

*2 copies
STOLK*

~~FOR OFFICIAL USE ONLY~~

JPRS: 3649

3 August 1960

[Faint, mostly illegible text]

CZECHOSLOVAK ADVANCES IN MEDICAL SCIENCE

[Faint, mostly illegible text]

RETURN TO MAIN FILE

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

19990713 060

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
205 EAST 42nd STREET, SUITE 300
NEW YORK 17, N. Y.

Reproduced From
Best Available Copy

~~FOR OFFICIAL USE ONLY~~

F O R E W A R D

This publication was prepared under contract by the UNITED STATES JOINT PUBLICATIONS RESEARCH SERVICE, a federal government organization established to service the translation and research needs of the various government departments.

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON, D.C. 20540
1964 O - 400-000

JPRS: 3649

CSO: 3918-D

Existing Laws Relating to Copyright Make Necessary That
This Text Be Restricted To The Official Use of the U.S.
Government

CZECHOSLOVAK ADVANCES IN MEDICAL SCIENCE

Following is a complete translation of the Czech-language
periodical Casopis Lakaru Ceskykh (Journal of Czech
Physicians), Vol. XCIX, No. 19, 6 April 1960, pages 577-603.]

<u>Table of Contents</u>	<u>Page</u>
I. Fifteen Years of Successful Work of the Czechoslovak Health Services	1
II. Results of Scientific Research in the Field of the Medical Sciences and the Health Service During the Past Fifteen Years	4
III. Fifteen Years of Industrial Drug Production in Czechoslovakia	28
IV. Development of Our Gastroenterology and Nutrition in the Past 15 Years	35
V. The Development and the Tasks of Biophysics in Czechoslovakia	41
VI. Perspectives of Virological Research	49

I. FIFTEEN YEARS OF SUCCESSFUL WORK OF THE CZECHOSLOVAK HEALTH SERVICES

Pages 577-578

Dr. J. Plojhar,
Minister of Health,
Czechoslovak Republic

This year the whole Czechoslovak people remember with love and gratitude the fifteenth anniversary of the liberation of Czechoslovakia by the heroic Soviet Army. It is the anniversary of an event which became the turning point in the life of the Czechoslovakian nations and which opened a new, joyful phase in our histories. In the short period of the past fifteen years the Czechoslovak people, under the guidance of the Communist Party of Czechoslovakia, removed the capitalistic order, built up the foundations of the socialist society, and in the next time will complete the socialist construction of their fatherland. This development was conditioned fifteen years ago in an extremely important manner when Czechoslovakia was liberated by the Soviet Army.

The liberation of Czechoslovakia in the spring of 1945 brought first of all penetrating political and economic changes which also became the firm corner-stone of a new epoch in the histories of the Czechoslovak health services. In the people's democratic constitution basic principles were created for the consistent use of the rules of protection and strengthening of the health of the population and for the development of modern medical science. First of all there were the systematic and purposeful raising of the material and cultural level of the population, the definitive liquidation of unemployment, the arrangement of the social insurance and a whole series of further, indeed revolutionary, steps taken for the all-round welfare of the working man.

If one has to evaluate the development of Czechoslovak Health Services from the year 1945 on, it should be said that up to 1948, when in February the process of outgrowth of the national and democratic revolution into a socialist revolution reached its peak, the health service developed essentially on the foundations of the capitalist health service which were taken over as a downcast heritage from the period of the first republic. This was a health service in a caste system aimed at the exclusive benefit of the capitalists and of their willing menials, since it did not offer to the workers the necessary and fully deserved care. This health service used to show great differences in level between the east and the west of the state, between town and countryside, and quite accidentally it possessed a created network of health institutions. Moreover, these institutions were distributed over the territory of the state at many places with little forethought, and were managed by the most diverse titled people. Comprehensibly, the functions were carried out in the old fashioned way, individualistically, and there could not be anything said about a systematic care either preventive or therapeutic.

Only the historical victory of the Czechoslovak working people in February 1948 has led to a fundamental change. The then meetings of the work councils and the farmer-peasant commissions, however, staked out also other important health demands. The definitive defeat of the reaction made possible the realization of the proposed demands, and thus the road opened for a gradual fundamental rebuilding of the Czechoslovak health system. The organization and the contents of health care was changed to principles, thanks to a number of standard sanitary political provisions of the party and of the government. Regardless of the nationalization of the medical institutions and baths, and regardless of the introduction of national insurance, the decision of the party and the government dated 3 July 1951 about the unification of the health service, and first of all the document of the party and the government from the end of 1952 about the further development of the Czechoslovak health services had an extraordinary importance.

Indeed, in this important document, the basic political directives are the most completely laid out for the transformation of the Czechoslovak health services into a socialist system of the protection of health. The principles of this document are all the time the chief outline of the construction of the socialist health service, whose characteristic marks are: planned development and active participation of the population in the tasks of health care, accessibility, no charges, and high level of the health care, wide preventive measures, priority of the health assurance of the workers, of the mothers and children, emphasis of the importance of scientific work closely connected with the practice, and finally organizational unity of the whole health service as of a state health service.

In the period of the two-year and of the first five-year plan, the characteristic developmental features were a violent quantitative growth of the health services and their organizational transformation. Then, in the further development the weight was transferred upon the problem of the quality of the health care and upon the separate health political questions. Here belong first of all the deepening of the fight against tuberculosis, against malignant tumors, skin and sexual diseases, furthermore the questions of the healthy development of the new generation, the fight against alcoholism, then altogether the problems for whose successful solution the joint participation of all factors of public life is required.

A simple comparison with the time past not so long ago will suffice, and we see entirely clearly what gigantic improvements and progresses have been achieved during the elapsed fifteen years by the new Czechoslovak socialist health services in the fight for the better health of its people. Year after year the rising level of our health services was directly projected first of all into the improvement of the health condition of the inhabitants. The over-all mortality decreased, and especially the infantile mortality. In 1937, in our country 117.4 babies died out of 1,000 children in the age group below one year, and even in the year 1948 the over-all state average was

83.5 deaths. In 1958 it came to a dramatic decline of the infantile mortality in an over-all state average at 29.5 deaths. We then belong to the states with the lowest infantile mortality altogether.

We are aware of the fact that the conclusive part in the favorable development of our health services was played by the brotherly aid of the Soviet sanitarians and by the closest relations of our sanitarians with the Soviet men who have unselfishly given to us their rich and invaluable experiences, and made possible for us in this manner to build the health services upon socialist principles. Especially gratefully will we always recall the brotherly and unselfish help of Academician N. N. Litvinov and of his successor Prof. Dr. G. I. Lavrishchev who did especially meritorious service about the new development of our health services.

The prosperity of our national economy is directly reflected in the growth of the material basis of the Czechoslovak health services. This is witnessed by the better construction of dozens of new and modern hospitals, health centers, therapeutic and transfusion stations and of other numerous health establishments, of the constructed instruments and tools which will bear even the most rigorous comparison with the products of the most mature industrial great powers of the world.

Similarly in the field of international relations, the Czechoslovak health services are steadily gaining a greater weight, and the good reputation of the services is strengthening. Good results came from the international cooperation of the Czechoslovak sanitarians with the lands of the socialist camp in front with the Soviet Union. In the year 1958 then, the Czechoslovak Republic has recovered its active membership in the World Health Organization. Thereby, the participation of the Czechoslovak sanitarians in the international congresses substantially widened, and in our country also we had the chance to welcome at a series of scientific congresses the leading representatives of medical science from the most different states of the world.

When we look backwards upon the past fifteen years and evaluate the results of the construction of the new socialist health services, we may be justly pleased with the accomplished work which brought many additional advances. It would be a mistake, however, to fall asleep on the laurels and to fall into the feeling of self-satisfaction. Still many works and rather large tasks are waiting for us. Their fulfillment will depend upon everyone of us without difference, from the simplest sanitary worker up to the scientist physician. On our effort, strong resolution and enthusiasm will depend that in the shortest time in our beautiful country we should finish the construction of the socialist health service which is the best arm for the complete protection of the health of people!

II. RESULTS OF SCIENTIFIC RESEARCH IN THE FIELD OF THE MEDICAL SCIENCES AND THE HEALTH SERVICE DURING THE PAST FIFTEEN YEARS

Pages 579-588

Dr. Jan Stritesky,
Scientific Secretary of the
Science Council of
Ministry of Health

During the period of the mere fifteen years which elapsed from the moment of the liberation of Czechoslovakia in May 1945, we became witnesses in our country of a prosperity of scientific life which was never surpassed before. Having missed in the past a clear social function and a higher guiding concept, and hence developing in an elementary manner, science took a place under the new conditions as belongs to it in the society constructing socialism. Science endured to be the mere observer and commentator of the days; it became a spiritual power which, starting out from the needs of life, lays down a long-range direction of research, unveils by a systematized collective and complex method of work the new laws and results to which it comes, and turns them to the benefit of society and life practice. This is so also in the sphere of medical sciences and public health. The results of research gained in this section are remarkable, they influence expressively, often in an authoritative manner, the successful development of our health services, and in many respects they have raised our medical science to the highest international level.

In the following review we wish to attempt a brief analysis of the most important results of research obtained in our country during the time from the end of the Second World War. The review as a whole is far from being complete. It does not touch the results in the sectors of the theoretical disciplines. However, it is impossible to deal completely with the rest of the medical branches either. The material from which we drew at the arrangement of the analysis presented only the final reports of the research problems which the Secretariat of the Science Council of the Ministry of Health had at its disposal, only the evaluation given by the presidents of the main problem commissions, at occasions in the individual boards of directors of the Science Council. Without this help of the representatives of the main scientific spheres it would have been impossible to approach such a complicated and responsible task as the evaluation of the scientific progress is during the period of fifteen years.

A. Problems of the Living and Working Environment, of Work and of the Working Regime of Man

1. Hygiene. Czechoslovak hygiene, which in our country started to be claimed as an independent scientific and operational sphere from the end of the past century, has obtained the chance for an actual

quantitative and qualitative expansion only after the year 1945, especially then after the origin of the research institutions from 1952 on. In this time it came also to a specialization of hygiene at separate sections of the field, and a reflection of this development, so important for the period of the construction of the hygienic-epidemiological service, is obvious on the following which we jot down.

In the field of communal hygiene positive results were obtained first of all therein that an entire system of modern method had been elaborated for the recognition of the quality of environment. From these we pick out at least the originally solved methodology of automatic recording of the quality of water and partly of the air. Our extremely urgent problems of guaranteeing sufficient sources of good water for drinking and for non-industrial uses led us to systematic, long-lasting studies of the changes occurring in the huge water masses of the valley reservoirs. The regularities of these, changes were determined, and methods for the control of the water's quality were laid down. The obtained results will be the basis for the construction of future valley reservoirs for waterworks. In this partial sector, the task of the reliable purification of waste waters from the sanatoria has been also successfully solved. In recent years the hygienic research has been then oriented toward the problem of water from the physiological and toxicological points of view (toxic action of fluorine, nitrite methemoglobinemia).

The intensive industrialization, bringing with itself the growing pollution of the atmosphere, with the initiative of political places, has given the motive for the detailed mapping of the afflicted regions both to the quality and the nature of the injurious matter, and for the elaboration of a plan of redressing measures for the sanitation of the environment of large industrial agglomerates. The great attention devoted to the study of the effect of atmospheric pollution on the health of the population has yielded results at the international level. A tabulation was compiled showing the maximum permissible concentrations of the injurious substances in the air of residential districts.

The huge tasks of planning and construction of urban and country residences made necessary the systematic study of all hygienic problems here concerned. Furthermore such special problems were solved as ventilation, heating, lighting and noise in the lodgings as in the factories affecting the health of man. The results sharply influenced the residential type of construction, and they were made use of in the renovation and the construction of towns and villages.

Special mentioning is needed for the extensive analysis of the hygienic relations performed in the region of the water sections along the Danube which became the basis not only for the sanitation of the territory, but also for the elaboration of a territorial plan.

Very successful has been the research of the cleansers for the industrial workers. A number of special kinds were developed with perfect washing and protective action upon the skin.

The problems of common boarding in factories (establishments) under different operating conditions, in schools, in internates of workers' reserves, on the different brigades, in houses of pensioners required in the past years a great portion of the working capacity of our research workers in the field of physiology and hygiene of nutrition. In this section it was necessary to thoroughly erect and scientifically resolve all the problems starting with the composition of food and ending with the hygienic conditions of boarding. By the solution of the hygienic problems of the majority of sections of communal boarding it came to a decline in infections and to a practical disappearance of poisonings in communal boarding.

We include in the group of sciences of hygienic aspect the research of nutrition -- its physiology, pathophysiology and clinic, and therefore the results of the scientific work in this field is joined by us in the hygiene of nutrition into a single whole of subject matter. In the theoretical sense success was achieved at the determination of suitable doses of proteins and of several vitamins in our food, especially of vitamin C. Changes of taste have been found under hypnotherapy, and the problem of taste has been also studied experimentally on animals. The problems of the adaptational capacity of the organism under different modes of nutrition have been widely studied in long-range trials. In the problematic of the suitable dose of fat in the food it has come to new discoveries in the field of fat digestion, their transport, metabolic reaction at their use and the mobilization of the fat reserves. New mechanisms were found for the origin of obesity, specifically by the study of the pentose cycle at the transformation of the glucides. Successful studies were made of the relation of disease to some aspects of the nitrogen metabolism. The problems of the effect of nutrition upon reconvalescence and recovery were thoroughly investigated in patients after gastrectomy.

In the field of food hygiene, systematic research was done which was directed toward the protection of healthiness of the food articles and the sanitary guarantee of the food; and it brought remarkable results in many respects. Again, a great number of injurious and foreign substances, formerly used in food establishments, have been evaluated and from the practice removed. The limit of harmfulness of metals in food articles has been determined. Criteria were elaborated for the hygienic criticism of several recently employed preserve agents and pesticides. The substance of harmfulness of several fats was studied, and progress was reached especially in the analysis of the causes of the toxicity of rancid fat. The radioactivity of our and of the imported food articles was traced, and empirically the limit of their safety has been determined. Hitherto unknown microbiological criteria were discovered and introduced for the hygienic use of the food articles and of the food-dispensing equipments, especially in the field of sanitary microbiology. Methods were elaborated for the rapid field follow-up of the caloric and biological value of the board in the communal boarding.

The school hygiene went through a fundamental reconstruction of its contents so that it is now a branch which solves all hygienic problems of the life and work of children and of the young people first of all in the collective establishments. In the research the chief attention is now devoted to the hygienic problems connected with the transformation of our education, to the construction of establishments for children and youth and to the research of the development of children under different conditions of life. The results of the present study are hygienic standards for the operational training of the youth, for the creation of a series of new types of children's establishments from the infants homes to the universally instructive schools and for the demonstration of the effect of some factors of the living environment of children upon their development and health state. These new notions of ours have caused considerable echo in the foreign countries.

2. Hygiene of work and professional diseases. The circle of problems of this scientific sector, which in our country already from the past had a tradition, from the end of the Second World War on underwent a new great prosperity. The work was expanded in width and depth, and in many aspects original results were obtained at international level by which we were placed among the foremost states in the world.

In the field of industrial toxicology, studies have been made of the absorption, separation and transformation of the vapors of the important industrial poisons such as benzene, toluene, trichloroethylene and carbon disulfide, and original results were obtained. On the basis of these studies several tests of exposure were elaborated for the practice for the estimation of the risk of the workers, such as the phenol test with benzene, the test of benzoic acid with toluene, and the test of trichloro-ethanol with trichloroethylene. The relation of these tests to the concentration of the mentioned substances in the air has been successfully discovered; in the practice these tests proved themselves to be reliable. In case of carbon disulfide it was ascertained that it is bound with amino acids, which products are split by cysteinsul-dehydrase. Furthermore, the combining with protein was demonstrated. For the limit of exposure to CO a test was worked out with analysis of the expired air. In poisoning with lead, a method was elaborated for diagnostic mobilization with the aid of CaNa_2EDTA , already being used in the practice. With parathion, new metabolic ways were pointed out where it is probably detoxicated to nitrophenol. Very excellent therapeutic preparations were investigated for the treatment with organic phosphates of poisonings.

Systematical work was done on the study of the changes of the connective tissue in experimental silicosis. Especially the mechanism of the inhibitory action of cortisone upon the formation of collagen was elucidated, and a few substances necessary for its synthesis were laid down. It was repeatedly shown that the high-fat diet has a rather

worsening effect upon the development of experimental silicosis. Yet, it was proved in tests on rats that aerosol application, "Vincent" with calcium chloride, has a markedly favorable effect. Contrary to this, ACTH undoubtedly inhibits the fibrotization of the lungs, yet it will worsen the general reactivity of the organism.

From a number of methods for the functional examination of the lungs, the method of ventilation equivalents proved itself very good, furthermore the method of the recorded expirations and the new method for the determination of the residual volume and of the intrapulmonary mixture. In a few mines the offensiveness of their dust was determined and recognized, and accordingly, diagnostic criteria were elaborated, especially in regard to the temporary change of occupation.

For the analysis of the atmosphere and of the material for the purposes of the hygienic service, a long series of new original methods were worked out. In the field of ventilation technique, new notions were recognized, for instance about the effect of inserts and their sizes in the suction ventholes upon the flow characteristics, about the correct separation of the air in the workshops from toxic substances, about the expediency of the combined method of ventilation in the mines on the foreparts, about the influence of water sealing and scattering of water bags after blastings in the mines. At the determination of dustiness, new notions were acquired about the value of the individual methods in use.

In the field of physiology of work methods were prepared to be used at the study of the higher nervous activity, and they were adjusted for the use in the field, especially for the work loading the central nervous system and the analyzers. Similarly, the methods for the recognition of the threshold action of several toxic substances looked to be very good. A number of works succeeded in solving a few questions of the functional mechanism of the brain, and they elucidated the role of ammonia and pentose and of the nucleic acids in the energy metabolism of the cells. The Wetzell method for the determination of the accuracy of the growth of apprentices was verified, and introduced into the practice. A suitable drinking and eating regime has been elaborated for those who work in the heat. Much attention was paid to the mechanization in agriculture; especially, a suitable type of seat was planned for the tractor drivers.

In the field of ionizing radiation, great success was achieved by the discovery of the factor which causes inhibition of the cell division after irradiation with rontgen rays. By subsequent works it was shown that this factor is identical with the "properdin" system which has been also independently discovered by our authors. A number of works was aimed at the provisional diagnosis of the damage by radiation. Furthermore, some methods were elaborated for the determination of radium deposit in the organism, for the measurement of radon in the expired air, and finally a direct method for the determination of the amount of radioactive gamma-radiations in the organism.

3. Epidemiology and Microbiology. Thanks to the new material and cadre (personnel) conditions, this scientific section has been experiencing a unique prosperity in our country since 1945. The first post-war year was generally only a preparatory period in which the foundations of a decentralized microbiological and anti-epidemic service were built and the cadres were prepared. The development of the proper scientific work occurred then after the year 1951. For the short time which elapsed since then it reached nevertheless an international level in many respects. Today the situation is such that the Czechoslovak microbiology and epidemiology occupies an important position in the world.

Already in the field of microbiology, the research brought remarkable results of international extent in the question of transfluent ("prutokovy") culture for the solution of which a State prize was granted. The basic research of the formation of anti-bodies is advancing successfully. Equally successful is the basic virological research whose discovered results were three times honored with State prizes. Reference is made to the problem of influenza and to the discovery of the virus of the swine paralysis. A further State prize was granted for the original solution of the problem of bacteriophage with the aid of the electron microscope. Original results were obtained with the study of non-specific resistance and in the research of bacterial toxins.

In special bacteriological research a gigantic piece of work was done. Dozens and hundreds of works were published at home and in foreign countries which brought reports on the remarkable, very often original results at the study of streptococci, anthrax, listerellasis, brucellasis, enterobacteriaceae, pertussis and parapertussis, leptospirosis and Q-fever. Long and successful research of the streptococcal infections, especially in relation to rheumatic fever, obtained a special appreciation by the establishment of an international reference laboratory for streptococci at the Institute for Epidemiology and Bacteriology in Prague.

In a number of Czechoslovak scientific working places, the work aimed at the research into infection with natural foci has successfully developed. The results, for which the collective of scientific workers has been awarded with a state prize are remarkable in many respects. The most important of them refers to the tick encephalitis and to Q-fever, furthermore to the study of leptospirosis and tularemia. The parasitological research brought original results and discoveries about pneumocystosis, rewarded with a state prize, and about toxoplasmosis. Further state prizes were granted for the discovery of the laws of the existence and propagation of many transmitters of infections.

Similarly as in microbiology, the scientific research work has also advanced in the section of epidemiology far forward, and it has a great share in the improvement of the health condition of the

population. It came to important knowledges at the study of streptococcic infections where we should point out the success with an original method of hospitalization and treatment of scarlet fever, and at the study of infectious hepatitis and of the infections with natural foci. The tracing of the affliction of the population with the various infections offers not only an orientation about the circulation of the individual original infections in the population in the past and the present, but it also gives an important basis for the eventual protective inoculation (influenza, poliomyelitis). The epidemiological controlled research is the basis of the evaluation of the used substances for vaccination. In the evaluation of the inoculating substances against poliomyelitis the work of the Czechoslovak workers has reached an international level.

A specially important place is assigned in the scientific-research work in microbiology and epidemiology to the system of reference laboratories, established in the recent years at the research institutes (for instance, for streptococci, for the serological typing of Salmonellas, Shigellas, for staphylococci, for enteroviruses, for arbor viruses) and the so-called influenza centers. The laboratories look after the maintaining of the necessary scientific operational level, and they provide the cooperating laboratories with standard antigens, stocks and sera, and they determine the mailed bacterial strains.

B. Problems of Diseases and Diseased Conditions Which Endanger the Health of the Population the Most

1. Tuberculosis. The period from 1945 has had a conclusive importance for the development of the situation of tuberculosis in Czechoslovakia. The widely launched offensive which we have started in the fight against this disease under the new social and economic conditions follows from a scientific analysis of the situation. In 1958 -- on the basis of an epidemiological analysis -- it came to further deepening of the research and of the anti-epidemic work in tuberculosis. In this case of health work, more plastically than in other sectors, the importance of the close connection of theory and practice is apparent.

In the elapsed period of time, a number of complex questions have been successfully solved in the basic and applied research of microbiology, immunology, biochemistry, morphology and clinics of tuberculosis. Original inoculation substance, the M-vaccine has been elaborated which in some aspects is more advantageous than the BGG vaccine. For the mass cultivation of the Mycobacterium tuberculosis, an original liquid culture medium was constructed. The results of the complex work with the vaccination against tuberculosis put us among the front states in the world.

The tuberculosis of old people was scientifically studied, which is one of our actual problems. A particular therapeutic method

was worked out, and the principles of the use of anti-tuberculous substances were established. The special attention is now concentrated upon the problem, how to prevent the origin of the recurrence of sickness.

And in the section of the functional ventilation of the lungs, too, we have reached successes. A mechanical bispirometer, and an electronic spiograph were constructed.

2. Oncology. The problem of etiology of malignant tumors and of their most effective therapy have been constantly world-wide problems which had no where found their solution. Thus, they work on it everywhere more intensively. It is also so in Czechoslovakia.

Here, the scientific work proceeds partly in the direction of basic research, partly in the clinical direction. The most successful were the efforts in the field of basic experimental research which was oriented toward the virus theory. New tumors of viral etiology were bred. Success of international rank was reached with the production of leukemia in rats by the transfer of the acellular filtrate of the BS tumor.

Yet, the theoretical-experimental research is following still further problems, and it has original results. In immune biological studies, the passive transfer of antibodies against the growth of the tumor in rats was successful. The first exact evidence of carcinogens in the human body was provided, i.e., the evidence of benzpyrene and arsenic in the anthracotic lymphnodes of the lungs of man. A methodology was worked out for the detection of the early forms of cancer.

3. Diseases of the Blood Circulation. The rise of sickness and mortality by the diseases of the cardiovascular system did not cease, as it was followed here and abroad, and in the majority of the world statistics, and after the formation of new material and personnel conditions, a direct impulse was given for the deepening of the studies of this scientific sector in which we have an altogether old scientific tradition. The research was aimed first of all at the problems of the etio-pathogenesis, prevention and therapy of the most frequent cardiac and vascular ailments. Atherosclerosis was studied, and its clinically important forms, especially the coronary sclerosis. The problems of hypertensive disease were solved. Topics of the studies are furthermore the diseases of the peripheral arteries and veins, rheumatic carditis, problems of the relation of the higher nervous activity to the origin of cardiovascular disturbances, and the problems of surgical approach to the treatment of the congenital and acquired cardiac and vascular defects. A number of finished tasks, with the obtained results and with their originality, is the solution on an international level.

From the rich review of the several hundred works solving the given group of problems we take out the most characteristic. The problem of the pathogenesis and etiology of atherosclerosis has been

successfully studied and elaborated by several collectives from clinical, biochemical and epidemiological points of view. A new method was worked out which makes possible to quantitatively measure even the rapid changes of the blood flow through the most important arterial and venous sectors of the blood circulation, which at the same time also permits the quantitative analysis of the physiological and biochemical events aroused in the organism by medicament or by other influences.

The concept of the pathogenesis of hypertensive diseases was also elaborated and experimentally supported. The results excited a world-wide reaction. The work from the field of the therapy of hypertensive disease has an important direct effect for the practice.

Parallel with the hypertensive disease, the problems of pyelonephritis were also studied, and remarkable results were obtained in respect to the differential diagnosis and prevention. Two artificial kidneys have been installed which for a number of years have been centers for the whole Middle Europe both for the treatment and for the study of anuria and of the metabolic changes in case of uremia. At this place it should be mentioned that for many years an investigation of nephrolithiasis was undertaken, and the experiences were worked up monographically.

At a high scientific level are the results of the researches into the basic problems of the transportation of the electrolytes in the cell. A state prize was awarded for the pioneer solution of spatial electrocardiography (spaciography). Further distinction with state prize came to the original solution of the surgical approach to the treatment of the cardiac cavity after infarction of the myocardium.

A system of simple diagnostic criteria was worked out for the settling of the indication for surgery of mitral stenosis. Important are the results of the solution of the problem of the prevention of embolism and the prevention and treatment of venous thrombosis, as well as the accurate diagnosis of the disorders of the main venous system of the lower extremities.

4. Rheumatic Disease. Although it is a matter of a group of diseases which for a long time and since many years used to cut out from the active work many working men still in their middle ages, in our country this discipline began to have a systematic scientific care since 1945. First of all, it was needed to educate a qualified staff. The process has been speeded by the arrangement of rheumatology in the curriculum of the medical faculties and by the creation of a scientific-research institute.

Topics of long-range research are chiefly three diseases: acute rheumatism, progressive polyarthritis, and Bekhterev's disease. The study of rheumatic fever (acute rheumatism) made substantial progress both in prevention and in therapy. The result of central epidemiological research of streptococcic infections and of their relation to acute rheumatism is the introduction of penicillin prophylaxis in all cases of streptococcic sore throat.

In chronic progressive polyarthrititis new results were obtained in the serological diagnosis of this disease and in its therapy. A drug cure (with gold, hormones, antimalaria drugs), and a method of medical athletics was worked out.

Important contributions are the results of the study of Bekhterev's disease. The arrangement and the investigation of the methods of complex therapy according to the new notions is a progress which had its sensation in the foreign countries, too.

5. Endocrinology. Since the end of the war, endemic goiter has been intensively studied. First of all, a wide investigation was carried out in the field both according to the causes and its spread, and a state-wide goiter map was manufactured. Then, they proceeded toward the prevention, and in three stages the iodization of the table salt was introduced. The intensity of endemic was thus lowered about to half. In the following stage they progressed to the study of further factors: to the original discoveries belong the recognition of the goitrogenic substances in our foods, for instance, the seasonal variation of thiocyanate, the goitrogenic quality of the vegetables and of the milk from the comprehended regions in the trial on animals, and so on.

The laws of the relations of the goitrogenous substances, thyroxin and iodine to the growth and the size of the thyroid gland was also established. Simultaneously, they started in the field, at the clinics and laboratories to study the oligo-symptomatic thyrotoxicosis which in our country is catching in masses the population of several districts. The rest of the disturbances of the thyroid gland were also studied, and a methodology of the application of radioactive iodine was developed in the pathogenesis, diagnosis and treatment. The original discoveries were especially significant in the cancer of the thyroid gland.

From the other endocrine diseases the steroid hormones of the suprarenals were studied at which the titration of the hormones in the body tissues and the clinical diagnosis of the syndromes have been elaborated. Furthermore new endocrine remedies were manufactured, especially from the anterior lobe of the pituitary, and the synthesis of oxytocin from the posterior lobe was made. Several researches of the neuro-humoral relations, for instance, in the region of the hypothalamus-pituitary, have an international priority: a new diencephalic hormone was isolated which stimulates the production of thyreotrophine from the adenopituitary; and until this time unknown relation was discovered between the production of adiuretin and several drugs; the interoception was discovered in the kidneys for the hormone of the posterior lobe of the pituitary. Finally, attention was paid to the role of the hormones in the load reactions (for instance, priority of the discovery of the influence of ACTH upon leukokinin), furthermore in the metabolism (influence of hormones upon the water metabolism and electrolyte metabolism, upon the metabolism of bones,

upon the transformation of the lipids in regard to arteriosclerosis), in ageing and in malignancies.

6. Hematology and Blood Transfusion. In this sector, enormous progress was made since the year 1945. The origin of the organization of the transfusion service and the construction of a network of transfusion stations created a wholly new supposition not only for the assurance of the required blood for every patient at any place of the state, but also for a strictly scientific approach to transfusion and for the development of the service on a scientific basis. As a result of research, in the interest of the safety of the blood transportation, the amount of citrate in the blood preserves was reduced, and operating procedures were worked out and checked, first of all by bacteriological methods, from the point of view of the sterility of the transfusion preparations. A successful solution at the international level was the preparation and the manufacture of the most necessary blood products and plasma substitutes.

In the field of hematology, parallel and in coordination with the oncological research, the problems of leukemia were studied. Prospective results were reached in the question of etiopathogenesis, especially with aiming at the nucleic acids and their possible specificity. In the field of immune hematology a new methodology was worked out for the demonstration of the antibodies against leukocytes, platelets, and tissues, hitherto unknown effect of the heat inactivation was shown on the results of antiglobulin consumption test, the seriological and biochemical properties of lectins were studied from the root of the "thorny needle" (jehlice trnité), the mutual relation of the separate coagulation factors was closer elucidated. The spontaneously occurring anticoagulation has been examined in detail.

7. Neurology. The group of neurological problems has been growing in depth during the last fifteen years on many of the clinical working places, and it obtained for itself an internationally important place.

The experimental and clinical research of the higher nervous activity has richly developed, with special aspect to the cooperation of the two signal systems of man. A new concept of the physiology and physiopathology of the synthesizing analyzers of the first and second signal systems has been created, starting out of the Pavlovian doctrine and further developing it. New notions have been found on the physiology and physiopathology of the cortical region of the parietal lobe and on the proprioceptively motor spheres.

Systematic analysis of a great variety of reflex and mechanical links about the pathogenesis of disk diseases in a large number of patients made possible to create a neural reflex theory of the pathogenesis of the discogenous disease, this so frequent and socially so important ailment. The research includes many partial world priorities. The employed objective physiological methods made also

possible a more profound way to trace the various general physiopathological laws on a model of discogenous disease and to determine the indications and the action of the various therapeutic methods and preventive measures.

On an up to the present time largest material, by means of different methods the clinical and electroencephalographic picture of narcolepsy and hypersomnia has been studied. A singular explanation of narcolepsy was proposed as a dissociated sleep inhibition. The same laws were shown as in the phase states of hypnosis.

Epilepsy was the object of a wide scientific study. The research developed in its whole range from the basic theoretical works to applied research in the clinical practice. Simultaneously, the problems of the neuroses were studied, those which, in view of the higher incidence in our health service, have an extraordinary importance. For a large set of neuroses, by experimental physiological methods, definite physiopathological laws could be found. The researches are continued.

Systematic research of neural infections has also successfully developed. The czechoslovak tick encephalitis and the rozhnov encephalitis was of wide interest even abroad (state prize 1955).

In the semeiology, the pathophysiology and clinic was further elaborated, and the right hemisphere was described as dominant to a certain degree, and the left hemisphere as the subordinate one in the right-handed persons.

Increased attention was concentrated on the research of the use of the various conditioned reflexes for the restoration of the mobility in spastic plegias. A method of using the conditioned reflexes was worked out, and results were achieved which have fundamental importance in clinic and theory.

Considerable progress was achieved in neuro-radiological research. Priority diagnostic methods were elaborated, especially the method of shifting small amounts of air at pneumo-encephalography, and the method of pneumo-perimyelography. The results have great practical and theoretical importance.

The research in electroencephalography, electromyography and in other electroneurological branches has also developed stormily. The results also penetrated into the international literature.

6. Psychiatry. The Czechoslovak psychiatry in the last 15 years underwent a difficult but clearcut development, both ideological and methodological. The reliable basis on which it came to a union of the former classification of scientific concepts was the Pavlovian doctrine and the dialectic materialistic approach to the solution of the problems. The new organization of the scientific work and the planning of science helped the indicated development in many directions. The tasks entrusted to psychiatry and the new point of view in scientific work have brought also into psychiatry a new working concept and a methodology taken over from other branches of science. The psychiatric research is aiming with preference at the field of physiology and

experimental pharmacology, and, for the solution of problems, it uses the methods of biochemistry, electro-encephalography, etc. It contributes to the gradual demolition of the former isolatedness of the psychiatric problems and of psychiatry as a department.

The topics traced in the psychiatric research concentrated chiefly on the development of new active (effective) methods of treatment. The various methods of shock therapy were studied; the application of sleep therapy and of hypnosis were investigated; research of therapeutic regime and of work therapy was developed. Lately, by the wide clinical, experimental and laboratory researches, an extensive display of new and specifically effective chemotherapeutic agents has been achieved. In the treatment of alcoholism, new original methods were worked out.

Special attention was devoted to the study of the problems of child psychiatry. Parallel with the neurology, the questions of neuroses were tracked down. The research of reactive psychosis and schizophrenia deepened. The questions of therapeutic preventive psychiatric care were scientifically investigated.

9. Ophthalmology. The Czechoslovak ophthalmology, in its own scientific research work during the recent years, was able to lean upon a good basis on which it had been working already before. Immediately after the war, it succeeded in stamping out the majority of infectious inflammations of the anterior segment of the eye which especially endangered the eyesight of the newborn. Simultaneously, at a wider scale, concentrated attention was paid to the study and prevention of the consequences of the disturbed mobility of the eyeballs. Thus, it was possible to erect a few stations for the education of amblyopia, and to work out good operative methods for the correction of these states. The results which were thus reached are acknowledged at a wide international forum.

A lengthy research task, followed on many working places, is the problem of physiology and pathology of the cornea, especially the study of the conditions on which its transparency depends. At the first place, we put the clinical and experimental solution of the question of tissue metabolism. Parallel with this basic research, a few operative methods were worked out which facilitate the performance of keratoplasty, eventually making it more secure than previously. All this work developed at a high level, and it has a live international echo.

Special attention was paid to the early diagnosis of glaucoma, and the dispensary care for this ailment. These forms of care have been much more introduced in our country earlier than elsewhere, and upon a much wider basis. Even at other sections of ophthalmology, new special operative methods were developed; especially we refer to the safe extraction of senile cataract, the special operative technique of congenital cataract of the lens, the operation for retinal detachment, and so on.

In the department of ocular traumatology, the research widely expanded in regard to the corrosion and burns of the anterior segment of the eye, and it was shown how the consequences of these injuries depend upon the state of the vascular supply by the intrascleral plexus. For the care of the perforating injuries of the cornea three-thread atraumatic stitches were proposed and manufactured by our industry which make possible the physiological closure of the wound in its deep layers.

In the neuro-ophthalmological department, a few independent disease units were delimited, especially the ischemic edema of the optic nerve, the segmental optic neuritis, the fibrous dysplasia, and so on. At the same time, a few original methods were elaborated for the examination of the anterior segment of the eye with infrared light, and the original apparatus was constructed for objective adaptometry and recording of the changes in the width of the pupil by infrared converter. All these methods have their priority and they are widely and favorably appreciated.

10. Otorhinolaryngology. After the Second World War the scientific work developed at considerable range in all three fields of this discipline.

In otiatry, the introduction of antibiotics brought fundamental changes into the therapy of the acute inflammatory ailments. Extraordinary good results were obtained both in the treatment and in the prevention of the complications.

Substantial attention was paid to the research of the disorders of the hearing due to various causes (inflammatory, dystrophic, degenerative). At chronic inflammations and in otosclerosis the diagnostics was improved by the elaboration of the methods of verbal audiometry for Czech speech with the purpose of making more accurate the indication for the microsurgical methods of improving hearing. The methodology and technique of these operations was improved. The hearing disorders due to noise were studied with measures for their prevention.

In the department of the respiratory ways, the research into the precancerous condition of the larynx and of the malignant tumors has been widened, especially for the larynx. The problems of their treatment, especially the operative ones, have been systematically studied. The question of the operability by partial resection and the healing of the wounds after laryngectomy in an irradiated terrain have been solved. Original methods were elaborated for the schooling of rehabilitation of the voice after laryngectomy, and for the method of functional reconstructional laryngectomy, which makes possible a more perfect use of this schooling. At the same time, work has been done on the problem of scleroma of the respiratory pathways (in Slovakia).

Phoniatriy enjoyed considerable prosperity with the research of the vocal function and speech, especially of the speech neuroses, dysphonia and the mentioned reeducation of the voice after laryngectomy.

The results of the scientific work devoted to the rehabilitation of voice and speech after laryngectomy have been appraised by the awarding of state prizes.

In the department of the swallowing pathways (esophagus) much research energy was devoted to the tonsil problems, especially to the streptococcic anginas and their prevention, frequently in collaboration with epidemiology and microbiology.

11. Stomatology. Already before the War, stomatology had a high level in several respects; under the new conditions, it developed in width and depth.

New notions of international importance have been achieved at the study of the structure and physiology of the tooth, and at the research into the pathology of caries and the reaction of the dental pulp. In the prevention of dental caries, fluoridation of the drinking water was worked out and introduced as a trial. Simultaneously, the contents of fluoride in our water supplies have been investigated. Great efforts were devoted to the conduct of detailed analysis of the state of the dentures of the population.

In the therapeutic care in stomatosurgery new methods were proposed in the care of the developmental anomalies and in the preprosthetic correction of the jaws. A high level was reached in the surgery of malignant tumors and in maxillary traumatology.

In conservative stomatology and prosthetics new materials were made and evaluated, original methods of prosthetic diagnosis were introduced and the theory and practice of the entire prosthesis has been worked up. Experimentally, the main questions of the stomatological casting of metals have been solved. In orthodontics, an original explanation was worked out for the origin and care of the functional anomalies of the denture.

12. Dermatology. While in the prewar period the dermatological research had a character of a tremendous casuality, in the year 1945 and especially after 1948, its systematic development occurred in the framework of planned research. The most important topical impulses for its activity were given by the needs resulting from the effect of the working environment upon the working man in the stage of the new expansion of our industry and of the new technology. This circumstance caused that the chief trend of research was oriented toward the professional diseases and toward the protection of the skin against injuries.

The new tasks required new approaches for the solution. A widely laid fundamental dermatological research started in which the skin was studied from the physiological, biochemical, bacteriological points of view, and the detoxicating mechanism of the skin was tracked down. Since there was no good methodology, original working methods were elaborated, by which the properties of the cutaneous surface were systematically studied. In several respects, the original results reached an international level. As concrete tasks aimed at the practice, methods and means were worked out for the prevention of skin diseases

due to professions, especially, diagnostic functional methods. In collaboration with the hygienists, effective cleansing agents were developed with protective effect upon the skin, and protective agents for the workers at exposed working shops.

C. Welfare of Women and Children

The generally known difficult relations in maternity and child welfare and the high infant mortality before the second World War and after the war, immediately after 1945 and especially then after 1948, became the motive for the development of a wide action aimed at the removal of this unworthy (shameful) state. The scientific approach to the given difficult tasks and the application of scientific notions at the solution had a great share in the ultimate success.

1. Care of Woman as a Mother. From the start, in the foreground of scientific interest stood the main task to assure the safety of child birth for the mother and the fruit. Its solution led our health organization to an international level; in many respects, it brought original scientific results.

In the clinic and in the experiment on animals, great effort was devoted to the study of the asphyxia of the fetus at birth. The results of this research led by an original method to the critical judgment of the importance of the insufficient saturation of the fetal blood with oxygen for the origin of after-birth asphyxia, in case of an accidental decay of the fetus. The so-called oxygen test was worked out and introduced which makes possible a more exact diagnosis of the intrauterine jeopardy of the fetus.

At a high level are the clinical physiological works on the diffusion of glucose from the maternal organism by the placenta into the fetus, on the circulatory relationship in the intervillous spaces in the third stage of labor, and on the relations of the acid-base equilibrium of the mother and fetus during labor. In specific pregnancy diseases, late gestoses, the justification and the possibility was successfully shown how to distinguish the separate stages of the disease with different prognostic importance, and how to differentiate them from other ailments by means of new original diagnostic methods. Greatly valued results followed from the research of the relations between the diseases of the fetus and of the mother and some anthropozoonoses (toxoplasmosis, ornithosis), and the viral infections (influenza, infectious hepatitis), and from the research of the importance of a number of intracellular parasitic viruses, bacteria and protozoa for the habitual abortion.

In the department of labor aids attention was paid to the problem of relieving the pain at delivery, and a special methodology was worked out for the preparation of the pregnant women for the delivery.

The inflammation of the genitals created a group of problems and a special chapter of research. On this exceptionally important field,

progress was made by finding out the relation of the latent infections to the origin of the inflammatory complications. In collaboration with phthisiology, the question of the diagnosis and treatment of the tuberculosis of the female genitals was successfully solved.

In recent years the research of the endocrine disorders was intensively developed in gynecology. Both a methodical approach and concrete problems of the disorders of the menstrual cycle have been worked out. The diagnostics of the developmental disorders was substantially completed, and their share in the disorders of the cycle was indicated. The problems of the ovarian function were explained by embryological studies of the histogenesis and the innervation of the ovaries. The anatomical study on the vascular changes at the uterine cervix in precancerosis and at the incipient stages of cancer achieved an international range.

2. Child Welfare. With declaring a fight against morbidity and mortality, in the first postwar years the efforts of all pediatric scientific work shops were concentrated first of all to the elaboration of methods of a safe artificial nutrition of infants, and to the study of the questions of etiology and therapy of infantile toxicoses. Both tasks were successfully mastered. The foundations of an artificial nutrition were worked out and numerous aspects of the physiology and pathology of mineral and water metabolism in the infants were elucidated. Therapeutically, new rehydration methods were introduced.

The favorable development of infantile mortality, at a further postwar stage, transferred the attention of the scientific workers to the problems of neonatal mortality, and it gave an impulse to a systematic, widely spread research of the physiology and pathology of the newborn. The origin of the childbirth injuries was studied in great detail. From the study, numerous notions resulted for the diagnostics, prevention and treatment of injuries. For lowering the neonatal mortality furthermore, the research of the nursing methods of the prematurely born children had a great importance.

Original, exceptionally valuable theoretical and practical results came from the clinical and experimental researches aimed at the thorough investigation of the blood incompatibility in the newborn. The basis of the diagnostics was staked out, and the methodology of treatment by exsanguination transfusion was elaborated. In connection with these works, original laboratory methods helped to solve the problems of the origin of kern-icterus, at which several unknown aspects of the bilirubin synthesis were solved by the newly found methods.

A special chapter in the pediatric research is the study of the physiology of the central nervous system in the newborn. By the method of the conditioned reflexes, chiefly palpebral and food reflexes, the development of the neural functions was investigated. The used methodology -- partly original -- indicated an interesting difference between the children born at term and/or prematurely.

In the pathology and physiopathology of older children, more problems were successfully studied: in the first postwar years the

treatment of tuberculous meningitis; furthermore, the already previously mentioned therapy of burns by an original, highly effective and economical method which other states have also taken over; the so-called plasmocytic bronchopneumonia, in this the author made a discovery; the group of problems of the chronic non-specific respiratory ailments; juvenile diabetes; diagnosis and treatment of the congenital heart defects (angiographic methodology for the exact localization of the defect and the surgical treatment); and finally the effect of vaccination and treatment on the morbidity of some communicable diseases and the dystrophy of the infant.

D. Therapeutic Methods, Therapeutic Agents and Pharmacotherapy.

In this section of scientific work, which makes a greater chapter of its own in the plan of research, including in itself the topics of the main operative disciplines in medicine, balneology, physiatry and pharmacy, in the recent fifteen years almost in all partial branches it came to a gigantic swing of scientific work and in many cases to advances of an international reputation.

1. Research in the Departments of Surgery, Traumatology, Orthopedics. One of the main long-rang scientific tasks which were solved in the last fifteen years was the group of problems concerning resuscitation -- reanimation. Within the framework of this task, at the study of shock and clinical death, many new notions were gained in the physiopathology, symptomatology and therapy of these states. The discovered results became a work awarded by the state prize; this work detected the cause of the preceding death at large blood trans- missions and by this work a method of therapy was found for the treatment of rapid hemorrhages with the use of blood transfusion, later also with the use of substitute solutions. Very interesting and important are the works on cerebral anoxia.

As a result of the solution of special questions in resuscitation, a defibrillator of high-frequency was constructed which at the World Fair in Brusseles in 1958, was awarded with the Grand Prize. For the installation of artificial respiration and for oxygen therapy further technical equipments were constructed: an automatic valve, a half-automatic reviving instrument, and a voluminous reviving instrument. The experiences from the experimental and clinical works of resuscita- tion were utilized at the elaboration of the design at building resuscitation rooms at the operating wings of the surgical departments of hospitals.

Another important group of tasks which were solved successfully in the past years is the group of problems of surgical inflammations in relation with the rational use of antibiotics. Here belongs the research on the prevention of postoperative infection by the method of the so-called protected coagulum. A state prize was given for the work on the pathogenetic therapy of the after-labor (postpartum) inflammation

of the breast. Equally successful were the works solving the problems of the relation of antibiotics to the lymphatic system and the preparation of antibiolympines which are chiefly resorbed through the lymphatic pathways. The action of the tetracyclic antibiotics was studied on the enzymes, and highly favorable results were obtained which were further elaborated. Furthermore, an important contribution for the rational use of antibiotics was the results of the research on the protective action of the tetracycline antibiotics in case of oxygen deficiency of the organs.

In the physiopathology of the lymphatic system, new original methods of the radiological demonstration of the lymphatic system have been worked out: functional two-time lymphography, indirect lymphography, lymphography of the lumbar and pelvic regions. The research devoted to the part of the lymphatic system in the pathogenesis and therapy of anthrax and tetanus has also brought very important results. Special mention is due to the experience that the method of transplantation, relying upon the experimental biological and genetic studies, has been worked out at a high level and practically applied in our country.

Almost unprecedented is the series of further works which, at a high, frequently international level, solved the operative approach to the therapeutic mastering of some, formerly hardly manageable or even untreatable diseases and pathological conditions, and which make possible reliable results with lowering the risk to the patient. Here belongs the group of works from the thoracic, cardiac and vascular surgery, originating from many Czechoslovak clinical working places. The methodology of operation on the heart, with contraction of the pulmonary and venous openings, in developmental defects, in the cavity of the heart, and so on, was solved and worked out often by original methods. The conditions of extracorporeal circulation have been studied. At some establishments, successful work was done on the improvement of foreign instruments and on the development of original instruments for extracorporeal circulation. Methods were elaborated for substituting for the defect of the vessels homeoplastic and artificial preparations. A method of new operation was suggested and elaborated for the superficial varicose veins by electrocoagulation. The technique of surgery was improved for the palatoschisis, replacement of throat, tumors of the lungs, and of the mediastinum, replacement of the urinary bladder, and of the ureter by small intestine, and so on.

The works considerably developed in the field of traumatology. The technique and methodology of the primary suture of open wounds and fractures was improved as well as the technique of the primary suture (stitch) of ruptured tendons under a screen of antibiotics. Successful was the solution of the question of reconstruction of the injured hand and of the skin plastic. The indication and the technique of osteosynthesis was more precisely delineated, especially of the fractures of the femur and the forearm. Good prevention was achieved

in post-traumatic reactions and in their treatment by super-transfusion, respectively pharmacodynamically. The obligatory active immunization against tetanus was introduced in children. Post-traumatic rehabilitation was elaborated and organized on a state-wide basis.

Special attention was concentrated in research of the treatment of burns. Treatment with compressing bandages, covering spray and early plastic surgery, with control of the internal environment and hemodynamics, has been worked out, with pertinent aseptic measures, from the rendering of the first aid on.

On the basis of the studies of the defects of the hip joint in displacement at the juvenile age, bloodless methods were introduced in orthopedics for the correction by the use of technical devices -- biochemical appliances and large feather pillows (pads). The problems of plastic surgery of the hip joint with the use of metallic or auto-plastic material have been also solved.

2. Research in Balneology and Physiatry. The period from 1945 means the stage which interfered with the Czechoslovak baths affairs in an almost revolutionary manner. From this change new great tasks resulted for the balneological research and for the creation of a new scientific approach to the balneological practice.

The concept of balneotherapy was fundamentally changed in the spirit of the doctrine of I. P. Pavlov. It is understood as a synthesis (set) of a whole number of factors of the external environment combined with the use of the natural therapeutic sources. For the scientific practice, then, from this the task will arise to put the treatment with the natural agents upon a firm basis of scientific research, to make it objective, to release the balneological and physical treatment from the obsolete and unnecessary (unjustified) methods, and to get rid of the superstitions.

The research developed both in the clinical and the basic aspect. In the basic research, substantial and wide questions were solved in the physiology and physiopathology in relation to the therapeutic methods by the natural agents. The clinical research started on it.

In the basic research, with an original method, a few important questions were solved and they gained an international reputation. The laws were established by which the iontophoresis is controlled; simultaneously for the practice the methodology of dosing of iontophoresis was worked out. The laws of the polar and interpolar reactions were established at the passage of the galvanic current through the body. New basic notions were revealed on the course of the thermoregulatory function in the different forms of bathes. The conditions of the absorption of iodine from the therapeutic baths were established.

In the section of clinical research, on the basis of long-lasting tracking of the function of the kidneys and of the urinary pathways, therapeutic approaches of complex balneotherapy were worked out for the treatment of urological diseases. The methodology of complex

therapy of the stages after poliomyelitis has been worked out, the action of the injection of the source gas was examined, evaluation of the several physiological indices after the application of the various peloids was done, the action of the carbon dioxide baths upon some indices of the circulation and upon the vegetative indices, etc., was followed up.

Parallel with the given physiological and clinical research, studied were finished which are important for the evaluation of the natural sources (springs). The methodology for the judgment of the peloids was worked out, the research of the enzymatic activity of muds was tested, and several analytical methods used for the analysis of mineral waters were simplified and made more accurate.

3. Research on Blood Proteins, Fractions and Substitute Solutions

In close connection with the development of the transfusion service from 1951 on, a systematic research of the blood and of the blood substitutes has started. After the surmounting of the initial difficulties, in this field the scientific work has obtained eminent theoretical and practical results.

The technique of the blood protein fraction production has been reproduced and, after certain modifications, transferred into production. The fractionation was elaborated by aluminum salts. On a principle hitherto nowhere in the world used, a new method of the isolation of the gamma globulin was proposed and worked up by means of acridine pigments (Rivanol). The new technique was a great clamor, and it reached quick spread also in the foreign countries. Similarly original is the result of the work which successfully isolated from the protid plasmatic spectrum a new, hitherto unknown fraction, called leukokinin which increases the ameboid movement of leukocytes and which takes part in the cellular defense of the organism.

The successful solution of the preparation of fibrin rings has an international extent, and these preparations are in practical use in the vascular surgery for the sutureless anastomoses. A preparation was elaborated and the production of the substitute antishock substance "dextran" was solved, and a new method was elaborated for its fractionation. An original method was worked out of the preparation of cardiolipin, and it was transferred into manufacture. With the solution of the preparation of this important and basic agent for the diagnosis of syphilis we have set ourselves up in business considerably against the foreign countries.

4. Research of New Drugs, Antibiotics, Sera and Vaccination Substances

The research in this segment represents an important level and a successful stage of scientific work which laid down the basis of the origin and prosperity of a new department of the Czechoslovak industry. Here more than anywhere else, the importance of the complex solution of problems in close cooperation of the theoretical various scientific disciplines and the clinic has been proved, as well as the importance of the approximation of the scientific-research workshops to

the manufacturing centers. During the time since the year 1945, and especially during a period still considerably shorter it was possible to build out a highly articulate organism of scientific workshops and industrial enterprises, and to furnish it also materially with a cadre whose quality is growing year after year. Thanks to this development it was possible not only to elaborate and transfer into production the almost entire known modern well-proved drug preparations, but also to develop further original preparations and to work out special methods. We arrived thus to stages that, in regard to the safety of drugs (assurance of drugs) for special demand, Czechoslovakia became practically self-sufficient, and that even an export is quickly developing.

In an unforeseen number of solved problems, of published patents and of obtained results we have to limit ourselves in this part only to a main outline.

In the field of antibiotics we have reached the stage that all ten important and main antibiotics have been prepared by research and transferred into production in a very good quality. To this result, biologists, physicians, and chemist have contributed, and their collaboration made possible several important successes of international level. For these scientific successes state prizes have been awarded. We have been the first land on the earth where the problem of the peroral penicillin preparations has been solved. The scientific elucidation of several secondary effects of the tetracycline antibiotics upon the macroorganism has been laid down, and the preparation of tetracycline citrate was compiled. Furthermore, model preparations of antibiotics, with specific affinity to the lymphatic system have been worked out, and the group of problems of the aimed flooding of the organism with antibiotics has been elaborated.

In the segment of the special pharmaceutical preparations the chemotherapeutics should be mentioned with priority, of which a whole series was developed, and whose quality is at the international level. Our sulfonamides are looked for and are exported to foreign countries.

Remarkable successes were obtained in the research of the anti-coagulants. An original preparation, the Pelentan, was developed, which is known all over the world, and is manufactured even in foreign countries under Czechoslovak license. The Czechoslovak heparin was prepared in good quality. Very successful was the research of the ergot alkaloids, where an original methodology was worked out so that the cultivation of the ergot, the isolation of the active substances, and their chemical transformation are now at the peak of the world level.

On the basis of the research work the production of the cardiotoxic (digitaloid) glycosides was successfully solved and assured. From the substances against hypertension the synthesis of reserpine was examined, and from the ganglioplegics the Czechoslovak pentamethonium and dimekamin.

~~FOR OFFICIAL USE ONLY~~

From the substances acting upon the nervous system, an original antihistaminic drug was developed, and an effective original spasmolytic, the thiospasmin. Lately, great attention was paid to ataractic drugs in which the research is going quickly forward.

Also the synthesis of the steroid hormones has been mastered, and the production of all therapeutically important proteo-hormones has been solved. The production processes were elaborated for the most modern insulins. An original peroral antidiabetic drug is under research.

For the fight against tuberculosis we have the effective preparations of INH and PAS. In collaboration with oncology, the cytostatic azauracil and azauracilriboside were prepared, and the way was solved from the croton lactones to further substances. The preparation of the vitamins B₁, B₂, B₆, D₂, C, K₁ has been solved and introduced.

Of the high level of research in pharmacotherapy and of the social importance of the obtained results testifies the fact that to the workers in these problems groups the state prize was awarded five times: for research of the relations between the chemical constitution and the pharmacodynamic action of drugs, for research of the complexons, for elaboration of a method of production of vitamin B and sulfadimethylpyrimidine, for research of the ergot alkaloids and elaboration of their production, for research of the alkaloids isolated from the various kinds of Colchicum.

In the segment of sera and vaccines, our research, lately closely related to the production, was worked out so that now we have at our disposal all classical preparations in good quality. Here, the research is quickly developing further. Especially the ready mastering of the preparation of high quality vaccines against poliomyelitis and the successful execution of the vaccination action as a whole-state measure should be mentioned. Of the success in research and the use of the original vaccine against tuberculosis, of the M-vaccine, we have already made a note before.

E. Scientific Bases of the Organization of Public Health Affairs.

A special independent chapter in the plan of research is given to the topics embracing the question of theory, history and organization of public health affairs, health institutional affairs, health statistics, revision service and health culture. The question is about an intricate group of problems of a wide scientific segment whose main efforts are directed to it that with scientific methods the form of the socialist public health should be shaped, the reliability of the bases of the Czechoslovak public health system should be incessantly checked (verified), and the anticipation of further development of our party should help these bases to become firm and to become more profound so that the conditions for a smooth transition to the stage of communism should

~~FOR OFFICIAL USE ONLY~~

be assured. The task is not easy. This scientific sphere is developing in our country only in the cadre, and the sense of the existence of a discipline of "organization of public health affairs" is subject to discussion, while in the Soviet Union and in further socialist states as well as in the capitalist world its importance is beyond dispute. By such a situation the results which research has transferred to the segment of the organization of public health affairs are stimulating.

An object of a long-range research is the study of the health status of the Czechoslovak population. It is a standard task whose important part is the original, successfully solved experimental research of all diseases. The materials from the study of the health state of the population have been also the foundation on which the Scientific Council constructed the hypothesis about the development of the demographic and health status of the population of the Czechoslovak Republic in a long-range perspective.

No less important are for our public health affairs the works which scientifically justify, elaborate and experimentally verify new organizational forms and methods of work from the viewpoint of the principles of socialist public health affairs.

In the segment of institutions, a whole series of partial tasks have been successfully solved, studying the functional panel and the types of the selected health equipments, occasionally their parts.

In the field of revisional activity, the characteristics of a few important professions have been worked out, and the revisional criteria were scientifically motivated in nosological units which mostly contribute to the morbidity connected with the working invalidity.

J. S., Prague 12, Str. W. Piecka 98

(Submitted to editorial office in March 1960)

III. FIFTEEN YEARS OF INDUSTRIAL DRUG PRODUCTION IN CZECHOSLOVAKIA

Pages 588-591

Engineer Josef Palkoska

Director of the SPOFA (: Spolecnosti farmaceuti: Association of pharmacutists?) Association of Enterprises for Health Manufacture.

In Czechoslovakia, the manufacture of drugs has developed differently than in other countries, and with considerable delay. In the years 1925-1930 a whole series of producers started with the preparation of imported substances in dispensing shape, the preparation of Galenicals in an enlarged therapeutic scale. The chemical production in a laboratory scale occurred only later, as a consequence of the insufficiency of the imported substances, and chiefly during the period of occupation when, after the closure of the high schools (universities) the university workers and students entered into the factories. But even in this era, it was impossible to develop and to build the industry, since the chemical industry proper has been dependent upon foreign concerns, and it was unable to a limited extent to deliver the basic chemical compounds needed for the synthetic drugs. Even for the working up of the drugs (medicinal plants) and of the animal material, it was not prepared. The cultivation of therapeutic plants has been unknown in our country, and a limited collection was set up for the use in the people's posts of Folk's medicine treatment, not so much for the need of the pharmacies. The collection of animal organs, too, which has been introduced in 1941, was designed for the enterprises in Germany, and only to a slight extent were the organs and glands worked up into different extracts in the domestic factories. Beside the larger producers, there was a whole series of small workshops which, licenced up to 25%, have been working up foreign specialties from imported substances or have only adjusted the ready final medicinal forms; in addition to this, entire series of productions were directly provided in the pharmacies. Of course, this method of production was very lucrative, the expenses fell upon research, and, with the primitive equipment and cheap manpower, it was easy to manage the production. To get a permit for the manufacture and to register a specialty was no trouble at all. The number of the manufacturers steadily increased, and, by the end of the Second World War, it reached about 150. Almost 5,000 proprietaries were registered, and even in 1947 there were 2,500 preparations, often of the same composition, and mostly in groups which we would today call of little therapeutical effectiveness.

After the nationalization in the years 1946-1948 the main task has been the provision of restriction so that already in 1949 the

number of the produced specialties dropped to 638. However, even such a large number of specialties had covered only 30% of the drug requirements at home, whereas the remaining portion was assured by the importation of specialties.

In the first phase after nationalization, the concentration of the pharmaceutical productions was directed to separate types of drug forms, and specialization of the individual factories was provided. The construction of the basic productions has started for the purpose to gradually substitute for and replace the import of ready medicaments, and to assure sufficient supply. To be sure, in 1946 and in 1948, the production of even the most needed chemicals, antipyretics, analgetics such as acetylsalicylic acid, phenacetine, antipyrin, amidopyrin, sulfonamide, besides sulfanilamide and sulfapyridine, was not guaranteed, it was necessary to import the basic sedatives, hypnotics, steroid hormones, vitamins, diuretics, spasmolytics, and so on. Beside the difficulties in the production, the importation also disturbed the continuity of production, not to mention the considerable expenses which had to be exerted on the importation during this time. For this reason the construction of new production has been inevitable and unavoidable. In 1948 the production covered only 1/6 of the entire need of ready medicaments, whereas 5/6 was imported, beside the importation of the pharmaceutical chemicals. During the same period they started the construction of the research and control institute. The control was aimed chiefly at the revision of the controlling methods, at the elaboration of new analytical methods, the widening of the pharmacological departments, bacteriological laboratories and at the erection of a farm for laboratory animals. Revision of the manufacturing procedures had to be done for the separate specialties and for those substances which during this time have been produced to a limited extent. An injection department was built, ointments and suppositories were made, liquids were manufactured, tablets and pills were produced. In all these products, the composition and the procedure were revised for the guarantee of higher stability. The greatest efforts were however spent on the construction of the chemical industry, especially the production of sulfonamides, barbiturates, papaverine, roentgen diagnostics, ergot alkaloids, steroid hormones, vitamins, antibiotics, and organ preparations. The construction of the chemical productions made possible an extremely large collection of ready drug products which had to be elaborated by research, mastered by technology, and solved by engineering methods. In many cases, it came to the construction of apparatuses of an output of up to several hundred tons of synthetic substances whose production covered the domestic needs and even the demands of exportation.

The building up of the chemical productions was made possible by the development of the basic chemical industry, by the development of the research institute and by the establishment of industrial technological laboratories. The topics of research, in the first years

after the nationalization, have greatly influenced the tasks of establishing the productions of known substances which formed the basis of the chemical production proper. Until lately, it was possible to get at an original topic and search of new original drugs. A whole series of workers had to be educated not only for research but also in industry, control and in the economic functions so that the complicated problems of the chemical and pharmaceutical productions could be mastered in their technical and organizational aspects. In the course of development an enlargement of the collection and its modernization had to be guaranteed, assurance of the final quality of drugs, in the pharmaceutical productions new roads had to be entered for the mechanization of productions of the dispensing forms, injections, tablets and pills.

PRESENT STATUS OF PRODUCTION AND ITS FURTHER NEXT DEVELOPMENT.

From 1948 on, the production has grown more than ten times, and the number of workers increased about 4 times. The tempo of growth in production was not even in the separate years, especially small was the increment in the years 1953 and 1954, although even in these years the uninterrupted growth of the basic chemical productions continued. By this time, the chief influence on the rise of production came first of all by the development of the production of the antibiotics whose production steadily increases. Lately during the fifteen-year period, the construction of workshops for vitamins and their demand for animal production has contributed to the growth of industry.

The number of preparations dropped in fact to 540, at which however only 272 are original, of which the majority has only the name even if the composition has changed during the time. During the ten years, 268 new modern preparations have come out which has improved greatly the assurance of pharmaceutical care. The quality improved, and it came to a substantial lowering of the unstable preparations. In the year 1948, the number of complaints was about 1%, in 1957 this ratio was only 0.14%. With the growth of production and the increase of the quality of products, a steady drop came in the import of ready medicaments. Thus in 1948, the import was eleven times larger than in 1960. With the development of production, the export is developing. In 1949, the rate of export was only 1.5%, in 1958 it was already 20.5%. Already in 1958, the export was so large as the whole production in 1949. The growing production tasks were guaranteed by the permanent growth of the productivity of work (labor). In the first period of development after 1948 the chief sources of the concentration of production were the concentration, specialization and organization of work. From 1955 on, it is solely the great mechanization of pharmaceutical operations which has a favorable influence upon the growth of production, enabling a further development.

The collection of imported drugs was reduced. While in 1951 the number of imported medicaments was about 600, in 1960 it dropped to 100, of which 15 are antibiotics, and 85 are other drugs. Even in the future we must count with a certain import, since in the production proper it is not wise, not economical and sometimes even not possible to produce a smaller amount, especially if the product is protected in our country by patent applications.

The state of the individual productions:

PRODUCTION OF SYNTHETIC DRUGS

For the production of ready remedies, the pharmaceutical industry requires 254 pharmaceutical chemicals, considered chemically pure substances, of which only 212 are manufactured and 42 are imported. Vitamin A is passing into half-operation, vitamin B₁, B₂, B₆ are currently manufactured, the preparation of vitamin B₁₂ is elaborated in research, vitamin C is manufactured at a large scale, furthermore the vitamins D₂, K₁, K₃, K₅ are produced, and in a half-operation is the production of vitamin E synthetically, even from germ oil, also nicotinic acid, and niacinamide; from the hormones, the testosterone, methyltestosterone (p. 590), progesterone, ethinylestradiol, ethinyltestosterone, desoxycorticosterone; from the synthetical ones, diethylstilbestrol; at the same time, work is done on the introduction of the manufacture of cortisone, hydrocortizone, and the preparation of prednisone and prednisolone and further methyl and fluoro derivatives. Among the sulfonamides we can mention all the classical sulfonamides such as sulfanilamide, sulfathiazol, sulfaguanidine, sulfadimethylpyrimidine, phthalylsulfathiazol, sulfanilacetamide and the newest sulfamethoxyprazidine which are manufactured in our country.

From the barbiturates, large is the production of phenobarbital, pentobarbital and thiopental. We have in the production collection synthetic anesthetics such as mesocaine, tetracaine, synthetic analeptics and antiepileptics. A special subject group is formed by the anticoagulants such as Pelentan, for which we have a world priority, and antihistamines such as Antihistamin, analergin, alfadryl, and so on. Currently we manufacture synthetic analgetics, and lately we developed the group of ataractics. Beside guaiakuran, there are benactyzin, theadryl, meprobamate. The collection of x-ray diagnostics was enriched beside the already known diodon and triumbren still by the Jopagnost and Ultrabil.

Among the synthetic medicaments we may further mention the group of dermatologic drugs, diagnostic agents, muscle relaxants, neuroplegics, and spasmolytics. All the groups are enriched by further new preparations which are already in, or are being introduced into, production.

PLANT-DERIVED MEDICAMENTS

At home, about 185 kinds of medicinal plants are used, from this 100 types are freely growing in Nature, and 55 types are cultivated; 30 types are imported. In the Research Institute of Medicinal Plants a special division of agrotechnical methods is elaborating methods for the cultivation of medicinal plants and the results are transmitted to the cultivators. Especially good results were obtained in the artificial cultivation of ergot. Today we have at our disposal a whole series of stocks of the different alkaloidal types which we can use for the evaluation of the ergot at the manufacture of the ergot alkaloids. Similarly so, at a large scale, the camomile is cultivated, and the red and wooly foxglove for domestic demand and for export. The treatment of the medicinal plants reached a high level.

The production of the ergot alkaloids is in the first line; among them we produce at the same time the ergotamine, ergometrine, methylergometrine, dihydroergotoxin, dihydroergotamine, diethylamide of the lysergic acid. Further research of the preparation of partially synthetic ergot alkaloids is continuing.

Even the production of the opium alkaloids has been substantially widened in the past years; in recent times, work was done especially on the modernization of the entire manufacture which has to be newly set up in the course of the third five-year plan. The simultaneous production includes all derivatives of morphine, specifically not only for the own need, but also for export. In the isolation of the crystalline glycosides from foxglove great progress has been made. The manufacture of crystalline digitoxin, lanatoside C, mixture of the crystalline glycosides ABC and of desacetyl-lanatoside C from the wooly foxglove has been introduced. Beside these already mentioned medicaments from plants, which are obtained as chemical entities, at the same time the whole extract was also worked up for the preparation of Galenical remedies.

In the last few years, with the development of the chemistry of the corticoids, good raw materials are looked for for their manufacture, especially from the group of sapogenines or alkaloids of a favorable chemical structure. Plants are looked after which could be cultivated under our climatic conditions. It is not excluded that the fermentation procedure will be a more favorable solution than cultivation. But, even with that, there will be new problems which will show what an importance the plants as sources of new medicaments have.

MANUFACTURE OF ORGAN PREPARATIONS

During ten years, the production of insulin preparations has been mastered so that today the assortment is complete. Beside the normal crystalline insulin, we produce globin-Zn-insulin, protamine-Zn-insulin, watery suspension of purified amorphous insulin as dep-,

interdep-, superdep. A further important group are the pituitary hormones. Currently we manufacture corticotropin, follicotropin, luteotropin, somatotropin, thyrotropin. Previously, pituitrin was manufactured from the pituitary; today it is substituted by oxytocine which is prepared synthetically. Among the other organ preparations there is choriogonadotropin, secretin, pepsin, trypsin, liver extract, heparin and further others which are currently produced in our country.

PRODUCTION OF ANTIBIOTICS

Since 1949, when the production of amorphous penicillin was introduced, the manufacture of the antibiotics expanded to 10 produced by fermentation, in addition to two antibiotics which are synthetically made.

In our country we currently make penicillin G and salts, penicillin V as acid and potassium salt, among the tetracycline antibiotics there are chlorotetracycline, oxytetracycline and tetracycline in different forms of dispensing, further on the streptomycin sulfate and dihydrostreptomycin sulfate, and lately we also entered on the production of erythromycin, fungicide, and work is being done on neomycin. Among the synthetic antibiotics there is already the older production of d-chloramphenicol, which is steadily improving from the economic point of view, and the production of d, l-cycloserine has been newly introduced.

PRODUCTION OF FINAL MEDICINAL FORMS

This production has been modernized not only in part of preparation, but also in part of dispensing and of final adjustment, it is done on assembly lines which guarantee the standard quality of the products. In this production the greatest difficulty is the deficient quality of the packing material, the lacking precision of its manufacture, not to say anything of the ampul, phial or of the external wrapping material, which project, -- in addition to the difficulty in production -- also into the stability of the final medicinal form. During the whole time we have not introduced any other dispensing form, excepting the gelatine capsules, partly for the inaccessibility of a dispensing machine (the SCHORER Firm, which is willing only to dispense in it) for the soft gelatine capsules, in case of hard gelatine capsules there are difficulties with the dosage and administration of the capsules from America which is the exclusive manufacturer.

The industrial production covers not only the demands of the Ministry of Health but also, to a considerable part, also those of the Ministry of Agriculture, and partially also those of the food industry, beside the requirements of the foreign trade.

Even in the third five-year period, in addition to new productions which will be laid down in research, the main center of gravity of construction is just in the classical productions of the pharmaceutic

~~FOR OFFICIAL USE ONLY~~

chemicals which are at the same time either in half-process or in manufacture which however does not have sufficient capacity or it is obsolete. Planning was arranged for a new construction of morphine and derivatives, of vitamin E, of ephedrine, vitamin A, enlargement of the production of vitamin B₆ and C, enlargement of the production of the foxglove (digitalis) glycosides, of glucose, heparine, dry nutrient media, and a whole series of other smaller synthetic productions in the amount of from 100 Kg to 2 tons.

The further demand of antibiotics and vitamins and of some chemotherapeutic agents and amino acids in the agriculture, the enlargement of the export in the third five-year, the widening of the demands in the Ministry of food industry gives our production further economic suppositions so that, just in the third five-year period, the share of the Ministry of Health will be under 50% of the entire national industry so that the current and uncalculated monthly requirements of our distribution will be more smoothly balanced.

The growing industrial production of medicaments in the Czechoslovak Republic gives a good assumption for its further development and housekeeping, yet it is very much necessary that the highest support should be reached by the scientific medical workshops and by the entire medical ground so that it should be possible to maintain the level in the world and vice versa, that the production of medicaments should get into the foreground among the greatest industrial enterprises, by the quality and freshness of its preparations.

J. P., Praha-Zizkov, Husinecka 11.

(Submitted to editorial office in April 1960).

~~FOR OFFICIAL USE ONLY~~

IV. DEVELOPMENT OF OUR GASTROENTEROLOGY AND NUTRITION
IN THE PAST 15 YEARS

Pages 591-593

Dr. J. Masek, lecturer

Institute for Research of the People's Nutrition in Praha

The contemplation of the time phase which begins with our liberation in 1945 and which roughly ends with the year 1960 is a very cheerful thing. To be sure, into the next five-year period we are entering still with greater possibilities of planned research, and generally already with an accomplished organizational network in the whole field, up to a few exceptions, on a generally clear basis (for instance speciality preparation of the field for experts in metabolism and nutrition, II. class). Also other material conditions have been also assured -- for instance the development of working places for research and school, and the rapid growth of expert cadres. Considerable support is also the specialist society, the Czechoslovak Association for Gastroenterology and Nutrition, a section of the Czechoslovak Medical Association (J. Evang. Purkyne Association), whose foundation in 1945 and the first meeting in 1946 was still conducted later by the great personality from the period before the Second World War, by Prof. Jirim Scheiner, the first chairman of the association. From the scanty 18 members, at the end of 1946 it became already an association of 52, and today there are 250 members among whom almost 20 personalities of real prominence can be enumerated. The working meetings, conferences and sessions are the lever of activity. Last year's 8th meeting with international participation has been a great review of the activity and of a high level of expertness.

The magazine of the Association also, coming out already as the 14th annual volume under the title of Czechoslovak Gastroenterology and Nutrition, has grown from its original (under the title "Gastroenterologia bohema" /Bohemian Gastroenterology/- review for physiopathology of digestion and nutrition) not only by volume but also by its importance in our life of specialties.

The material presuppositions in themselves would still not mean an actual development if they would not have been carried by the working forces and efforts of those who after 1945 have consecrated their forces to the new and at that time hardly traditional specialty field -- gastroenterology and nutrition.

Even in our country, generally it was an old tradition of clinical work and there is a large staff of surgeons who devoted themselves in detail to abdominal problems. But, new forces arose to their work, and from new positions, in a new historical epoch. Leaning firmly on the scientific dialectic materialism, they started to systematically develop our expert activity not only as much as possible but also in a new

~~FOR OFFICIAL USE ONLY~~

quality, growing from the new bases developing with socialistic societies, from their demands and from their own new cultural force. A particularly characteristic sign is here the stressing of the experimental activity whose consequence was the rational foundation of medicine on physiology and the experimental approach to the solution of all the problems. The classical pattern of the materialistic physiology has become here the traditional school of I. P. Pavlov who, also by a firm connection of the interests of physiology and clinic has given an example of the form of research which as experimental medicine is today everywhere the appreciated approach to the rapidly growing health problems. Even if before about ten years the forms of this approach were often made difficult with dogmatism and with formalism, following also from the ideological immaturity, this moment was none the less a powerful encouragement for the clinics to approach the physiological thinking and to fructify it in return by their collaboration. A few home-made patterns were also not amiss in this direction. For the development of our special field, next to the classics, there have been also physicians of the younger generation in front of whom stood the late Dr. Milos NEDVED, lecturer as the personality most outstanding in our field. He devoted himself to the problems of proteins and he wrote a detailed study on the health aspects of the nutrition of the people. He was the first to review for us the state of research in nutrition and dietetics in the U.S.S.R.

The research and the practice in our country went on very nearly by themselves. The research sensitively intercepted the demands and possibilities, growing from actual health situation, and replied to them. Hence, no wonder that the wave of epidemic hepatitis, luckily seized epidemiologically by the Raskov group and quickly concentrated in our country to the hospital in Motola, and then to the Pavlov Institute at Karlovar, has been the subject of careful study. Let us remark that one of our successes is the exemplary epidemiological study and the interception of hepatitis, the recent establishment and determination of the "Motol virus" (KUBERIKA et al.), the finding out of the peculiarities of cure of infectious hepatitis by a group of clinicians (HOENIG, TION, SOUSEK, and in the Slovakia HOLOMAN et al.), the recognition of the pseudoneurasthenic syndrome (KLIMKOVA), studies of the group from Karlovar led first of all by the above mentioned. Newer are the works about the liver tests and their diagnosis, and in our country original studies about porphyria and about the deviations of the liver clearance from the Netouska clinic (HOENIG, BERMAN and others), and the very original discoveries of TALAFANTOV about the glucuronic couplings of bilirubin.

Already in 1949, at the first session it was possible to discuss cholelithiasis and cholecystitis. The biliary pathways were a center of the attention of surgeons (PODLAHA, NIEDERLE, CARSKY), and more recently also of the internists to whom is contributed the introduction of the method of temporary duodenal intubation by HERFORT and others.

~~FOR OFFICIAL USE ONLY~~

In the postwar years, the problems of nutrition were concentrated about the protids. The protids thus became at a certain time also the interest of research, generally the motives here were still more profound (fight against cancer, new physical and chemical methods, chromatography of the amino acids, electrophoresis). In our country, to this group of problems belong also the works of SLAVIKOV about the metabolites of folic acid, the work of POPOV on the protein optimum, the studies of HRUZOV on the so-called "reserve" protein with a sharp division of the "labil" and of the "stabile" one according to the speed of digestion.

Not even the clinicians remained in the background. Study was made of the postoperative nutrition, especially from the point of view of the supply of nitrogen (CARSKY Clinic in Bratislava, KRATOCHVIL on dogs). These possibilities are controlled by the method of nitrogen balance (DOBERSKY and others, KOJECKY, BUCKO). The problems of parenteral realimentation, promoted abroad especially by the works of ELMANOV, were solved in our country experimentally by KRATOCHVIL.

Again we turn to the problems of hepatology:- thus, from the point of view of "harmfulness", the hyperprotein diets are already solved at a certain period of their evolution (session in Luhacovici in 1958). Directives are here especially the works of SHERLOCK. From the diagnostic methods, the bioptic puncture of the liver, the puncture of the gallbladder according to ROYER, remain isolated; thereafter, the laparoscopy (HOUBAL) and the splenoportography meant a certain success; they were elaborated at a higher level (ROSCH et al.). This promises a certain help even in the diagnosis of pancreatic lesions; it was worked out here by HERFORT.

In "classical" gastroenterology a certain success is the Czech polarographic method for pepsigen (JANOUSEK). Attention is paid to the determination of these ferments also in the seza (RONSKY) as well as in the urine (GREGOR). The main interest (importance) together with the "domestic" gastric test, detected independently from the English procedure by PLACER and PELIKAN, consists in the possibility of determining the potentially malignant state of achlorhydria. Remarkable studies on the influence of antihistaminics upon the secretion of the stomach, showing a variability of effect depending both on the state of the gastric mucosa and on the size of the dosage, have been worked out by KOHOUT and KORBIV.

In the research of the ulcer disease our authors started out just logically from the neurogenous concept. Here however it did not come to any surprising discoveries; nevertheless comparison of experiences was made according to the type of work; the obtained results, including the evaluation of cure by sleep, were gathered at the dispensary signs (KUHN) and we proposed our classification of the stages of the ulcer disease (MASEK). In our country only in the last few years did they start with the viopsy of the gastric mucosa, and were the characters of the different types of gastritis stated more precisely, previously accessible to diagnosis only by the gastroscopy. After a number of years

interest was focussed upon the diagnosis of the intestinal radiological lesions; the basic work on the diagnostics of the disturbances of the small bowels was written by VESIN. Newer are the subject of controversy of the possible artefacts of the methodological technic (mainly the contrast substances -- CHOCHOLAC, PIRK et al.). A special commission under the guidance of MARATKOV devoted itself in the last few years to the physiopathology of the intestines even from other aspects.

In the field of the nutritional group of problems it came to an essential clarification of the concept: - science in nutrition. Similarly as, e.g., the oncology, the nutrition science is also not identical with any other field, however it is a synthesis of knowledges of the physiology, physiopathology, clinics, therapeutic nutrition and the science of food articles. In its preventive aspect it is a hygienic science. Two experts are here specialists according to the performance of their practice: - one is the hygienist of nutrition, aimed at the prevention by nutrition, at the tracking down not only the requirements and the qualities of the food but also even the indices by which some nutritional types appear in the state of the nutrition of the population, and then the other is the clinician studying the metabolism and dietetics. An expert designing toward nutritional problems may also come from the physiologist or the physiopathologist or from any other expert, but there is no "specialization" in such a function. It is the physician together with the chemist, the food experts, agriculturists, etc., who build the science of nutrition. The specialization will express somewhere the function, but in the scientific field the division is clear according to the method of approach to the study of a few questions (clinical, physiological, biochemical, etc.). The change of functions, of specialization, of method of approach in research, of scientific segment as a whole and of its purposes lead comprehensibly to misunderstandings which appear even at the international forums in the discussions, for instance, the specialization of "nutritional workers". To be sure, a "nutritional worker" may exist, but his main approach is again that of a clinician, physiologist, hygienist or of any other older worker devoted to nutrition chiefly from his own point of view, from the other aspects he is then as an educated physician with extremely wide erudition.

In the research plan in 1959 it came to the articulation of a new standard task under the title: "Research of the foundations of a rational nutrition of man". Here, the main problems of research are already clearly set after a few years as the question of the importance of fats in nutrition. Already today, we do not look at fat as a mere calory bearer or only as a carrier of vitamins. Even in our research, the relation of cholesterolemia to the dosage and type of fat is clearly indicated, but also to the degree of the working effort (MASEK et al.). The differences between cholesterolemia in the Far East and in the European nations has been emphasized by REINIS. A study appeared on the influence of oils on the course of atherosclerosis (SOUKUPOVA, VAVRIKOVA, FIALOVA et al.). The question of the effect of the

exogenous cholesterol on the blockade of the use of fat has been intensively studied (FABRY), also the occurrence for the state of heparinocytes (FABRY, FODOR, LOJDA), the effect of high fat intake on growth and on the composition of the body of animals, and other questions which touch on the problem of obesity. A further task is the study of the foreign matters in food articles (JANICEK). This research has a very promising outlook, and in a few cases it is connected with questions of hygiene, tracing the toxicity of some adjacent customary substances (pigment, preservation agents -- GORNER, HALACKA). A special chapter is also the research into the differential boarding of workmen, guided in our country by WOLF. With the study of the toxic effect of fluorine remarkable results were obtained in Slovakia (the MACUCH collective).

A wide research of the state of nutrition of the population has been aimed at the knowledge of between nutritional norms; it was especially necessary to separate it for the Czech land (KRIKAVA) and for Slovakia (BUDLOVSKY).

Gastroenterology also has its further perspective of growth. The prepared meeting of the Association in 1961 has to be devoted to the pathology of bowels, i.e., to include not only the diagnosis, but also the dynamism of the non-inflammatory ailments and of their connection with the macro-organism. More than elsewhere the new methodology of approach is also recording further progress in this field. Hence, here it is a sensitive point to improve the roentgen diagnostic by means of the new roentgen devices (roentgen kinematography, television, and so on), which save personnel and patient from an overexposure and which make possible the approach to the study of the motility of the digestive tract. New methods are also the use of transistors, the introduction of electrogastrography (KOJECKY), the biopsy of the stomach and of the intestines (SETKA). For the progress of public health it is also necessary to deepen the research of therapeutic means. For this purpose, the committee of the Section elected a special working commission, with Prof. FUCIK in the front. Other lines of research are the problem of digestion and resorption, the research of pancreatic diseases, the tracing of the bile ducts, and so on.

The Czech and the Slovak gastroenterology and nutrition is growing then not only in width -- about which testify the creation of member groups in Brno, Bratislava and Kosice (:Kassa) with a clear arrival of young and enthusiastic cadres -- but it also steadily improves its basic research and its relations with the practice.

Meditation over the past years has brought here not only some satisfaction, but also an encouragement for further activity, for further discussion and for increased efforts to bring prosperity to the field on a higher level than before. The method is to rise the part of experimental work, inevitable is also the improvement of instruments, if it has to come to further progress. The approach is a correct ideational aiming, noetically given by the dialectic materialism,

~~FOR OFFICIAL USE ONLY~~

and the use of those up-to-date methods which are presented to us especially by mathematics.

We are convinced about the further successes which in the future years we will have both for the interest of the sick and for the correct prevention and for the further widening of the good name of the Czech and the Slovak science in the world.

J. M. Praha-Krc, Budejovicka 800

(Submitted to editorial office in March 1960).

~~FOR OFFICIAL USE ONLY~~

V. THE DEVELOPMENT AND THE TASKS OF BIOPHYSICS IN CZECHOSLOVAKIA

Pages 593-596

Prof. Dr. Ferd. Heroik

Biophysical Institute, Czechoslovak Academy of Sciences,
Brno.

Biophysics is, in a certain sense of the word, an old discipline. Suffice it to recall the works of HELMHOLTZ who was a great biophysicist, and who made himself famous especially by works on the biophysics of the sensory organs. Then, however, a certain gap came in the development of biophysics which was caused thereby that the development of physics was not giving enough scientific facts for the physical interpretation of the living phenomena. Only during the past twenty years did we become witnesses of a new, powerful development of biophysics. As in every borderline field of science, discussions are going on about what the proper contents of biophysics is. The bordering fields have an advantage therein that they are getting heuristic and fruitful impulses from both sides. Therein however lies also a certain danger. If the effect of physical thinking prevails in biophysics, the biophysics could have easily slipped by the ideological side to just a conquered mechanism. On the other hand, an excessively emphasized biological aspect will in itself resist the application of the analytical physical methods.

The motion, if we understand it in a general sense (i.e., self-motion) is a form of existence of matter, and -- as ENGELS indicates -- it is an indivisible, inseparable property of matter, and therefore it comprises all processes occurring in the universe, from the simplest mechanical movement up to the most complicated manifestation of life, as is reasoning. ENGELS distinguishes a main and a secondary form of movement. The main form of movement cannot transform into simpler forms of motion, whereas the secondary form of movement can transform. Thus, for instance, during life, thinking cannot be explained by physical or chemical processes, whereas there are many chemical processes in digestion by which it is possible to explain digestion to a great extent. This transmissible element is the secondary form of motion in digestion. It is then interesting that the task of biophysics is to study the secondary forms of motion in the living organisms which can be transformed into physical phenomena. In other words, if we start out from physics and if we use the physical laws for the interpretation of the living phenomena, we are working biophysically. Vice versa, if we study the complexity of the physiological process which we interpret by biological laws we are working physiologically. Between biophysics and physiology there is nearly a consistent number (series) of transitions, there is much diffusion.

Biophysics finds its greatest use in the analysis of the elementary biological structures and phenomena. Hence, it is comprehensible that at the same time many physicists devote themselves to the problems of molecular biophysics which is studied on the bacteriophages and the viruses. It does not mean however that the simplest phenomena of life would be excluded from the field of biophysics. As the eminent German biophysicist, SCHREIBER(1956) correctly observes, one has to distinguish between the absolute and relative threshold values. We talk of an absolute threshold value then when for instance at a radiobiological reaction an interaction takes place between the discontinuity action of radiation and the discontinuity reaction of a simple biological object. The relative threshold value comes into validity in more complex biological systems (for instance, erythema of the skin), where between the primary action of radiation and the final effect there lies a whole series of processes which cause that only a statistical regularity of a higher order is imaginable between the absorbed energy and the biological reaction.

On the whole, the biophysics can be divided according to KUZIN into three main fields of working:

1. study of the physical peculiarities of the organism,
2. action of the physical factors upon the organism,
3. use of exact physical methods for the study of biological problems.

As long as it is a matter of study of the physical properties of the organism, then not only the physico-chemical properties of the living organism, such as its viscosity, surface tension, electric charge must be interesting, but one has also to break into the molecular structure of the living matter. Here we have at disposal a whole series of precision methods, as the electron microscope, the roentgen spectral analysis, the ultracentrifuge, electrophoresis, osmometry, turbidometry, and so on. In this field, a new segment of biophysics arises which is called molecular biophysics. The solution of problems in this area is important not only for biology but also for physics, since it concerns chiefly the problems of the structure of macromolecules.

Among the physical influences, the action of radiation is to be named at the first place. Man in his normal environment is unceasingly exposed to radiation, and with the increasing peaceful use of the atomic energy the action of radiation will be unceasingly increased. Especially the ionizing radiation has become the delicate instrument by which the important living processes in the organism can be examined. Generally it should be kept in mind that the mere irradiation of the organism without a thorough physical analysis of the observed processes is not yet biophysics. Biophysics will become only then when we taken into consideration the magnitude of photons, the time and the space factors, eventually the linear transfer (relation to the ionic density). A much more neglected field of physics is the action of the ultrasound and especially the action of heat where much pertinent material has completely escaped notice.

From what has been said it is obvious that in biophysics the methodology has great importance. Biophysics must thoroughly, theoretically and practically, know the physical methodology. At the same time there is the dosimetry of ionizing radiation and the methods of electronics. The valuable physical instrumentation makes a great share in the work of biophysics. Hence, all progresses in the construction of physical devices must be systematically followed, and new notions must be applied to the area of biology. Biophysics has to be always a reliable adviser in all these problems.

Status of Biophysics Abroad. As it was already mentioned, biophysics went through a rapid development. This is caused to some extent thereby that, in consequence to the rapid development of the peaceful use of atomic energy, the action of ionizing radiation on the living organism is examined in many institutes. These radiobiological laboratories arise in the different atomic centers, at the universities, medical research institutes, and so on. Accordingly, biophysical institutes were built out as such where according to the radiobiological topics, work is also done on the remaining biophysical problems. Such a large institute is the Biophysical Institute of the Academy of Sciences in Moscow, Berlin, Frankfurt am Main, Chicago, New Haven, and elsewhere. Furthermore, we also meet with the phenomenon that many microbiological, physiological, immunological, endocrinological and other institutes have biophysical laboratories. This state leads in a wholesale scale to a splitting up, which is also caused thereby that the biophysical works are published in magazines which are remote from biophysics in their aims. Essentially only the magazine Biophysics, issued in Moscow, is exclusively devoted to this scientific branch. In other magazines, the majority also discusses overwhelmingly the biochemical and physiological topics. To special problems of biophysics is devoted the magazine Journal of Molecular Biology.

Generally, the biophysical institutes are physical in the majority, which have a good biological erudition. To a smaller measure then, they are medical and biological. We will turn to the problem of cadres for biophysics still in later paragraphs.

At the same time, in the Netherlands a commission was organized for the preparation of an International Biophysical Congress in which the Czechoslovak biophysicists are also represented. This commission also has to create an organizational framework for the establishment of an International Biophysical Union within the range of UNESCO.

The importance of biophysics, and especially of its field of radiobiology is shown by the fact that the first scientific committee which was created by the annual meeting of the OSN has the task to study, at a wide international extent (scale) and with a great political responsibility, the biological action of atomic radiation. Even in this committee, Czechoslovakia has its representatives.

Development of Biophysics in Czechoslovakia. As in many other areas of our biology, also in biophysics we meet with the Purkyne name.

~~FOR OFFICIAL USE ONLY~~

His works in the field of sensory physiology have often biophysical characters.

Before the first World War, unique biophysical works arose in the physiological institutes and in the institutes of medical physics of Charles University. A great contribution for the biophysics of ionizing radiation came from the Stoklas school which in its time was the leading workshop of world-wide formate. Not less important are the works of photobiology which arose in the Institute for Physiology of Plants of Charles University under the leadership of academicians Nemce and Prata. This group of problems has been later transferred to the Brno Institute of Plant Physiology where Ulehla and Moravek devoted themselves to it. In the period before the Second World War, a number of workers appeared who devoted themselves to biophysical topics. Here, first of all Academician Laufberger must be mentioned, furthermore corresponding members Behounka, Hercika and others. The works of these authors were in our country put down as the foundation for the development of radiobiology and of the molecular structure of the living matter. In the same time, the biophysical work is concentrated in the Biophysical Institute of the Czechoslovak Academy of Sciences in Brno which was established in 1954 from the biophysical laboratory of the Academy. In this institute, work is done chiefly on radiobiological topics, a smaller part of the tasks is devoted to molecular biology of the living matter and of bacteriophage. Other biophysical workshops are created in the framework of the medical faculty and of the Military Medical Institute (named after J. E. Purkyne) at Hradec Kralova where work is done on problems of radiobiology, on the use of isotopes, on electrophysiology and the effects of cold. In the framework of the Czechoslovak Academy of Sciences, there is furthermore the workshop of the graphic examination methods of Academician Laufberger where important methodological questions of biophysics are solved. Radiobiology and the biological use of radioisotopes is studied also in the biological institute of the Academy where they are also working on some questions of molecular biology. Of course, the biophysics is also being worked up at the institutes of medical physics of our medical faculties, especially in Prague where work is being done on the problems of physical chemistry, on the action of radiation, on ultrasound and other problems. In the Institute of Industrial Medicine and Diseases of Occupations in Prague, biophysical topics are followed up particularly along the line of radio-hygiene. Applied biophysics has its wide use in the Physiatrie Research Institute in which the work is continued in the old Czech tradition in the sphere of physiatry. Special attention must be paid to Slovakia where, with a good cadre coverage, very favorable conditions are developing for biophysical work at the medical faculty of Kosice.

At the Czechoslovak Academy of Sciences, lately a commission was established for cybernetics which certainly soon will submit the results of its interesting work. Also a commission for astrophysics is in close connection with the biophysical problems.

~~FOR OFFICIAL USE ONLY~~

For lack of place there is no way to mention the many laboratories and working places where biophysical work is done, and particularly the numerous workshops of radiobiology of which there are altogether twenty. Summarily it may be said that in our country, similarly as elsewhere in the world, biophysics is, with the exception of a few main working places, conducted in the most diverse institutes. This status has its advantages which consist therein that in such cases the biophysical work is influenced by the problem group of the given institution, so that it is caught by an excessive onesidedness (bias) to which sometimes the biophysical research will lead. The defect is however the considerable splitting up and also the circumstance that the working group is missing which would be aiming at a single important topic. A further defect is that as to the methodical side these accidental working shops are not always well equipped, which then will be manifested therein that as to the methodical aspect they are left a few years behind the workshops abroad.

Prospects of Biophysical Research. Generally it is clear that under our relations it is not possible and it is even not wise to aim at the whole volume of biophysics, since we do not have for this either the needed methodological construction, or the cadre of leading workers. Hence it would be necessary that biophysics in Czechoslovakia be concentrated on a few main problems:

1. Radiobiological Research. Here we have already a powerful tradition which starts in the years before the first World War, and from those times on it continues successfully. Radiobiology comes to the center of attention for many important results which concern the entire human population.

It is shown that we are in need still of the fundamental knowledges about how the ionizing radiation acts upon the living organism. Hence, a great attention must be paid to the study of the basic actions of ionizing radiation. For this work, in our country there are many favorable conditions and it should be demanded that it should develop at a larger scale than hitherto. Equally important is the action of the small doses of radiation which however requires great patience from the experimenter since in this field results cannot be quickly reached, since the majority of tests lasts a few years. This is however a very important field which at the present needs enthusiastic workers. With this is also connected the requirement that in our country they should start working in radiogenetics, which generally presupposes that the work in normal genetics be properly developed. This necessary favorable condition should be fulfilled previously before work is started on the action of radiation upon the process of heredity. Unfortunately, our genetics did not so develop as we have wished. One of the most important fields of radiobiology is at the same time the disease from radiation, its prevention, diagnosis and therapy. In this field, in our country work is being done on a wide basis, and generally good results were obtained.

2. A further important biophysical task is the study of the physical phenomena in the living matter on a macromolecular level, and the examination of the physico-chemical peculiarities of the living system, when the area of molecular biology has already a good tradition, so that it can be said that in this sphere we are connected to a previous series of researches at a world-wide scale. It is generally facilitated so that in the meantime to this department only a few laboratories are devoted in the world.

3. There is also a successful development in the work in the field of the action of low temperatures upon the living system. This group of problems has a very practical importance for our food industry and for the medical use of low temperatures.

4. In our country, the works about the action of ultrasound also have a good tradition. In the recent time, this topic is no more in such a center of attention with our workers, so that it is a certain deficiency.

5. In various institutes and laboratories, a modern methodology is generally introduced where we are often on a world level. It is generally necessary that the construction of new devices and conditions for their use should be better assured organizationally.

6. Physiatry is an important field of applied biophysics on the field of medicine. As already mentioned, even here we have a good tradition which must be further developed.

The central deficiency of our research is that a whole series of young scientific workers who without proper experience are devoted to those tasks at the start will produce variants of works already performed in other foreign laboratories. This method is still correct from a pedagogical point of view for the introduction of the worker to the given problem group, certainly it would be an error if the custom should remain to a certain degree, since then we would have never taken up in biophysics the place which now belongs to us on the basis of the successes of our scientific workers and generally on the basis of the good laboratory build-up of our standard institutes.

Organizational Measures. For the successful research it is necessary that the work be well coordinated. It can be said that, after many years of poly-pragmatism in the field of radiobiology now the whole problem group was successfully concentrated at the single commission of the State Plan at the Academy of Sciences. We expect very much from this new organization, especially therefore that it will succeed in catching the workers at many different workshops and in coordinating their work. Less well coordinated is the work in other segments, as in macromolecular biophysics, in the action of the low temperatures, of the ultrasound, and in the methodical work. Here it will be needed that the Biophysical Association should take up this coordination for the time being.

The Biophysical Association was established on 23 February 1956 as a section of the J. Ev. Purkyne Medical Society. It became so from

the suggestion of the I. Radiobiological Conference which was held in Brno in November 1955. At the present time, the Biophysical Association has about 180 members; besides the meetings and the seminars, it arranged the II. Radiobiological Conference at Hradec Kralova (March 1957), a symposium on the action of cold at the same place (February 1958), an international symposium on the biological action of radiation and on the use of radioisotopes in biology and medicine in October 1958 in Prague, with the participation of 70 foreign leaders. This symposium was the first meeting of radiobiologists from the People's democracies, the USSR and China. At the present time the Biophysical Association has five working groups: for radiobiology, radioisotopes, radiohygiene, cold biology and a group for the molecular biology.

An important problem of our activity in biophysics is the deficiency of the scientific cadres, especially of physicists and physical chemists. We have many biologists and physicians who are willing after the completion of their studies to devote themselves to biophysics, of course they are in need of a thorough training in physics, physical chemistry and mathematics. On the other hand, we are not in the fortunate position, as it is abroad, where a whole series of physicists are interested in biological problems, since they see in it a huge perspective for physics proper. As we have already said, the majority of the leaders of foreign laboratories comes from the rank of physicists, especially of atomic and nuclear physicists who have been interested in the same problems. It is commonly known that at the present time the prominent workers in the field of bacteriophage and genetics are having their education in physics. These circumstances make it necessary to devote great attention, especially at our natural-science faculties, where the professors of physics should awaken the interest of their students in biophysics, and where it would be necessary in the future to think of the erection of chairs for biophysics with pertinent lectures and trainings.

The students of the natural-science faculty who would work in these chairs should have the obligation to visit medical physiology, occasionally also a few clinical lectures at the medical faculties. We have also a direct deficiency in mathematicians which would be interested in biomathematics -- a field which is so deeply worked up in foreign countries.

As to the institutes and laboratories, in this year the building of the biophysical institute of the Czechoslovak Academy of Sciences was put into operation in Brno, and the laboratory of graphic investigational methods of the Academy in Prague. In the new building of the Biophysical Institute of the Academy at Brno our young biophysicists are getting splendid opportunities for a successful research. About the work in this institute, researchers from the Soviet Union, from the German Democratic Republic, from India, Austria and from other countries are manifesting interest. The equipment of all institutes of medical physics should be improved at our medical

~~FOR OFFICIAL USE ONLY~~

faculties. The newly built Institute of instrumental techniques of the Academy of Sciences in Brno intends to cover in its program the construction of biophysical instruments in collaboration with the Czechoslovak biophysicists.

In the main outlines, these are the organizational measures which must be provided in the reviewed time. It cannot be expected that it will come to a turmoil of development of our biophysics just as a result of these measures. Here, it depends mostly upon our young scientific generation, on its enthusiasm and perseverance in work.

F. H., Brno, Street Obrancu miru, 10

(Submitted to editorial office in March 1960).

~~FOR OFFICIAL USE ONLY~~

VI. PERSPECTIVES OF VIROLOGICAL RESEARCH

Pages 596-603

Academician Dionyz Blaskovic
Virological Institute of the
Czechoslovak Academy of
Sciences, Bratislava

1. Basic Tasks of Virology.

Two important tasks are facing virology.

The first is the protection of the people's health, of the health of animals and plants against the smallest particles of matter which are considered alive and which we call viruses.

In the second it is the question of the knowledge of the essence of the viruses, of their origin, the knowledge of the processes which lead to the synthesis of proteins and of other organic substances in organized systems (cells).

Both above mentioned tasks of virology are closely connected with each other. The experience shows namely that neglecting the basic, at the first glance theoretical tasks will result in the non-finishing of the tasks immediately connected with the practice. The complicated nature of the group of problems, the carrying out of tasks qualitatively different from each other requires a good division of labor.

We have however in mind first of all the concrete and immediate goals of virology:

To recognize the agents of the different sicknesses ascribed to viruses (since we still do not know the cause of every infectious disease in which the infectiousness of the ultrafiltrate from certain materials is demonstrated);

To search for means for the prevention and treatment of viral ailments.

It is a matter of approach to the problems and a matter of conception to have these two concrete problems solved from a point of view which is wide as well as profound.

The first task is essentially of a diagnostic nature, and it serves the most diverse disciplines of the medical and veterinary sciences and practice, including phytopathology and the protection of plants.

For the prevention and treatment of viral infections it is necessary however to become deeply engaged in the processes of infection of the organism and of its resistance against the contagion. Finally, it is necessary to penetrate into the solitary causes of the pathogenesis and resistance of the organism, to reach the knowledge of the composition and the properties of the viruses, of their synthesis and inheritance, and the cause of the strict or obligate parasitism of the viruses.

2. Characteristics of Virological Research and Practice

It will be necessary to make concrete the preceding thoughts and to indicate how the practice and its demands are connected to the research work and how with the development of the scientific discipline the criteria for the research activity will increase.

Let us now start from the field since its securing is the most urgent and the most essential. Building from the other direction, i.e., from the complicated problems toward the simple ones, does not stand on any ground, it does not lead to results, since the researchers are unable to check their results and with their work they stand in complete isolation.

At the first glance it seems that virus infections are continuously arising in the field. It is possible. It is however certain that, with the aid of new methods and instruments, it is being uncovered what, due to the roughness of the detecting methods, was hitherto hidden for us. As gripe we still continue to designate a number of acute infections of the respiratory tract although now we know that such a clinical picture may be caused, for instance, by the adenoviruses and the new members of the group of myxoviruses. For the differential diagnosis, reliable diagnostic methods must be developed. Without them, neither the medical nor the epidemiological nor epizootological practices are accurate, it will be impossible to do an accurate analysis of the morbidity, and the specific therapy and prevention will be without a foundation. The quality of the diagnostic methods must be their easy mastering, simplicity, and little demand on personnel and material. Otherwise they cannot be done in the terrain and in the practice. The higher degree the virology has reached, the better methods are used in the terrain. The health service, the veterinary service or the plant protection will work the better and the more successfully the wider is the network of the diagnostic laboratories in the given field.

The introduction of laboratory diagnostics of the virus diseases in the terrain (field) is not old. Not so long ago these methods were still done in the research laboratories, they were held as research work. The possibility of their use in the field represents the right progress of transfer of the research task into the practice. But the use of these methods is not a privilege of the field only: good diagnostic methods are also needed at the more ingenious research itself.

During the past six years the use of tissue cultures in the virological practice led especially to the discovery of new types of viruses and to the solution of manufacturing processes for the preparation of a few vaccines. With the aid of them, the diagnosis of new types of viruses of the respiratory and digestive tracts became possible. Even though the detailed determination of these viruses is not a daily act in the practice, there where the distribution of the food articles is made safe in suitable containers, as in the USA, the

diagnosis of new virus infections does not meet with difficulties even in the detached laboratories. Even the field laboratories, especially their methodical center, will be able in the future to demonstrate the existence of further types of animal (human) viruses. The cause of infectious hepatitis must be solved, the importance of the various viruses which damage the cells must be determined, and agents of the epidemic diseases must be searched for, and we must penetrate into the mystery of the cause of malignant tumors.

We cannot expect the solution of these tasks from the field workers for whom the task soon will be reserved to use of the diagnostic methods which are already verified and checked.

The manufacture of a few preparations with anti-viral activity, for preventive and therapeutic purposes, has also gone into practice. A few of the preventive measures, as the vaccination against smallpox, rabies, yellow fever, are taken for classical. They are proofs of empiricism, of observing talent and of industrious and persistent research work (vaccination against yellow fever and poliomyelitis). Alas, we cannot be contented with the results of preventive vaccination in many human and animal viral diseases. Not even the manufacturing procedures are satisfactorially mastered (the vaccines against typhus, tick encephalities, grippe). However, the protection of health with the aid of a few hitherto produced vaccines does not anyhow entitle to the hopes for the liquidation of the pertinent contagion. For the future remains the job to search for manufacturing processes and substances against many epidemically investigated diseases (grippe, parotitis, herpetic infection, morbilli, and so on). Together with the searching of new vaccines one has to take in view also the securing of their control of action and of effectiveness in the field itself, and not only under experimental conditions.

A similar dissertation is valid also for the specific antiviral sera whose use in the meantime is very much restricted and chiefly little effective. Their application is justified sooner in a quick prophylaxis than in the suppression of a fully developed disease process.

The introduced two examples of diagnostic service and preparation of antiviral medicaments for the prevention and treatment prove how far we have progressed in the individual problems and how the operation itself in the field practice is dependent upon the research work of larger entities.

We arrived reluctantly at another plain of the virological research which is characterized by a greater number of people, solving separate tasks, with a greater space and with better instrumental equipment. Their targets (goals) however also serve definite concrete aims, for instance, the preparation of new antiviral substances, specific as well as non-specific, the improvement of the quality of the today used vaccines and sera, the introduction and the improvement of methodical procedures for the work with the viruses, the solution of a few today obscure infections for the virology, the search for

measures and forms for anti-epidemic work and of foundations for the theoretical epidemiology.

From the remainder of the problems which are to be solved, the organizational connections of this kind of working groups is also coming to light. Their research has an over-all validity, but it is restricted to the given problem. A generalization of the results is not sought for, neither does it come from general knowledges for the most part. It asks for its definite department, whether it is already hygiene or agriculture or even chemistry. It may be attached to an establishment, it may be independent. Its construction in the field and the practical requirements are contained in the direction of the work alone and in the organizational setup.

The research at the universities has a partly special position. According to the capacity of the staff and of the financial possibilities, the researchers at the universities must solve narrowly specified research tasks to conclusions (for instance, to semi-finish), or they must select for themselves definite knotty problems of theoretical character, particularly however to prepare, select and recommend talents for the scientific work so that they should be not lost, but sooner or later be taking their place in research.

A further access to the solution of the research problem is still to be mentioned, namely the research which has to elucidate the nature of the phenomena in nature, the essence of the processes and reactions, their meaning, laws, heredity of the characteristics and properties, with which the causes must be explained in consequences, why the substances with the antiviral preventive and therapeutic effect which are used in the practice are a failure. Such a road promises results since today, in the tracking down of viral infections and of the natural resistance of the organism, we did not get very far. It can be said that we are meanwhile on the same level, explaining the same phenomena from different points of view, but not penetrating into the substance itself by the used methods. Maybe our shortcomings stand out mostly on examples from the pathology of the human viral infections.

The course of viral infection is well described in man, but only in the so-called typical cases. We know rather well the various degrees of infection of the cells by the viruses. But we do not know how to explain the cause of latent infections, the fate of the virus multiplying in the organism, certainly not causing any clinical changes and signs of disease, we do not know the nature of the considerable variability of the viruses on one hand (the grippe virus), and the nature of the relative stability of a few viruses on the other hand (polio and tick encephalitis viruses). We are in a dilemma about the isolation of the viruses for which we do not know how to find clinical manifestations, we are unable to account for the problem of the perseverance of the viruses in the organism, or in the population during the inter-epidemic period, and we did not trap the complete circulation

of the virus in nature, which takes place without the participation of man. Moreover, we are also essentially standing before the problem what is in fact a virus, or actually everything proving its living character, which viruses have more properties of living or non-living matter, and finally: how the viruses would arise, or what are today the conditions that make new types of viruses arise. At the listing of these problems, the problem is also unwillingly pressed upon us, in which collectives, in which spaces and with which people will a gradual and systematic explanation of the nature of the unknown phenomena and reactions become possible.

The given enumeration of the basic virological tasks is very general, and little is concrete in it. It would become more accurate, if we would have had definite models of viral infections in mind, and according to them we would have experimentally coordinated the knowledge about the constitution of the viruses, and the constitution of the affected cells, about the mechanism leading to the adsorption of the virus to the cell, and about its further fate in the cell until the elimination of new viral particles from the cells, about the mechanisms which are in the position to frustrate the process of adsorption or which lead the reproduction of virus to a non-infectious particle (incomplete virus). We would be timid not follow up why the new population of viruses, some will arise of equal or of different qualities than the "parental" viruses; in other words; As the more definite and influential the heredity of the properties of the virus is, so the changes occur in the bonds of the arrangement of the nucleic acids and in their bases in the successive generations. Thus, we could become more concrete in examining also the protective reactions of the organism in which a viral infection occurs, also that how these reactions are studied and how they are directed. Everywhere is full with gaps, deficiencies. And these shortcomings must be overcome and entered so deeply into the structure of the matter of viruses, and finally of the cells, into the configurations of the macromolecules and of the reactions as they are repeated, creating chemically and biologically (functionally) equal or different units and systems. We did not go in biology to such a depth as for instance physics went in splitting the atom and following the reaction of smaller and smaller of its subunits.

In this situation the theoretization does not help, but only a well chosen access to the solution of a few problems. For the tracking down of those process which are as a fundamental attribute or a theoretical research, for the virus infection a suitable model must be selected, the process of infection has to be tracked down on simple systems, then on complicated ones, the reproducibility of the obtained findings must be found out, and the acquired results must be verified on further models. The selection of these models must be aimed, not haphazard, just so as also the approach to the solution must have its substantiality so that it should not go unnecessarily blindly.

The volume of the examination of these basic problems itself requires a large number of experts working at a high methodological level of their discipline and well versed with the progresses of the discipline in which they co-participate at the solution of the problem. This sketch of access to the solution is of course characteristic for the solution of biological problems in general. For definite problems the need of biologists is in different directions: morphologists, physiologists, virologists, chemists: biochemists, physical chemists, analyzers, synthetizers, and physicists -- especially biophysicists. The suitable aid of further specialists, of, for instance, statisticians at the evaluation of the tests, and so on, is very desirable.

For complex work, however, the conditions should be fulfilled that the collective should actually work for a single goal, that ensuring the solution it should be informed about the momentaneous state of the joint research, and everyone of its members should actively work on the searching of the most suitable direction in which the research should set out. Organizationally, such a collective belongs to the all-national institutions which help and require such a type of research which first of all has to solve practical tasks. In the socialistic states there are academies of sciences which with a net of institutes have to guarantee such a perspectival basis today for more theoretical, tomorrow for more practical tasks. But essentially, there is no organizational articulation in this matter, but (except) the quality of the problem-solvers themselves. A few tasks can be also solved in the collectives themselves (for instance, morphological problems), of course, thereby the coordination of the several groups, of their work and of the results must be more consequent with each other.

3. Tendencies in the Virology in the World.

To make it possible to draw a conclusion from what today characterizes the virological work and research in the world, for the evaluation first of all the adequate criteria must be established and they must be answered.

The best would be to rely upon the actual opinion coming from a personal visit of the eminent research workers in the world as also from working places currently of the diagnostic practice.

Furthermore it would be possible to form an opinion from a systematic follow-up of the verified works in the most diverse journals. From these works however we would learn little about the activity of the activity of the actual working places, routinely in the diagnostic practice.

Finally, conclusion about the state of virology could be made from the international congresses. In the meantime, in the world no virological meetings were held, and on the last two international microbiological meetings -- especially on the last one, finished in August 1958 at Stockholm -- a section was not given to the virology as

a whole, but only to its selected parts. Symposia or conferences or discussions on beforehand determined topics are nowadays the most favorable forms of presentation of views and results of work of the virologists. For that reason we must also take this into consideration at the judgment of the status and of the goals of virology in the world. Then, there remains something else, how to use partially each of the three known criteria and how to do a general evaluation which would surely recognize the errors. First of all, the basic question of virology: what is a virus, what is its structure, and on what depends the infectiousness of the viruses and how does the process of infection run in the cell affected by the virus.

The effort to learn the structure of a pure virus preparation is closely related to the effort of obtaining such samples of viruses which are free of the smallest traces of "impurities" that come from the media in which the viruses have reproduced. There are substantial preparative methods as well as methods which differentiate the traces of the non-virus substances in the preparation. According to the classical works about the chemical composition of the tobacco mosaic virus and of other plant viruses whose purification is relatively easier, the analysis of animal and especially human viral preparations is also performed (grippe, polio viruses, and adenoviruses). Every method requires an easy way of getting a great amount of viral material from that medium where one has not to work with living tissues. For this purpose, there are the nutrient fluid from tissue culture, less allantoic fluid or yolk pouch of the chicken embryo. When milligram quantities of viral preparations can be obtained from liters, rather hectoliters of volume of the pertinent fluid medium, the difficulty of the entire procedure will stand out, as well as its expensiveness, and demanding nature on experts and instruments. Virology cannot be satisfied with the analysis of only certain representatives of each group of viruses which, according to their biological and antigenic properties, belong to a certain group. This work is weightier for the reason that it is dealing not only with a quantitative but also a qualitative analysis. We start out namely from the conviction that the biological properties of the viruses must have their specific chemical substratum. To these basic analytical works, furthermore to the establishment of the physical properties of the viral particles are devoted chiefly the biochemists, chemists and physical chemists in the United States, England, Australia, and the German Federated Republic. When we here are selecting a few states, we have in mind such from where results with similar goals are coming out systematically. We do not wish thereby to say that certain analyses of viral preparations should not be done on principle in other states.

The problem is not resolved what chemical composition (compound) of the virus particle is responsible for the infectiousness of the virus preparation. The work on the models of bacteriophages as well as of the tobacco mosaic virus indicates that such a substance could be the nucleic acid of the pertinent type. Gierer and Schramm and

coworkers (Tubingen), Fraenkel-Conrat and coworkers (Berkeley-California) start out from the tests that in the mosaic virus of the tobacco the infective principle is actually connected on the ribonucleinic acid. This finding however did not generally happen. It is a very powerful impulse for the elucidation of the problem, how this is also in other types of viruses. With a certain precaution it is said that ribonucleinic acid itself is the cause of infectiousness in the virus of encephalomyelitis of the horse (Eastern type), in the virus of poliomyelitis, encephalomyelitis of the mice and of tick encephalitis (Sokol et al, Czechoslovak Republic), but probably this is not true for the group of myxoviruses. The topic itself is very enticing, and continuation in these works can be expected at different working places.

The nucleinic acids, eventually the nucleoproteins are intensively studied even from another aspect of the work as important as the essence of the infectiosity of the viruses. In the nucleic acid, in the combination of its base, in their mutual bond and sequence, in their connection to protein (more correctly amino acids), the essence of the heredity of the properties of viruses is seen. Even here, until now, the most detailed studies were done on the model of the bacteriophage. In animal viruses or in plant viruses these problems are less examined in a thorough way, even when on the model of, for instance, the grippelike virus of the Newcastle disease, the authors tried to explain the origin of the variants and of the mutants.

The existence of viral particles of different biological properties, for instance, with different pathogenicity for the animals and man, was shown to be very good even for the practice. By the selection of such mutants from a culture of viruses, A. B. Sabin (Cincinnati, USA) has obtained the so-called weakened poliomyelitis viruses which at the present time are used in vaccination trials with living virus. The weakening of the virulence of highly pathogenic viruses makes it possible not only to have a selection with the so-called plaque method, but also to have a passage through different experimental animals or a cure of the embryo (germ). (The Koprovski Vacine against poliomyelitis). At several places in the world (USA, USSR, Czechoslovak Republic, Japan, Israel) they tried with different methods to obtain the virus with non-pathogenous properties for man, and to use such for vaccination purposes. Here can be also mentioned the vaccination with living grippelike virus widely used in the practice for vaccination in the Soviet Union, and the propositions to use live virus for vaccination against parotitis and measles. The results of these vaccinations did not lead, however, to a conclusion about the sufficient effectiveness of such vaccination. About this more is required so that all these works would be justified by the knowledge of the process of the adaptation of the viruses, of the origin of stable variants or mutants of the viruses so that, at a massive inoculation, we should not calculate with a fear of the possibility that, in the vaccinated population of people, from the material with which they are inoculated, again highly virulent, for the man and his vicinity pathogenic variant or mutant will arise.

By the given examples it is evident how the so-called theoretical research is very tightly connected with the practical problems, and how it will be necessary to aid and to support that we should not leave the practice in uncertainty or we should not arm it sufficiently with the highest effectiveness when vaccination is already introduced into the practice.

The process of infection of the organism with the virus is determined by the properties of the virus itself, and to a great extent by the status of the infected organism (susceptibility, resistance). In the meantime, these processes of infection are analyzed mostly on the simplest systems, which are ready at our disposal, namely, on the tissue cultures. Many efforts are devoted to the problem of the relation of the virus to the cell. A number of symposia prove this, which dealt with this group of topics in definite variations on different models. The result of these researches was the knowledge of several phases in the process of infection of the cell by the virus. For this work, morphological methods are helpful, electron microscopy, histochemistry and the use of labelled atoms (isotopes). It came to an important conclusion that the process of viral infection of the cell and the stages of the viral multiplication cannot be solved without a good knowledge of the metabolism of the cell itself. And thus, today, attention is paid to the importance of the cell membrane, of its organelles, of the cytoplasm itself, to the structure and function of the nucleus, and to the metabolic processes connected with the existence of the cell organs in the process of infection.

Parallel with the tracking down of the viral cell-infective process or the viral infection of the organism, the process of the protective mechanism against the viruses as foreign elements must be also taken into consideration. Here belongs the study of the importance of the complement factor for viral infection, the importance of the properdine, inhibitor of viral adsorption to the cell, of the virus neutralizing substances demonstrated in organ extracts and in the blood, but until now chemically still not specified. In connection with the follow-up of the factors of non-specific resistance, it is desired to more profoundly elucidate also the origin and importance of the antiviral humoral immunity which is considered as the substance in the protection of the organism before infection, but in some infections being insufficient, as for instance insufficient to explain the existence, for instance, of the latent infections.

At the research of transmissible encephalitis, it seems to be important to understand the question of the circulation of the virus in nature, a question important in epidemiology and epizootology. Here, it must be stated that we do not master the ecology of viruses either in nature or in the human population, even if this has an immense epidemiological importance and even if its solution could give us the key to the problem of the cyclic character of the epidemics by viral infections. In the research of the ecology of viruses of transmissible encephalitis in nature, the Soviet Union, the U.S.A., and the Czechoslovak Republic are participating to a considerable degree.

~~FOR OFFICIAL USE ONLY~~

Many more virologists are devoted to the problem of the viral etiology of malignant tumors. The the number of tumors of the various animals (Rous sarcoma, Ehrlich's ascites carcinoma, carcinoma of the mouse breast, virus papilloma and myxomatosis of rabbits, polyoma virus of the mice, et al.) are joining the results and possibilities with the transmission of malignant human tumors to mice, or to rats by means of cell-less filtrates of the mentioned tumors. These facts make it possible to suppose that in the cell-free filtrates the virus is present which is some type of experimental animals will cause the tumor disease after a long period of incubation. Many scientific workers are surmising that we are standing close to the threshold of new discoveries in the field of the viral etiology of human malignant tumors.

The last year can be considered as an upturning, because many new types of viruses were diagnosed, specifically by means of old and new methodical approaches. Among these, the introduction of tissue cultures of the most different origin, especially however of the single-layer cell lines, has made possible the isolation of adenoviruses, echoviruses, of a few new types of Coxsackie viruses, furthermore of the members of the myxovirus group and of many still unclassified viruses. We can talk directly of a qualitative "jump" in the methods of virological work, as far as the introduction of the chick embryo is at least, or still earlier the introduction of the susceptible animal. Here, it is the matter not only of the possibility to isolate the virus in tissue cultures but also to use these in a whole series of serological tests, titrations, for which formerly test animals were kept or chicken embryos have been used. These discoveries, realized especially in the U.S.A., make possible also at the same time that all over the world the virologists will be able to isolate new types of viruses. (Note: Here we should mention the discovery of two types of myxoviruses in Czechoslovakia, the Virus influenzae A equi (Prague) (: equine A-influenza virus) 1950, the Virus influenzae A anatis (Kosice) (: Duck A-influenza virus) 1956, and the encephalitis virus "Tahyna" from mosquitoes.)

The development of good diagnostic methods is however directly dependent upon the quality and standards of the diagnostic reagents, such as the nutrient media, the high-quality cell stocks, antigens and sera for diagnostic purposes. Their concentrated preparation, price accessibility, and good quality make possible for the laboratories the reliable and quick diagnosis of viral infections, and they facilitate the work of every virological laboratory, whatever their laboratory aims are. Only there can a reliable diagnostic service be established where good provisions are made for the manufacture and distribution of the standard virological diagnostic preparations. The quality, constancy and harmlessness as well as the price accessibility of the preparation are the principles upon which for instance the World Health Organization is building, and which it recommends for the management of the few so-called reference laboratories

~~FOR OFFICIAL USE ONLY~~

which are entrusted with the preparation, distribution of some diagnostic aids, and with the determination of the isolated viruses.

Finally, a few words about the types of virological working places. These arose from practical needs, or according to the conception of a few workers who started to build them. They did not arise according to any scheme elaborated beforehand.

In the hospitals, for the needs of clinical practice, the virological labs are usually attached to the system of bacteriological laboratories.

The antiepidemic service of the State Health Administrations uses the microbiological labs located in the field to the purpose that, within their framework, diagnostic service be guaranteed chiefly for the antiepidemic work.

The laxity about the health of the population compels the Health Administration to establish working places which will scientifically deal with methods of proof of the new viral infections for which methods of diagnosis or specific preventive preparations or therapeutic means are still unavailable. For this task whose solution is almost exclusively of a research character, a considerable number of experts are needed who will be accumulated at the working places organizationally belonging to the spheres of public health, of university schools, academies of sciences, or to specialized institutions only.

Finally, there are the groups of workers at the universities, special institutes for theoretical research in biology and chemistry, in institutes of academies of sciences, which are aimed at the solution of basic problems of the pathogenesis and resistance against viral infections, and of the physical and chemical properties of the viruses. The synthesis of the results of the separate working groups is done in the world at the international symposia to which experts from most states have been invited. It must be mentioned that until now the symposia of this kind were chosen by the initiative of the western states, especially of the U.S.A., and England, and the participants of these symposia belonged also to the western states. Only in the last 2-3 years were the symposia, dealing with questions of basic virological research, also frequented actively by virologists of the Soviet Union and of the people's democracies.

4. Status and Prospectives of Virology in Czechoslovakia.

The period after the Second World War represents a succession of workers of human virology with approach to concrete and systematic work. Of such an approach we can talk in concrete terms only after 1948. It is characterized by the education and training of workers in virology, by the establishment of working places and by the creation of conditions for the diagnostic research activities. The emphasis of preventive tendency in medicine, and the importances of the hygienic and antiepidemic services, which were the results of our close

collaboration with the Soviet Union (Law 4/1952) had a great influence also upon the development of virology in Czechoslovakia. A good anti-epidemic service work cannot be imagined without diagnosis of viral infections, which must be moved (shifted) and assured as far as possible in the field. From the original three, generally small virological working places in 1948 (the Virological Department of the State Public Health Institute in Prague and in Bratislava, and the virological laboratory of the Microbiological Institute of the Medical Faculty of Charles University at Prague), in the course of 10 years, a number of working places developed with different working aims.

In a few districts, within the framework of the District Hygienic Epidemiological Station (DHES for short), the virological diagnosis of a few viral infections is assured. It is chiefly about the diagnosis of influenza (serologically and by culture), of tick encephalitis, and in some laboratories also of poliomyelitis, Coxsackie infection, ornithosis, parotitis and lymphocytic choriomeningitis. These virological laboratories of the DHES are methodically led in their performance by the Institute of Epidemiology and Microbiology in Prague, and by the Regional Institute of Epidemiology and Microbiology in Bratislava. The diagnosis of poliomyelitis, enteral viruses is directed by the Institute of Sera and Vaccines -- Virological Division. Even the required diagnostic preparations are procured for the laboratories of the DHES mostly from the mentioned institutes. The experts of the DHES are regularly schooled in the given institutes in the new virological methods which then they can introduce into the practice.

We do not think that the network of virological laboratories in the districts is sufficient. It is important that at the equipment of these stations with virological is considered as an urgent task. The aiming of work of these working places, at great distances from clinical compounds, especially from infectious departments, remains that the demands of these clinical compounds are insufficiently satisfied. The deficiency to a smaller extent rests on the question what the laboratories of the DHES are capable to diagnose as well as in the fact that the physician-virologist of the laboratory cannot be directly interested in the clinical course of the ailment and cannot be a direct collaborator of the clinical doctor. For this work he does not have the needed time. The clinics and the hospitals themselves did not lead to give the pertinent impulse and space for the diagnostic virologists in their own sphere. Only a few of the microbiological institutes of the medical faculties in Czechoslovakia assure the clinical diseases with such a diagnostic service. The faculty institutes, which is finally also their mission, are more intent to do and they are actually doing definite limited research activities in separate virological tasks with practical and theoretical goals.

The present experience with the manufacture of anti-viral preventive and therapeutic medicaments indicated that such a work cannot be broken loose from the research work. Here the matter is not only about the guarantee of the development of the technological preparations and

quality of the medicaments, but also about the evaluation of the effectiveness of the manufactured vaccines and sera. Inasmuch as for this work field studies are required, this work must be carried out in collaboration with special institutes of the public health agency, which in our republic is represented by the Institute of Epidemiology and Microbiology in Prague, furthermore the Regional Institute in Bratislava and the district hygienic-epidemic station. With one or the other work, reference is made to a number of problems of basic character which must be elucidated if it has only to progress in the solution and for the benefit of the thing itself.

The fact that at the reorganization of the manufacture of sera and vaccines they remembered to strengthen the scientific research factors, and this was directly incorporated into the manufacture has helped both- manufacture and research. We are unable to confirm that specifically the manufacture of the anti-viral preparations was stabilized, or that all over the world it is subject to many improvements, sometimes to a complete reconstruction.

Our agency institutes of epidemiology and microbiology in Prague and the regional institute at Bratislava have divided tasks, and their main direction of research is antiepidemic work. They however specifically appropriate the methodology and diagnosis of the already known viruses, the search for new viruses and the study of the properties of the isolated viruses. It is the matter about the viral infections of the respiratory pathways (myxo, adeno, Coxsackie and Echo viruses), about measles, ornithosis, hepatitis (the Prague Institute), tick encephalitis (the Bratislava Institute). The epidemiology of poliomyelitis and by the enetral viruses is virologically tracked down by the virological departments of the Institute of Sera and Vaccines which remains also the methodological center for the preparation of tissue cultures.

With the guaranteeing of the virological tasks of the anti-epidemic service for a considerable large area, it was possible in Czechoslovakia to gradually change over in the Virological Institute of the Cechoslovak Academy of Sciences in Bratislava from the ordinary tasks to the solution of problems of the nature of pathogenesis and resistance in model infections:- in grippe and equine encephalomyelitis and in tick encephalitis. To these tasks belongs also the similar goal at the research of rickettsiasis (Q fever) and of the plant viruses of the group of yellow. In the institute, by means of the methods of complicated collaboration of experts, problems are solved of the mechanism of cellular infections with viruses, they deal with the natural protective substances in infections with the virus of influenza, with the nature of the adaptation of viruses to the organism, with the mechanism of the infection of domestic animals with viruses of the tick encephalitis, and with the elimination of this virus with the milk, as well as with the research of the active principles against the mentioned virus infections. The selection of the topics as well as the methodical aiming were filled out from the overall world situation in the research of viruses and viral infections as well as in the protection of health against these infections.

The goal was:- to find the more convenient preventive and therapeutic means against the viruses by way of the knowledge of all the roads which lead to manifest or latent infections, the production of non-virulent viruses, to the neutralization of the viruses before they reach susceptible cell systems.

The work of Czechoslovak virologists appeared in the different domestic and foreign magazines. Yet, it should be also mentioned that the international forum of the works coming out from the people's democratic states and from the USSR is the "Acta virologica" which is published in the Czechoslovak Academy of Sciences, to which many Czechoslovak virologists contribute with works of generally virological contents and of medical aims.

The viral etiology of the malignant tumors is dealt with by the workers of the Oncological Institute in Bratislava. The workers with the models of animal viral tumors (Rous sarcoma, Ehrlich's ascites tumor, the Brown-Pearce carcinoma in rabbits, the tumor B-77 of chicken isolated in the institute, the Deals guinea-pig sarcoma, the Walber 258 rat tumor), especially however with the non-malignant filtrates of rat tumors MR and BS obtained at the institute, which, after a long period, gradually lead to tumor disease in the rats. Tumor BS can be transmitted not only to a newborn rat but also to adult rats, by way of intravenous application.

In the selection of topics and its working out, during the past ten years of the development of Czechoslovak virology certain shifts occurred and the present status is not considered the same what at the working places has been topically done before a few years, justly so as also in the future the picture will be different than it is today.

The district hygienic-epidemiological stations widen the range of their diagnostic performance.

The Institute of Epidemiology and Microbiology at Prague passed over from the problems of encephalitis, grippe and Cocksackie infections to the problem group of myxoviruses, adenoviruses, infectious hepatitis, and ornithosis, most recently to the problem of measles. Here goes on a work of a special working place and it is coordinated with the work of other working places.

The regional institute of epidemiology and microbiology in Bratislava was aimed at the research of the transmissible neuroinfections, of tick encephalitis, equine encephalomyelitis, Cocksackie infections, infection with the viruses of Col SK, following particularly the problem of the circulation of viruses in Nature.

The Military Institute of Epidemiology and Microbiology is devoted chiefly to epidemiological questions of grippe and to the problems of tick encephalitis.

To the ecology of the virus of tick encephalitis, to the research of the Nature's foci of this infection as well as to the infection with the viruses of Cocksackie, adenoviruses and grippe are devoted the workers of the Military Institute of epidemiology and Microbiology at Prague.

The workers of the Microbiological Institute of the Medical Faculty of Brno are devoted to the questions of tick encephalitis, of grippe and of parotitis.

The collective of the Virological Institute of the Czechoslovak Academy of Sciences is systematically engaged in the problems of epidemiology, prevention of grippe and tick encephalitis, in the methodical problems of the proof of the purity of viral preparations, in the tracking down the individual phases of experimental grippe infection, in the metabolism of infected and non-infected tissues, in the action of substances which protect against the infection of the cells, specifically by the methods of virological, morphological and chemical research. Considerable efforts are devoted to research on the natural foci of tick encephalitis and to the experimental evidence of the elimination of the virus of tick encephalitis with the milk of domestic animals.

The veterinary virology has been aimed until recently only at the preparation of medicaments interpreting a few classical virus infections. Mostly from the foreign countries manufacturing processes were taken over for the preparation of vaccines or hyperimmune sera with the exception of vaccines against contagious paralysis of the swine, which was developed in our country. The elaborated vaccines against foot-and-mouth disease, rabies, swine plague, contagious swine paralysis, fowl plague helped in Czechoslovakia to attenuate the spread of the epizootics, and in the socialistic sectors of the rural economy to restrict the appearance of these infections at a rather small extension. The principal deficiency is that one control works alone in the manufacture of the preparations, without any State control above it.

The laboratory diagnostics of the viral infections of animals was dependent first of all upon clinical, epizootological data, dissecting-room changes, occasionally on histological pictures of the perished animals. Only in the recent eight years were laboratories built where a virological diagnosis of the infection of the domestic animals is done. Thus, in the State Veterinary Research Institute in Prague (SVRI) rabies, ornithosis, fowl plague, is diagnosed; in the branch at Brno, Aujeszky's disease, pig influenza, besides the already mentioned diseases. In the same institute at Bratislava, besides the mentioned ones, also the viral equine abortion, the viral infection of fowl and at the branch at Kassa ornithosis, fowl plague and Aujeszky's disease.

A few district branches of the Slovak Virological Research Institute in Czech lands started the diagnosis of a few infections on chicken embryos. The Terezin BioVet works the laboratory diagnosis of foot-and-mouth disease for the whole Czechoslovakian Republic.

The institutes of the veterinary faculties of Brno and of Kosice solve the problems of epizootology, active prevention and therapy of some infections, they endeavor to introduce new methodical approaches and processes into the diagnostic practice, occasionally they elucidate a few problems of pathogenesis or specific immunity.

~~FOR OFFICIAL USE ONLY~~

The deficiency of the laboratory diagnosis is that the methods are not standard, and each working place is working for itself. The methodics of tissue culture were not introduced in practice, which in the human virology helped to develop not only the diagnosis and the preparation of many preventions but also it led to the elucidation of problems about the nature of tissue infection by viruses and of other problems basically virological.

In prospect, the articulation of the virological practice and research should be similar as in human virology. Here it is necessary only to express the demands of the erection of a state control institute for sera and vaccines.

The main present feature of the plant virology in the Czechoslovak Republic is the protection of plants against the supposed viral infections (potatoes, hop, sugar beet, fruits, trees, vine) and the effort for their exact diagnosis. The works of basic character have been hitherto sketches of elementary nature, and they were done only in certain narrow sectors. A tendency to their planned development appears only in two working places (the Biological and the Virological Institutes of the Czechoslovak Academy of Sciences). Of course, even the practical tasks of the individual products are not virologically assured equally and to a sufficient extent:- for instance, there are deficiencies especially in fodder (clover and so on), tobacco, vegetables and ornamental plants. This results from the short number of phytopathologists at the separate specialized agency institutes.

Hitherto we do not have sufficient reliable evidence about the occurrence of the different viruses at the territory of the Czechoslovak Republic, which is also connected with the fact that the claims on the diagnostic service from the side of practice are non-existent or minimum.

The viral diseases would simply evade notice. This state would urgently require an improvement by the building out first of all central diagnostic laboratories at the phytoquarantine control laboratories of the rural economic institutes, later perhaps also at the district laboratories, which would perform reliable laboratory diagnosis. With this is also connected the standardization of the diagnostic methodology and the manufacture of diagnostic aids (antisera, standard testing materials). The standard methodology and the standard procedures for the preparation of antisera would have to be elaborated by the separate institutes according to the products, respectively viruses, and should be delivered to the given laboratories for disposal. These laboratories should have for care also the control of the health status of the sitting and the maternal nursery material such as potato, hop, fruit trees, vines and so on.

Separate specialized institutes should be devoted in perspective especially to the questions of prevention of viral diseases in the individual products, namely both by suitable agrotechnics (terms and methods of explanation, fight against weeds, and so on), and by searching for resistant varieties, furthermore to follow up the ecology of viral

~~FOR OFFICIAL USE ONLY~~

diseases and their transmitters (possibility of chemical control). One of the tasks would be also the sanitation of the valuable but completely contaminated varieties (meristemic culture, and so on).

The institutes of the Czechoslovak Academy of Sciences would have to steadily and more and more change over for the solution of the mechanism of infection in plants, the protection of them against infections, the proof of the origin of the viruses, of the latent and manifest infection, ecology of viruses in the Nature.

* * *

Recapitulating the aims and results of virology in Czechoslovakia we have also to say briefly something about the prospects of further development. Let us gather them together into points:

1. Workers must be schooled in virology for each type of virological work. Suitable workers for scientific and laboratory work must be searched for at the universities.

2. The field work for the demands of the protection of health of animals, people and plants and for the anti-epidemic service must be guaranteed by field working places of the Regional and the District Epidemiological Health Stations for the service of medicine, by branches of State Veterinary Research Institutes in the separate districts for the veterinary component, and by phytoquarantine control laboratories for the rural economy. The building of these components -- as far as this is not done -- will be necessary. It will be required to build virological laboratories within the framework of the microbiological laboratories at the large infectious departments of the hospitals (clinical virology).

3. The institutes of epidemiology and microbiology of the Ministry of Health must assure in the field of virology the problems of the antiepidemic control, they have to methodically arm and lead the lower components, they must find the agents of the obscure diseases, they must offer bases for the preventive epidemiology, they must track down the ecology of viruses among people and animals. Similar formations must guarantee these tasks in the field of veterinary science (State Veterinary Research Institute) and in rural economy.

4. The institutes of the faculties, as far as they deal with virological work, must guarantee the solution of certain concrete problems, or must solve methodical problems or parts of the problems of theoretical research. They must have to breed experts, teachers and research workers. Here, also the research institutions without pedagogical obligations must have certain duty.

5. At the special oncological institutes the virological trend of research must be widened in the problems of etiology of malignant tumors. Just so, it will be necessary to develop the problems of genetics of tissues, the immunology at tumoral diseases and the chemotherapy of tumors.

~~FOR OFFICIAL USE ONLY~~

6. The Institute of Sera and Vaccines and the factories for its manufacture (Biogen, Biovet) must have their own research components, without which neither the technological development nor the quality of the preparations is guaranteed.

7. The institutes of the Academy (Czechoslovak Academy of Sciences, Czechoslovak Academy of Agricultural Sciences) must solve the questions of the health and agricultural practice at the highest level and complexity of the work in excellence. It is true especially for the solution of the problems of pathogenesis and resistance against the viral infections, cytophysiology and biochemistry of cells, chemotherapy of viral infections, of the problems of the heredity of viruses.

8. In the State plan, the coordination of the tasks with the individual working places which participate in research is required.

9. For all virological working places it is necessary to be assured by a central preparation of culture media, cells and tissues, diagnostic sera and antigens, certain technical aids. The assurance of these needs strengthens research and practice, it may be built for the demands of the socialistic states and as their reinforcement. By the fulfillment of these needs an important progress can be expected in virology at the world scale and suitable conditions can be created for the further requirement which is

10. the collaboration in virology with the U.S.S.R. and with the states of the people's democracies, and the coordination of the research activity in the most important problems. For this problem the level of the joint international magazine "Acta virologica" must be increased.

* * *

If we objectively evaluate the development of virology in Czechoslovakia, we must admit the successes in this field as well as in the number of experts, working places, laboratory equipment and obtained results. These must be reached mainly in the future, as the process of the further construction will depend both upon the expert and the ideological maturity of the workers, with a developed feeling for collaboration and with a mutual respect for the work of the other, but with the use of open criticism and with an effort for collaboration with the nearest laboratories of the State camps of peace, with good working relations with the virologists all over the world.

D. B., Bratislava, Sasinkova 9.

Copyright - A, Authority State Public Health Publishing House.]

END

~~FOR OFFICIAL USE ONLY~~