

Dr. Robert E. Davies

Continued

night to ask if he would undertake to scale the flag-pole on College Green. The Administration had agreed to fly the flag at half-staff on the one-day national Moratorium, but a faction of the protesters demanded it be kept that way until the War ended. And consultation with faculty, and a petition by hundreds of staff, indicated consensus for returning it to full staff. By day officials announced this decision, but that night on patrol campus police found the halyard cut. Though he opposed the War, Dr. Davies believed in consensus; though he had never before climbed a flagpole he had a book that told how; and though he was, as he jokingly said, a Britisher who had been on the "other side" of a war some two centuries before—nevertheless in a high wind before dawn Bob Davies went up the rusting pole and restrung the halyard so that the U.S. flag could fly at sunrise. (A few years later when Penn was in a budget crisis, he did it again—to preserve funds for academic needs.)

Other friends remember that Dr. Davies helped create the legal defense fund of WEOUP (Women for Equal

Opportunity at the University of Pennsylvania); served as an expert witness in grievance cases and lawsuits involving women and minorities; and, with Dr. John deCani and Nancy Geller of the Wharton School, helped develop and publish statistical measures of faculty quality through which discrimination could be challenged.

"Bob Davies has fought for the rights of students, faculty and staff; he supported critical sit-ins and worked tirelessly to advance the status of women and minorities," said his longtime colleague at the Vet School, Dr. Adelaide Delluva.

"Affirmative action had a powerful ally in Bob Davies, not only at Penn but throughout academia," added Dr. Phoebe Leboy of the Dental School, a former Senate chair who was the first head of WEOUP and is active in the Association of Women in Science. "As a teacher and scholar of the first rank, he was determined to see quality recognized in all people regardless of color or gender, and he believed in changing the system from within. Bob Davies helped revolutionize the admission of women and minorities in his school, and spent untold hours working to support individual women

and people of color for appointment and promotion, both here and on other campuses. In individual cases he was University colleague to staff grievants as well as faculty; and in the meantime he spearheaded those meticulous, time-consuming studies that laid the groundwork for new policies and procedures to make the system fairer," she continued. "WEOUP and the University have lost a friend who not only spoke eloquently for equity and diversity, but who worked as hard as he talked."

Dr. Davies is survived by his wife of 32 years, Dr. Helen C. Davies, professor of microbiology and associate dean of the Medical School; two sons, Daniel J. Conrad of Vancouver and Richard D. Conrad of Philadelphia; and a foster daughter, Lisa Edwards of Philadelphia.

The Robert E. Davies Memorial Fund has been established. Gifts may be made to it via checks to the Trustees of the University of Pennsylvania, designating this Fund and mailed to Room 627A Franklin Building, University of Pennsylvania, Philadelphia, PA 19104-6205.

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Twenty-third Annual Canine Symposium

The 23rd Annual Canine Symposium was held January 23 at VHUP. Following are summaries of the talks presented.



Canine Hyperthyroidism

Thyroid hormones affect nearly every system of the body. Often referred to as "the great impersonator," hypothyroidism, the most prevalent thyroid disorder in dogs, manifests itself in many different ways. Dr. Carole Zerbe, assistant professor of internal medicine at VHUP, discussed the disease process, symptoms, diagnosis and treatment of hypothyroidism.

Hypothyroidism is characterized by reduced levels of thyroid hormones, triiodothyronine (T3), and thyroxine (T4). Both are produced by the two thyroid glands located in the neck. Hormone production is regulated by signals sent by the brain in the form of thyroid releasing hormone (TRH) and by the pituitary gland produced in the form of thyroid stimulating hormone (TSH). Iodine is also very im-

portant for thyroid hormone production.

Thyroxine circulates in the blood in several forms. Usually bound to proteins, about 0.1% exists free in the blood. It is the free hormone that is biologically active. Most of the free T4 is converted into T3 in the blood or within the cells, where it works on the intracellular level to increase oxygen consumption and heat production.

Thyroid hormones increase basal metabolic rate, blood flow to a variety of tissues, and cardiac output. They directly or indirectly increase the rate of breakdown of protein, fat, and carbohydrates. Additionally, thyroid hormones are important in the development of young animals. These hormones are necessary for normal bone growth and maturation

and for proper development of the nervous system.

Normal protein production is necessary for healthy hair and skin, and 95% of hypothyroidism cases in dogs are diagnosed because the owner sought treatment for abnormalities manifest in the skin and coat. Bilaterally symmetrical alopecia, or hair loss, primarily in frictional areas, is a common symptom. Hypothyroid dogs also exhibit dry, brittle coats, "hot spots," hyperpigmentation of the skin, follicular plugging, thickening of the skin and rat-tail appearance.

Other symptoms may include exacerbation of existing bleeding conditions, lethargy, blepharoptosis (drooping of the upper eyelids), reproductive problems, fluid retention and weight gain. Because of a decreased metabolism, heart rate and body temperature also drop and affected dogs can have a cold, clammy feel to their skin and thermophilic tendencies. Recurrent infections of the skin are also common. If thyroid deficiency occurs in young animals they will develop dwarfism characterized by mental retardation.

Diagnosis of hypothyroidism is difficult. This is because most of the thyroid hormones produced by the thyroid gland are actually within the cells and not in the blood. Because thyroid hormones are bound to proteins in the blood and the amount of these proteins changes with different situations the amount of thyroid hormone we measure also changes. Additionally, T4 is converted to the most biologically active hormone, T3, but sometimes it is converted instead to reverse T3, an inactive hormone. The important point here is that the amount of thyroid hormone we measure in the blood may not accurately reflect the activity level of the thyroid. Consequently it must be realized that when thyroid hormones are measured and found to be low, it may or may not reflect hypothyroidism.

For example, many drugs, such as steroids and anti-convulsant medications, as well as certain diseases, cause thyroid hormone levels to drop, rendering a reading that falsely indicates hypothyroidism. "The body has this wonderful protective mechanism that, when it's sick, doesn't burn a lot of calories," said Dr. Zerbe. "It doesn't want to waste energy, and one of the ways it responds to this is by keeping T3 and T4 values low." Thyroxine during

these times will probably be converted to a biologically inactive thyroid hormone, reverse T3.

To determine if thyroid hormone suppression is drug/disease-induced, or is low because of hypothyroidism, a TSH stimulation test should be performed; T3 and T4 levels are obtained and TSH is administered. "If the T4 measurement rises above 4.0 ng/dl following TSH dosage, the patient most likely does not have hypothyroidism," said Dr. Zerbe. "Suppressed, or "flatline," response indicates the presence of hypothyroidism. Even with this test it may be difficult to determine if the dog actually has hypothyroidism so sometimes we will recommend trial therapy as a way to determine if the clinical signs were in fact related to low thyroid hormone levels."

A major drawback of TSH stimulation testing is the expense and its limited availability. TRH testing is a less expensive alternative whose efficacy as a diagnostic tool as compared to TSH stimulation testing is currently being tested at VHUP.

Treatment and prognosis for hypothyroidism is excellent. The treatment of choice is hormone replacement with a synthetic T4. A recent study showed that the veterinary T4 product is significantly better for thyroid replacement in dogs than products used as replacement for people.

Hypothyroidism is not breed-specific. It can affect any breed large or small, though large breed dogs are most commonly affected. Some breeds such as golden retrievers, Irish setters and great Danes seem to have an unusually high frequency. It is likely that there is a genetic component to hypothyroidism but this has only been documented in congenital hypothyroidism in the Scottish deerhound and the giant schnauzer where it was shown to be autosomal recessive.

Onset of hypothyroidism normally occurs in middle and older age, so screening of puppies is usually not indicative of future problems. Also, "normal" thyroid hormone levels in puppies are much higher than in adults. If depressed thyroid hormone production is discovered in puppies, however, it is important to supplement them with thyroid hormones for normal growth and development.

Ultrasonic Imaging

Ultrasonography for companion animals, once available only at teaching hospitals, is becoming more widely accessible as private practitioners acquire the equipment for their practices. Dr. H. Mark Saunders, assistant professor of radiology at the School, explained the mechanism, indications, advantages and limitations of this valuable diagnostic tool.

Once used primarily to determine pregnancy or fetal viability this non-invasive imaging technique is utilized today to examine thoracic and abdominal organs. Sound wave beams above the frequency limits of human hearing are emitted from a transducer placed on the skin. Black and white images are generated as the computer in the machine analyzes the reflected ultrasound waves. The relative echogenicity, or amount of sound reflected, increases as the tissue density increases. A dense mass returns more sound and appears brighter, or hyperechoic, on the imaging screen than the surrounding tissues of lower density. Ultrasound waves cannot penetrate air or bone, thus the technology cannot be used to evaluate lungs or skeletal structures.

Ultrasonography allows the diagnostician to view organs in real time and from different angles. "The images are pie-shaped, very thin slices of the abdomen," said Dr. Saunders. "They provide us with a picture of the interior architecture of an organ whereas radiography gives us only a silhouette."

Animals usually don't have to be sedated for an ultrasound exam. "Animals are placed on their side on the table," explained Dr. Saunders. "The abdomen has been clipped to allow better contact with the transducer. To enhance this contact, a gel is used on the transducer head. Most animals are quiet, some even go to sleep as the room is dark."

Each organ presents a specific ultrasound appearance and the radiologist is able to diagnose abnormalities by the deviation from the normal appearance. "We know, for example, the echogenicity of a normal liver," said Dr. Saunders. "If we get a different picture, we know there is disease. We are not able to diagnose a specific disease from an ultrasound image. However, when we take

into account the patient's history, physical examination findings, radiographic abnormalities and laboratory findings, we can be more specific about the disease process. In some cases an ultrasound-guided biopsy may be needed. This may require sedation, but it is less invasive than traditional surgery."

Structural abnormalities of the following abdominal organs can be evaluated by ultrasound: liver and gall bladder, spleen, pancreas, stomach, intestines, kidneys, bladder, prostate gland, uterus, testes, adrenal glands and major blood vessels. Ultrasound is also used to examine the heart, and in horses, tendons.

Ultrasonography is a valuable diagnostic tool and it is not surprising that more and more practitioners are purchasing the equipment. But Dr. Saunders cautioned "before spending \$25,000 for a portable machine, the practitioner has to determine 'Am I going to work with cats and dogs solely, or am I going to do cats, dogs and horses?'" The transducers required are different for large or small animals." A veterinarian will have to invest quite a bit of time in developing his/her ultrasound technique before advertising diagnostic service. Practitioners in private practice must realize that their new machine may not pay off immediately; it's usually a long-term investment.

J.C.

Some Geriatric Diseases in the Dog

Many dog owners label as normal features of their pets' aging process symptoms which are indicative of serious underlying geriatric problems. Dr. Meryl Littman, associate professor and chief of medicine at VHUP, addressed some of the processes, symptoms, diagnostic tests and treatment options relating to renal, hepatic and cardiac failure in older dogs.

Chronic renal failure, which plagues many dogs entering the middle and upper years, typically creeps up slowly and gradually, and is marked by impairment of the kidney's mechanism for filtering and excreting the waste products of metabolism. The salt-water balance in the blood may be disrupted, and acidic waste products may accumulate in the

blood, resulting in blood acidosis.

Polyuria (excessive urination and polydipsia (excessive thirst) usually occur first, and blood abnormalities show up when the kidneys have lost 75% of their function. Other clinical signs include dehydration, constipation, weight loss, lethargy, vomiting, appetite suppression, hypertension, anemia and kidney infection. Protein-losing nephropathy (PLN), one possible cause of chronic renal failure, is marked by the excretion of proteins, important in the prevention of fluid seepage from the blood vessel walls, into the urine. Low serum protein levels and ascites (fluid accumulation in the peritoneal cavity) result.

Proper diagnosis of kidney failure includes complete bloodwork, urinalysis and urine culture. Most clinicians obtain a urine protein/creatinine ratio and perform abdominal ultrasound or radiography to monitor the size and appearance of the kidneys, which, in older dogs, tend to shrink.

Dogs suffering from impaired renal function should be properly hydrated, either through plentiful supply of drinking water or with subcutaneous fluid injections. Aluminum hydroxide may be administered to decrease serum phosphorus, sodium bicarbonate to neutralize acid in the blood, and antibiotics if infection is present.

A low-protein, high-carbohydrate diet should be fed to kidney failure patients not suffering from PLN. Dr. Littman advocated integrating such high-carbohydrate foods as pasta and potatoes into younger dogs' diets to acclimate them to such foods, should the need to apply dietary restrictions arise later in life. Dietary salt should also be restricted, and appetite stimulants, antiemetics and H2 blockers, such as Tagamet and Zantac, administered when needed. Kidney dialysis is an expensive option, usually reserved for acute cases.

Hepatic failure interferes with the detoxification of the blood. Liver failure in older dogs, which may be due to chronic active hepatitis, cirrhosis, nodular growth and liver shrinkage, may present with such vague symptoms as weight loss, lethargy and decreased appetite. "This may be all the dog shows," Dr. Littman said.

It is therefore necessary to have an older dog checked when such relatively commonplace symptoms are present, because they may be indicative of more than the normal aging process. Fevers, vomiting, diarrhea, ascites, edema, jaundice, polydipsia - excessive thirst, and polyuria - excessive urination, are among the clinical signs of liver failure.

Other manifestations include decreased tolerance to drugs and hepatoencephalopathy - impaired mental function resulting from the accumulation of toxins in the brain. Dogs suffering from hepatoencephalopathy may experience lethargy (depression), restlessness (mania), and/or seizures.

In diagnosing liver failure, most veterinarians look for low levels of albumin, blood urea nitrogen (BUN) and glucose, and elevated bilirubin, liver enzymes, and serum bile acids measurements. A complete bloodcount (CBC) is usually done to check for the presence of anemia and infection. Urinalysis, blood coagulation profile, ammonia tolerance test and abdominocentesis are among other diagnostic tests performed on dogs presenting with signs of liver failure.

A liver biopsy may also be done, but it is not without risks, as dogs with liver failure have low tolerance for anesthesia and are prone to excessive bleeding.

Dietary changes are a key element in the management of liver disease in older dogs. Unless the serum albumin is found to be very low, a high protein diet should be replaced with one high in carbohydrates. Dietary copper and salt should be kept to a minimum.

Many veterinarians prescribe the drug lactulose for dogs suffering from hepatoencephalopathy. Diuretics, used to reduce swelling caused by ascites, should be used judiciously, and certain drugs that must be metabolized by the liver should be avoided.

The heart, critical to nutrient delivery and waste uptake, may, in the aging dog, undergo rhythm disturbances, impaired cardiac muscle contractility and abnormal blood flow resulting from faulty valves.

Decreased cardiac output and retarded fluid circulation may result in fluid leakage outside of the vascular system and into the chest and abdomen. Pleural effusion (fluid accumulation

around the lungs) may occur, and is marked by labored breathing and cyanosis, manifested as a bluish tinge to the tongue and gums. Ascites may cause G.I. problems and enlargement of the liver and spleen. Edema in the legs may also be present. Other signs include fainting, renal failure and general lethargy, caused by inadequate perfusion of oxygen and other blood nutrients throughout the body.

Diagnostic tests include chest auscultation to detect murmurs, chest radiographs, EKGs, blood pressure measurement, echocardiograms and bloodwork.

Drug therapy may include medications to improve the heart's pumping mechanism, vasodilators to reduce the risk of fluid seepage from the veins, and antiarrhythmics. Aspiration of the fluid in the chest may be necessary. A diuretic, prescribed to reduce blood volume, is often coupled with a salt-restricted diet to reduce fluid retention. Exercise restrictions are usually recommended.

Preventive geriatric care should begin when a dog enters "middle age," Dr. Littman said, which is about seven or eight years of age in large breeds and about ten in small breeds. Visits to the veterinarian should be stepped up to twice annually, baseline blood and urine levels should be established, and every owner should be observant of changes in his/her dog's appetite, thirst, excretion, weight and stamina. Owners should watch carefully for the symptoms of any problems to which his/her breed might be predisposed.

The final word for geriatric care is "finality": The dog owner should protect the quality of life when caring for a geriatric dog and should discern when the quality of the dog's life has deteriorated, and make decisions accordingly.

J.C.



Understanding Canine Behavioral Disorders

Every dog owner is a student of canine behavior, and of this complex discipline, there is no better teacher than our own mutt. According to Dr. Karen L. Overall, lecturer in behavioral medicine, who runs the Behavior Clinic at VHUP, owners must use skills of observation and perception to try to understand what their dogs are trying to communicate by their actions. This, she said, is step one towards combatting behavioral disorders.

"We often misinterpret many of their signals," Dr. Overall said, "and therein lies the big problem." Dogs and people have co-evolved and, as part cause and part effect, our social systems are homologous in many ways. However, Dr. Overall warned, dogs don't express themselves in the same ways we do, and owners need to learn how to read the signals that they display through their ears, fur, tail, mouth and stance. They must also realize that dogs do not see the world in the same way that people do. For example, she said, "There is a myth that pets and kids go together." If we allow this myth to materialize according to a child's wishes, the results could be lethal, because a dog's idea of play usually differs from that of a child's.

Aggression is the problem most commonly seen at the Behavior Clinic, Dr. Overall said, and most of the 8% of patients euthanized in the Behavior Clinic between 1987 and 1990 were euthanized because of dominance aggression. Such behavior patterns may appear more prevalent in certain breeds, particularly those selected for guarding traits and protective behavior.

Some of the individuals within such breeds as Dobermans and Rottweilers may inappropriately guard against people or objects which pose no threat. From a risk assessment standpoint, certain individuals within breeds selected for specific sets of behaviors could develop inappropriate variations in those traits. This tends to put a false "label" on the breed. Any generalizations about breed-related behaviors, Dr. Overall emphasized, must be made cautiously.

Crucial to the prevention of problems, said Dr. Overall, "is matching the

personality of the dog with that of the owner." The adoption process should include research on the behavioral and physical characteristics of different breeds, a project with which the Behavior Clinic and the American Kennel Club (AKC) both offer assistance.

Puppies taken from their mothers at four to six weeks of age or younger may be likely to develop behavior problems as adults because of decreased canine socialization, and it is important to allow them to remain with their mothers throughout this crucial developmental period. Temperament testing in puppies is a valuable screening tool, although it has limitations.

"Do it," Dr. Overall said, "but don't expect it to give you any guarantees."

Many dogs don't develop behavior problems until social maturity, about 18-24 months of age. Onset of such afflictions as idiopathic shyness, hallucinatory disorders, separation anxiety and ritualistic behaviors may be quite sudden, and the help of a specialist is recommended.

Obsessive-compulsive behaviors, found to run in family lines, may be the result of inbreeding. Many owners mistake such behaviors as tail-chewing with boredom, but the real culprit is anxiety, and such anxiolytic drugs as clomipramine can be effective in eradicating ritualistic behaviors.

When we are looking to enhance the quality of our relationship with our own canine companions, we must start with the puppy. Dr. Overall cautioned against justifying a puppy's inappropriate behavior by its youth. "Puppies need boundaries," she said, "just like the rest of us do...Intervene. Don't decide that the dog is going to set the rules."

The study of canine behavioral disorders may prove as important to human mental health as it is to that of dogs themselves. Many of the same behavioral problems observed in dogs are also found in people. At the Behavior Clinic, Dr. Overall is using dog models to try to determine whether obsessive-compulsive behavior is caused by inappropriate

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metabolites in the bloodstream.

When studying the behavior of our own little Fido, Dr. Overall reminds us not to lose sight of the big picture. "Our pets are a mirror of a lot of things," she said. Is a dog "acting out" because of marital turmoil in the home? A new baby? A change of address? The field of

animal behavior is a relative newcomer to the realm of scientific research and medical practice, and its emergence is long overdue in the canine world. We share our lives with our dogs and accept them as full-fledged members of our households. Their behavior captivates us, confuses us and impacts our lives in a

powerful way. Maybe that's why seven of every ten clients question their veterinarians about their dogs' behavior.

When reflecting on canine behavior, Dr. Overall said, dog owners should bear this in mind: "Behavior is not just an event - it's a process."

J.C

Kleberg Fellowship Awarded

Dr. Alain Bouvet has been selected as the fourth Kleberg Fellow in the Section of Medical Genetics at the School. The fellowships, established in 1989 by the Robert J. Kleberg, Jr. and Helen C. Kleberg Foundation, support a postdoctoral research training program in medical genetics for veterinarians.

The objective of the program is to attract and train talented veterinary scientists in genetics research, emphasizing those fields which provide the greatest potential to advance the understanding, treatment, and prevention of diseases in which genes play a major role. Because of their broad education in the biological medical sciences and their direct involvement in the health and productivity of animals, veterinarians are ideally suited to play a major role in research into the basic mechanisms involved in genetic disease, gene therapy, identification and engineering of genes that will be important in producing disease resistance.

Dr. Bouvet's work as a Kleberg Fellow will center around the molecular analysis of genetic diseases that are homologs of human genetic disease. Dr. Bouvet comes to Penn from the Department of Molecular and Cellular Physiology, Cambridge Research Station, Cambridge, England, where his research focused on the detection and localization of genes in swine, using flow cytometry and DNA hybridization techniques. Dr. Bouvet received his veterinary degree from the University of Montreal and his Ph.D. degree in biomedical sciences from the University of Guelph, Canada.

Dr. Rosanne Taylor is the other current Kleberg Fellow. Dr. Taylor received her veterinary and Ph.D. degrees from



Dr. Rosanne Taylor and Dr. Alain Bouvet, the two current Kleberg Fellows at the School of Veterinary Medicine.

the University of Sydney, Australia, where she became interested in the pathogenesis and therapy of genetic disorders utilizing animal models of human genetic disease. During her graduate work, she studied the use of bone marrow transplantation as a therapeutic approach to the lysosomal storage disease, fucosidosis in the dog. Desiring further training in molecular genetics and gene therapy research, Dr. Taylor entered the Kleberg postdoctoral training program in medical genetics in 1991. She is currently working in the laboratory of Dr. John Wolfe on the gene therapy of murine and canine Mucopolysaccharidosis VII.

The Kleberg Fellowship Program,

still the only of its kind in any veterinary school in the world, will have a significant effect on the long-term course of the profession of veterinary medicine and on knowledge concerning the mechanisms and treatment of genetic diseases in animals and human beings. Additional fellowships will be offered to veterinarians with outstanding academic records and demonstrated talent in areas basic to the field of genetics.

Individuals interested in this program should contact Dr. Donald F. Patterson, Chief, Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania, 3800 Spruce Street, Philadelphia, PA 19104.