagues elsewhere and to be known and appreciated by them.

Progress in the Study of Higher Nervous Activity—Relationships to Mental Health

Evidences of the myriad ramifications of the work of the great Pavlov and his school were among the most interesting scientific activities observed. Pavlov worked until his death in the physiological laboratory of the Institute of Experimental Medicine, Leningrad, founded in 1890 and the oldest institute of its kind in Russia. Pavlov's laboratory, with a staff of 11 people, is now in charge of P. S. Kupalov. Rooms for the experimental study of conditioned reflexes and operating rooms are in active use, and pictures concerning Pavlov's association with the late Walter B. Cannon are prominently displayed. Experimental studies conducted even during the war have been published in the *Transactions* of the Physiological Laboratory of Pavlov, and Prof. Kupalov has in preparation a monograph in extension of Pavlov's writings.

Pavlov, feeling the need for more space, built a small laboratory in Koltushi, a suburb of Leningrad, and asked the government for 1,000,000 rubles for its support. He received 12,000,000 rubles. Building of the extensive laboratories and of the community now known as Pavlova was begun in 1929. After Pavlov's death in 1936, at the age of 86, the institute at Pavlova was put in charge of Academician L. A. Orbeli, who decided to undertake the study of the evolution of the nervous system on a large scale. The institute thus became the Institute of Evolutionary Physiology and Pathology of Higher Nervous Activity. This now has a staff of 90 workers, with 45 more in the associated clinic for the study of children. The administrative office is decorated with pictures of Sechenov, Claude Bernard, Johannes Müller, Darwin, Huxley, Sherrington, and the Georgian physiologist, Torchanishvili.

Study of the activities of the nervous system at many levels of the phylogenetic scale are in progress at Pavlova. There we were privileged to meet E. Ganicke, for 40 years a collaborator of Pavlov, who has studied the comparative physiology of the conditioned reflex and has repeated in mice Pavlov's work with dogs. Prof. Ganicke stated that he had been able to demonstrate conditioned reflexes even in insects and in mollusks, though obviously at a primitive level. Under other investigators work is proceeding on a monkey colony, and behavior of children is observed at an associated clinic.

Ontogenetic development receives equal attention at Pavlova. The comparative development of the neuromuscular apparatus and its behavior is under study in embryos and newborn of various animals. Effects of altered environmental conditions, such as O_2 and CO_2 tension, blood sugar level, etc. during embryonic development, are also studied.

An abridged version of this report, which was presented before the American Philosophical Society in Philadelphia, October 19, 1946, appears in the *Proceedings of the American Philosophical Society*, 1947, 91, 181–188.

Development of nervous activity during the maturing of rabbits, mice, rats, guinea pigs, dogs, monkeys, and humans is under investigation. The cerebral cortex has been found to be relatively undifferentiated functionally in the newborn. The work at Pavlova has demonstrated that in nervous activity, as in morphology, "ontogeny recapitulates phylogeny."

The inheritance of higher nervous functions in genetically known lines of dogs is also under investigation. The "nursery for dogs' children" is well designed and obviously the object of scrupulous care.

M. K. Petrova, for 25 years a collaborator of Pavlov, is one of the most creative of his school. She has achieved much of Pavlov's original intent of imitating experimentally in animals characteristic pictures of neuroses and psychoses as they occur in man. Volume 12, 1945, of the *Transactions* of the Physiological Laboratory of Pavlov, which she presented to us, contains eight of her own articles, covering 221 pages. Summaries are in English. Experimentally induced phobias in dogs are described. Weakening of inhibitory processes in the central nervous system is shown to be an indispensable condition for the appearance of such phobias. The nature of the phobia is closely connected with some event previously experienced by the dog and strongly affecting it. The weakening of the inhibitory process could be brought about and the phobia made manifest by prolonged overstrain, prolonged use of conflicting conditioned reflexes, or chronic alcoholization of the animal. Following amelioration of the conditions cited, phobias disappeared as soon as nervous equilibrium was restored.

Dogs have also been observed over many years in which anxiety states produce trophic disturbances of the skin. Continuous observation of one dog throughout six years "showed that trophic disturbances in the form of extensive exudative eczema appeared every time her nervous activity weakened under prolonged periods of daily work which was beyond her strength." Easing of the work and rest to restore weakened nervous activity resulted in complete restoration of nervous equilibrium, together with healing of trophic lesions. Such anxiety neuroses and their accompanying skin dystrophies also responded well to prolonged sleep induced by veronal or hypnosis. Relapse was induced by the prolonged action of alcohol. Further detailed studies are presented by Petrova on the effects on the higher nervous activity and symptomatology of dogs of varying nervous constitutions of prolonged administration of thyroid extract, alcohol, bromine, caffeine, and other drugs. Some of this material is in preparation for detailed publication in the *American Review of Soviet Medicine.*

Other outgrowths of the work of the Pavlov institutes were seen at Sukhumi, in Georgia, near the Black Sea. Here an extensive primate colony is maintained as a biological experiment station of the Academy of Medical Sciences of the USSR. The director, L. G. Voronin, is a former member of Pavlov's staff. Many aspects of physiology, psychology, and pathology of these primates are studied in comparison with similar aspects in man. A remarkable feature is the study of behavior under natural conditions, in great enclosures of natural tropical jungle. We were particularly interested in the observations of relationships of mothers and young in *Macacus rhesus* monkeys and in an "orphanage" of motherless macaques. These little "orphans" were under the care of a former school teacher, and their remarkable confidence in her was reminiscent of the relationships of trust and kindness between children and teachers in the Soviet nurseries and schools visited.

To what extent are all these comparative studies of nervous activity contributing to the practical management of mental disease and to the securing of mental health? An American psychiatrist, K. E. Appel, has recently written:

> Modern psychiatry rests to a great extent on the work of three men: a Russian, an American, and an Austrian. The importance of the emotions, and their effect on the biological organism, was brilliantly studied by Walter Cannon. The organization of responses and the conditions of learning were ingeniously investigated and worked out by Pavlov in his studies of the conditioned reflex. The *effects* of conditioning or training, both parental and social, on the development of the human personality were the contributions of Freud (*Amer. Rev. Soviet Med.*, 1946, **3** (Suppl.), 32–39).

V. A. Gilyarovski, director of the Institute of Psychiatry in Moscow, when asked a similar question during our visit to that institution, replied that the contributions of the Pavlov school were of the greatest importance to practical psychiatry and that the physiological approach to mental disease, in his opinion, was definitely more valuable than the Freudian. Physiological and chemical work is particularly cultivated in this Institute. Great attention is also paid to psychiatric work with children.

The great importance of psychiatry has become even more manifest in the USSR since the end of the war. Dr. Gilyarovski stated that functional disturbances of the nervous system did not increase in the Red Army during the war. This he attributed to the high morale (the wholehearted devotion of the troops to the defense of their country), the good attitude of the officers, and the low rate of infectious diseases in the Red Army. The incidence of endogenous psychiatric illnesses has not increased since the war's end. That of functional disturbances of the nervous system did increase in places under German occupation and has increased in general since the end of the war. When a person is in high spirits, said Dr. Gilyarovski, he can do everything better than when he is depressed and upset, but after a period of prolonged nervous strain comes a period of reaction. Dispensary care at an early stage is particularly important for the

care of men in the period of reaction following demobilization.

Particular attention is being paid to preventive and early treatment of mental illness. Small hospitals and dispensaries are being built near railroad stations and in centers of population throughout the Soviet Union for purposes of early treatment, and many cures are obtained. A capacity of 100–150 beds is considered optimal for mental hospitals. Separate hospitals are provided for children and for epileptics. Nurses attend the patients who do not require clinic care but do require care in homes. Particular attention is bestowed on veterans and those who were under bombing. There are at present about 60,000 beds for chronic mental cases in the Soviet Union but 100,000 are desired.

The value in securing mental and emotional health of conditioning to kindness, security, and group solidarity was illustrated in a remarkable way at the Institute for Pediatrics in Leningrad. This is a training school of pediatric medicine, offering a 6-year course from secondary school to graduation, and a postgraduate course of 3–6 months integrated with a children's hospital. There are about 2,000 students, mostly women, and about 1,000 child patients. The proportion of male students has, however, been increasing since the end of the war. Research, care, and teaching all proceed within the same institution, and children long confined to the hospital even have school in the wards. The director, M. A. Mendeleva, stressed the particular importance of kindness and understanding in working with children. During the siege of Leningrad the hospital was for months under direct bomb- and shellfire. Five hundred stoves were made and installed in the Institute to replace the central heating, which was demolished by the bombing. During the summer vitamin needs were met by growing blackberries, raspberries, etc. on the hospital farm and preparing syrups from them. According to Dr. Mendeleva, there were no neuroses among the patients during all this time. This she attributed to the confidence of the patients in those who cared for them, the calmness of the staff, and the fact that nothing was ever permitted to interrupt the routine.

Consideration of programs safeguarding mental health in the Soviet Union cannot be adequate without at least brief reference to the care and training of children in nurseries, kindergartens, and schools. There was a conscious and successful effort to make every child feel secure in being wanted and loved and in having a place in the group. The older children also had a sense of responsibility to their communities and took it as a matter of course that they would contribute to the needs of their communities by active personal work. The excellent program of child care makes possible active participation in work by women with families.

To what degree the conditioning of children to kindness, group participation, and responsibility is traditional and to what degree it is a conscious adaptation of psychological principles, we do not know. At all events, it impresses us as basically sound mental hygiene.

Communal Hygiene

The Institute of Public and Communal Hygiene in Moscow, which was founded in 1931 and included in the Academy of Medical Sciences in 1945, suffered a great deal during the war. Repair is still not complete, and equipping is under way. The Institute has 9 divisions and 12 laboratories as follows: (1) Division of Air Hygiene and Town Planning, in which there are two laboratories: Microclimate and Air Study; (2) Division of Water Hygiene, Water Supply, and Canalization, with two laboratories: Study of Drinking Water and Study of Sewer Water; (3) Division of Soil Hygiene and Purification of Towns, including two laboratories: Soil Study and Helminthological Study; (4) Division of Hygiene of Dwellings and Public Buildings, with its two laboratories: Lighting Hygiene, and Conditioning, Heating, and Ventilation; (5) Division of Personal Hygiene and Customs, in which there are two laboratories: Study of Clothing and Articles of Personal Hygiene; (6) Division of Bacteriological Sanitation, with a laboratory; (7) Division of Physiology, with a laboratory; (8) Division of Organization Methods, Consultation, and Examination; and (9) Division of Municipal Statistics and Legislation.

The Institute staff comprises 14 professors with the M.D. degree, 29 senior scientific workers, 22 junior scientific workers and specialists, 6 postgraduate students, 25 scientific auxiliary personnel, and 35 business personnel—131 persons in all. The director is A. N. Sysin.

The problems upon which the Institute works, as presented to us in writing by E. A. Bragin, the assistant director, are given below, together with some observations noted during our round of the laboratories.

(1) Sanitary consequences of the war: (a) re-establishment of Stalingrad—expedition into Stalingrad with a staff of 6 scientific workers; (b) dwellings in the re-establishment period; and (c) cleaning cities in periods of war and subsequent times.

A landscape architect was at work with large maps of Stalingrad, major buildings, parks, etc. Particular attention was being given to discovering the optimal relation of parks and recreation centers to the distribution of the population and to the planting of trees in the city. The design and location of buildings with respect to air currents and ventilation was under consideration. Formulation of optimal hygienic conditions in town planning is being sought. A book is now in press on the planting of trees in cities.

(2) Acclimatization: (a) population in Arctic conditions—expedition to Dikson Island with a staff of 3 persons; (b) clothing and conditions in different climatic zones.

Study of the influence of the microclimate of cities on persons is carried out by observation of the condition of meteorological factors in 5 points of the city of Moscow with meteorological statistics. The problem is an explanation of the hygienic problem of creation of the most suitable microclimatic conditions in different parts of the city, depending on the function of these parts, by means of planning and planting trees in the city. The laboratory establishes special methods for outer districts for the purpose of massive carrying out of observations.

The study of acclimatization of persons is carried out in different climates of the USSR by special programs, both for local institutes and also a special expedition into the Arctic. The expedition visits Dikson Island, Igarku and a series of points on the shore of the Karsky Sea. The study referring to conditions, morbidity and meteorological factors gives a great amount of material which has been obtained in these places in a series of years.

(3) Pollution of atmospheric air: (a) dust pollution in relation with meteorological factors and the significance of planting trees in the regions where the air is full of dust; (b) bacteriological pollution of the air and its sanitation.

The influence on the process of self-purification of air by filtration through planting trees is seen in different regions of Moscow and it is seen in places significantly covered with dust as well as those little covered with dust in different seasons of the year.

Studies are carried out on the characteristic processes of self-purification and pollution of air by the method of study of the loss of solar radiation and its specific participation depending on change in content of aerosols and micro-elements of the air medium.

A theory of normal pollution of the air is being developed for establishing different origins of pollution, for establishing city standards of planning for the purpose of different types of businesses.

Detailed studies are conducted with regard to fuels, wind velocity, humidity, temperature, etc. in relation to the smokes and fumes from specific installations in Moscow and Stalingrad and with regard to better methods of stoking, precipitation, etc.

We saw apparatus for the collection of dust on oiled slides supported in vertical and horizontal planes on a weather vane device, and a portable device containing batteries, fan, flowmeter, and cotton strainer for collecting and weighing dust.

With regard to ridding the air of confined spaces of its pathogenic microorganisms, work was proceeding along the lines in progress in the United States but was at a relatively early state of development in the Moscow laboratory. A simple infection chamber was available in which bacterial aerosols were sprayed and the killing action of ultraviolet radiation and germicidal vapors was under investigation. Vapor of fir balsam was reported to be germicidal and that of certain vinyl ethers bactericidal in a concentration of 0.1–0.2 mg./l. of air. "The activity (of this vinyl ether) is not found to be dependent on the humidity of the atmosphere, and therefore this preparation is preferred above triethylene glycol (Robertson)." A 6,000-volt electroprecipitator is reported to be a sensitive detector of bacteria in air.

(4) Pollution and self-purification of water: (a) reservoirs and sanitary conditions of them—expedition to Klyazminsky reservoir (water station) with a staff of 8 scientific workers; (b) manufacture of sewerage water and its significance in pollution of water.

Charts of bacterial counts of the Moscow water supply since 1937 indicated that these counts were high when the water was derived chiefly from the Moscow River but had been lower in recent years with water coming mainly from the Volga.

Stress was laid upon a method of bacteriological sampling in which the water was filtered through a collodion membrane held in a filter of Seitz type. The membrane was then removed, laid on the surface of an endo-agar plate, and incubated. *Escherichia coli* colonies of characteristic appearance grew out in the membrane. A member of the staff described this and other "Russian methods" and said proudly, although with some embarrassment, that these were the reasons American standard methods of water analysis had not been adopted.

(5) Sanitary indications of soil pollution.

In the laboratory of soil hygiene it was explained that, during the siege of Stalingrad and in other circumstances of prolonged deprivation of protein during the war, the colon bacillus flora of the feces of the human population was greatly reduced.[1] Many bacteria with typical biochemical reactions of *Aerobacter aerogenes* appeared in the feces under these circumstances.

The work carried out in the Soviet Union and in part by the Institute of Hygiene indicates complete absence from soil not polluted by persons or animals of both *A. aerogenes* and *E. coli*; and that either is an indication of some sort of pollution. Thermophiles are also used as indicator organisms for animal and human fecal pollution. The thermophilic organisms resulting from human fecal pollution have a lower temperature tolerance—up to 60° C.; those of some animal feces tolerate 60° or above.

Detailed description of the studies of these laboratories regarding sanitation, mineralization of organic matter, and microbic antagonisms in the soil will not be attempted here.

(6) New sources of lighting and their sanitary purposes.

The Division of Hygiene of Dwellings and Public Buildings has existed in the Institute from the day of its beginning in 1931. The Division consists of: (a) laboratory for the hygiene

[1] Those who have read Simonov's *Days and nights* may appreciate the spirit of people who investigate the intestinal flora under the appalling conditions of Stalingrad.

of special and artificial lighting; (b) laboratory for the hygiene of heating, ventilation and air conditioning in which there are special chambers for microclimate with the use of conditioned air. The staff of this Division is 14 persons. The chief of the Division is Professor S. I. Vetonkin, M.D.

The Division has as its basic problems the working out of hygienic problems for scientific basic planning, outfitting and improvement of dwellings and public buildings:

(a) Study of microclimate of reserved spaces (study of village buildings, air ventilation, large buildings, etc.). At the present time there is experimental study of few-storied buildings in Stalingrad, Moscow and abroad with the Division working on hygienic problems of normal dwellings, inner outfitting and arrangement of dwellings in the post-war period (expedition to Stalingrad and abroad).

(b) Study of climatic lighting and the physiological-hygienic basis of the method and norm of natural and artifical lighting of closed dwellings and open spaces. In the pre-war years, the laboratory of hygiene of lighting worked on the questions of: (1) lighting of schools, (2) lighting of medical establishments, (3) lighting of dwellings and (4) climatic light in Moscow. In subsequent years the laboratory is attacking the study of new sources of light (luminescent lamp) in a hygienic relation—physiological-hygienic purpose of luminescent lamp of low pressure mercury arc and also sterilamp (bactericide).

In the current year one doctor completes a dissertation under the direction of the laboratory of hygiene of dwellings on the theme: "Hygienic basis for lighting schools"; besides this, post-graduate students have carried out dissertations in collaboration with the Division on the theme: "Hygienic requirements for lighting medical institutions."

(7) History of hygienic thought in the USSR until the Revolution and in Soviet times.

(8) Network of scientific study and sanitary-prophylaxis establishments in the USSR.

(9) Home and municipal legislation in relation to sanitation and further perspectives.

(*Continued in next week's issue.*)

Officers of the AAAS, 1947

President: HARLOW SHAPLEY, *Harvard University*

President-Elect: E. W. SINNOTT, *Yale University*

Chairman of Executive Committee: JAMES B. CONANT, *Harvard University*

EXECUTIVE COMMITTEE MEMBERS: A. J. Carlson, University of Chicago; Otis W. Caldwell, Boyce Thompson Institute; Fernandus Payne, Indiana University; Walter R. Miles, Yale University; Charles F. Kettering, General Motors Corporation; Kirtley F. Mather, Harvard University; E. C. Stakman, University Farm, St. Paul; Arthur H. Compton, Washington, University; G. A. Baitsell, Yale University; and F. R. Moulton, 1515 Massachusetts Avenue, N.W., Washington, D. C.

SECRETARIES

Mathematics (A): Raymond W. Brink, University of Minnesota, Minneapolis, Minnesota

Physics (B): Joseph C. Boyce, New York University, New York City

Chemistry (C): Ed. F. Degering, Purdue University, LaFayette, Indiana

Astronomy (D): Charles C. Wylie, University of Iowa, Iowa City, Iowa

Geology and Geography (E): George W. White, Ohio State University, Columbus, Ohio

Zoological Sciences (F): J. William Buchanan, Northwestern University, Evanston, Illinois

Botanical Sciences (G): George W. Martin, University of Iowa, Iowa City, Iowa

Anthropology (H): Marian W. Smith, Columbia University, New York City

Psychology (I): Harold E. Burtt, Ohio State University, Columbus, Ohio

Social and Economic Sciences (K): Successor to Albert E. Waugh (resigned) not yet announced.

History and Philosophy of Science (L): Raymond J. Seeger, Bureau of Ordnance, Navy Department, Washington, D. C.

Engineering (M): Frank D. Carvin, Newark College of Engineering, Newark, New Jersey

Medical Sciences (N): Malcolm H. Soule, University of Michigan, Ann Arbor, Michigan

Agriculture (O): Ernest E. DeTurk, University of Illinois, Urbana, Illinois

Education (Q): Dean A. Worcester, University of Nebraska, Lincoln, Nebraska