

## COLLEGE OF VETERINARY MEDICINE - Summer Research Program 2023

### Goals of this program:

- Maximize the opportunity for students to further their education and training by learning to conduct biomedical research under the supervision of a faculty mentor.
- Encourage veterinary, pre-vet, and animal science students to consider careers in biomedical research following graduation.

### Key features:

- Program is provided for **10 weeks (May 30 - August 7) during Summer 2023.**
- Stipend of \$6,500; half of which will be paid at the beginning and half at the end of the 10-week program.
- Students conduct **hypothesis-driven research** under the guidance of an MWU faculty mentor.
- **Weekly colloquium** where each scholar will investigate topics in biomedical research and career development.
- **Program orientation** with seminars in research methodology and ethics.
- **Career chats** where scholars will have an opportunity to meet with distinguished speakers regarding careers in biomedical research.
- **Presentation of summer research results at the NVSS Conference in San Juan, Puerto Rico, August 3-5, 2023.**

### Requirements:

- Students in the first and second years of the veterinary medical program are eligible.
- Students must maintain good academic standing leading up to and during the Summer Research Program.
- Students must have successfully completed VMEDG 1510 Principles of Veterinary Scholarship.
- Orientation in the faculty mentor's laboratory through successful completion of the VMEDG 1301/1302 Research Elective in Spring 2023, prior to the start of the program.
- Time commitment for the Summer Research Program is expected to be significant and could average 40 hours of research activity per week over the length of the 10-week program.
- Full participation in activities of the Summer Research Program, as stipulated by the Program Directors and/or Associate Dean for Research.
- Full participation in research and/or laboratory activities, as stipulated by the student's assigned faculty mentor, such as lab meetings, experiments, etc.
- Presentation of research findings as a poster and/or oral presentation at the 2023 NVSS Conference, the CVM Phi Zeta Research Day in Winter 2023, and the MWU KAS Research Day in Spring 2024.
- Student provides final project update, approved by faculty mentor, to the Associate Dean for Research by September 29, 2023.
- Students are not required to have performed past services or to agree to perform future services for the University, as a condition of receiving the research stipend.

### Application components due on **January 13, 2023:**

1. A letter of interest indicating:
  - Interest in up to three mentors and their corresponding research projects. These choices must be made from the MWU faculty members and research projects listed in this document and ranked from #1-3.
  - A vision of how this experience may shape/guide the fellow into a career in biomedical research.
  - A statement of whether the applicant will/will not be eligible for Federal Work Study (FWS) funds for the 2023-2024 school year.
  - A statement of whether the applicant is/is not interested in being considered for the off-campus USDA/ARS research opportunities provided through Boehringer Ingelheim (see email for additional info).
2. Curriculum Vitae
3. One letter of reference from a faculty member at the student's university who is familiar with the student's interest in research. The student does not have to have prior research experience to qualify for this award.

Application review process:

Applications will be reviewed by MWU College of Veterinary Medicine (CVM) Research Committee and ranked based on:

1. Eligibility of student
2. Letter of interest
3. Letter of reference

The highest-ranking applicants will be selected for the program.

**Number of positions (tentative): 20+ for CVM students, depending on funding availability.**

Important dates:

- **Application submission deadline January 13, 2023.** E-mail application as a single PDF file to Francis Eko, PhD, Associate Dean for Research, [feko@midwestern.edu](mailto:feko@midwestern.edu), with subject: **MWU-SRP-2023**.
- **Awards announced no later than February 15, 2023.** For additional program information, please email Dr. Katie Wycislo, [kwycis@midwestern.edu](mailto:kwycis@midwestern.edu), or Dr. Sylvia Ferguson, [sfergu@midwestern.edu](mailto:sfergu@midwestern.edu), SRP Faculty Co-Directors, with subject: **MWU-SRP-2023**.

**Student awardees will be guided to a research mentor at MWU whose research project closely aligns with one of the student's choices.**

The student and mentor will then develop a research proposal **by April 28, 2023**, to include:

- 3-page research proposal which must contain the following sections: Specific Aims, Background and Significance, Innovation, Research Design, Timeline, and Specifics of Student Involvement. Preliminary data are not required.
- Separate sections of literature cited and biosketch of PI(s), both in NIH format.
- Applicable vertebrate animals, human subjects, and biosafety descriptions in NIH format (indicate MWU file #).

**College of Veterinary Medicine – Department of Pathology**

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Laboratory principal investigator: Tamara Chamberlin, DVM, PhD, DACVP and Mary E. White, DVM, DACVP

Project 1, Title: Temporal changes with postmortem fluid analysis

Summary: Dipstick, quantitative assessment, and microscopic evaluation of urine and aqueous humor at set time intervals postmortem to determine how decay affects measurements over time. This would help with interpretation of these results during necropsy to improve diagnosis of clinical morbidity and mortality.

Methods acquired during fellowship: Tissue and fluid collection, complete urinalysis, microscopic evaluation of fluids, refractometry

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Laboratory principal investigator: Weidang Li, PhD

Project 1, Title: Analysis of CD8+ T-cell and macrophage infiltration during female reproductive tract infection

Summary: The objective of this study is to understand hematopoietic cell infiltrates in the female mouse genital tract following Chlamydia Infection. Specifically, to better understand how CD8+ T-cells and macrophages relate to Chlamydia pathology after Chlamydia infection in mice via flow cytometry analysis of genital tissue cells.

Methods acquired during fellowship: Following lab introduction, the student researcher will be trained on all necessary techniques necessary for completion of the research project. The student researcher will be working independently with facilitation from PI on experiments. Methods acquired during the fellowship include cell culture, tissue single cell isolation, and flow cytometry.

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## Faculty Research Projects -- CVM 2023 Summer Research Program

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Laboratory principal investigator:	Katie Wycislo, DVM, PhD, DACVP
Project 1, Title:	Evaluation and optimization of commercial quick stains for use in veterinary hematology and cytology
Summary:	Digital slide scanning has made it possible for veterinary practitioners to submit cytology cases electronically. However, for optimal feedback on cases, practices must be able to create well-stained samples using commercially available quick stains. This goal of this study is to create optimal staining protocols for common cytology quick stains.
Methods acquired during fellowship:	Basic study design and statistical analysis, collection and processing of hematology and cytology samples, sample evaluation (including microscope use), and staining

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### **College of Veterinary Medicine – Department of Equine Medicine and Surgery**

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Laboratory principal investigator:	Margaret Brosnahan, DVM, PhD, DACVIM
Project 1, Title:	Profiling the oral and peripheral blood immune status of horses with and without equine odontoclastic tooth resorption and hypercementosis (EOTRH)
Summary:	The summer research assistant will assist with the development of a protocol for evaluating salivary cytokines in horses. We will work on the protocol and establish values in normal horses. We may begin collecting samples on horses affected with equine odontoclastic tooth resorption and hypercementosis (EOTRH). Dr. Kevin Lee will be collecting pathology samples for another part of this project and there may be an opportunity to help in this area as well.
Methods acquired during fellowship:	Horse handling, venipuncture, sample collection and processing, radiography, equine dental examination, bench techniques will include multiplex cytokine analysis (MagPix), cell counting, possibly some flow cytometry, possibly some gross anatomy/pathology sample processing

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**Faculty Research Projects -- CVM 2023 Summer Research Program**

**College of Veterinary Medicine – Department of Small Animal Primary Care**

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Laboratory principal investigator: Rachael Kreisler, VMD, MSCE, DACVPM (Epidemiology)

Project 1, Title: Effect of passage through vial septae on needle sharpness

Summary: This project will be a randomized controlled trial to determine whether needle passage through one or two vial septae impacts needle sharpness as determined by electron scanning microscopy and the amount of pressure required to pass through standardized simulated skin.

Methods acquired during fellowship: Scanning electron microscopy, physical model building, statistical methods

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Laboratory principal investigator: Rachael Kreisler, VMD, MSCE, DACVPM (Epidemiology)

Project 2, Title: Effect of actively warmed insulated leg coverings on the core body temperature of cats undergoing abdominal surgery

Summary: This project will be a randomized controlled trial to determine whether actively warmed insulated leg coverings in conjunction with truncal warming result in higher temperatures in postoperative recovery as compared to truncal warming alone. Insulated actively warmed leg coverings will be prototyped and built for this project.

Methods acquired during fellowship: Physical model building, heat signature analysis, statistical methods

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## Faculty Research Projects -- CVM 2023 Summer Research Program

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Laboratory principal investigator:	Rachael Kreisler, VMD, MSCE, DACVPM (Epidemiology)
Project 3, Title:	Association of intake type, intake date and demographic variables on positive PCR or seropositivity for COVID-19 in shelter cats
Summary:	Seven (2%) of 350 cats admitted to an animal shelter in 2021 were PCR positive for COVID-19, and 10 (11%) of a sub-sample of 92 cats were positive for COVID-19 antibodies. This project will involve blind coding of the medical records for the 350 shelter cats to determine whether there are associations with intake, geographic or demographic variables for PCR and seropositivity, particularly regarding whether PCR infections are likely to have been shelter-acquired.
Methods acquired during fellowship:	Geographic information systems, coding medical records, epidemiologic investigation methods, understanding of how PCR and ELISA work (no PCR work anticipated, possible ELISA work), statistical methods

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Laboratory principal investigator:	Emily B. Smith, MS, DVM
Project 1, Title:	Student experience with patient stress during abdominal ultrasound
Summary:	Students have expressed feelings of emotional discomfort while witnessing companion animal abdominal ultrasounds, especially when patients appear distressed themselves. This study will investigate via questionnaire the level of stress students may experience when helping/handling patients who are awake during routine abdominal ultrasound.
Methods acquired during fellowship:	A brief 5-10 question questionnaire will be offered via paper to each student who participated in helping/handling of patients during routine abdominal ultrasound offered through MWU's Internal Medicine Department during each business day of a 10-week period. Data will then be compiled and presented in paper and poster formats at the end of that time.

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**Faculty Research Projects -- CVM 2023 Summer Research Program**

**College of Veterinary Medicine – Department of Specialty Medicine**

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Laboratory principal investigator:	Tokiko Kushiro-Banker, BVM, MS, PhD, DACVAA
Project 1, Title:	Effects of saphenous and sciatic nerve blocks using ropivacaine with or without morphine in dogs undergoing stifle surgeries
Summary:	Regional anesthesia prevents postoperative hyperalgesia effectively, but opioids can decrease this effect in humans and rats. Opioids are used routinely in veterinary patients and veterinary regional anesthesia is quickly gaining popularity in recent years. This study is to assess if the clinical dose of morphine negatively affects nerve block effects in dogs.
Methods acquired during fellowship:	Animal handling (dog), canine pain scoring (may be required to come to assess patients overnight occasionally; each assessment takes about 20-30 min), client communication, assistance with nerve blocks

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**College of Graduate Studies – Department of Anatomy**

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Laboratory principal investigator:	Heather F. Smith, PhD
Project 1, Title:	Functional forelimb morphology of the hinge-backed tortoise ( <i>Kinixys homeana</i> )
Summary:	Captive tortoises are often affected by luxations of limb joints, such as the glenohumeral joint. These conditions may result in lameness, and often lack known etiology. This dissection-based project will improve interpretations of luxated joints and orthopedic disorders by providing detailed anatomical descriptions of osteological landmarks and forelimb myology.
Methods acquired during fellowship:	Dissection, surgical skills, anatomical description, photographic documentation, imaging techniques, muscle mapping

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## Faculty Research Projects -- CVM 2023 Summer Research Program

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Laboratory principal investigator:	Margaret Hall, PhD
Project 1, Title:	The effects of aging on the retina and optic nerve in the rhesus macaque
Summary:	Drs. Heesy, Veilleux and I have acquired a sample of 150 macaque eyes that come from animals of known parentage that range in age from infancy to senescence, making this an unprecedented sample to study age-related changes in the visual system.
Methods acquired during fellowship:	Precise anatomical measurements, retinal whole mounts, preparing histological sections of the retina and optic nerve, staining techniques, counting techniques and programs

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Laboratory principal investigator:	Leigha Lynch, PhD
Project 1, Title:	Brain anatomy of the North American river otter
Summary:	This study will focus on identifying the gyri and sulci of the brain of North American river otters from micro-CT scan data. The goal will be to generate a published 3D model of the brain for education and research purposes.
Methods acquired during fellowship:	Familiarization with brain anatomy of otters, processing of micro-CT data, 3D model generation, conference presentations (January 2024)

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### **College of Graduate Studies – Department of Biomedical Sciences**

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Laboratory principal investigator:	Nafisa M. Jadavji, PhD
Project 1, Title:	Role of genetic deficiencies in one carbon metabolism on hypoxia outcome
Summary:	One-carbon (1C) metabolism is a metabolic network that integrates nutritional signals with biosynthesis, redox homeostasis, and epigenetics. It plays an essential role in the regulation of cell proliferation, stress resistance, and embryonic development. The natural form of the B vitamin,

## Faculty Research Projects -- CVM 2023 Summer Research Program

folate, is central in 1C, as well as the synthetic form of the vitamin referred to as folic acid. In the cell, 1C plays an essential role in nucleotide synthesis of purines, removal of uracil from DNA, and methylation, through the metabolism of homocysteine and generation of S-adenosylmethionine. Our work has previously shown that dietary folic acid supplementation is beneficial after hypoxia, however, the mechanisms through which this occurs remain unknown. Little is known about the molecular mechanisms underlying the cellular responses to lack of oxygenation and how to prevent damage once a reduction in O<sub>2</sub> supply has occurred. The aim of our study is to investigate how genetic deficiencies in one-carbon metabolism impact hypoxia outcome.

Methods acquired during fellowship: Fly behavior, tissue dissection, microscopy, statistical analysis, solution preparation, antibody staining

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### **College of Graduate Studies – Microbiology & Immunology**

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Laboratory principal investigator: Dhritiman Samanta, PhD

Project 1, Title: Role of short-chain fatty acids in inhibiting *Coxiella burnetii* growth within host cells

Summary: *Coxiella burnetii*, a zoonotic pathogen, causes spontaneous abortion in farm animals and life-threatening Q fever in humans. In this project, we aim to study the role of three short-chain fatty acids in inhibiting *Coxiella* growth in human cells. Our project will potentially identify novel therapeutics for human *Coxiella* infections.

Methods acquired during fellowship: Mammalian cell culture, immunofluorescent assay (IFA), Live and fixed-cell microscopy, image analysis, statistical analysis

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### **College of Graduate Studies – Department of Physiology**

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Laboratory principal investigator: Tobias Riede, DVM, PhD

**Faculty Research Projects -- CVM 2023 Summer Research Program**

Project 1, Title: Vocal production mechanisms

Summary: All mammals, including humans, produce rhythmical sounds as soon as they are born. How those vocalizations develop remains a mystery. Breathing movements, laryngeal movements and orofacial movements must be coordinated to produce a voice. We sample morphology, behavior and physiological parameters in humans and animals to better understand the respective roles in this complex behavior.

Methods acquired during fellowship: Animal behavioral observation, sound and video analysis, histological image analysis, CT image analysis/segmentation/3D anatomical reconstruction

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