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PHYSIOLOGY AND ZOOLOGY

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Annotation
Modern trends and tasks of physiology. One of the main tasks of modern physics is to elucidate the mechanisms of mental activity in animals and humans in order to develop effective measures against neuropsychic diseases. The solution of these questions is facilitated by the study of the functional differences between the right and left hemispheres of the brain, the elucidation of the subtlest neural mechanisms of the conditioned reflex, the study of brain functions in humans through implanted electrodes, artificial modeling psychopathological syndromes in animals.

Keywords: Clinical and functional tests, bioelectric and metabolic processes, Chronic experience, artificial models, Physiological movements.

Introduction

The study of the functions of a living organism is based both on physiological methods proper and on the methods of physics, chemistry, mathematics, cybernetics. Such an integrated approach allows the study of physiological processes at various levels, including the cellular and molecular. The main methods of understanding the nature of physiological processes, the laws governing the work of living organisms are observations and experiments carried out on different animals and in various forms. However, any experiment performed on an animal under artificial conditions does not have absolute significance, and its results cannot be unconditionally transferred to humans and animals found in natural conditions. In t. N. In an acute experiment (see Vivisection), artificial isolation of organs and tissues (see. Isolated organs), excision and artificial stimulation of various organs, removal of bioelectric potentials from them, etc. are used. Chronic experience allows you to repeat research on one object several times. In the chronic experiment in F., various methodological techniques are used:

Imposition of fistulas, removal of the studied organs into a skin flap, heterogeneous anastomoses of nerves, transplantation of various organs (see Transplantation), implantation of electrodes, etc. Finally, in chronic conditions, complex forms of behavior are studied, for which they use the techniques of conditioned reflexes or various instrumental techniques in combination with stimulation of brain structures and the registration of bioelectric activity through implanted electrodes. The

introduction into clinical practice of multiple long-term implanted electrodes, as well as microelectrode technology for the purpose of diagnosis and treatment, has made it possible to expand research on the neurophysiological mechanisms of human mental activity.

Registration of local changes in bioelectric and metabolic processes in dynamics has created a real opportunity to clarify the structural and functional organization of the brain. With the help of various modifications of the classical method of conditioned reflexes, as well as modern electrophysiological methods successes have been achieved in the study of higher nervous activity. Clinical and functional tests in humans and animals are also a form of physiological experiment. A special type of physiological research methods is the artificial reproduction of pathological processes in animals (cancer, hypertension, Graves' disease, peptic ulcer, etc.), the creation of artificial models and electronic automatic devices that imitate the work of the brain and memory functions, artificial prostheses, etc.

Methodical improvements have fundamentally changed experimental techniques and the way experimental data are recorded. Mechanical systems were replaced by electronic converters. It turned out to be possible to more accurately investigate the functions of the whole organism by using the techniques of electroencephalography, electrocardiography, electromyography, and especially biotelemetry on animals and humans. The use of the stereotaxic method has made it possible to successfully investigate deeply located structures of the brain. For recording physiological processes, automatic photographing from cathode-ray tubes on film or recording with electronic devices is widely used. The registration of physiological experiments on magnetic and perforated tape and their subsequent processing on a computer is becoming more and more widespread. The method of electron microscopy of the nervous system made it possible to more accurately study the structure of intraneuronal contacts and determine their specificity in various brain systems.

Modern trends and tasks of physiology. One of the main tasks of modern physics is to elucidate the mechanisms of mental activity in animals and humans in order to develop effective measures against neuropsychic diseases. The solution of these questions is facilitated by the study of the functional differences between the right and left hemispheres of the brain, the elucidation of the subtlest neural mechanisms of the conditioned reflex, the study of brain functions in humans through implanted electrodes, artificial modeling psychopathological syndromes in animals. Physiological studies of the molecular mechanisms of nervous excitement and muscle contraction will help to reveal the nature of selective permeability of cell membranes, create their models, understand the mechanism of transport of substances through

cell membranes, elucidate the role of neurons, their populations and glial elements in the integrative activity of the brain, and in particular in memory processes.

The study of various levels of the central nervous system will make it possible to find out and role in the formation and regulation of emotional states. Further study of the problems of perception, transmission and processing of information by various sensory systems will make it possible to understand the mechanisms of formation and perception of speech, recognition of visual images, sound, tactile, etc. Physiological movements are actively developing, compensatory mechanisms of restoration of motor functions in various lesions of the musculoskeletal system, and also the nervous system.

Research is underway on central the mechanisms of regulation of the autonomic functions of the body, the mechanisms of the adaptive-trophic influence of the autonomic nervous system, the structural and functional organization of the autonomic ganglia. Studies of respiration, blood circulation, digestion, water-salt metabolism, thermoregulation and the activity of the endocrine glands make it possible to understand the physiological mechanisms of visceral functions. In connection with the creation of artificial organs - the heart, kidneys, liver, etc. F. must find out the mechanisms and interaction with the recipient organism. For medicine, F. solves a number of problems, for example, determining the role of emotional stress in the development of cardiovascular diseases and neuroses. Important areas of F. are developmental physiology and gerontology.

ZOOLOGY (from zoo ... and ... logic), a complex of sciences that study the diversity of the animal world, the structure and life of animals, their relationship with the environment, the laws of the individual and historical. development. The term "Z." appeared in mid. 18th century and gradually began to replace the previously existing concept of "natural history of animals". Z. is traditionally subdivided into several. directions related to the study of the department. groups animals, including invertebrates and vertebrates. Within the framework of the first, protozoology, or protistology, was isolated - the science of unicellular animals, malacology, which studies mollusks, carcinology - crustaceans, arachnology - spiders, acarology - ticks, entomology - insects, etc. In turn, entomology, coleopterology, which studies beetles, myrmecology - ants, lepidopterologists am Lepidoptera (butterflies). Parasitic organisms and the diseases they cause in humans, animals and plants have become the object of parasitology. A special section of parasitology is helminthology, the subject of which is parasitic flat and round worms. Specific. Soil zoology deals with soil fauna (mainly invertebrates). Dept. scientific. disciplines in vertebrate culture: ichthyology, which studies fish and fish-like, herpetology - reptiles and amphibians,

ornithology - birds, theriology - mammals. Among the main. tasks of anthropology - the study of human evolution and his position in the system of the animal world.
Centre. taxonomy occupies a place in Z. Construction of natures. hierarchical systems of the animal kingdom and its dep. subdivisions - the task of a number of zoologists. disciplines. This applies to both living and extinct animals; the latter deals with paleozoology (section of paleontology). Knowledge is systematic. the position of the species of the studied individuals is necessary when working with biological. objects for decomp. Levels organization of life - from molecular structures to multi-species communities.
In the process of development of zebra morphology, animal morphology has become isolated, which studies the external and internal structure (anatomy) of animals (see Comparative Anatomy of Animals), the comparative, functional, and evolutionary aspects of the department. organs and systems. The patterns of individual development of animals are investigated by embryology, historical - by phylogenetics, evolutionary theory. In the early stages of zoster development, animal physiology branches off from it, which studies the various functions of the organism. The establishment of the laws of inheritance and variability of traits is dealt with by animal genetics, their relationship with the environment and among themselves studies the ecology of animals, the spatial distribution of animals on the planet - zoogeography. Ethology and zoo psychology investigate decomp. aspects of animal behavior. At the molecular and cellular levels, animals are studied, respectively, biochemistry and cytology. Z. is closely associated with a number of complex biological. sciences such as hydrobiology, oceanology, soil science, forestry, biogeochemistry, space biology, etc.
Zoological. man began to accumulate knowledge since ancient times. Already the life of primitive people (at least 1 million years ago) was closely associated with a wide variety of living organisms around them, knowledge of important natural phenomena. OK. 40-50 thousand years ago, and possibly even earlier, people learned to fish and hunt. The domestication (domestication) of animals began 15–10 thousand years ago. Stone people art century has brought to us expressive, accurate drawings of many. animals, some of which are now extinct - mammoth, woolly rhinoceros, wild horses, bulls. Many of them were deified, became the subject of a cult. The first attempts to systematize knowledge about animals were undertaken by Aristotle (4th century BC). He managed to build a hierarchical one. system including St. 450 taxa of animals, in which steps are visible transition from simple forms to complex ones (the idea of a “ladder of creatures”), to draw the line between the animal world and the plant world (in fact, separate them into a separate kingdom).

He made a number of zoologists. discoveries (including the description of live birth in sharks). Aristotle's achievements and authority prevailed in Europe for several. centuries. In the 1st century. n. e. Pliny the Elder, in his 37-volume Natural History, summarized the knowledge about animals that was available at that time; alongside with valid facts it contained a lot of fantastic. information. Galen continued the tradition of honey. schools of Hippocrates, supplementing them with their own comparative-anatomical. research and physiological. experiments on animals. It is numerous. writings were authoritative guides until the Renaissance. During the Middle Ages in the states of Europe and Asia, the development of landmarks was limited by the dominant religions.... doctrines. The accumulating information about animals and plants was of apocryphal or applied nature. The largest biological. The encyclopedia of the Middle Ages was the works of Albert the Great, including the treatise "On Animals" ("De animalibus") in 26 books.

In this century, Z. is characterized by intensive specialization. Along with entomology, ichthyology, herpetology and ornithology, theriology, zoology of marine invertebrates, etc. are being formed. Systematics is reaching a new level of development both in the field of higher taxa and at the subspecies level. Research in embryology, comparative anatomy and evolutionary morphology is especially fruitful. Animals. The contribution of zoologists to the disclosure of the mechanisms of transmission of hereditary information, to the description of metabolic processes, to the development of modern times is significant. ecology, theory and practice of nature conservation, to clarify the mechanisms of regulation of the main. body functions, maintaining homeostasis of living systems. Zoological. research has played a significant role in the study of behavior and communication processes in animals (formation zoo psychology, ethology), determining the factors and laws of evolution, creating synthetic.

Constantly replenishing its arsenal with ever more sophisticated instrumental methods, methods of recording and processing observations, gold is developing in terms of both specialized (in terms of objects and tasks) and complex research. The importance of theoretical, conceptual constructions has increased along with experiments in nature. The use of the achievements of mathematics, physics, chemistry, and a number of other sciences in Zealand proved to be fruitful. The instrumental arsenal of zoologists has significantly expanded: from radioactive tags and telemetry to video recording and computer processing of field and laboratory materials. Confirmation of the laws of G. Mendel (E. Cermak-Zeisenegg, K. Correns, H. De Vries, 1900) stimulated the study of individual variability and heredity in animals. Further progress in the study of the mechanisms of transmission of

hereditary information is associated with the development of biochemistry and molecular biology. In parallel with the analysis of the molecular basis of heredity, studies were conducted on other factors that determine the individual development of animals. H. Spemann discovered the phenomenon of embryonic induction in 1901.

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