DEPARTMENT OF PATHOLOGY, MICROBIOLOGY AND IMMUNOLOGY (PMI)
UC DAVIS SCHOOL OF VETERINARY MEDICINE
Program Update – November 2014

CORE VISION AND MISSION

• To provide a critical linkage between the basic and clinical sciences
• To effectively integrate the disciplines of immunology, microbiology and pathology into the teaching, research, and service programs of the School and campus
• To focus on integrated multi-disciplinary teamwork and translational research

DIVERSE FACULTY

The PMI department, led by Chair Dori Borjesson, consists of a large, diverse group of vibrant faculty, including:

Adaska, John
Affolter, Verena
Anderson, Mark
Baumgarth, Nicole
Borjesson, Dori
Boyce, Walter
Byrne, Barbara
Christopher, Mary
Clothier, Kristin
Coffey, Lark
Conrad, Patricia
Ernst, Peter
Gershwin, Laurel
Lairmore, Michael D.
Lanzaro, Gregory
LeFebvre, Rance
Keel, M. Kevin
MacLachlan, N. James
Mete, Asli
Miller, Christopher
Moeller, Robert
Mohr, F. Charles
Moore, Peter
Murphy, Brian
Nyaoke, Akinyi
Owens, Sean
Pesavento, Patricia
Reilly, Christopher
Shivaprasad, H.L.
Sigurdson, Christina
Stott, Jeffrey
Uzal, Francisco
Vernau, William
Woods, Leslie
Woolard, Kevin
Yilma, Tilahun

The PMI Department supports: research; professional DVM, graduate academic and graduate clinical teaching; and clinical service in the disciplines of anatomic pathology, clinical pathology, immunology, microbiology, molecular biology, parasitology, and virology.

NEW FACULTY

Francisco Carvallo joined the California Animal Health and Food Safety Laboratory System (CAHFS), at San Bernardino, this year as an Assistant Professor of Clinical Diagnostic Veterinary Pathology. He obtained his DVM from the Universidad Austral de Chile, Valdivia, Chile (2001) and a Doctor of Science from the Universidad Nacional Autonoma de Mexico, Mexico City, Mexico (2007). Dr. Carvallo completed a 3-year veterinary pathology residency at the University of Connecticut, Storrs, in 2010 and received Diplomate status by the American College of Veterinary
Pathologists in 2011. He joins us from the Universidad de Chile, Department of Animal Pathology where he served as an Assistant Professor. Dr. Carvallo’s current research interests include neuropathology and small ruminant pathology.

Lark Coffey joined the Department of Pathology, Microbiology and Immunology as an Assistant Professor in Virology last year. She obtained her BS in Biology from University of the South, Sewanee, Tennessee (2000) and her PhD in Experimental Pathology from the University of Texas Medical Branch, Galveston, Texas (2005). She completed a number of postdoctoral fellowships in viral pathogenesis and viral discovery at the Blood Systems Research Institute, University of California, San Francisco and the Pasteur Institute in Paris, France. Dr. Coffey’s current research is focused on the evolution and transmission dynamics of arboviruses, with an emphasis in understanding mechanisms of cross-species transfers mediated by modifications in host range, altered virus-host interactions, or changing ecology and environments.

NEW LEADERS

Our PMI faculty bring a broad range of expertise to the School and we have been fortunate to have their leadership in a number of key areas including:

California Animal Health and Food Safety Laboratory System (CAHFS) – Tulare Branch Chief

John Adaska, a pathologist, was recently appointed as CAHFS Branch Chief of the Tulare Laboratory. He has been a member of the Tulare Lab since his appointment in 1996 and previously served as Interim Branch Chief (CAHFS) – Fresno Lab in 2009. In 2009 he was elected as the Secretary-Treasurer of the American Association of Veterinary Laboratory Diagnosticians (AAVLD). Dr. Adaska has served as a member of the CAHFS South Valley Laboratory Building Committee since 2008 and in 2010 became chairman. Construction of the new Tulare Lab is underway with completion scheduled for December 2015.

Comparative Pathology Graduate Group Leaders

We are happy to announce that Patricia Pesavento has been selected as the new Chair of the Graduate Group in Comparative Pathology and Brian Murphy will be serving as the new Vice-Chair of the Graduate Group.

Dr. Pesavento is an active member in our group and has been an exceptional mentor since 2008. She is passionate about teaching and mentoring PhD students and will be a fantastic advocate for our group. Her research focuses on naturally occurring diseases of animals, the identification of novel viral pathogens in a variety of animal species, and emerging diseases in animals in close interface with humans. Dr. Pesavento received her PhD from Harvard University and her DVM from UC Davis. She is a board-certified Veterinary Pathologist. She has been at UC Davis since 1996, first as a veterinary student and most recently as a professor.
Dr. Murphy, an associate professor, has been a member of our group since 2008 and has been a wonderful mentor to our students. He has been an active member of the Educational Policy Committee and he is very interested in high level scholarship and focused mentoring for our students. His research is focused on viral transcriptional regulation (especially retroviruses), viral latency and the relationship of virus-host cell interaction to pathogenesis. Dr. Murphy received his PhD and DVM from Washington State University. He is also a board-certified veterinary pathologist with special emphases on oral and bone pathology.

Global Programs – Associate Dean

**Patricia Conrad** was appointed as Associate Dean for Global Programs earlier this year to provide leadership, oversight, and administrative coordination of global programs in the School. She will develop a vision, mission, and strategic plan for global programs that is synergistic to the School’s Strategic Plan. Dr. Conrad will work with faculty, staff and students to foster global programs in education, research, service, outreach and engagement; create databases to track faculty and student projects globally; build extramural resources for global programs; and identify potential partnerships with investigators seeking support through sponsored research related to the School’s mission. Dr. Conrad will promote the development of sustainable, reciprocal relationships between UC Davis faculty, partner institutions and communities to provide a basis for education, research and mentored student projects and experiences. She will also provide administrative infrastructure within the School to help facilitate international activities for professional DVM and graduate students.

Student Programs – Associate Dean

**Sean Owens** continues to serve as our Associate Dean for Student Programs. He provides leadership, oversight, and administrative management of the Student Programs Office and other duties that include: coordination of support services for professional students; management of the DVM admissions process; pre-veterinary outreach activities including diversity and career advising; and student ceremonies. Dr. Owens led the development of a strategic plan that outlines goals and strategies for enhancing student experiences, broadening diversity of our student community, and promoting awareness of career opportunities in academia, research, private practice and in public health.

Associate Director, Clinical Laboratory Services – Veterinary Medical Teaching Hospital

**Bill Vernau** has been serving as Associate Director, Clinical Laboratory Services, for the past year. He’s been a member of our faculty since 2000, and has served as Chief of the Clinical Pathology Service since 2009. Dr. Vernau leads the laboratory service, diagnostic and educational programs of the clinical laboratories, including the related operational, fiscal and facilities issues. He promotes communication between Clinical Pathology Laboratory sections (Clinical Biochemistry, Hematology, Microbiology/Parasitology, Immunology/Virology and Transfusion/Regenerative Medicine), as well as interactions with the many receiving services that depend on the laboratories for accurate and timely results and interpretations to underpin high quality patient care and teaching.
ZOETIS EXCELLENCE IN RESEARCH AWARD

**Dori Borjesson** was awarded the Zoetis Excellence in Research Award at the Fall Faculty Reception in October. She was recognized for the exceptional quality and productivity of her research efforts in regenerative medicine with an emphasis on utilizing mesenchymal stem cells as a therapeutic option for both orthopedic injury (such as bone and tendon damage) and in immunomodulation. Dr. Borjesson and her team are able to generate mesenchymal stem cells from bone marrow, adipose tissue and umbilical cord blood/tissue, and study the effect of these cells on lymphocyte activation. Recent work published in the journal *Stem Cells and Development* has extended this focus to include canine adipose-derived mesenchymal stem cells, where they studied the interaction of these cells with bacterial organisms. This groundbreaking work is opening up novel therapeutic strategies and generating several ongoing clinical trials. The potential of this work is also recognized by funding agencies, including NIH, that have awarded significant grant funding to support these important studies.

RESEARCH FUNDING – MAJOR PROJECTS

The PMI faculty are heavily engaged in research and discovery. Collectively they have garnered more than $22 million in research funding from federal, state and private foundation/gift funding sources. Research topics cover a broad range. For example:

- Dairy Food Safety
- Mountain. Lion Habitat Interfaces
- Zoonotic Pathogens in Coastal Ecosystems
- Inflammation for Stem Cell-based Therapy
- Influenza Surveillance and Research
- Ecological and Genetic Determinants of Malaria
- Emerging Infectious Diseases
- HIV/SIV Transmission
- Bluetongue Virus

MYSTERY OF BLUETONGUE LIVESTOCK DISEASE SOLVED

The bluetongue virus, which causes a serious disease that costs the cattle and sheep industries in the United States an estimated $125 million annually, manages to survive the winter by reproducing in the insect that transmits it. These findings, by Christie Mayo, James MacLachlan and a team of veterinary scientists, solve a century-old mystery and are particularly significant as global climate change brings more moderate winter temperatures around the world. The new study appeared Sept. 12 in the journal PLOS ONE.

The epidemiological study was conducted on a commercial dairy farm in Northern California. Scientists were able to demonstrate that the virus overwinters in female midges that fed on an infected animal during the previous season. This discovery has important ramifications for predicting the occurrence of bluetongue in livestock and hopefully for eventually developing controls for the disease.
Bluetongue disease, first identified during the 1800s in southern Africa, is transmitted by the *Culicoides* biting midge, a tiny gnat sometimes referred to as a “no-seeum.” The disease mostly sickens sheep but also infects cattle and goats, as well as deer and other wild ruminants. In the U.S., the virus’ greatest economic impact is in the cattle industry, because it is bigger than the domestic sheep industry and is most adversely impacted by international trade barriers related to bluetongue. The virus that causes bluetongue was first isolated and identified in the western hemisphere in the early 1950s at the UC Davis School of Veterinary Medicine. The disease does not pose a threat to human health.

**VETERINARY SCIENTISTS ON THE EBOLA FRONTLINE**

In September, two veterinary scientists working for the Centers for Disease Control and Prevention (CDC) who received their PhD and DVM degrees from the School, traveled to West Africa to work on the front lines of the Ebola outbreak. Professor James MacLachlan, their mentor at UC Davis, says “veterinary researchers like Kim Dodd and Brian Bird with the joint skillset of a DVM and PhD are invaluable in dealing with One Health situations like this Ebola outbreak, where emerging and zoonotic diseases have such a devastating impact on global health – a great example for what a veterinary degree can lead to.”

Kim Dodd, a current UC Davis combined degree student (PhD ’14, DVM ’15), joined her mentor and UC Davis alum Brian Bird in Sierra Leone. Dr. Bird (PhD ’08, DVM ’09) serves as a veterinary medical officer in the Viral Special Pathogens Branch of the CDC and is now the Lead of the CDC Ebola Field-Laboratory located at an Ebola Treatment Unit in Kenema, Sierra Leone. This field-laboratory supports the international response to this unprecedented outbreak in partnership with the Sierra Leone Ministry of Health, the World Health Organization (WHO) and other international collaborators. The laboratory serves as a regional reference laboratory to provide rapid Ebola testing. Dodd and Bird provided critical testing to identify cases so that rapid tracing of patient contacts can begin and to reduce the transmission of Ebola within the population. Early and rapid testing is important as the initial clinical signs of Ebola virus infection can be nonspecific and similar to those seen with malaria, lassa fever, or other tropical diseases. Rapid identification of positive cases is essential for referral to Ebola treatment centers, and to send negative cases elsewhere for treatment and follow-up.
UC DAVIS VETERINARIANS WARN OF POTENTIAL AEROSOL BIRD TOXINS

Avian specialists are warning of several potential aerosol toxicoses, and are urging bird owners to take special precautions with their fragile animals. “Birds are exquisitely sensitive to aerosol toxins, much more so than humans,” said Leslie Woods, DVM, PhD, DACVP, Professor of Clinical Pathology, Microbiology & Immunology at the School. “That is why canaries were used in the coal mines as sentinels for gas leaks to give the workers time to vacate the mines. Their fragile respiratory anatomy and physiology will cause them to die long before humans. If the workers saw dead canaries in the mines, they knew the environment was not safe for them.”

In her duties as an avian pathologist at the California Animal Health and Food Safety (CAHFS) Laboratory at UC Davis, Dr. Woods has encountered a steady number of birds that died due to any number of a variety of avian aerosol toxicoses. Many of those toxicos revolve around the typical kitchen. CAHFS has discovered that items such as self-cleaning ovens and teflon-coated cooking pans can be culprits in bird deaths. These non-stick surfaces emit polytetrafluoroethylene (PTFE) gas, the cause of teflon toxicosis, when heated above 260 degrees Celsius (500 degrees Fahrenheit), a temperature that can be attained when teflon-coated pans are left to boil dry or food is left to burn onto the pan. PTFE gas can kill birds within minutes.

Beyond kitchen items, other PTFE sources include teflon-coated irons, ironing board covers, heat lamps, and the heating elements of some reverse-cycle heat pumps. Other toxicos beyond just PTFE that affect the fragile respiratory system of birds include: bleach, ammonia, cigarette smoke, burned foods, spray paint and carbon monoxide (which the coal mining sentinel canaries were sent in to detect). Items such as air fresheners, hair products, nail polish, and scented candles may produce other airborne toxicos. Bird owners should be sure their birds are removed to well ventilated, closed rooms in the house (or outside) when using these items.

In her treatment of birds as the Chief of the Companion Animal and Exotic Pet (CAPE) Service at the teaching hospital, Joanne Paul-Murphy, DVM, DACZM, reports that PTFE toxicosis is rapid and fatal, leaving no time to get to a veterinarian. In cases of other inhaled toxicos, Dr. Paul-Murphy explained that the effects can be less dramatic and there are treatments that CAPE can provide if caught early enough, such as immediate oxygen support, saline nebulization and bronchodilators. Birds showing signs of respiratory distress should be seen by a veterinarian immediately. Signs may include an increased effort to inhale and exhale, short and rapid breathing, wheezing, change or loss of voice, depression, and a bluish color to the skin (usually noted in birds that have facial skin).

GLOBAL HEALTH CONSORTIUM

Patricia Conrad was recently elected to the Board of the Consortium of Universities for Global Health (CUGH). The consortium, established in 2008 with generous funding from the Bill & Melinda Gates Foundation and The Rockefeller Foundation, is a Washington, DC-based organization of leading universities located around the world. Their mission is to build interdisciplinary collaborations and facilitate the sharing and implementation of knowledge to address global health challenges. Its membership includes over 120 academic institutions from high, middle, and low income countries.

CUGH assists members in sharing their expertise across education, research, and service, and is dedicated to creating equity and reducing health disparities everywhere. CUGH promotes mutually
beneficial, long-term partnerships between universities in resource-rich and resource-poor countries, developing human capital, and strengthening institutions’ capabilities to address these challenges. It is committed to translating knowledge into action and making the university a transforming force in global health.

WEST COAST VETERINARY PATHOLOGY MEETING

More than 50 individuals from academic institutions, biopharmaceutical companies and contract research organizations and six DVM students attended the 31st Annual West Coast Veterinary Pathology Conference held at the School in May. The program included 18 excellent case reports presented by veterinary pathology residents and veterinary students. As in previous years, a wide range of species, including domestic, zoo/exotic, and laboratory animal, and diseases were represented in the presentations. The second day featured two keynote speakers who this year focused on the skeletal system. Dr. Brian Murphy took participants on an intellectual journey through the evolution of the skeletal system and the various ways, from squids to mammals, that animals achieve structural support. Dr. Kevin Keel (pictured with culture dishes of the fungus Geomyces Distructans) discussed the remarkable and specialized skeletons of birds and amphibians, and diseases of bones in those species.

FULBRIGHT SCHOLARSHIP – 2011 EGYPTIAN REVOLUTION

When Professor Mary Christopher left for Egypt as a Fulbright Scholar in November 2010, she had no way of knowing she was heading into a tumultuous uprising—against poverty, rampant unemployment, government corruption and the autocratic governance of former President Hosni Mubarak—that would erupt soon after the New Year. Her work, which began in the relative calm and security of the Mubarak era, continued after the initial revolt amid an atmosphere of hope and euphoria, but also uncertainty about the future.

Christopher documented her experiences in a photo exhibit, “A Fulbright in Egypt: Continuity amid Change,” now on display in Gladys Valley Hall at the School and on the website at: http://www.vetmed.ucdavis.edu/egypt_exhibit/

Christopher’s 75 photos and informative captions tell a compelling story of her journey and of the continuity of life in Egypt even as this most populous of Arab nations was undergoing wrenching and often violent political and social change. Her images also focus attention on the animals of Egypt, their intimate connections with people, and the intersections of culture, politics and religion. The exhibit is arranged into sections, including: the 4,000-year-old Giza pyramids; the Fayoum Oasis, an historic agricultural area and nature preserve southwest of Cairo; veterinary practice and education; and the burgeoning metropolis of Cairo.

PMI Department web site: http://www.vetmed.ucdavis.edu/pmi