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The Eighth All-Union Congress of Physiologists, Biochemists, and Pharmacologists was devoted to summarizing the results of scientific work done during the past 8 years. The representatives of the three related special fields did not discuss general problems which would have a bearing on the program of future work. Principal attention was paid to the definition of new problems in the solution of which all experimental workers could join forces whose chief aim is establishing the closest connection between theoretical disciplines and practical work in public health. In connection with the very rapid development of technical procedures, great significance was attached to new methods of investigation. New equipment, appliances, designs, and operations were demonstrated on an extensive scale. Emphasis was also placed on methods of instruction and discussions of the results of work done by the administration of the All-Union Society of Physiologists, Pharmacologists, and Biochemists. A sizeable group of foreign scientists participated in the congress.

As far as the problem of the interrelationships between the cerebral cortex and subcortical formations is concerned, the most extensive material on this subject was presented in a report by K. M. Bykov. In addition to reviewing the results of his former investigations of the influence exerted by interoreceptor signals on the behavior of the organism, he cited a number of new data obtained lately. Among these data, the most convincing are those pertaining to the irradiation and concentration of the excitation in the interoreceptors of the intestines as well as facts which prove the dynamic localization of interoreceptors in the brain. These facts were obtained in the course of an ontogenetic investigation. The main points presented by Bykov in his report are the principle of the very close interaction between external receptors and internal receptors and the existence of specific induction relationships between them. Another basic conclusion made by Bykov in regard to the existence of the closest connection between interoreceptive and humoral factors. He based his arguments on the example of the upper cervical sympathetic ganglion of the cat. In his opinion, this ganglion can be regarded as a model of the operation of the external cortical centers of the brain.

Several physiological laboratories concentrated on the problem of clinical death. V. A. Negovskiy confirmed again that the conditioned reflexes in cases of massive blood losses disappear before unconditional reflexes, while the processes of active internal inhibition are interfered with earlier than the processes of excitation. The same strict step-wise order of pathological functions of the cerebral cortex is observed in partial and complete starvation, as has already been pointed out by I. P. Pavlov. When the blood is replenished by transfusion, all these phenomena take place in a strictly defined order.

It is of interest to note that whenever there is the slightest delay in the restoration of the activity of the cerebral cortex, the process of the restoration of other vital functions is also disturbed. Comparatively new is the use of artificial hypothermia (lowering of the temperature of the body down to 42°C) with the view to extending the period during which life can be restored after clinical death under conditions of deprivation of the animals of blood. Morphological investigations of the brain show that the nerve cells are preserved much more effectively after hypothermia has been established.

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In a report made during the discussion, P. M. Chepov stated that after a large-scale blood-letting the effects are not limited to spasms of the peripheral arteries of the extremities, but that in addition to this medium arteries which are rich in muscle tissue begin to carry out rhythmic peristaltic contractions in the direction to the heart, thus stimulating coronary blood circulation. This phenomenon, which had been discovered by Chepov with the aid of motion-picture X-ray vasography carried out after introduction of a contrast liquid into the arteries, confirms fully the theory of a peripheral arterial heart which has been advanced at one time by M. V. Yanovskiy, who established the active role played in blood circulation by changes in arterial tonus.

P. S. Kupalov gave a thoroughgoing analysis of a phenomenon which was already known, i.e. of the development of paths in the cerebral cortex. This author called attention to radical changes in the tonus of the excited unconditional center governing the evolution of saliva, or to be more exact, of the cortical representation of this center, which creates the prerequisite for the formation of a temporary connection, thus illustrating the principle of the formation of paths. As far as the classical conditioned reflexes, i.e., temporary associations, are concerned, P. S. Kupalov asserts with justice that sometimes a reinforcement of the conditioned irritation which has been repeated several times leads to inhibition and breaking of the temporary association, as has already been indicated in I. P. Pavlov's work. This must serve as a warning to those who test conditioned reflexes by the motor method and in doing so apply 20-30 irritations in succession.

A report by E. A. Asratyan dealt with the basic mechanisms of the formation of conditioned reflexes and of conditioned inhibitions. In this report the role played by the intensity of superimposed secondary irritants in the formation of a conditioned reflex of the second order (a positive effect) or of a conditioned inhibition (a negative effect) was emphasized. This is a convincing proof of the unity of the processes of excitation and inhibition.

As far as the important problem of the localization of functions in the cortex and subcortical centers is concerned, two opposite tendencies found expression. One group of physiologists attempted to ascribe the process of establishing the connection in the temporary food association completely to the cortical ends of the analyzer, asserting that this is the place where the cortical synthesis takes place. This concept is beguiling because of its physiological way of interpreting the phenomena. Those inclined to the second approach (N. A. Rozhanskiy et al) are of the opinion that closing of the conditioned [reflex] connection takes place with an obligatory participation of the subcortical formations and that the subcortical centers are themselves capable of forming the simplest conditioned reflexes. This view received substantial support on the part of the Slovak physiologist, K. Lishak. He showed in his report that in applying the method of prolonged implantation and healing in of miniature electrodes in the region under the bulges of the brain heightened sensitivity and reinforcement of orientation reactions can be brought about and demonstrated. If the electrical irritation is reinforced by food, a full-fledged conditioned food reflex is developed.

Lishak's declaration to this effect was emphatically supported by N. A. Rozhanskiy, who pointed out that Lishak's theory would explain the formation of conditioned reflexes in animals which lack a cerebral cortex, i.e., fish, and also by N. I. Grashchenkov, who pointed out that this theory lends further support to the assumption that there is a connection between higher nervous activity and endocrinic factors, i.e., effects the centers of which are located under the bulges of the brain.

The problem of the phylogenesis of cortical reactions has interested physiologists for a long time, being one of the basic problems of the physiology

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of evolution. Two opposed points of view were expressed at the congress on the important problem of the qualitative differences between the higher nervous activity of higher animals and lower animals.

Some physiologists are of the opinion that the number of reinforcements required for the formation of a conditioned reflex cannot serve as a measure of the degree of development of the brain of the animal and that conditioned food reflexes in response to single irritations form in fish, turtles, birds, rats, dogs, and simians after approximately the same number of reinforcements by means of unconditioned irritants (L. G. Voronin). Other physiologists assume that the slow formation of conditioned reflexes in humans whose mental development is retarded speaks against this interpretation.

The majority agrees that the formation of processes of inner inhibition (particularly processes of the diminishing of trace reflexes) and formation of synthetic conditioned reflexes with subsequent differentiation of their individual links serve as the most effective criteria of evolutionary development.

A considerable amount of interest was elicited by a report of L. A. Orbeli dealing with the ontogenesis of the higher nervous activity of children, particularly the origin of reflexes of the second signal system, which are of great importance in pediatry. Orbeli emphasized that there can be no single method for studying the development of children of different ages. The ontogenesis of the mental activity should be investigated with consideration for the capacity of the children to subject speech signals to acoustic analysis and also of the social meaning to be attached to sounds, i.e., semantics.

The problem of the biological action of radiation of the alpha, beta, and gamma types was also discussed at the congress. Reports by B. N. Tarusov, G. M. Frank, D. I. Zakutinskiy, G. Ya. Gorodisskaya and A. A. Kanarevskaya dealt with this subject.

Although according to the data which are available, the radiation factor primarily affects the blood and the organs of blood formation (the bone marrow, the lymphatic nodes, and the spleen) and also the liver, a particularly important role, possibly a decisive role, is played in radiation injuries by the central nervous system. Since interference with the functions of the latter brings about pronounced dystrophic changes in the organism.

The problem of effects exerted on the organism by radiant energy has a close relationship to the problem of the origin of cancer, because a remote consequence of exposure to ionizing radiation which exerts an internal effect is the formation of malignant tumors (cancer and sarcoma), as well as development of malignant leukoses.

Thus the possibility of controlling the physiological mechanism of the action exerted by various types of radiant energy brings us nearer to an understanding of the biological essence of cancer and consequently to the therapy and prophylaxis of cancer.

The demonstration at the congress of new appliances and methods of investigation based on the principles of electronics and telemechanics aroused great interest. It is known that cathode tubes used as oscillographs make it possible to introduce a high degree of precision into physiological and clinical investigations and to make processes otherwise hidden from view completely visible.

At present, techniques involving the use of photocells have advanced to such an extent that it is possible not only to determine the hemoglobin

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content in the lobe of the ear, but also to measure the level of the blood pressure and the condition of the capillary network several times per minute with a high degree of precision.

M. N. Livanov and a group of engineers succeeded in designing an appliance resembling a television screen, on which one may see simultaneously as images 30 or more projections of brain centers where electrical oscillations are being excited by means of electrodes equipped with conductors. These oscillations correspond to currents pertaining to the activity of the brain and the method described is referred to as complex electro-encephalography.

A great impression was made by the demonstration carried out by L. Nikolai (German Democratic Republic) of a new type of an electronic amplifier based on the semiconductor principle and using a germanium diode. With the aid of this amplifier, one may induce an excitation in any tissue of the organism without using conducting wires. This is done by letting a miniature germanium diode heal directly into skeletal muscles, the muscles of the heart, intestines, or any other tissue, using for the induction of irritations an external field of high frequency.

The 8th All-Union Congress has demonstrated that soviet physiological science, including biochemistry and pharmacology, forges ahead with assurance, surmounting considerable difficulties and achieving new successes in the course of its advance. The great number of reports that have been presented and the multiplicity and precision of the methods of research that have been used testify to this.

Soviet physiologists have condemned the possibility that any line of research or any group of scientists may acquire a monopoly. The participants at the meeting have set an example of a critical evaluation of scientific opinions and have declared themselves in favor of active criticism and self-criticism in scientific discussions as well as for the maintenance of the closest connections between physiological theory and practical work in public health.

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