

W^{MU}eternary

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



fat cat

Don't Be a Fat Cat...It Could Kill You

- **Veterinary Medicine In Cuba and the Navajo Nation**
- **Helping Future Astronauts Make It to Mars**
- **The College's New Equine Ambulatory Program**
- **Flashback! Columbia's Forgotten Drive-In Movies**

VMR

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on the cover...



Being a fat cat, whether feline or human, can be a dangerous thing these days. Just ask Professor Frank Booth.



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Veterinary

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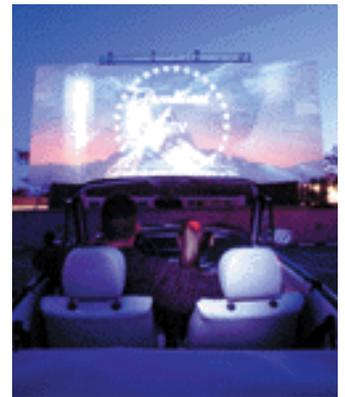
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Bricks and Mortarboards

Facilities, be
they classrooms,
laboratories, or
hospitals, make
a tremendous
difference in our
ability to recruit
the “best and
brightest.”

People often say that universities are much more than *bricks and mortar*. And, they’re certainly correct. After all, buildings would be just empty shells without people. However, let’s be honest. Facilities, be they classrooms, laboratories, or hospitals, make a tremendous difference in our ability to recruit the “best and brightest.” In fact, one could argue that a university’s facilities are the single most important factor in recruiting faculty and staff. In turn, faculty, staff, and facilities, taken together, have a lot to do with the quality of students that a university attracts.

I’ve said previously in this column (and elsewhere) that the state’s commitment to build the College’s new teaching hospital, Clydesdale Hall, was a critical turning point in our history. Clydesdale Hall is a magnificent facility for both clinical service and student instruction. Thousands of animals and hundreds of veterinary students have benefited. But, even more importantly, the generous initial gift from Anheuser Busch and the state’s decision to provide additional funding to build Clydesdale Hall, sent a powerful message regarding the critical

role that veterinary medicine plays in Missouri and beyond. I know that this commitment was a major factor in my decision to come to MU in 1994. The same has been true for other faculty and, I suspect, students and staff. Similarly, subsequent major renovations of the former teaching hospital, the diagnostic laboratory, and Connaway Hall have greatly facilitated faculty, staff, and student recruitment.

Today, the College is engaged in further renovation projects and more are planned. Office and laboratory space in the east wing of the Veterinary Medicine Building is being renovated to house two recently-recruited endowed professors, Kristina Narfstrom and John Critser, and to provide additional space for the Research Animal Diagnostic and Investigative Laboratory. We also are in the initial stages of relocating the histology laboratory from the first to the second floor of this same building. This will augment a student corridor on the second floor, while allowing needed research laboratory space to be developed on the first floor.

Most support for these projects will come from the

state’s mission enhancement program. Future projects include extensive renovation of the library and dean’s office complex to create an environment that is more conducive to student study and recruitment. As a result, the major entrance of the Veterinary Medicine Building will likely be redirected from the south (facing Clydesdale) to the west (facing Campus Drive) side. We anticipate that private giving will be essential for this project to move forward.

One of the great joys of being dean is sensing the pride that alumni feel upon returning to the College and witnessing our tremendous recent gains in facilities. For my part, even greater pride is felt as I watch students walk across the stage in Jesse Auditorium to graduate (moving the tassel from the right to the left side of their *mortarboard* in the process). Yes, a college is much more than *bricks and mortar*. It’s, first and foremost, people—our faculty, staff, students, alumni, clients, and friends.

Please know that we are committed to working with all of you to provide the outstanding facilities you so richly deserve. **VMR**

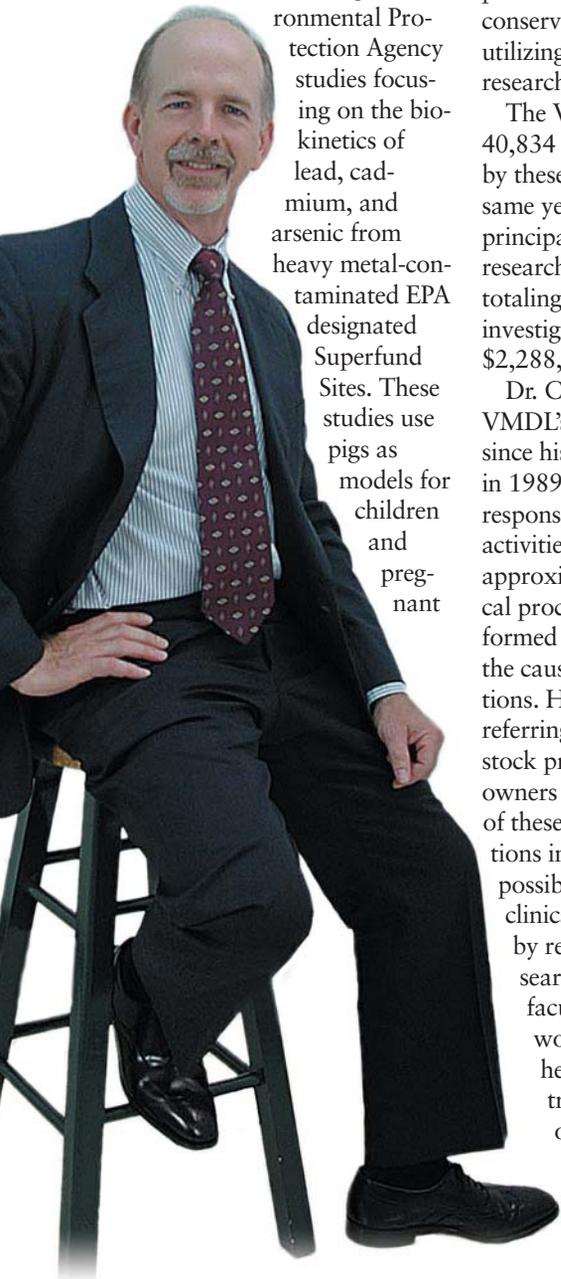
Around the



Stan Casteel Assumes Reins of the College's VMDL

Dr. Stan Casteel, a MU College of Veterinary Medicine professor, was appointed Director of the MU Veterinary Medical Diagnostic Laboratory effective June 15, 2001.

Dr. Casteel continues to serve as VMDL's chief toxicologist. He is best known for his work involving Environmental Protection Agency studies focusing on the bio-kinetics of lead, cadmium, and arsenic from heavy metal-contaminated EPA designated Superfund Sites. These studies use pigs as models for children and pregnant



women. This approach is an important departure from EPA's default assumptions regarding heavy metal bioavailability.

VMDL is a full-service veterinary medical diagnostic lab. It provides in-depth laboratory diagnostic support to veterinary practitioners, livestock and poultry producers, companion animal owners, wildlife conservationists, and scientists utilizing animals in their research.

The VMDL processed 40,834 accessions submitted by these groups in 2000. This same year, VMDL faculty were principal investigators on research grants and contracts totaling \$956,955, and co-investigators on additional \$2,288,448.

Dr. Casteel has been VMDL's chief of toxicology since his arrival at the College in 1989. In this position he is responsible for the service activities of the unit and approximately 4,200 analytical procedures that were performed last year to pinpoint the causes of animal intoxications. He communicates with referring veterinarians, livestock producers, and animal owners on a daily basis. Most of these telephone conversations involve his suggesting possible diagnoses based on clinical descriptions supplied by referring veterinarians. A search for an additional faculty toxicologist to work with Dr. Casteel as he assumes his administrative responsibilities is ongoing.

Dr. Casteel received his bachelor of science degree from South-

west Missouri State, Springfield, in Chemistry in 1978, and his DVM from MU's College of Veterinary Medicine in 1983. He received a PhD in toxicology from Texas A&M University in 1987.

Dr. Casteel is board certified in toxicology by the American Board of Veterinary Toxicology and is a Fellow with the American Academy of Veterinary and Comparative Toxicology.

He has previously been listed in Who's Who in Frontiers of Science and Technology, Outstanding Young Men of America, and Who's Who in Veterinary Science and Medicine.

Dr. Casteel is a member of the Phi Zeta Honor Society of Veterinary Medicine and has received two Merck Awards for Creativity in teaching. He has written more than 70 scientific papers and has made numerous presentations around the US and several in Europe.

New MU Study Will Determine If Dogs Possess Cancer Genes

A just-begun study at the College will help determine if there is a genetic cause for certain types of canine cancer and if dogs can inherit these cancer genes. If there is such an association, the researchers want to create a test to detect this predilection before the dogs are bred.

"If canine research parallels that of human studies, we may find there are specific genes that relate to certain cancers," said Dr. Larry Thornburg, associate professor of veterinary pathobiology, who is helping conduct the study.

"We don't know if such genes occur in dogs and whether they are inherited."

Dr. Thornburg and Dr. Gary Johnson, also an associate professor in veterinary pathobiology, have just begun their two-year research program. They are requesting blood and



tumor samples from 11 dog breeds for their study: Boston terrier; beagle, flat-coated retriever,

German short-haired pointer, Standard Schnauzer, mastiff, Doberman pinscher, American cocker spaniel, English cocker spaniel, dachshund, and Labrador retriever.

"During the last decade, researchers have discovered genes in humans that cause cancer or speed its progression," Dr. Thornburg said. "Veterinarians are interested in knowing if this same process occurs in dogs."

The study will extract DNA from normal canine blood samples and samples from tumors. These samples will be compared to see if cancer-causing genes exist in dogs and if these are the same genes associated with cancer in humans.

Similar human genetic studies are being conducted around the world, but this may be a first in veterinary medicine research.

"Our hope is to find genetic causes for cancers in cats and dogs and to find the patterns of mutations that take place in the non-inherited forms of cancer," Dr. Johnson said.

If a genetic link is found, a

College

test could be developed for breeders to see if a dog has inherited a gene that could potentially cause cancer.

"The idea would be to have a test that any breeder could use to test a dog before using that dog to breed for puppies," Dr. Thornburg said. "By understanding the patterns of genes involved in cancer, we could also design more effective therapies in the future," Dr. Johnson said.

The test could be as simple as a breeder checking for cancer with a blood sample or by dabbing a cotton swab inside the dog's mouth and sending the sample for testing. The web site for the Cancer Registry is www.caninecancer.net.

College Participates In Program For Biomedical Research Community

The College is participating in a network of research facilities to serve as a one-stop shop for the biomedical research community to donate and acquire mutant mouse and rat models.

Faculty in MU's Department of Veterinary Pathobiology are members of a consortium which has been funded by the National Institutes of Health (NIH) to develop one of four Mouse Resource and Research Centers and for which funding is approved for the only National Rat Resource and Research Center. The Regional Mutant Mouse Resource and Research Center (MMRRC) and National Rat Resource and Research Center will provide infrastructure for health monitoring, rederivation, cryopreservation and phenotyping of genetically-modified

rodents. These centers are funded by NIH's National Center for Research Resources (NCRR).

Investigators who have created genetic mouse and rat strains donate them so that they can be disseminated to other investigators. It is estimated that there are more than 3,000 strains of mutant mice that have been created by turning on and off particular genes or by inserting foreign genes into the mouse genome. Considerably fewer rats are available. Ultimately, this technology will be extended to other species.

"When numerous researchers have access to a shared national resource, such as the mouse resource center," says NCRR Director Dr. Judith Vaitukaitis, "the effectiveness of that resource is maximized relative to its monetary cost and scientific impact." She adds, "Shared resources allow scientists to integrate diverse research expertise, rapidly and effectively study emerging health problems, address complex research queries, and pursue unexpected research opportunities."

MU's MMRRC will be operated by the Research Animal Investigative and Diagnostic Laboratory directed by Dr. Lela Riley. Dr. John Critser, the College's Gilbreath McLorn Professor of Comparative Medicine, will also be involved and is the principal investigator for the rat resource center.

Funding for each of the two resource centers approximates \$7 million over five years.

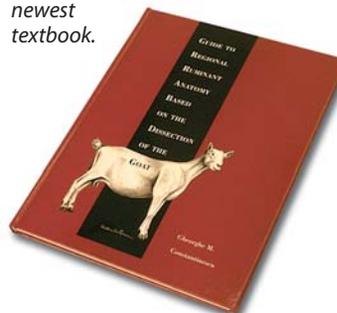
New Anatomy Book Published By Gheorghe Constantinescu

Dr. Gheorghe Constantinescu, professor of veterinary anatomy in the College's Biomedical Sciences department, recently saw his new textbook, *Guide to Regional Ruminant Anatomy Based on the Dissection of the Goat*, published by Iowa State University Press.

The book is a dissection guide for the goat with references to other large ruminants and sheep. It contains more than 230 illustrations, drawn by Dr. Constantinescu, well known for his medical artwork.

Dr. Brian Frappier, associate professor of veterinary anatomy, and Dr. Germain Nappert, former assistant professor of food animal medicine, contributed to the textbook.

Dr. Constantinescu's newest textbook.



Missourians Contribute to Endowments, Scholarships

The College received two significant donations in 2001 to support student scholarships.

A donation of \$937,335 was made by the Theodore G. Short Trust Fund. The trust provides financial assistance to prospective students of the MU College of Veterinary Medicine.

The Short Trust was previ-

ously funded at around \$350,000 and had been providing the College around \$20,000 annually for first-year student scholarships. This \$937,335 increase in corpus means the College's annual distribution from the Trust will jump to around \$80,000 beginning next year and on into the future.

Mr. Short is a former MU student and Galena, Mo. resident who died in 1996.

A second donation was made by Thelma Zalk, a St. Louis friend of the College and client of the MU Veterinary Medical Teaching Hospital.

She has funded two endowments: \$550,000 to establish a professorship in tumor angiogenesis and \$250,000 to create an endowment for the study of animal wellness. These amounts are in addition to a \$300,000 gift that Mrs. Zalk presented to the College in 1999 to establish an endowment for financially-needy veterinary medical students.

Class of 2004 Student Awarded Kappa Alpha Theta Scholarship

Mayuri Chhotu, MU Class '04, was the recipient of the 2001 Betty and James Lambert Kappa Alpha Theta Foundation Scholarship. The award is given in recognition of her high academic scholarship, achievement, and community involvement.

The Foundation is one of the largest scholarship endowment programs in the country.

Equine Section Starts Study Of Equine Spinal Ataxia

The College is conducting a two-year study entitled

Around the College

“Quantification of Spinal Ataxia in Horses Using Kinematic Analysis of Gait” under the directorship of **Dr. Kevin Keegan**, associate professor of equine veterinary medicine and surgery. Spinal ataxia is an inability to coordinate muscle activity during voluntary movement and can be caused by several conditions, one of those being equine protozoal myeloencephalitis (EPM), an infection of the central nervous system of horses.

Unfortunately, unless clinical signs are severe, it is often difficult to diagnose horses with EPM. The goal of this study is to develop a clinically-useful tool that is capable of differentiating normal horses from horses afflicted with spinal ataxia.

The study is one of several funded by the Morris Animal Foundation in fiscal year 2002.

Class of '05 Student Honored By MU Graduate School



Nicole Holloway

Nicole Holloway, DVM '05, was named Marshal of the Masters at the Spring 2001 graduation ceremony for

the MU Graduate School. The accolade recognizes the graduate with the best academic performance, thesis research, and extra-curricular accomplishments.

The recognition allowed Holloway, who was awarded a Master's degree in biomedical sciences with a specialization in veterinary pathobiology, to be the first person to receive a degree at the ceremony. Her thesis dealt with passive antibody transfer in calves, a subject that she will continue to her PhD.

As part of her Master's work, Holloway saw two of her scientific papers published in the Journal of the Veterinary Medical Association and another paper printed in the Journal of Veterinary Research.

Holloway is from St. Louis and received her undergraduate degree from Tulane University in New Orleans. After graduation from the College she intends to pursue either a public health or veterinary medical teaching career.

Old Clinic Facility Remodeled for New Research Missions

College alumni who remember the old Veterinary Medical



Teaching Hospital at 1600 East Rollins Road wouldn't recognize the place. This summer construction workers, using jackhammers and saws, demolished the inside of the second floor to make way for two new research centers.

The \$2.01 million project will create laboratory space for two new endowed professors, Dr. Kristina Narfstrom in Ophthalmology and Dr. John Critser in comparative medicine.

Dr. Narfstrom's work focuses on diseases of the eye and retina, for both humans and animals, in association with MU's School of Medicine.

Dr. Critser's interests include reproductive biology and cryopreservation of tissue.

First White Coat Ceremony

Students in the College's Class of 2003 became the first to

formally don white coats in a ceremony recognizing their entry into the clinical part of their studies in the Veterinary Medical Teaching Hospital.

The event, College dean Dr. Joe Kornegay observed, is to impress upon students, clients, and the public the important

symbolic role of the white coat in patient-doctor interactions. He said that the white coat signifies the acceptance of a great responsibility and commitment and symbolizes the transition from student to student practitioner.



The Class of 2003 displays their new white coats in the College's Auditorium.

Emergency and Critical Care Conference Held



Todd Thomas, MU DVM '96, from Winchester, Mo., receives instruction from **Dr. Keith Branson**, clinical assistant professor at the MU Veterinary Medical Teaching Hospital in the wet lab portion of the Small Animal Emergency and Critical Care Conference held this November at the MU College of Veterinary Medicine. In addition to providing hands-on practice in such areas as venous access, intubation for nasal oxygen administration, enteral nutrition, and cardiopulmonary resuscitation, the two-day MU Continuing Education program also provided lectures on the latest emergency and critical care techniques. The conference is a biennial event at the College and was sponsored in 2001 by Cook Veterinary Products, the Iams Company, Biopure, Tyco/ Kendall Animal Health, and SurgiVet.

Drawing Attention to an Unrecognized PLAGUE



Dr. Frank Booth and Dr. Dharmesh Vyas working in Dr. Booth's College of Veterinary Medicine laboratory.

Frank Booth knows the epidemic that haunts the 21st Century isn't disease-borne—it's sloth.

For both people and animals, life was different in 1901. America was an agrarian society. Chores started before sunup. Want milk? Milk the cow. Want to be warm? Chop the firewood.

The workload only got more physical as the day wore on with shoveling, pushing, fixing, and lifting being common techniques to earn a living. Even companion animals worked—if not catching mice then herding farm animals.

Basic nutrition came from what could be coaxed out of the ground. A lean harvest meant few vegetables canned in glass jars in the cellar. Butchering a hog was a major financial decision, as well as even more work to render the fat and smoke the meat.

Fast forward to the 21st Century. America works by punching computer keys in office cubicles. E-mail makes even the chore of walking to the next office obsolete. Stairs are for fire emergencies as elevators provide vertical movement. Shovel snow from the driveway? Why with a SUV?

And nutrition? Vegetables are mostly french fries from Burger King's drive-in window. A buck will buy 24 ounces of orange juice; not to mention the Big Gulp of your favorite soft drink containing total calories more attuned to the hard-

working farmer a century ago.

Technology has evolved faster than humanity. And it's killing us. The Centers for Disease Control estimate that 60 percent of Americans don't exercise enough. Scientific literature reports that a sedentary lifestyle is responsible for the early deaths of 250,000 people and billions of dollars in annual health care costs. Lack of sufficient physical exercise, researchers say, is responsible for dramatic increases in type 2 diabetes, heart disease, obesity, and colon and breast cancer.

While television touts consumption of even more fattening or laborsaving products, a lone biologist is starting a movement to recognize the dangers of what he calls a modern plague.

A Mild-Mannered Revolutionary

Dr. Frank Booth is a quiet and unassuming biologist and professor who spends his weekdays culturing muscle cells in his College of Veterinary Medicine lab on the University of Missouri's tree-lined east campus. Each evening, for an hour, he runs the streets of downtown Columbia. On Saturdays, it's usually a game of high-intensity Ultimate Frisbee.

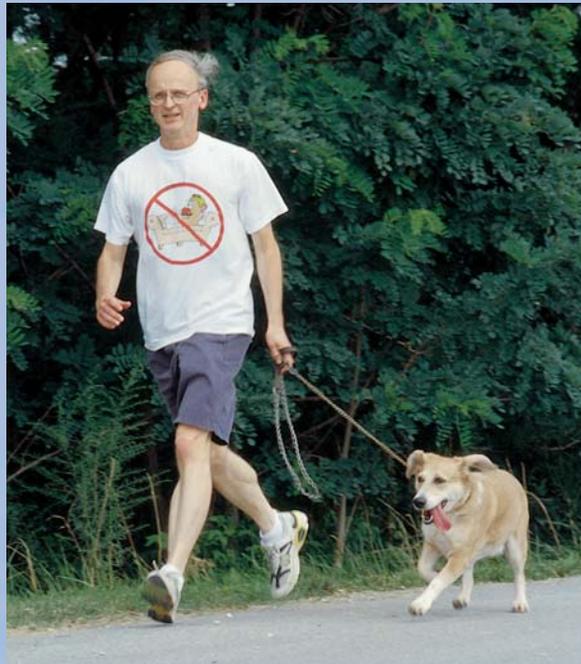
His passion, however, is his crusade to alert the public, researchers, physicians and veterinarians, to the dangers of modern inactivity. To Dr. Booth, the issue is nothing less than an epidemic. Death from heart disease is the major cause of death today in the US. Development of type 2 diabetes is up 600 percent since 1958. The increase in chronic back pain, osteoporosis, and high blood pressure has soared so quickly that it is hard to measure. One common contributor to these maladies is simple: People are not getting enough exercise.

"I don't understand why everyone is so blind to this," he says. "We're seeing a whole new set of diseases—chronic diseases that are slow in onset but deadly in later life. An alarming number of these are related to inactivity, yet people are more interested in curing the common cold."

Dr. Booth, who earned a PhD in exercise physiology, said that inactivity is linked to at least 26 chronic diseases and

other health conditions. Deaths from these problems kill about 250,000 people each year in the US. "That's more deaths than are caused by alcohol, firearms, illicit drugs, and motor vehicle accidents combined," he says. "Only smoking, that kills 400,000 people a year, causes more."

And the health care costs associated with these diseases? Try \$200 billion per year, Dr. Booth said. "Why is this going on?" he asks. "Why, with a six-fold increase in diabetes, aren't people beating the walls to stop this? This should not be



Dr. Booth and Swim, often seen running along the streets of Columbia. Other dogs in Dr. Booth's life have had similar exercise—related names: Jog, Dash, and Sprint.

happening in the United States. We should be studying why inactivity is unhealthy at the biological level. There is a reason why our bodies are built in the way that they are."

Dr. Booth points out that the level of exercise needed to avoid health problems is hardly insurmountable. Health experts recommend adults get at least 30 minutes of moderate exercise a day, the equivalent of a brisk two-mile walk. According to an estimate by the US Centers for Disease Control, a measly 22 percent of adults engage in even this small amount of activity. Just 15 percent of Americans engage in vigorous exercise, such as running.

RID: Getting the Word Out

While not performing his research and teaching duties at the College, Dr. Booth directs his advocacy group, Researchers Against Inactivity-Related Diseases (RID), to study maladies caused by modern lifestyles. So far, about 200 researchers and other experts have joined the cause with more than 100 respected scientists and physicians petitioning the National Institutes of Health to fund inactivity-related research projects.

In a short one-year period, Dr. Booth and colleagues have hit the academic and scientific journals hard: the *Journal of Applied Physiology* did a major piece on the critical importance of exercise, and the *Journal of the American College of Sports Medicine* published a Dr. Booth-penned editorial. Major US newspapers have done long articles. In May 2000, he traveled to Washington DC to make his case with officials of the Surgeon General's office. Senators and other officials were likewise informed that a serious health threat was occurring with virtually little notice. Also, Dr. Booth introduced the idea that health-care dollars spent fighting inactivity could have real benefits. "There are advocacy groups against drunken driving, but we're the first advocating against a sedentary lifestyle," he said.

Another target: physicians. "Doctors ought to urge their patients to exercise with the same persistence they use to get them to quit smoking," Dr. Booth said. "There's a lack of understanding of activity as a preventive strategy," he continued. "They're focused on the disease and not the causative factors involved." And veterinarians are not forgotten, either. The same health risks facing people also threaten companion animals who enjoy air conditioned homes and high-fat diets rather than romping in pastures and eating table scraps.

Dr. Booth's message is getting out. From Los Angeles to New York, major newspapers have written long articles about his campaign. One story alone, in four major newspapers including the LA Times and Atlanta Journal-Constitution,

had a combined readership of more than 6.5 million. Dr. Booth and colleagues have held Capitol Hill press conferences and are currently working with the staffs of various Congressional committees.

An Early Commitment to Exercise

Frank Booth's interest in preventing health problems through exercise began as an undergrad at Ohio's Dennison University in the mid-1960's. His biology advisor, Dr. Robert Haubrich, was also his assistant swim coach, and the two had intense discussions on athletic performance. That led Dr. Booth to being one of the first grad students to study the new science of exercise physiology at the University of Iowa. Dr. Booth was one of the first PhDs in the field.

His initial work centered on making athletes go faster and jump further. He helped develop some of the first scientific analysis on carbohydrate loading and collagen synthesis. Dr. Booth's studies of the ligaments of rats proved that they did grow bigger, stronger, and more resilient with exercise.

During this time other scientists were beginning to investigate exercise in another way—how it could prevent disease. These scientists discovered that human hearts, like Dr. Booth's rat ligaments, improved with exercise. While pioneers in this field, like Dr. Paul Dudley White, founder of the American Heart Association, touted exercise as an inexpensive and natural method of both quality and quantity of life, few other physicians and scientists listened.

In 1975, Dr. Booth joined the faculty at the University of Texas Health Science Center. There, years later, he encountered a student, Brian Tseng, frustrated that the latest scientific evidence on exercise and health had no part in the school's curriculum. As they discussed the issue, a light went on for Dr. Booth who connected his performance research to its larger societal implications. That change in perspective—from exercise to improve athletic performance to exercise to prevent disease—changed the direction of Dr. Booth's life.

A change of career to the MU College of Veterinary Medicine was more than a change of geography, but a change in his life's mission—to scientifically discover the benefits of exercise and make those benefits known to the larger world.



In May 2001, Dr. Booth and more than 40 scientists met with Washington D.C. media and 120 legislative staff members to discuss governmental ways to help rid inactivity as a contributor to disease. The effort resulted in at least one appropriations bill being modified to address the scientists' concerns. Dr. Booth and team plan to make his "March on Washington" an annual event.

The Next Step

Dr. Booth plans to accomplish those goals by conducting his own research in his MU College of Veterinary Medicine laboratory, coordinate the research efforts of other organizations to build the scientific case, and then disseminate these data to health professionals, funding agencies, and the public.

Lately, Dr. Booth has been studying how exercise switches genes in muscle cells on and off. His Yale University colleague, Pierce Laboratory Biologist P. Darrell Neuffer, confirmed that the same change occurs in muscle tissue from cyclists shortly after exercise. Both scientists believe that such research can con-

tribute to a greater understanding of how exercise can benefit humans and animals—including ways to control diabetes and prevent heart disease.

"It has to become more than writing scientific papers alone because, basically, they are having minimal impact," Dr. Booth says. "We have to have legislators, courts, scientists, advocacy groups. The best model may be that of the coalition of interest groups that have worked successfully to change attitudes toward tobacco. Inactivity is the equivalent to a modern plague. We haven't any more time to lose." **VMR**

Part of the Journey **to Mars** Will Begin at MU's College of Veterinary Medicine

Space Weightlessness Studied in an Earth-Bound Way

If you want to be the first person to step foot on Mars, you'll have to overcome one weighty problem. Humans are not designed for long periods of weightlessness.

The journey to Mars will take at least two years each way. Earth orbital flights of only two weeks have shown that astronauts' bodies significantly atrophy due to a lack of gravity.

NASA scientists are beginning to wrestle with the human problems of such a trip in addition to the more familiar engineering problems of propulsion, communication, and landing on the red planet. Even if those mechanical problems are solved, no one will leave Earth until scientists know how to protect future astronauts from the problems of weightlessness that

include muscle atrophy, heart problems, and cognitive complications.

One person working on the answer to this question is Dr. Marc Hamilton, an assistant professor of veterinary biomedical sciences at the MU College of Veterinary Medicine. Last year, Dr. Hamilton received a \$755,000 grant from the National Space Biomedical Research Institute, a NASA-funded consortium, to help study some of the effects of long-term weightlessness. NASA provides most of the institute's budget and this year awarded grants to 86 proj-

ects selected from a pool of 281 proposals.

Dr. Hamilton's three-year study is designed to see how specific human genes react when a person is inactive, the best simulation of weightlessness on earth.

He said knowing whether a specific gene is active while the body is inactive can provide future scientists with data on ways to keep astronauts in shape. An earth-bound application of this research will help other scientists determine how inactivity changes the way human cells react to metabolic diseases such as obesity, heart disease, and diabetes.

Dr. Hamilton's process uses a special needle to take biopsies from human volunteers who have been in controlled laboratory conditions dictating specific levels of activity or inactivity. Even one inactive day is known to disrupt the functions of dozens of genes. Some of the test subjects will have up to two weeks of bed rest before the biopsies. Bed rest is considered by scientists to be the closest way on Earth to reproduce weightlessness on the human body.

The biopsies are processed in such a way that they emit a florescent glow that intensifies as the gene becomes more active. A computer reads and measures the glow. The amount of the glow gives an indication of how much each gene is disrupted by a lack of exercise. A follow-on study could use such data to create new ways of exercising in space.

Dr. Hamilton and team know which genes to look for because of the recently-completed human genome that mapped the human DNA.

This technique will allow him to monitor the activity of about 15,000 genes—about half of the human genome. Dr. Hamilton said before the DNA map, trying to find genes that reacted to inactivity was like trying to find the proverbial needle in a haystack.

Dr. Hamilton was recruited from the University of Texas about two years ago. He also is a researcher for MU's Dalton Cardiovascular Research Center. Another of his current projects, using similar techniques, is the role that muscles play in metabolizing fat cells. **VMR**



Dr. Marc Hamilton backed by a computer scan that shows the activity of specific genes.

A Quality Program from

THE SHOW ME SELECT PROGRAM IS DESIGNED TO IMPACT THE MOST IMPOR



Strict record keeping is an important part of TQM. The paper trail that accompanies each heifer that goes through the Show Me Select program creates confidence among cattle buyers that the product has met strict quality standards.

W. Edwards Deming, born to a poor Sioux City, Iowa farm family in 1900, saw something amiss in America in 1950. Having left the farm to become a University of Wyoming and Yale-educated statistician, he noticed that post-war American industry was inefficient. Processes used to build houses, cars, and other goods had become a patchwork of disjointed concepts and procedures that made them more expensive and of less quality than they needed to be.

Corporate America listened to Deming and told him to get lost—and he did, in Japan. Deming's advice to the Japanese was to not copy the Amer-

ican-style inspection system but to incorporate quality control principles into every part of the management and manufacturing process. His words were taken to heart and the country zoomed from making cheap metal toys to a manufacturing leader producing what many considered premium products.

By the 1980's, Deming's principal concept, Total Quality Management, TQM, had become a buzzword in many American boardrooms. In 1981, Ford Motor Co. hired Deming in a desperate attempt to stem the flow of huge losses. Ford soon adopted its well-known slogan, "Quality Is Job One," and not only moved back into profitability but also took the industry lead away from General Motors.

In the mid-1990's, some Missourians thought that TQM could help the state's cattle farmers battle poor cattle reproduction rates. About one-third of the state's heifers only bore one calf—a chilling rate considering that most farmers needed each heifer to produce at least five calves to break even. With an estimated 2,062,000 cows on nearly 60,000 Missouri farms, the economic stakes were immense.

In 1997, the nation's first comprehensive, statewide, on-farm program to increase cattle reproduction productivity was begun. Called the Show Me Select Replacement Heifer Program, the effort was a start-to-finish, coordinated,

TQM approach to use the best practices known to increase efficiency. It involved the combined efforts of cattle producers, veterinarians, Missouri Cattlemen's Association, Missouri Department of Agriculture, Missouri Veterinary Medical Association, and the Missouri Livestock Market Association. The program involved faculty from the MU College of Veterinary Medicine and other divisions. Important information was conveyed to producers and veterinarians through MU Outreach and Extension.

The plan's first concrete results have come in. And, so far, the results have been very good.

Factory Quality on the Hoof

Missouri is second only to Texas in the number of beef cows in production. Income from cattle is the state's largest source of agriculture revenue. In the 1990's, low beef prices made it hard to make a living from cattle. With a soft market, the only way to survive is to become more efficient at every stage of the production process, just what TQM is designed to do.

The approach taken by the Show Me Select team uses many of Deming's principles for improving production in a factory, only here the factory is a heifer and the products are multiple calves, says Dr. Richard Randle, MU College of Veterinary Medicine ruminant health veterinarian and co-leader of the Show Me Select program.

The effort to make a momma cow a more productive bearer of calves begins at her birth, he said. Cows without the physical structural soundness for successful calving are not allowed into the program. Then, successful candidates are weaned on feed, minerals, and vitamins known scientifically to best create the optimum weight for the cow at puberty. Best practices in veterinary care come in, too, with a scheduled program of proper health examinations, vaccinations, and parasite control.

The program's next step involves the cow's first conception. Most Show Me Select heifers are bred through artificial insemination to utilize the best genetics available with an aim toward the best possible



Heifer to Calf

IMPORTANT PART OF FARM LIFE—THE BOTTOM LINE



Dr. David Hardin



Dr. Robert Larson



Dr. Richard Randle

birth time. There is one additional quality flourish—all heifers are bred with semen from bulls with a known superior birthrate and high calving-ease EPDs—expected progeny differences. Introducing these superior genetic factors at this point should create even more fertile cows in generations to come.

After insemination, each heifer is examined by ultrasound or palpation by a veterinarian to confirm the pregnancy. Heifers that don't get pregnant on the first attempt are generally housed with a bull for additional opportunities to conceive.

During the pregnancy, extension specialists and cooperating veterinarians inspect the enrolled heifers at least

twice on the farm. At every step, practices known to be the most efficient and productive are consistently used. To be a full member of the Select program, each heifer must undergo the same process based on the best scientific knowledge available. Everybody involved in the process must be part of a coordinated effort with an eye toward the final, quality, product.

Today, technical capability alone is not sufficient for success, says Dr. David Hardin, director of the MU College of Veterinary Medicine's Continuing Education department that helped establish in the Select Program. What differentiates the successful from the unsuccessful organization are planned and coordinated

systems of work processes that people throughout the organization understand, believe in and are a part of. Dr. Hardin said that these systems of clear work processes reduce bureaucracy and cycle times, increase responsiveness and innovation, and lower costs thereby assuring product and market success.

The diploma for the heifers who complete the program is a black and yellow ear tag signifying that they have been handled in accordance with, and have met the requirements of, the Select program. This badge is akin to the ISO-9000 certification in manufacturing that shows buyers from around the world that the product was built in accordance with strict quality standards and can be bought with confidence.

The Bottom Line?

So far, 32,000 animals from 390 farms have been enrolled in the program. One hundred fifty veterinarians and 17

regional extension livestock specialists have participated in 80 Missouri counties.

The results? Only 10 percent of Select heifers required calving assistance by veterinarians, about half the national average. Almost 90 percent of the heifers calved within two weeks of their projected calving date, a big improvement over national figures. Best of all, more than 90 percent of all enrolled heifers calved—a three hundred percent improvement over conventional figures.

Even though the program is still in its early stages, producers participating in the Select methods have seen a boost to their bottom line. While the increase in efficiency won't see Rolls Royces populating the state's feedlots, it is helping Missouri cattlemen to cope with tough financial times and preserve their way of life.

W. Edwards Deming, who grew up in a tar-paper Iowa farm shack but achieved worldwide acclaim, probably would have understood and appreciated such success.

VMR



The yellow and black ear tag of the Show-Me program signifies that the animal has been raised in accordance with strict standards.



COLLEGE *Ambassadors*

Not long after graduation, MU College of Veterinary Medicine alumni feel the pull of their communities. Sometimes, it's helping to organize an animal-related function. Other times, it is serving in an appointed city or county post for the betterment of the citizenry. In some cases, it is going straight into the political arena for a much more visible role.

It's no secret why this pull exists. Few professionals are as trusted as veterinarians. Veterinarians are also natural problem solvers with a practical bend to getting things done well.

The skills needed to play an effective community leadership role are not always directly taught in college. Public speaking, organizing people, and public

relations skills don't come naturally; these are crafts best honed with exposure and training.

Recognizing that today's students will be tomorrow's community leaders and spokespeople for the profession of veterinary medicine, the College has started an on-the-job training program to let students practice these skills. It's hoped when the community begins to pull on these future graduates, they will take to their leadership role in a more comfortable and effective way.

The College's Ambassador Program was formally instituted last year. Ambassadors are veterinary medical students who represent the College at trade shows and alumni events and give tours of the school. They get a big dose

On-the-Job Training



Barbra Horrell

of dealing with the public and portraying themselves, and their College and profession, in the best possible light. These students report to the Office of Student Recruitment and Retention, directed by Barbra Horrell.

Ambassadors are on duty for at least a dozen College and Missouri events a year such as Black and Gold Day, alumni weekend, family day, and graduation. Off campus they represent the College at such important functions as the American Royal in Kansas City and the Missouri Veterinary Medical Association convention.

Life As An Ambassador

Ambassadors are an informal group of volunteers. Each must be in good standing academically to participate. They contribute within the limitations of their classroom and clinical demands. Their goal is to communicate the mission of the College to the public, attract talented and diverse applicants, and increase the recognition of the College and its role in the community.

Generally, Ambassadors come from each of the four classes and there can be at least two dozen in the program at any one time. Ambassadors are chosen for assignments based on a number of factors including the location of the touring group (people from Kansas City would enjoy talking to a student from there). Other times, Ambassadors will be called to duty because of their particular interest—someone interested in wildlife would be the best choice for a group of conservationists. Often, it's just who's available when an assignment comes down.

The rules for representing the College to the public are straightforward and practical. They're reminiscent of what earlier generations learned in charm school, but largely lost in recent generations: Smile, make eye contact, and greet everyone; face forward; be nice to everyone; try to look nice; and remember people who you've met.

"Many people would like information about the College and talk to an

Because the College Ambassadors are well on their way to becoming veterinarians, they can take prospective students into areas of the College that ordinary tour guides could never go. Here an Ambassador describes a routine surgical procedure to a group of pre-vet scholars.

For Tomorrow's Community Leadership

Ambassador but won't start the conversation," Horrell tells the troops.

"Think about it, why did these people come to an event, if not to talk to people like the Ambassadors."

Other rules: Be positive, be personable. "It doesn't matter if you just flunked a path exam or were turned down for financial aid or just ate two Dollar Dogs at the Zou deli, there is something honest and positive for you to say about classes, tuition, or whatever the topic of discussion is," she continued.

Another bit of practical advice is to stand independently, no clumping into groups of College people. "Visitors attending events are very unlikely to approach a closed circle or break into a conversation," Horrell said. "Since the whole reason for ambassadors at an event is to talk to the public, talking to each other isn't really very helpful."

Still another rule: No Bluffing. "If you don't know the answer, either suggest someone else to contact or offer to find out yourself," Horrell says.

Horrell directs the Ambassadors to a degree of professionalism that a drill sergeant would envy but yet is always mixed with a counterweight dose of mom's love. Ambassadors don't shirk tough questions from visitors, but Horrell has given the students guidance on how to respond. For example, if a visitor asks about what happens if a client of the teaching hospital can't afford to treat an animal, the students can say that no emergency treatment is refused to alleviate suffering. And, there is an informal effort to help animals such as classmates who've adopted sick strays.

Sometimes the crowd can be rough. "Some visitors have said that veterinarians are only in it for the money," Tara Brooks, class of 2004 said. "I respond with a chuckle and then explain the low pay scales for first-year veterinary medical graduates. I then explain the high average debt load most new graduates have. I also made a big point about the compassion that this profession requires."

Typical Questions

What sort of questions do Ambassadors field when they meet the public? Ambassador Mayuri Chhotu, class of



The College's Ambassadors sometimes get a chance to meet with the important people of Missouri, including Lt. Governor Joe Maxell. Earlier that day, the Ambassadors discussed issues confronting veterinary medicine and education with Governor Bob Holden. College faculty who assisted on the trip were Drs. Ron Cott, Allen Hahn, and William Fales.

2004, says that it's often, "How do I (or my son or daughter) get into vet school?" Then, what's it like there?

The questions often give Chhotu, whose career interest lies in laboratory animal medicine with an eye toward possibly joining the FBI, the opportunity to educate the questioners that veterinary medicine is often more than a veterinarian helping cats and dogs. Beyond community medicine and its related specialties, veterinarians can deal with herd health issues, food safety, and service work such as done at the College's Research Animal and Investigative Laboratory and Veterinary Medical Diagnostic Laboratory.

Brandon Reinbold, class of 2003, agrees that questions about getting into veterinary medical school are the most frequent. "They have the same dream that we have," he said. "They see the Ambassadors as a realistic and credible source of what it is really like to become a veterinarian." Reinbold, who says he is not a natural public speaker, plans to use his emerging mass communications skills later to help the public understand critical issues facing agriculture. "Immersion in this program will make it easier."

"I think most people are surprised at the capacity and scope of our facilities," Matthew Mahn, class of 2003 said.

"Many people don't realize that we are

legitimate doctors that complete the same amount of schooling as medical doctors. People are surprised that we can treat cancer, have an ICU department, and perform blood transfusions. Most of the erroneous impressions that I have seen deal with people's perceived limitations of the field of veterinary medicine. They don't realize how complex and advanced the field is."

Sometimes, too, there are just the fun moments such as when Mahn had a group of grade-school kids who got a kick out of finding their total group weight on the scale in the equine department.

And then are the days when the road to an education is filled with bumps. "I was giving a tour of Clydesdale Hall to a group of high school students," Kyle Malter, class of 2003 remembered. "I told the group about the massive supply of cedar chips that we store for bedding. As I opened the door to show them the storage room they all laughed. I then realized I had opened the wrong door, to the bathroom!"

And then there was a 14 year-old girl, admirably petting a horse in an equine stall that asked Brooks, "Do they really make hamburger out of horses?" Finally, a question of an Ambassador that's easy to answer.

A Time Honored Method of *Teaching Success*

During his working day, Dr. Cecil Moore, director of the MU Veterinary Medical Teaching Hospital, instructs some of the country's most focused, serious, mature, and intelligent students. Veterinary medical students traditionally have robust academic backgrounds, a compassion for life, good teamwork and communication skills, and a strong work ethic.

Dr. Moore knows that these qualities didn't come about by accident. In their formative years these students went through a process of being challenged, mentored, guided, and coaxed. Their strong sense of responsibility was taught, early on, through a series of increasingly more challenging and complex projects. Sometimes, not every attempt worked

Cecil Moore trades his daytime surgical scrubs for blue jeans and boots to help youngsters practice the skills that they will need in life.

out. That was part of the process, too, as it helped students to learn how to overcome frustration and adversity.

In an earlier time, many youngsters attained these skills on the farm. Even as pre-teens, farm kids had meaningful duties and responsibilities to make the family business work. Being slack on chores such as failing to feed the animals every day was not an option—the

consequences of failure were immediate and dramatic. In 21st century urban America, young people can grow to near adulthood without ever having to accept such responsibility.

To ensure that younger people enter adult life with traditional skills of success, for the last decade Dr. Moore has spent his off hours working with young people near Hallsville, Mo. Using the husbandry of farm animals as training aids, something as old as civilization itself, Dr. Moore guides young people through a course in achieving success.

Enter the 4-H

The young people who go through Dr. Moore's unofficial training course, from preteens to teenagers, are part of



On a warm summer day in Hallsville, Mo., Dr. Cecil Moore answers a question from a young 4-H'er. The Hallsville 4-H group is currently the largest such club in Missouri.

the Hallsville area 4-H.

The 4-H program is designed to be a dynamic, informal, educational program for young people that is governed by a national board of trustees. The program partners with volunteer leaders, land-grant universities, foundations, and state and national governmental agricultural entities.

4-H is one of the largest youth organizations in the US with more than 6.8 million participants and more than 610,595 youth and adult volunteers. Universally recognized by its four-leaf clover emblem, 4-H sponsors organize clubs, school-enrichment groups, individual study programs, camps, and school-age child care programs. There are 110 program areas, including community service, communications, arts, consumer and family sciences, environmental education, earth sciences, healthy lifestyle education, leadership, science and technology, and plants and animals.

To date, more than 45 million people are 4-H alumni. They include such diverse people as Orville Redenbacher, Reggie White, Dan Reeves, Johnny Carson, and Reba McIntire.

Dr. Moore is no stranger to the 4-H concept. As a youngster in Adair County near Kirksville, Mo., he learned electrical concepts, horsemanship, beef production, shepherding, and public speaking through 4-H projects. It was a family affair as his brother, David, MU DVM '74, was also a 4-H'er. The tradition didn't stop there. David's son John, MU DVM '95, and John's four brothers are other 4-H alumni. Dr. Cecil Moore's two children, Miranda and Nathaniel, have been members of the Hallsville group. Nathaniel remains active and serves currently as club treasurer. Dr. Moore's wife Gerri is also a 4-H leader, having served as both club sponsor and sewing project leader. Gerri also presently serves on the Boone County Extension Council which is integrally involved in county 4-H activities.

The main focus of the Hallsville group, of which Dr. Moore is a leader, is the husbandry of sheep. "Accepting the responsibility of the husbandry of animals actively involves young people in more than basic animal behavior," Dr. Moore said. "They have to make a time commitment and follow through

on it without fail. With this they also make a moral and economic commitment to care for their animals and treat them humanely. These are among the important life-long skills acquired through 4-H." Youngsters involved in the Hallsville project raise sheep with an eye toward exhibiting them in shows and winning awards. To this simple goal comes hard work and complex decision-making.

Setting Goals and Making Them Happen

"The young people in 4-H are encouraged to set goals and plan for them," Dr. Moore said. "One goal might be to have an animal in the best possible presentation form at a specific competition. This means the young person has to plan and accomplish tasks to make that happen."

These tasks can run the gamut that a small business owner would recognize: Setting a timeline, gathering and negotiating resources, making corrections when something goes awry, monitoring that plans are still realistic, following through on commitments and promises, communicating frequently about the process and progress of their efforts, and being accountable in a competitive environment. "Thinking about what the project involves," Dr. Moore said, "members must be able to think critically and evaluate their projects as well as develop efficient communication skills if they are to describe the merits of their animals. They must develop technical expertise as well as other skills such as being able to negotiate, operate in teams, follow instructions, or be a leader. These are the skills that will later translate into success," he noted.

The Hallsville group has more than 100 members—meaning that 4-H'ers get a chance to play many different roles. Some projects can involve up to 30 members while other endeavors may be more individual. Competitive endeavors are judged by the most important group of all—other 4-H'ers. "Competition is healthy in this environment as the young people are evaluated by their peers and leaders with immediate constructive feedback," Dr. Moore said.

Such evaluations help the participants to evaluate their plan and consider

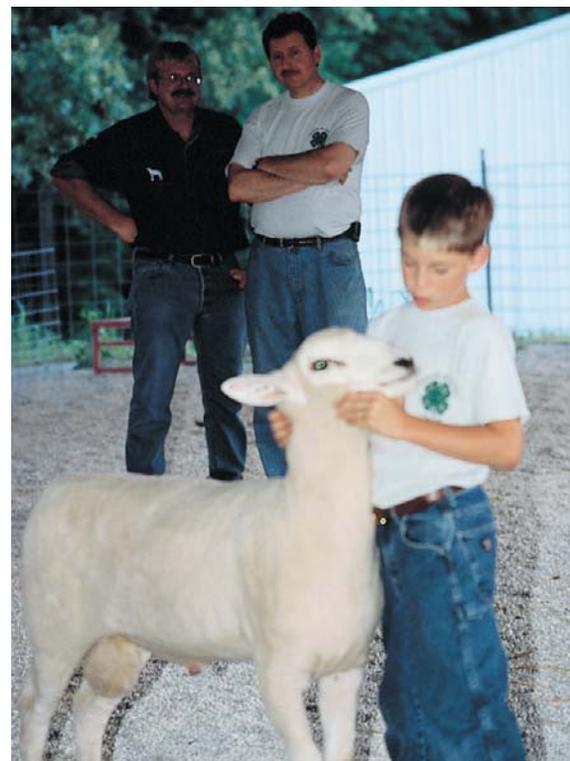
other strategies if the coveted first-place blue ribbon is not achieved. "Failure teaches us to concede defeat, lose gracefully, determine what we did wrong, learn to modify, and set new goals," Dr. Moore said. Frequently, 4-H'ers will pitch in to help their peers who are younger or struggling, strengthening the bonds of trust and community.

Competition can come in the form of local, county, state, and national levels—each with an increased dose of competition.

The 4-H experience also allows young people to get their first taste at leadership, too. Dr. Moore said that this can take the form of organizing people and resources to get something done or conducting a meeting using Robert's Rules of Order. In each county, 4-H activities are organized into local clubs, where many people get a chance to exercise some leadership roles.

Often, the pre-teen members co-mingle with the teenagers, giving the senior 4-H'ers a chance to coach and mentor the younger ones.

Dr. Moore has served as project leader in the Hallsville 4-H club for both sheep and veterinary science projects and is beginning his 11th year as a project leader. He also supports the state-wide 4-H effort as a contributing member of the 4-H Foundation. **VMR**



Young 4-H'ers accept the responsibility of their animals knowing that they can rely on advice from adult leaders like Dr. Moore.

Long before commandeered airliners crashed into New York's World Trade Towers and the Pentagon and anthrax-laced letters arrived in mailboxes, officials at the MU Veterinary Medical Diagnostic Laboratory (VMDL) considered what bioterror threats could be launched against Missouri's agriculture. It didn't take long to create a list of horrors if an enemy initiated such asymmetric warfare.

Gaining knowledge from scientific conferences and other resources and comparing notes with other groups who saw the possibility of international terror morphing into a domestic threat, VMDL quietly began to put people and procedures in place to help guard the state's agriculture. To its mission of diagnosing accidental and disease-borne problems with Missouri's food supply, it added a new mission of alerting the public to any *intended* attack on the state's agriculture.

Without fanfare about a year ago, VMDL completed its plans and joined a little-known organization called the

Missouri State Emergency Management Agency. Charged with identifying and responding to bioterrorism or other agricultural emergencies, this agency coordinates state resources like VMDL, Missouri National Guard, and Missouri Department of Public Safety and works in cooperation with the USDA, Missouri Veterinary Medical Association, and national law enforcement and public health agencies. With its entry, VMDL became a full member in the state's organized bioterror response team.

When the first news accounts of September 11 began hitting TV screens, MU's VMDL already had in place procedures and lab tests to identify and handle evidence of terrorist activities aimed at Missouri's animals and a quick reporting program to appropriate state and national agencies.

And it was not just new tests and procedures. VMDL also had steadily recruited people trained in the science of identifying bioterror. During the past few years, the laboratory has been quietly bolstering its already impressive team of scientists and technicians with

alumni of the USDA's Plum Island Animal Disease Center, sitting off the tip of Long Island in New York Harbor. To date, four of VMDL's pathologists and one virologist have trained there, considered the nation's most prestigious animal disease diagnostic center. This means there are probably more bioterror experts at VMDL than any similar facility in the nation. "This puts us in a unique position to handle terrorist threats," Dr. Stan Casteel, VMDL's director, said.

A New Reality

"Terrorism in agriculture is not sensationalism, it is reality," says Dr. Harley Moon, Iowa State University veterinary medical professor and former director of the Plum Island center. Dr. Moon currently leads the National Academy of Sciences committee to evaluate biological threats to agribusiness. "A threat to agriculture could easily be introduced in multiple places simultaneously." Food is a logical way of introducing biological agents, he continued. It is relatively easy and doesn't require



Even before the horror of September 11, VMDL was already watching for terrorist dangers to Missouri's agriculture...

the same financial and technical sophistication of weaponizing anthrax.

Targeting food also fulfills several terrorist goals: it can be done mysteriously and anonymously (only four percent of terrorist acts are claimed by the groups who performed them, according to a US Navy Intelligence study); it bypasses a strong military and hits a nation in the pocketbook; and it spreads fear via a staple of everyday life.

Unlike the attack on New York's WTC, a large number of human deaths may not be necessary to harm America's food economy. Look at the foot and mouth disease epidemic that hit the United Kingdom in February 2001. While only a few animals were actually diagnosed with a disease, the cost to restore the public's faith in beef cost more than \$3.5 billion in destroyed animals and lost farm income—not to mention lost tourism. There is no clear evidence this was bioterrorism, but it's an example of the economic chaos an attack on the food supply could create.

"The consequences of a successful attack would be enormous," says a technical brief by the USDA. "Economic loss would run into billions of dollars, even for an attack which is quickly halted and remedied. Deliberate assaults...would cause unprecedented public and political concerns, and negatively affect consumer confidence in the safety of US products and the government's ability to handle national agricultural disease or toxin emergencies. These are not small and unlikely problems—the former governments of Great Britain and of Belgium were both defeated in part by public loss of confi-

dence in their ability to handle major food safety crises that had become international in scope."

Nationally, US agriculture contributes more than \$1 trillion of the gross domestic product and \$50 billion in export revenue. It can devastate a state's economy, too. An avian influenza outbreak in Pennsylvania in 1983 tallied \$465 million in direct costs and \$150 million in lost trade.

Missouri Livestock, An Attractive Target

Dr. Casteel said that threats to Missouri agribusiness can come in many forms and be directed at the state's cattle herds, turkey and chicken farms, swine production facilities, and even horse farms. MU's VMDL has for years had experts in avian, bovine, porcine, ovine, and equine areas—experts now watching for any telltale signs that could be associated with a bioterror attack. They have been on alert for any suspicious viruses, bacteria, or toxins long before September 11.

While avian, equine, and other animal diseases are watched even more carefully today, VMDL's antenna is raised highest over livestock, probably the most likely target in Missouri agriculture, according to law enforcement experts.

Missouri's many sale-barns, together with a relative lack of traditional security, marks the state as an attractive target for a terrorist attack. Missouri's numerous, but smaller, cattle farms mean that terrorists can strike several targets at once in a comparative small area statistically increasing the chances of success.

Grazing livestock, or open lots of feeder animals—any animal dispersed over far distances—are much more clandestinely accessible to a terrorist than animals in closed pens. Unless caught in the act, perpetrators know that they can introduce a disease and disappear, leaving investigators scratching their heads. Since many potential bioterror organisms, such as anthrax, occur naturally in Missouri and can live for a long time in the environment, a well-disguised bioterror attack could be difficult to identify, Dr. Casteel said.

Livestock are also a known critical economic part of the state's business. Missouri is second only to Texas as a cow-calf state with 3 million head. And Missouri leads all the states in the total number of purebred cattle herds. Sales of cattle and hogs contribute \$1.6 billion to the state's economy every year. Total livestock revenues approach \$2.5 billion.

Missouri is also located at the demographic center of the nation. A leading farm state, it has a myriad of close economic ties with the planet's most productive agricultural breadbasket, the American Midwest.

Livestock also make attractive targets because it would require near perfect conditions—and repeated attempts—to successfully contaminate farm crop fields. Despite all the attention being given crop dusters, using one to spread germs is not as easy as it sounds. The planes are designed to spray pesticides in heavy, concentrated streams, whereas bioweapons are ideally scattered in a fine mist over as large an area as possible. The nozzles in crop dusters are best

Particularly on alert at VMDL is Dr. William Fales, head of the bacteriology section. Dr. Fales, familiar with naturally-occurring anthrax, is careful to watch for any of the substance that has been modified to easily disperse in the air like talcum powder. This aerosol version of anthrax is "very, very, very, very dangerous," Dr. Fales says. In Senator Daschle's suite of offices in Washington D.C., 20 people breathed in this type of airborne particle when a letter was opened. Two other office workers were exposed when the powder somehow floated to neighboring offices down the hall. Fifteen minutes later, police officers inhaled microscopic specks in the air. "This suggests very pure, very fine particles that were handled by someone who knew what they were doing. Even after settling on a surfaces some of the dust can take to the air again, and become dangerous a second time," Dr. Fales said.



Anthrax bacilli

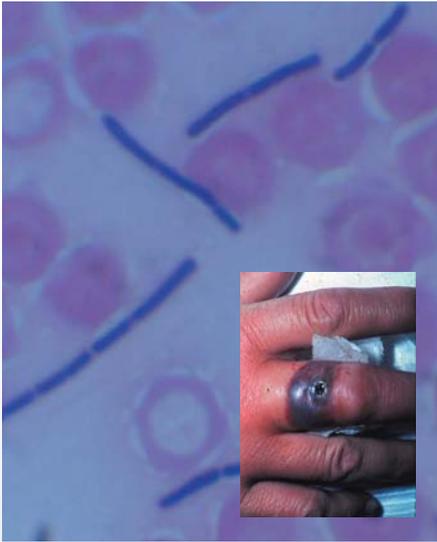


When exposed to air, spores form on the anthrax bacilli. While anthrax in its vegetative state can be killed by simple boiling, its spore form is incredibly hardy. An autoclave, with a temperature of 121 degrees C at 15 pounds of pressure for 60 minutes, is one of the few reliable ways of killing the endospores.



A few tiny anthrax cells dropped on a blood agar plate will, within 24 hours, grow into heavy colonies of the disease with millions of cells per colony.

A New Threat



Anthrax in its bacillary (rod) form among typical red blood cells. In the terminal stage of the disease, anthrax kills its host by releasing deadly toxins that usually fill the lungs with fluid and shuts down the respiratory system.

A nick with an infected scalpel will cause the cutaneous form of anthrax.

suited to discharging relatively large particles—100 microns in diameter—not tiny one-to-two micron specks of weaponized bacteria.

Attacking foodstuffs in the processing stage would be difficult, too, as larger food companies have instituted effective security measures. And sometimes such bioterror attacks just don't work. An attempt by the Rajneeshee religious cult in northwest America to sprinkle *Salmonella* on a salad bar resulted in several people getting sick, but no mass death.

Guarding Against the New Threats

To Dr. Casteel, the most worrisome terror threat to Missouri cattle is the introduction of foot and mouth disease (FMD) which can also spread with astonishing speed among sheep and swine. Not seen in this country since 1929, the disease is harmless to humans but renders farm animals economically worthless. If a successful bioterrorist attack was to occur, Missouri could be



Microscopic view of an anthrax culture strain.

forced to destroy much of its own livestock, as Great Britain had to do earlier this year.

A vial of the highly infectious FMD pathogen released in a cattle sale barn could cause a media sensation, tarring the entire state even if affected animals were immediately quarantined. Potentially-infected animals sold out of the state could cause widespread suspicion and panic against Missouri both at the political and consumer level with messy lawsuits and disruptions of the food supply. The economic ramifications could be felt for years.

Second on Dr. Casteel's threat list is familiar to anyone reading a newspaper today: Anthrax.

"I would suspect that the main anthrax threat to cattle would be by simply introducing it into animal feed," Dr. Casteel said. "Aerosolizing anthrax into a fine powder that is easily carried by air currents—like what appeared in letters to NBC News and Senator Tom Daschle's office—is technically hard in comparison."

Anthrax, Dr. Casteel says, stands out as a weapon because its spores are particularly hardy; they are resistant to sunlight, heat and disinfectant; and can remain active in soil and water for years. Anthrax occurs naturally in both wild and domestic animals including cattle and sheep. Infection from direct contact with affected animals is fatal in 20 percent of cases. If inhaled, however, anthrax spores cause death in almost 90 percent of the cases.

VMDL has been quietly reminding Missouri veterinarians not to be quick to necropsy dead cattle where anthrax symptoms are apparent. Anthrax bacilli inside of an animal pose little threat to humans but can become the deadly spore form upon contact with air. A veterinarian who breathes in these spores can quickly develop the dangerous pneumonic form of anthrax. A nick with an anthrax-tainted scalpel could cause the cutaneous form.

Dr. Casteel says that the other possible bacterial bioweapons include the toxin from *Clostridium botulinum* (botulism) and *Yersinia pestis* (plague). Still other possible threats include West Nile Virus, Bovine Spongiform Encephalopathy (BSE), Scrapie, and Chronic Wasting Disease. "It was brought to our attention

that chlorinated hydrocarbon pesticides, such as DDT, could be used to contaminate livestock feed. Ingestion by cattle would contaminate large numbers of food animals," Dr. Casteel said. "Also, nerve gas could be sprayed in large feed lots as a way to contaminate large amounts of edible tissue. We're prepared to deal with this threat in our toxicology lab by checking samples from potentially contaminated herds. We know what residues to look for to confirm or rule out any such contamination."

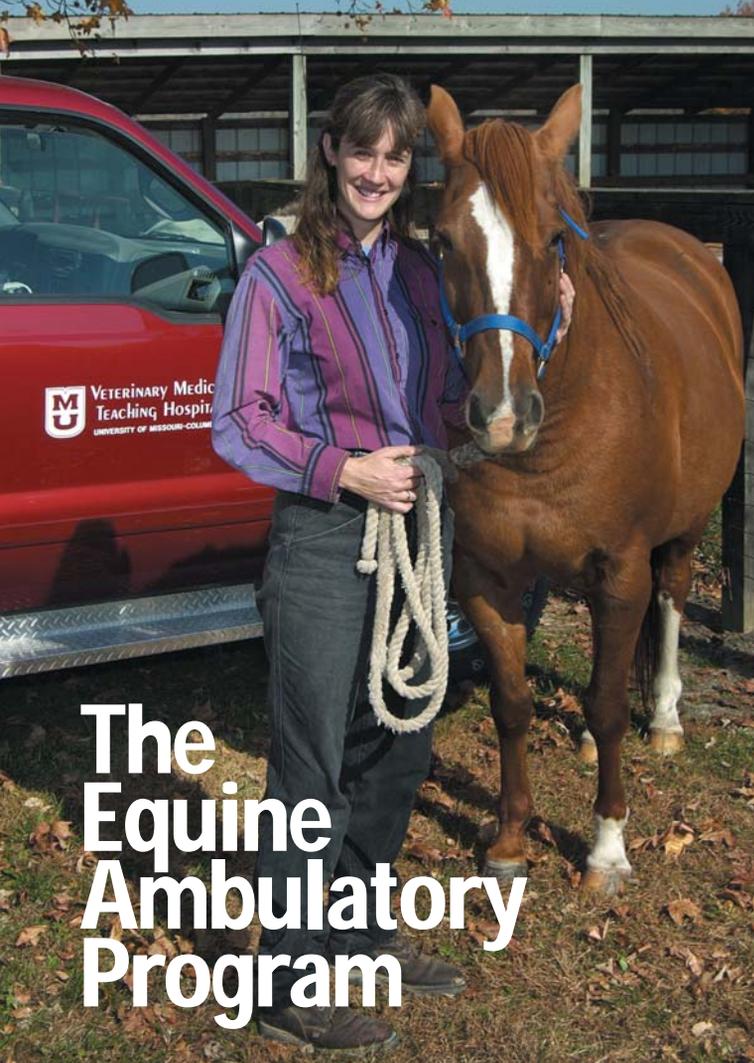
Dr. Casteel and team won't say much about the specific tests and procedures so as not to yield any technical edge to the terrorists.

VMDL has been in the business of identifying animal health problems since its founding in the 1960's. Guarding against bioterror threats is just its newest mission. Within days of the anthrax letter scares, VMDL was at work testing suspicious letters arriving in University mailboxes. So far, the cultures, that take 24 hours to process, have shown nothing more than hoaxes and misunderstandings.

The rapid identification of any bioterrorist substances is vital to the problem being quickly contained and dealt with, Dr. Casteel said. Since VMDL is the only fully accredited veterinary medical diagnostic laboratory in Missouri, it is on the front lines with the mission of quickly identifying any disease, determining a medical response, identifying the method of transmission, helping determine the duration of illness and expected mortality, giving advice on the best isolation and quarantine measures, and helping to safely dispose of carcasses of infected animals.

Dr. Casteel points out that any Missouri food animal-related terrorist action will probably be first discovered by the VMDL as it routinely works with in-the-field veterinarians in identifying sources of livestock disease and death. Last year the MU VMDL performed 180,000 tests to determine animal disease problems from a full spectrum of specimens—from biopsies to whole animals, body fluids and organ specimens to samples of feed and water. Since VMDL scientists have been routinely diagnosing problems with Missouri food animals for more than 40 years, anything new or unusual should be noticed immediately. **VMDLR**

A New Version of an Old Country Tradition



The Equine Ambulatory Program

At the beginning of the 20th Century when horses were still Missouri's primary mode of transport, the country horse doctor made house calls. That veterinarian, relying on a horse and carriage for locomotion, probably knew everyone in the area. It wasn't uncommon for a traveling veterinarian to be invited in for lunch and, "oh, since you're here, doc, can you look at my horse?"

Today, equine ambulatory service is still a country staple. Only now, the horse-drawn carriage has given way to a four-wheel-drive pickup truck. In May of 2001, the MU Veterinary Medical Teaching Hospital instituted a new equine ambulatory program, relieving

some of the equine medicine duties previously handled by the food animal ambulatory team.

Amy Rucker, MU DVM '93, was brought in from Springfield, Mo. to run the operation. The program's mission is to give veterinary medical students a look at life in private practice and horses other than the referral cases in the teaching hospital. It also provides Missouri horse owners a valuable medical service and a chance to meet the next generation of equine veterinarians.

In the program's first year, students got a hands-on opportunity to see equine medicine up close. In addition to routine medicine and emer-

gency cases, in late spring the students worked with mares and foals, in the summer with lameness cases, and in the fall it was a dose of routine preventative care and vaccinations. "The horse owners love it and the students love it," Dr. Rucker said. "The students are interested in every little thing and the clients love to tell stories about which horse kicked so and so."

Equine ambulatory medicine is an elective course with a three-week rotation. As only two students can fit into the truck at one time, everyone is guaranteed their fair share of hands-on experience at each stop.

The territory covered by the service is "whatever is needed," Dr. Rucker said. Generally, however, calls seldom range more than 30 miles from Columbia.

There is still need for the ambulatory horse doctor, Dr. Rucker says. One reason is logistics. "In breeding season it is not economically feasible to move 20 horses to the clinic," she said. "Some horses are either too sick or lame to move, would be hurt by moving, or would just be quieter in their own environment." Also, she said, there seems to be an emerging area of care well suited to ambulatory work—equine geriatric medicine. "Many owners have adopted their horses as part of the family," Dr. Rucker said. "They're keeping their horses longer and we're seeing more age-related diseases such as pituitary problems."

Dr. Rucker moved back to Missouri after enduring a couple of winters in South Dakota where she helped operate a mostly equine practice.

"There were great horses and people there, but one winter lasted for six months," she said. "The show drifts were almost over the barns and I

had to snowmobile to my calls."

After the frozen north she worked in Springfield, Mo. with the equine practice of Jim Joyce, MU DVM '85. While she loved working in the Ozarks, the opportunity to start an ambulatory equine practice at MU was too appealing not to pursue.

Rather than the horse-drawn carriage of an earlier century, Dr. Rucker relies on a four-wheel-drive Ford pickup for her rounds. It features all of the routine equipment plus specialty dental, ultrasound, radiograph, and endoscope gear. The truck even has a name, Edna the Pony Pre-server; a moniker given by a student who won a naming contest and took away a pizza as first prize.

A cell phone keeps Dr. Rucker in touch with the MU equine admitting desk and helps when directions to a new location are needed. Another important help: a laptop computer and printer. "I can do all of the medical records and billing right out of the truck," she said. "I can also immediately issue printed prescriptions and invoices."

While the computer also has an electronic map function, it still doesn't replace stopping for directions once and awhile. The name on the side of the truck gives away its mission. "People who see me say, 'oh, by the way since you're here, can you look at my horse,'" Dr. Rucker said.

Which is probably not too unlike the experiences of the veterinarians of an earlier century. **VMR**

Dr. Rucker graduated from the College in 1993—the last year not to be taught in Clydesdale Hall. "I never got a chance to work in the building as a student," she says. "I work here now. I guess I kinda snuck back in."

Alumni at Large

Kansas City Zoo Veterinarian Earns Diplomate Status

The Kansas City Zoological Park's Senior Staff Veterinarian and *MU DVM '87 Kirk Suedmeyer* recently passed credentialing requirements of the American College of Zoological Medicine, earning him the title, Diplomate, ACZM.

Dr. Suedmeyer is one of about 32 zoo veterinarians in the country to pass the certification exam since the ACZM was formed in the early 1980's. About 35 veterinarians in academia have earned the recognition and there are approximately eight charter diplomats. Dr. Suedmeyer is now one of four veterinarians in the state of

Missouri to be ACZM board certified; the other three are with the St. Louis Zoo. There are two board-certified veterinarians in the state of Kansas.

Dr. Suedmeyer passed the exam on his first attempt. The certification designates him as a specialist in zoological medicine. His field of expertise is General Zoo, which includes aquatic, reptile/amphibian, avian, wildlife, and captive mammal species.

Dr. Suedmeyer is well known for his groundbreaking work in performing transabdominal ultrasounds on a pregnant elephant—he was the first veterinarian to perform this procedure. He

also performed this examination in a Black rhinoceros, Bornean orangutan, and African lion.

Cornelius Receives Commendation From Illinois Air National Guard

Lt. Col. Jim Cornelius, MU DVM '75, received the Air Force Commendation Medal for exceptional work accomplished as Chief of Public Health at the 126th Medical Squadron, Illinois Air National Guard, based at Scott AFB, Illinois near St. Louis. His squadron supports the 126th Airlift Wing that fly a dozen Boeing KC-135 airlift refueling tankers. These planes routinely refuel fighter aircraft of the Air Force, Navy, and Marines in worldwide missions.

He was presented the award for meritorious service in providing outstanding leadership to the unit in his capacity as Chief of Public Health. Dr. Cornelius was specifically cited for maintaining an exceptional infection control program and for his training and mentoring of junior officers and enlisted personnel throughout his squadron. He was also instrumental in an Air National Guard survey that tracked the causes of disease, injury, and premature death among members of the Air Guard's 90 US units. This effort reduced losses through education of military members in preventative measures.

Within a week after the terrorist attack on the World Trade Center, Dr. Cornelius was named acting commander of the 126th Medical Squadron and was expected to be deployed overseas in support of US troops.

Dr. Cornelius's medical mission is to keep military personnel medically qualified to deploy overseas at any

moment by monitoring the health of Air Guard personnel through physical exams and proper immunizations for the geographic area to which they are being deployed. He then provides medical intelligence briefings on medical threats that could compromise the health of the individual and, therefore, the military mission.

Lindsey Wins Award From MU Agriculture College

Dean Lindsey, MU DVM '57, was awarded a 2001 Citation of Merit award from the University of Missouri's College of Agriculture, Food and Natural Resources.

The award is given for professional attainment by a person in a related curriculum field and was presented during the college's second Celebration of Excellence held this summer. He lives in Carmel, Ind.

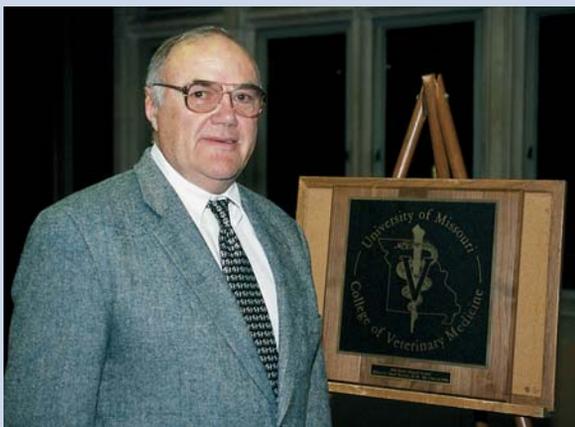
The award recognizes Dr. Lindsey's life's accomplishments. "He has used his life and his talents, both professionally and personally, to mediate, and, in the case of his community, help those less fortunate than he," the citation reads.

Lindsey grew up on a 69-acre livestock farm in Dallas County, Mo. When he was 11, his father passed away and an uncle who lived on a neighboring farm provided him with the tutelage and support he needed to finish high school as valedictorian. He farmed for a year, then enrolled as a pre-vet major at the University of Missouri-Columbia in 1951.

Laughlin and Nave Honored in 2001

Dr. M. Harold Laughlin, professor and chair of the College's veterinary biomedical sciences department, and *James E. Nave, MU DVM*

Herzog Awarded 2001 Dean's Impact Award



Robert (Bud) Herzog, MU DVM '56, was awarded the MU College of Veterinary Medicine's 2001 Dean's Impact Award. The award is given each year to recognize individuals who have made sustained contributions to the College. "This is certainly the case with Bud Herzog who has served as a valued mentor to so many of our students and graduates over the years," said Dr. Joe Kornegay, dean of the College. "In particular, since 1993, veterinary students from both MU and Kansas State have benefited from working with Dr. Herzog in his role as veterinarian for the American Royal livestock show in Kansas City. It's a great pleasure to recognize Bud for his many contributions to the College." Dr. Herzog lives and works in Lee's Summit, Mo.



Dr. M. Harold Laughlin



Dr. James Nave

'68 and veterinarian in Las Vegas, were both honored by the MU Alumni Association in 2001 with Faculty /Alumni Awards.

Faculty/Alumni Awards, first awarded in 1968 by the alumni association, recognize the achievements of faculty and alumni. Assistant, associate, and full professors are considered for their work as teachers, researchers, and administrators. Alumni are considered for both their potential and actual accomplishments in professional life and service to their alma mater.

Recognized as one of the leading exercise physiologists in the country, Dr. Laughlin serves the University and College as both a talented researcher and teacher. In 1995 he and his team received a \$7.5 million Program Project Grant from the National Institutes of Health (NIH) to use an innovative miniature-pig model for research on the benefits of exercise. At the time, it was the largest grant ever received by the University. It was renewed in 2000 for another five years and \$8 million.

Dr. Nave has risen from humble beginnings in rural Forsyth, Mo. to the pinnacle of his profession. Along the way, he has served his country and his community with devotion. After graduating from Mizzou, he served in the US Army from 1968-1971 and was awarded the Bronze Star for service in Vietnam. Nevada Veterinarian of the Year in 1988, he has been a

leader in many national and regional professional organizations, including serving as president of the American Veterinary Medical Association in 2000-2001. A force in the community, Dr. Nave chaired the professional division of the Southern Nevada United Way Campaign. The World Boxing Council has also recognized him five times as Boxing Commissioner of the Year.

Dr. T.J. Vogelweid: Five Decades' Service

Fifty years after graduating from MU's College of Veterinary Medicine, **Dr. T.J. Vogelweid** paused briefly for a reception to honor his achievement, and then went back to work.

The Moberly, Mo. veterinarian, who started in the community a year after graduation, still operates the Moberly Animal Clinic that he built in 1963. His future plans are to "keep practicing" with occasional vacations for hunting and fishing.

What changes in the profession did he see in his half-century? "When I began practicing it was 90 percent large animal as opposed to today where it's 90 percent small animal," he said. "I used to get as many as 20 calls a day to help some farmer in the country. Today, such calls are very rare."

Probably the most important advancement in veterinary medicine, he notes, is the development of effective antibiotics. He treated the first documented case of parvo in 1978—an infection that went around the world in only six months due to the ready availability of worldwide travel. Without good antibiotics, readily available, such rapid problems would be more commonplace and far more deadly.

Dr. Vogelweid served in the American military during World War II. He was involved in the Battle of the Bulge and Battle for Germany, and received a Purple Heart for wounds suffered in combat.

Schmitt Is Alumnus of the Year

Dennis Schmitt, MU DVM '78, and Southwest Missouri State University agriculture associate professor, was the 2001 recipient of the MU College of Veterinary Medicine's Alumnus of the Year Award.

Dr. Schmitt is best known for his 15 years' work researching artificial insemination techniques in elephants, mostly working with animals at the Springfield, Mo. Dickerson Park Zoo. In November 1999, his work with the zoo's Asian elephant, Moola, was rewarded with the birth (after a 674 day gestation) of a 378 pound son, Haji—the first elephant (Asian or African) born through artificial insemination.

The Asian elephant is an endangered species. Poaching and human encroachment on their habitat have decreased their numbers to fewer than 40,000 in the world—with about 15,000 of these in cap-

tivity. Without help, the species could pass into oblivion within a generation.

Lightfoot Named Exotic Animal DVM of 2001

Teresa Lightfoot, MU DVM '80, was named the Exotic Animal DVM of 2001 at the International Conference on Exotics, sponsored by the Zoological Education Network.

The award is presented each year to an individual who is extraordinarily competent with all aspects of exotic pets, is dedicated to advancing the knowledge of exotic pet medicine, and is deeply involved in education.

Dr. Lightfoot is a Diplomate of the American Board of Veterinary Practitioners in Avian Practice and teaches an exotic avian veterinary medicine course for technicians at the St. Petersburg Community College, Florida.

Dr. Lightfoot works for the Avian Animal Hospital of Bardmoor, Largo, Florida. **VMR**



Teresa Lightfoot

Wilt Recognized for Outstanding Service



Vincil "Mac" Wilt, MU DVM '78, here introducing his grandson, **Jacob Major**, to a calf, was named the 2001 Missouri Veterinary Medical Association's Veterinarian of the Year. The Paris, Missouri practitioner was recognized for his outstanding service and contributions to his community, state, and clients.

Class Notes

50's

Paul Nicoletti, MU DVM '56 and a professor of pathobiology at the University of Florida's College of Veterinary Medicine, was recently awarded the Gold Star Award for outstanding service to the veterinary profession by the Florida Veterinary Medical Association. Dr. Nicoletti is an internationally known authority on brucellosis and travels extensively as a consultant for agencies of the United Nations. He is a former Florida CVM Teacher of the Year and is a recipient of the AVMA Basic Sciences Teaching Excellence Award. He previously was named the MU College of Veterinary Medicine's Alumnus of the Year and won the Missouri Alumni Association's Distinguished Award.

Leon Russell, MU DVM '56, was presented the International Veterinary Congress Award by the American Veterinary Medical Association. He was recognized for his role in increasing the awareness and image of public health and food safety. He is a graduate professor in four departments at the Texas A&M College of Veterinary Medicine. Dr. Russell served as the American Veterinary Medical Association President in 1993-1994.

60's

David Morris, MU DVM '60, moved his practice to a new location in Sikeston, Mo. The new location, 603 Brunt Street, is one mile north of his previous location on Highway 61 where Dr. Morris had practiced for almost 40 years.

B.J. Laubhoff, MU DVM '62, announced his retirement from his Livingston, Texas practice. He plans to tour the US and Canada in a RV.

Wilfred Ostmann, MU DVM '69, announced his retirement in July. His clinic, located in Union, Mo., was purchased by **Chris Landrum**, MU DVM '97, and **Julie Landrum**, MU DVM '99.

70's

Raymond Ebert, MU DVM '70, recently completed a two-year continuing education program at the University of Illinois designed to help veterinary practitioners better meet the expanded challenges of the swine industry. Dr. Ebert is a veterinarian at the Pleasant Hill (Mo.) Animal Clinic.

Tom Lenz, MU DVM '75, was named the 2001 vice president of the American Association of Equine Practitioners. Dr. Lenz was in private practice for 15 years before

joining the Bayer Corporation, Animal Health, where he is senior director of research and development. He lives in the Kansas City area.

Don McCormick, MU DVM '76, recently retired from practice. His Monett, Mo. Veterinary Hospital was purchased by **Brent Herrin**, MU DVM '92. The practice was founded by **C.J. McCormick**, MU DVM '52, and Don McCormick's father. C.J. McCormick retired in 1985.

Rebecca Kirby, MU DVM '77, received the Innovative Veterinary Diets Award at the American Animal Hospital Association's annual meeting in San Antonio. The award is bestowed on a veterinarian in recognition of significant contributions to small animal veterinary medicine and surgery. Dr. Kirby is an adjunct assistant professor of small animal surgery at the University of Wisconsin-Madison, a practicing emergency veterinarian in Milwaukee, and the director of education and chief of medical services and ICU at the Veterinary Institute of Trauma, Emergency, and Critical Care in Milwaukee.

80's

David Swayne, MU DVM '84, was recognized by the US Department of Agriculture for his work linking avian influenza H5N1 to an infection in live poultry. Dr. Swayne's USDA Agricultural Research Service team, part of the agency's Southeast Poultry Research Laboratory in Athens, Georgia, was cited for its research leading to an advanced understanding of the pathobiology and epidemiology of the H5N1 influenza strain and development of strategies to protect US poultry from the disease.

James Czajkowski, MU DVM '85, aka James Rollins, saw his latest adventure novel published in June. *Deep Fathom* is the third in a series of adventure thrillers preceded by *Subterranean* and *Excavation*. Both of the previous books hit the *New York Times*' Bestseller List. *Deep Fathom* concerns a deep-sea salvage team who explore the wreck of Air Force One in the middle of the Pacific. His next book will be named *Amazonia*. He lives in Sacramento, CA.

Jill Goddard (nee' Pippin), MU DVM '88, and her husband Capt. Matt Goddard, announced the birth of a son, Hal Daniel, born July 26 at the Wright-Patterson Medical Center in Dayton, Ohio. Dr. Goddard is a veterinarian in Dayton and Capt. Goddard is a logistics research officer with the US Air Force.

In Memoriam

Joan Flynn, MU DVM '73, died December 2, 1999 near Joplin, Mo. She was an USDA inspector.

Larry Moudy, MU DVM '73, died February 4, 2001 at his residence in Mount Vernon, Ind. He was a veterinarian in the area for 26 years. Previously, he also practiced veterinary medicine in Henderson, Ken. He was a US Army veteran.

Larry Nelson, MU DVM '76, died May 14, 2001 at his home in Dell Rapids, ND. He earned his bachelor's degree from South Dakota University in 1967 and served as an agricultural missionary with the Methodist Church in Bolivia, South America, from 1968 until 1972. After earning his DVM degree, he practiced large animal medicine in Wakarusa, Ind. from 1976 until 1988. He married Mary Dack in Columbia, Mo. in 1978. In 1988, they moved to Dell Rapids, ND to become partners in the Montrose/Dell Rapids Veterinary Medical Clinic. He practiced until this year when ill health forced his retirement. He leaves his wife and three daughters, Jackie, Kristen, and Sara.

Laura Solien, MU DVM '83, died July 12, 2001 from injuries sustained in a traffic accident near Shipshewana, Ind. Born in St. Louis, she was a veterinarian at the Maplecrest Animal Hospital in Goshen, Ind. She joined the firm in 1998, moving from the Chicago area. She leaves her parents and two sisters.

Daniel Boon, DVM, PhD, who taught clinical pathology at MU College of Veterinary Medicine in the 90's, died earlier this year. The Biomedical Sciences & Pathobiology Department at Virginia Tech University has established the Dr. G. Daniel Boon Memorial Excellence in Veterinary Clinical Pathology Fund to honor his memory. This fund will be used to promote and support veterinary students following the career path to which he exhibited tremendous personal and professional dedication. The fund will provide a scholarship award for the DVM student within the college who achieves the highest academic ranking in the clinical pathology course each year.

90's

Brent Herrin, MU DVM '92, has purchased the Monnett (Mo.) Veterinary Hospital. He previously practiced in Indiana and had a private practice in Cassville, Mo. The hospital was founded by **C.J. McCormick**, MU DVM '52, who is now retired. His son, **Don McCormick**, MU DVM '76, runs the practice.

Matt Starost, MU DVM '94, passed his pathology boards late last year and is working for the MD Anderson Cancer Center in Austin, Texas.

Tami Beckeman, MU Class of '96, recently began a new job at Banfield, The Pet Hospital in Sunset Hills, Mo. Dr. Beckeman is from Arnold, Mo. and previously worked in a small animal facility at Birnamwood, Wisc. She has four dogs and one cat.

Stacy Lettsome, MU Class of '96, recently began a new job at Banfield, The Pet Hospital in Manches-ter, Mo. Dr. Lettsome previously worked in a small animal facility at Birnamwood, Wisc.

Jenny Webster, MU DVM '96, recently purchased the Pet Station animal hospital in Cuba, Mo. She previously practiced veterinary medicine in Rolla, Mo.

Rachel Cook, MU DVM '97, a veterinarian at the Farmington (Mo.) Animal Hospital, was recently featured in a Park Hills (Mo.) Daily Journal newspaper article about students exploring veterinary medicine as a career choice. Dr. Cook spoke to students at the Desloge Elementary School in Desloge, Mo.

Chris Korte, MU DVM '98, recently started a new business, Direct Vet Mobile Services, in North Kansas City. He will specialize in house calls to a mixed-animal clientele in Platte and Clay counties, north of Kansas City. His new truck is equipped with ultrasound, x-ray, microscope, and centrifuge.

Bob and Jennifer Shockley, both MU DVM '98, recently assumed ownership of the Higginsville, Mo. Veterinary Clinic from **Donald Case**, MU DVM '76 who ran the business for 23 years. The Shockleys previously practiced veterinary medicine in Odessa, Mo. In April, the Shockleys also announced the birth of a daughter, Courtney.

00's

Amy Gebhardt, MU DVM '00, recently announced her engagement to Nathan Moon. The wedding is planned for April 2002 in Salt Lake City, Utah. Dr. Gebhardt reports that she is working at a small animal clinic in West Bountiful, Utah that recently received a Veterinary Economics Practice of Excellence Award.

Jennifer Keaton, MU DVM '00, announced the birth of a daughter Jordan, born January 21, 2001 at 6 lbs., 12 oz. Dr. Keaton and her husband Vance live in Anderson, Mo.

Jim Clawson, MU DVM '01, has joined the Lewisville, Texas office of Banfield, The Pet Hospital. He is from Russellville, Ark. His family includes his wife, Carmen, and dog, Humvee.



The Many Retirements

of Donald Schmidt

Somewhere in the vast personnel archives of the University of Missouri is the 1992 paperwork processing the retirement of Donald Schmidt, DVM and College of Veterinary Medicine educator and pathologist. With that file are three addendums for 1995, 1998, and 2001.

Dr. Schmidt, it seems, has retired three times from the College. Three times his services as a pathologist were too valuable to easily let go and he was asked back to help in one project or another.

In this latest incarnation, Dr. Schmidt works part-time at the College in his chosen field of pathology, analyzing specimens from veterinarians in the field. Sometimes, after peering at a slide, he takes a phone call from a practitioner with a question. Few of the practitioners know that they are discussing cases with someone with more than a half-century in the field.

Farm Days, the Chicago Zoo, and Academia

According to his biography in *Who's Who in Veterinary Medicine*, Dr. Schmidt was born on January 29, 1922 on a dairy farm in the north-central part of Wisconsin.

It was then on to the University of Wisconsin and a 1944-degree in agricultural bacteriology. Dr. Schmidt wanted to go on to veterinary medical school, but his father wouldn't hear of it. Instead, it was electrical engineering where he struggled with mechanical drawing. "My roommate said, 'you're a farm boy, what are you doing in

engineering?'" Dr. Schmidt said. After graduation, veterinary medicine proved too irresistible and he attended, and graduated from, the Michigan State College of Veterinary Medicine in 1947.

The young graduate had been noticed by the American Veterinary Medical Association who offered him a fellowship in pathology--either at the Mayo Clinic or George Washington University. "Since Wisconsin was my home, I chose the Mayo Clinic in Minnesota," Dr. Schmidt said.

"In retrospect, that was a good choice because I was one of the few veterinarians accepted by the Mayo Clinic as a fellow. Also, I met my wife, La Vaune Hauser, who

was a histology technician there." They were married in 1951.

"I stayed at Mayo for three years working toward a pathology PhD. One day my advisor asked me if I was interested in taking the job as the zoo veterinarian at the Brookfield Zoo in Chicago. I jumped at it."

Dr. Schmidt would stay at the zoo for three years and help develop some of the first techniques specific to zoo veterinary medicine.

"There were no courses in exotic animals," he said. "A zebra was treated as a horse and a tiger was just a big cat. These were before the days of tranquilizers and dart guns. Typically, the veterinarian would walk back in forth in front of a cage with a dangerous animal and try to figure out what was wrong."

While developing better techniques to work with zoo animals was challenging and rewarding, his interest in pathology took him back to Michigan State in 1953 to join the staff of the pathology department. There, in 1961, he was conferred his PhD in veterinary pathology. Later, he would be certified in both anatomical and clinical pathology by the American College of Veterinary Pathologists.

Dr. Larry Morehouse, putting together the MU Veterinary Medical Diagnostic Laboratory with little more than a tattered shoestrung for a budget, noticed the new graduate and coaxed Dr. Schmidt, wife and three daughters, to Columbia, Mo. Dr. Schmidt was the MU veterinary medical

school's new director of clinical pathology and, because of a tight budget, took care of bacteriology, too.

Helping Build VMDL, Teaching, and Retirement(s)

Dr. Schmidt knew that if the VMDL was to survive in its service mission that it would have to build a strong reputation for quality. To Dr. Schmidt, that meant attracting the best people, giving them clear missions, supporting them administratively, and staying out of their way. "You can never get the best results if you don't have the best people," he said."

In addition to his laboratory work, Dr. Schmidt was thrust into the classroom, at first teaching a clinical pathology class to sophomores. The relationship between students and teacher must have stuck as Dr. Schmidt received five Norden Teaching Awards and a Golden Chalk Award.

"I enjoyed the teaching aspect best and it was the part of the work that I was most reluctant to leave when I came to the official retirement age in 1992," he said. "I wasn't ready for retirement and to leave the classroom. I talked to the dean and asked him if I could continue."

That first reprieve from retirement lasted until 1995. During this time he organized and filed the medical images that he had taken during his tenure as a clinical pathologist at MU. These included photomicrographs and gross pathology photos. When he finished, the college had a collection of 23,500 images that are still in use today.

For two years Dr. Schmidt enjoyed retirement and developed new interests such as woodworking, making furniture for his daughters who moved onto careers and family life in California, Wyoming, and Texas, and toys for his 16 grandchildren.

Retirement didn't last long as VMDL director Dr. Harvey Gosser called with a request for help. Mission requirements met, he returned to retirement until earlier this year when the newest VMDL director, this time Dr. Stan Casteel, called with another request. Today, Dr. Schmidt again offices out of the VMDL building on MU's east campus, poring over cytology slides, reading aspirates from the suspicious lumps, bumps, and internal organs, trying to help a veterinarian with a diagnosis. "Just as I have done ever since I started here," he said.

Veterinary Medicine in Cuba—

Long on Talent, Short on Supplies



The surgery suite at Havana's Central Veterinary Clinic, little changed since the 1950's.

Dr. Bill Monsees spays a cat with Cuban veterinary technicians watching. Later, the team removed a venereal tumor mass from the vagina of a dog. Surgery is the only treatment possible for this condition in Cuba as there are no chemotherapy or X-ray therapies available. The American vets reported that their Cuban hosts were friendly and open. They like Americans but do not like the economic embargo placed upon their country.

Time has stood still for many aspects of Cuban life since their revolution in 1959. Unfortunately, veterinary medicine there is one of those areas. As with the patched-up 1950's vintage cars that still rumble and cough down the country's roads, Cuban veterinarians constantly deal with obsolete equipment, lack of parts, and frequent breakdowns.

Craig Humphreys, MU DVM '83, and Bill Monsees, MU DVM '54, served as volunteer veterinarians in Cuba for two weeks this June. They were invited by the Consejo Científico Veterinario de Cuba, the Cuban veterinary medical association, to work alongside local veterinarians to share knowledge and expertise.

The pair, part of a four-person volun-

teer team sponsored by the Christian Veterinary Mission, visited clinics in Havana and the village of Pinar del Rio in western Cuba. While Havana's Central Veterinary Clinic is the largest and best in the country with 15 veterinarians and 200 clients per day, Pinar del Rio is in a hilly agricultural area where many rural people still live in thatched huts called bohios and farmers still use oxen to pull plows.

Supply Shock

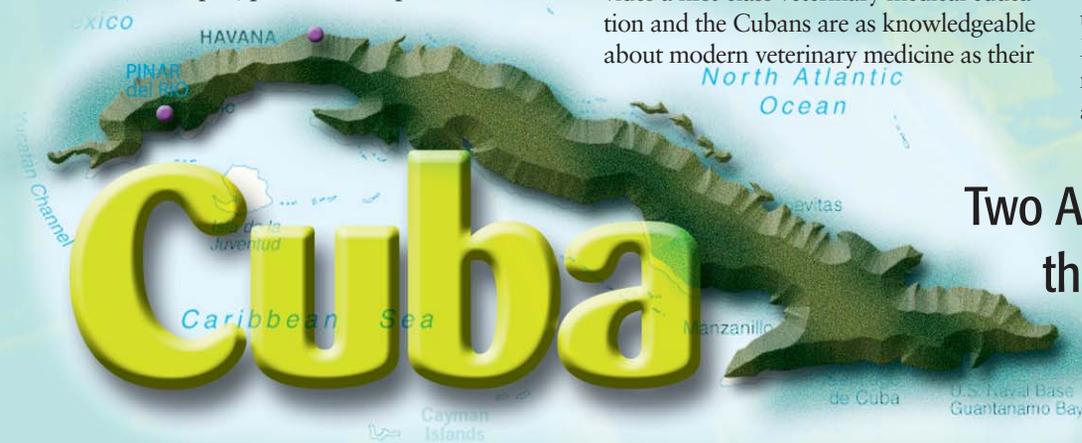
Dr. Humphreys, who works in a mixed animal clinic in Lancaster, Wisc., was surprised to find his Cuban colleagues to be well informed. The country's education system, famous for its literacy, also provides a first-class veterinary medical education and the Cubans are as knowledgeable about modern veterinary medicine as their

European or US counterparts.

Where the system falls down, he said, is in the availability of supplies and medications. While Cuban veterinarians know the techniques, their ability to perform at modern levels is hindered by a lack of even basic equipment.

"Cuban surgeons must use a single scalpel blade for an entire day's worth of surgeries," Dr. Humphreys said. "Equipment that we take for granted, like a gas anesthetic machine, isn't even available in the Central Veterinary Clinic. There are no modern methods of sterilization. Instruments are washed in alcohol between procedures. Suture material is whatever the veterinarians can find."

"I was surprised that there is not even the most basic of staples available," Dr. Monsees said. "There is no roll cotton, no gauze, no sterilizers, no injectible antibiotics anywhere. I saw a dog with an



Two Alumni Travel to
the Island to Assist
Veterinarians

infection come into the clinic a few days after she had been spayed. It was obvious what had happened."

All surgeries the Americans witnessed were performed without the surgical area being draped or the surgeons wearing gloves. Reason? Nothing was available. No medical records are kept because of a general lack of paper. There are few pathology resources for companion animals—those are saved for the economically more important farm animals. Telephones still have rotary dials and the surgical suite itself hasn't been updated since Fidel Castro took power in 1959.

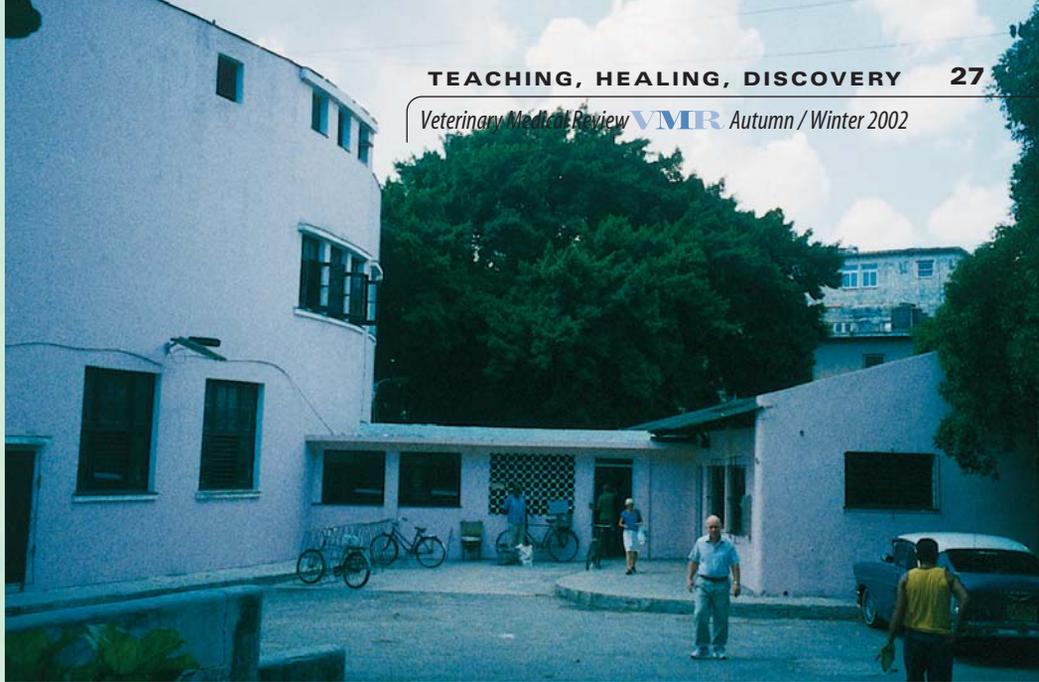
Often, when equipment is available, it doesn't work. A Fluotec III vaporizer that Dr. Humphreys saw was pushed into a corner because its rubber parts had cracked with age.

Dr. Monsees, who operated a mixed animal practice in Sedalia, Mo. from 1956 until 1983 before retiring to Lake Ozark, Mo., brought the Cubans instruments and supplies donated by the MU College of Veterinary Medicine and Jefferson City-area veterinarians. Much of the equipment was eagerly accepted. Because veterinary medicine as practiced in Cuba is at such a basic level, not all of the devices were suitable for immediate use. Many donated orthopedic pins were useless without modern anesthesia and other related equipment. Dr. Monsees and his ever-resourceful Cuban colleagues modified the pins into something that could work.

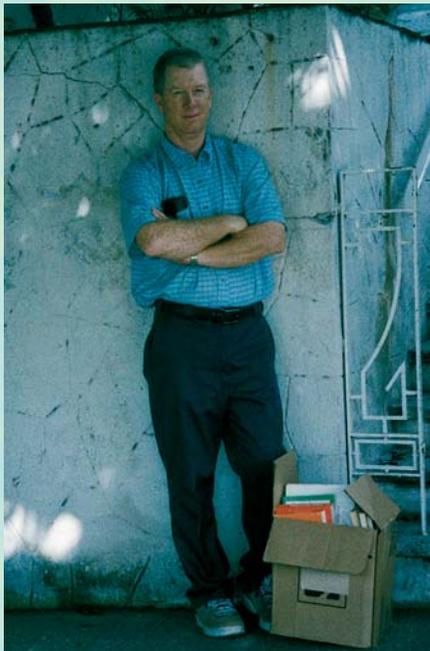
Cuban prescription medications and veterinary supplies come from only one source, Labiofam SA. While this state-run enterprise officially dispenses over-the-counter drugs and medications at virtually no cost, it frequently has no stock. The US embargo is not totally to blame—the Cubans lack hard currency to buy from trading partners in Europe and Asia. In the state-run grocery stores, dog food is another rarity. When available it sells for five American dollars a can. Consequently, Cuban pets eat table scraps.

Small Fees, Small Wages

While some procedures can't be done, client costs are low because of government subsidies, Dr. Humphreys said. A typical spay costs the client \$1 and the repair of a femoral fracture goes for two bucks. All veterinary medical fees are



The Clinical Pathology, Bacteriology, and Parasitology department of the Central Veterinary Clinic. Note the 1957 Chevrolet BelAir, with whitewall tires, at the lower right.



Dr. Craig Humphreys waits for a taxi in front of his Cuban boarding house, a down-at-the-heel building that probably once was an elegant mansion. Because direct flights from the US to Cuba are prohibited, the volunteers flew first to Toronto.

turned over to the central government that, in turn, pays the veterinarians' salaries and operates the clinics.

Dr. Monsees, who was the Missouri State Veterinarian from 1983-1986 and still performs relief veterinary work in the Jefferson City area, said the small salaries of Cuban professionals also surprised him. Veterinarians, he said, are typically paid 300 pesos per month, about \$13.65 in US dollars. "That's less than a teenager's weekly allowance here in the

US," he said. Cuban schoolteachers also make this salary.

Physicians make about 500 pesos per month and the average citizen's salary can be less than 150 pesos per month. Interestingly, the highest paid Cuban workers are government police who make 800 pesos.

Physicians and veterinarians alike are legally prohibited from making money from work, in their area, on the side. "There's not a lot of ambition to work hard in Cuba because you can't make any more than a base salary," Dr. Humphreys said. "Many professionals take jobs outside of their professions to help make ends meet. Jobs that can garner hard currency, like dollar tips in hotels or restaurants, are sought.

There are about 9,500 veterinarians in Cuba; about 6,400 belong to the Cuban veterinary medical association, Dr. Monsees was told. Each of the country's 14 regions has a large, government-operated clinic. There is one school of veterinary medicine, in Havana.

The Americans' trip was arranged through the Seattle-based, non-profit Christian Veterinary Mission. The organization facilitates short- and long-term missions where veterinarians, veterinary students and technicians, and other animal health professionals can use their skills to bring physical and spiritual hope to people whose survival depends on livestock. Established in 1976, the organization has facilitated more than 900 such missions, particularly in underdeveloped areas, like Cuba. **VMR**

Helping the Navajo Nation & Its Pets

The alarm went off at 5:30 am with a breakfast meeting scheduled for 5:45. The volunteer medical team members are scrubbed and ready, if not a bit bleary eyed, as Dr. A. Elmer Blum, MU DVM '54, surveys the crew and issues the marching orders for the day's work.

Today's location is Kayenta, Arizona in The Navajo Nation. Dr. Blum, wife Peggy, and others have volunteered their time to provide veterinary medical care to

the people of the area. The Nation, which encompasses 17 million acres across Arizona, New Mexico, and Utah, is home to more than 280,000 people, 80 percent of whom live below the poverty line.

For Dr. and Mrs. Blum, who are retired and live in Katy, Texas, this trip is one of a half dozen this year. Each trip is usually a one-week excursion to The Nation's poorest and most remote areas. During the 2000 program year, Dr. Blum and other volunteer veterinarians spayed or

neutered 2,179 dogs and cats free of charge. This summer, Dr. Blum and Peggy volunteered for their first one-month tour.

The program for which they have volunteered is called SNAP, the Spay-Neuter Assistance Program. A Houston-based non-profit organization operating since 1993, SNAP is designed to stop the destruction of healthy dogs and cats in animal shelters resulting from overpopulation.

They accomplish this by sponsoring sterilization surgeries for dogs and cats to prevent homeless animals from being born, educating the public about animal overpopulation, making wellness services available, and providing free-of-charge services for financially disadvantaged families.

During 2000, SNAP, through fixed and mobile facilities, provided direct care to 52,731 dogs and cats. SNAP volunteers contributed 11,812 hours of service in several areas including Hopi, Zuni, and Navajo tribal lands; Houston and San Antonio, Texas; Hampton Roads, Virginia; and in Monterrey, Mexico.

Dr. Blum heard about SNAP about two years ago. "I knew that I wanted to do this after I heard about the program," he said. "I want to stay in the profession and there is such a great need here. These surgeries are so expensive and the unemployment rate is so high that the people don't have enough money to help control the animal population. The dogs are beginning to run in packs and kill the livestock, further impoverishing the people."

After graduation from the MU College of Veterinary Medicine in 1954 and until their retirement in 1978, Dr. and Mrs. Blum owned and operated clinics in Missouri and Texas. Their son, Earl, still manages the family clinic in Festus, Mo.

By 6:20 am in Kayenta, the doors of the mobile clinic open to the day's clients, some of whom have been waiting since 4 am. Veterinary medical services are hard to come by on the reservation, if the services are available at all. Navajo children



The excellent facilities and two capable veterinary technicians allowed Dr. Blum to sterilize more than 400 cats and dogs in less than one month. SNAP got involved in The Navajo Nation after hearing that its animal overpopulation was so great that large numbers of feral or loose animals were being destroyed. Many dogs were rounded up and shot because they attacked herds of sheep, an important commodity in the impoverished area.

make up the majority of the clients, clutching their beloved kittens and puppies. No one on the team has the heart to turn anyone away.

SNAP's philosophy requires that all care be given in first-class facilities and given by an elite corps of professionals. The mobile clinic is a new \$160,000 self-contained and air conditioned RV bus complete with two anesthetic machines, a prep area, an operating room, an inside recovery area, and up to 22 cages that was converted with the help of donations and the Arizona Humane Society. A tent-like awning outside—under which it can be blistering hot in the summer and chillingly cold in the pre-dawn desert winter—serves as the waiting area.

By 6:45, while volunteers check in patients and prepare medications, Dr. Blum has begun his first surgery. It's still dark outside.

A steady stream of animals and their owners arrive. Mrs. Blum today enters the patient list into a computer between cleaning cages.

Although pre-surgery instructions that animals should arrive with empty stomachs have been noted on flyers, many of the outside dogs have obviously eaten. By 8 am, Dr. Blum is already dealing with some of the other medical problems that come with the animals. As each surgery is finished, Mrs. Blum keeps a close eye on the recovering animals. To not disappoint any of the clients who have waited for assistance, the crew usually works through lunch.

As there are usually no hotel or restaurant facilities near the site of the SNAP visits, veterinarians and other volunteers usually stay at a hotel 50 or more miles away. This necessitates the 5:30 am breakfast meeting to get an early start on the day. "Sometimes, the crew has to leave so early for the surgery site that nothing is open for breakfast," Mrs. Blum said. "We're often so busy that we don't have time for lunch. We do 'cheat' and take a cooler full of water, juices, and soda. We have been to sites with no bathroom facilities. While we make sure that the animals have first class facilities, sometimes the crew does not. The motel room looks really good at the end of the day."

The clients wait patiently for their turn in line. To a person, the volunteer crew reports, the clients are appreciative of the

Dr. A. Elmer and Peggy Blum stand in front of the SNAP mobile clinic. Though the areas that SNAP services are often primitive, SNAP's facilities are state-of-the-art. The converted RV that Dr. Blum used in The Navajo Nation was a new vehicle specifically converted for the purpose and featured first class equipment. When one crew of volunteer veterinarians and technicians completes their tour, a new group takes over.



rare opportunity for their animals to obtain first-class veterinary medical attention. There are no complaints about the long waits. Their "thank yous" are as often in the Navajo language as in English as many of the clients speak only Navajo. A volunteer who speaks the language is always on hand to explain post-operative care instructions before the animals are released back to their owners.

At 4 pm, after taking only two breaks during the day, Dr. Blum finishes the last surgery. He has neutered, spayed, or otherwise assisted 33 animals—including a

male cat brought into the clinic at the last minute. At 6 pm, the last patient has been picked up and the cages have been cleaned so to be ready for the next day that starts again at 5:30 am. **VMR**

To contact SNAP:

Spay-Neuter Assistance Program

401 Studewood Street, Suite 350

Houston, TX 77007

Phone: (713) 862-3863

Toll-Free: (800) 762-7762

Fax: (713) 880-3172

Web: <http://www.snaptx.org>



Navajo children love their animals as much as any other kids. Many were so appreciative of SNAP's work that they gave Indian Bread and other delicacies to Dr. Blum and team. Some of the clients drove 150 miles for SNAP's services. One 12-year-old boy told Dr. Blum that only one of his two dogs needed sterilization as his "grandmother got the other one." Dr. Blum examined that dog who possessed a telltale scar, but was otherwise quite healthy.

On Friday evening, after a hard week of studying or working in veterinary medicine, the last thing a student or clinician wants to do is to get dressed up and wait in line at a classy walk-in movie theater. If there are kids involved, loud and figgedy kids, there is even less inclination.

For 40 years, Columbia had a working alternative. Stuff the spouse and kids into the car and go to the drive-in movie. Here, protected by the confines of your Pontiac, your progeny could be themselves without embarrassment. While the movie might not be intellectually challenging, who cared after a tough week of studying.

The Sky-Hi Drive-In near the end of its days. Its traditional family fare has been replaced with R-rated B-movies such as the Cauldron of Death.



Broadway Drive-In, summer 1963.

The first drive-in

appeared in New Jersey in 1933. They hit their peak in popularity in the late 1950s before television became an American living room staple. Today, 80 percent of drive-ins that existed during those years have gone dark, gone to seed, or have been bulldozed and reincarnated as shopping centers.

Columbia's first facility, the Broadway Drive-In, appeared in 1948 in a pasture west of town. There were about 850 drive-ins then in the US. The

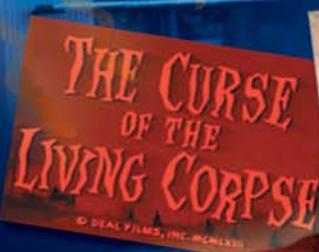
Broadway was a big hit with the younger Columbia crowd as the only entertainment alternatives were the mom-and-dad-oriented walk-in theaters and the dance band-playing KFRU-AM—the only radio station in town.

The late '40s were the days when Columbia's West Blvd. really was at the west end of town (rather than in its center as it is today) and city telephone exchanges consisted of four digits. The baby boom generation was just coming out of diapers and was as raucous as kids could be. Columbia was a small town in those days with only 37 physicians and two veterinarians: Carl Hulen and Stanley Smith. (There were seven places to get your vacuum cleaner fixed, though.) The town's only ambulance service was the local funeral home, which today seems somewhat of a conflict of interest.

By 1958, the baby boomers were becoming teenagers and city phone numbers jumped to seven digits (the four digits now preceded by Gibson 1-)



PLEASE REMEMBER
to check the screen on the way
when you leave the theatre.



Columbia's

DRIVE-INS

Friday



and the veterinarian population surged to three. There were now 5,000 US drive-ins, the peak of the genre, with the newest being the Parkade on Highway 40 and Parkade Blvd. in pre-Interstate-70 Columbia. The Parkade would fall on hard times and would temporarily close in 1963. It was replaced, however by a facility in Centralia, the BeBe. In 1965, the Sky-Hi Drive-In opened on Highway 63 Business Loop South, southeast of Columbia.

Columbia was too much the small traditional Midwestern town for its drive-ins to become the “passion pits” of the larger cities. As the baby boomer started to date, local drive-ins were a rare venue of entertainment—for everyone. Any young couple intent on serious making out had too

many obstacles—teachers, ministers, and the friends of parents could be in the next car. Other teenagers, in this city where everyone knew everyone and what was happening, were not above playing practical jokes on an arduous pair hoping to be alone. Sneaking friends into the drive-in via the car trunk was about the most serious, and frequent, guilty pleasure. Drive-ins were where mom, dad, and the kids would spread a blanket in front of the car and munch on a fried chicken picnic while waiting for the sun to go down and the show to start (less “citized” people would back their pickup beds to the screen and sit on lawn chairs). The younger kids could romp in the playgrounds just under the large screens.

Screen fare was seldom the serious theatrical releases from Hollywood—that you could get at one of the walk-in-theaters like the Missouri Theatre. Drive-in movie posters promised Thrills, Shock, and Suspense. Sci-fi flicks like *Twenty Million Years to Earth* and *Forbidden Planet* that kept the kids quiet for two hours were what drive-ins did best. Drive-in content was like the hamburgers and hot dogs at the concession stand—a treat only indulged in on weekends.

Television was becoming a big part of Columbia life with 31 “Television Receiver Set” sales and repair companies in 1967. There were two black and white TV stations: the University’s KOMU and Jefferson City’s KRCG if your rooftop aerial was high enough. Local drive-ins took a hit when the TV stations broadcasted movies until midnight rather than signing off the air at 10:30 pm at the end of the local news. In 1967, the Broadway responded to television by touting its new, better quality speakers that hung inside your car’s window.

By 1970, Columbia boasted 21 veterinarians and three area drive-ins—the Broadway, Sky-Hi, and BeBe.

Through the 1970s, a shopping center grew between

Broadway Blvd. and the Broadway Drive-In. In 1980, the parking area, playground, and screen were bulldozed to make room for the Gerbes Supermarket—edging out another American icon, the corner grocery store. This left just the Sky-Hi and the then popular American International horror movies.

The Sky-Hi lingered until 1988 when fewer than 900 drive-ins were still operational in the US. The last first-run movie to show there was *Bonnie and Clyde* in 1968. From there, it was slasher films and B-movies. Slowly, the facility took on a down-at-the-heel appearance as its family trade opted for popcorn in front of the new color television.

The Sky-Hi didn’t go out without a fight, however. It tried a variety of marketing tricks including triple horror film marathons on each Friday the 13th. Finally, it’s Closed For the Winter sign stayed up permanently and that was that. Remnants of that facility, such as the old wooden ticket booth and concession stand, could still be found only a few years ago. When Columbia straightened and repaved the highway and added new sidewalks, the last of Columbia’s drive-in history disappeared. Today, the site is a garden supply store.

VMR

Drive In

Back to Suspense



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Class of 2004 (Left to right) Back row: Roberta Westbrook, Wendy Dillon, Kyle Malter. Front row: Laretta Richtermeier and Jill Forinash

- 1 Hooded sweatshirt in zippered front (shown) or pullover with the new University of Missouri logo. **\$25** Specify S M L
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