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APPLICATIONS OF PAVLOV'S TEACHING IN VETERINARY SCIENCE

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[A digest]

The most recent scientific meeting of the Academy of Sciences USSR held with the Academy of Medical Sciences USSR was devoted to problems of I. P. Pavlov's physiological teaching. This meeting has shown that further development of Pavlov's physiological theory on the basis of the theory of evolution and Michurin's principles of biology are not proceeding quite smoothly.

Pavlov's theory concerning the materialistic basis of consciousness has inflicted a heavy blow on the reactionary idealism favored by bourgeois scientists of America and Western Europe. Nevertheless, the fight against bourgeois theories which Pavlov carried on has not been pursued to an adequate extent since his time. As far as further scientific utilization of Pavlov's inheritance is concerned, considerable shortcomings exist in the work of veterinary higher educational institutions and those specializing in animal husbandry.

Many leading veterinary texts contain outlived remnants of Virchow's cellular theory. Thus, N. I. Shokhor in his textbook (1947 edition) describes inflammation as a purely local process and disregards the effect of the nervous system on the appearance of inflammation. He states that disease, as a rule, is transmitted by internal contact with affected parts, by contact with exudates, or metastatically, and only in certain cases (rabies, tetanus, leprosy) propagates along the nerves.

Professors K. G. Bol' and B. K. Bol' in their Fundamentals of the Pathological Anatomy of Domestic Animals (1948) state that tumors grow independently, are not included in the general system of tissue growth and regulation of functions and metabolism by the organism or individual organs, and lack any functional significance. The influence on tumor growth of the whole organism, and of the nervous system in particular, is thus denied. The authors disregard the work of Pavlov's pupil Petrova, who established by the autopsy of dogs which had been exposed to nervous strain that growth of tumors resulted from nervous irritation. Petrova's results prove that the first stimulus initiating the growth of a tumor comes from the brain cortex.

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The same applies to the theory of inflammation as expounded by Bol' and Bolt. These authors pay no attention to Speranskiy's data on the part which the nervous system plays in inflammation, but discuss this process from the viewpoint of Virchow's organomorphological theory. The problems of regeneration, atrophy, etc., are treated from the same standpoint, while the nature of the pathological process is discussed from an entirely faulty viewpoint. On page 22 of their book, the authors state that the difference between pathological processes and normal ones consists in the fact that injured cells and tissues acquire distinct properties, and, that the processes taking place in these cells and tissues proceed at an excessively heightened or lowered rate and, furthermore, are disturbed as to time and place. It would follow from this that the problem of the quality of a pathological process resolves itself into mere quantitative changes.

One of the most glaring examples of the undervaluation of the role played by the nervous system is the absence of a chapter on the pathology of the nervous system in Shokhor's textbook.

In Professor Olivkov's General Surgery, the sections on regeneration, ulcers, and wounds are written from an organolocallistic viewpoint, and the problems are discussed by detaching the local from the general. While 102 pages of this book are devoted to the subject of wounds, only page 233 contains a reference to the effect on the organism as a whole, and this is restricted to vitamin deficiency, while the role of the nervous system is disregarded.

In the textbook on special pathology and therapy of internal noninfectious diseases of domestic animals by Professors Faddeyev, Sinyev, Polyanskiy, and Skorodumov (1947), the role of the nervous system is not explained in describing therapeutic measures and clinical aspects of pathological processes.

Elements of Virchow's outlook are also present in Professor Gannushkin's Course of Epizootology (1949). In the chapter "Susceptibility and Resistance of the Organism Toward Infection," Gannushkin explains resistance to infection by the barrier effect of uninjured multilayer skin epithelium, the effects of the mucous membranes of the digestive tract and of the flickering epithelium of respiratory organs, phagocytosis, and humoral factors (the effect of antibodies). The role of the nervous system, as it effects various resistance factors, is overlooked entirely.

Various manuals of special pathology and therapy divide animals into two constitutional types, the vagotonic and the sympathicotonic. This classification is based on the theory of Ettinger and Hess, according to which there is an antagonism of the sympathetic and parasympathetic nervous systems. Assumption of any such antagonism is based on localistic concepts, however, because in a number of cases there is synergism of both systems.

Professor Mozgov's text Veterinary Pharmacology demonstrates a faulty understanding of the interaction between therapeutic agents and the organism, which is based on acceptance of Virchow's teachings. Thus, the author says that a pharmacological effect on the cell is possible only if the therapeutic agent is in direct contact with the cell. This book propagandizes Ehrlich's concepts. The author says that Ehrlich created the science of chemotherapy and synthesized a number of [therapeutically active] substances. It is well known that Ehrlich, who was an adherent of Virchow, has not created any chemotherapeutic theory and that the synthesis of a number of [therapeutically active] substances by him is merely an accident.

During the past 30 years, Soviet scientists have accomplished much in the field of the physiology of agricultural animals, using Pavlov's methods. This applies particularly to problems connected with the physiology of digestion and sucking. A number of investigators have clarified the fundamental relationships

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underlying the unconditioned salivation reflex in swine. Others have studied the unconditioned salivation reflex in ruminants and have clarified the influence of the brain cortex on the generation of saliva releasing reflexes. Still others have investigated the conditioned and unconditioned salivation reflexes in horses.

Various phases of digestion by ruminants have been investigated in great detail. The digestion of horses has been studied under application of Pavlov's methods. The physiology of the pancreas in ruminants has been investigated. A considerable number of investigations dealt with the digestion in birds.

All this work is of great importance from the viewpoint of establishing a physiological basis for optimum diets of animals to raise productivity in animal husbandry.

However, the results obtained in the study of the physiology of digestion have not been utilized to a sufficient extent by veterinary clinicians in the prophylaxis of diseases of the digestive tract and the development of diets which would expedite the recovery of diseased animals. Data on noninfectious diseases show that diseases of digestive organs comprise 25-30% in horses, 30-35% in cattle, and 35-40% in swine. If one considers the extent of noninfectious diseases, which affect hundreds of thousands of animals, the economic significance of developing prophylactic and therapeutic measures against digestive diseases on the basis of Pavlov's methods becomes apparent.

Pavlov's concepts are also insufficiently applied in the technique of feeding. N. F. Popov's experiments have shown that when the daily ration is given in five feedings, the digestibility of cellulose is 20% higher than when the same quantity of food is given to the animal in three feedings. When too large a portion is offered to the animal, a part of the food remains uneaten. On the other hand, according to K. I. Bykov the mere process of eating acts as a signal which influences metabolic processes of the organism.

Pavlov's theory postulating types of nervous activity is of great significance in obstetrics and artificial insemination, and his theory should be applied to a greater extent.

The treatment of problems connected with the regulation of metabolism must be revised radically. The law of body surface and of the principle of compensation, as formulated by Rubner, disregarded entirely the higher regulatory functions exerted by the nervous system. Experimental work by Pavlov's school shows that the level of metabolism, as established by conditioned reflexes, depends to a considerable extent on idiosyncrasies acquired in the course of an individual life. In evaluating this factor, the influence of the external medium in establishing paths of conditioned reflexes must be taken into account. An animal has an individually acquired and conditioned mode of regulation of metabolic processes, of the activity of the cardiovascular system, of digestive processes, and of other physiological functions.

All this must be taken into account in developing high-quality cattle, from the production standpoint, and in feeding them.

From the veterinary viewpoint, problems in connection with the raising of young animals, development of resistance to unfavorable external conditions, long life, and high productivity are of particular importance. The effect of temperature factors in combination with other external conditions and physical exercise (e.g., the training of horses) are powerful means of acting on the animal organism through its nervous system and numerous receptor mechanisms. The scientific justification for raising calves in unheated sheds follows from this. In general, all measures aimed at training and increasing the resistance of animals must take into account the important function of the nervous system, the conditioning of the organism, and the dependence of the organism on the exterior medium.

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To obtain successful results based on Pavlov's methods and teaching, it will be necessary to take various organizational measures. Thus, a number of leading veterinary scientific research institutes (the Ukrainian, Leningrad, Kazan', and others) lack departments of physiology, biochemistry, and pathological physiology. Even the All-Union Institute of Experimental Veterinary Medicine does not have a pathological physiology department. Under the circumstances, the institutes in question are not in a position to do work which would further develop Pavlov's teaching.

Practical laboratory training in the fields of physiology and pathological physiology at veterinary and animal husbandry higher educational institutions is limited to work carried out on small animals. Pavlov's statement to the effect that one must take into account the particular species to which the animal belongs is forgotten. Facilities for experimenting on large agricultural animals are absent.

It is also necessary to organize authors' collectives to provide adequate textbooks on the physiology and pathological physiology of agricultural animals and to create monographs and textbooks on problems of the physiology of higher nervous activity.

There is no doubt that the appeal of the Academy of Sciences USSR, and the Academy of Medical Sciences USSR to further work based on Pavlov's teachings will find a wide response among scientists who are active in the veterinary field.

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