Just Bone Tired
Equine Bone Stress

When we think of fatigue our thoughts usually turn to a decreased functional ability of such tissues as muscle, or the central nervous system as the result of prolonged exertion. Rarely do we relate the term to bone, except perhaps in a subjective sense, when we refer to ourselves as being “just bone tired.” In fact, this very hard tissue does become fatigued after prolonged or unusual stress, and may then develop fatigue fractures. For example, in man, there is a condition known as “March fracture” that occurs in military trainees after periods of forced marching, and is the result of bone fatigue. This situation is somewhat akin to the cracks that form in the materials of airplane wings due to constant movement, or in the steel of buildings following earthquakes.

Anyone who has viewed fast-action films of horses at a full gallop must be impressed with the marked distortion that occurs in the lower leg at the time the foot strikes the ground. During this time, leg bones undergo deformation, and this phenomenon is known as a cycle. Thus, in a horse, moving at full gallop, many cycles occur in the leg bones. If certain limits are exceeded in terms of the number of cycles, or the degree of strain, the bone becomes fatigued, and a fracture may occur. Fatigue fractures in horses usually take one of two forms: “buck shins” or saucer fractures.

A study of fatigue fractures of the third metacarpal bone in horses is one aspect of the research being conducted by Dr. David Nunnamaker and associates at New Bolton Center. Aside from the basic information about bone that will be forthcoming from this study, it has great practical importance to those engaged in training and racing horses. It is estimated that seventy percent of thoroughbred horses develop fatigue fractures, usually early in their careers. Horses under two years old are prone to “buck shins,” while older animals usually exhibit saucer fractures. These two conditions are estimated to result in the loss of 400,000 racing days annually, at the staggering cost of ten million dollars to the racing industry. And so, one goal of Dr. Nunnamaker’s work is to find ways of diminishing the fatigue fracture problem.

(continued on page 4)
On Not Seeing the Forest

Many of us share the common trait of taking the good things in life for granted. This tendency is reflected in the way in which we react to many great advances in medical science. For example, we now treat the most serious bacterial infections with antibiotics or sulphonamides and expect recovery, yet less than a half-century ago such infections were fatal. Not many years have passed since polio in youngsters and distemper in dogs were dreaded diseases, but today both are under good control. It is part of human nature to simply not "see the forest for the trees," and to accept great advances as our just due without any sense of appreciation for the years of dedicated work that made them possible.

Similarly, we who comprise the School of Veterinary Medicine community often appear to take for granted that we are one of the world's greatest veterinary schools. This attitude may result from a preoccupation with our own sphere of work to the extent that we do lose sight of the forest. Or, it may come from a lack of appreciation for how we achieved this prestigious position. In any event, a brief trip back into recent history may serve to establish a more realistic perspective.

As late as 1953, there was serious question as to whether this school could, or should, survive. The new dean, Dr. Mark W. Allam, asked a small group of faculty to meet one evening at his home. The dean posed a bottom-line question: "Should we recommend to the trustees of the University that this school be phased-out?" There were a number of reasons for asking this shocking question. The physical plant was antiquated and in disrepair; operating funds were at poverty level and research funds were practically non-existant; the faculty was small, undeveloped, and in-bred; our standing within the University was that of a "poor cousin"; and we had no base of support among agricultural groups, breeding associations, kennel clubs, or the state government. It is not much of an exaggeration to say that, at that time, we could have put all of our friends in a telephone booth!

After some discussion it was decided that rather than recommending a phasing-out process, we should vigorously attack our deficiencies, and develop a plan that would launch the school towards academic excellence. Considering the magnitude of the problems, that was a brave, and perhaps, unrealistic decision. However, under the energetic and imaginative leadership of Dean Allam, and his successor, Dean Robert Marshak, with the help of many individuals and groups, the next three decades became the golden years for the School of Veterinary Medicine. We literally rose from the ashes, and today, we have achieved a level of academic excellence.

Now we have a choice as to how to treat our reputation. We can rest on our laurels, or emulate the many who brought us to this prestigious position and meet the present and future challenges. If we are to maintain our place and prepare for the future it is important for us to develop new facilities and continue to strengthen our faculty. This means creating a Basic Science and Library building in Philadelphia, and an isolation unit, intensive care facility, and biomechanics laboratory at New Bolton Center. As important as these will be, such facilities will have little meaning unless we provide for new professorships and endowed chairs in several disciplines.

A major undertaking? Yes. And its success will depend, in part, on demonstrating an attitude of pride and appreciation for what we have today, combined with a resolve to continue the work started almost thirty years ago. There are many, many ways to show displeasure, but few avenues for making known our positive feelings, on an individual basis. Since this is rarely practiced on a one-to-one basis, perhaps we need to set aside one or more days each academic year to express our good feelings in a more formal fashion. Appreciation Days? We could do worse, and the forest would not be quite so obscure.

Dr. John Martin, VMD
About Bovine Leukemia...

In September 1981 Dr. J. F. Ferrer and his associates reported in the journal, Science, that infectious bovine leukemia virus (BLV) is frequently present in cow's milk. This finding generated immediately the question of whether the presence of BLV in milk poses a public health hazard. Dr. Ferrer has never stated or implied that BLV infects human beings and, in fact, in the report in Science he states that the available evidence fails to show that BLV infects humans or contributes to the causation of human leukemia. Dr. Ferrer does caution that studies to date do not entirely rule out the possibility of human infection and that a definite answer to this question must await the development of a molecular probe which is fully representative of the BLV genome. Such a probe is necessary in order to thoroughly explore the possibility that segments of BLV genetic material are present in the cells of human leukemia patients or of people exposed to BLV.

Dr. Ferrer states that while pasteurization apparently inactivates BLV particles, we do not know whether the genetic material of the virus, which is incorporated into infected milk cells, is inactivated at pasteurization temperatures.

Dr. Ferrer and his colleagues have never recommended that people stop or curb their consumption of milk. While man has probably been drinking milk from BLV-infected cows for a very long time, human leukemia is a relatively rare disease. It is also important to take into account the enormous nutritional value derived from drinking milk and this appears to outweigh the very small possible risk. However, Dr. Ferrer does believe that infants should not be fed raw milk from BLV-infected cows and suggests that people who may wish to drink raw milk can have tests done to make sure that their cows are uninfected.

Beyond the public health question, BLV infection (at least 20% of the American dairy cattle population is infected) is perhaps the greatest single threat to the large American cattle export business. Many countries do not allow the importation of BLV-infected cattle or of semen from infected bulls. Indeed, some countries even forbid importation of cattle testing negative for BLV, but which originate from herds where any level of infection is present. West Germany, a country with an official BLV eradication program, is already displacing the United States in the cattle export business.

These facts indicate that there is urgent need for an intensive research effort to settle, once and for all, the issue of whether or not BLV poses a potential threat to human health and to move ahead on the development of a full-scale eradication program, including the development of an effective vaccine against BLV infection. That development of such a vaccine is feasible has already been demonstrated by Dr. Ferrer in recent experiments at New Bolton Center.

Dr. Ferrer and his group are continuing their research in order to obtain more information on many important aspects of bovine leukemia, including modes of transmission, methods of control and development of a vaccine. Bellwether will update this work as new data becomes available.
This research has three major phases: to quantitate, in vivo, the degree (amplitude) of strain that develops on the surface of the third metacarpal bone during different gaits on turf and hard surfaces; to study, in vitro, the number of cycles that can be expected to result in fractures when staves of bone are exposed to varying strain levels; and to study the histology of normal and abnormal bone obtained from horses of different age groups who have undergone varying degrees of training and racing.

For the in vivo studies on running horses, an instrument known as a strain gauge is attached to the front leg of a horse and the strain data recorded by this is transmitted, through telemetry, to an oscilloscope equipped with a computer to analyze and store information. This part of the study addresses one factor responsible for fatigue fractures—the amount of strain placed on the third metacarpal bone.

Since fatigue fractures are related to not only total strain range, but also to the number of cycles, the in vitro phase of work will examine the latter factor. Staves of bone (obtained from autopsy material) are placed in a fatigue machine. One end of the bone stave is fixed while the free portion undergoes constant bending (cycles). The amount of bending will be within the strain ranges that were measured in the intact animal. The object is to determine the number of cycles that result in fatigue failure.

Histological work will be done on specimens of the third metacarpal bone obtained from horses destroyed as the result of catastrophic injuries. This will include microscopic examination of normal and abnormal bone (including stress fractures) obtained from several categories of horses: animals one or two years old that were trained but were never raced; two-year-olds that have been raced; and horses in each ascending age group up to five years of age. This aspect of the research will provide much-needed information about the relationship of age, training, and racing to the structure of bone.

Dr. Nunnamaker believes that this research will allow us to make reasonably accurate predictions concerning the best methods of training for young horses with developing bones. Proper assessment of the number of cycles leading to failure, using racing strain amplitudes, might allow a trainer to condition a horse at strain levels that are acceptable, and then race the animal at higher strain amplitudes but restrict the number of cycles to a safe range while the bone is maturing and remodeling. In this way the animal may pass through the era of risk without valuable time being lost in a prolonged treatment program which may restrict training and racing. Comparisons of standardbreds and thoroughbreds indicate that methods of training play some role in the development of fatigue fractures. Standardbreds, even though they train for much longer distances (and thus have many bone cycles), have a much lower incidence of this type of fracture than thoroughbreds. Presumably, this is related to the lower degree of strain on Standardbreds' bones.

Dr. Nunnamaker conducts his research in the C. Mahlon Kline Center for Orthopedic Research and Rehabilitation at New Bolton Center. This facility was conceived by the late Dr. Jacques Jenny, a pioneer in orthopedic research in animals. It was Dr. Jenny who first developed the use of internal fixation for the treatment of fractures in horses. This approach is credited with saving the lives of many horses that would have been destroyed otherwise. In earlier efforts, Dr. Jenny used...
the available human hardware with a great deal of success. Dr. Nunnamaker points out that his present work is a continuation of Dr. Jenny’s, which developed the basic techniques for fixation in the horse. The present research is directed at the development of improved hardware for the horse and a study of how to use this to the best advantage. To do this, the laboratory is equipped with machinery to manufacture the equipment. To investigate the suitability of various materials in treating fractures in the living animal would be very time-consuming, due to the limited availability of usable clinical material. To obviate this problem, Dr. Nunnamaker uses bone specimens obtained at autopsy. Bones are cut to simulate fractures. Fixation materials are applied, and the specimen is then subjected to various numbers of cycles and degrees of stress. The instrument used for this procedure is an Instron, and operates under carefully controlled hydraulic pressure. The Instron is able to accept whole legs, and can deliver up to 1,000 cycles per second. With this approach, Dr. Nunnamaker is able to test the durability of various materials and to determine optimum locations for fixation devices.

Another promising area of research is the use of pressure for the diagnosis and treatment of lameness in horses. These shoes transmit, via radio, weight-bearing data to a recorder so the investigator can determine the areas of the foot that are bearing greater and lesser amounts of weight. Dr. Nunnamaker is quick to caution that, while this technique offers some fascinating possibilities, there is much to be done in perfecting materials and techniques.

Dr. Nunnamaker’s work is an outstanding example of comparative research, an area in which the School of Veterinary Medicine is a recognized world leader. In fact, the accumulation of rooms in which the work is done is known as the Comparative Orthopedic Biomechanical Laboratory. The research is conducted in cooperation with a number of other facilities, including the Department of Orthopedics of the School of Medicine of the University of Pennsylvania, the Veterans Administration, and Harvard University. The present location of the laboratory, within the Kline Center, leaves much to be desired. For example, the computer and testing machinery are located in the same room, without adequate sound-deadening capabilities. Plans have been developed for a separate biomechanical laboratory, attached to the Kline Center, with a suitable functional arrangement of rooms, which will allow this important area of research to be developed to its fullest potential.

Dr. Nunnamaker occupies the prestigious Jacques Jenny Chair of Orthopedic Surgery. In addition to the publication of many papers, he is co-author (with Dr. G. E. Fackelman) of Manual of Internal Fixation in the Horse. At present, Dr. Nunnamaker is involved with his colleague, Dr. Charles D. Newton, Associate Professor of Orthopedic Surgery, in preparing a text for a new book on canine orthopedics.

**Philly Polars Make Public Debut**

This winter, as most Philadelphians fasten coats and turn collars up against the chill, two of the city’s newer residents are naturally prepared to enjoy the bitter winds and tiny temperatures of the season.

Adamant opponents of the cold, in fact, might find positive inspiration for winter from a visit to the Philadelphia Zoo, where these two yearling polar bears are happily adapting to the season that most closely resembles their natural habitat.

The creative white bears, both females, were donated to the Zoo by the Icasy Klondike Company, makers of Klondike Ice Cream Bars. At their public debut on October 25, one bear was named Klondike, in honor of her donor. The other will be named this month by the winner of a naming contest co-sponsored by the Zoo and the Philadelphia Daily News.

Both bears relocated to Philadelphia from New York homes: one arrived from the Bronx Zoo in New York City, the other from the Seneca Park Zoo in Rochester. But, like every polar bear, or ursus maritimus, the Philadelphia Zoo bears are descendents of Arctic bears of circumpolar regions.

According to Dr. Dietrich Schaal, Mammals Curator at the Zoo, the physical characteristics of polar bears allow for their survival in moderate temperatures, but they are best suited for chillier conditions. Thick layers of fat and a dense coat provide polar bears with excellent protection against cold. In addition, fur pads on the bears’ feet serve a dual purpose: they act as insulation and provide solid footing in icy environments.

Since their arrival in Philadelphia, the two-year-old bears have grown to weigh about 250 pounds each. Each consumes an unusual mixture of three pounds mackerel, one-half pound suet, two pounds suprema (a commercial meat preparation), two pounds dog food, two pounds carrots and apples, and four ounces peanut and vitamin A-D oil. Their meal, except for the mackerel, is mixed together and served up once daily, in the afternoon.

Klondike and her friend are residents of a special section of Bear Country, a support facility which opened in November 1977. All Bear Country inhabitants enjoy indoor shelters, a cubbing and denning area, access ramps to upper enclosures, filter and pumping areas, a food preparation area, and television equipment and controls.

The polar bears’ residence also includes a specially constructed, 300,000-gallon capacity fresh-water pool, and is surrounded by rock formations reconstructed of grinite, a concrete mixture sprayed under high pressure onto mesh forms reinforced with steel rods.

Like all polar bears, Schaal cautioned, the two bears at the Philadelphia Zoo “look cuddly, but they’re not.” Actually, he warns, “they’re predictably dangerous.” As a result, the young bears are handled and fed by remote control. The doors to their habitat are opened and closed by outside pulleys, and they are fed indoors. “The indoor feeding,” Schaal explains, “is used as a control mechanism for the bears.”

Although the pair at the Zoo may have mean dispositions, their personalities are masked by their beautiful, furry white appearance and playful behavior. Since their October arrival, Klondike and her friend have become one of the more popular attractions at the Zoo. And, as the temperature continues to drop, their natural affinity for the cold will insure that the playful Philly polars will grow increasingly comfortable in their new environment.

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**ANIMAL PROFILE**

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**Apologia**

In the last issue of *Bellwether*, we inadvertently omitted crediting the Philadelphia Zoo for the biographical information and photo for the story: “Massa—The Big Boss.”

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**Photo courtesy of New York Zoological Society.**
Dr. James Buchanan
The Participant’s
Participant

Dr. Buchanan traveled extensively in Europe and in the United States, examining veterinary hospitals to be abreast of the latest in technical advances. Being midwife to a $16.5 million project required a great measure of patience and a highly developed sense of listening to the anticipated needs of those who would work in the hospital. As Dr. Buchanan put it, “They all had input into the construction of this building, and the limits of structure and budget had to be reviewed with each one.”

As Professor of Medicine in the Department of Clinical Studies, Dr. Buchanan is an impromptu researcher. This can be seen from the time he has spent debating the merits of sigmoidoscopy for routine screening for colon cancer, to the time he attended a meeting of the National Heart, Lung, and Blood Institute, in which he was in the minority of perhaps 10 attendees. Buchanan responded by writing a paper and submitting it to the journal, Clinical Research, in which he outlined the pros and cons of sigmoidoscopy.

Mr. Barry Haines
Of Buildings and Sheep

It would not be at all surprising to encounter Barry Haines rushing about New Bolton Center with a pipe wrench in one hand and a sheep crook in the other. Barry’s primary job at the center is maintenance of the physical plant, but his heart is with the woolly creatures. The mention of sheep ignites an immediate gleam in his eyes.

As building administrator for New Bolton Center, Barry is responsible for the maintenance of seventy structures ranging from the historical Allam House to the newly-dedicated George D. Widener Hospital for Large Animals. This involves all routine maintenance, including operating efficiency and the eternal homeowner plagues such as leaky faucets and clogged drains. His expertise in this type of work comes naturally.

The senior Mr. Haines, Barry’s father, was a builder for forty years. We imagine that it was from him that Barry acquired his appreciation for working with well-built structures, and especially farm buildings. Barry has what he terms “a five-year program” for New Bolton Center, designed to bring all buildings up to a simple maintenance level, which will require considerable repair to some structures. With the cost of construction material caught in the inflationary spiral, estimates for this work total close to $800,000. At this time $650,000 has been received from the University. Thus far two barns have been renovated as part of the program to improve patient care. This included converting wooden stall sections to cinder block and covering them with an epoxy paint for easy maintenance and disease control. The asphalt floors have been replaced with cement and a new drain system has been installed. These barns are over fifteen years old and, like other buildings of this vintage, have arrived at a point where some major improvements are needed. This includes the pole barns used in the leukemia research program which are now undergoing repair. While supervising these major projects, Barry’s phone seems to ring continuously with requests for immediate service on minor problems involving plumbing, faulty electrical sockets, or bulky air conditioners. Mr. Haines
Helen Linwood
Keeping Track of History

Would you like to know how many students graduated in 1902, or how many matriculated ten years later? You may think that a lot of searching would be involved to get this information. Wrong. Just ask Helen Linwood and she'll provide the answers in less than a minute.

Helen Linwood, known to many alumni as Helen Jarrett, is the Assistant for Admissions and Academic Affairs at the School of Veterinary Medicine, and she keeps these and other vital statistics at her fingertips.

Helen first came to work at the school in 1949, to succeed Miss Edna Wesley Tuteur, who had been chief clerk for over forty years, she was senior clerk. Miss Tuteur stayed about a year to guide Helen into the complex duties of the chief clerk. Back then, the office was in the old quadrangle building near the arch and the chief clerk's desk stood in the bay window so a sharp eye could be kept on everyone and everything.

The school was not as large as it is today, the office not only handled admissions, but also prepared the budget, maintained personnel records, and hired the clerical staff. As the school grew and the student body and the faculty expanded, Helen's duties changed; her office no longer prepares the budget or handles personnel records. Admissions work has grown so that it now occupies much of Helen's time.

The school has placed an important part in the personal life for it was here that she met her husband, Norman. While she was working at the front desk. At that time, he was a detective lieutenant with the Philadelphia Police Department, on leave of absence to do investigative work at the University.

Helen and Norman live in Norristown, and until last June operated an antique shop in their spare time. "We loved it, but we did not have the time to go to the auctions and sales to scout for new pieces," she said. "It has become very hard to find quality pieces. You have to spend many hours at auctions and may come away with only one item."

Antiques are still an important part of their lives, although in a different form. Norm has a great collection of newspapers, dating back to colonial times and spanning the history and development of this country. "One of the papers we have has a story in which Mrs. O'Learc claims that it was not her cow which started the Chicago fire by kicking over the kerosene lamp," Helen chuckled. "I start reading the stories and history comes alive, it's so interesting."

Modern technology, however, has made Helen's work easier. "I remember when we had to fill out the Matriculation Book, and Volume II of the Graduate Book is a 152-page volume, begun in 1987 when the chief clerk entered the names of the first graduating class. "It's the history of the school in a nutshell," Helen proudly stated as she pointed out the old-fashioned penmanship of one of her predecessors. The class of 1982 will begin Volume II and Helen had to search for a suitable book.

Helen loves her work and has a special affection for the University because of her undergraduate days here. "I had so much fun when I went to school on this campus," she reminisced. After receiving a B.S. Science degree from the School of Education, she taught for a few years, and during summer vacations, worked in the Zoology department. When Helen learned of the job opening for assistant to the educational services committee. Imagine the organization and attention to detail required to keep track of the more than 700 files assembled by Helen from November to May each year. Once that process is completed, Helen still continues to work since she is often called upon to arrange counseling meetings for rejected applicants to explore late admittance possibilities.

On top of all of that, Helen keeps two very special historical records. The Matriculation Book, a thick, old-fashioned journal reminiscent of another era, and the Graduate Book. When classes were smaller, each student would come to the office to sign the Matriculation Book. "Obviously," Helen explains, "with a class of 109 the line would be too long, and this tradition is no longer followed." Instead, Helen enters the name of each student. The
Oceans, inhabited by a multitude of animals, cover three-fourths of the earth, yet little is known about the habit, life cycles, and diseases of ocean dwellers.

Until recently, marine animal study was left to the care of biologists and aquaculturists. This has changed as it has been recognized that, through the application of traditional skills and knowledge, veterinarians can contribute much to the care and study of marine animals. Veterinary medicine took to the water at Woods Hole, Mass., in 1976, when marine biologists, aquaculturists, and veterinarians met to formulate a program for Aquatic Veterinary Medicine which relied on a number of disciplines to study and maintain the well-being of marine animals and their environment. The program was named AquaVet.

The School of Veterinary Medicine at the University of Pennsylvania, together with the New York College of Veterinary Medicine at Cornell University, provided impetus and sponsorship for AquaVet, furnishing matching grants to the initial funding received from the New York Sea Grant Institute. From its inception, the program has been under the leadership of Dr. Donald A. Abt, Director, and Dr. Charles G. Rickard, Associate Director. Dr. Abt is Associate Dean and Professor of Epidemiology and Biostatistics at the School of Veterinary Medicine, University of Pennsylvania. Dr. Rickard is Associate Dean and Professor of Pathology at the New York State College of Veterinary Medicine. To make the program a reality, the cooperation of other institutions was needed. The Marine Biology Laboratory, the Wood Hole Oceanographic Institution, and the Northwest Fishery of the National Marine Fishery Service opened their facilities on Cape Cod and helped to make the program a success.

Participants in the four-week course, selected annually on a competitive basis, now number thirty-two per year. Admissions committees at Penn and Cornell select eight students each from the two schools. The other sixteen places are filled by Drs. Abt and Rickard from applications received from other schools and graduate veterinarians. Participants have come from twenty other schools representing almost as many states. Graduate veterinarians, participating in the program, are eligible for continuing education credits.

In May 1977 the first sixteen students arrived at Woods Hole to participate in AquaVet. Since then, students, veterinarians, and other professionals, 145 in all, have completed the course Introduction to Aquatic Veterinary Medicine. It is a demanding course of study, which explores all aspects of marine life. Lecture topics range from ecology to anatomy, to the study of disease conditions and their prevention and treatment. Classes, field trips, seminars, and laboratory sessions are held six days a week, beginning at 8 a.m.

Discussions often continue into the night at the Swope Center of Marine Biology Laboratory, where students and faculty live. This environment allows interaction between program participants and resident and visiting scientists.

AquaVet is interdisciplinary and it takes about fifty researchers and teachers to cover the vast subject. These experts come from the nation's leading universities, research facilities, and industry. "We give a smorgasbord to those who are interested in bio-medicine," Dr. Abt said, "we let them taste what's available. AquaVet is a frontier in veterinary medicine. The biologist has studied what's there, biomedicine goes to see what's there and how best to interact so as to prevent and eliminate disease."

The course begins with the study of salt marsh ecologies, inter-tidal zones, and offshore areas. Students apply the techniques of comparative anatomy and physiology to compare and contrast aquatic animals with those species commonly encountered by veterinarians. They explore the relationship between the marine animal and its habitat and learn how this environment may influence the interaction between disease-producing agents and the animal.

They are encouraged to apply the veterinary viewpoint to problems encountered in the rearing of water-dwelling animals in aquaculture systems. Drawing on their knowledge of epidemiology, parasitology, genetics, nutrition, toxicology, and other fields, students seek solutions to the problems which afflict marine animals and their habitat. Diseases are studied, and compared with those found in land animals. The animals examined vary greatly. They may be starfish or marine mammals, snails, mussels, or birds. Their interaction and role in the food chain and ecosystem are investigated and often used as models for more detailed disease study.

Following the introductory course, a limited number of students are selected to pursue an additional eight-week period of research designed to provide an in-depth look at a particular topic. These students continue to work at Woods Hole or begin to study at a cooperating institution in another part of the country.

The concept of AquaVet is important with respect to future food supply. Fish are a vital resource, yet they have been harvested without much thought to replenishing or protecting the supply. Man has altered the environment of the once fertile coastal fishing grounds by carelessly dumping industrial wastes into the waters of rivers, lakes, and oceans. Many species have been pursued with relentless greed. Pollution has wiped out marine animal populations or has fostered an environment which can only support a small sickly population. AquaVet, through the application of veterinary medicine, may be able to help raise a healthy marine animal population. Already solutions have been found to combat some diseases of fish, raised in aquaculture conditions, with vaccines.

AquaVet is not only vital to the role of marine life as a food source, it also contributes to establishing marine animals as models for the study of body functions and disease control. Much that is known about the transmission of nerve impulses was learned through the study of the giant axon of the squid, begun in 1933. Yet, for all of the years that the squid has been studied, scientists have never found a way to raise it in a laboratory setting. Ideally, a researcher should have a colony of animals from a known strain, such as are available in laboratory mice and rats, but too little is known about marine animals' life cycles, breeding habits, and development phases to permit systematic reproduction of laboratory strains. An AquaVet student tackled the problem and attempted to raise very young squid in a laboratory setting. He found that the
young animals lacked the ability to detect the boundaries of the aquaria used in a laboratory setting, and continually bumped into the walls. This caused abrasions which became infected and caused the death of the young squid. The student was able to reduce the mortality rate somewhat by covering the walls of the aquaria with opaque material, but the problem is still not solved and much more research remains to be done. "We have to develop a body of knowledge, and this has to be constantly expanded," Dr. Abt explained, while telling the "squid story."

The work with marine animals has not only improved the understanding of such vital functions as neuro transmissions, it also has helped to provide insight into the mechanism of fertilization and cell development. Sea urchin research has contributed greatly to the basic knowledge of sperm-egg interaction and has proved relevant to cancer research and fertility regulation.

And the expansion of knowledge continues. Last year, at the year-around laboratory for the student of diseases of marine animals, established under Aquavet, five previously unidentified diseases of marine animals were discovered, a drop in the bucket compared to the work that needs to be done. Take for example, ciguatera poisoning, a disease more common in warmer climates, which is contracted from eating fish which are carrying the toxin. Although it does not affect the fish, it can have serious consequences for those who consume the fish. It is a great public health problem and science has yet to find a way of identifying the toxin carriers. A bit closer to Pennsylvania, another problem has been Red Tide, a parasitic disease which caused the closure of many Eastern oyster and clam beds. Ciguatera and Red Tide are just two examples of the mysteries which need to be unraveled as man looks to the oceans as a continuing food source. Aquavet will play a vital role in solving those and many other problems.

Many of Aquavet's participants have graduated. Some are pursuing further studies in the field, some are doing research, and others are using the skills and knowledge gained at Woods Hole in private practice. Dr. Abt tells of two graduates who have devoted their practice to exotic animals and he envisions an increasing demand for veterinarians interested in aquatic animals as food sources, laboratory animals, or as companion animals.

To supply this demand, plans are being made to introduce courses on marine animals in the regular curriculum of the School of Veterinary Medicine. This will broaden the base established by Aquavet, and perpetuate knowledge in a specialty of great importance, if marine animals are to continue their vital role in meeting the world's needs for quality food supplies.

The School of Veterinary Medicine, in collaboration with the School of Dental Medicine, have inaugurated a new program of Veterinary Dental Medicine. Courses in Comparative Oral Form and Function and Comparative Oral Pathology and Treatment are being offered to familiarize students with the hard and soft tissues of the head and neck and with dental functions in different mammalian species. The courses provide information on the pathology and treatment of oral problems in humans and animals. In addition, a veterinary dental clinic is open at the Veterinary Hospital of the University of Pennsylvania (VHUP), staffed by members of both faculties. Students will have the opportunity to observe and practice basic dental care on both companion and exotic animals. A large animal dental service is being planned at New Bolton Center for a spring 1982 opening. The third component of the program is interdisciplinary research in dental medicine with an emphasis on technology transfer, development of new animal models for human disease, and improved understanding and treatment methods for animal oral problems.

Information about the program may be obtained by contacting the Program Director, Dr. David Roberts, School of Dental Medicine, Clinical Research Center, 400 Spruce St., Philadelphia, PA 19104.

At a meeting of the Veterinary School's Board of Overseers on September 18, 1981, Dr. David E. Rogers, a new member of the Board, presented a striking wood sculpture to Dean Robert Marshak. Carved by Dr. Rogers from a solid block of buttonwood, it represents the relationship between man and his companion animals.

The sculpture, titled The Bond, may be seen in the reception area of the new Veterinary Hospital of the University of Pennsylvania.

Dr. Rogers is president of the Robert Wood Johnson Foundation and a former dean of the Medical School of Johns Hopkins University.
98 Down, 2 to Go!

This is a regularly appearing column, highlighting sequential events in our veterinary school’s ninety-eight-year history. It is provided for your continuing education, as we approach our centennial which occurs in 1984.

History has a tendency to highlight dramatic incidents or eloquent statements and it often overlooks the less spectacular facts involved in the culmination of a particular event. For example, the American cowboy is an important contributor to the development of the West. In literature, song, and motion pictures he is depicted as a romantic figure when in reality he led a rather dreary, harsh life. Lincoln’s Gettysburg Address was presented in such eloquent prose that we sometimes lose sight of the fact that it marked a very tragic period in this country’s history.

In a way, this type of situation is true of the origin of the School of Veterinary Medicine. Most writings about the school speak of the role played by Dr. Benjamin Rush, an eminent physician and a faculty member of the Medical Department of the University of Pennsylvania. In 1807, Dr. Rush, at the invitation of the Philadelphia Society for Promoting Agriculture, spoke to a class of medical students on “The Duty and Advantages of Studying the Diseases of Domestic Animals and the Remedies Proper to Remove Them.” Dr. Rush spoke of his desire to see “the veterinary science taught in our university,” and of the advantages of physicians becoming more knowledgeable about animal diseases. He elaborated, in moving terms, about man’s obligation to care for the animals that served him and about the need to develop a concept of “one medicine.” From a philosophical and medical standpoint his comments presented a strong case for the development of veterinary medicine in the young country, but they actually had little to do with the eventual establishment of a veterinary department at the University of Pennsylvania. This is not to diminish the importance of Rush’s remarks, but rather to place this piece of history in its proper perspective with regard to the creation of a veterinary school.

Dr. Rush’s oration took place in 1807. A period of seventy-seven years was to elapse before the trustees of the University saw fit to create the veterinary department and it is doubtful whether, in making this decision, they were influenced by Dr. Rush’s comments. In fact, the prime mover in bringing the trustees to a moment of decision was a farm manager named Horace Smith.

As befits the situation, Mr. Smith was an alumnus of the University and a Quaker by persuasion. After graduation, he developed what was apparently a good business dealing in the importation of china and glass. The Civil War provoked a business failure, and Mr. Smith enlisted in the Sanitary Commission, an organization that provided nursing service in field hospitals. The war experience drained his health and he turned to farming as a therapeutic measure. In the 1870s Mr. Smith was manager of a large horse farm in what is now West Philadelphia. His distress at the lack of competent veterinary service convinced him that the establishment of an educational system was needed for aspiring veterinarians. With this goal in mind, he began a voluminous correspondence with friends, politicians, physicians, and leaders in agricultural organizations. One of those with whom he actively corresponded was Dr. James Law, Professor of Veterinary Science in the Agricultural College at Cornell University, and later first dean of the veterinary school at that institution. Most of Mr. Smith’s correspondents were enthusiastic about the idea of establishing a veterinary school. Encouraged by this, Mr. Smith wrote to Dr. William Pepper, then Provost of the University, inquiring as to whether the trustees and medical faculty “would be likely to approve of having a chair of veterinary science established in connection with the University of Pennsylvania.” On the evening of November 30, 1877 the medical faculty responded favorably to this idea, and on January 1, 1878 the trustees resolved that it would be “desirable to establish a Professorship of Veterinary Medicine and Surgery whenever a suitable endowment can be procured for this purpose.” Mr. Smith’s efforts had been successful!

The problem, then, was money and Mr. Smith turned his attention to raising funds, including the initiation of a subscription campaign. In this he was not so successful, but in 1882, Mr. Joshua B. Lippincott, a member of the trustees and president of a large publishing firm, announced that he was contributing $10,000 “for the purpose of establishing a Veterinary Department under the control of the University of Pennsylvania.” Shortly after this, Mr. Joseph Gillingham, a trustee and owner of a large cattle farm, announced that he, too, would contribute $10,000 for this purpose.

With this money in hand the trustees approved construction of a building and began to search for a faculty. The original building stood on a triangular plot of ground bound by Pine Street (now Hamilton Walk), 36th Street, and Guardian Avenue (no longer in existence). This site is now occupied by the Medical Laboratories Building. It was opened to receive students on October 2, 1884 and was built at a cost of $16,900. (More about this in the next issue of Bellwether.)

Let us retain Dr. Benjamin Rush’s eloquent and imaginative statement as a part of our heritage, but let us also remember that it was the persistence of Mr. Horace Smith that finally ignited the spark that was needed to establish our school!
The Loyal Red and Blue

Aside from its role as the tie that binds the graduates of this school, the Veterinary Medical Alumni Society is playing an increasingly active role in the affairs of its Alma Mater. This comes through a mutual effort on the part of the society and the administration. A case in point is the participation of the president, Dr. Cleve Brown, in the recent Faculty Educational Retreat. In developing the format for the retreat, the administration recognized the importance of having input from alumni on matters of teaching and curriculum. As various recommendations proposed at the retreat are implemented, the alumni will be called upon to advise the faculty on the educational program.

Our alumni are scattered over the United States and it is very often difficult to arrange for school visits. So, the school has developed an outreach program by sponsoring hospitality suites at major professional meetings, where the dean and the president of the alumni society, or their designees, are present to talk with students and answer questions about current school affairs. The formal bond between our body of graduates and the Veterinary School is the Executive Board of the Alumni Society. This group meets, at the school, every two months to discuss alumni affairs and to act in an advisory capacity to the administration. The president of the society prepares an annual report which provides alumni with a digest of business transacted at meetings of the Executive Board. The Executive Board consists of Dr. A. Cleveland Brown (V '59), president; Dr. Nancy O. Brown (V '73), first vice president; Dr. Kenton S. Stokes (V '66), second vice president; and Dr. Josephine Deubler (V '38), secretary/historian. Dr. Stokes serves as representative to the General Alumni Board and is chairman of the Liaison Committee. This committee meets annually for a two-day session in which all major activities of the school are surveyed. A report of this meeting is presented on Alumni Day. Dr. Loy Awkerman (V '52), is past president, and serves as representative for Organized Classes. Other committee chairman are: Dr. Howard G. Lee (V '36), Alumni Annual Giving; Dr. Clifford F. Wright, Jr. (V '49), Benjamin Franklin Associates; Dr. Samuel F. Scheidly (V '29), Awards Committee; Dr. Bruce Schmucker (V '59), Continuing Education; Dr. Raymond W. Giuliani (V '59), Membership; and Dr. John E. Martin (V '42), Publications. The Student Representative is Mr. Randy Ross, president of Student Government.

In addition to providing the school with valuable counsel, members of the Alumni Society have been generous in their financial support. Alumni House, the dormitory-cafeteria complex at New Bolton Center, was constructed through alumni contributions. Each year, graduates respond to the Alumni Annual Giving Campaign in an enthusiastic fashion, and participate in other major channels of support, such as the Benjamin Franklin Associates, in growing steadily. Funds contributed through these programs are unrestricted, enabling the school to purchase equipment and to carry out programs that cannot be supported with restricted funds. Unrestricted funds are a vital part of the school's annual budget.

The administration is grateful to the many individuals who take time from their busy lives to serve the school, and to the Veterinary Medical Alumni Society collectively for its support. We need the benefit of your counsel, and hope that you will always feel free to pass on your suggestions as to how we may better meet our missions in education, research, and service.

If you have news to share or about alumni, you may do so through this column by sending the information—typed, double-spaced—to Elizabeth Cauth, Alumni Affairs, U of P School of Veterinary Medicine, 3906 Spruce Street, Philadelphia, PA 19104.

Animal Rescue League Gives Gift to VHUP

The Animal Rescue League of Philadelphia has given $11,900 to provide the Emergency Service of VHUP with an acute care cage and a defibrillator.

This will enable the Emergency Service to give immediate oxygen therapy, and provide proper temperature and humidity control—all important in the treatment of critically ill and injured animals. The defibrillator is used for cardiac arrest cases to "restart the heart."

The Emergency Service never closes and is equipped to provide life-saving procedures as soon as an animal is admitted. When the patient's condition is stabilized, it can be admitted to the Intensive Care Unit where twenty-four-hour monitoring of vital signs plus life-support systems maintain the patient.

Clark Pavilion Dedicated

On September 18, 1981, Dean Robert M. Marshak and the Board of Overseers dedicated the Elizabeth Dunn Clark Ambulatory Pavilion in the Veterinary Hospital of the University of Pennsylvania. A plaque in the pavilion records that it was provided through the generosity of Mrs. Clark and is in "recognition of her dedicated humane interest in all animals."

Meet the Board of Overseers

The following individuals comprise the Board of Overseers of the School of Veterinary Medicine.

Dr. Kenneth W. Allen
Mrs. David Banks
Dr. A. Cleveland Brown
Roger Caras
Christine Connelly
John D. Cope
H. Richard Dietrich
Keith Eckel
The Honorable Penrose Hallowell
Max C. Hemp
John D. Hoffman
Philip Hofmann
John Hoyt
Dr. E. J. Kersting
Mrs. Gerard B. Lambert
Walter Mannheimer
Henry S. McNeil, Jr.
J. Maxwell Moran
Vincent B. Murphy, Jr.
Richard W. Newpher
Charles Ord
Mrs. William D. Patterson
Mrs. Joan Ferguson Pew
Mrs. David Rockefeller
Dr. David E. Rogers
Dean Samuel H. Smith
W. B. Dixon Stroud
Robert Whitaker
Robert Williams
Charles E. Wissner, Jr.
Charles Wolf
There have been false negative results for various noninfective until they have been ingested by a mosquito. Generally, coughing is the first sign noticed. Infection is diagnosed before clinical signs appear. Often the emphasis has been on early diagnosis. Usually the only difference between a puppy described as “pet quality” and one considered a “show prospect” is the opinion of the person who has graded the litter. Unless there are malformations or disqualifying faults, the difference may never be noticed except by one familiar with the breed.

Most people with show dogs resent a reference to “your pet.” The males are dogs and the females are bitches. This is a question of semantics with some snobbery thrown in.

If you are considering a show career for your puppy, the American Kennel Club’s breed standard is your guide. In addition to faults which disqualify any breed (blind, deaf, lame, castrated, spayed, or not having two normally-located testicles), individual breeds may have disqualifications such as the wrong color, an over- or under-shot bite, too large or too small (as an adult over one year of age), etc. There’s always the chance that an extremely promising “show prospect” as a puppy may become just another dog after it matures. If you are looking for a member of the family, personality should be the first requirement, followed closely by adaptability.

Send your pet care questions to Josephine Deubler, Animal Crackers, U of P School of Veterinary Medicine, 3800 Spruce Street, Philadelphia, PA 19104.
Nostalgia

For many graduates between the years 1912 and 1954 the phrase "over there," uttered in a soft, guttural tone and accompanied by a haphazard wave of an arm attached to a hand holding a cigar, conjures memories of only one person—Dr. Frank E. Lentz. "Over there," was Dr. Lentz' stock phrase in reply to any student who had the temerity to inquire as to the location of one of the several hundred drugs then stocked in the pharmacy. Most of us give directions by pointing to the vicinity in which an object is located. With Dr. Frank the wave of the arm—usually from the elbow down—could mean north, south, east, west, or even up or down. At that time, the pharmacy had ceiling-high cabinets equipped with a sliding ladder. Therefore, the student, who wanted something from Frank's endless supplies, was on his own because Dr. Lentz seldom deigned to do any searching himself.

The room was called the Pharmacy but it served many other functions. In one closet there was a stock of candy, chewing gum, cigarettes, and sundry of other items. This was, of course, a self-serve closet in which there was a box for receiving payment for items taken. In addition to the lure of the "goodies closet" the pharmacy was the source of all payments for items taken. In addition to the lure of the "goodies closet" the pharmacy was the source of all sorts of information, and also served as the social center of the school.

At an early stage in his career, Dr. Lentz was recognized as an astute businessman. Students and faculty often sought his advice on such non-academic matters as mortgages, automobile purchases, the strength of the stock market, and the advantages of savings and loan associations. More than this, many senior students looked to Dr. Frank as the best source of information on operating a practice.

Junior students were assigned to pharmacy duty on a rotating basis, and this duty involved many things. Amid the aromatic odors of camphor and the repugnant smell of sulfur, students would concoct the many remedies then in vogue. This included filling thousands of one-ounce gelatin capsules with kaolin and pectin (for diarrhea), mixing cough remedies containing guaiacol and wild cherry syrup, or preparing tincture of iodine or Lugol's solution. This was before the advent of antibiotics and sulfonamides and dogs suffering from horrendous cases of pneumonia were treated with a foul mixture known as C.C.C. (camphor, cod liver oil, and creosote). This was also the day of the famous novoxil, a silver compound with a shiny black cast, which was the last word for treating diarrhea.

Not all of the students' time was occupied in pharmaceutical duties. There were frequent trips to the pharmacy annex, a house on Pine Street where drugs were stored. On at least one occasion the pharmacy duty involved some pyrotechnics.

A daily visitor to the pharmacy was Dr. Henry C. (Harry) Campbell, Professor of Bacteriology, and like Dr. Lentz, a sharp businessman. Most mornings the two doctors would discourse on the world's financial situation. One spring morning Dr. Lentz gazed out the window on Thirty-Ninth Street and observed that there was a parking space near the archway of the school. Knowing that Dr. Campbell would soon arrive, Dr. Frank directed a student to gather up some wooden crates and build a substantial bonfire in the parking space so that his friend would have a reserved spot!

If all of this is taken to indicate that Dr. Frank Lentz was a "character," and indeed he was, be it known, then, that he was a loveable character.

Although Dr. Lentz, himself, never talked about such affairs, it is a fact that he was a source of financial aid to many needy students. Also, numerous young graduates were able to start practices with drugs and instruments obtained on credit from the good doctor. In addition to academic functions, Dr. Lentz operated a retail drug business. He earned his VMD degree in 1907 and also had a degree in pharmacy. Dr. Frank Lentz is indeed a legend of a time when bureaucracy had not yet become a way of life, and when many of life's problems were dealt with on an individual basis rather than through a complicated, impersonal agency.

A plaque in the cafeteria area of the Alumni House at NBC recognizes Dr. Lentz as a benefactor of the school. The Frank E. and Harriet Lentz pharmacy in the new Veterinary Hospital of the University of Pennsylvania (VHUP), was provided through the generosity of the Lentz family. The inscription on the plaque best describes the roles played by Frank and his lovely wife in the history of this school. "Together they befriended and sustained generations of veterinary students."

Holding the Tiger by the Tail

An animal trainer, when asked how he handled a cage full of tigers, answered, "Very carefully." The same is true about a faculty's approach to changes in teaching methods and the curriculum.

In 1970 the faculty of the School of Veterinary Medicine took a revolutionary step in veterinary medical education by breaking away from the traditional lock-step type of curriculum and instituting a core-elective curriculum. This proved to be a highly effective change— one that has been emulated, in part, by a number of other schools. However, after twelve years, during which there was much piecemeal discussion, it became obvious that there was a need for in-depth consideration of the curriculum and of teaching methods.

Through October 9 to 11, 1981 about sixty members of the faculty convened for a three-day retreat at New Bolton Center. They were joined by eight students and several experts on education from other institutions. Dr. Cleve Brown represented the alumni and Dr. Wayne Mountain, the Pennsylvania State Board of Veterinary Medical Examiners. Thomas Ehrlich, new Provost, spoke of the University's commitment to seek ways of more adequately recognizing good teaching and of developing techniques for improving teaching methods.

Those assembled, spent three days of soul-searching activity in twenty-four different workshops and three plenary sessions. At the end it was obvious that considerable progress had been made in meeting the two major goals of the retreat: to elevate the priority of teaching, to improve methods of teaching, and to determine the changes that are needed in the core-elective curriculum. Many of the recommendations will now be translated into action. Some changes can be made fairly quickly while others will require considerable study. The faculty and all of those who participated in this noble effort are to be congratulated. The tigers have been approached and they are being dealt with—carefully.
The International Conference on the Human/Companion Animal Bond, held on October 5-7, 1981, was a huge success. Our congratulations to Drs. Aaron Katcher and Alan Beck and their colleagues for the arrangement of an imaginative conference at which much factual scientific information was presented on the rapidly developing field of man/animal relationships. Over 475 attended the workshops and formal sessions.

On November 15, 1981 Dean Robert Marshak and the Kling Partnership (an architectural engineering/interior design firm) were hosts to several hundred guests who celebrated the tenth anniversary of the Alarik Myrin Memorial Research Building at New Bolton Center. "The Myrin Research Building has housed us well for a decade," said Dean Marshak, "and we are counting upon it for decades more. It continues to serve the purposes for which it was designed, and this is a good opportunity to thank the people who made the building possible." Happy Anniversary!

Dr. Richard McFeely, Associate Dean and Director of New Bolton Center, was named President of the Pennsylvania Veterinary Medical Association. Dr. McFeely also serves as President of the American College of Theriogenology.

Congratulations to the following individuals who were elected student officers:

First-Year Class
President: Felix Vega
Vice President: Carla Drozdowicz
Secretary-Treasurer: Julie Block

Second-Year Class
President: Stephen People
Vice President: Jim Reed
Secretary-Treasurer: Barbara Davis

Third-Year Class
President: Rodney Boden
Vice President: Andrea Peut
Secretary-Treasurer: Tim Marqueen

Fourth-Year Class
President: Tony DeCarlo
Vice President: Anna Edling
Secretary-Treasurer: Tim Marqueen

Student Government
President: Randall Ross
Vice President: John Pantalo
Secretary: Sheri Bekerian
Treasurer: Betsy Gayrell-Hart

Organization of Minority Veterinarians
President: Christopher D. McCoy
Vice President: Shari S. Thompson
Treasurer: William J. Walz

Organization of Minority Veterinary Medical Students
President: Thomas Eng
Secretary-Treasurer: Felix Vega

Representative: Susan M. Prattis

SCAVMA Officers
President: Jim Stoltz
Vice President: Alan Glassman
Co-Secretaries: Susan Large and Jill Bailey

Co-Treasurers: Bonnie Brock and Holly Leather
Faculty Advisors: Drs. E. H. Hammer and D. Kawalcyzk
HOD Delegates: Nolon Patton and Jim Luntig

Student Wildlife Organization
President: Bruce Herwalt
Faculty Advisor: Dr. W. Medway
American Association of Bovine Practitioners
President: Ken Birdchard

Oops! We are sorry. In our last issue of Bellwether we omitted the appointment of Dr. David Freeman as Assistant Professor of Surgery on July 1, 1981.

November 6, 1981 was designated as Boucher Day in honor of Dr. William Boucher, Professor of Medicine, who retired on December 31 after forty-one years of faculty service. During the day papers were presented at New Bolton Center on various aspects of diseases of farm animals. In the evening over 450 attended a buffet to do honor to this outstanding individual and his family. Following dinner numerous individuals recounted personal experiences involving Dr. Boucher.

Dr. Carl E. Aronsen, Associate Professor of Pharmacology and head of Laboratories of Pharmacology and Toxicology, was elected as President of the American Academy of Veterinary Pharmacology and Therapeutics at the Annual Meeting of the Academy on July 19, 1981.
**General Services**

The Large Animal Hospital can accommodate ninety patients and has a six-stall isolation unit for the treatment of infectious disease cases. The hospital is open from 9 a.m. to 5 p.m. and 24 hours-a-day for emergencies. Arrangements for hospitalization or emergency services can be made by calling: (215) 444-5800. In-patient and out-patient referrals should be directed to specific sections by calling:

- **Medicine**—(215) 444-4281 or Surgery—444-3200.
- **Pathology**—444-5800, ext. 202.
- **Radiology**—444-5800, ext. 359.
- **Reproduction**—444-5800, ext. 316.
- **Nutrition**—444-5800, ext. 359.
- **Epidemiology**—444-5800, ext. 359.
- **Ophthalmology**—444-5800, ext. 354.
- **Endocrinology**—444-5800, ext. 359.
- **Respiratory**—444-5800, ext. 359.

**New Bolton Center**

New Bolton Center is the rural campus for the University of Pennsylvania's School of Veterinary Medicine, located in southern Chester County, near Kennett Square, Pennsylvania. The center operates a Large Animal Hospital which contains various specialty sections including Anesthesia, Clinical Laboratory Medicine, Medicine, Microbiology, Nutrition, Pathology, Radiology, Reproduction, and Surgery.

**Specialty Services**

**Heart Station**

Clinic days: Tuesday and Wednesday, 9 a.m. to 5 p.m. Services include cardiac consultation, electrocardiograms, phonocardiograms, echocardiograms, and cardiac catheterization. Complete work-ups for poor racing performance can also be executed, including respiratory evaluation, submaximal exercise testing, endocrine evaluations, endoscopy, cardiology, and lameness evaluations. Work-ups can be scheduled for other days. Call (215) 444-0900.

**Nutrition**

Nutritional services, for the livestock industry, are offered in cooperation with referring practitioners of the New Bolton Center Field Service. Call (215) 444-5800, ext. 316.

**Ophthalmology**

Ophthalmology cases may be scheduled through Drs. Beech or Raphel, call (215) 444-4281.

**Radiology**

Radiology, Monday-Friday, 9 a.m. to 5 p.m. Only referral cases accepted. Provides x-ray therapy and other radiological services. Call (215) 444-5800, ext. 198.

**Reproduction**

Fertility Clinic: Tuesdays, 9 a.m. to 5 p.m. The Georgia and Philip Hofmann Research Center for Animal Reproduction provides fertility evaluations for stallions, mares, and other large animals. Call (215) 444-5800, ext. 220.

**Endocrine Laboratory**


**Cytogenetics Laboratory**

Chromosome analysis. Call Ms. Lynne Kressly, (215) 444-5800, exts. 204 or 110.

**Resources**

**Events**

**January**

- 27-28 Penn Annual Conference/ Hilton Hotel of Philadelphia, 34th & Civic Center Boulevard, Philadelphia
- 30 Canine Symposium for Owners and Breeders/University Museum, Harris­son Auditorium, 33rd and South Streets, Philadelphia, 9:00 am - 5:00 pm

**February**

- 6 University of Pennsylvania Pre-Vet Club/ Invitational Day at New Bolton Center
- 10 Practical Issues Raised by Veterinarians Concerning Owner Reaction to Pet Loss or Bereavement/ University of Pennsylvania, Faculty Club, Philadelphia, 9:00 am - 5:00 pm
- 24 American Farrier's Association Seminar/New Bolton Center
- Surgical Approaches to the Bones and Joints of Dogs/School of Veterinary Medicine, Philadelphia, 9:00 am - 5:00 pm

**March**

- 12 Current Trends in Bovine Nutrition/New Bolton Center, 8:30 am - 5:30 pm
- 17 Emergency Medicine & Surgery for the Practitioner/University of Pennsylvania, Faculty Club, Philadelphia, 9:00 am - 5:00 pm

**April**

- 17 Open House/New Bolton Center
- 24 Equine Lameness Seminar/New Bolton Center, 9:00 am - 9:00 pm
- Spring SCAVMA Picnic/New Bolton Center
- 24-30 AAHA Meeting/Las Vegas, NV

**For information on Continuing Education courses, contact Elizabeth Caulk, (215) 243-4234.**

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Diagnostic Services

The Clinical Microbiology Laboratory, in the Murphy Laboratory Building, has a number of diagnostic services for the practitioner: isolation and identification of aerobes, fungi, Salmonella, CEM (not for export purposes) organisms; microbiological evaluation of environmental, surgical and postmortem specimens; mastitis specimens; antimicrobial susceptibility testing, direct gram stains; acid-fast and KOH (fungal) stains; preparation of bacterins, and certified EIA (Coggins) testing. Specimens should be sent directly to Microbiology, c/o Murphys Laboratory, New Bolton Center. For general information call (215) 444-5800, ext. 155, or for specimen and special handling procedures, exts. 156, 157, or 159.

Clinical Laboratory Medicine provides routine hematologic, urine, and fecal analysis. Profile studies (12 separate assays) are available at reduced charges. A limited number of tests are available during evening and weekend hours. For a detailed listing of tests, fee schedule, and preferred collection system, call (215) 444-5800, ext. 250.

The Laboratory of Large Animal Pathology offers necropsy and biopsy services. Biopsies should be mailed to the laboratory. Animals for necropsy must be accepted by the duty pathologist. Call (215) 444-5800, ext. 211.

Poultry Diagnostic Laboratory: Monday-Friday, 8:30 a.m. to 4:30 p.m. This is a University-state cooperative laboratory, providing diagnostic and consultation services for poultry, game birds, and pet birds in the following areas: serology, bacteriology, virology, and pathology. Farm visits may be arranged. Call (215) 444-4262.

Diagnostic Assistance For Herd Problems. Clinicians are available to assist and/or consult with referring veterinarians in the evaluation of difficult or unusual problems. For information, call Dr. Robert Whitlock, (215) 444-5800, ext. 321.

Auxiliary Services

The Large Animal Hospital has, on call, certain specialty services at the Philadelphia campus, such as neurology and dermatology. Investigators in research units at New Bolton Center, such as the Comparative Leukemia Studies Unit, are also available for consultation. For information call (215) 444-5800.

New Bolton Center
382 West Street Road
Kennett Square, PA 19348

Veterinary Hospital of the University of Pennsylvania

Soft Tissue Surgery: Clinic days have been expanded to Monday-Thursday.

The Behavior Clinic can now be reached for discussion of behavior problems and appointments during the following hours: Monday and Wednesday, noon to 2 p.m.; Thursday and Friday, 1 p.m.-2 p.m.; and every day except Wednesday, 4 p.m.-5 p.m. (215) 243-4525.

Wildlife Service offers veterinary care for wildlife and unowned animals such as pigeons, hawks, owls, squirrels, rabbits, and groundhogs found abandoned and in need of veterinary care. During regular hours call (215) 243-4680 or 243-4685. For information, contact Dr. William Medway, 243-7891.

Parasitology Laboratory offers the ELISA serology to detect heartworm in dogs ($10). Contact Dr. Robert Grieve, (215) 243-5646.

Virus Diagnostic Laboratory offers feline and canine virus diagnostic tests. Call (215) 243-3161.