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Featured Department: Department of Veterinary Physiology and Pharmacology

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THE OLDEST available catalog found in the files of the department of Veterinary Physiology and Pharmacology is for the year 1910-11. In this catalog the faculty for the Division of Veterinary Medicine consisted of the following persons: Charles H. Stange, dean and professor; Ralph R. Dykstra, professor; William W. Dimock, associate professor; Harold E. Bemis, assistant professor; Howard S. Murphey, assistant professor; George Judisch, lecturer; and H. D. Bergman, assistant. Three of these men are living today: Dr. Dykstra, Dr. Bergman, and Mr. Judisch. Dr. Albert Boynton Storms was president of Iowa State College at this time.

During the school year of 1910-11, physiology was taught by Dr. H. S. Murphey. The course consisted of two 1-hour lectures per week during each semester of the second year. Pharmacy was taught to the junior students by Mr. George Judisch as two lectures, with one 2-hour laboratory per week for one semester. Mr. Judisch also lectured to the junior students in materia medica for 2 hours during the week for one semester. Therapeutics was taught by Dean C. H. Stange along with theory and practice of veterinary medicine.

In 1912 the Division of Veterinary Medicine was departmentalized with the creation of the Department of Veterinary Physiology and Pharmacology under the direction of Dr. H. D. Bergman, who presented the lectures in physiology and therapeutics. Dr. Bergman added a 2-hour laboratory to the course in physiology for veterinary students. In addition, he initiated a course in general physiology intended specifically for agricultural students. In 1919 when the college changed from the semester to the quarter system, the lectures were increased to three per week, plus one 3-hour laboratory per week for three quarters to the sophomore students. In 1935 the course in physiology...
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was increased to a total of 18 credits, at which figure it now stands. Physiology is now begun in the spring quarter of the freshman year and continued through the fall and winter quarters of the sophomore year. A recitation period is substituted for one laboratory period in the first quarter, and a seminar takes the place of one laboratory period in the third quarter; this arrangement is to stimulate library use by the students.

The course in physiology for agricultural students is currently offered as three lectures per week to the junior animal husbandry students in the fall quarter.

In 1940 a new course, physiology of the domestic fowl, was offered by this department to meet the need of students in poultry husbandry for more instruction in physiology.

A course in physiology for graduate students was first offered by Dr. Bergman soon after the department was organized. This course has attracted graduate students from agriculture, home economics and the general sciences.

When the Department of Veterinary Physiology and Pharmacology was organized, Mr. George Judisch continued to teach pharmacy and materia medica. Dr. Bergman lectured in therapeutics to the junior veterinary students five times a week for one semester. A continuation course of one credit was presented one year later to the senior veterinary students. During this period Mr. Judisch continued to teach pharmacy and materia medica. In 1925 he gave up these duties and Dr. Bergman took over the responsibility for teaching pharmacology and therapeutics to the veterinary students. Through the years instruction in this subject area has been presented in various ways and in various places in the curriculum in an effort to improve and modernize the program. Beginning in 1955 pharmacology and therapeutics will be offered as a series of three consecutive courses of four credits each. The first course consisting of four lectures a week will be given during the third quarter of the second year of the veterinary curriculum. The subject will continue through the two successive quarters in the third year of the curriculum.

**Personnel**

As stated above, the Department of Veterinary Physiology and Pharmacology was first organized with Dr. H. D. Bergman as head and professor. Mr. George Judisch was lecturer in the department. Beginning in 1915 there was a succession of assistants in the department. These were Dr. H. H. Dukes, currently head of the Department of Physiology of the New York State Veterinary College; Dr. Harry Orr, presently dean of the School of Veterinary Medicine at Oklahoma A. & M.; Dr. J. H. Yarborough, who has been a successful practitioner in Miami, Fla., for many years and Dr. L. H. Schwarte, who is now professor of veterinary research at Iowa State College.

Following his graduation in 1918, Dr. Dukes served in the U. S. Army and was in private practice for a short time. In 1921 he returned to join the department as an instructor and was made assistant professor in 1925 and continued in the department until 1929. Dr. Earl Hewitt succeeded Dr. Dukes on the faculty of the department. Dr. W. T. Oglesby served as an assistant and obtained his D.V.M. degree in 1932. He remained as an instructor on the staff for 1 year. In 1935 L. Meyer Jones joined the department as assistant, as did William E. Irwin in 1936. Both men received their D.V.M. degrees in 1939. Dr. Jones remained with the department until 1942. Dr. Walter Venzke assisted briefly with the teaching until Dr. Loyal Payne joined the department in the fall of 1942. In 1944 Dr. Jones returned to the departmental staff to assume the responsibility of teaching pharmacology and therapeutics, which was relinquished by Dr. Bergman following his appointment as dean of the division in 1943. Dr. J. C. Pickens has been handling the nutrition course given to the senior students during the winter quarter for three credits.

In 1953 Dr. Joseph Graca joined the department to assist in the teaching pro-
gram and, especially, to conduct appropriate research.

Research Activities

Although teaching has been the prime objective of the department since its organization in 1912, considerable attention has been devoted to research problems in veterinary physiology and pharmacology. Some of the earliest departmental research was upon the effects of pituitrin in milk production in the cow and the sow by A. C. McCandlish during 1917 and 1918 under the supervision of Dr. H. D. Bergman. From 1924 to 1926 Drs. H. D. Bergman, H. H. Dukes and Mr. J. H. Yarborough devoted considerable time to research on the physiology of the rumen, especially the phenomena of rumination and ruminal-reticular motility. During this same period the diurnal phases of rumination in cattle were studied by Dr. L. H. Schwarte. An extensive project on the chemical and morphological characteristics of the blood of normal and cholera infected swine was carried out during 1929-31 by Dr. E. A. Hewitt and Dr. W. T. Oglesby. Intestinal motility in the chicken was the subject of considerable investigation by Dr. H. W. Orr in 1930.

Cooperative research with the Department of Physiological Chemistry was conducted by Dr. E. A. Hewitt, V. E. Nelson, and D. A. Greenwood in 1938 upon the effects of fluorides and chlorides of some of the alkali earth compounds on the respiration and blood pressure in the dog. In 1940 Dr. E. A. Hewitt and Dr. L. Meyer Jones studied the effect of intravenous injections of salts of sodium, calcium and potassium upon intestinal motility in the dog.

In more recent years, Dr. Jones has investigated the pharmacologic and toxicologic action of the sulfonamides when injected intravenously in cattle. In addition, he has studied the action of alpharnapthyl urea (ANTU) as a toxic agent in dogs following its accidental ingestion during rat extermination programs. Dr. Jones also investigated the analgesic and the toxic action of procain hydrochloride when injected intravenously in dogs. Later, the toxic action in the larger domestic
Dr. Jones later investigated the effectiveness of curare as an aid to anesthesia in several species of domestic animals, and conducted a brief study of experimental lead poisoning in calves.

Since joining the department, Dr. L. C. Payne has studied the production of glucuronic acid arising in the detoxification process of chloral hydrate, a widely used large animal hypnotic. More recently, Dr. Payne has been conducting research on the influence of sex hormones on the hatchability of chicken eggs and on the influence upon growth of young chicks. Currently, Dr. Payne is studying the estrogen levels in bovine plasma in a cooperative project with the Department of Veterinary Obstetrics and Radiology. Dr. Payne is continuing to devote much of his time to a study and analysis of the results of the ISC Veterinary Medical Aptitude Test.

The Department of Veterinary Physiology and Pharmacology has cherished the idea of developing an intensive program of research and graduate study. Several students have been interested in taking advanced work, both for major and minor credit in veterinary physiology. It is hoped that this program will be expanded to a reasonable degree.

In 1952-53 a joint research project with veterinary anatomy was carried out by Dr. Robert Worthman on the anatomy and physiology of the vertebral venous system of the dog.

Dr. Graca is continuing research on the correlation of drug action with age which was initiated at the University of Minnesota previous to his joining this department in 1953. Dr. Graca is also studying the toxicity of rare earth elements in animals in a program sponsored jointly by the Institute for Atomic Research and the Department of Veterinary Physiology and Pharmacology. In addition, Dr. Graca is conducting another project on the effect of antibiotic-antipyretic drug combinations on the blood of normal dogs and under conditions of artificially induced pyrexia, which is supported in part by the Veterinary Research Institute and by grants-in-aid from Sharp & Dohme and Chas. Pfizer and Co.

**Graduate Program**

The Department of Veterinary Physiology and Pharmacology has granted seven degrees of Master of Science in veterinary physiology; one Master of Science with a joint major in veterinary physiology and veterinary anatomy; and one Doctor of Philosophy degree. Currently two students are pursuing work toward a Doctor of Philosophy degree in the department, and another student is studying for the same degree with a split major in veterinary physiology and animal nutrition. At the present time there are 20 students from other departments taking a minor in veterinary physiology towards either the M.S. or Ph.D. degree. Veterinary physiology has been elected by approximately 500 graduate students for Instrumentation: Tissue Respiration Studies
minor credit toward the M.S. or Ph.D. degree since the department was established.

During the past year the research facilities of the department have been expanded to further research in fundamental problems relating to veterinary medicine. Four new research laboratories have been designed to provide mobility in use for present and future research programs. These include a clinical research laboratory for hematological technics; an instrumentation laboratory for tissue respiration studies, tissue culture technics, chromatography and other new research developments; and experimental surgery laboratory; and in an animal colony room providing approximately 150 mice per week raised under control conditions.

The need and potentiality for an extensive research program in veterinary medicine, both fundamental and applied, is no doubt greater than in any other field of biological science. The increased recognition of metabolic diseases in domesticated animals emphasizes the need for an enlarged continuing program of research in physiology, pharmacology and related fields.

TRANSMISSIBLE GASTROENTERITIS IN PIGS. From an enteric disorder of pigs in New York state, a virus was procured that produced signs of illness resembling the naturally occurring transmissible gastroenteritis.

Oral administration of either filtered or unfiltered intestinal suspensions from infected animals readily and regularly produced characteristic signs of illness in pigs, and, since parenteral inoculation of virus did not, it appeared that the natural route of infection was by way of the mouth. In the acute phase of illness, virus was found in the blood, liver, spleen, brain, and lung in a low concentration but was present in high concentration in the intestine and kidney.

Virus was recovered from feces of infected pigs for intervals of time extending 2 to 8 weeks after inoculation. Since virus was recovered from the lungs and kidneys of infected pigs for only a short time after inoculation, from the blood during the period of clinical illness, and in no instance from the urine, it would appear that persistence of virus in the feces has epidemiological significance. Infected pigs that showed persistence of virus in the intestines were stunted and did not gain weight as well as pigs that did not harbor virus or uninfected pigs.


THE INFLUENCE OF SHOCK ON CEREBRAL HEMODYNAMICS AND METABOLISM. Preliminary observations of the cerebral hemodynamics and the metabolism of subjects in shock disclose that there is a reduction in the rate of cerebral blood flow. The cerebral metabolic rate varied from normal to markedly reduced values. The cerebral arteriovenous oxygen differences also showed considerable variation. In some cases the extraction of oxygen was greatly increased above normal, and in others it was reduced.

These results suggest that during shock compensatory mechanisms may maintain the cerebral metabolism despite a reduction of arterial pressure and cerebral blood flow. The decreased metabolism and oxygen extraction noted in some subjects may result from failure of compensatory mechanisms. It is possible that these alterations of cerebral hemodynamics play an important role in the prognosis of shock.