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WORK OF THE DEPARTMENT OF BIOLOGICAL SCIENCES, ACADEMY OF SCIENCES USSR, IN 1954

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Soviet biological science is developing on the basis of the only correct philosophy, i.e., that of dialectical materialism. It has the purpose of acquiring a knowledge of the laws of living nature in order to be able to use this knowledge for the benefit of socialist society and for the building of communism in the USSR. The victories achieved by Soviet science in the fight with idealism and metaphysics in biology are a necessary prerequisite to our advancement in the theoretical field and to the solution of many practical problems. The August 1948 session of the All-Union Academy of Agricultural Sciences imeni Lenin and the combined session of the Academy of Sciences USSR and the Academy of Medical Sciences USSR have exerted a great influence on the progress of Soviet biological science. These meetings were a turning point for soviet biological science after which it began to forge ahead on the basis of the materialistic principles of Michurinist biology and Pavlovian physiology. These sessions contributed to the consolidation of the forces of Soviet scientists and the purposeful application of these forces for the solution of a number of theoretical problems in biology and of problems pertaining to the people's economy. An objective analysis of the development of biological science in the USSR testifies to the progress achieved recently. It is our duty to continue to safeguard biological science in the future from the influence of foreign reactionary concepts of morganism and vitalism.

However, it would be a mistake to pass in silence over definite shortcomings which have developed in our biological science. These shortcomings are not connected with the principles applied in our work, but basically pertain to the practical ways in which various scientific and organizational problems should be solved.

It follows from what has been said above that we have a right to regard with pride the ideological basis of our work and the theoretical prerequisites of this work which have a bearing on the development of science.

Whether a theory is true or false can be established only by relating this theory to reality. Every theory must be confirmed and justified by experience and practical applications.

The veracity of facts which have been established must be beyond question. Nevertheless, one could find examples of a superficial and irresponsible attitude towards facts, into the interpretation of which much that is subjective is being introduced. Exact experimental work is often replaced with dogmatism and bookishness. Generalizations which are too sweeping are made without a sufficient experimental basis and often arrived at by ignoring the experimental results obtained by other investigators, including progressive foreign scientists. Under such conditions the elements of conceit inevitably appear. All this is incompatible with the responsibility which rests on scientists who are developing a progressive materialistic theory.

We must pay the closest attention to the thoroughness and accomplishment of our experimental technique [literally, the culture of our experiments], the exactness of our methods, and the reliability of our assertions. We must contribute by every means to raising the material equipment of our laboratories to the desired level.

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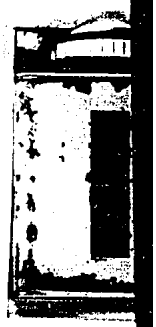

It is a characteristic trait of Soviet science that it applies the principle of collectivism. One must aspire to solve scientific problems in a collective manner. However, the collective way of conducting the work must be combined with a full utilization of the personal initiative and experience of every individual scientist.

It is necessary to remember that the solution of actual scientific problems can proceed along several roads. For that reason the existence of a number of scientific schools is justified, which solve the same problems by different means, but nevertheless always base their work on correct philosophic and methodological principles A competition between such schools can only contribute to the advancement of our science.

A situation under which scientists label as idealistic any line of research with the conclusions of which they do not agree is absolutely impermissible. The forms and ways in which scientific truth can be achieved are diverse: dogmas, abstract schemes, and artificially supported personal authority do not contribute much to the progress of science.

Of great importance in the progress of science are discussions and a free exchange of opinions. The purpose of the exchange of opinions must be the scientific substantiation of materialistic ideas. Of course, the purpose of the discussions which are carried out and the task of criticism in general consists in the reinforcement of the materialistic basis of science and not in its destruction.

Discussions and exchange of experience can be constructive only when sufficient experimental data are available.

Notwithstanding this, many of the discussions which had been conducted in the USSR recently were distinguished by too abstract a character: the concepts advanced in them were not sufficiently supported by factual data. We suggest that the theoretical discussion of problems which arise on the basis of Michurinist biology be expanded and that these discussions be carried out with a sufficient evaluation of experimental data. The strength of USSR's science is that it serves the people and the workers. Science is closely connected with life and practical applications. It is supported from many sides by the experience of the advanced workers of production, thus receiving extensive data for theoretical generalization and conclusions pertaining to production.

Collaboration between scientists and the pioneers of production is one of the most important conditions assuring the success of Soviet science. One must mention in this connection that the decision of the plenary session of the Central Committee of the CPSU has particularly emphasized the necessity of studying the results of advanced production experience.

The decisions of the 19th Congress of the CPSU, of the Central Committee of the CPSU, and of the Soviet government have set before us important tasks connected with the further advance of agriculture and an expansion in the production of consumer goods.

The September [1953], January [1954], and February-March [1954] plenary sessions of the Central Committee of the CPSU were devoted to agriculture. This testifies to the unflagging attention which the party pays to agriculture. Biologists must help in carrying out the tasks connected with the expansion of agricultural production.

The investigations carried out by the Department of Biological Sciences under the plan for 1954 were in agreement with this attitude. A considerable number of decisions made by the Council of Ministers USSR, and imposed on the

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institutions of the Department of Biological Sciences, are effective in definite fields. At the same time, more work of a theoretical nature than in former years was done under the 1954 plan. For instance, a considerable stress was laid on research dealing with the effects of ionizing radiation on animals, plants, and microorganisms, the application of the isotope methods, etc. The work in question was carried out at the Institutes of Genetics, Microbiology, Biophysics, and Animal Morphology. This work was distinguished by the award of a President of the Academy of Sciences USSR Prize.

Interesting results were obtained with the use of electron microscopy. In discussing the most important work which has been carried out at the institutes of the Department of Biological Sciences in 1954, research on proteins and their role in metabolism must be mentioned first of all.

Most of the work on this subject has been done by the Institute of Biochemistry imeni A. N. Bakh. Specifically, research done in 1954 established a number of interesting facts in regard to the formation of protein-lipoid complexes. It has been demonstrated that doubling of the molecular weight of the proteins takes place in the course of the formation of these complexes and furthermore that mixed complexes between egg albumin, serum albumin, and ergosterol are formed.

It has been demonstrated that the enzymatic properties of proteins are not restricted to substances which were hitherto regarded as enzymes; proteins which were considered inert are also endowed with pronounced enzymatic activity. In the light of the results obtained, one is led to the belief that any protein possesses catalytic properties to a certain extent.

In the order of increasing complexity of the research that has been conducted, I shall mention work with artificial protein systems in which inclusion of individual enzymes or complete enzyme complexes has been realized, research on natural polymolecular systems (as, for instance, particles which can be isolated from the lysates of bacteria or from the intracavity liquid of the silkworm), and work on isolated mitochondria, plastids, etc.

In regard to the problem of heredity and modifiability, it may be said that this problem is one of the most important problems of general biology, and is of fundamental importance for the clarification of processes of individual and evolutionary development of organisms and also of related phenomena pertaining to mutations of plants and animals that would be of benefit to human beings. The work on the problem in question was conducted mainly at the Institute of Genetics. In carrying out this work, the institute set itself the task of establishing the laws according to which inherited modifications arise.

In 1954, new data were obtained which confirm and expand the postulate to the effect that there is an adequate adaptive response of organisms to new conditions of life by appropriate modifications. Investigation of the processes of the transformation of summer varieties into winter varieties has shown that there is a direct connection between the development of new properties pertaining to survival in the winter and the accumulation of assimilated products under conditions of an appropriate illumination. The adequate character of the modification of phytopathogenic viruses has also been demonstrated. All these data testify to the fact that there is no selection of forms which are already present in the population, as has been asserted in the foreign literature, but actually a modification of the initial form. The modifications which take place bear an adaptive character.

New data have been obtained on the fertilization of plants. In these investigations the interaction between the pollen elements and the surrounding tissues of the maternal organism were studied. The role of the process of interaction in raising the vitality of the developing germ has been shown.

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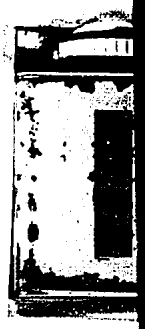

In 1954, work on the processes of species formation in plants and on the selection of winter wheats and corn has been continued at the Institute of Genetics.

Of great theoretical and practical interest is the work that has been conducted at the Main Botanical Garden of the Academy of Sciences USSR under the direction of Academician N. V. Tsitsin, dealing with the selection of plants. As a result of this work, a number of valuable varieties of agricultural plants including winter and summer wheat -- Agropyrum hybrids -- have been recommended for practical agricultural use. These hybrids give large yields of grain in many regions of the USSR. Perennial wheats and branched rye have also been introduced. The branched rye yields a large quantity of green matter which can be used as fodder for farm animals. The work done by N. V. Tsitsin in this field has been outlined by him in the monograph Otdalennaya Gibridizatsiya Rasteniy (The Remote Hybridization of Plants) published in 1954.

One must note that a number of problems connected with the phenomena of heredity has not yet been adequately investigated. This refers particularly to the effects of radiation on heredity. Problems in this field have been investigated at the Institute of Genetics, but not to an adequate extent.

With reference to radiobiological problems, one may say that the latest achievements in the field of nuclear physics have opened up perspectives for the application of nuclear radiation in medicine, agriculture, and industry. On the other hand, progress in this field has resulted in the great danger that humanity may be threatened when this radiation is used for purposes of aggression.

Soviet biology is faced with the urgent task (a task which cannot be delayed) of investigating the mechanisms of the biological action of nuclear radiation for purposes of scientific and practical application and also with the aim of developing measures against the dangers which would arise if this radiation were to be used as a means of aggression.

Work on these problems has been delegated to the recently created Institute of Biological Physics. However, this does not relieve other institutes of the department of responsibility for work in this field. Although investigations on this subject have been conducted at these institutes for a long time, the scope of these investigations has not been adequate. A decisive change is needed here.

As far as the work on radiobiology during 1954 is concerned, the following results may be mentioned. Work has proceeded along two lines: research on radioactive isotopes and work which dealt directly with radiation and the effects of radiation on biological objects.

The work on isotopes has been carried out at the Department of Biological Sciences on a sufficiently extensive scale. During recent years radioactive isotopes have been introduced into practical work at biological and agricultural institutions as one of the most valuable methods of scientific research. Furthermore, a number of institutions of the Department of Biological Sciences have obtained new data on the vital activity of plants and animals by using this method.

At the Institute of Plant Physiology it has been established that during the photosynthetic formation of proteins in plants C^{14} enters most rapidly into the composition of alanine, serine, and glycine. It has been established that the velocity with which the products of photosynthesis are transported in sugar-beet plants amounts to approximately 100 cm per hour. This important aspect of the physiological activity of plants is of great importance from the standpoint of practical measures that are taken, because in a number of cases we do not take into account this velocity.

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A method of investigating synthetic reactions with the aid of the isotope method has been developed. New methods of investigation have been developed to a considerable extent and applied in soil science, particularly in work done by the Institute of Soil imeni V. V. Dokuchayev. Application of tracer atoms, heavy water, etc., made it possible to solve in 1954 a number of problems which are of importance in connection with the theory of the nutrition of plants. The results of the investigations that have been carried out will make it possible to interpret from a scientific point of view the use of fertilizers and improve the effectiveness of their use.

Investigations carried out at the Institute of Biochemistry have shown that the resorption of carbon dioxide by the sprouts and roots of tobacco plants from a solution containing tracer atoms is accompanied by the formation of a secondary product in these plants, i.e., of the alkaloid nicotine. The process of the fixation of carbon dioxide in the roots proceeds independently of illumination and is a dark reaction.

At the Institute of Microbiology the role of individual amino acids in the synthesis of protein by fodder yeast has been clarified with the aid of methionine containing tracer atoms. The data which have been obtained will be used for the improvement of the quality of fodder yeast.

Vitamin B_1 containing tracer atoms made it possible to solve within a very short time the problem in regard to the best methods of obtaining microbiological preparations which contain vitamins and are to be used as food and in medicine.

As a result of the investigation of the laws underlying the biosynthesis of vitamin B_2 by microorganisms, a technological scheme for the production of a highly active vitamin concentrate was developed.

The Institute of Zoology has conducted important work on labeling fish with radioactive phosphorus. This element is deposited first in the soft tissue of the fish and in the scales, while later it accumulates in the scales and the bones. On using this method of labeling fish it was possible to show that young fish released into a river can be easily detected among fish that have not been labeled.

The method of tracer atoms has been extensively used in other institutions of the Department of Biological Sciences, such as the Institute of Physiology, the Institute of Animal Morphology, the Laboratory of Physiological Chemistry, etc. In studies on the restoration of brain tissue the effect of biologically active substances in the mechanism of the contraction of the heart and the mechanism of glycogen metabolism, etc., has been clarified. The method of using radioactive isotopes and heavy isotopes has been introduced into extensive use at our institutes. In some cases we are making a transition to the next, more advanced stage in this work and are beginning to develop a critical attitude towards some conclusions which have been made hitherto on the basis of the use of this method.

Notwithstanding this, we are not conducting enough work on the study of the activity of radiation, particularly of hard radiation. Energetic measures must be taken to expand the work in this field.

In 1954, a number of the institutions of the Department of Biological Sciences conducted research on the effects of radiation on microorganisms and on simple biological models and investigations on the elucidation of the mechanism of the effects of biological radiation. Specifically, research which has been conducted at the Institute of Microbiology yielded new data on primary injuries produced by radiation. Research has been continued on the effect discovered last year that irradiation stimulates the biosynthesis of ergosterol by

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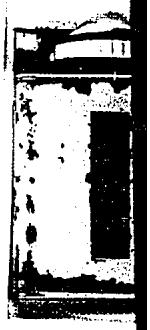

microorganisms. Data have been obtained which indicate the possibility of obtaining, by means of irradiation, cultures which have a hereditarily fixed capacity to produce increased quantities of ergosterol. This is of great importance from the practical standpoint, because ergosterol is an indispensable starting material for the industrial production of Vitamin D and of a number of other valuable substances. At the Institutes of Genetics and Biophysics, a large number of investigations has been carried out dealing with the effects of ionizing radiation on the fertility of male and female animals. A number of new facts and relationships has been discovered pertaining to the sterilizing effects produced by radiation, which are potentially of importance not only from the theoretical but also from the practical standpoint. In this connection, it is of particular significance that the effect of the radiation appears not only in the individuals directly subjected to the radiation, but also in their progeny. Thus, one may conclude that there is a hereditary fixation of the effects of radiation in the progeny.

As a result of the further improvement of luminescence microscopy the Institute of Biophysics has developed a rapid method for the early diagnosis of radiation injuries to the organism. This method is being transferred to medical institutions for checking on a wide scale.

Work done at the institute of animal morphology has demonstrated that a number of substances may exert a prophylactic effect and thus alleviate the reaction of the animal organism to the effects of radiation. The protective action that is exerted is apparently connected with a reduction of content of oxygen in the organism. This action consists in general alleviation of the radiation injury and primarily of the injury to the blood formation system, digestive system, and other systems that are very sensitive to the effects of radiation. When unquestionably lethal doses of radiation have been applied, a certain protective action was obtained by administering emulsions of bone marrow during the first 4 days following irradiation.

At the Institute of Biochemistry, it has been established that the harmful action of X rays on proteins is determined not only by the presence of sulfhydryl groups, to which some foreign investigators ascribe a particular significance in the mechanism of the effects produced by radiation. It has been demonstrated in this work that the vitamins P and B_6 protect protein solutions from aggregation upon irradiation.

I should like to discuss new methods of investigation which have been introduced rather extensively in 1954 and which are basically connected with the use of electron microscopy. In 1954, the equipment of the Laboratory of Electron Microscopy has been modernized. A new universal electron microscope was received, which is much superior to all older models. Improvements have been carried out on the older models which increase their resolution. Microtomes have been acquired which make it possible to prepare for electron-microscopic investigations sections ranging down to 100th parts of microns in thickness. As a result of the improvements in laboratory techniques which have been carried out, possibilities have been created of applying the method of electron-microscopy to an increasing extent in various fields of biology.

Electron-microscopic investigations have been carried out in the fields of microbiology, virology, and biochemistry. In connection with the acquisition of the microtomes mentioned above, work on histology has been initiated.

I should also like to add that great progress has been made in the application of luminescence microscopy and optical microscopy.

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The Institute of Microbiology has conducted work on the chemosynthesis in nitrating bacteria. It has also carried out investigations on the physiological and biochemical characteristics of bacteria inhabiting petroleum deposits.

The role of these bacteria in the decomposition of individual hydrocarbons and the formation of combustible gases has been clarified. Measures have been devised for the regulation of the activity of these microorganisms with the purpose of increasing the yields of petroleum from the deposits.

During 1954, the first microbiological investigations in the vicinity of the North Pole were carried out. It has been established that at very large distances from the nearest islands, under ice which is many years old, the whole depth of the water and also the bottom of the Arctic Ocean are populated with microorganisms. Various species of bacteria and even of yeasts were found at all depths of the ocean. The data obtained are not only of importance from the standpoint of hydrobiology, but also of significance for the hydrology of the Central Arctic Region, because the bacteria are good indicators of ocean currents.

Problems connected with the new ideas on noncellular forms of living matter and the development of cells have been studied at a number of institutes of the Department of Biological Sciences on the most diverse organisms and the most diverse systems showing increasing degrees of organization. This work has been done on viruses, on lysates, on bacteria, and on plants and animals.

The Institute of Microbiology has shown that one may sometimes find in filtrates from cultures of gram-negative and lactic acid bacteria small formations of an irregular outline which can be reseeded on special media after an indefinite length of time. The morphology of these microforms was studied with the aid of optical and electronic microscopes. It was found that the physiological activity of these forms is very slight and that their growth is very slow. At the present time there is no reason to consider these forms as stages in the vital cycle of the microorganisms.

The influence of denaturating effects on the structure of the particles of bacteriophage was investigated at the Laboratory of Electron Microscopy. It was found that ammonium sulfate exerts no influence on the particle of the phage. Urea brings about disintegration of the phage particles. A pressure amounting to several thousand atmospheres has a similar action on a number of bacteriophages. New data on the fine details of the cell division of some of the simplest bacteria have been obtained at the institute.

Investigations on plant cells have been carried out at the Institute of Genetics and the Main Botanical Garden. It has been shown at the Institute of Genetics that scarification of cells is characteristic not only for regeneration processes, but can also be observed in the tissues of a normally developing organism. This phenomenon has been investigated in detail on the processes of the growth of some plants.

At the Institute of Animal Morphology, experimental work has been done on the ontogenesis of the silkworm. Furthermore, investigations have been carried out on regeneration of skeletal muscles after macerated smooth-muscle tissue has been implanted. The fact that smooth muscle substitutes [literally "models"] of skeletal muscles survive for a long period of time has been demonstrated and the dynamics of the smooth muscle tissue replacing the removed skeletal muscles have been observed. At this institute a considerable number of clinical data have been accumulated on the beneficial effect which a leukocyte preparation exerts on the healing of refractory ulcers and wounds.

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As far as botany and research on plant physiology are concerned, the All-Union Botanical Society prepared, on the occasion of the Eighth International Botanical Congress at Paris, a collection of articles entitled "Voprosy Botaniki" (Botanical Problems), which played a considerable role in acquainting foreign scientists with the present state of USSR botany. At the Institute of Plant Physiology imeni Timiryazev new and very important functions of the root system have been discovered. These functions consist in the primary synthesis of many amino acids and are connected with the metabolism in other parts of the plant. The Institute succeeded in finding ways of overcoming the reduction in the protein content of the grain of summer wheat resulting from irrigation. To achieve this end, extraradical nitrogen fertilization during the formation of ears of the plants was used. It is known that this problem has been of cardinal importance in connection with the irrigation of the Trans-Volga region.

In this manner, an increase in the yields of hard southeastern wheat having a high protein content can be achieved with irrigation and this increase can be combined with a retention of high quality. Furthermore, new significant data have been obtained on the role of soil microorganisms in the nutrition of plants through the roots. Although the plants are of course completely autotrophic under conditions of inorganic nutrition, the microorganisms still play an important role for the autotrophic plants, because they are capable of stimulating the physiological activity of these plants by evolving vitamins and other physiologically active substances.

Finally, one could demonstrate that the formation of amino acids in the process of photosynthesis takes place without utilization of the sugars available in the cells. One may conclude from this that the formation of amino acids in photosynthesis is a primary process. This very important question must be subjected to further research.

As far as investigations of the fauna of the USSR are concerned, the Institute of Zoology has completed publication of three volumes of Fauna SSSR (The Fauna of the USSR) and has compiled eight manuals for the determination of specimens of the fauna of the USSR. An investigation which extended over many years and dealt with the origination of nutritional forms among insects that damage forests has been completed. Field investigations in the region of the Angara Construction Project ("Angarastroy") have been completed. These investigations dealt with the biology of insect pests and measures for combating them.

During 1954, the Interinstitutional Commission on the Colorado Beetle continued its work. This commission has set up a coordinated plan of investigations on this pest.

The Institute of Paleontology has concentrated its investigations on deposits in regions which are important from the economic standpoint. In accordance with this principle, the paleozoic deposits of Siberia have been the principal ones investigated. Investigation of these deposits fits into the general academic problem of establishing the presence of petroleum and natural gas in the eastern regions of the USSR, a task which was given to the academy by the government.

By doing creative work within the scope of Pavlov's theory, the institutions of the Department of Biological Sciences obtained many new and interesting data in 1954. For instance, the Institute of Physiology established new facts pertaining to one of the central problems of Pavlov's teaching on higher nervous activity, namely the problem of cortical inhibition. The development of forms of unconditional innate inhibition in the course of ontogenesis has been proven. The mechanism of the release of cortical inhibition has been clarified and the existence of a limit for cortical inhibition processes demonstrated thereby. This investigation is of great significance from the standpoint of developing ideas in regard to the limit of working ability.

On the basis of clinical data, the relationships between types of higher nervous activity and the course of intestinal ulcers in human beings was studied.

A series of investigations pertaining to disturbances of the functioning of digestive organs in dependence on functional disturbance of the higher nervous system has been completed. One must particularly note research on the experimental formation of the higher nervous activity of dogs. It has been shown that keeping the dogs under conditions of free perception or perception that is interfered with affects the formation of the type of the nervous system.

At the Institute of Higher Nervous Activity the physiological basis of hypnosis was subjected to investigation. The physiological significance and effects of sleep therapy in various diseases were studied. Work has also been done on the so-called nervous exhaustion in children of school age.

The physiological laboratory has obtained new data indicating the significance of the relative intensity of the excitation of cortical centers for the functioning of conditioned reflex connections as far as the physiology of conditioned reflex realignments is concerned.

In 1954 the Laboratory of Evolutionary Physiology, which works under the direction of Academician Orbeli on problems of age physiology, expanded its activities.

At the Institute of Animal Morphology, investigations have been completed which show that with the aid of substances that contain free sulfhydryl groups one may eliminate the acute toxicity of streptomycin and its specific neurotoxic action, which becomes apparent after prolonged application of this antibiotic.

Furthermore, it has been experimentally demonstrated that all sulfhydryl substances that have been tested (free cystein, cystein hydrochloride) have a pronounced chemotherapeutic activity with reference to diseases brought about by Gram-positive as well as Gram-negative bacteria.

There is an increased trend toward concentration on problems which are of importance from the standpoint of practical application. This trend must be reinforced in the future. To give a few examples, a number of institutes of the department have worked in 1954 on the development of virgin land. The Institute of Soil has done the most extensive work on this subject.

Expeditions dispatched to the Turkman SSR have studied gum-bearing trees with the purpose of using them in the industry.

Under the supervision of the Institute of Biochemistry, work has been done on the drying of seed grain, a procedure which was not regarded as feasible hitherto. It has now been shown that this new procedure yields very good results. In this manner an effective remedy has been found for the situation which arose in Siberia this year, to give an example.

Work on animal husbandry, as in previous years, is not yet on the desired level, although a number of institutes of the Department of Biological Sciences have conducted in 1954 work on problems of significance in this field. For instance, at the Institute of Genetics problems connected with intervariety crossing and other means of improving the productivity of animal breeding were investigated. This institute has also conducted work on the improvement of lactation and of the fat content of milk. The Institute of Physiology imeni Pavlov has conducted investigations on the formation of milk and lactation in farm animals. In the course of this work the existence of a connection between processes of inhibition in the central nervous system and the fat content of the milk was established.

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In regard to publications, one may state that the institutes of the department have published a great amount of material in 1954, particularly as far as monographs are concerned. The total amount of published material issued by the Department of Biological Sciences amounted to 2,500 printed sheets. However, this does not satisfy the requirements of our scientists, because 600 printed sheets prepared for publication have not been published.

In 1954 the publication of several new periodicals, particularly of the journal Fiziologiya Rasteniy (Plant Physiology) was begun. The biological abstract journal [Referativnyy Zhurnal Biologiya], which is of great importance for us, also started publication in 1954.

The contacts with foreign scientific organizations have been reinforced and expanded in 1954. This development has been aided to a great extent by numerous foreign trips made by our scientists and by visits of foreign scientists to the USSR. The exchange of books has also been expanded. Experience acquired in contacts with foreign scientists has demonstrated that these contacts contribute to a development of friendly relations and cultural cooperation between the USSR and foreign countries and furthermore serve the cause of peace. The encounters with foreign scientists enable us to acquire an insight into the positive experience of foreign scientists, which is often of great importance and must be taken into consideration by Soviet scientists. Altogether 30 trips abroad have taken place in 1954 and 500 of our scientists participated in these trips. We have taken part in scientific congresses, meetings, and conferences and our scientists presented reports at these gatherings. Specifically, scientists from the Zoological, Soil, Forest, Animal Morphology, Genetics, Plant Physiology, Microbiology, Biochemistry, and Botanical Institutes and from the Main Botanical Garden, the Institute of Physiology imeni Pavlov and the Helminthological and Physiological Laboratories have gone on trips abroad.

During 1954 our biologists have visited the following countries: France, Africa, Italy, Czechoslovakia, Pakistan, Hungary, German Democratic Republic, England, Albania, Rumania, China, Bulgaria, Sweden, Finland, Poland, Canada, Japan, and Austria. Our country and our institutes were visited by biologists from Norway, Albania, Rumania, Czechoslovakia, India, Japan, Austria, Bulgaria, Iran, Poland, Holland, Hungary, England, Chile, Colombia, the German Democratic Republic, and Canada. I have enumerated all this in detail in order to demonstrate the extent and growth of our contacts with foreign scientific institutions.

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