

NEWSLETTER

Penn Vet and Global Health: *improving food animal productivity*

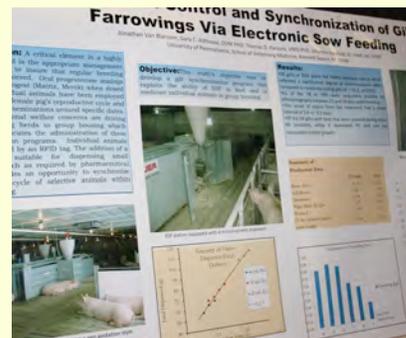


Dr. Dipti Pitta joined the Penn Vet faculty as an Assistant Professor of Ruminant Nutrition in the Department of Clinical Studies at New Bolton Center in July of 2011, and is now a part of the Penn Vet's Center for Animal Health and Productivity, the focus of which is sustainable food animal production. She received

her veterinary degree from India and was awarded a PhD in animal science from Massey University, New Zealand. Her primary area of research is in ruminant nutrition and microbiology and until joining Penn, had worked as a post-doctoral research associate at Texas AgriLife Research Center in Vernon, Texas. *Continued on page 2*

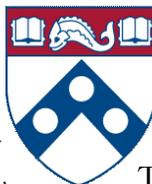
Student Research

Academic achievements of Penn Vet's VMD and VMD/PhD students were celebrated at the **Annual Phi Zeta Student Research Day** on March 22nd. 36 abstracts were submitted and reviewed by faculty judges. Six oral presenters were chosen and the remaining abstracts were shown as posters in a competitive session. Keynote speaker, Paul McKellips, gave a rousing and enthusiastic talk on public support of research and the use of animal models. Read more and see who the winners are on page 5.



TRAINING FOR A NEW GENERATION OF SCIENTISTS

On May 7, 2012, Christine Pfund, Ph.D., will be hosting a mentoring workshop for CHOP and UPenn researchers. Dr. Pfund is a faculty member of the Wisconsin Program for Scientific Teaching and author of *Entering Mentoring: A Seminar to Train a New Generation of Scientists*. Her work is focused on preparing current and future faculty to be effective teachers and mentors, as well as successfully integrate their



approaches to research with their approaches to teaching and learning. You may register and preview the workshop materials at <http://www.research.chop.edu/tools/dems/>. The workshop will be held in the CHOP Colket Translational Research Building (CTRB) Conference rooms (1200 A/B First Floor). Contact David Taylor if you have questions at this address: taylor@email.chop.edu.

IMPROVING FOOD ANIMAL PRODUCTIVITY ...continued from page 1

During her research career, Dr. Pitta's research has allowed her to work closely with farmers from India, New Zealand and the USA on various nutrition-related issues, allowing for the direct transfer of her research findings to improving agricultural land use and promoting animal production.

A passion for ruminant research prompted Dr. Pitta to work on various projects addressing the nutritional needs, metabolic disorders, physiologic status and management of ruminants in both indoor and pastoral grazing systems. "Ruminants are unique miniature biological machines", she says; capable of harvesting the energy and nutrients stored in plants through an efficient digestive system to provide milk and meat for human consumption. The mechanisms involved in the digestive process are complex and accomplished by a diverse and dynamic group of microbes that are inherently present in a cow's forestomach, or rumen. Dr. Pitta's specific interest is in studying the rumen microbial structure of ruminants and how it shifts with dietary change and the physiological state of the animal. She is trained to use both conventional culture methods and advanced microbiological technologies to explore the rumen microbiome and she is convinced that her research will lead to novel findings that will have practical application in

promoting animal health and production.

Dr. Pitta's research focuses on the use of next generation sequencing platforms, such as the 454 Roche system, to characterize rumen microbial populations in beef cattle in response to dietary change. Transition of grazing steers from warm-season grasses to cool-season grasses can result in potentially lethal disturbances in the digestive system. As cattle transition from grazing hay (high in fiber) to wheat forage (high in protein), the speed of fermentation in the rumen increases and Dr. Pitta hypothesized that the resulting decrease in pH due to lactic acid accumulation disturbs the normal and cellulytic flora in the rumen. To address this hypothesis, Dr. Pitta used the sequential approach of metagenomics to study ruminal bacterial diversity in steers as they transitioned from Bermudagrass hay to winter wheat forage. Pitta et al. (2010) indicated that genera such as *Prevotella* and *Rikenella* dominate (50%) ruminal populations on hay-based diets while *Prevotella* alone dominated (60%) in steers that grazed winter wheat (Figure 1). It was proposed that feed supplement such as *Saccharomyces cerevisiae* fermented product (SFP) can prevent the onset of transition-induced digestive disturbances in steers. Dr. Pitta undertook a more comprehensive

study using a larger number of fistulated steers (n=14) to assess the effect of such supplementation on transitional changes induced in rumen bacterial populations (Pitta et al., 2012). Results showed that the nutritive quality of wheat is the driving factor for inducing shifts in bacterial populations and that SFP promoted certain (cellulytic) bacterial genera such as *Ruminococcus* and *Fibrobacter* and lactic acid utilizing bacteria such as *Selenomonas*, *Megasphaera*, *Enterococcus*, *Lactococcus* and *Atopobium*. Dr. Pitta predicts that SFP supplementation restores the balance in the rumen by promoting bacteria that utilize lactic acid, thus mitigating digestive disturbances such as bloat in cattle. She concludes that further identification of shifts in bacterial populations during the course of a metabolic disorder or disease will provide essential insight for supplementation strategies to ameliorate these problems and can reduce economic loss by maintaining productivity in animals.

To expand her previous studies, Dr. Pitta now plans to study the rumen microbiome in dairy cattle to determine its impact on dairy production. She is currently working on a project "A novel approach to enhance the production efficiency of dairy cows through the application of
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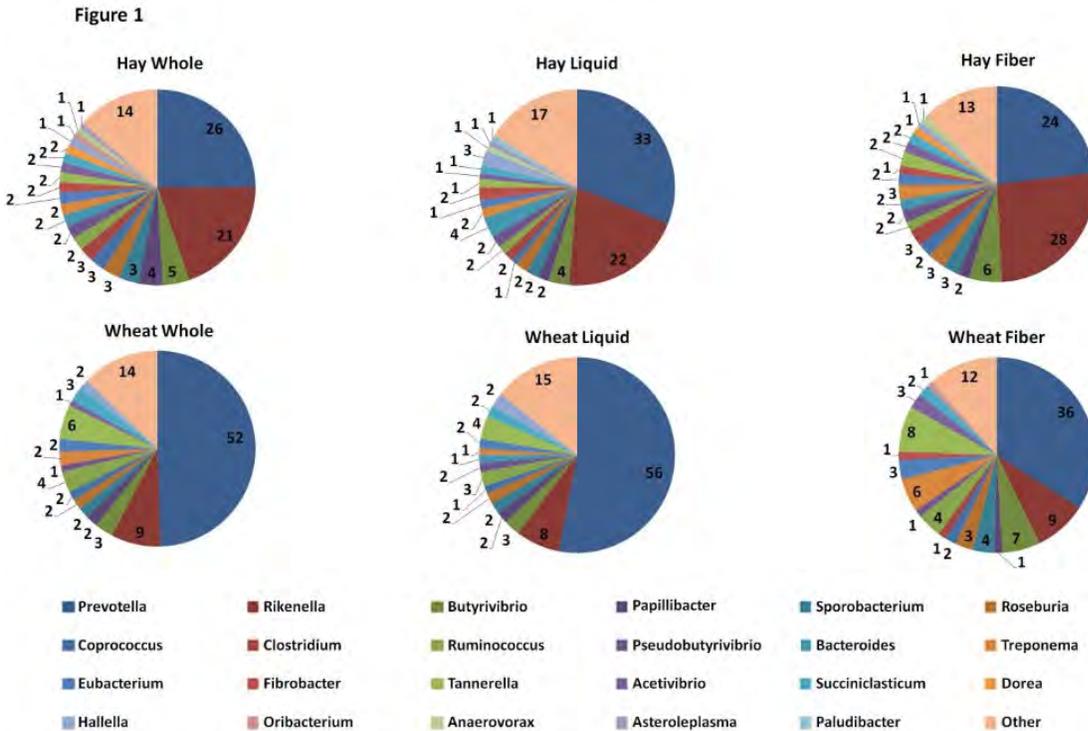


Figure 1: Phylogenetic composition of bacterial genera present above a cutoff value of 0.9% in whole, liquid, and fiber ruminal fractions of bermudagrass hay and wheat

metagenomics to rumen microbiome”, funded by a University Research Foundation grant from the University of Pennsylvania. This project is designed to screen a few dairy cattle for their rumen microbial diversity structure in various physiological states (*i.e.* dry, early and late pregnancy, transition to lactation and later stages of lactation) on different dietary regimen. This study will aid in identification of genes and enzymes that are associated with key metabolic pathways in the breakdown of fiber and or nitrogen capture to form metabolizable protein, which is a primary driver for milk

protein. She believes that such information is necessary to optimize nutrition that will improve dairy production efficiency. Application of genomic technology to explore microbes and their genes in the gut of animals can ultimately lead to novel findings and provide greater insights to reduce greenhouse gases, enhance food security and improve the overall quality of food animal production.

Notably, rumen microbes also express genes and enzymes capable of breaking down the most renewable source of energy, for example, lignocellulosic material. As

commercial enzymes capable of degrading lignocellulosic material into sugars required for the generation of biofuels are not readily available, this energy source remains virtually untapped. With the use of advanced sequencing techniques available at Penn, Dr. Pitta believes that it will be possible to identify ruminal genes or enzymes capable of degrading lignocellulosic material, finally allowing for the harnessing of this valuable energy resource. Accordingly, she submitted a grant proposal to the Department of Energy to produce next generation biofuels from the plant biomass using enzymes

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ANNUAL FACULTY RETREAT at NEW BOLTON CENTER



mediated disease in the upper aerodigestive tract: a significant pathologic and economic problem”.

Marie-Eve Fecteau (Clinical Studies New Bolton Center) & **James M Mullin** (Lankenau Institute for Medical Research) Title: "Got MAP? *Mycobacterium avium subsp. paratuberculosis* in animals and people".

The annual Faculty Research Retreat will be held on Friday, **June 8, 2012** on the campus of New Bolton Center. Dean J. Larry Jameson of the University of Pennsylvania's Perelman School of Medicine will deliver the Marshak Lecture entitled "Shaping the Future of Penn Medicine". Serge Fuchs, Nicola Mason, Michael May and John Lewis serve as the organizing committee for the 2012 retreat. "Translational and Collaborative Partnerships" is the theme and the presentations are as follows:

Brett A Kaufman (Department of Animal Biology) & **Joseph Baur** (Department of Physiology Perelman School of Medicine) Title: "Regulation of mitochondrial biogenesis in age-related diseases".

David Holt (Clinical Studies Philadelphia) & **Sunil Singhal** (Perelman School of Medicine) Title: "Of Mice, Dogs, and Men: Imaging Tumors During Surgery".

Erika Krick (Clinical Studies Philadelphia) & **Kendra Bence** (Animal Biology). Title: "Clinical and molecular aspects of cancer cachexia in cats".

Thomas P. Schaer (Clinical Studies New Bolton Center) & **Robert C O'Reilly**, Nemours/Alfred I DuPont Hospital for Children) Title: "Biofilm

In addition to oral presentations there will be a competitive poster session with prizes. Faculty as well as staff members who are authors on posters may register at:

<http://survey.vet.upenn.edu/index.php?sid=11431&lang=en>



Oriol Sunyer, Department of Pathobiology, was the *guest editor for a Special Issue* on Teleost Fish Immunology--*Developmental and Comparative Immunology* (2011)

Volume 35, Issue 12. This special issue contains 19 reviews on current aspects of fish immunology, and it represents the journal issue with the largest number of fish reviews ever published. Thus, this special issue on fish immunology is likely become a reference point for the field.

Calendar

May 4, 2012

Penn Integrative Oncology Symposium 8:30 am to 1 pm. Contact Jennifer McGuire at rjen@exchange.upenn.edu.

May 7 & May 8, 2012

"K" award workshops, "Know Your K" and "K99/R00" workshops are planned. <http://www.med.upenn.edu/postdoc/>

June 8, 2012

Penn Vet's Annual Faculty Research Retreat at New Bolton Center

August 24-25, 2012

Symposium to honor Professor Ralph Brinster and his break-through scientific accomplishments. narayan@vet.upenn.edu or atchison@vet.upenn.edu

Publications



Erika Krick, Sorenmo KU, Rankin SC, Cheong I, Kobrin B, Thornton K, Kinzler KW, Vogelstein B, Zhou S, & Diaz Jr. LA (2012) Evaluation of clostridium novyi-NT spores in dogs with naturally occurring tumors. *Am J Vet. Res.* 73(1): 112-118.

Kasinathan, R.S., Morgan, W.M., and **Robert Greenberg**.

(2011) Genetic knockdown and pharmacological inhibition of parasite multidrug resistance transporters disrupts egg production in *Schistosoma mansoni*. *PLoS Neglected Tropical Diseases*, 5, e1425.

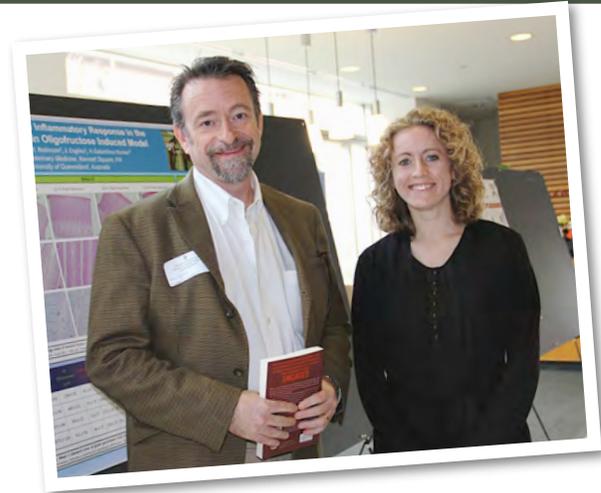


Zheng Y, Chang S, Boopathi E, Burkett S, John M, Malkowicz SB, & **Sam Chacko** (2012) Generation of a human urinary bladder smooth muscle cell line. *In Vitro Cell Dev Biol Anim.* 48(2):84-96.

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ANNUAL PHI ZETA STUDENT RESEARCH

Faculty and students gathered in the Hill Pavilion Marookian Auditorium on Thursday, March 22nd to hear talks and view posters presented by VMD and VMD/PhD students who submitted abstracts in a competitive process. A panel of faculty judges selected the following winners: Oral Presentations--1st Place Kristin Gardiner, (VMD) (mentor Gus Aguirre); 1st Place Jeff Carey (VMD/PhD) (mentor Mark Goulian); 2nd Place Kristine Stellato (VMD) (mentor, Lisa Murphy); 2nd Place Richard A. Jiménez (VMD/PhD) (mentor Richard Schultz); 3rd Place Bryan Vorbach (VMD) (mentor Oriol Sunyer); 3rd Place Brittany Gregory (VMD/PhD) (mentor Vivian Cheung). Poster Presentations: 1st Place Hope Douglas; 2nd Place Irene Bukh; 3rd Place, Catherine Brinkley; and Honorable Mention, Angella Dorsey-Oresto. Keynote speaker, Paul McKellips spoke on "Animal Rights Extremism and Public Opinion about Lab Animal Research".



Keynote speaker Paul McKellips and 1st place winner of the VMD oral presentations Kristin Gardiner



Abby Shearin introducing Richard Jiménez



Dr Margret Casal and 1st Place combined degree winner Jeff Carey



Carolyn Powell, Diana Richerson and Marjorie van Saun

GRANT-WRITING BLUNDERS by Karen Kaplan, Nature's Assistant Career Editor



For complete article see the February 16 2012 issue of Nature 482: 429-431.

Avoid being too ambitious—don't propose a study that would take decades. Grant officers can tell when an applicant is overextending.

Don't use abbreviations, acronyms, jargon or highly technical language. Reviewers who aren't familiar with your field will get annoyed and may think that you are trying to cover up for a lack of knowledge or ability to carry out the experiment.

Don't give short shrift to explaining why your proposal is important. Reviewers don't already know. Explain the study's impact, advances and potential.

Make the application easy to read —don't cram it with text, use too-small fonts or miniaturize any figures.

Get lots of colleagues from within and outside your field to review your application closely and provide written responses.

Make sure that you're asking for an appropriate sum. If you request too much or too little, reviewers will conclude that you don't know what you are doing.



RECENT AWARDS



Drs. D. Galligan, J. Ferguson and T. Parsons

Thomas Parsons

National Pork Board
Systematic Literature Review and Needs Assessment of Housing Systems for Lactating Sows and their Litters. 12/15/2011-12/14/2012 \$42,961

David Galligan

Washington State University (USDA)
Standardization of Health Event Data Recording to Improve Prevention and Control of on-Farm Disease in US Dairy Farms. 2/15/2012-2/14/2013 \$6,419

Nicola Mason

NIH/NIAID
Identification of a naturally occurring model for EBV-associated lymphomagenesis. 2/15/12-1/31/14 \$440,000

Daniel Morris

ACVD
Longitudinal Household Transmission of Veterinary *Staphylococci*: a Pilot Study. 4/20/12-10/31/13 \$20,000

William Beltran

NIH/NEI
Translational Gene Therapy for Rhodopsin Autosomal Dominant Retinitis Pigmentosa 3/1/12-2/28/17 \$7,944,522

Charles Vite

Mayo Clinic Rochester
Neurophysiologically Based Responsive Pharmacotherapy for Epilepsy. 9/30/11-9/29/12 \$310,086

Igor Brodsky

Pilot Project-Integrated Screening of Host Modifiers to Infection \$20,000 2/1/12-1/31/13

David Christian

NIH NIAID F32-AI-098374-01.
Visualizing impacts of *T. gondii* invasion events on mucosal immunity, 2/1/12-1/31/13 \$52,190.

Peijing (Jeremy) Wang

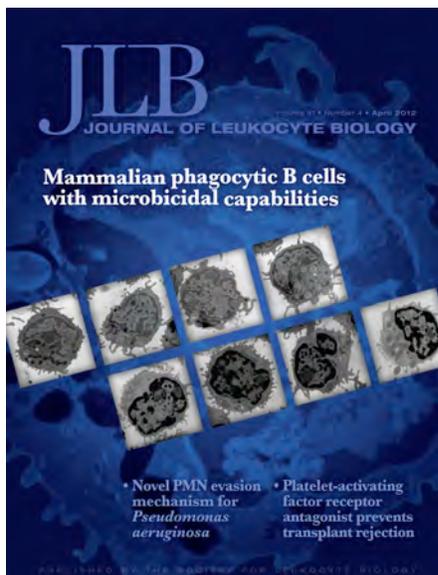
Functions of MOV10L1 in piRNA biogenesis and germ cell development 4/1/2012-3/31/2017 \$1,885,000.

Peijing (Jeremy) Wang

Functions of TEX11 and its associated proteins in mice and humans 7/1/2012-6/30/2016 \$1,280,000

Denys Volgin

Sleep and Cognitive Function in Rodent Model of Prenatal Alcohol Exposure. 6/1/2012-5/31/2014 \$136,000



Parra, D., A. M. Rieger, J. Li, Y.A. Zhang, L. M. Randall, **C.A. Hunter**, D. R. Barreda and **J. O. Sunyer**. 2011. Pivotal Advance: Peritoneal cavity B-1 B cells have phagocytic and microbicidal capacities, and present phagocytosed antigen to CD4+ T cells. *J. Leuk. Biol.* (Nov 2011, *Epub ahead of print*).

Publications



SH Huang, PJ Kozak, J Kim, G Habineza-Ndikuyeze, C Meade, A Gaunier-Hausser, R Patel, E Robertson, and **Nicola Mason**.

2012 Evidence of an oncogenic Gamma-herpesvirus in domestic Dogs. *Virology* 427: 107-117

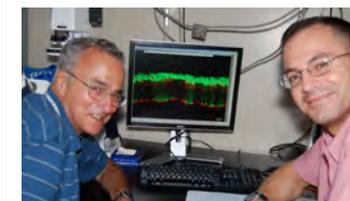


DA Hill, MC Siracusa, MC Abt, BS Kim, D Kobuley, M Kubo, T Kambayashi, D LaRosa, ED Renner, J Orange, FD Bushman and **David Artis** (2012)

Commensal bacteria-derived signals regulate basophil hemato-poiesis and allergic inflammation. *Nature Medicine*, Advance online publication, Mar 25.



Zaprazna, K. and **Michael Atchison**. (2012) YY1 controls immunoglobulin class switch recombination and nuclear AID levels. *Mol. Cell. Biol.* 32:1542-1554



William Beltran, Cideciyan AV, Lewin AS, Iwabe S, Khanna H, Sumaroka A, Chiodo VA, Fajardo DS, Roman AJ, Deng WT, Swider M, Aleman TS, Boye SL, Genini S, Swaroop A, Hauswirth WW, Jacobson SJ and **Gus Aguirre** (2012) Gene therapy rescues X-linked photoreceptor blindness in dogs and paves the way for treating /RPGR/ form of human retinitis pigmentosa. *Proc. Natl Acad. Sci. USA*, 109 (6): 2132-2137.

IMPROVING FOOD ANIMAL PRODUCTIVITY ...continued from page 3

produced within the cow's gut. As future energy needs cannot be met by fossil fuels alone and biofuels derived from grain distillation or oilseeds are increasingly diverting edible products from the human food chain, Dr. Pitta sees biofuels derived from woody biomass as an important and sustainable energy alternative.

Finally, Dr. Pitta has become an active participant in Penn's global activities as Penn continues to promote global health initiatives and the one health concept. She visited India recently along with four Penn vet students to explore the dairy and animal husbandry practices in the rural communities of West Bengal, Punjab, Gujarat and Andhra Pradesh. Through surveys of these regions, it became apparent that impaired nutrition and suboptimal management of milking cattle in India clearly limits productivity. Dr. Pitta is currently exploring a potential role for the University of Pennsylvania to work in collaboration with state governments and local organizations to promote animal productivity and contribute to poverty eradication in India.

Dr. Pitta's office is located in room 206; Center for Animal Health and Productivity (CAHP Building); New Bolton Center, 382 W Street Rd, Kennett Square, PA 19348



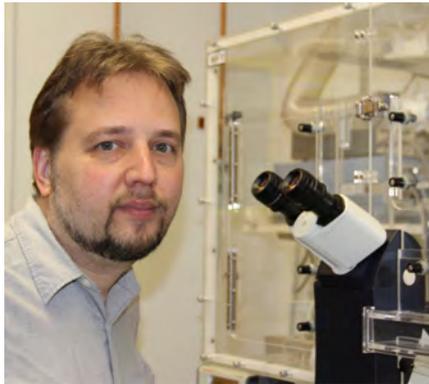
Visit to AMUL (Anand Milk Union Limited) the largest dairy cooperative located in Gujarat, India by Penn Vets (students: from left Audrey Barker, Kasey Dalton, Shannon Kerrigan, Jamie Rettig, Dr. Dipti Pitta and senior member of the NGO, Mr. Srinivas Sankaraneni)

References:

Pitta, D. W., W. E. Pinchak, S. E. Dowd, J. Osterstock, V. Gontcharova, E. Youn, K. Dorton, I. Yoon, B. R. Min, J. D. Fulford, T. A. Wickersham, and D. P. Malinowski. 2012. Transitional diversity dynamics in rumen bacterial populations of steers grazing wheat forage and receiving a *Saccharomyces cerevisiae* fermented product (SFP). *J Anim Sci* (under review).

Pitta, D. W., W. E. Pinchak, S. E. Dowd, J. Osterstock, V. Gontcharova, E. Youn, K. Dorton, I. Yoon, B. R. Min, J. D. Fulford, T. A. Wickersham, and D. P. Malinowski. 2010. Rumen Bacterial Diversity Dynamics Associated with Changing from Bermudagrass Hay to Grazed Winter Wheat Diets. *Microb. Ecol.* 59:511-522.

Penn Vet Imaging Core Facility



Penn Vet's Imaging Core Facility recently hired a new manager named Gordon Ruthel who is available for training and assistance. Dr. Ruthel has a Ph.D. in neuroscience from the University of Virginia and did his postdoctoral work in the laboratory of the renowned cell biologist, Peter Hollenbeck at Purdue. For

the past 11 years, Dr. Ruthel has managed a high end imaging core facility at the US Army Medical Research Institute of Infectious Diseases (USAMRIID). He has broad experience with a range of confocal and wide field imaging methods including dark field microscopy, live cell imaging with a spinning disk confocal microscope, basic and advanced confocal techniques, and Stimulated Emission Depletion (STED) Microscopy. For training or assistance with any of the core instruments (<http://research.vet.upenn.edu/pvic>), please contact Gordon at (215) 746-0471, goruthel@vet.upenn.edu or Bruce Freedman, the PVIC Scientific Director at bruce@vet.upenn.edu.

The Penn Vet Research Newsletter is distributed quarterly.

Suggestions, requests, comments, and story ideas should be directed to:

resnews@vet.upenn.edu

Office of the Associate Dean for Research

Phillip Scott, PhD

University of Pennsylvania

School of Veterinary Medicine

Editor: Gayle Joseph



University of Pennsylvania
 School of Veterinary Medicine
 380 S University Avenue
 3rd Floor Hill Pavilion
 Philadelphia, PA 19104-4539

TO:

