

The Biomedical Electronics Program at I. S. U.

Daniel King

BIOMEDICAL electronics is a relatively new science. As a science it requires a basic knowledge of anatomy, chemistry, electronics, mathematics, physics and physiology. The utilization of this knowledge to design equipment for detecting biological changes, to improve the instruments of today and to evaluate these results by quantitative methods is the goal.

The Biomedical Electronics Program at Iowa State University was initiated jointly in 1957 by the College of Engineering and the College of Veterinary Medicine. This program is sponsored by the Department of Electrical Engineering, the Department of Veterinary Anatomy, the Department of Veterinary Physiology and Pharmacology, the Engineering Experiment Station and the Veterinary Medical Research Institute. The chairman of the administrative committee is Dr. Victor W. Bolie, Professor in Electrical Engineering and Veterinary Physiology. Other members of the committee are Dr. Erskine Morse, Associate Director of the Veterinary Medical Research Institute; Dr. D. R. Boylan, Associate Director of the Engineering Experiment Station; Dr. Robert Getty, Head of Veterinary Anatomy; Dr. Melvin J. Swenson, Head of Veterinary Physiology and

Pharmacology and Dr. Warren Boast, Head of the Department of Electrical Engineering.

The program at Iowa State is primarily for research purposes involving graduate work for qualified students. Those interested in graduate work will include post-graduate students in Electrical Engineering and Veterinary Medicine, and students who have received degrees in other physical and biological sciences. The prerequisite for doing graduate work requires a balance of anatomy, chemistry, electronics, mathematics, physics and physiology. No definite pattern of coursework is required in fulfilling these requirements. The primary purpose of the graduate program is the training of Engineering graduate students in advanced methods of designing instruments for biomedical measurements, in applying engineering principles and methods to the study of anatomy and physiology and of training graduate students in Veterinary Medicine specializing in advanced methods of using modern instruments for solving medical research problems.

The research portion of the program applies the technical knowledge of the members of all the cooperating departments to develop and refine instruments for making biomedical measurements as well as utilizing electronic means in

Daniel King is a Junior in the College of Veterinary Medicine at Iowa State University.

CILOPEN

offers a
DOUBLE GUARD against **BLOAT**



EFFECTIVE The inclusion of both PENICILLIN and SILICONE in the Cilopen formula offers a double guard against bloat. The Penicillin aids in preventing bloat fermentation in the rumen. The Silicone counteracts the foaming action and allows the animal to release accumulated gases. There is no substitute for Cilopen's effectiveness.

FAST ACTING Cilopen is fast acting when added to the drinking water of cattle because it is transported to the rumen rapidly where

it performs its thorough preventive action against bloat-causing germs.

VERSATILE Cilopen has proven effective when added to either drinking water or feed the evening or morning prior to turning cattle into legume pasture. It has also proven effective on chronic "bloaters."

ECONOMICAL It is far more economical to prevent bloat than to treat it. This is especially true with Cilopen because of the low cost per dose . . . just one-half teaspoon per day per animal.

CILOPEN is available in one and five pound containers . . . Available to Veterinarians only.



DIAMOND LABORATORIES
D E S M O I N E S . I O W A

therapy and diagnosis. Projects which have been completed are an electrically shielded room containing electronic equipment and surgical apparatus for neuro-anatomical studies. High gain preamplifiers have been constructed for a twin beam CRT oscilloscope for use in cardiovascular and neurophysiology experiments. A simplified, ultrasafe cardiac defibrillator is in the final proving stages. An electronic analog computer is currently being used to investigate the feedback regulation problems associated with normal and abnormal hormone function. Considerable research is being done with miniaturized transistor radiotelemetering equipment for remotely monitoring body function in the active animal.

Presently all research is being done in the available facilities present in each department. The State of Iowa and the United States Public Health Service have allocated funds totaling \$400,000 for the construction of a Biomedical Electronics laboratory building. This building will be a three floor structure extending from the southwest corner of the Veterinary Medicine Quadrangle. Construction is to begin in the summer of 1960. This building will contain an electronics shop, small animal quarters, a fully shielded and instrumented surgery room, radiotracer laboratories, drug and chemical rooms, and research laboratory space. The program will continue to be supported by research and training grants.

Data to be obtained in the near future will include correlation and evaluation of neuroanatomical and neurophysiological findings on a quantitative basis employing electronic methods. Biological measurements of the aging process and more exact recordings of numerical values in physiology will be forthcoming. After these data have become established one can then gain the benefits of better teaching through more vivid and exact descriptions of biological processes. Even more important, the establishment of normal values will be important as a diagnostic aid, as well as a means of evaluating methods of therapy both in research and practice.

End

continued from page 131
ologic examination revealed the presence of numerous lungworms in the alveoli and bronchioles. These parasites have been identified as *Filaroides milksi* (Whitlock, 1956).²³

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the suggestions and assistance of the following staff members at the College of Veterinary Medicine, Iowa State University, Ames, Iowa, in the preparation of this paper: Dr. E. A. Benbrook, Department of Veterinary Pathology, Dr. W. S. Monlux, Department of Veterinary Pathology, and Dr. P. C. Bennett, Supervisor of Iowa Veterinary Medical Diagnostic Laboratory.

1. Benbrook, E. A., Outline of Parasites Reported for Domesticated Animals in North America. Fifth edition. Iowa State College Press, Ames, Iowa, 1958.
2. Dougherty, E. C., The genus *Filaroides* van Beneden, 1858, and its relatives: Preliminary note. Proc. Helminth. Soc. Wash. 10, 69, 1943.
3. Dougherty, E. C., The genus *Aelurostrongylus* Cameron, 1927 (Nematoda: Metastrongylidae), and its relatives; with description of *Parafilaroides*, gen. nov., and *Angiostrongylus gubernaculatus* sp. nov. Proc. Helminth. Soc. Wash. 13, 16, 1946.
4. Dougherty, E. C., A Further Revision in the Classification of the Family Metastrongyloidea Leiper (1909) (Phylum Nematoda) Parasitology 41, 91, 1921.
5. Hall, M. C., Two New Genera of Nematodes, with a Note on a Neglected Nematode Structure. Proc. U. S. Nat. Museum. 59, 541, 1921.
6. Hare, T., Notes on Chronic Tracheo-Bronchitis of the Dog due to *Oslerus osleri* (Cobbold, 1879). Vet. Rec. 11, 1074, 1931.
7. Lapage, Geoffrey, Veterinary Parasitology. Oliver and Boyd, London, 1956.
8. Monnig, H. O., Veterinary Helminthology and Entomology. William and Wilkins, Baltimore, 1947.
9. Neumann, L. G., A Treatise on the Parasites and Parasitic Disease of the Domesticated Animals. William R. Jenkins, New York, 1906.
10. Neumann, L. G., Parasites et Maladies du Chien et Chat. Vigot Freres, Paris, 1941.
11. Neuveu-Lemaire, M. Traite d' Helminthologie Medicale et Veterinaire. Vigot Freres, Paris, 1936.
12. Oldham, J. N., Correspondence. Vet. Rec. 66, 181, 1954.
13. Olsen, W. and Bracken, F. K., Lungworm, *Filaroides osleri*, in a Dog in Colorado. Jour. Amer. Vet. Med. Assoc. 134, 330, 1959.
14. Ortlepp, R. J., The Lung Worm, *Filaroides osleri* (Cobbold) in South African Bird Dogs. J. South African Vet. Med. Assoc. 16, 86, 1945.
15. Price, E. ., The Coyote (*Canis Latrans Texensis*) a New Host of *Oncicola Canis* (Kaupp) and *Oslerus osleri* (Cobbold) J. Parasitology. 14, 197, 1928.
16. Runnells, R. A., Animal Pathology, Iowa State College Press, Ames, Iowa, 1945.

continued on page 163