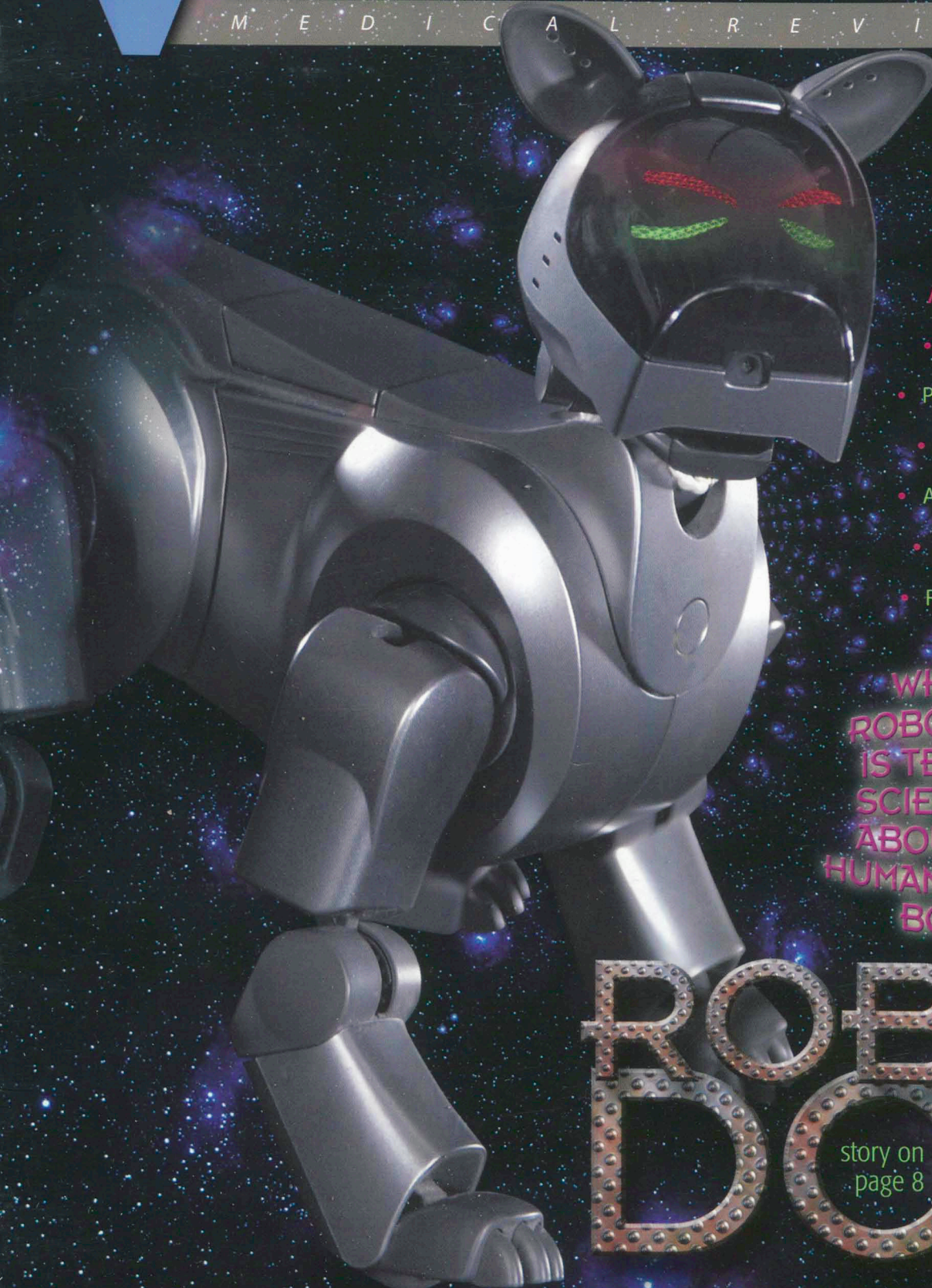


W^MU Veterinary

M E D I C A L R E V I E W



Also Inside...

- Canine Melanoma
- Postcards from the Past
- Sight to Blind Dogs
- Ancient Equine Disease
- Mission to Mongolia
- Retired Movie Theaters

WHAT A
ROBOT DOG
IS TELLING
SCIENTISTS
ABOUT THE
HUMAN-ANIMAL
BOND

ROBOT DOG

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page 8

VMR

Veterinary Medical Review

is published twice a year by the College of Veterinary Medicine, University of Missouri-Columbia

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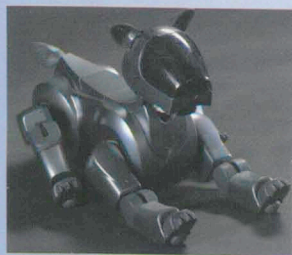
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on the cover...



Want to know if it is pleasurable interaction or something about a flesh and blood dog that contributes to human health? Ask a robot dog.



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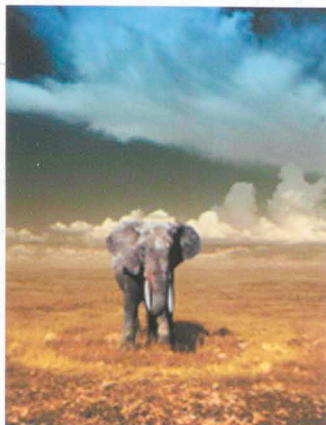
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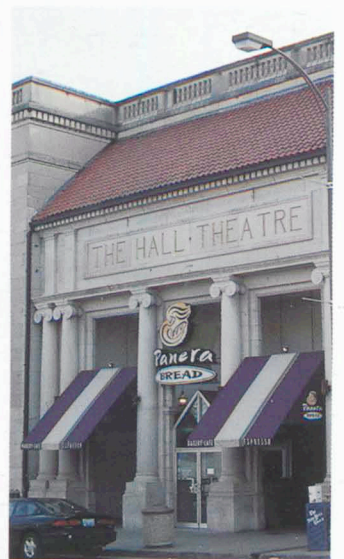


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THE *One Medicine* C O N C E P T

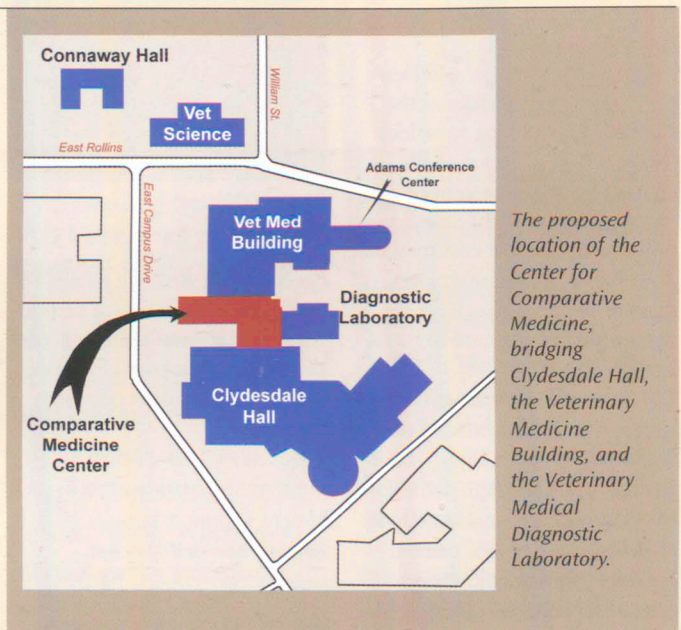
This issue of *Veterinary Medical Review* highlights several faculty research programs that impact both animal and human health. Such programs are often grouped under the collective heading of *comparative medicine* or the *one medicine* concept.

The comparative medicine approach goes back to the birth of our nation and beyond. Benjamin Rush, Physician-in-Chief of the Continental Army and a signatory to the American Declaration of Independence, believed firmly that "there is but one medicine." His course on the practice of medicine

included an introduction titled "The Duty and Advantages of Studying the Diseases of Animals," in which he wrote of "the advantages to be derived from a knowledge of animal disease in aiding our inquiries with the diseases of the human body."

Because of the strength and diversity of its life sciences programs, the University of Missouri-Columbia is ideally positioned to advance the one medicine concept. MU is one of only a few universities with medical and veterinary schools and additional strong programs in agriculture, biological sciences, nursing, nutrition, and biomedical engineering on the same campus. Thus, physicians, veterinarians, and other scientists and health-care providers are able to work together in clinical and laboratory settings to address fundamental questions impacting health and disease of humans and animals.

The recent definition of our genetic makeup has brought further attention to the validity of comparative medicine. Because humans and animals share many of the same genes, they develop strikingly-similar inherited diseases. Moreover, genes will probably have similar effects on the expression of acquired



The proposed location of the Center for Comparative Medicine, bridging Clydesdale Hall, the Veterinary Medicine Building, and the Veterinary Medical Diagnostic Laboratory.

conditions such as cancer and cardiovascular disease across the species. In fact, the use of animal models in biomedical research has never been greater. The College of Veterinary Medicine is playing a leadership role in this genetic revolution. Our faculty work with both spontaneous diseases of domestic animals and a number of experimental animal models. Many of these faculty are featured in this issue of *Veterinary Medical Review* or have been highlighted in the past.

For MU and the College of Veterinary Medicine to continue to advance its programs in comparative medicine, crit-

ical new facilities will be required. One important priority is a proposed Center for Comparative Medicine that would literally bridge our veterinary medicine building, Clydesdale Hall, and the Veterinary Medical Diagnostic Laboratory. Much-needed research laboratory space, faculty offices, and core facilities to support clinical and diagnostic programs would be provided. This effort is being led by Dr. John Critser, Gilbreath-McLorn Missouri Professor of Comparative Medicine. Look for more information on this exciting initiative in coming issues of *Veterinary Medical Review*.



Benjamin Rush, physician-in-chief of the Continental Army, believed firmly that "there is but one medicine."

Around the



College Researchers Seeking Answers To Canine Epilepsy

Two University of Missouri College of Veterinary Medicine researchers are offering dog owners an opportunity to help further research on canine epilepsy.

Drs. Gary Johnson and Dennis O'Brien, researchers at the College, are working to unlock the secrets of a disease that affects two to six percent of the dog population. While medication is available the cost may be prohibitive. In addition, one-third of the dogs that have the disease do not respond to medication.

"There are two causes of epilepsy, both in humans and in dogs," Dr. O'Brien said. "It can be contracted through some sort of brain damage, such as a blow to the head or a brain tumor. However, in the majority of cases, it is difficult to pinpoint any type of event that led to the disease. Because of this and the familiar clustering of affected dogs, we presume that there is a strong genetic component. Dogs that have epilepsy, who have not received any type of brain damage, usually start showing signs of the disease between 6 months and 3 years of age."

To find their answers, the two researchers have turned to the Internet to survey owners of affected dogs, and so far, the results are promising. Since a genetic link is presumed, the researchers must first find which genes could be responsible.

"We have found that males tend to be at greater risk than females," Dr. Johnson said. "One possible culprit is the X-chromosome. If a mutation on



Dr. Gary Johnson

the X-chromosome is passed to males, they don't have a second copy, unlike females, to rely on as a healthy backup. However, that's probably only one piece of the puzzle."

For more information, or to obtain instructions on how to submit a sample, visit www.canine-epilepsy.net.

College Investigator Searches For Answers To Cleft Palate

Cleft palate affects one in every 700 human newborns and an unknown number of animals. Depending on the severity, the resultant large gap in the roof of the mouth can make swallowing difficult and cause other major problems. The cause is largely unknown, but a MU College of Veterinary Medicine faculty member is hoping his research will shed light on this birth defect and help prevent it in the future.

"We believe that cleft palate has a genetic basis, but we also believe that it can be caused by environmental chemicals that interact with certain susceptible genes," said Dr. Chada Reddy, an associate professor of veteri-



Dr. Dennis O'Brien

nary biomedical sciences. "We know that one-third of chemicals such as pesticides, metals, and industrial chemicals can cause birth defects in animals. Maternal stress and drugs such as diazepam, phenytoin, and even aspirin can cause cleft palate in animals."

Dr. Reddy's research will focus on three chemicals known to cause cleft palate in animals. His laboratory exposes human cells to these chemicals and determine which genes the chemicals affect. By comparing the information to results from previous animal studies, Dr. Reddy will be able to narrow his search to those genes affected by all three chemicals in both animal and human cells.

"The next step will be to determine how relevant the changes in these genes are to palatal cell growth and development," Dr. Reddy said. "We will be using information from the Human Genome Project in these studies. Following these studies, we can search for ways to reverse the disruption in gene function as a way to prevent cleft palate induced by chemicals"

Lela Riley Named Associate Dean Of College of Veterinary Medicine

Dr. Lela K. Riley, professor of veterinary pathobiology and director of the Research Animal Diagnostic Laboratory, has been appointed associate dean for research and postdoctoral studies at the MU College of Veterinary Medicine.

Dr. Riley was awarded her PhD in microbiology from the University of Kansas in 1979 where she subsequently was a postdoctoral fellow in pharmaceutical chemistry.

She joined MU in 1987 first as an assistant professor in pathology, later being named as an associate professor and professor in pathobiology.

Her research interests include pathogenesis of bacterial and viral pathogens, characterization of emerging pathogens, and the development of novel molecular diagnostic assays. She participates in training programs in comparative medicine, genetics, and molecular microbiology and immunology. She was instrumental in the establishment of two new NIH-funded centers at MU: the Mutant Mouse Regional Resource Center and the Rat Resource and Research Center.

As associate dean for research and post-doctoral studies, she will represent the College to MU and to other institutions in matters pertaining to research or postdoctoral studies, enhance interdisciplinary and interdepartmental research activities within the College of Veterinary Medicine, and strengthen its postdoctoral training programs and opportunities.

College

Popular Knee Repair May Be Dangerous Says MU College of Veterinary Medicine Scientist

More than one million people annually have surgery for knee cartilage problems. Many are treated with a popular surgical procedure that uses radiofrequency to remove damaged cartilage and smooth roughened cartilage. A MU College of Veterinary Medicine researcher, however, says the procedure's long-term effects might be very damaging to the human knee and advocates the need for further study.

"The newest procedure in knee repair uses radiofrequency," said Dr. James Cook, assistant professor of veterinary medicine and surgery. "With a special tool, you can smooth the cartilage and restore its surface structure very well, or so it appears. The problem comes several months or years down the road when we are noticing long-term effects from the treatment, effects so damaging that in some cases the bone is beginning to decay. We need to discover why this is happening."

Dr. Cook believes he has solved part of the puzzle. In two recent studies, he exposed normal dog cartilage and arthritic human cartilage to radiofrequency treatment and then watched the cartilage over a long period of time. He discovered that an excess amount of heat from the radiofrequency treatment could cause the cells in the cartilage to change.

When the radiofrequency probe passes over the cartilage, the frequencies make ions in the tissue move and create their own heat, causing additional changes

in the cartilage and surrounding cells. This domino effect eventually begins to damage other cells, which create enzymes in response to the damage. The enzymes further complicate the problem because they degrade cartilage and bone tissue, in the knee.

The procedure also creates another problem. When the radiofrequency treatment smooths the cartilage, it also seals the tissue surface to a degree, preventing movement of some substances, including nutrients, in and out of the cartilage. This seal might effectively

starve the cartilage, causing it to weaken.

"This treatment can be very effective at solving a large problem in our society," Dr. Cook said. "However, we need to look at how much heat we are creating and other nuances of the procedure—the settings of the tools, how long we expose the cartilage, the extent of damage before the procedure, etc. We need to develop a standard for this procedure to ensure that we reduce future complications."

Nat Messer Receives AAEP Service Award

Nat T. Messer IV, DVM and associate professor of veterinary medicine and surgery, earlier this year received the Distinguished Service Award from the American Association of Equine Practitioners (AAEP). The award honors individuals who have provided exemplary benefits to horses, the horse industry, or equine veterinary medicine.

Dr. Messer served as the chairman of the AAEP Equine Welfare Committee from 1995 - 1998, and played an instrumental role in the association's efforts on such issues as pregnant mare urine collection, the Horse Protection Act, and the transportation of horses to slaughter.

In addition, Dr. Messer is a member of the American Veterinary Medical Association and has served on its National Board Examination Committee and the Publications Committee for the Journal of the American Veterinary Medical Association. He is a past president of the Colorado Veterinary Medical Association, a member of the Missouri Vet-

VETERINARY PEOPLE



Try Keeping Up With This Veterinary Medical Student

Veterinary medical students learn to be fast to keep up with classes and clinics. Tim Julien, Class of 2004, may be among the fastest of students after respectably placing in the recent Chicago Marathon, probably the world's second most famous race after Boston's. • In the 2001 Chicago Marathon race run this autumn, Mr. Julien placed 171st

out of 37,500 people who registered. That put him among the race's fastest 0.005 percent. • Julien, from Dixon, Mo., has been running since the seventh grade. He was a varsity cross-country runner at Washington University in St. Louis where he was a six-time All-American. In his senior year he placed second in the 5K Division Three nationals and 10th in its cross-country run. • His first marathon was the 2000 Chicago Marathon when he helped pace a friend through the almost 27 mile course. His friend was injured early and the pair finished well behind, but it gave Julien confidence to run solo in a race, that since 1977, has attracted the world's fastest runners. • Julien's time in the 2001 Chicago Marathon was two hours, 42 minutes—only 34 minutes behind the first place finisher who can earn up to \$250,000. • Two charlie horses, the first striking at the 12-mile mark, hindered his time. Luckily for his veterinary medical education, the distance from the clinics to classes isn't as demanding.

Around the



erinary Medical Association, and a diplomate of the American Board of Veterinary Practitioners.

Improving Diagnostic Tests For Equine Spinal Ataxia

It can debilitate horses at any age and is very difficult to diagnose. Spinal ataxia is a disorder that can be harmful, and sometimes deadly, for horses. One MU College of Veterinary Medicine veterinarian is developing a tool to make diagnosis, and eventually treatment, much easier for veterinarians, but he needs help.

"Ataxia is a common neurological sign of disease that affects the spinal cord in horses and causes them to become very weak and wobbly," said Dr. Kevin Keegan, an associate professor of veterinary medicine and surgery. "The disorder is caused by a number of different diseases and is difficult to diagnose beyond a reasonable doubt. This study is a step that eventually could lead to a better diagnosis of the disease, but we need to hear from horse owners who fear their animal could have the problem. We are looking for owners who would be willing to donate their animal to our study."

Currently, diagnosis is based on subjective measures and can be very complex. Like other neurological diseases, diagnosis can be difficult because the clinical signs are slow to develop. Through his study, Dr. Keegan believes he can develop a set of guidelines veterinarians can use to objectively diagnose the disease.

Horses donated to the project

will learn to walk on a treadmill and then, using a sophisticated array of computer technology, Dr. Keegan will map the horse's movements digitally and compare them to the movements of a healthy horse.

"Through this research, we will identify those clinical signs that are the most important," Dr. Keegan said. "This way, when veterinarians try to identify the problem out in the field, they will have a tool they can use and will know how to evaluate the signs they see in their diagnosis. The FDA is very interested in this because in order to approve the use of certain drugs for a particular problem, veterinarians need to be able to make a very definitive, objective diagnosis."

Horse owners who might have an animal that could be donated to the research program can call Dr. Keegan at the MU Veterinary Equine Clinic at (573) 882-3513.

Columbia Man Named Director Of College's Development Office

Park Bay of Columbia, Mo. was recently named director of development for the MU College of Veterinary Medicine.

Mr. Bay was born on a crop and livestock farm near Tarkio, Mo. As a boy, he rode his horse to the country school. Before coming to MU as a student, he served in the U.S. Coast Guard in the Atlantic on both 40-ft. patrol vessels and ice breakers. At MU's College of Education, he majored in Industrial Education.

The classroom would not be in his future as the young graduate was snagged by Kansas

City's Farmland Industries as a retail fieldman (and later as co-op general manager). In this capacity, he provided Missouri agriculturists with feed, chemicals, and "whatever the farmer needed." Mr. Bay became one of his own customers, as he would later own a 120-acre farm near Woodlandville, Mo.

The bank officer who helped Mr. Bay with his financial needs asked him in for a visit. He was pleasantly surprised to learn that the bank officer wanted to recruit the young fieldman to the bank as its newest agriculture loan officer. That meeting led to a nearly 27-year career with First National Bank and Trust in Columbia, Mo.

Mr. Bay's goals for the MU College of Veterinary Medicine include strengthening an already impressive student scholarship program, funding several capital improvement programs, and "building lasting relationships with friends of the College of Veterinary Medicine."

Mr. Bay and wife Marjorie have three children, Charles, Janet, and Catherine who is currently attending college. When not at work, he is a member of his church choir (where he is a deacon), is the Lieutenant Governor of District 5 of Kiwanis International, sings with the Boonslick Chordbusters Chorus and The Overtones (a barber-shop quartet), and, in his spare time, farms.

Youngquist Named Top Theriogenologist

The American College of Theriogenologists (ACT)



Park Bay

recently named Dr. Robert S. Youngquist, a professor of veterinary medicine and surgery at MU, as the 2001 Theriogenologist of the Year. The award recognizes outstanding achievement in the field of animal reproduction research. The ACT is a veterinary specialty board recognized by the American Veterinary Medical Association in 1971 to certify veterinarians in theriogenology.

Dr. Youngquist has made major contributions to the field of theriogenology in research, teaching, and service activities during his career at the University of Missouri. He was the editor of *Current Therapy in Large Animal Theriogenology* published in 1997 by W.B. Saunders and has also served on the editorial boards of the *American Journal of Veterinary Research* and *Theriogenology*.

Dr. Youngquist received his DVM in 1971 from Iowa State University and earned the status of diplomate of the American College of

College

Theriogenologists in 1976. Since earning his diplomate status, he has been heavily involved with ACT, serving on the examination committee and as the college's secretary (1980-1983) and president (1984-1985). His interests include all domestic species, but his research has focused on normal and abnormal ovarian function in cattle.

Dr. Youngquist has a keen interest in working with students and has served as chairperson for six Masters students and on the committee for an additional 19 Masters students. He has twice received the Norden Award for Distinguished Teaching in Veterinary Medicine and in 1996 received the Dean's Impact Award.

The ACT also awarded Dr. Youngquist its 2001 David E. Bartlett Award, which is presented annually to a distinguished individual who has

made significant contributions to the field of theriogenology.

VMDL Associate Director Named ACVP President

Margaret "Peg" A. Miller, an associate professor in the Department of Veterinary Pathobiology and associate director of the College's Veterinary Medical Diagnostic Laboratory, was elected President of the American College of Veterinary Pathologists (ACVP) for 2002-2003.

The ACVP is the oldest and largest (with about 1,400 members) American Veterinary Medical Association-recognized specialty board. ACVP was established in 1948 to advance veterinary pathology, standardize training, and certify specialists by examination. It strives to improve and protect human and animal health for the betterment of society through excellence in veterinary pathology. Veterinary

pathologists participate in diverse activities including diagnosis of spontaneous diseases, training of veterinarians and pathologists, public health and regulatory work, and biomedical research.

Dr. Miller earned the DVM degree at MU in 1977 and a PhD from Washington State University in 1981. Professional interests include diagnostic pathology, investigations into mechanisms of toxic olfactory and pulmonary disease, and teaching pathology to veterinary students and residents. Certified in anatomic pathology by the ACVP in 1982, she has chaired or served on numerous committees in the organization, including the Examination Committee, Editorial Board, and Council.

Richmond Veterinary Student Receives Scholarship Award

Daniel Renfro, a third-year student at the MU College of

Veterinary Medicine, was one of 27 students nationally to receive a 2002 Western Veterinary Conference Student Award.

The award was presented in February in Las Vegas. Each recipient received a \$2,500 scholarship and a \$1,000 stipend to attend the conference.

"Student debt load is staggering," said Jack Walther, DVM, Western Veterinary Conference scholarship chairman. "At the same time, students need to be introduced to organized veterinary medicine in order to become interested in and become more involved in their profession."

The Western Veterinary Conference is one of the world's largest conferences for professional veterinarians and hospital staff. It offers courses to the profession in 42 clinical subject areas involving 22 animal species. **VMR**

New Histology Lab



Dr. Brian Frappier, clinical associate professor and recipient of the 2001 Kemper Foundation Fellowship for Excellence in Teaching award, sets up the first histology practical exam in the College's new histology laboratory in the Veterinary Medicine Building. The new lab replaces one downstairs in the same building that will be converted for research. The new histology laboratory features computers at each student station and overhead television screens. The televisions can show video or, in conjunction with the computers, what is being seen by the instructor's microscope. Students take tests on the computers which are then electronically graded.

What a

ROBOTS DOGG

*is telling
scientists
about the
human-animal
bond.*

Dr. Richard Meadows and Dr. Rebecca Johnson with Lady Jane



It's no secret that pets make people feel good. Today, scientific research has measured human chemical responses that indicate petting a dog can lower a person's blood pressure, owning a cat can positively change body chemistry, and caring for an animal will enhance the human body's immune system.

Those results pose an interesting question: Are these chemical changes the result of happy interaction or is there something within the living animal itself that triggers the response?

To find out, two scientists are asking a robot dog for help.

Dr. Richard Meadows, director of the University of Missouri's College of Veterinary Medicine's community practice section, and Dr. Rebecca Johnson, the Millsap Professor of Gerontological Nursing and Public Policy at MU's Sinclair School of Nursing, are the two scientists involved. They are conducting comparative studies to see if the beneficial human chemical changes that occur with dogs still happen if the animal is made out of metal and electronics.

The results could suggest new ways to treat a variety of human ailments like cancer and depression. Combined with other scientific studies, the results may also give new insight into ways to enhance other known byproducts of pleasurable human-animal interaction such as delaying the aging process, promoting better mental health, and even preventing medical problems.

The study began in September. Fifty pet owners and 50 non-pet owners will have their blood chemistry measured to establish a baseline. Their blood pressure will then be monitored

Lady Jane is just like any dog, except for the wires and computer chips

continuously as they interact with a real dog. When the blood pressure drops by five percent, indicating a change in body chemistry, blood will be drawn and measured for chemical indicators known to be associated with health and feelings of well being. The study will then be repeated with the robot dog and a control group.

The research team is also looking for similar chemical changes that occur in the living dog as they react with their owners.

The findings will then be compared, revealing something, perhaps, about the age-old mysteries of human-animal partnership.

Expanding on Earlier Discoveries

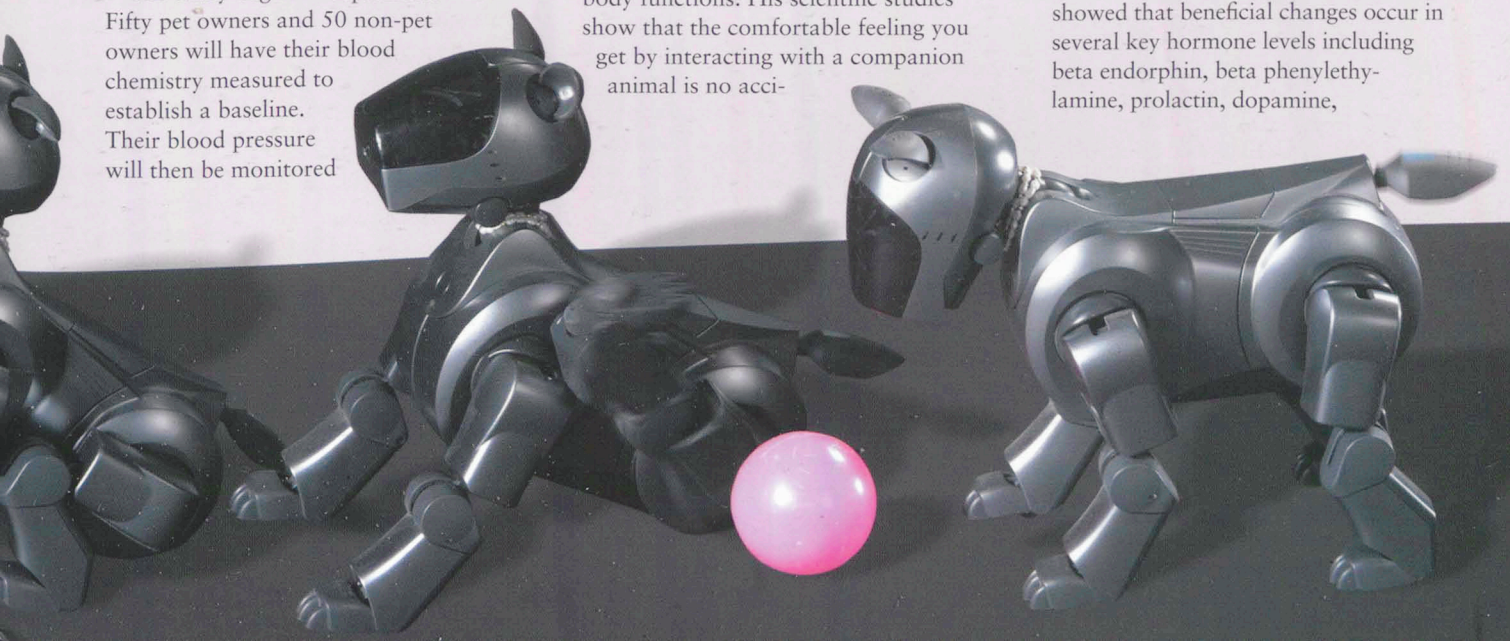
The MU work is an expansion of the scientific findings of Dr. Johannes Stefanus Joubert Odendaal of South Africa. His contribution to science is not merely noting that people feel better after interacting with an animal, but measuring the effect on human body functions. His scientific studies show that the comfortable feeling you get by interacting with a companion animal is no acci-

dent—it's chemistry. The effects go way beyond the warm and fuzzy.

Dr. Odendaal is a professor and research development director of the Life Sciences Institute, Technikon Pretoria, South Africa. He is uniquely qualified to pursue this research. His academic achievements have few rivals in the world. In addition to his veterinary medical degree, he holds no fewer than three other doctoral degrees: a DVSc (the equivalent to a PhD) in Veterinary Science, a DPhil in Psychology, and a PhD in Physiology. In 1993, he earned membership in the Royal College of Veterinary Surgeons, London.

Dr. Odendaal's latest scientific study involved six clinically-depressed people who were each given a dog visit for 30 minutes daily. The group's blood makeup was measured before introduction of the animal and found to be low in the amino acid precursors of chemicals that create pleasure and joy, serotonin, phenylethylamine, and dopamine. After the dogs were introduced, the amino acid precursors of these chemicals increased in their blood serum. The people also reported that they felt less depressed. This was the first time a therapeutic relationship between animals and humans had been scientifically measured. This pilot study could provide a safe, natural, and effective alternative to treating the clinically depressed with pharmaceuticals—without the attendant costs and side effects.

Earlier, groundbreaking studies showed that beneficial changes occur in several key hormone levels including beta endorphin, beta phenylethylamine, prolactin, dopamine,



ROBOT DOG...continued

and oxytocin within about 15 minutes of a positive interaction between animals and humans. The release of these chemicals not only makes people happy, but also decreases the stress hormone cortisol.

To many researchers, the most exciting facet of the Dr. Odendaal study is that positive human-animal interaction may delay production of bad body chemicals associated with diseases such as cancer. It's a double-whammy, too, as the study indicates an improvement in body chemicals associated with a healthy immune system. We may soon see a time when people at risk for certain cancers may be prescribed a pet to help delay onset of the disease, Dr. Odendaal said.

But, is it the living dog or the pleasant interaction that triggers the changes?

It is no accident that MU has connected with Dr. Odendaal. The MU College of Veterinary Medicine recently launched the Center for the Study of Animal Wellness (CSAW), a virtual center aimed at fostering research to demonstrate the beneficial effects of human-animal interaction. In association with the MU Sinclair School of Nursing, a major goal of CSAW is developing research models that reach across species and disciplines. For example, CSAW is looking into how interacting with a dog can affect anxiety, depression, fatigue, and sense of coherence among cancer patients.

Funded by Someone Who Knows the Significance

The study is being funded entirely through the non-profit Veterinary Pet Insurance Skeeter Foundation. The foundation is designed to help validate and promote the human-animal bond, perpetuate the positive effects that pets have on human health, and educate people about the immense value pets can provide to society. It was founded by Dr. Jack Stephens, a tough Oklahoma cowboy who went on to earn his DVM degree from the MU College of Veterinary Medicine and who later started Veterinary Pet Insurance.

Dr. Stephens is more than an interested sponsor. He'll tell you it was his connection to a little dog named Spanky that helped him survive his cancer.

Diagnosed with Stage 4 throat cancer, Dr. Stephens was given only six months to live in 1989. Initially, his little dog Spanky annoyed Dr. Stephens by demanding so much attention. He followed Dr. Stephens everywhere, including his radiation treatments. In Dr. Stephens' long sleepless nights that followed, Spanky seemed to know how to help. "Sometimes I'd be real sick afterward and he knew when, where, and how to approach me," Dr. Stephens said.

Spanky also made him exercise. "If he hadn't done that, I would have just sat around feeling sorry for myself," Dr. Stephens said. "That is the downward spiral of cancer that I think pets definitely help you overcome."

Spanky's insistence on interacting with Dr. Stephens over a long period of time raises an intriguing question—what if Dr. Stephens could have turned off Spanky as one might a robot dog?

Dr. Stephens' cancer is now in remission. He is so convinced of the medical benefits of animals that he has created a foundation to grant money to researchers investigating the healing power of pets—including the Center for the Study of Animal Wellness at the MU College of Veterinary Medicine.

Preliminary results of the study—to see if a flesh and blood dog is more beneficial to humans than happy interaction—will be available within a year.



Raising Lady Jane

The \$1,500 commercially-available robotic dog found its way to the MU College of Veterinary Medicine through some old friends, benefactors Ken and Barbara Levy of St. Louis. The animated robot was named Lady Jane in honor of the Levy's Cavalier King Charles Spaniel dog who had recently died. • It represents the latest in artificial intelligence—a computer's ability to sense its surroundings and learn from them. The computer's mission, aided by sonar and voice recognition software, is to sense the presence of people and interact with them in many of the same ways that a real dog might. Lady Jane also howls, cries, sneezes, shakes its body, and blinks its angry red and happy green eyes. A blue light near its tail indicates contentment. • Getting to the point where the mechanical dog could be used in the research study was a project in itself. The robot is programmed to come out of the box as an infant. As it learns, just like a real dog, it goes through different stages: toddler, childhood, adolescence, teenager, and adult. •

"When Lady Jane came out of the box, she did nothing but lay there and cry," said Dr. Rebecca Johnson. • Students assisted with the socialization of the robot, a process that took several months. The students stroked the sensors on the robot's back, chin, and feet. Occasionally, Lady Jane would react with flashing eyes and an electronic beep. Left alone, it would cry and squirm. • Lady Jane's programming finally decided to leave infancy and to stand up. "There were about seven or eight of us watching," Dr. Johnson said. "Suddenly, she stood up and took a step or two. Everyone applauded." • Adolescence was a terrible time for Lady Jane," Dr. Johnson recalled. "She was totally non-compliant. She wouldn't answer with her usual tones." • Lady Jane stayed so long in adolescence that the researchers thought there was a mechanical fault. The turning point came during a social gathering where Lady Jane apparently got over-stimulated and went under the sofa with her angry red lights flashing. • "She sort of went ballistic that night, so I put her on the charger," Dr. Johnson said. "The next day she raised her paw to signal she was going to be an adult."

Adding Value to the Food Animal Curriculum

Teaching student veterinarians ways to have a rewarding career

It's become a national problem. New veterinary medical students, who today mostly come from urban areas, are not as interested in food animal medicine, preferring small animal practices.

But food animal medicine can be a financially rewarding career. According to a recent survey published in the *Journal of the American Veterinary Medical Association*, the average starting salary for a small-animal veterinarian is \$45,817, whereas a new graduate in a large animal exclusive practice earns on average \$43,600—virtually identical.

And this isn't a statistical anomaly. In the two preceding surveys, incomes for new graduates entering large animal practices exceeded those of their small animal colleagues. When one looks at incomes for all veterinarians in private practice, the mean annual income of large animal veterinarians, \$79,602, exceeds that of small animal practitioners, \$75,669. Clearly, opportunities abound.

To prepare young Missouri veterinary medical students for a career in large animal medicine, the Food-Animal Section of the University of Missouri Veterinary Medical Teaching Hospital has instituted changes in its curriculum to ensure that students are not only prepared for large-animal work, but are aware of opportunities to make a good living at it.

New Roles, Opportunities, For Food-Animal Practitioners

In spite of rapid urbanization, Missouri is still a mostly rural state with a substantial part of the population relying on agriculture for their livelihood. The state's livestock and related products amount to more than \$2.5 billion in annual sales—almost 60 percent of the state's agricultural receipts.

“Missouri is home to more than two mil-

lion beef and dairy cattle, ensuring a stable and ongoing demand for food-animal practitioners,” says Dr. Jeff Tyler, head of MU's food-animal program. “Practice roles for food-animal veterinarians have broadened to encompass preventative health maintenance and consultation, as well as the traditional roles in diagnosis and treatment of individual livestock. These new functions for large-animal veterinarians have actually raised client and employer expectations, causing food animal careers to be among the most financially lucrative entry level careers in private practice,” he said.

Some of these additions to the MU curriculum strengthen the fiscal value of a veterinarian to producers, in addition to the expected medical skills.

For example, the coursework has increased emphasis on production medicine programs. Here, veterinarians team with the producers to determine ways to increase the yield of beef or dairy products. Several local producers have been enlisted to help in providing first-hand experience to the students.

Students also actively participate in the Show-Me Select Heifer Replacement Program, an undertaking by MU's extension service and others. This program creates added value for beef producers by enabling them to produce quality female replacements, rather than solely producing feeder calves.

Another program, a six-week elective course, instructs students on the theories and practice of commercial agriculture, giving students insight into the farm as a business and how scientific and statistical knowledge can impact the bottom line.

Veterinary students also participate in the management and care of a feeder calf

alliance in cooperation with Veterinary extension faculty and Brad White, MU DVM '97, who practices in Perryville, Mo. Dr. White has been an innovator and leader in this program which attempts to increase producer access to markets and secure premium prices for their products. “Under the direction of Dr. Loren Schultz, veterinary students have assumed responsibility for delivery of services to a local sale barn,” Dr. Tyler said. “This experience provides the students with greatly increased exposure to routine cattle handling, feeder calf processing, pregnancy diagnosis, and regulatory medicine.”

This curriculum is delivered in the MU teaching hospital's food animal clinic which remains one of the busiest such facilities in North America. The clinic's ambulatory caseload has also increased three-fold over the last five years—giving students a broad range of experience and exposure to career options.

In addition, as director of the program, Dr. Tyler has overseen an increased emphasis in food animal medicine and surgery in the pre-clinical curriculum. Moreover, two new elective courses have been added to the DVM curriculum, a food animal surgery course and a food animal medicine course.

And the program is having some tangible results.

“MU College of Veterinary Medicine student scores on the food animal component of the North American Veterinary Licensing Examination consistently surpass the national average,” Dr. Tyler said. “These accomplishments ensure that we will continue to prepare students for rewarding careers serving the livestock industry of Missouri.” **VMR**



Canine Melanoma Research May Translate to Humans



Carolyn Henry, DVM, and Clay Anderson, MD

From Lassie to Rin Tin Tin, stories abound about dogs that heroically save their masters' lives by braving icy waters or running for miles to find help. But with research currently being conducted at the University of Missouri College of Veterinary Medicine, new stories are being written about dogs who save lives in a more scientific way.

Carolyn Henry, DVM and assistant professor at the College, heads a project designed to measure the effectiveness of immunotherapy on dogs who have been diagnosed with oral melanoma. If the vaccine proves to be successful, this research may have a profound effect on

the ability to control and eliminate melanoma in humans, too.

Melanoma, a particularly dangerous type of skin cancer, is the fastest growing form of cancer in the United States. It affects people, dogs, and other species. When left untreated, malignant melanoma can spread to other organs with fatal consequences. Current treatments include surgery, radiation, and chemotherapy.

Although vaccines have been used to prevent diseases for nearly a hundred years, treating melanoma and other cancers by vaccine is a relatively untapped concept being tested in clinical trials. Dr. Henry's research, one

of only a handful of trials in the nation involving dogs, is among the most promising.

Dr. Henry's project began in February 1999 with the aid of Jim Schwarz, MD, an oncology fellow at MU's Ellis Fischel Cancer Center, and Drs. Mary Lynn Higginbotham and Dudley McCaw, oncology residents at MU's Veterinary Medical Teaching Hospital. The team's plan was to create vaccines using malignant cells taken from pets with melanoma. Once those cells were removed from the affected dogs, they were to be irradiated and combined with a viral vector to form a tumor cell vaccine. The cells would have

produced GM-CSF, a substance that can activate the patient's immune system and induce natural killer immune cells. The vaccine was then to be reintroduced into the dogs' systems by injection, ideally fighting the malignant melanoma cells through this immune system activation.

Early tests suggested that, although this approach may be effective, the creation of individualized vaccines could become problematic in terms of both time and money. So, a more manageable method was adopted.

Instead of making custom vaccines for each dog, the new approach involved the creation of single vaccine from the malignant melanoma cells of two dif-

ferent dogs. This new vaccine, technically described as an allogeneic vaccine, would then be used to treat all of the other dogs involved in the clinical trial. This change provided several benefits for researchers. First, more dogs could be included in the program, and investigators also could test a single vaccine in animals with varying degrees of melanoma occurrence.

To date, approximately 25 dogs have undergone the eight-week vaccine process. No significant negative side effects have been documented, and improvement has been noted in some of the participating pets.

"It is important to point out that the dogs involved in these studies are all companion animals," Dr. Henry says. "They live at home and are brought in by their owners for weekly vaccinations. Their cancers appeared spontaneously in a real-world environment, just like people get cancer in everyday life."

According to Dr. Henry, the fact that oral melanoma in dogs closely resembles cutaneous melanoma in humans makes her study compatible with research currently being conducted at Ellis Fischel. In essence, the research on dogs may serve as a useful precursor to related studies

involving human patients.

"This type of study can be implemented in a time frame substantially shorter than similar studies in human patients," Dr. Henry says. "And, during that period of time, we can work out specifics of testing, such as dosage, methods of measurement, and possible negative side effects. This type of research has the potential to affect a variety of human melanoma vaccine studies being conducted around the country."

Some of these human studies are being directed by Clay Anderson, MD, an assistant professor of hematology and oncology at Ellis Fischel. Although there is no direct link at this time between the results of the MU veterinary studies and Dr. Anderson's human research, he is keenly aware of Dr. Henry's work.

"Right now, faculty and staff members of the College of Veterinary Medicine, the School of Medicine, the Research Reactor Center, Ellis Fischel, and other parts of the MU campus share research dollars and ideas and function as a sort-of 'virtual' cancer center," Dr. Anderson said.

"Given the direction that our current efforts are headed, it is very realis-

tic to expect that we could take a project from test tube to animal research to human testing and on to a final licensed product all on this campus within the very near future. This multi-pronged approach makes research more effective and less toxic to humans. And, when we help dogs along the way, that's the real benefit."

The mutually beneficial nature of such translational research may be illustrated best by the story of Murphy, a cairn terrier with skin cancer treated by Dr. Henry. Murphy had been referred by a veterinarian in Missouri after a malignancy was diagnosed. During that same period of time, Murphy's owner also was diagnosed with cancer and had just begun chemotherapy.

"It was an unusual relationship that existed between those two," Dr. Henry recalls. "Somehow the hopefulness of the treatment we were providing to Murphy gave his owner an added dimension of confidence in his own fight against cancer. And, undoubtedly, the extra care shown to Murphy by his obviously empathetic owner helped the dog throughout the course of therapy."

VMR

► Canine Cancer Clinical Trial Started

The MU College of Veterinary Medicine is participating in a clinical trial designed to assess the ability of a gene-based therapy to cause remission of oral melanomas in dogs.

In preliminary studies, this therapy caused shrinkage or elimination of melanomas. Only mild side effects were noted. In this study, lipid-formulated genes encoding the immune stimulants *Staphylococcus aureus* enterotoxin A and canine interleukin-2 are injected into the dog's tumor. The immune stimulants produced in the tumor then initiate or boost the dog's own immune response to the cancer.

The product used, an intratumor gene therapy, is intended as an adjunct to surgery, the standard of care for oral melanoma. Therapy includes up to six weekly intratumoral injections, surgical removal of any residual tumor (if necessary), followed by four post surgical injections.

Patients that qualify for this clinical trial must:

- Have the presence of a tumor that is accessible for injection and potentially removable by surgery.
- Have no local or distant metastasis detected.
- Not be undergoing concurrent radiation, chemotherapy, holistic therapies, supplement therapy, or cancer diets.
- Meet other qualifications that may apply.

These trials are being conducted at multiple clinical sites. Veterinarians who have a patient that may benefit from participation in this trial should contact the oncology clinical trials service at the MU VMTH, 573/882-7821. Owners of animals who may qualify should contact their veterinarian.

Other members of the MU Veterinary Medical Teaching Hospital oncology team include Dr. Dudley McCaw (left), and surgeon Dr. Eric Pope (center) and Dr. Carolyn Henry (right).



It's always been difficult to think about documenting and preserving history when you're knee deep in emergencies and running a veterinary business. Consequently, most veterinary artifacts that survive from earlier times tend to be hard steel and wood pieces of equipment—tangible things that endure for decades.

Softer things—information, locations of clinics, old photos, and even the clothing of previous generations—are often lost in time.

Old postcards, treasured and saved by their recipients, are one soft artifact that has endured to give a glimpse into the past. The photos and brief descriptions of buildings, people, and equipment of long ago are often the only remaining visual record of something



that was once important.

Postcards about Missouri veterinary medicine have survived because of the dedication of the director of library services at the University of Missouri College of Veterinary Medicine, Trenton Boyd. A “persistent deltiologist,” i.e., postcard collector, he has more than 52,000 cards in his collection. About 3,000 deal with veterinary medicine in general, with a couple hundred of those with Missouri's veterinary medical history in particular.

Those few hundred cards give a rare glimpse into the profession's past—veterinarians in bowler hats and ties, horse-drawn ambulances for cows, and patent medicines that may, or may not have, have had real medicinal value. Sometimes, it is the paper postcard that remains when bricks and mortar are long gone, such as the case of the

Kansas City Veterinary College.

The importance of postcards as history is not unrecognized. In 1994, Mr. Boyd addressed the 27th International Symposium on the History of Veterinary Medicine on the importance of postcards as a tool to document history.

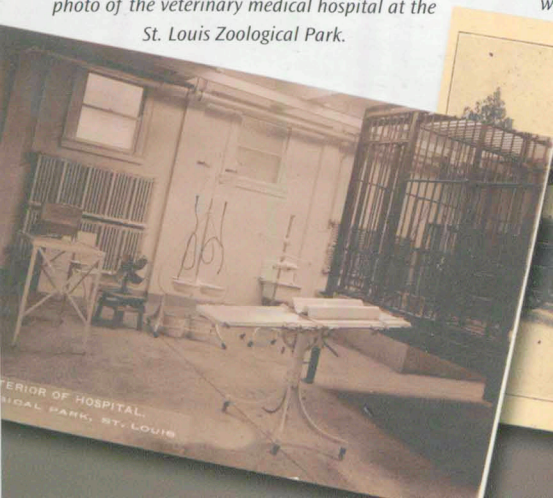
His interest in collecting postcards was sparked while collecting pictorial memorabilia on Missouri in the 1970's, when he stumbled across a postcard of a 1930's clinic in Springfield, Mo. The resulting collection, now stored in a fire-resistant room in his home, is categorized into such areas as veterinary medical schools, veterinary museums, veterinarians at

POS



Zoo Medicine

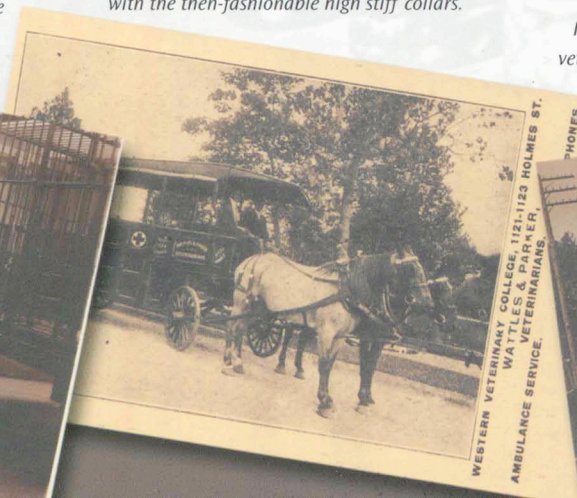
Zoo medicine in the early 20th Century featured few technological aids that are common today. A stout steel cage, an Emerson Electric fan, and a wheeled examination table were the most modern devices in this early photo of the veterinary medical hospital at the St. Louis Zoological Park.



Horse-Drawn Ambulances

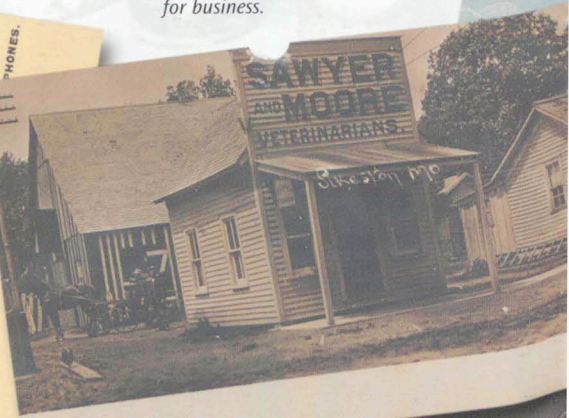
The Western Veterinary College on Holmes Road in Kansas City operated a two-horse ambulance in the days before World War I. Their vehicle was large enough to carry both bovine and equine patients.

The ambulance was operated by veterinarians Wattles and Parker, probably seen in this picture with the then-fashionable high stiff collars.



Dirt Streets

In the days before Sikeston, Mo. paved its streets, veterinarians Sawyer and Moore put up their shingle for business.



work, reminder cards, the military, and veterinary humor. Some professors at both the College and University have used slides of his postcards to accompany lectures. Mr. Boyd's cards on teratology, animal birth defects, may be one of the best single visual sources of the subject in the nation.

Mr. Boyd has several collectors keeping an eye out for anything to do with veterinary medicine. He's traveled to Europe several times to leaf through collections there.

Postcards are sometimes imperfect sentinels of history, Mr. Boyd says. Only about half of the cards are dated or have some written description. Postcard collectors, and histo-

rians, can examine the card's design, paper, and printing methods for clues. Most often, Mr. Boyd can determine the age of an undated card to within 10 years. Often, a close study of the photograph will yield information about the lives of veterinary practitioners of old. One postcard of a Dr. Herman F. Sass, veterinary surgeon and dentist, proudly shows his two-story facility and a new horseless carriage next to a somewhat worn horse-drawn vehicle. The cancellation mark over the stamp indicates the approximate year when one veterinarian may



have graduated into the motorized 20th century.

"A friend of mine at the Missouri Historical Society told me that one of the best ways to document history is through photographs and these images," Mr. Boyd said. **VMR**

From the Past POSTCARDS

A Collection of Old Postcards Is a Rare Opportunity To See Missouri Veterinary Medicine the Way It Once Was

Model-T Ford

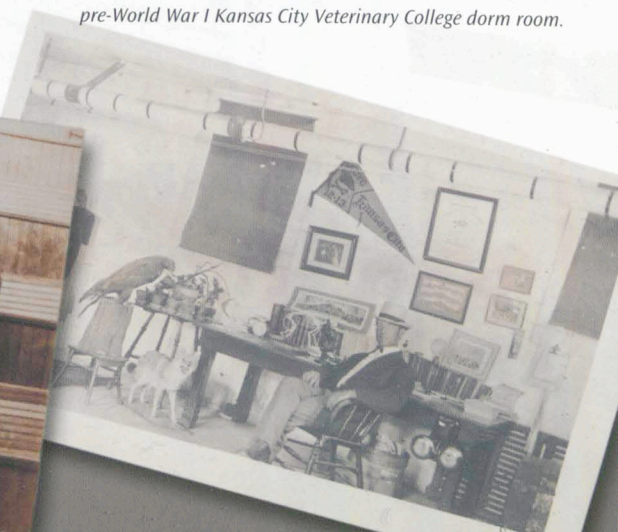
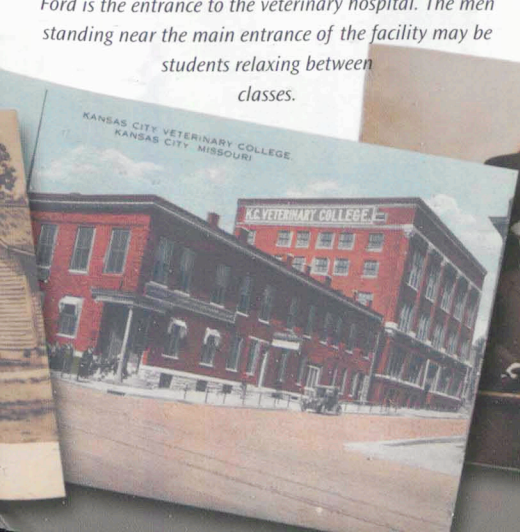
With an early version of the Ford Model T parked nearby, the Kansas City Veterinary College was the subject of a hand-painted postcard, probably circa 1915. Just to the left of the Ford is the entrance to the veterinary hospital. The men standing near the main entrance of the facility may be students relaxing between classes.

Bowler Hats

The Kansas City Veterinary College Class of 1911 shows off their Bowler hats.

Pre-War College Dorm

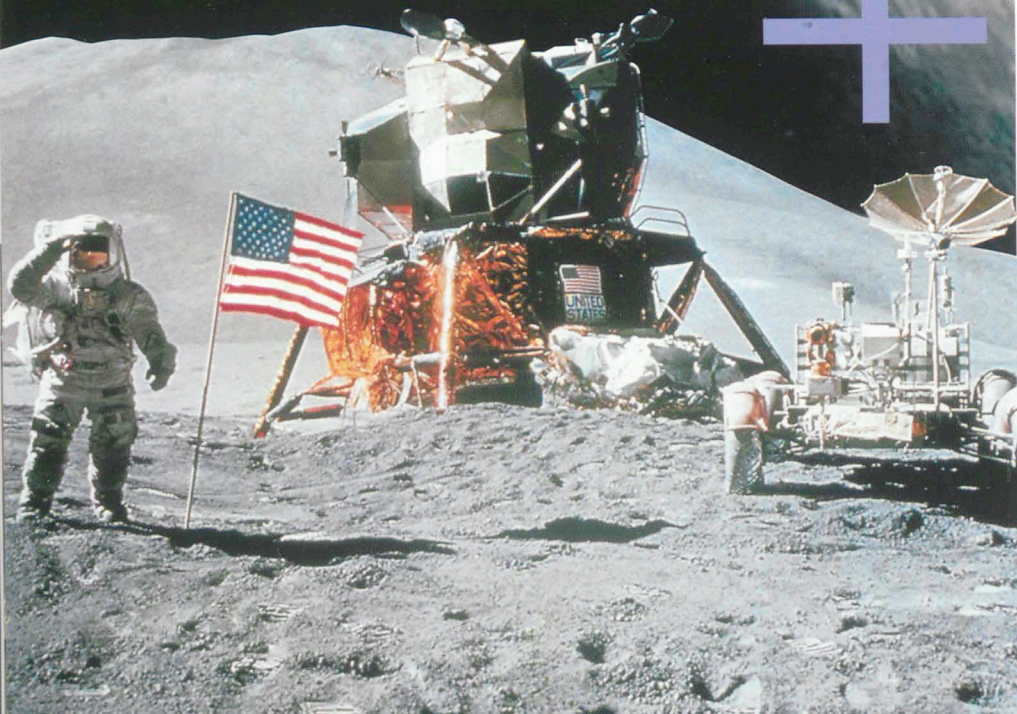
All the comforts of home: books, class photos, specimen slides, plants, a few stuffed animals, a snazzy hat, a wash tub for a wastebasket, and a desk with an alarm bell. A scene from a pre-World War I Kansas City Veterinary College dorm room.



Exploring Gender Differences in

Space Flight

A New College Research Project Will Help Future Astronauts During Long Voyages



Humans have never been a stationary bunch. Before the nineteenth century ended, every corner of Earth had been visited by at least one group of explorers.

Today, humans have a permanent presence in space with routine shuttle flights to an international space station. There are early discussions of going to Mars.

Like explorers of old, there are obstacles for the newest pioneers to overcome. One is the gap in understanding of gender differences as they relate to the harsh environment of space. The last ten years of space faring have shown significant variations between men and women in zero-G functions of the heart, lungs, brain, and nerves. The biological basis for these differences is unknown.

With more than a quarter of the astronaut corps being women, a better understanding of these differences will be needed before the long-duration space missions now envisioned will ever occur.

This summer, NASA awarded a \$3.5 million grant to help establish the University of Missouri's Center for Gender Physiology and Environmental Adaptation (CGPEA). The CGPEA is a joint effort by the MU School of Medicine, College of Veterinary Medicine, Sinclair School of Nursing, College of Engineering, College of Agriculture, and College of Arts and Sciences. The director of this new center is Dr. Meredith Hay, associate professor in biomedical sciences and physiology.

Dr. Hay says that MU is uniquely positioned to conduct this type of research because of its demonstrated and nationally recognized interdisciplinary abilities in cardiovascular sciences, neurosciences, endocrinology, and musculo-skeletal research. The College of Veterinary Medicine is already involved in various research programs in these areas. The CGPEA is going to heavily rely on the College's research and that at the new MU Life Sciences Center. The initial focus will be on understanding the differences between males and females regarding molecular and cellular responses to differing environments and how the human body copes with these challenges.

Exploring the Differences

Women returning to Earth's gravity from space have experienced some unique problems, mostly in the regulation of blood pressure and spatial re-orientation, says Dr. Hay. Other differences between male and female astronauts have shown up in cognitive func-

tion, balance, central nervous system operation, bone density, muscle strength, and, maybe, how the body ages. Many of these problems also are manifested in men returning to space, but not always to the same degree or duration as with women.

On the other hand, women astronauts may be better physiologically adapted in immune system functions and radiation sensitivity than males. Understanding why the differences occur may give future researchers clues on how to better prepare explorers of both genders for long-duration space flight.

The initial six research programs by the CGPEA will concentrate on understanding life processes at the molecular and cellular level—something in which the MU College of Veterinary Medicine is already engaged. In fact, of CGPEA's first six projects, half will be conducted on MU's veterinary medical campus.

For example, Dr. Virginia Huxley, professor of physiology and an adjunct faculty member at the College of Veterinary Medicine, will be investigating sex differences in micro-vascular permeability. This can help determine coronary differences in space flight. Dr. Doug Bowles, assistant professor in the college's biomedical sciences department will be investigating how micro-gravity accelerates vascular disease. Dr. Leona Rubin, also an associate professor in biomedical sciences, will be looking into the influence of sex steroids on muscle atrophy during zero-G. Dr. Hay's own research will focus on sex-hormone influence on regions of the brain involved in blood pressure regulation. In addition, Dr. Tim Jones, professor of physiology, will study sex differences in the central nervous system mechanisms regulating balance. Dr. V.K. Ganjam, professor of biomedical sciences specializing in endocrinology and reproductive physiology, will have the major responsibility for the management of the Hormone Assay Core which will assay hormone levels in the mice, rats, and pigs used in the various studies.



Meredith Hay received her Master's degree in Neurobiology and PhD in Cardiovascular Pharmacology from the University of Texas Health Sciences Center in San Antonio. Her post-doctoral work occurred at the University of Iowa and the Baylor College of Medicine. She returned to San Antonio for an appointment as a faculty member in the Department of Physiology. In 1996 she was recruited as a faculty member for the University of Missouri's Department of Veterinary Biomedical Sciences. She researches how neurons help regulate blood pressure—an important part of understanding the causes of certain forms of hypertension. It was during this research that she first noticed how gender differences influence certain disease problems.

Dr. Rubin's work will dovetail with ongoing research on cardiovascular disease and exercise at the college. Here, age-matched and littermate pigs will be tested with skin patches introducing various supplemental estrogen and testosterone doses. The pigs will then go from a sedentary to a physically active mode—the best replication on Earth of the transition from zero-G to gravity—to see if such hormonal changes can help prevent problems.

Dr. Marybeth Brown, an associate professor in physical therapy whose research laboratory is at the College of Veterinary Medicine, is already studying sex and age differences in the loss of bone and muscle strength on Earth. The loss of bone and muscle strength during space flight and the time needed to recover bone loss following space flight is much greater in women than in men. Here on Earth, independent of age, post-

menopausal women are more than twice as likely to develop osteoporosis. Knowing why these sex-based differences in bone loss occur will help future astronauts on long-duration flights.

Benefits On Earth

Data from these studies also may have important benefits back on Earth. "Our research will be looking at the structural and functional differences found at the system, organ, tissue, cellular, and sub-cellular levels, as well as differences in response to pharmaceuticals," Dr. Hay says. "Recent findings from these studies are beginning to provide a rational basis for many sex-related differences in disease epidemiology and health outcomes. Sex-based biology has the potential to revolutionize the way in which we understand health and treatment of disease for both men and women."

One space-oriented study that could have earthly benefits involves the fact that women are more susceptible to problems of returning from micro- to full-gravity. These problems include post-flight cardiovascular complications, bone loss, orientation difficulties, confused cognitive functions, and reduced immune function similar to aging. A better understanding of these problems could help increase the average lifespan of people on earth or help people recovering from long periods of being bedridden.

Another potential area for discovery is the gender differences in cardiovascular disease, something that claimed the lives of about 504,000 men and 446,000 women in 1998. "While heart disease is the leading cause of death in both men and women," Dr. Hay said, "44 percent of women versus 27 percent of men die within a year after a heart attack. Similarly, women are up to 70 percent more likely to develop lung cancer than men when exposed to similar levels of cigarette smoke. There is a wide gap in our knowledge of why these differences exist."

By pursuing such knowledge, humans will be continuing their historic role of exploration. **VMR**



Micro-surgery is accomplished with the use of a microscope. Dr. Narfstrom, left, injects a protein into the eye of one of the Briard Beagles.

Bringing Sight to Blind Dogs

Candy, Snoopy, Faithful, Rex, Buddy, and Checkers have a lot in common. They have the floppy ears and mournful eyes typical of Briard Beagle mixed-breed dogs. Like any dogs, they enjoy their meals and playtime.

They also share one unfortunate trait: they are blind. Blind since birth because of a genetic defect found in this breed of dogs. A mutation of a gene prevents production of a protein, RPR65, in their retinas. This leaves their retinas with abnormally developed cells that don't function normally. In humans, this disease is known as Leber's Congenital Amaurosis (LCA) and accounts for up to 20 percent

of blindness in children.

Starting a warm day in June at the University of Missouri's College of Veterinary Medicine, the dogs (and friends Lady, Gip, Odie, Lufsen, and Alonzo) underwent a micro-surgical technique to replace the protein lacking in their eyes. The MU surgical and research team's goal was to scientifically prove that such a technique would be an effective treatment.

Only four weeks after surgery, the dogs started responding to visual cues. They seemed to recognize the veterinary medical students who came to play with them. They reacted to light and movement and didn't bump into things as often as they had before. Scientific measurements of

their retinas' responses to light stimuli indicated more tangible evidence. After only one treatment, a part of the dogs' retinas had gained some visual function—some up to 30 percent of normal sight.

The results were remarkable news to the international scientific team that had pioneered the procedure. With this critical result, there was evidence that children blinded by LCA may someday be treated and gain some vision.

An International Effort

The scientists who made the procedure possible on that warm June day in Columbia, Missouri came from all over the world and were led by Dr. Kristina Narfstrom, the MU College of Veterinary Medicine's Ruth M. Kraeuchi-Missouri Professor in Veterinary Ophthalmology. A DVM and PhD, Dr. Narfstrom is an acknowledged researcher and teacher in the structural and functional aspects of retinal cell biology, comparative aspects of clinical retinal disease, and intraocular microsurgery.



Bonus, one of the dogs who underwent the micro-surgery in June, continues to adjust to a world of vision.

Dr. Narfstrom has been researching LCA for 15 years since she first found a strain of dogs in her native Sweden that carried the analogous genetic disease. Since then, she has teamed with other collaborators to identify clues about the origin of the problem and how it might be

cured. Dr. Narfstrom has lectured around the world on retinal diseases and other eye problems for more than two decades. She joined the MU College of Veterinary Medicine in February 2001 to continue her research and to head the College's efforts in comparative ophthalmology—the teaming of human and veterinary vision researchers to find cures for vision problems that afflict a variety of species.

Her worldwide LCA research team hailed from Norway, Australia, Sweden, Germany, and the US. Each added a critical element to the research.

MD, PhD and Ophthalmologist, Ragnheider Bragadottir, a specialist in vitreo-retinal surgery from Ullevål University Hospital in Oslo, Norway, provided procedures for the micro-surgery. T.M. Redmond, a PhD from the US's National Eye Institute, Bethesda, Maryland, created the missing RPR65 protein. E.P. Rakoczy, PhD, from the Lyons Eye Institute, Perth, Australia, developed the process to transport the protein into the photoreceptor cells. Mathias Seeliger, MD, PhD from the University Hospital in Tuebingen, Germany, joined with colleague Martin Katz, PhD, associate professor of ophthalmology at MU's Mason Eye Institute, on other aspects of the research.

A procedure to replace a missing protein sounds easy enough, but required years of intense research and hard work—especially since the replacement surgery is done inside a living eye.

Not As Simple As It Sounds

It has been thought, and now largely proven, that many human and animal diseases are caused by damaged or missing genes. Like a computer software command that is scrambled, the intended function of the gene never fully occurs or causes something adverse to happen. Sometimes, these broken genes, which appear like a string of pearls on the chromosome, are passed from parents to children and the genetic problem is hereditary. LCA is such a hereditary disease.

Having a map of genes and their functions has opened a new era in the treatment of disease and offers hope to sufferers of a myriad of medical problems from cancer to heart disease. Specific genes are even known to influence the aging process.

For the blind Briard Beagle dogs, the initial key discovery was finding the one specific defective gene, from billions of other genes, that caused the missing protein in the retina. The groundwork for this finding was laid by Dr. Narfstrom and colleagues who used discoveries in both canine and human genome-mapping to home in on the damaged LCA gene. It was from this point that Dr. Narfstrom and her international team started their work toward a surgical procedure.

The MU procedure to get the missing protein in the eye was a major hurdle. The solution came from Dr. Rakoczy who



Dr. Kristina Narfstrom is a 1973 DVM graduate from the Royal Veterinary College, Stockholm, Sweden. She earned her Veterinary Medical

Doctorate (VMD), a degree equivalent to a PhD, from the Department of Ophthalmology, University Hospital of Linköping, Sweden. Further research rendered her the title Docent in 1986. In 1992, she qualified for board certification in the European College of Veterinary Ophthalmology and, the same year, obtained a full Professorship at the Department of Medicine and Surgery at the Swedish University of Agricultural Sciences, Uppsala, Sweden. She was appointed the Ruth M. Kraeuchi—Missouri Professor of Veterinary Ophthalmology at the University of Missouri-Columbia, Feb. 1, 2001.

developed a benign virus to carry the protein into the retinal cells. Getting the protein precisely into the dog retina via a micro-surgery injection without damaging other structures of the eye was one of Dr. Bragadottir's contributions. The protein, itself, was developed by Dr. Redmond.

The theory was that once the protein is in the cell, it begins to integrate with other proteins. The protein acts like a missing piece in a machine, clicking itself into place, Dr. Narfstrom says. When the chemical "machinery" in the cells begin to act normally, they produce another key protein for vision, rhodopsin.

With the machinery fully at work, the team hoped, photoreceptors would start to transform light energy into electrical impulses that change into neural signals that are sent to the brain—thus, making vision possible.

Initial results on the MU dogs indicate that is exactly what happened. Interestingly, a few weeks after the treatment to one eye, the other untreated eye began to exhibit signs of responding to light. This fact indicates to Dr. Narfstrom that the missing gene may be able to find its way through a method other than direct injection, perhaps through the blood stream. If so, the complexity of future treatments

could be far less difficult and expensive, and future possible FDA approvals could occur more quickly.

The Next Steps

With the positive early results, Dr. Narfstrom is beginning to think about the next steps in her research—investigating if the techniques will work with other vision problems.

LCA is a subset of a larger group of vision problems known collectively as tapeto-retinal degenerations, the most prevalent being Retinitis Pigmentosa (RP). Other RP problems include Usher's syndrome that appears during the teen years and is typified by severe and progressive peripheral vision and hearing loss.

Dr. Narfstrom said that all forms of RP seem to be

genetic in their origin and could, therefore, respond to genetic therapy as in the case of her dog patients. "The results of our work is important because this is the first time that we can scientifically verify that a hereditary retinal disease has been successfully treated," says Dr. Narfstrom. "It's exciting because of its application to other similar diseases."

While the first results are promising, years' more work needs to be done before veterinary and human medical treatments can be considered.

Dr. Narfstrom's team is wrestling with a new set of questions now that the initial clinical results are known: Will additional or different procedures produce more sight than the 30 percent gained by one treatment? Will the results be permanent? Will there be any unexpected adverse effects? Retinal cell transplantation experiments report some immune reactions against transplanted tissue—something that has not been seen yet in the MU dogs.

So far, however, none of the major scientific fears have surfaced, and the 11 dogs remain healthy and happy and continue to adjust to their new world of light and movement. **VMR**



Dr. Philip Johnson and veterinary medical students discuss the diagnosis of a horse at the MU College of Veterinary Medicine's equine clinic. Other team members who assisted Dr. Johnson in identifying Equine Metabolic Syndrome were Dr. Simon Slight and Dr. V.K. Ganjam, of the college's biomedical sciences department; Dr. John Kreeger in the Veterinary Medical Diagnostic Laboratory; Dr. Nat Messer and Dr. Andria Cogswell in the equine medicine section of the MU Veterinary Medical Teaching Hospital; and Dr. Preston Buff and Dr. Duane Keisler in the MU Animal Sciences Unit. Dr. Johnson's research received funding from the Animal Health Foundation of St. Louis and the American Quarter Horse Association.

It's an ancient phrase spoken by horsemen on the steppes of Russia, the Mongolian desert, Japanese mountains, and the Great American West: No Hoof, No Horse. Since ancient times, the puzzling disease of laminitis has destroyed the horse's ability to transport people, usually giving that horse a death sentence in the cruel economics of survival.

Today, researchers from the University of Missouri's College of Veterinary Medicine Equine Section have identified a clue to this centuries-old problem. A form of Cushing's disease may help explain why obesity increases a horse's risk of developing laminitis.

The researchers made their discovery while investigating classic Cushing's disease, a condition in horses and people caused by a tumor of the pituitary gland. The tumor causes an overproduction of glucocorticoid hormones, particularly cortisol. In horses, this imbalance often causes abnormal hair growth and the development of pockets of body fat on their crest and rump. Cushing's disease is also associated with an increased risk of laminitis.

*New Syndrome, Old Solutions
For An Ancient Equine Disease*

LAMINITIS



Laminitis, A Disease That Has Baffled Veterinarians for Centuries, May Finally Be Better Understood

Clues From Human Medicine

Dr. Philip Johnson, professor of equine veterinary medicine and surgery, was intrigued that some horses develop characteristics associated with Cushing's, even though they have no tumor and test negative for the disorder. The researcher, and a team of colleagues, suspected that something other than a pituitary tumor caused excess cortisol production in these horses.

The team borrowed from human medical research showing that the fat tissue that accumulates in certain obese people has the remarkable ability to convert an inactivated and plentiful hormone, cortisone, back into its active form, cortisol.

"The conversion of cortisone to cortisol is the result of erratic regulation of the hormone by an enzyme called 11-beta hydroxysteroid dehydrogenase (HSD)," Dr. Johnson said. "As their fat tissues produce more and more cortisol, affected people develop Cushing's-like symptoms, such as upper-body obesity, fatigue, depression, even though they have no glandular abnormalities or tumors. They are also hypertensive—high blood pres-

sure—and at risk for atherosclerosis "hardening of the arteries"

Armed with these findings, Dr. Johnson and his team began to examine the relationship between a horse's body shape, the level of glucocorticoids in his system, the presence of Cushing's disease and his risk for laminitis.

"There is a well-recognized syndrome in which laminitis affects sedentary, mature horses in conjunction with the development of obesity," Dr. Johnson said, explaining that his team wanted to see whether fat alone affected critical hormone levels in horses.

His team developed a test to measure levels of HSD in horses, looking specifically for the form of the enzyme responsible for converting inactive cortisone into cortisol. They compared levels of HSD in skin and hoof tissues of healthy and laminitic horses. HSD levels in the laminitic horses were markedly higher. "These results suggest that elevated cortisol production by peripheral fat tissues—or maybe just the peripheral tissues—could play a role in certain types of laminitis in horses," he said.

No Hairy Coats

The MU team has given their discovery the name Equine Metabolic Syndrome. The condition is easy to mistake for classic Cushing's disease, Dr. Johnson said, but has some key differences. "These horses do not have tumors of the pituitary gland, they do not have elevated levels of circulating cortisol—the levels are elevated only in certain (peripheral) tissues—they do not get thin and they do not get hairy coats. Nor do these horses respond to treatment that readily controls classic Cushing's syndrome," he said. "Horses with Equine Metabolic Syndrome also tend to be younger, eight to eighteen years, than horses with pituitary-type Cushing's Syndrome."

Like classic Cushing's, however, Equine Metabolic Syndrome in horses appears to correspond with a human disorder—in this case, adult-onset (type 2) diabetes.

"Adult-onset diabetes in humans is believed to arise as a result of sedentary life style and eating too much (especially a high glycemic diet) for the level of activity. There are also some genetic predispositions," Dr. Johnson said, adding that poor peripheral circulation and skin diseases are common complications of this condition in people with diabetes and there may be parallels in horses as well.

Equine Metabolic Syndrome is probably very common in horses, Dr. Johnson observed. Horses most likely to have the condition include "easy keepers" and others who are difficult to keep trim. More studies are needed, he says, to fully understand Equine Metabolic Syndrome and to develop effective treatments for it.

In the meantime, Dr. Johnson recommends that the owners of at-risk horses keep them on a commonsense regimen that combines a high-fiber diet with plenty of exercise. Sound familiar? That's because it's the same sort of program human health advocates have been promoting for years. "The bottom line is that horses, like people, should not be allowed to get too fat, their activity should not be restricted and high-glycemic index diets should be avoided," says Dr. Johnson. "For horses, this means rich, grain-laden diets as opposed to forage-based rations," he said.



Should All Other Efforts Fail to Save the African Elephant From Extinction, a MU College of Veterinary Medicine Professor May Offer the Species a Last Chance Through Cryopreservation

Dr. John Critser is a member of the American Society of Zoological Parks and Aquariums, American Association of Tissue Banks, American Society of Andrology, Society for the Study of Reproduction, Society for Cryobiology, and Sigma Xi. He is currently a member of the Cryobiology Society Board of Governors and a member of the NIH's NCCR Comparative Medicine Study Section.

Last Hope for the African Elephant



The African elephant, the largest living land animal and prized for its ivory tusks, faces

extinction at the hands of poachers and habitat loss due to human population pressure.

There may have been five million African elephants in the 1940's. Probably one-twentieth of that number remain today. World organizations are desperately working to create preserves and develop techniques to increase the animals' ability to reproduce.

Should these efforts fail and the species slip into extinction, the African elephant has one last chance at survival. In freezers at the University of Missouri-Columbia College of Veterinary Medicine, nine time zones away from Africa, are probably the largest collection of genetic materials from the species. Should the last African elephant die, these "banked" materials could be used to artificially inseminate other elephant breeds to create a new generation.

Leading this last-chance effort is one of the world's recognized experts in the field of cryopreservation, John Critser, PhD.

Last year Dr. Critser was named the MU College of Veterinary Medicine's Gilbreath-McLorn Professor of Comparative Medicine with the mission of developing a comparative medicine program at MU.

Here, he will lead collaborative efforts by the MU colleges of veterinary medicine, medicine, engineering, and other life science programs to develop new ways to investigate and treat disease. Dr. Critser's personal research interests are mostly in the cryobiology and reproductive biology area. Saving elephants is one of numerous projects.

"We may be losing one animal species every hour or every two hours every day," Dr. Critser says. "There is a growing interest in finding ways to preserve the genetic material from rare and endangered species, with the intent to both study the genetic information and to reintroduce it into the population through planned breeding programs."

Dr. Critser was awarded his PhD from the University of Wisconsin-Madison in 1985. From 1985-1987, he was a fellow in the department of obstetrics and gynecology at the Mayo Clinic. From 1997 until 2001, Dr. Critser was also the director of the Cryobiology Research Institute there. He holds nine patents—mostly in the cryoreproductive area.

Before coming to MU, Dr. Critser was a professor in the departments of pathology and laboratory medicine, obstetrics and gynecology, and microbiology and immunology at the Indiana University School of Medicine. Since 1989, he has worked with a number of zoos—including

Chicago's Brookfield Zoo, the Smithsonian National Zoo in Washington, D.C., and the Indianapolis Zoo—to boost captive breeding programs using artificial reproduction techniques.

Cryopreservation

What is cryopreservation? The freezing of tissue at super cold temperatures is a technique used by scientists since the 1700's. It puts the cells in suspended animation. Unfortunately, freezing so damages the living material inside the cells as to make impossible any attempt to reinvigorate life.

In the mid 1900's, cryobiology science improved rapidly with the discovery of cryoprotectant substances, typically glycerol, dimethyl sulfoxide, or ethylene glycol, that were added to cell freezing solutions. Semen, embryos, and other cells and tissue from animals and humans could now be preserved with the expectation of the materials still being viable after thawing.

It's still not easy, though. During freezing, cells must be dehydrated so water inside the cells does not form ice crystals, something that would cause the cell membrane to rupture. To dehydrate the cells, they are cooled very slowly prior to plunging them into -196° Centigrade (-320° Fahrenheit) liquid nitrogen. Cells cooled too slowly are susceptible to high concentrations of salts and other compounds that are left behind as the

W h a t i s C O M P A R A T I V E M E D I C I N E ?



Previously frozen rat eggs after sperm injection begin their development.

■ At the cellular and genetic level, life and disease processes are little different between the living creature an animal, human, or sometimes even a plant. With researchers at the University of Missouri in various academic areas such as nursing, medicine, veterinary medicine, and agriculture beginning to delve into many of the same questions, it was only natural that a formal method of research collaboration be instituted.

At MU, that collaboration will occur at the National Comparative Medicine Center, housed in the College of Veterinary Medicine and directed by Dr. John Critser. The goal of the center will be to coordinate research on life and disease from var-

ious academic units. Initial collaborations are emerging in areas of existing research strengths at the University, including molecular medicine, the development of animal models of diseases, cancer biology, viral pathogenesis, and novel drug development and delivery.

Recent discoveries that the genetic makeup of animals and humans is similar have further emphasized the validity of the comparative medicine approach, says Dr. Critser. Moreover, he said, humans and animals seem to share many of the same genes and develop strikingly similar inherited diseases, particularly cancer and cardiovascular diseases. MU has been a leader in comparative medicine through

an informal collaboration of various academic departments.

The Center will also benefit from MU's Mouse and Rat Research and Resource Centers that serve as national repositories for rodent genetic models.

Dr. Critser says that the center will provide several benefits to Missouri including faster and more dramatic discoveries because of enhanced scientific collaboration between researchers from varying disciplines, increased resources and qualified personnel for the state's biomedical industry, and enhanced research funding opportunities.

obstant?

water turns into ice.

When cells are thawed, they are warmed rapidly and the cryoprotectant solution must be removed. The cells are then cultured in an incubator where they will resume their growth and development.

For reproduction, researchers like Dr. Critser currently concentrate on cryopreserving cells made for the purpose—sperm or gametes. After this genetic material is thawed, it is artificially inseminated or transferred into a species relative of the original animal.

Dr. Critser's team is working on procedures to isolate and fertilize eggs from endangered animals, as well as the techniques for transferring embryos into live animals. This will require additional investigation and development, he says. Using methods such as in vitro fertilization and embryo transfer for an animal requires detailed knowledge about the animal's physiology and how its reproductive tissues respond in various situations. Generally, this work must be done on a species-by-species basis.

After birth, the new animal is a DNA replicate of the extinct animal and can go on to reproduce itself.

Thawed cells have retained their viability following freezing in liquid nitrogen for more than half a century. Scientists believe that cells can be stored for hundreds or

even thousands of years and retain their viability upon thawing.

The African Elephant's Last Hope?

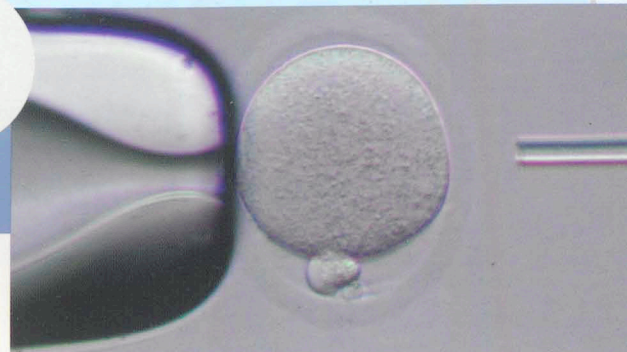
A promising new technology, now being developed in College laboratories, uses preserved ovarian tissue.

"The major advantage of cryopreserving ovarian tissue, as opposed to oocytes or embryos, is that fairly generic protocols appear to be successful in freezing such tissue," Dr. Critser says. "These findings may be a boon to conservation biologists working to collect and preserve genetic resources from those species that are most threatened by extinction."

Ovarian tissue also appears to be less susceptible to cellular damage than eggs and embryos. Dr. Critser says his group's findings suggest that this could be the most promising technique for a wide variety of species.

This research began in 1997 when Dr. Critser and others showed that cryopreserved ovarian tissue from different species could produce viable eggs in immune-compromised mice, a strain of mice that can readily accept foreign tissues because its immune system has been suppressed.

In 1998 he successfully transplanted African elephant ovarian tissue, frozen for preservation, into a research mouse, induc-



In *in vitro* fertilization, the egg is held in place via a hollow needle head that produces suction. Sperm is delivered via a probe that is inserted into the egg.

ing the mouse to create two immature follicles—microscopic structures that contain developing eggs. After 11 weeks, the mice showed indications of mature follicles, indicating that hormone production from the elephant's ovarian tissue was established in the mouse. One test mouse developed a mature egg two months after transplantation.

In other experiments, cryopreserved mouse ovarian tissues were transplanted into immune-compromised mice. After hormone production was established, mice with "mouse-to-mouse" transplants produced live offspring.

These techniques could lead to cryopreserved ovarian tissue from humans to circumvent fertility problems caused by certain illnesses or medical conditions. Cryopreservation could also store human ovarian tissue when a young woman is about to undergo radiation or chemotherapy for cancer.

And maybe also save the African elephant. **VMR**

It bordered on a national economic calamity when Mongolia's national livestock herd of about 33 million was threatened with an outbreak of foot and mouth disease (FMD), brucellosis, and toxicity problems.

To help the struggling and poor nation, whose economy is almost entirely reliant on livestock, US agricultural aid agencies and the Army Veterinary Corps last year sent a team to Mongolia. Their mission was to evaluate the extent of disease already present, observe the effectiveness of Mongolian medical measures, and brief the US ambassador on whether to dedicate foreign aid money for additional vaccine.

Two team members were Lt. Col. Peggy Carter, MU DVM '85, and Lt. Col. Robert (Bob) Walters, MU DVM '84. Dr. Carter is the commander of the US Army's Pacific Northwest District Veterinary Command based at Fort Lewis, Washington. Dr. Walters commands the Japanese district and is headquartered in Camp Zama, Japan.

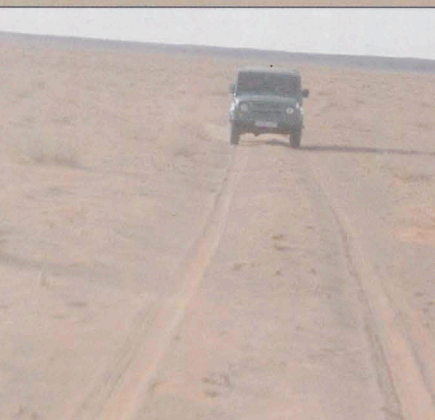
A new outbreak of FMD was already underway when the Army team arrived in Mongolia's capital of Ulaanbaatar. Drs.

Carter and Walters rolled up their sleeves and joined their Mongolian counterparts with vaccinations, disinfecting animals, establishing a quarantine area, and making sure that equipment, vehicles, and people didn't spread the disease. Shooting animals and burying their carcasses was also part of the grim work.

The mission was conducted at the request of the US State Department. Unlike the United Kingdom's response to FMD, Mongolia chose to eradicate its affected animals and vaccinate contact animals as a means of control.

Into the Gobi Desert

The trip went according to plan initially, and the American team had the unqualified support of local officials. Support almost disappeared when the team asked about the more recent outbreaks in the Gobi Desert. The Mongolians said that they were reluctant to allow the US team access to anything in eastern Mongolia, fearing possible spread of the disease. Unlike the disease outbreak in Ulaanbaatar, which was better contained since the animals were penned and more easily isolated, the eastern country animals are free-ranging



Unlike the brush-filled desert in the American southwest, the Gobi desert is virtually bare. Dr. Carter traversed this wasteland with aid of a Russian-built jeep.

and, thus, represented a threat to the isolated and nomadic herds, they said.

The unspoken reason may have been to protect the reputation of the country's critical exports. That left the American team in a quandary—how do you help when you can't ascertain the full extent of the problem?

Dr. Walters, who had visited Mongolia five times and had become friends with many governmental officials, talked the Mongolian officials into letting Dr. Carter and her team travel into the Gobi for an investigation of the outbreak there.

Her mission there was twofold: Assess the damage done by current and previous outbreaks of FMD there, and assess how well the disease was contained to the local area. This latter objective was a critical one as it could provide the evidence to allow future animal shipments from the area—an economic imperative as such exports are a very significant part of the

region's economy.

Dr. Carter led a group by train into the southern interior of the country and then by rented Russian jeep to an outbreak near the border of China.

The jeep ride to the province of Dornogov, one of five Mongolian provinces of the Gobi Desert, was an eye opener, Dr. Carter said. Unlike the sandy Sahara, the Gobi is comprised of barren expanses of gravel plains and rocky outcrops. The sparse vegetation supports the khulan (wild asses), rare Saiga antelopes, untamed takhi horses, the world's only desert bear (the Gobi bear), ibex, snow leopards, wolves, exotic and shaggy-necked Bactrians (two-humped camels), and some confused gazelles that ought to be living in eastern Mongolia. Dornogov is also home to nomadic Mongolian shepherds who crisscross the Gobi.

"There's a huge difference between an outbreak in Mongolia versus one that would occur in the US," Dr. Walters said. "Mongolia is an extremely poor



Dr. Robert Walters and Dr. Peggy Carter

Two MU Alumni Travel to the Ancient Land To Battle a Disease Outbreak And Help Save The Local Economy

Mission to
Mongol



Dr. Carter watches the burial of a herd of infected cattle.

country with a ratio of about 10 animals to each person. Most animals are free-ranging and live as browsers, akin to an 1870's trail herd from Texas to Dodge City."

It was everyone's fear that animals from one infected herd would commingle with others, spreading the disease in an uncontrollable way. This could destroy the only livelihood that the Mongolians can make from the harsh terrain.

Slightly smaller than Alaska, Mongolia is a landlocked country with vast desert plains, grassy steppes, and rugged mountains. There are limited natural fresh water resources, and less than six percent of the country is arable land.

Of Mongolia 2.8 million population, half still live a nomadic herder's life on the steppes. Little changed since Genghis Kahn. Economic activity, as for centuries, is still based on agriculture and breeding of livestock, primarily sheep, goats, cattle, camels, and horses. With little industrial activity, it is with these animals that the country hopes to stabilize, and then prosper.

Forty percent of the population are considered by the

United Nations to live in poverty, and the country's total GDP is only \$4.7 billion. Real economic growth is shrinking by one percent per year. The average annual per capita income is only \$1,780.

Mongolians and Americans

With Khan in their history books, Mongolians suffer a reputation of being unreconstructed barbarians. Dr. Carter says the opposite is true. They are an educated, thoughtful, and cultured race for whom hospitality is not only a point of etiquette but also a matter of survival. The harsh desert conditions have long meant relying on the goodwill of others and reciprocating such hospitality.

"I have developed a deep affinity for the Mongolian people, Dr. Walters said. "The majority are friendly, helpful,

and cooperative. When I first went to Mongolia in 1999, there was a lot of suspicion of the American military and Americans in general. Over the past couple of years I've see more Mongolians speaking English and the number of visits we've made have helped decrease any suspicions."

The Mongolians are very much like Americans in their resilience and mental independence, Dr. Carter observed. "Veterinarians in the Gobi were hard working and intelligent. Their costumes had the same feeling as the old photos of western US veterinarians wearing ties and bowlers. It is amazing how rapidly they are adjusting to a non-centralized economy and fee-based practice."

The Mongolians have a beautiful cultural tradition of "throat singing," Dr. Carter said. "They presented us with an evening of entertainment and traditional Mongolian dining that featured a terrific ensemble," she said. "With throat singing, the singer concurrently creates a very deep, throaty sound and a high-

pitched sound. The high pitch is an ethereal sound like playing the saw, and the low sound is like a recorder or pipe."

Another surprising Ulaanbaatar tradition is that private persons act as impromptu taxis. "If you're seeking a ride, you indicate which direction you are going and hold up a hand," Dr. Carter said. "Any car might pull over and offer you a ride, and the fee is a standard rate in the city."

And there is the food. Dr. Walters has been on five missions to Mongolia and says he has grown accustomed to the country's fermented mare's milk and homemade vodka. Another local delicacy: raw fat being presented to an honored guest. "On previous trips I've seen my first case of gid in sheep, necropsied sheep to find hydatid cysts all over the abdomen and then enjoyed the large intestine/cecum sausage at dinner that night," Dr. Walters said. "Mongolia is like going back in time two hundred years." **VMR**

Dr. Carter surveys a suburb of the capital city of Mongolia, Ulaanbaatar.



Alumni at Large

Stan Casteel Uses Pigs to Prioritize EPA Clean-Up Sites



You might not see it, but it's there. Chemical and heavy metal contamination, a health threat, lies silently in our backyards. Now, a University of Missouri-Columbia researcher is reducing this threat and the cost of eliminating it.

Stan Casteel, MU DVM '83, professor in the University of Missouri's College of Veterinary Medicine and director of the Veterinary Medical Diagnostic Laboratory, is using pigs as scientific models for children who might be exposed to heavy metal contamination at approximately 900 Environmental Protection Agency Superfund sites. The project is funded by the EPA and the Missouri Department of Natural Resources with the intention of making Superfund clean-up decisions more science-based through specific site research reports. Currently, Dr. Casteel is working on three EPA site reports.

The metals that pose the greatest threats

are lead, arsenic, and cadmium. These chemicals, from mining and industrial contamination, can enter the bloodstream easily and have adverse effects on humans, especially children. Studies have found between 1 and 90 percent of the metals are absorbed into the bloodstream, depending on the chemical form and the associated soil composition. Prior to Dr. Casteel's research, the EPA assumed an average absorption rate for all lead in soil, which made a priority clean-up list difficult to make.

"Once the EPA receives the report, they decide whether or not to clean the site and when," Dr. Casteel said. "In some cases, I've found only two percent of the lead is available for absorption and have saved a lot of money in clean-up costs—up to 50 percent. Money from these savings is then redirected toward cleaning up sites with high lead availability."

In addition to Dr. Casteel's analysis studies, he also has experimented with a phosphorus application that can reduce the lead available for absorption by close to 50 percent. Under direction of the Missouri Department of Natural Resources, researchers cover the contaminated area with the phosphorus compound, which combines with lead to reduce the absorption rate.

Michael Joyner Installed As President of Texas VMA

Michael Joyner, MU DVM '84, earlier this year, was elected president of the Texas Veterinary Medical Association. He will begin serving his term in March 2003 during the 100th year of the association.

Dr. Joyner practices small animal medicine at East Lake Veterinary Clinic in Killeen, Texas. He has previously served in several TVMA leadership positions, including second and third vice president and chair of the board of directors.

The Texas Veterinary Medical Association was founded in 1903 and is a professional association composed of more than 3,000 veterinarians.

Varner Named 2002 Top Theriogenologist

Dickson D. Varner, MU DVM '78, was named the 2002 Theriogenologist of the Year by the American College of Theriogenologists.

The award recognizes outstanding achievement in the field of animal reproduction research. The ACT is a veterinary specialty board that certifies and recognizes veterinarians in theriogenology.

Dr. Varner is a professor of theriogenology and Pin Oak Stud Chair of Stallion Reproductive Studies in the College of Veterinary Medicine, Texas A&M University, where he has served on the faculty for the past 17 years. His work centers around teaching, case management, and research in the discipline of equine reproduction, with emphasis on the stallion.

Dr. Varner is married to Patricia Varner, MU DVM '79, an aquatic animal pathologist.

Dr. Robert Youngquist, professor of veterinary medicine and surgery at the MU College of Veterinary Medicine, was the 2001 winner of the award.

Bequest Honors Nicoletti For Work In Cattle Disease

A Tampa, Fla. couple was so grateful for the brucellosis expertise of a University of Missouri alumnus, **Paul Nicoletti**, MU DVM '56, that they have willed more than half of their \$2 million estate to the University of Florida in his honor.

The bequest is the largest individual gift the college has ever received and will be used to enhance food animal education.

In the 1970's, the Department of Agriculture opposed the vaccination of adult cattle as a means of controlling brucellosis, adhering instead to a test and slaughter policy. At the same time, Dr. Nicoletti worked for the USDA where he studied the disease and advocated vaccinations.

Dr. Nicoletti teaches epidemiology at the Florida CVM. He is a diplomate of the American College of Veterinary Preventative Medicine, a former Florida VMA president, and the 1991 recipient of the International Veterinary Congress Prize. MU's Alumni Association honored Dr. Nicoletti in 1987 with a Faculty/Alumni Award and in 2000 the MU College of Veterinary Medicine named him Alumnus of the Year.

Beard Named Manager of Hunte Corporation

Kenton Beard, MU DVM '93, was named general manager of the Hunte Corp., headquartered in Goodman, Mo.

The company, founded in 1991, distributes pets to the professional pet industry. More than 180 people—including six full-time veterinarians—are employed in its two Missouri facilities.

Dr. Beard will be responsible for all operations, including procurement, kennel operations, transportation, and marketing. He is the first veterinarian to hold a senior executive position at the company.

He and his wife and two daughters reside in Neosho.

MU DVM '89 Team Earn Business Award

Kathleen Lopez and **Julie Dyer**, both MU DVM '89's and co-owners of the Lake-wood Animal Health Center in Lee's Summit, Mo., were presented the area's Chamber of Commerce Small Business of the Year Award.

The award recognizes their hospital's commitment to good business practices.

Drs. Lopez and Dyer started the clinic in 1994 with one other employee. Today, the hospital has 19 employees and a growing list of 2,783 active clients.

As a community service, the clinic sponsors an annual dog run to benefit the area Humane Society. Last year it raised more than \$3,200.

Taylor Celebrates 40 Years of Missouri Veterinary Medicine

Richard Taylor, MU DVM '62, recently celebrated his 40th year of practicing veterinary medicine in the Fayette, Mo. area.

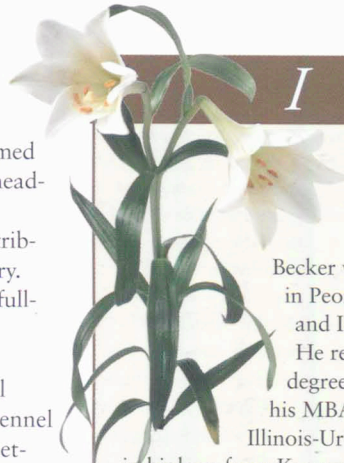
He and his wife Joyce established the Howard County Veterinary Service, Fayette, about a month after graduation. Their original facility was in the basement of their home. Pets were taken down a flight of steep steps for treatment. The garage served for drug storage.

Dr. Taylor remembers that his first client visit was made in a Volkswagen bug to treat a sow. The charge was \$4.75. The front room of their house sported a carpet that Joyce had glued together from samples.

In April 1963, they purchased a new house/office on Highway 5 and 240 that had a mortgage payment of \$93 per month.

Today, Howard County Veterinary Service is housed in a new facility near that crossroads.

VMR



In Memoriam

Stephen Vaughn

Becker, MU DVM, '53, of Decatur, Ill. died on Feb. 14, 2002. Dr.

Becker was born Sept. 13, 1948, in Peoria, the son of Charles and Ida Sue Vaughn Becker.

He received a bachelor's degree in animal science and his MBA from the University of Illinois-Urbana, a bachelor's degree

in biology from Kansas State University, and a doctorate in veterinary medicine from the University of Missouri-Columbia. He was employed by the University of Illinois-Springfield, where he taught risk assessment. Dr. Becker served in the Army during the Vietnam War and was a member of the Society of Toxicology and of the Armed Forces Institute of Pathology. He married Karen Sue Breen in Omaha, Neb. in 1973.

Charles Berry, MU DVM '53, of Kansas City, Mo., died October 4, 2002. Dr. Berry was born Dec. 14, 1926 in Glenwood, Mo. In the fall of 1947, after two years in the US Armed Forces, he enrolled in the MU College of Veterinary Medicine, receiving his degree in 1953. In

1956, he joined Trans World Airlines as a pilot, retiring in 1986.

Robert A. Mutrux, MU DVM '53, of Wheaton, Mo., died March 28, 2002. He was born in Cassville, Mo. and practiced veterinary medicine for 45 years in southwestern Missouri. He is survived by his son, Robert Alan Mutrux Jr. of Miami, Fla.; a daughter, Vicki Baker of Springfield, Mo.; a brother, J.D. Mutrux of Springfield, Mo.; and five grandchildren. Dr. Mutrux served in the US Army in World War II.

Walter E. Landaker Jr., MU DVM '54, died Feb. 7, 2002 in Antioch, Calif. He was born in Clinton, Mo. and practiced in Sunland, Calif. for 29 years. He was also a Master Mason for 50 years. He is survived by his wife of 60 years, Maxine, and two children: Susan Dalke of Brentwood, Calif., and David Landaker of Santa Cruz, Calif.

Arthur D. Allen, MU DVM '62, died July 18, 2002 near Belton, Mo. He is survived by his wife, Norma Lou Allen; daughters, Bev Scott Huppenthal (MU DVM '78) and family, Lynn Lauterbach and family; son, A. Kent Allen (MU DVM '79), his wife Linda R. Allen (MU DVM '80), and family. Dr. Allen was also a faculty member at the MU College of Veterinary Medicine.

Need a Super-Sauve Marketing Tool?

Call Double-O Skeeter

Skeeter, a 9-year-old miniature pinscher, is the constant companion of Jack Stephens, MU DVM '72 and president of Veterinary Pet Insurance. Skeeter is also the star of an animated cartoon adventure series that appears on the company's web site, www.petinsurance.com.

So far, Skeeter has appeared as the canine version of James Bond, the captain of the Love Boat, a streetwise Starsky and Hutch cop, and an Arnold Schwarzenegger-type terminator.

"Our staff came up with the idea," says Dr. Stephens from VPI's headquarters in Anaheim, California. "Mostly, we're doing it for entertainment purposes. We're going to feature a new cartoon every month, so, hopefully, people will keep coming to our web site."

It's no surprise that VPI's marketing gurus thought of a cartoon starring Skeeter who serves as the company mascot and is prominently featured in company marketing products. Skeeter holds the title of "chairman of pet relations." We use Skeeter as an icon for the company to keep in tune with the human-animal bond," says Dr. Stephens. "He really represents everyone's affection for their own pet."



Skeeter as the International Dog of Mystery, a canine takeoff on James Bond.

Class Notes

50's

Norden Stefanides, MU DVM '56, was presented the William Barrett Memorial Award for Excellence in Western Art by the New Mexico State Fair's Division of Fine Arts. Dr. Stefanides' sculpture was of a Union soldier and his horse.

60's

Joe Burden, MU DVM '64, recently saw the celebration of the 50th anniversary of his clinic, the West Plains Veterinary Clinic, in West Plains, Mo. Dr. Burden purchased the clinic in 1978 from its founder, Dr. Ray Ledgerwood. The mixed practice clinic serves 14 south Missouri and north Arkansas counties.

70's

William J. Boever, MU DVM '70, was named director of the Saint Louis Zoo. Dr. Boever, a veterinarian at the Zoo for the past 32 years, will continue to supervise day-to-day operations. **Steven Holmstrom**, MU DVM '72, was presented the American Veterinary Dental College's Peter Emily Service Award for his outstanding contributions to further the field of veterinary dentistry. **Jack Stephens**, MU DVM '72, last year donated a collection of mounted animals to the Lon V. Stephens Museum at Central Methodist College, Fayette, Mo. Included in the December 23 delivery were full body mounts of a musk ox from the Canadian Northwest Territory, two Alaskan wolves, and head and shoulder mounts of African hoofed mammals.

Chip Kammerlohr, MU DVM '73, was elected vice-president of the Missouri Veterinary Medical Association. He will also chair the organization's statewide membership committee. Dr. Kammerlohr owns the Cassville (Mo.) Veterinary Clinic. He served as president of the MU Veterinary Medical Alumni Association. He and his wife Dana train search and rescue dogs.

Don McCormick, MU DVM '76, retired from his Monnett, Mo. veterinary practice in August. Dr. Don, as he is known to his clients, joined the practice two years after graduation from the MU College of Veterinary Medicine. The practice

was established in 1952 by his father, **C.J. McCormick**, MU DVM '52. The Monnett practice was purchased by **Brent Herrin**, MU DVM '92.

Marlyn Whitney, MU DVM '79, joined the MU College of Veterinary Medicine's Veterinary Medical Diagnostic Laboratory as a clinical pathologist. She received her PhD in clinical pathology from Purdue in 1989. She was on the faculty of the Texas A&M College of Veterinary Medicine from 1986-1994 and was a clinical pathologist with the Texas Veterinary Medical Diagnostic Laboratory from 1994-2001.

80's

Robert Gordon, MU DVM '86 and a veterinarian at the Mandarin Animal Hospital in Jacksonville, Fla., was awarded the Gold Star Award for Outstanding Service to the veterinary community by the Florida Veterinary Medical Association.

Henry Pasternak, MU DVM '86, recently completed a new 5,000-sq.-ft. free standing building to house his Highlands Veterinary Hospital in Pacific Palisades, Calif.

Julia Robinson, MU DVM '86, was recently awarded diplomate status with the American College of Veterinary Internal Medicine and the American Board of Veterinary Practitioners.

90's

Brent Herrin, MU DVM '92, purchased the Monnett (Mo.) Veterinary Hospital. Dr. Herrin and his wife, Cordelia, purchased the practice from Don McCormick, MU DVM '76.

W. Wayne Fry, MU DVM '92, was named president of the Missouri Academy of Veterinary Practice. The organization is the continuing education arm of the Missouri Veterinary Medical Association. Dr. Fry has practiced veterinary medicine in Independence, Mo. for the last seven years at the Chrysler Animal Center. **Shelia Livingston Taylor**, MU DVM '92, was named as an advisor to the Alpha Psi Tau chapter of Phi Theta Kappa, the honorary society for two-year colleges. Dr. Taylor recently celebrated five years as a faculty member in the science department of the

Ozarks Technical Community College, Springfield, Mo., and continues to practice part-time veterinary medicine as a relief veterinarian. She also serves as President of the Southwest District of the Missouri Veterinary Medical Association. **Shaun Sweiger**, MU DVM '94, recently completed the University of Nebraska's year-long Cattle Production Management course. The course is designed to provide in-depth training in beef production, management, and economic strategies. Dr. Sweiger lives in Edmond, Okla.

Cheryl Talken, MU DVM '94, has joined the Olathe, Kan. Banfield veterinary hospital. She previously worked in small animal veterinary medicine at Overland Park Veterinary Hospital. Dr. Talken has

one dog, Sadie, and three cats, Andy, Emmett, and Coco.

Christopher and **Bridget Puzio**, both MU DVM '96, announced the birth of their son, Noah Benjamin, born Dec. 27, 2001. The family operates a small animal practice in Ridgewood, New Jersey.

Melanie Grundy, MU DVM '98, late in 2001 purchased the Central PetCare Clinic in Carthage, Mo. Her new web page address is www.centralpetcare.com.

00's

Amber Baughman, MU DVM '01, joined the Holden (Mo.) Animal Clinic and Supply as a staff veterinarian specializing in equine reproduction and lameness. She previously worked for a mixed animal practice in Centerville, Iowa.

The Tempest, VETERINARY STYLE



Allen Weltig on stage with cast members of *The Tempest*, and Dr. Sharon Holmes (right). Dr. Holmes played two roles, the *Master of the Ship* and the *Sun Spirit*.

It's well known that a good veterinary medical student needs to have a lot of skills. Among Allen Weltig's, MU class of 2003, accomplishments is that of stage actor and director. Last summer Mr. Weltig directed "The Tempest" at the Maplewood Barn Community Theater in Columbia, Mo. • The play was Mr. Weltig's professional debut as a director. For the last few years he had performed in other plays. The theater is only a hobby, he says. After graduation he plans to begin his veterinary medical career and pursue acting and directing as a hobby. • Class of 2002 alumnus Sharon Holmes got into the act, too, playing one of the supporting characters in the play.

Catching Up With...

Bill Wolff

The report by the US Department of Agriculture couldn't be more disturbing. A major bio-terror attack on American agriculture is possible and could result in deaths, a disruption of the economy, and panic among the public.

The report, released this September, finds that the nation cannot adequately detect and identify many of the weaponized pests and pathogens and needs a comprehensive plan to defend against attacks with biological weapons.

The report didn't surprise *William (Bill) Wolff, DVM* and retired University of Missouri College of Veterinary Medicine food animal clinical associate professor living in Columbia, Mo. At the time of the report's release, Dr. Wolff was just finishing an operations manual for the Missouri Veterinary Medical Association on what veterinarians—who will probably be among the first to see evidence of any bio-terrorism attack—should do to minimize an attack's impact. Dr. Wolff's manual will be distributed to Missouri veterinarians who will use it to inform producers, county and public health officials and others about devastating livestock diseases.

"The message that we're trying to get out is that early recognition and response by practicing veterinarians will be critical to limiting a disease outbreak," Dr. Wolff said. "It will be veterinarians working with local officials who will be the ones who will shoulder all of the burden during the early stages as state and federal agencies begin the process of diagnosis and containment. It must be the veterinarian and the local producer who are educated on what to look for and are ready to respond quickly. Foot-and-mouth disease (FMD), for example, can spread far and wide in the few hours from discovery until state and federal officials are able to respond."

Dr. Wolff was chosen for the assignment for a variety of reasons—his expertise in food animal medicine, including livestock diseases from around the world, and his experience in teaching. He was an ambulatory clinician and clinical instructor for the College from 1967 to 1969 and again from 1983 to 1992. When not teaching in Missouri he could be found doing general practice near his ranch in Montrose, Colorado.

A World of Experience

It was his overseas' experience that helped him gain insight into some of the livestock diseases that could be modified into weapons. His first tour was a two-year stint in Colombia, South America for the University of Nebraska, helping local farms become more productive. Then, it was four years in Kenya in teaching, extension, and research.

"Among the projects we did in Kenya," Dr. Wolff remembered, "probably the most important was the initiation of 'down-the-road' insemination of dairy cows. Here, the small farmers on subsistence farms would bring their cows in estrus to stalls with head catches, that we called 'crushes' located right on the road. The inseminator would arrive on a motor scooter or bicycle with a small semen tank attached, inseminate the cows in the stalls, and leave the bill in a wooden box. The farmer would pick the cow up later and would pay the bill with the next cow that he brought to the crush. We did receive some notes, instead of payment, that they would pay when the cow calved."

With this method, the farmers could increase the size and production of their herds without the expense and danger of keeping a dairy bull. "During the time I was there we saw several of the small subsistence dairies expand dramatically and install machine milking systems," Dr. Wolff said, "mostly due to the insemination project. The introduction of cows that had been hand-milked for several lactations to milking machines was an interesting spectator event."

From there, Dr. Wolff traveled to Paraguay, South America in a cooperative agreement between the MU Veterinary Medical Teaching Hospital and the Paraguay College of Veterinary Medicine. His mission there was to evaluate the country's large animal clinical training programs, and conduct surgical training. It was work he enjoyed, as it was mostly practical fieldwork rather than lectures. He's been back to Paraguay, a poor country, three times to help milk producers improve their milk quality through a program of farm analysis with later follow-up to evaluate progress. He did the same type of work



Dr. Bill Wolff is a 1954 Colorado State University College of Veterinary Medicine graduate. He remembers that quarterly veterinary medical college tuition and fees back then were only \$85. But then, he says, we could all work our way through school at \$1 per hour.

during five visits to El Salvador from 1993-1997. Both of these projects were funded by the producers in-country, with help from the US government and the University of Missouri.

The Main Threat: FMD

Security specialists and scientists looking into potential threats to Missouri producers think that FMD is the most likely bio-weapon for animals. FMD is something that Dr. Wolff has often seen in his travels and has written extensively about it.

"If Missouri does become a target of bio-terrorists, it could come by the FMD virus being dropped at a sale barn. From there it would spread around the state and devastate the state's livestock industry. However, we must remember that FMD is enzootic in most of the world, and accidental infection remains the most likely cause of an outbreak in the US."

One easy way to deliver the virus is through infected food. "Every modern outbreak has been caused by some FMD contaminated scrap of food, either brought in by ship or plane, that infected pigs and then spread to cattle, sheep and other pigs," he said.

Part of the plan to defend against agricultural bio-terrorism should be to enhance our basic understanding of the biology of pests and pathogens so we can develop new tools for surveillance and new ways to control an outbreak, he continued. **VMR**

The Old Movie Theaters...

College students and movies are inseparable. Films provide a relatively cheap escape from lectures and books. Movies are a traditional ritual of dating—many long-time marriages blossomed in a darkened theater.

Movie houses reflect the times in which they exist. Before the days when everyone owned a car, people walked to their corner grocery store and little neighborhood movie theater that was probably owned by a local family. In the 1950's as society prospered, corporate twin screen theaters with small parking lots flourished—attracting patrons who could drive across town to see a show. Today, multi-national-owned movie plexes are surrounded by concrete parking lots larger than the old neighborhoods and attract a regional audience.

Generations of MU College of Veterinary Medicine alumni have queued up to see a flick in Columbia. While all of the old movie houses still exist physically, none today offer Hollywood entertainment. Most—especially the old downtown theaters—have morphed into specialty stores.

So, what happened to the old movie houses and what are they now?

Where are they now?



The old Hall Theatre location is now a restaurant.

HALL THEATRE 102 SOUTH 9th STREET 1919-1976

The Hall Theatre's beginnings were not in movies, but Vaudeville, hosting traveling acts on their way between Kansas City and St. Louis. When live entertainment wasn't available, it hosted the new Hollywood entertainment and saw the evolution of film from the silent era through the talkies.

By the time there was a MU College of Veterinary Medicine in 1946, the Hall had been acquired by the Commonwealth Theater chain and still viewed major releases. Even with its prime downtown location near the MU campus, the Hall's limited seating capacity couldn't compete with newer venues. By the 1960's, it became an "art movie house" in winter that closed during summer vacation. It closed for good in 1976. A developer bought the Hall in 1987 with the intention of turning it into a conference center. Instead, it was remodeled and a restaurant moved there in the '90's.



The Old Varsity Theatre location is now a nightclub.

THE VARSITY THEATRE 17 NORTH 9th STREET 1927-1972

Like the Hall, the Varsity Theatre started out with live stage shows before evolving into movies. Today, the facility has come full circle as a nightclub, now called the Blue Note, which brings musical acts to town.

Its movie-exhibiting lifespan lasted from 1927 until May 1972 and was part of the Commonwealth chain from 1955 until 1960. *Rebel Without a Cause* with James Dean debuted in Columbia at the Varsity. Like the Hall, the Varsity was a neighborhood venue with no parking lot of its own, one screen, and seating for only a couple hundred patrons. You

walked up to the ticket window outside, bought your ticket, and then went inside into the lobby.

The facility stood vacant from 1960 to 1966, save for an occasional rummage sale. It reopened in February 1967 as the Film Arts and closed permanently after the last showing of D.H. Lawrence's *Women In Love* on May 2, 1972.

In July 1988, the Columbia Tribune newspaper reported that a developer planned to reopen the Varsity as a concert hall featuring a reconstituted '60's musical group, the Comic Book Society, as a house band. Plans were to remove the seats up front for a dance floor with tables alternating with seats in the back.

The Blue Note Rock Club started in 1991—keeping much of the original facade and ornate ceiling detail intact.



The old Missouri Theatre location is now a concert hall.

MISSOURI THEATRE 203 SOUTH 9th STREET 1928-1987

Like the others, the Missouri Theatre in its early years alternated live acts with movies. It was built with an ear toward good acoustics as by 1928 sound movies were "here to stay." The Missouri was the classiest in Columbia, most likely to show the best Hollywood movies—although generally not first-run films. Still a small town, Columbia had to wait until the feature films had played in Kansas City or St. Louis. (The brown octagonal film boxes arrived at the nearby bus station.) Even so, the Missouri was most likely to see well-dressed moviegoers in its ornate lobby or under its brightly lit sign while they waited for intermission to end and the second half of the movie to start. It showed the Hollywood blockbusters like *Spartacus*, *Swiss Family Robinson*, *Can-Can*, and *The Alamo*.

Commonwealth acquired the Missouri in 1953 and remodeled it the following year, reflecting the glitzy Hollywood style that characterized movie houses of the era. The facade was modernized again in 1967. It is this style that the facility wears today.

The Missouri Symphony Society bought the Missouri in December 1987 and the movies ended the following month. Champagne was served at the final show and folks could sit in the balcony for the first time in 15 years.



The old Uptown Theatre location is now an art gallery.

UPTOWN THEATRE 1010 EAST BROADWAY 1935-1986

While Columbia's other theaters opened in financial boom times before the Great Depression, the Uptown on Broadway seated its first customers during the nation's worst economic times.

Its "Formal Opening" on May 18, 1935 was for invited guests only. On opening day, a Columbia Tribune newspaper ad included a "creed" offered in the first person by the theater itself. A front-page article advised that "stage shows will be added when this high type of show is available."

Movies were a part of the nation's way of coping through the bad times. Columbia, somewhat insulated by the university, fared better than many communities and the small facility survived as a neighborhood theater with just an occasional remodeling. In the 1970's, you could watch *Big Jake*; *Mary, Queen of Scots*; and *Support Your Local Gunfighter*.

This all lasted until 1986 when Commonwealth's multi-screen Mall 4 Theatres opened and the Uptown closed its doors. The building later was used as a bike shop and today houses a fine art store.

CINEMA THEATRE 1729 WEST BROADWAY 1966-1999

In the mid-1960's, Columbia was moving west. On the edge of town, the Cinema Theatre opened on June 8, 1966 with *The Glass Bottom Boat*. It was a large and modern theater, seating 840 with a 76-ft. wide Cinerama screen. Almost 525 of those seats were "rockers," the latest movie house fad in battling the increasingly popular drive-ins.

The Cinema (originally to be named the Crest) was located between the Broadway Shopping Center and the Broadway Drive-In's box office. The Cinema's parking lot usurped about 150 of the drive-in's parking spaces. The Cinema was Columbia's first theater to have its own parking lot—a reflection of the waning days of the neighborhood theater to which patrons could walk.

Opening Day for the Cinema was a big deal. Columbians marveled at the lobby's interior decked out in shades of gold, with touches of

brown, pale green, and yellow. The carpet had a Hawaiian floral pattern. Gov. Warren Hearnes spoke at the ribbon cutting. "Miss Cinema," Donna Fogle (billed as Columbia's Future Miss America and wearing white gloves), was on hand to welcome guests and give each lady a carnation. A full-page Columbia Tribune ad promised a "modern refreshment center, the latest in projection lenses, climate controlled heating and cooling, luxurious American Recliner seating, Walker Super Hi-Lite Screen, distinctive carpet by Alexander Smith, and a lobby teller-type box office." "The magic screen will blossom in this totally new theatre!" the ad proclaimed. "It will bring you the world's finest motion pictures!"

And, it pretty much did until this last big single-screen auditorium in Columbia closed in 1999, a victim of the newest fad in movies, the multiplex. Columbia's multiplex opened on the city's southeast side. Today, the old Cinema is a classy second-hand store.



The old Broadway Cinema is now divided into two retail stores.

FORUM THEATRE 1400 S. WEST BOULEVARD 1967-1993

The governor didn't cut the ribbon of the 820-seat Forum Theatre on the southern outskirts of Columbia. Those duties went to Miss Eva Sugarbaker, reigning American Royal Queen, imported from Kansas City.

The Forum was the first business in the new Forum Shopping Center, and the theme was carried out with Italian statuary in the lobby and a carpet pattern featuring columns to match those at the nearby university. A Romanesque arch graced the entrance to the center's parking lot. The first film, *Tobruk*, played April 5, 1967. Admission was \$1.50 for adults and 50 cents for kids.

In 1993, the original structure was demolished and replaced with the current eight-screen multiplex, also named The Forum.

CAMPUS TWIN THEATRE 1102 EAST BROADWAY 1971-1998

By the seventies, multi-screen theaters were the rage with small neighborhood theaters becoming victims of rising ticket and labor prices. The Mid-America Campus I & II Cinema, which opened on September 8, 1971 with *Jenny* and *The Grissom Gang*, was Columbia's first two-



The old Campus Twin Theatre is now an outdoor apparel shop.

screen facility.

As its name implied, this facility was oriented to the campus crowd. It was home to "youth" pictures such as the last of the beach-blanket movies. Up until the end, the Campus Twin was respectable and upright.

Commonwealth assumed operations in the mid-eighties, then United Artists, and eventually Crown Cinema before it closed in 1998. Today, the building houses an outdoor-oriented clothing store. It was Columbia's last downtown theater.

BISCAYNE III THEATRE 301 NORTH STADIUM BLVD. 1973-1998

On Columbia's western suburbs' the Jerry Lewis Triplex, part of the Jerry Lewis chain of exclusively family-oriented theaters, opened at the Biscayne Mall in 1973. It struggled from its beginning. Only five weeks after its opening, the facility was renamed the Biscayne III Theatres under new management. The name wasn't all that changed. M- and X-rated movies were the new fare.

That lasted a few years until the home-video market cornered the demand for blue movies. The Biscayne adopted mainstream fare that went over well until the adjacent Columbia Mall built its four-screen cinema in 1986. The Dickinson chain, which then owned the Biscayne, dropped prices to \$1.50 per ticket to stay competitive, but finally threw in the towel in summer 1998.

The Biscayne mall was demolished in September to make room for an upscale shopping mall.

COLUMBIA MALL 4 THEATRES 2300 BERNADETTE DR. 1986-1999

Like many other cities, Columbia virtually abandoned its downtown with construction of a shopping mall on the west end of town. With the new Sears and Macy's stores, Commonwealth opened the Mall 4 on the same day it closed the Uptown, February 26, 1986. The four-screen cinema remained operational until 1999 when an even larger multi-screen movieplex opened in Columbia's southeastern suburbs. Today, the Columbia 4 is the site of a Barnes & Noble bookstore.

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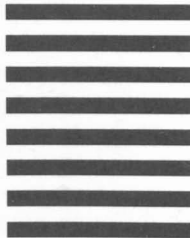
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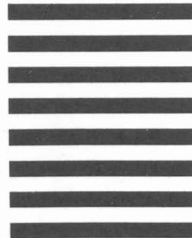
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