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NASA TM-76296

PHYSIOLOGY OF MAN AND ANIMALS IN THE TENTH FIVE-YEAR PLAN  
(Proceedings of the Thirteenth Congress of the I.P. Pavlov  
All-Union Physiological Society)

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Translation of "Fiziologiya Cheloveka i  
Zhivotnykh v Desyatoy Pyatiletke,"  
Fiziologicheskii Zhurnal SSSR imeni I.M.  
Sechenova, Vol. 66, No. 5, May 1980,  
pp 757-771



(NASA-TM-76296) PHYSIOLOGY OF MAN AND  
ANIMALS IN THE TENTH FIVE-YEAR PLAN:  
PROCEEDINGS OF THE THIRTEENTH CONGRESS OF  
THE I. P. PAVLOV ALL-UNION PHYSIOLOGICAL  
SOCIETY (National Aeronautics and Space

NS1-22684

Unclass  
G5/52 21896

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON D.C. 20546  
AUGUST 1980

1. Report No. NASA TM-76296	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle PHYSIOLOGY OF MAN AND ANIMALS IN THE TENTH FIVE-YEAR PLAN (Proceedings of the Thirteenth Congress of the I.P. Pavlov All-Union Physiological Society		5. Report Date AUGUST 1980	6. Performing Organization Code
		8. Performing Organization Report No.	10. Work Unit No.
7. Author(s) K. A. Lange		11. Contract or Grant No. NASW-3198	13. Type of Report and Period Covered Translation
9. Performing Organization Name and Address SCITRAN Box 5456 Santa Barbara, CA 93108		14. Sponsoring Agency Code	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546		15. Supplementary Notes Translation of "Fiziologiya Cheloveka i Zhivotnykh v Desyatoy Pyatiletke," Fiziologicheskii Zhurnal SSSR imeni I.M. Sechenova, Vol. 66, No. 5, May 1980, pp. 757-771	
16. Abstract <p>This is a report on the 13th Congress of the I.P. Pavlov All-Union Physiological Society. The Congress took place at Alma-Ata, USSR, from 24 - 28, September, 1979.</p> <p>The main form of work at this congress was symposium meetings, and selected ones are reviewed in this report.</p>			
17. Key Words (Selected by Author(s))		18. Distribution Statement THIS COPYRIGHTED SOVIET WORK IS REPRODUCED AND SOLD BY NTIS UNDER LICENSE FROM VAAP, THE SOVIET COPYRIGHT AGENCY. NO FURTHER COPYING IS PERMITTED WITHOUT PERMISSION FROM VAAP.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 26	22.

UDC 612.930.1

PHYSIOLOGY OF MAN AND ANIMALS IN THE TENTH FIVE-YEAR PLAN  
(Proceedings of the Thirteenth Congress of the I. P. Pavlov  
All-Union Physiological Society)

By  
K. A. Lange\*

The most important problems of modern basic and applied physiology, that are being worked out in the 10th Five-Year Plan by many thousands of Soviet physiologists were the subject of a comprehensive discussion at the 13th Congress of the I. P. Pavlov All-Union Physiological Society. The congress took place in Alma-Ata from 24 to 28 September 1979. There were 1029 participants in its work, including 801 delegates from 100 divisions of the All-Union Physiological Society. Whereas in number of participants the 13th Congress of the society was inferior to the three preceding congresses, the content of its scientific program was the most extensive and diverse in the entire history of congresses of physiologists. At the 50 symposium meetings materials were discussed from 152 papers and 315 scientific reports, while 270 scientific reports comprised the program of 33 section meetings. For the first time in the practice of the organization of congresses of physiologists, a placard system of scientific reports was introduced--stand reports. This made it possible for the participants of the congress to become acquainted with another 318 scientific reports. A total of 1055 papers were included in the congress program. In addition, four papers were heard at the plenary sessions. The papers and scientific reports in the congress program made up two volumes of materials.

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\* I. P. Pavlov Order of the Red Banner of Labor Institute of Physiology, USSR Academy of Sciences, Leningrad.

\*\* Numbers in margin indicate pagination in original foreign text.

The 13th Congress of the I. P. Pavlov All-Union Physiological Society was dedicated to the 150th anniversary of the birth of Ivan Mikhaylovich Sechenov. In addition, during the congress the 130th anniversary of the birth of Ivan Petrovich Pavlov was held. This determined the inclusion in the program of the first plenary session of the report of V. N. Chernigovskiy (Leningrad) "Problems of Physiology of Sensory Systems in the Works of I. M. Sechenov" and the report of E. A. Astratyan and P. V. Simonov (Moscow) "Current State of the Science on Higher Nervous Activity" in the program of the second plenary meeting. At one of the symposium meetings the report of A. V. Tonkiye (Leningrad) was heard with great interest "Mechanism of Sechenov Inhibition". One of the meetings in the section of the history and theory of the development of physiology treated different aspects of the scientific activity of I. M. Sechenov.

After noting that I. M. Sechenov entered the history of science as the brilliant founder of central inhibition, V. N. Chernigovskiy focused the attention of the congress participants on the extensive materials that indicate the important contribution of the "father of Russian physiology" to the physiology of the sense organs. The interest of I. M. Sechenov in this area of physiological science was traced by V. N. Chernigovskiy from the famous "Reflexes of the Brain" (1863) to one of the late works "Participation of the Sense Organs in the Work of Hands in the Seeing and the Blind" (1901). Based on a deep and comprehensive analysis, V. N. Chernigovskiy convincingly showed the invaluable importance of the idea of I. M. Sechenov on the existence of a special "dark, tenacious" muscle feeling for the entire subsequent development of physiology and especially for modern neurophysiology and the physiology of the sensory systems. The reporter stressed that, in particular, I. M. Sechenov predetermined essentially the feedback concept, substantiated the concept of "systems feelings," interoceptive signalling, and finally, actually formulated the idea on the visceral (interoceptive) analyzer, only without using the word "analyzer." V. N. Chernigovskiy also showed that I. M. Sechenov, in generalizing his many years of research on "vague sensations," starting from the internal organs and muscles, clearly and convincingly stated the problem of tissue reception, at the same time anticipating the development of one of the most important sections of modern physiology of reception.

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The report of E. A. Astratyan and P. V. Simonov covered the 130th anniversary of the birth of I. P. Pavlov. The survey of studies contained

in the report and which covered an investigation of different problems of physiology of the higher nervous activity was preceded by the authors by a discussion of a number of general theoretical questions. It was stressed in particular, that the actual achievements of the Pavlovian school--clarification of the main laws governing the formation, implementation and inhibition of the conditioned reflexes, extrapolation of these discoveries in the work of the healthy and sick human brain with regard for the appearance in man of a second (speech) signal system and special human thinking based on it, became possible thanks to the general methodological approach of I. V. Pavlov to the physiological and psychic problem. The report noted that the strength and depth of the dialectical thinking of I. P. Pavlov consists of the acknowledgement of different aspects of studying the neuropsychic (higher nervous) process that is unified in its objective nature. The authors of the report view the science of the higher nervous activity as a new field of knowledge that occurred at the "junction" of traditional disciplines that studied cerebral activity--physiology and psychology. Here it is stressed, that the science on higher nervous activity cannot be unequivocally classified either with biological science or the humanities, since it includes elements of all these branches of knowledge. The attention of the participants of the congress was further drawn to the most important results of studying the cellular-synaptic mechanisms for completing conditioned reflexes, analysis of the neurochemical foundations for completing conditioned bonds, their recording and reproduction, as well as analysis of the action of neuromediators. Especial attention in the report was given to the studies that treated an investigation of the neurophysiological foundations for purposeful behavior, among which the central position belongs to the problem of neurophysiological mechanisms of motivation. The development of research in the field of experimental neuroses that is characteristic for recent years is noted as a very positive fact. These are trends that are linked in the closest manner with clinical medicine. The report also examined the problems that today comprise the content of research in the field of behavioral genetics.

At the second plenary session the report of N. P. Bekhtereva (Leningrad) "Psychophysiology Today and Tomorrow" was also heard. After noting that in the given case by physiology of psychic activity is meant a strict physiological study of the cerebral support for psychic functions, N. P. Bekhtereva

made a comprehensive characterization of the advances in the development of this region of knowledge, mainly determined by the results of intensive studies in recent decades. She stressed that the attained progress, must however, be viewed only as an advance towards the solution of problems regarding the correlation of the physiological and psychic that was brilliantly substantiated by I. M. Sechenov back in 1863. N. P. Bekhtereva in her report focused primary attention on a detailed examination of the four most important problems of modern psychophysiology. The first named was the problem of the correlation between structure and function in the human brain. Further the attention of the meeting participants was directed towards the main results of studies and paths were substantiated for the further development of work whose task is to answer the question on which physiological reconstructions reflect the specific nature of the realized activity. As the third problem, N. P. Bekhtereva presented the interaction between different cerebral zones, stressing here that this aspect of psychophysiology has not only its own importance, but also a significant meaning for a correct evaluation of the entire supply of knowledge on the structural-functional and fine neurophysiological organization of the brain. After substantiating the need even in the modern studies for an investigation of the cerebral support not only under conditions of direct instrument contact with the brain, but also with regard for the contact with the brain of biologically active substances, N. P. Bekhtereva called the fourth problem the knowledge, first, of neuropeptides and their possible role in psychophysiology. N. P. Bekhtereva noted in this respect, that at the modern stage of development of physiology of the psychic activity, the words of I. M. Sechenov on the possible study of psychic processes in experiments on animals obtain new life. It is evident that the molecular-biological level of research predetermines the probability of the experimental-clinical development of psychophysiology. In concluding her report, N. P. Bekhtereva stressed that in psychophysiology not only are the richest, unique and reproducible results accumulated and analyzed, but the outlook is defined for an ever greater convergence with an understanding of the most complicated activity of the organism. /759

The report of A. M. Ugolev (Leningrad) "Trophology--Problems and Outlook" that was included in the program of the second plenary meeting, was given by

the author in the framework of programmed lectures. A. M. Ugolev substantiated the viewpoint of trophology as a new, forming area of science. The subject of this science is the laws governing the assimilation of substances necessary for life at all levels of organization of the biological systems--from cellular and organ to organism, population and planetary. The report made a detailed examination of the subject, problems and methods of trophology. The speaker gave a lot of attention to a discussion of the classic and trophological approaches to the problem of the ideal food and the optimal diet, as well as the population, ecological and evolutionary problems of trophology. A. M. Ugolev advanced the idea on the biosphere as the troposphere to a considerable degree, i.e. a system in which the processes of absorption and assimilation of food substances are implemented by their movement in a certain cycle coinciding with the concept "life." Instead of the discrete system "autotrophs-heterotrophs" he suggested a system where autotrophs are located on one pole, i.e., organisms that feed on inorganic substances, and on the other pole--complete biotrophs. Organisms with an increasing percentage of biotrophy are arranged between these extreme groups. The report also examined the applied problems of trophology. A. M. Ugolev stressed that an examination in the framework of one science of the microscopic and planetary processes is based on the need for an integral presentation of the phenomena that form the single, multiple-level system of trophological bonds.

As in the previous congress of the All-Union Physiological Society, at the first plenary meeting the participants were presented a survey that contains the characteristics of the development of research in the field of human and animal physiology on the territory of the union republic holding the given congress. A large report "Development of Physiological Science in Kazakhstan" was given by N. U. Bazanova(Alma-Ata). She stressed that the setting up of scientific research on human and animal physiology in the Kazakh SSR is inseparably linked to the creation in the republic of higher educational institutions--Zooveterinary (1929) and Medical (1931) Institutes, as well as the Kazakh University (1934). Precisely here, in the departments of physiology headed by M. P. Kalmykov and I. A. Baryshnikov the first physiologists were trained and the local teams of highly qualified researchers were educated. The further development of physiology in Kazakhstan was due to the organization in 1944 of the Sector of Physiology in the Kazakh branch of

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the USSR Academy of Sciences, that was reorganized in 1945 into the Institute of Physiology. The Sector of Physiology was created on the initiative of A. P. Polosukhin, whose name is linked to the birth and evolution of the Kazakh physiological school that is famous for its basic research in the field of the physiology and pathology of lymph formation and lymph circulation, regulation of circulation and respiration, as well as on the physiology of digestion of agricultural animals. N. U. Bazanova comprehensively characterized the activity of the collective that she heads in the Institute of Physiology of the Kazakh SSR Academy of Sciences, as well as the most important aspects of scientific research in the field of physiology that is being conducted in the Kazakh University, in the Alma-Ata Medical Institute, in the Alma-Ata Zooveterinary Institute, in the higher educational institutions of Karaganda, Semipalatinsk, Aktyubinsk, Tselinograd and other cities of Kazakhstan, as well as in a number of branch scientific research institutes.

O. S. Adrianov gave a brief presentation of the main materials in the report on the activity of the Central Council of the I. P. Pavlov All-Union Physiological Society in the USSR Academy of Sciences on the first plenary meeting. The text of the report by tradition was published on the pages of the Fiziologicheskii zhurnal SSSR and distributed among the congress delegates.<sup>1</sup> B. S. Kulayev (Moscow) gave a report on the revision commission of the society.

As at the 12th Congress of the All-Union Physiological Society, the main form of work of the 13th Congress was symposium meetings, of which a considerable number covered a discussion of the urgent problems of neurophysiology and the physiology of higher nervous activity. Symposia on different problems of the physiology of visceral systems, on the physiology of sensory systems, as well as on questions of the physiology of agricultural animals that are important in theoretical and practical aspects were represented fairly broadly in the congress program. As compared to the previous congresses of the society, at the 13th Congress collectives were considerably more widely represented that participate in the working out of problems of human physiology. The results of research and observations directly referring to clinical neurophysiology, physiology and pathology of higher nervous activity of man, age

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<sup>1</sup>See: Fiziol. zh. SSSR, 65, 8 (1979), 1235-1248.

physiology, physiology of labor and sports, as well as to problems of adaptation, aviation, space and underwater physiology were discussed at six symposiums, two stand and nine section meetings. A significant number of reports and scientific reports on the problems of human physiology were included in the programs and other symposium and section meetings. In the congress program the problems of human physiology were covered in a total of over 230 papers and scientific reports, which is almost 22% of the total number of reports.<sup>1</sup>

The data characterizing the content of the scientific program of the 13th Congress of the I. P. Pavlov All-Union Physiological Society are presented in table 1. Table 2 contains data on the distribution of papers and scientific reports included in the congress program according to the republic divisions of the society.

For the first time, the Scientific Council of the USSR Academy of Sciences for Complex Problems of Human and Animal Physiology was involved in the organization of the congress of the I. P. Pavlov All-Union Physiological Society. This predetermined to a considerable degree the formation of the congress scientific program with regard for the main trends in the development of physiological science in the USSR adopted for 1976-1980. In accordance with the recommendations of the office of the Division of Physiology of the USSR Academy of Sciences, the Program Committee of the 13th Congress of the Society in determining the themes of the symposium meetings was guided by the list of problems comprising the content of long-term research programs "Brain" and "Homeostasis," as well as the draft program "Labor," prepared by the Scientific Council of the USSR Academy of Sciences on Problems of Applied Human Physiology. This, in turn, determined the reflection in the scientific program of the symposiums in the congress of the most important problems of modern physiology in a theoretical and practical respect, and promoted the conducting of discussions the creative discussion of the results of studies whose implementation is provided for by the research programs mentioned above.

The noted features of the program for the 13th Congress of the All-Union Physiological Society, on the one hand, and certain frameworks of the journal survey on the other hand, serve as the basis for our attempt to limit the subsequent presentation of data characterizing the main paths of evolution

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<sup>1</sup>This part of the report on the work of the 13th Congress is published in the journal Fiziologiya cheloveka, 1980.

TABLE 1. CHARACTERISTICS OF SCIENTIFIC PROGRAM OF 13TH CONGRESS OF I. P. PAVLOV ALL-UNION PHYSIOLOGICAL SOCIETY

Trends of scientific research	Symposiums		Stands		Sections		Total		%
	number of meetings	papers reports	number of meetings	reports	number of meetings	reports	meetings	papers & reports	
Neurophysiology and higher nervous activity	18	117	5	88	8	62	31	324	30.7
Physiology of sensory systems	4	14	3	45	—	—	7	74	7.0
Physiology of visceral systems	13	86	6	91	7	63	26	274	26.0
Evolutionary and ecological physiology	5	30	2	24	1	9	8	88	8.3
Human physiology	6	29	2	47	9	75	17	169	16.0
Physiology of agricultural animals	3	23	2	23	4	35	9	90	8.6
Physiological cybernetics	—	—	—	—	1	8	1	8	0.8
Computer in physiology	1	7	—	—	—	—	1	10	0.9
Information support of physiological research	—	—	—	—	1	8	1	8	0.8
History and theory of development of physiol.	—	—	—	—	2	10	2	10	0.9
<b>Total</b>	<b>50</b>	<b>315</b>	<b>20</b>	<b>318</b>	<b>33</b>	<b>270</b>	<b>103</b>	<b>1055</b>	<b>100.0</b>

TABLE 2. DISTRIBUTION OF PAPERS AND SCIENTIFIC REPORTS INCLUDED IN PROGRAM OF 13TH CONGRESS OF I. P. PAVLOV ALL-UNION PHYSIOLOGICAL SOCIETY ACCORDING TO UNION REPUBLICS (IN % OF TOTAL NUMBER OF PAPERS AND REPORTS)

RSFSR	Az SSR	Arm SSR	BSSR	Georg SSR	Kaz SSR	Kirg SSR	Latv SSR	Lith SSR	Mold SSR
63.6	1.2	2.7	2.5	3.3	4.8	2.1	0.7	0.7	0.7
Tadzh SSR	Turkm SSR	Uzb SSR	Ukr SSR	Est SSR					
0.5	0.5	2.7	13.0	1.0					

of physiological science in the Soviet Union in the 10th Five-Year Plan, primarily to materials of papers and scientific reports that comprise the content of the symposium meetings. The structure of the survey correlates with the main trends in the research in the field of human and animal physiology in the current five-year plan.

#### Neurophysiology and Higher Nervous Activity

As already noted, the problems of neurophysiology and higher nervous activity occupied a traditional, i.e., very significant in number of papers and scientific reports, place in the program of the 13th Congress of the All-Union Physiological Society. A whole series of symposium meetings covered different questions of the general physiology of the nervous system. In relation to a discussion of the main mechanisms for the activity of the nervous system results were examined from studies on the properties of the sodium channels in the membrane of the myelinated nerve fiber (B. I. Khodorov, Moscow). A study of the molecular mechanisms for electrical excitability of the nerve cell (P. G. Kostyuk, Kiev) was responsible for the conclusion on the possibility of further progress towards separation of the channel-forming molecular structures and detection of those unique properties of theirs that determine the electrical excitability of the nerve cell. A study of the synaptic transfer with the help of isolation of the elementary synaptic reactions induced by intracellular stimulation of certain presynaptic components (A. I. Shapovalov, Leningrad) demonstrated the promising nature of this approach for further functional analysis of the main mechanisms for cerebral work.

Current information on the importance of glia in the nervous activity was presented in the papers of A. I. Roytbak (Tbilisi), N. G. Alesidze (Tbilisi), as well as R. A. Pavlygina, F. A. Brazovskaya, A. K. Mazikova and Ya. Khorsh

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(Moscow), and equally in the scientific reports included in the program of the symposium "Neuronal-Glial Interrelationships."

A broad circle of questions was discussed at the symposium treating the results of a study on the plasticity of the neuronal networks. Thus, in particular, studies were made on the lengthy trace processes in the neurons of the old cortex (V. G. Skrevitskiy, Moscow), the transmission of afferent signals of various time structure by the first central neurons (B. Ya. Pyatigorskiy, Kiev), and others.

At the symposium "Integration of Signals on the Level of the Brain Stem," results were discussed from an investigation of the synaptic organization of chewing reflexes (Yu. P. Lianskiy, Kiev), the role of the brain stem and cerebellum in regulating rhythmic movements (Yu. I. Arshavskiy, I. M. Gel'fand and G. A. Pavlova, Moscow), synaptic mechanisms for afferent control of the activity of the red nucleus (V. V. Fanardzhyan, Yerevan), the role of peripheral afferents and certain central structures in controlling the activity of the motor-neuronal cervical muscles (Ye. V. Guna, Kiev). The materials that characterize the functional organization of the respiratory center were presented in the paper of N. N. Ireobrazhenskiy (Kiev).

One of the symposium meetings covered studies on the neuronal mechanisms for cyclic movements. The problem of "locomotor" structures of the brain stem were comprehensively examined in the paper of M. L. Shik (Moscow). Questions were also discussed of the neuronal organization of the rhythm of respiratory movements (I. A. Keder-Stepanova and A. N. Chetayev, Moscow), segmental mechanisms for rhythmic movements (M. B. Berkenblit and G. N. Orlovskiy, Moscow), organization of the output systems during rhythmic movements (T. G. Delyagina and A. G. Fel'dman, Moscow). K. V. Bayev (Kiev) in his report presented materials from a study on depolarization of the primary afferents during rhythmic movements, while V. L. Sviderskiy (Leningrad)--a comparative neurophysiological analysis of the main mechanisms for the system of controlling locomotion in certain representatives of crustaceans, mollusks and insectivora.

Due to the development of studies on physiology of the smooth muscle, two questions were examined comprehensively. First, the mechanisms for

contraction-relaxing of smooth muscles (P. G. Bogach, Kiev), and second, the features of reactivity of the vascular smooth muscles (R. S. Orlov, Leningrad). In addition, results were discussed from studies on the nature of the non-adrenergic synaptic inhibition of smooth-muscle cells in the gastrointestinal tract (M. F. Shuba and I. A. Vladimirova, Kiev), mechanisms for activation of the smooth musculature of renal vessels (Yu. P. Ayvaz, Riga), mechanisms for relaxation of the smooth muscles (Z. D. Skrypnyuk, and F. V. Burdyga, Kiev) and others.

A number of important problems were discussed at the symposium "Hormonal Regulations and System of Feedback." V. B. Rozen (Moscow) presented extensive material characterizing the forms of application of the principle of self-regulation in the process of interaction of the hormones with the reacting cells. The report of L. G. Leyboon (Leningrad) discussed the mechanisms of feedback in regulating glycemia in animals of different stages of onto- and phylogenesis. T. M. Turpayev (Moscow) dedicated his paper to the problem of interaction of cholinergic and adrenergic mediator processes in the feedback mechanisms. He, in particular, formulated an idea on the self-regulation of the cholinergic mediator process by the mechanism of negative feedback, and of the adrenergic mediator process by the mechanism of positive feedback. Questions were also examined of transsynaptic regulation of the adrenergic process (B. N. Manukhin, Moscow), participation of the adenylate cyclase system in the mechanism for the action of thyroid hormones (T. S. Saatov, Tashkent), and others.

For the first time, the program for the congress of the All-Union Physiological Society included a symposium whose task was to discuss the role of the neuromediators in regulating the immune homeostasis. The urgency of this problem was stressed in the report of Ye. A. Korneva (Leningrad) that covered the question of the participation of adreno- and cholinoreactive mechanisms in regulating the immunological processes. An examination was also made of the role of the sympathetic-adrenal system (I. G. Orzhekhovskaya, A. B. Tsypin, B. I. Shal'nev, and O. A. Gotsiridze, Moscow) and meso-hypothalamic serotonergic system (L. V. Devoino, Novosibirsk) in regulating the immune response. The reports linked to a study of the effect of neuromediator mechanisms on different levels of regulating the immune homeostasis were presented by B. L.

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Aizhiyev (Makhachkala), D. S. Gordon, V. Ye. Sergeeva, L. A. Lyubovtseva, I. G. Zelenova and L. K. Leonova (Cheboksary), B. A. Saakov, S. A. Yeremina, R. A. Belovolova and L. E. Druyan (Rostov-na-Donu) and others.

A set of studies in the field of physiology of the autonomic nervous system was presented in the congress program by three large problems. A comprehensive discussion was held on the results of work associated with an investigation of the central and peripheral mechanisms for the autonomic nervous system, its adaptation-trophic function, as well as the formulation of questions on the physiology of autonomic ganglia. A. D. Nozdrachev (Leningrad) in his report characterized the enteral nervous system as an independent, third (in addition to the sympathetic and parasympathetic) part of the autonomic nervous system, suggesting that it be called the *metasympathetic*. V. P. Lebedev (Leningrad) presented research data on the sympathetic mechanisms of the spinal cord. The paper of O. G. Baklavadzhyan, O. K. Saryan and V. A. Skobelev (Yerevan) contained data that permitted a new presentation of the neuronal organization of the efferent link in the hypothalamus-bulbar sympato-activating components that participate in the autonomic regulation. The materials in the paper of V. A. Govyrin (Leningrad) on the theme "Sympathetic Nerves and Trophism of the Vascular Wall" contain data that indicated, in particular, that the vascular nerves have a trophic effect on the vascular wall and their prolapse leads to the development of a process that can be viewed as neurodystrophic. The paper of Ya. I. Azhipa (Moscow) treated an investigation of the functional activity of the sympathetic-adrenal, cholinergic and serotonergic system during the neurodystrophic process. It was shown, in particular, that invariable participants in the mechanisms of the neurodystrophic process are not only the listed systems, but also the endocrine glands closely linked to them, whose hormones can have a significant effect on the trophic function of the nervous system and the trophic condition of the peripheral organs and tissues by direct and indirect paths. The data contained in the materials of the paper of S. V. Anichkov and I. S. Zavodskaya (Leningrad) "Prevention and Pharmacotherapy of Neurogenic Dystrophies of the Internal Organs" confirm the conclusion that the measures directed towards an increase in the activity of the sympathetic nervous system and its mediator, towards the restoration of the energy resources in the tissues, and finally, towards the activity of the key

enzymes in the metabolic processes can be very useful not only for prevention, but also for pharmacotherapy of those diseases of the internal organs where the nerve factor has the leading importance. As a result of the analysis of the vast experimental material, I. A. Bulygin (Minsk) formulated in his report new, general principles for the structural-functional organization of the autonomic centers, especially the prevertebral sympathetic ganglia. In particular, it was shown that the structural-functional organization of the latter is based on chemical processes that occur in their individual components and ganglia on the whole. A. Ya. Ivanov, A. A. Selyanko and V. I. Skok (Kiev) in their paper presented materials obtained as a result of studying the cholinergic and serotoninergic transmission to sympathetic ganglia. Experimental analysis of the slow transport of protein from the perikaryons to the axons of the sympathetic neurocytes was made by V. N. Yarygin (Moscow).

A survey of the symposium meetings at which different problems were discussed of the physiology of the higher nervous activity should be started with the symposium that covered an investigation of the structural principles for the organization of cerebral functions. The report of O. S. Adrianov and A. G. Polyakova (Moscow) advanced a number of conclusions that confirm and develop the concept previously substantiated by O. S. Adrianov on the complex, but sufficiently ordered correlation of vertical and horizontal paths for conducting stimuli in the integrative activity of the brain. P. V. Simonov (Moscow), who studied the need-information interaction of the cerebral structures, in his report advanced a number of conclusions linked to the creation of a general plan for the systems organization of cerebral activity confined to the anatomical structure of the brain of higher animals and man. Of important practical and theoretical interest are the data in the report of V. M. Mosidze (Tbilisi) "Segmented Brain and the Problem of Interhemispheric Relationships." Within the symposium "Neuronal Mechanisms for the Time Link" results were summarized and paths were noted for the study of this problem (B. I. Kotlyar, Moscow), and results were also discussed of studies on the participation of the neurons of the main cortical zones in the conditioned defense reflex to sound (V. M. Storozhuk, N. F. Bakanova, V. I. Busel', V. N. Dumenko, Zh. A. Kruchenko, V. V. Sachenko, Ye. F. Semenyuk and G. N. Shevko, Kiev) and plasticity of the functional structure of neuronal networks as the bases for the switching function of the brain (V. L. Silakov, A. B. Rybkin, Ye. I. Kabalkin and G. F. Laufer, Leningrad).

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Primary attention of the symposium participants "Mechanisms of Conditioned Reflex" was concentrated on three reports. N. F. Susorov (Leningrad) reported on the results of studying the role of cortico-caudal subsystems in the mechanism of the conditioned reflex. L. G. Voronin, K. A. Nikol'skaya and Sh. K. Sagimbayeva (Moscow), based on the investigation of the architecture of the conditioned food reflexes suggested such a variant of the plan for a conditioned reflex that takes into account at the same time the features of the classic and instrument conditioned reflexes. F. K. Daurova and R. F. Kolotygina (Moscow) presented materials from work covering an investigation of the interaction of nuclear and scattered elements in the central structures of the signal, reinforcing and "foreign" analyzers in the process of forming positive and inhibiting conditioned reflexes.

In the last decade studies have been considerably activated in the field of experimental pathology and therapy of higher nervous activity. At the symposium meeting treating this important section of physiological science, M. G. Ayrapet'yants and S. N. Luk'yanova (Moscow) substantiated the hypothesis on the conditioned reflex mechanism for pathogenesis of experimental neuroses. M. M. Khanarashvili (Tbilisi) argued the need for development of principles of classification for experimental pathology of higher nervous activity. He stressed here that such a classification must take into consideration the urgent tasks of studying human neuroses. B. D. Karvasarskiy (Leningrad) dedicated his report to an examination of the main trends and outlook for research on pathogenesis of neuroses.

In relation to an investigation of the systems mechanisms for purposeful behavior the congress discussed the functional plasticity of the brain in the realization of purposeful behavior (N. Yu. Belenkov, Leningrad), limbic mechanisms of advance reflection in the experimental model "stress expectation" (F. P. Vedyayev and V. G. Samokhvalov, Khar'kov), systems analysis of purposeful behavior with extreme levels of motivational excitation (A. V. Kotov, Ye. I. Ivanov, L. F. Kelesheva and S. I. Tolpygo, Moscow).

Further development characterizes the research in the field of mechanisms and regulation of memory. The paper included in the program of the corresponding symposium given by M. N. Livanov (Moscow) suggested exposing the

importance of certain subcortical formations in the regulation of cortical processes, in conditioned reflex training. The report of G. A. Vartanyan (Leningrad) comprehensively treated the problem of regulating the trace processes normally and in pathology. The materials of the report of R. I. Kruglikov (Moscow) contained experimental data on the role of neuromediators in the processes of the memory. /766

The significant progress in studying the neurobiological aspects of regulating the cycle of wakefulness and sleep caused the organization of the corresponding symposium meeting. Here, in particular, discussions were held on the evolutionary and ecological aspects of the neurophysiology of sleep (I. G. Karmanova and L. M. Mukhametov, Leningrad, Moscow), psychophysiological and psychopharmacological aspects of sleep (L. P. Latash, Moscow), and an examination was made of the correlation between the dynamics of neurophysiological and autonomic indices during sleep (V. Lesene, Kaunas).

#### Physiology of Sensory Systems

Studies on the primary processes of reception were presented at the congress in three main papers. A. V. Minor (Moscow) reported the results of studying the mechanisms for excitation of the olfactory receptor cell. The data presented in the paper of O. B. Il'inskiy and G. R. Broun (Leningrad) showed the possibility of perception by vertebrate animals of natural electrical and magnetic fields, that can be viewed as ecological factors for organisms that have the corresponding sensory apparatus. The work of V. I. Govardovskiy, F. G. Gribakin and A. L. Berman (Leningrad) treated the central problem of photoreception--identification of the intracellular mediator and study of the mechanisms of its action.

The symposium that covered a discussion of research on the problem "Isolation of Signs that Describe Signals" suggested an examination of it as applied to auditory and visual systems. The materials of the paper of G. V. Gershun (Leningrad) "Recognition of Natural Sounds" included two aspects of the problem--characteristics of natural sounds, and data on different systems of sounds and levels of their organization. I. A. Vartanyan (Leningrad) presented materials on a neuronal analysis of acoustic sequence. N. G. Bibikov (Moscow)

dedicated his report to an examination of the mechanisms for an analysis of the envelope in the auditory system of animals. In relation to the activity of the visual system a discussion was held on the mechanisms for orientation selectivity of the neurons in the visual cortex (A. Ya. Supin, Moscow), interrelationships of the orientation and directional selectivity of neurons of the visual cortex (D. I. Kirvyalis, S. V. Alekseyenko, D. B. Stabinite and V. A. Vanagas, Vil'nyus), neurophysiological and functional characteristics of the spatial-frequency filters (V. D. Glezer, K. N. Dudkin, Yu. Ye. Shelepin, T. A. Shcherbach, V. Ye. Glauzel'man and I. V. Chuyeva, Leningrad), as well as data on a study of the sensitivity of the human eye to spatial frequencies in light (A. V. Bertulis, R. I. Tsitvaras and S. A. Yakubenene, Kaunas).

The problem "Recognition of the Sensory Pattern and Organization of Effector Control Signal" also comprise the topic of a symposium meeting. Here an examination was made of the plasticity of the neuron-detectors in the visual system (I. A. Shevelev, I. V. Maksimova, N. N. Verderevskaya and V. G. Marchenko, Moscow), a discussion was held on the participation of the frontal section of the cortex in the mechanisms to determine the biological importance of the sensory stimuli (G. A. Kulikov, A. S. Batuyev, V. G. Kamenskaya, L. I. Futer, N. N. Sokolova and L. A. Vasil'yeva, Leningrad), as well as the general approaches and modern information about the role of the sensory information in planning, organizing and implementing motor actions (V. S. Gurfinkel, Moscow).

Three main reports defined the directivity of the symposium "Mechanisms of Processing Information in the Vestibular System and Control of Functions." I. V. Orlov (Leningrad) presented original experimental data strictly on the mechanisms of processing information in the vestibular system. A. S. Dmitriyev, Ye. V. Burko, T. F. Mikhiyuk and G. K. Trobnikova (Minsk) reported on the results of a study on the role of the vestibular nuclei of the medulla oblongata in the formation of neurohumoral reactions of the organism to labyrinth and extralabyrinth stimuli. V. S. Raytses and A. A. Shlakhovenko (Ivano-Frankovsk) dedicated their report to a discussion of the participation of hypothalamic-limbic structures in regulating vestibular functions.

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## Physiology of Visceral Systems

A brief survey of the content of the symposium meetings that covered different problems of the physiology of visceral systems should be preceded by data on the symposium that has general importance both for this field of physiology, and for neurophysiology. This is the symposium "Structural-Functional Organization of the Central Mechanisms of Somatic-Visceral Interaction." The paper of R. A. Durinyan (Moscow) was heard with interest. It views the laws governing the somatic-visceral interaction in the central cerebral structures as the basis of reflex therapy. N. N. Beller (Leningrad) presented a detailed analysis of the organization of efferent effects of cortical and limbic structures on the autonomic functions. The paper of A. M. Veyn (Moscow) covered the results of an investigation of the central mechanisms for regulating the human autonomic functions.

Three important problems in the physiology of the cardio-vascular system determined the program of the corresponding symposium meetings. This, first, is the problem of microcirculation, its laws and regulation. Some results of the research in this area of physiology of circulation and unsolved questions were examined in the paper of A. M. Chernukh (Moscow). The general principles for regulation of microcirculation in the example of the brain were presented by G. I. Mchedlishvili (Tbilisi). P. H. Aleksandrov (Moscow) dedicated his report to the results of studying the dynamics of the blood flow structure in the microvessels. Second, studies linked to the systems analysis of the cardiac operation were comprehensively discussed. This concerned the effect of the nervous system on the processes of intercellular interactions in the myocardium (G. I. Kositskiy, V. I. Kobrin, N. Yu. Khaspekova, B. N. Pavlov and Sh. Kuyanik, Moscow), on the functional coordination of the nerve mechanisms participating in the regulation of the heart (M. G. Udel'nov, G. N. Kopylova, G. Ye. Samonina, N. A. Sokolova and L. D. Kuligina, Moscow), on the contractile function of the cardiac muscle during long-term adaptation and de-adaptation (F. Z. Meyerson and V. I. Kapel'ko, Moscow). Third, a comprehensive examination was made of the problem of nerve and humoral mechanisms for the regulation of regional circulation. In the given case, a generalizing report was brought to the attention of the symposium participants from four Leningrad research collectives which discussed the principles of study, as well as the regional peculiarities of regulating the organ circulation. The authors of the report--G. A. Konradi, Yu. Ye. Moskalenko, S. I. Teplov and B. I. Tkachenko, in addition, substantiated the tasks

of future research in the area of physiology of regional circulation.

In relation to the general problems of physiology of the cardiovascular system one should note the symposium on the physiology of lymph formation and lymph circulation. Questions of lymph formation were examined in the reports of Kh. Kh. Aynson (Tallin) and A. A. Aliyev (Borovsk). The first considered the problem of hormonal regulation of lymph formation and circulatory homeostasis, the second--intestinal lymph formation. Questions of regulating lymph circulation were the content of the paper of I. A. Beremzhanova, A. M. Beketayev and L. E. Bulekbayeva (Alma-Ata).

Within the framework of the symposium program "Regulation of Respiration" /768 two main papers were discussed. V. D. Glevovskiy (Leningrad) presented a survey that contained the characteristics of the mechanisms that determine the frequency of respiration, as well as data on the importance of the pneumotaxic centers. The materials referring to an analysis of respiratory regulation with different loads were presented in the paper of I. S. Breslav, G. G. Isayev, and A. M. Shmelev (Leningrad).

Three symposiums covered different aspects of the physiology of digestion and absorption. The discussion of the molecular bases for the processes of absorption was based on two reports. N. N. Nikol'skiy (Leningrad) characterized the modern ideas on the mechanism for transfer of substances through the epithelium of the small intestine. A. M. Ugolev, E. G. Gurman and G. M. Roshchina (Leningrad) presented experimental materials on a study of the enzymatic-transport conveyer. Two main papers also defined the scientific directivity of the symposium on the physiology of digestion. Here the attention of the meeting participants was concentrated on questions of regulating gastric secretion (P. K. Klimov, Ye. M. Matrosova, V. A. Bagayev, G. M. Barashkova, N. S. Boyko, M. V. Polosatov and A. A. Fokina, Leningrad) and on the results of studies treating the enzymatic homeostasis and the possible role of hydrolases inducted by digestive glands (G. F. Korot'ko, A. S. Pulatov, V. G. Sukhoterin, N. F. Kamakin, E. A. Vepritskaya, V. A. Aleynik, G. S. Lemeshkina and V. R. Kantorovich, Andizhan). At the symposium on the physiology of nutrition, T. Sh. Sharmanov (Alma-Ata) reported the results of a study on the disrupted appearance of the physiological effect of certain vitamins in protein insufficiency.

G. K. Shlygin (Moscow) dedicated his paper to the problem of "Parenteral Nutrition and the Digestive System." The facts on the dependence of the humoral and cellular immune response on protein insufficiency and surplus in nutrition were reported by M. N. Volgarev (Moscow).

Urgent problems on the physiology of water-saline metabolism and the kidneys were examined at the symposium "Transport of Water and Ions in the Nephron." The discussion questions on the mechanism of facultative reabsorption of water were characterized by L. N. Ivanova (Novosibirsk). Yu. V. Natchin (Leningrad) dedicated his report to a discussion of the role of cells and cellular contacts in reabsorption and secretion of ions. The interrelationship and compensation for the processes of renal canalicular transport were the topic of the paper of M. Ya. Ratner (Moscow).

In relation to the discussion of the morpho-functional organization of the neuroendocrine system the program of the corresponding symposium included three main reports. V. G. Baranov, O. N. Savchenko, M. V. Propp, O. A. Danilova, A. L. Polenov and G. S. Stepanov presented a generalized report from three Leningrad research collectives. It covered an extremely important problem--hypothalamic regulation of the sex cycle. B. V. Aleshin (Khar'kov) gave the report "Hypothalamus and Thyroid Gland." The report of M. I. Mityushov and A.A. Filaretova (Leningrad) talked about the hypothalamic regulation of the hypophysis-adrenal cortex system.

At the symposium "Physiology of Thermoregulation" the report of S. Zh. Tleulin (Alma-Ata) characterized the neurophysiological fundamentals of thermoregulation. M. A. Yakimenko dedicated his report to a discussion of the physiological importance of the regulating point of thermoregulation. The results of a neurophysiological analysis of the mechanisms that regulate cold shivering were presented by Yu. V. Lupandin (Petrozavodsk).

Significant advances in the development of the problem of homeostasis determined the organization at the 13th congress of a special symposium. Its program included, in particular, the reports of D. M. Zubairov (Kazan') who reported on a change in the mechanisms that regulate the blood coagulation system by catecholamines, B. A. Kudryashov (Moscow) who presented data on the leading links in the regulatory interrelationships of the coagulating and anticoagulating /769

systems, and B. I. Kuznik (Chita) who characterized the universal mechanism for regulating blood coagulation and fibrinolysis.

#### Evolutionary and Ecological Physiology

The structural-functional and biochemical bases for evolution were discussed at two symposium meetings. The program of one of them provided for a discussion of the problems of the evolution of the functions of the nervous system, in phylogenesis, and the other--examined problems of the evolution of nervous system functions in ontogenesis. The report of A. I. Karamyan, M. G. Belekhova, A. A. Kosareva and N. L. Tumanova (Leningrad) presented the structural-functional organization of the ascending and descending bonds of the forebrain of reptiles. The data it contains are necessary for a discussion of questions of homology and analogy in the structures of the brain of vertebrates. The published materials from the paper of Ye. M. Kreps (Leningrad) on the biological role of membrane lipids indicate that one of the important biological functions of lipids, their adaptive role, is compensation, balancing of unfavorable or unusual, or altered conditions of the environment. The results of a study on functional morphology of the afferent systems of the brain in the evolution of the pre-mammalian vertebrates were the content of a paper by N. P. Veselkin (Leningrad). The program also provided for a discussion of the reports of I. P. Ashmarin (Moscow) on the evolution of molecules that transmit inter-cellular signals within the organism, and L. V. Krushinskiy, Z. A. Zorin and B. A. Dashevskiy (Moscow) on evaluating the rational activity of ravens. Among the papers included in the program of the second session, the paper of A. A. Volokhov (Moscow) in which the effect of the environment is viewed as a factor in detecting the periodicity of cerebral functions in ontogenesis. K. V. Shuleykin (Moscow) dedicated his report to presentation of the data on neuronal mechanisms for integration of functions in ontogenesis. A. V. Voyno-Yasenetskiy (Leningrad) presented experimental materials on the fusiform complexes of cerebral potentials in ontogenesis. The results of a systems analysis for the behavior and morphological study of the brain of chimeras were contained in the report of F. A. Ata-Muradova and M. A. Aleksandrova (Moscow).

The problems of evolutionary physiology were covered by the symposium

"Physiological Mechanisms of Age Development" whose program provided for a discussion of three main papers. V. N. Nikitin (Khar'kov) dedicated his report to the results of studying the biochemism and endocrine situation in the bodies of laboratory animals during experimental continuation of life by periodic growth-restricting nutrition. I. A. Arshavskiy (Moscow) presented data of many years of work that permitted a substantiation of the negentropic theory for individual development. The problem of the correlation of central and local mechanisms of regulation in the process of aging was examined in the report of V. V. Frol'kis.

Urgent questions of ecological physiology comprised the scientific program of the two symposium meetings that were united by the theme "Homeostasis and Structure of Physiological Adaptations." Complex forms of natural adaptations and their evolution were comprehensively discussed in the paper of A. D. Slonim, V. F. Davydov and A. F. Bazhenova (Frunze). V. A. Isabayeva (Frunze) dedicated her report to the characteristics of the principles for adaptation of equilibrium systems of the organism under extreme conditions of high mountains. The biochemical mechanisms for adaptation were examined by I. S. Balakhovskiy (Moscow). The materials linked to a study of the adaptive self-regulation of neurodynamic processes were presented by N. N. Vasilevskiy (Leningrad). The current state of the question on the cellular level of adaptation to hypobaric hypoxia was presented by Z. I. Barbasheva (Leningrad). The results of many years of research on the role of time links in the formation of adaptive processes were related by M. F. Avazbakiyev in his paper (Alma-Ata).

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#### Physiology of Agricultural Animals

In accordance with the main trends in the development of the physiology of agricultural animals, the program of the 13th Congress of the All-Union Physiological Society organized three symposiums on the most important problems in this field of physiological science. The discussion of the regulation of lactation was opened by the paper of I. I. Grachev (Leningrad) "Regulatory Mechanisms for the Function of Secretory Cells." The report of M. G. Aliyev (Baku) covered hypothalamic control of the secretion of lactogenic hormones. The results of studying the physiological mechanism for hypogalactia during

stress were reported by Kh. D. Dyusembin (Alma-Ata). Basic and applied research in a practical sense comprised the content of the symposium "Physiology of Digestion and Nutrition of Agricultural Animals." N. U. Bazanova (Alma-Ata) reported on an investigation of the parietal digestion in the complex stomach of the ruminant animals. The materials in the paper of N. A. Shmanenkova (Borovsk) covered a study of the interrelationship between proteins and amino acids in the animal organism. Ye. Z. Tkachev (Dubrovitsy) presented data on the digestive and metabolic functions of the gastrointestinal tract of pigs in relation to the effective use of fodder. At the symposium "Physiological Bases of Adaptation, Breeding of Agricultural Animals, and Neuro-endocrine Mechanisms for Continuing their Productive Life" the program provided for a discussion of three main papers. The materials of the paper of S. K. Karapetyan (Yerevan) examined the biological and physiological foundations for continuing the productive life of poultry. A. P. Kostin (Krasnodar) presented data that characterize the role of receptors in the adaptation of agricultural animals to environmental factors. The neuro-endocrine mechanisms of the stress molting in the kurtem were reported by B. G. Novikov and S. M. Garmatinoa (Kiev).

One of the symposiums that was organized in the congress program "Use of the Computer in Physiology" was of interest practically for all trends of modern physiological science. This is convincingly indicated by the content even of only the main papers. N. I. Moiseyev, M. Yu. Simonov and V. M. Sysuyev (Leningrad) characterized the key problems in the use of the computer for processing data of physiological research. V. A. Lishchuk (Moscow) set his task to acquaint the participants in the meeting with the experience of formulating a model system to automate physiological and clinical research. Questions on the use in neurophysiological research of experiments with bio-electrical control based on feedback with the research object were examined in the paper of A. V. Korinevskiy and T. A. Korol'kova (Moscow).

Since certain trends in physiological science were represented at the congress only by section meetings, it is necessary to divert somewhat from the rule adopted for this survey and in the most general features reconstruct here the problems discussed in these meetings. These are, first, meetings

that cover the genetics of higher nervous activity, at which reports were given by the representatives of the research collectives from Leningrad, Baku, Moscow and Novosibirsk. Second, a special meeting took place on the problems of nerve-muscle physiology. Its program included reports of researchers from Kazan', Alma-Ata, Leningrad, Moscow and Petrozavodsk. Third, the problem of histo-hematic barriers was again examined independently in the program of the All-Union Physiological Congress. A special meeting discussed work in this field of physiology that was done in Perm', Ashkhabad, Moscow, Leningrad and Riga. And finally, fourth, a section was organized "Physiological Cybernetics," whose meeting program provided, in particular, for reports on predicting the condition of the organism from the viewpoint of cybernetics (R. M. Bayevskiy, Moscow), on the morpho-functional bases for self-organization of the nerve mechanisms of the brain (A. B. Kogan, Rostov-na-Donu), on a systems analysis of the autonomic functions (V. A. Shidlovskiy, N. A. Mrinova, V. G. Deynega and L. A. Shcherbatenko, Moscow, Donetsk, Kazan' and others).

The scientific program of the congress provided for reading of lectures on the urgent problems of physiological science and related fields of knowledge. In particular, the lectures of V. M. Glushkov (Kiev) on artificial intellect were met with great interest, R. A. Durinyan (Moscow) on physiological problems of reflex therapy, O. S. Adrianov (Moscow) on the problem of correlation of structure and function of the brain, V. I. Medvedev (Leningrad) on adaptation and activity, A. M. Chernukh (Moscow) on the problems of micro-circulation, A. M. Ivanitskiy (Moscow) on physiological studies in nerve and mental diseases.

The discussion meetings went well, roundtable discussions that discussed problems of teaching physiology in higher schools (organized by G. I. Kositskiy, Moscow) and the physiology of the future (organizers V. I. Medvedev and V. A. Shidlovskiy).

In conclusion it is impossible not to note the exceptionally efficient organization of the congress, the creation of all the conditions necessary for the fruitful realization of the vast scientific program. It is evident that credit here belongs to the organization committee, and in the first place N. U. Bazanova and the Kazakh group of members of the organization

committee who gave a lot of their effort and time to preparing and carrying out the congress, surrounding its participants with continuous care and attention.