

MU VMDL Newsletter

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A Message from the Director

It was great to see so many clients, friends and supporters of the VMDL during the 124th MVMA Convention at Tan-Tar-A Resort Jan. 21-24. The VMDL held its advisory board meeting from 3-5 p.m. on Jan. 22. An update on recent VMDL development was provided to board members and MVMA district presidents who were present.

I was able to share the following information:

- The VMDL received full accreditation from the American Association of Veterinary Laboratory Diagnosticians through December 2016. Accreditation assures VMDL's clients that results are accurate and recognized by laboratories in other states and countries.
- The VMDL processed 42,907 accessions and performed 93,293 tests to support veterinarians and producers. The cases were from 104 counties in the state of Missouri and 26 states in the U.S.
- The FedEx Express Prepaid Stamps program saves time (next-day delivery) and money (average \$11 per shipment). You can request the stamps just like other supplies from the VMDL. If you call early in the day, we can fax a FedEx shipper and submission form the same day and send FedEx labels via the U.S. Postal Service for subsequent shipments.



- The VMDL has created new submission forms based on animal species. Currently, we have a generic form (online fillable), and avian-, equine-, food animal-, and small animal-specific forms. It is much easier to find the relevant tests on the forms.
- The VMDL provides online access to its clients. Once you log into the MU VMDL portal (portal.cvm.missouri.edu/), you can see lab results and pathology reports as we work on your case.

Finally, we understand that it is our privilege, not a right, to work with you to protect and promote animal health and public health.

Best regards,
*Dr. Shuping Zhang, Director,
Veterinary Medical Diagnostic Laboratory
Professor, Department of Veterinary Pathobiology*



Veterinary Medical Diagnostic Laboratory

Veterinary Health Center
University of Missouri

VMDL MISSION STATEMENT

- To provide appropriate and timely diagnostic support to veterinary practitioners, livestock and poultry interests, companion animal interests, wildlife conservationists and state-federal regulatory officials.
- To monitor domestic animals, indigenous wildlife and zoo animals for diseases that are a threat to livestock health and public health.
- To support the teaching mission of the College of Veterinary Medicine.
- To create new knowledge through fundamental and translational research.

The VMDL is committed to all aspects of our mission statement, including our important role in biosecurity. As an AAVLD-accredited laboratory working within the National Animal Health Laboratory Network, the VMDL will be called upon to provide testing services in the face of suspected or confirmed foreign animal, zoonotic, and/or economically important disease outbreaks.

Thankfully, avian influenza has not reared its ugly head in Missouri yet this season, but should this occur, the VMDL will accommodate the massive increase in testing that will be required.

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FOCUS ON FACULTY: Meet Tim J. Evans

Tim J. Evans, DVM, MS, PhD, is a diplomate of the American Board of Veterinary Toxicology (2001) and the American College of Theriogenologists (1997). He received his doctor of veterinary medicine from the University of California, Davis, in 1982. He received his master's degree from MU in veterinary medicine and surgery in 1996 and his doctorate in veterinary pathobiology from MU in 2002. His PhD research was supervised by Stan Casteel, DVM, PhD, and was funded in part by an Environmental Protection Agency STAR fellowship.

From 1984 to 1993, Evans was a resident veterinarian on horse breeding farms.

He came to MU in 1993. Although Evans graduated from high school and veterinary school in California, he considers Columbia, Missouri, home.

Evans' work in the VMDL

The full-time staff in the MU VMDL Toxicology Section consists of Evans (section chief), George Rottinghaus, PhD, (analytical chemist), and the individual who actually does the real work, Ben Landers (research specialist and technician extraordinaire).

As the Toxicology Section chief, Evans coordinates Toxicology Section activities, addresses any questions or complaints regarding toxicology laboratory results or procedures, and provides feedback to the VMDL director on Toxicology Section testing and pricing issues, as well as supervising quality assurance and quality control within the section.

In his role as a diagnostician, Evans deals with the mundane and bizarre on a daily basis. He interprets and finalizes all



VMDL toxicology results. He routinely spends at least several hours every day fielding toxicology phone calls and emails from veterinary professional students, faculty colleagues, and veterinarians from across Missouri, as well as other veterinary colleagues, livestock producers, pet owners, and on occasion, law enforcement, attorneys, and insurance company representatives from throughout the U.S. and Canada.

He is a passionate educator, and strives to foster the health, well-being, and success of his students. As an instructor, he teaches topics that include favorites of veterinary students, such as veterinary clinical and diagnostic toxicology, as well as also reproductive pharmacology within the veterinary professional curriculum, and principles of toxicology and environmental health in online formats. Modeling one of his VMDL mentors, Bill Fales, PhD, Evans makes sure students understand that they don't cease being one of his students just because they graduate. Their calls and emails are always welcome.

Evans was the recipient of the 2015 Governor's Award for Excellence in Teaching from MU. He was a William T. Kem-

per Fellow for Excellence in Teaching in 2013, and was awarded the Carl F. Norden-Pfizer Distinguished Veterinary Teacher Award in 2012. Evans was also awarded a SCAVMA Teaching Award for Clinical Sciences and the George Dadd Award for peer-reviewed excellence in teaching, as well as other teaching awards.

Outside of the VMDL

Evans is the president-elect of the American Board of Veterinary Toxicology, and he is one of the faculty sponsors of the MU Chapter of the Christian Veterinary Fellowship (CVF). He enjoys traveling to the Southwest each year on a CVF trip to provide veterinary care on the Navajo reservation in northern Arizona.

While Evans is serious about his toxicology efforts and research, he believes that there is a prominent place for humor in our daily lives. Evans loves to scare fish by attempting to catch them in the lake behind his home, and he has learned to make balloon animals, until he can go fishing again. He is also an enthusiastic collector of brightly colored (some would say ugly) aloha and vintage Western shirts, especially those no longer wanted by the survivors of their previous owners. Around the MU campus, his alter ego is known as **THE ANTIDOTE: THE ENEMY OF ALL THINGS TOXIC**.

Evans and his wife of almost 34 years, Debbie, have a daughter, Andreyia, who is a missionary, and a son, Will, who aspires to be a stand-up comedian and comedy writer. The Evans family proudly owns two 14-year-old miniature dachshunds, both of which have had back surgeries performed at the Veterinary Health Center. Evans is a loyal MU Tiger.

NEWS AND ACCOLADES AT THE VMDL

MU College of Veterinary Medicine Professor Emeritus William H. Fales, PhD, Bacteriology Section chief, was the recipient of this year's Missouri Veterinary Medical Association President's Award. Outgoing MVMA President Chuck Barry, DVM, honored Fales with the award during the organization's annual convention held at Tan-Tar-A resort in Osage Beach.

The award is given to an individual who was instrumental to the efforts of the organization's president to advance the veterinary profession for the betterment of animal health in the state.



Fales was elected to full membership in the Missouri Veterinary Medical Association in 1991 and was elected to honorary membership in the Missouri Academy of Veterinary Practice in 1999.

"Dr. Fales has been a consistent supporter of the MVMA, attending West Central District meetings, policy forums, MVMA Day at the Capitol events, board meetings, committee meetings and annual conventions," Barry said. "He has always represented the MVMA and the College of Veterinary Medicine with the highest level of character, confidence and enthusiasm. I know he has been an encouragement to me, others in the MVMA and countless students during the last year and over the last several decades."

The President's Award is the third award the MVMA has bestowed upon Fales. He is a previous recipient of the organization's Distinguished Service Award and Mixed Microbial Practitioner Award.

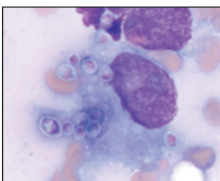
Congratulations, Dr. Fales, on this well-deserved honor!

A native of Redding, California, Fales served in the U.S. Army Medical Service Corps from 1966-69. He then pursued a master of science and a doctorate in bacteriology at the University of Idaho, Moscow. He began his career at the University of Missouri in 1974 as a research associate in the Department of Veterinary Microbiology. From 1975 to 1981 he was an assistant professor in the Department of Microbiology and served

as a clinical microbiologist for the Veterinary Medical Diagnostic Laboratory and the Veterinary Medical Teaching Hospital. In 1981 he became a tenured associate professor, and in 1986 was named a full professor. He was elected as an honorary diplomate of the American College of Veterinary Microbiologists in 1992. In August of 2015 he retired from MU, but accepted an adjunct appointment and was named professor emeritus.

CHALLENGE: WHAT'S YOUR DIAGNOSIS?

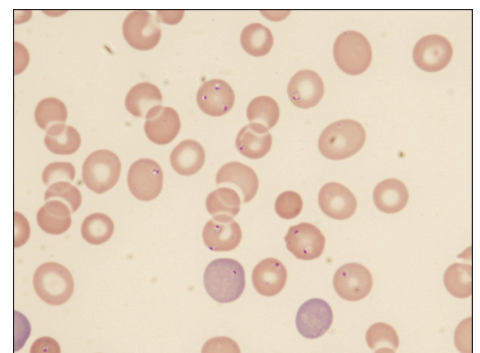
Congratulations to Amy Lovall of Bogey Hills Animal Hospital for correctly diagnosing histoplasmosis in our last "What's Your Diagnosis?" contest. The histoplasma capsulatum yeast in our previous image display the typical cytologic features we expect for these organisms: They are smaller than an RBC, oval, surrounded by a thin clear halo, contain an often eccentric blue to purple area, and are notably within macrophages. Excellent work!



Our next challenge features a blood smear (Wright-Giemsa staining) from a dog.

Here is the history:

A 2-year-old intact male Staffordshire Terrier presented with a few month history of weight loss and recently identified lethargy and anemia, all following an accidental fight with another Staffordshire Terrier. CBC today revealed a regenerative anemia (PCV 25%, 275,000 reticulocytes/microliter). The image is a representative high magnification view of the patient's blood smear. What is your diagnosis?



E-mail the correct answer to Angela Royal at royalab@missouri.edu by April 15 for a chance to win!

WINTER 2016

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Equine Gastrointestinal Health – Microbiomes and Metagenomics

By Philip Johnson, BVSc, MS, MRCVS, ACVIM, ECEIM

In recent years, there have been remarkable advances in our understanding of the importance of the complicated and critical relationship between the mammalian host and the teeming population of microorganisms with which it is invested. The newly designated University of Missouri Metagenomics Center (MUMC) places those of us interested in equine gastrointestinal health in an especially good position to take advantage of this modern technology and to apply it for the health benefit and welfare of our equine patients. Equine clinical faculty have teamed up with colleagues at the VMDL and in the MUMC in order to employ this technology to better understand clinical disease of the equine GI tract.

The term microbiome has been adopted to represent the ecological community of commensal, symbiotic and pathogenic microorganisms (including bacteria, fungi, worms, protozoa, and viruses) that literally share our body space. For example, the human microbiome consists of approximately 100 trillion microbial cells that outnumber human cells by a factor of 10 to 1. Even more incredibly, the microbiome of the human GI system consists of approximately 3.3 million genes compared to the paltry 25,000 genes that are responsible for the biological composition of the human organism. As such, the GI tract microbiome represents one of the most complex microbial ecosystems anywhere in any environment.

Many medical conditions have been linked to changes in status of the GI microbiome, especially in people. Specific disruptions of this microbiome have been reported in the context of many chronic human bowel ailments, including ul-

cerative colitis, Crohn's disease, irritable bowel syndrome, and celiac disease. Hospital-acquired *Clostridium difficile* enterocolitis, which is also a problem for horses and foals, is a commonly reported and potentially fatal complication of antibiotic use. These cases represent an especially devastating disruption of the microbiome and, in some cases, have been successfully solved by administering fecal microbiota from a healthy person to the patient. The influence of the GI microbiome on health extends beyond the intestinal tract, and specific changes in the microbiome have been linked to the development of obesity, risk for diabetes, autism, Alzheimer's disease, atherosclerosis, and some forms of cancer.

Key to the recent explosion of knowledge depicting such a powerfully intimate relationship between the microorganisms of our bodies and the state of our health has been the development of next generation sequencing or NGS. This method has allowed scientists to identify and characterize the vast population of microorganisms that inhabit the body in an affordable and rapid manner. This method employs a DNA fingerprinting approach in which the genetic identity of microorganisms can be quickly determined and catalogued using PCR technology. Our MUMC acquired the equipment for ultra-fast NGS and introduced and encouraged its employment to help answer questions about the microbiome in different species.

The existence of the horse itself is predicated on the health of a substantial large intestinal microbiome for purpose of nutrient derivation from their grass/forage-based diet; therefore, we wasted

no time in moving ahead with a project to map the microbiome along the entire length of the equine GI tract.

Using this approach, we plan to develop knowledge and a basis upon which to better understand certain types of GI disease. For example, a causative explanation for the majority of equine diarrhea and colitis cases cannot be identified, even following extensive testing for known pathogens and post-mortem examination. This observation has led us to the hypothesis that a professional pathogenic microbe may not be responsible for diarrhea in most instances, but rather a non-specific shift in the relative proportion of different groups of microorganisms within the microbiome may be to blame. Such a population re-arrangement has been termed dysbiosis. NGS technology represents an insightful method to study gastrointestinal dysbiosis in horses and our team is well placed for this purpose.

Ultimately, we hope to identify novel changes in the GI tract microbiome that may have relevance to equine intestinal disease conditions such as colic, diarrhea, and even laminitis. We're also very interested in the potential link between the equine gastrointestinal microbiome and risk of obesity, insulin resistance (equine metabolic syndrome) and endocrinopathic laminitis.

We have much to learn and so many potential areas in which we need help to do a better job for our equine patients affected by crippling GI diseases. We're really excited to get started with this area of research and welcome any questions and conversations about this potentially very important new line of investigation.