



AQUAVET®

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Produced by Publications Services, University of Pennsylvania

78871/9.99/1M/RC

Design by Deena Wickstrom.

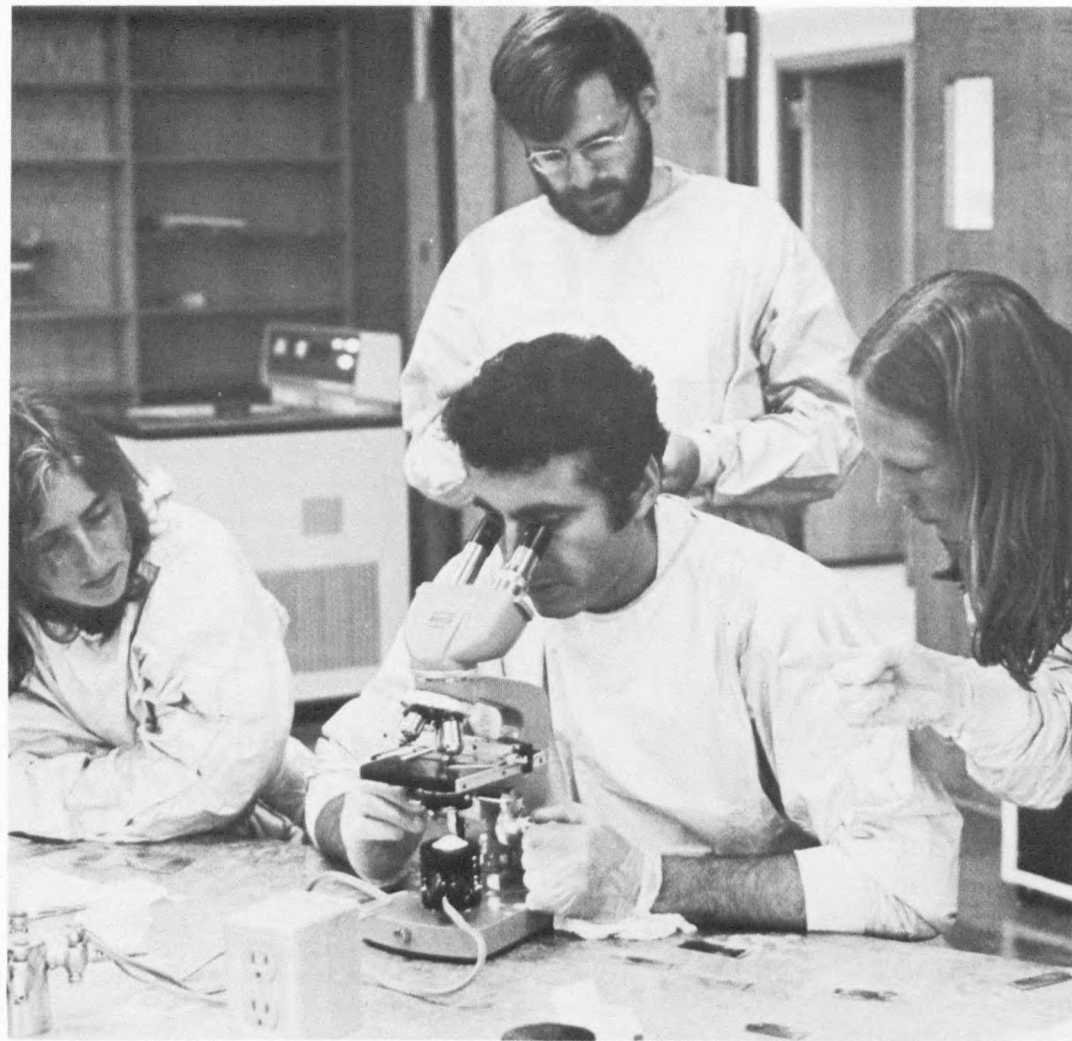
Photographs on pages, 2,4, 6, 8, 9, 10, 14, 16,19, 20 and cover by
Dr. Donald A. Abt, University of Pennsylvania and on pages 5,
12, 17, 18 and 21 by Russ Hamilton, Office of Public Information,
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AQUAVET®



A Program in Aquatic Veterinary Medicine

Presented by the School of Veterinary Medicine,
University of Pennsylvania and the College of
Veterinary Medicine, Cornell University



AQUAVET®

Members of the veterinary medical profession are increasingly expressing a desire to contribute to the welfare of the inhabitants of the aquatic world. Furthermore, excessive harvesting, ever more significant pollution problems, and disease have had devastating effects on many sea animal populations, once taken for granted. In a protein-hungry world, control and prevention of disease among aquatic animals, especially those cultured for human consumption, is crucial. The biomedical skills used so effectively by veterinarians to deal with disease and increase productivity among terrestrial animals can be applied to aquatic animals as well. But this will be possible only if schools of veterinary medicine develop programs to train students and stimulate research in aquatic animal medicine.

One major effort toward accomplishing these goals is *AQUAVET*, sponsored by the School of Veterinary Medicine at the University of Pennsylvania and the College of Veterinary Medicine at Cornell University, and presented in

collaboration with three marine science institutions at Woods Hole, Massachusetts: the Marine Biological Laboratory, the Northeast Fisheries Science Center of the National Marine Fisheries Service, and the Woods Hole Oceanographic Institution.

AQUAVET began formally in the spring of 1977 as the result of efforts, conducted in the summer of 1976, to identify and bring together persons and institutions sharing the belief that the veterinary profession is in a position to contribute to the well-being of the aquatic environment and its inhabitants, and is poised to carve out an important niche in the burgeoning aquaculture industry, as well. During the formative months, it became clear that many shared this belief and that students in veterinary medicine were eager to learn more about aquatic animals than is offered in the traditional curricula.

The positive responses received in 1976 led to a successful application to the New York Sea Grant Institute for funding to launch *AQUAVET* in the



spring of 1977. The grant provided the necessary support for a four-week, intensive course, during which the potential of the field of aquatic veterinary medicine was explored with sixteen students from the veterinary schools at Cornell and Pennsylvania. Following the course, which was presented by more than fifty faculty members from eighteen institutions, eight of the students remained with the program for eight weeks of research at the laboratories of several cooperating institutions at Woods Hole and elsewhere in the country.

Drawing from the lessons learned during *AQUAVET '77*, the program directors decided to increase the number of students in *AQUAVET '78*, and more importantly, to extend the opportunity to participate to students at all schools and colleges of veterinary medicine in the country. In addition, a limited number of openings were made available to persons who had already received the veterinary degree. At that juncture, it was felt that this was the best way to achieve one of

the major goals of the program — to identify, stimulate, and encourage as many potential leaders of this emerging branch of veterinary medicine as possible.

In 1983, the first *AQUAVET II* course was offered. Attended by seven individuals, most of whom were alumni of *AQUAVET I*, the course lasted four weeks and served to augment the introductory course by covering, in greater detail, subjects in mariculture, toxicology, nutrition, and diseases of cultured fish.

Over time, *AQUAVET* has become well established and accepted within the profession, and many of its alumni are presently pursuing careers in aquatic animal medicine. Today, the goal of *AQUAVET* is to provide for the orderly progression of students into positions of leadership, from which the real contributions of the profession can be made to society. The generation and application of new knowledge must be the ultimate mission.





Basic Course

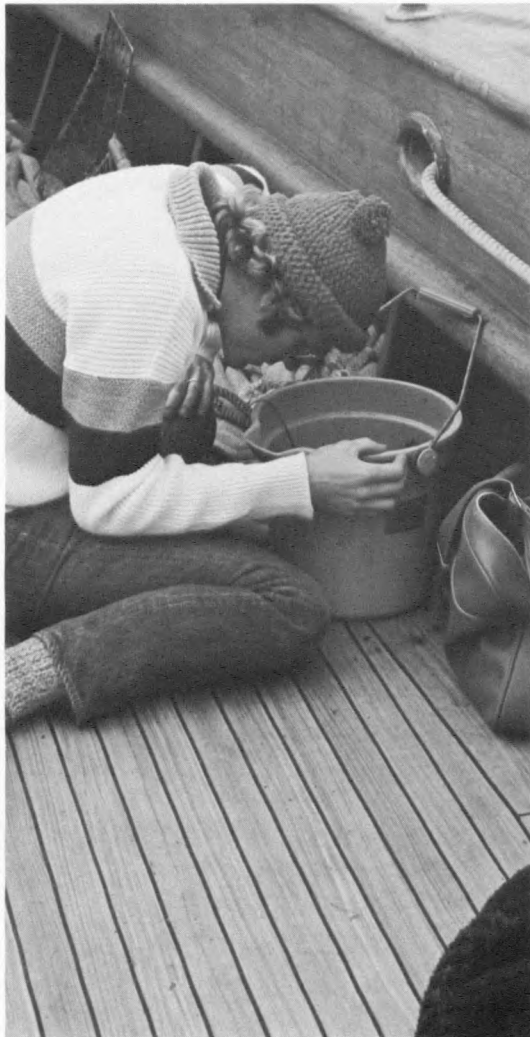
The four-week *AQUAVET I* course, Introduction to Aquatic Veterinary Medicine, is a demanding educational experience requiring total involvement from participants during the entire period. At least five and one-half days a week are scheduled, as are evenings, with all students taking part in every session. During the unscheduled hours there is opportunity for the informal exchange of ideas and information among students and faculty, many of whom are leaders in their respective disciplines. Because individual study time is limited, reading assignments are made available in advance when possible. There is little written work, but each student is required to prepare and present a seminar to the group during the course.

The program is diverse, incorporating many topics relating to aquatic organisms, their environment, and the application of traditional veterinary disciplines to aquatic animals. To deal with this breadth of subject matter, faculty members are enlisted from a

variety of backgrounds and fields of interest, and a broad range of learning situations is used. In addition to lectures, laboratories, student seminars, and discussions, there are field trips, practicums, and films.

The following partial list of lecture and discussion topics during a recent *AQUAVET I* session illustrates the scope of the course:

Aquarium Management and Life-support Systems
Ecology, Natural History, Anatomy of Marine Invertebrates
Ecology, Natural History, Anatomy of Marine Vertebrates
Biology and Medicine of Reptiles
Physiology, Histology, Hematology, Endocrinology, and Immunology of Fin Fish
Toxicopathology of Marine Organisms
Fresh and Salt Water Aquaculture Systems
Economics of Aquaculture
Tropical Fish Culture
Fisheries Management
Bacterial, Viral, and Parasitic Diseases of Cultured Fish
Non-infectious Diseases of Cultured Species
Diseases of Cultured Shellfish
Marine Mammals in Health and Disease



Field trips have included tours of the Woods Hole scientific community and facilities; the intertidal environment; the New England Aquarium; the New Bedford fishing fleet and processing plants; ecologically sensitive marine habitats and visits to local aquaculture enterprises.

Student seminar topics, which are approved in advance by the directors, may be on any relevant subject not specifically addressed by the faculty during the *AQUAVET* lectures. A few of the dozens of topics that have been presented during the course include Ciguatera toxicity, the diving reflex in marine mammals, venomous fish, fresh and salt water prawn culture, and marine invertebrates as models of mammalian disease.

Advanced Courses

AQUAVET II is a natural extension of the basic course. While similar in organization, the focus of *AQUAVET* II is narrower, allowing a more detailed

look at specific areas of aquatic animal medicine for students and veterinarians interested in continuing in the field. In the past, a four-week course covering health management in confined populations of invertebrates and fish has been offered. More recently, *AQUAVET* II has been presented as a two-week course on the pathology and histopathology of selected aquatic invertebrate and vertebrate species of importance as biomedical research models. *AQUAVET* II courses are expected to continue evolving in response to the need for focused educational opportunities in aquatic animal medicine. The subject matter to be covered in these courses will be announced each year, and may include such topics as mariculture, histopathology of marine and fresh water fish, tumor biology of aquatic animals, and husbandry and diseases of ornamental fish. Completion of the *AQUAVET* I course, or adequate equivalent preparatory work is a prerequisite for admission to any *AQUAVET* II course. In





addition, it is generally assumed that applicants will have completed the basic science courses in the veterinary curriculum or have graduated prior to attending.

Summer Research

AQUAVET makes available, on a competitive basis, a limited number of Fellowships to pursue research projects for eight weeks during the summer. Successful completion of the basic *AQUAVET* course (or equivalent preparation) is a prerequisite to participation in the research phase. Specific research projects are identified and established during the four-week course, and in general, the work is conducted in laboratories at collaborating institutions. All research is under the direct supervision of a cooperating investigator at the institution where the project is carried out. Frequently, scientific publications result from these research experiences.

Students wishing to be considered

for an *AQUAVET* Research Fellowship should submit the appropriate application form to the directors.

Faculty

Students will have an extraordinary opportunity to meet with the faculty informally as well as in the classroom environment during the *AQUAVET* courses. In addition to the directors of *AQUAVET* who are in residence at Woods Hole throughout the four weeks, dozens of experts from veterinary colleges, other collaborating institutions, and many additional establishments in fields relevant to aquatic animal health form the teaching staff each year. These individuals represent a broad spectrum of disciplines and bring varied interests and experiences to the courses. The faculty has included individuals from the following:

School of Veterinary Medicine,
University of Pennsylvania
College of Veterinary Medicine,
Cornell University

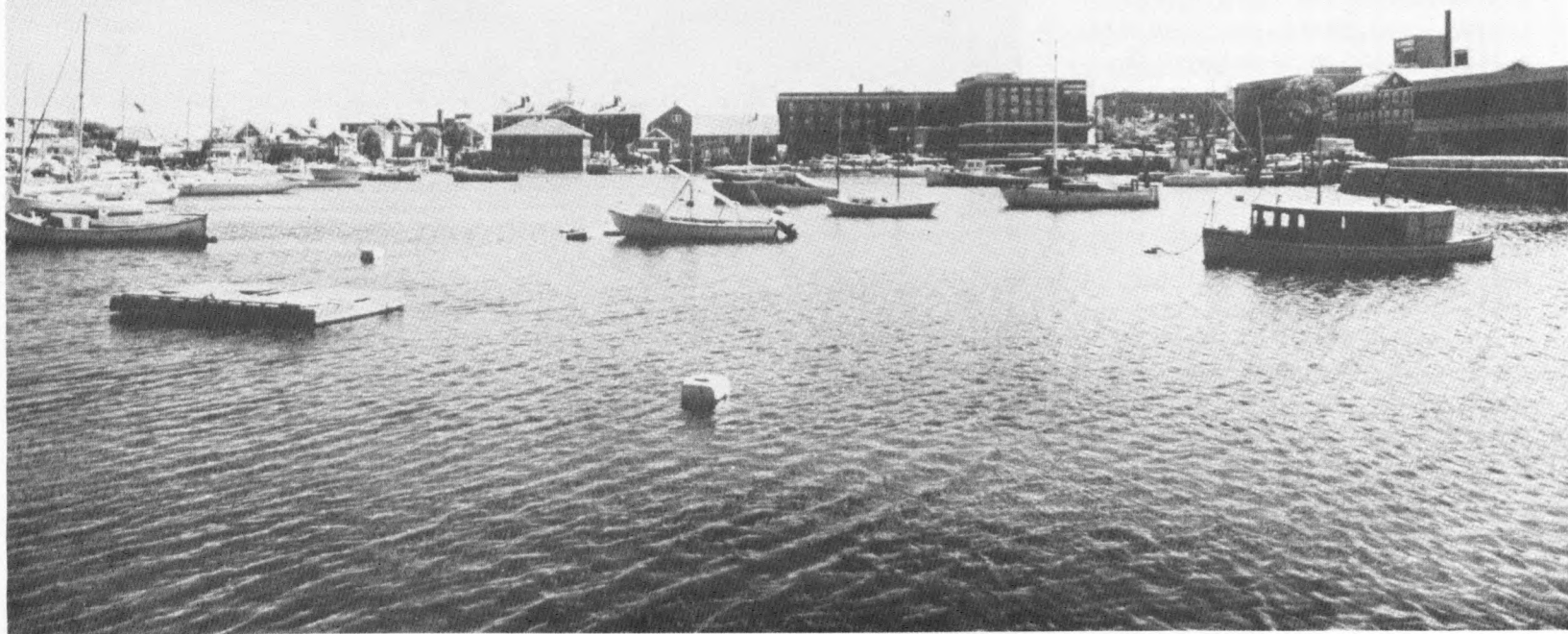
Marine Biological Laboratory
Northeast Fisheries Science Center
National Marine Fisheries Services/NOAA
Woods Hole Oceanographic Institution
College of Veterinary Medicine,
University of Florida
College of Veterinary Medicine,
Mississippi State University
School of Veterinary Medicine,
North Carolina State University
Boston University Marine Program
Drew university
Haskin Shellfish Research Laboratory,
Rutgers University
Massachusetts Institute of Technology
SUNY - Buffalo
University of Connecticut
University of Massachusetts - Amherst
University of Massachusetts - Dartmouth
New England Aquarium
Mystic Aquarium
Philadelphia Academy of Natural Sciences
Sandwich State Fish Hatchery
Experimental Pathology Laboratory, Inc.
Marinetics, Inc.
National Fish Health Research
Laboratory, BRS/USGS

U.S. Environmental Protection Agency
U.S. Food and Drug Administration - CVM

Credit

Students from the veterinary colleges at Cornell and the University of Pennsylvania receive academic credit for successful completion of any *AQUAVET* course or research phase. Other institutions may, at their own discretion, grant credit to participating students. *AQUAVET* students already in possession of the veterinary degree are issued continuing education credits upon successful completion of the course.

Those students requiring a formal grade in order to receive academic credit from their home institution should make this fact known to the directors before the start of the course. Grades will be based on class, field trip, and laboratory participation and on the student's seminar presentation.



Locale and Facilities

Woods Hole, a village in the town of Falmouth, on the southwest shore of Cape Cod, is a world center for marine sciences that attracts researchers, students, and other scholars from all parts of the nation and many other countries to work and study at seven of the institutions there. Five of these are private - the Marine Biological Laboratory (MBL), the Woods Hole Oceanographic Institution (WHOI), the Boston University Marine Program (BUMP), the Woods Hole Research Center, and the Sea Education Association (SEA) - while the other two, the Northeast Fisheries Science Center of the National Marine Fisheries Services (NMFS/NOAA) and a branch of the United States Geological Survey, are federally funded.

Some thirty buildings, clustered primarily on a small neck of land between Great Harbor and Eel Pond, and more than a dozen research vessels constitute the facilities, many of which are shared by the several institutions.

The MBL/WHOI Library, one of the most extensive of its kind in the world, is jointly supported and serves the entire scientific community; research vessels owned by one agency may be leased by others; representatives of one institution may join another group's research cruise; and the computer system and electron microscopes of the MBL and WHOI are made available to various groups of scientific investigators. Activities are also shared, creating a mutually stimulating and enriching environment for all participants.

The campus of the Marine Biological Laboratory serves as headquarters for *AQUAVET* in Woods Hole. In general, lectures and laboratory sessions are held within the facilities of the MBL, but the scientific and educational resources of the entire Woods Hole community are drawn upon to provide optimal learning experiences. Particular benefit accrues from the presence of the recently constructed Marine Resources

Center. This state-of-the-art structure provides exceptional aquatic laboratory animal holding facilities and the mariculture research activities of the MBL. A wealth of teaching material for the courses, in addition to student research opportunities, is derived from this facility.

Students and faculty live and take their meals at the MBL's Swope Center, a modern complex comprising bedrooms, an excellent cafeteria, spacious lobbies, a large lounge, and other special facilities for exhibits and conferences. All bedrooms in the Swope Center accommodate 2 students and include private bath and shower facilities. Linens are provided. Pets are absolutely forbidden anywhere in Swope Center - a rule that is strictly enforced. Parking space throughout Woods Hole is scarce at all times, and the situation becomes even more critical after the first of June. In general, students will find cars more of a nuisance than a convenience.





Equipment and Supplies

In addition to the usual classroom supplies, such as notebooks, students in *AQUAVET* must provide their own basic dissecting and postmortem instruments and regular laboratory coats. Those who are selected as *AQUAVET* Summer Research Fellows should discuss in advance the availability of any specialized equipment that will be needed. Students who wish to save specimens encountered during the course must bring their own containers.

Clothing should be comfortable and serviceable, capable of meeting the demands of diverse weather conditions and the varied terrain encountered on field trips. Soft-soled shoes are a must. Late May and even early June in Woods Hole can be quite cold and frequently wet, necessitating practical rain wear such as foul-weather gear and waterproof boots (essential for some field trips, as well), plus warm sweaters, jackets, et cetera. Days can also be hot, particularly toward the middle of June, and the sun can be punishing, so dark glasses and head coverings may be desirable.



Cost

Tuition and other costs attendant on participation in the *AQUAVET* courses are determined on an annual basis and reflect current operating expenses. Every effort is made to keep tuition and fees as low as possible. Stipends allotted to those persons who are selected for the summer research program are also determined annually according to available funds.

Travel costs to and from Woods Hole, cost of Sunday meals (which are not served at Swope), and miscellaneous expenses must, in any case, be borne by the students.



Admission

Admission to the *AQUAVET* I and II courses, and to the research program, is competitive and based primarily on a review of application materials submitted. Decisions are made by a committee from the sponsoring institutions, in consultation with faculty from each applicant's school. The decisions represent the committee's assessments of each applicant's ability to make use of the opportunity, as indicated by academic performance, previous experience in related fields, purpose and goals, and general qualifications. The potential contribution of the student to the future development of the field of aquatic veterinary medicine will be among the factors considered by the admission committee.

Cornell University and the University of Pennsylvania are equal opportunity, affirmative action educators and admit students of any race, color, sex, religion, and national and ethnic origin, and students who may be handicapped or disabled.



Application and Further Information

A person wishing to apply for admission to the AQUAVET I or II courses, or the research program, must submit transcripts of all college-level work and a completed application form. Statements on that form should contain all relevant information but should be kept as succinct as possible. The deadline for receipt of applications is indicated on the form, as is the approximate date on which applicants will be notified of the committee's decision. Requests for application forms may be made in writing, by fax, or by Email to the director. Completed application forms and transcripts must be submitted to the Office of the Director as original documents, not as facsimile or Email versions. Course announcements and application materials are automatically sent to each North American College or School of Veterinary Medicine in late October on an annual basis to facilitate access by veterinary students. Course information is also available on the World Wide Web

at: <http://web.vet.cornell.edu/public/aquavet>
Further information about any aspect of AQUAVET may be obtained by contacting:

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