# CCVM 2023 Summer Programs – Available Projects

| Faculty Mentor | Projects |
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| Dr. Luiz Bermudez | Project 1: Johne's disease; host response to *M. paratuberculosis* infection. Because *M. paratuberculosis* is acquired through the GI tract, do neutrophils participate in the host response?<br><br>Project 2: Antibiotic resistance; study resistance to quinolones during the last 3 years, including determining the mutations in the bacterial target.<br><br>Project 3: Susceptibility of salmonella isolates causing animal infection in Oregon |
| Dr. Claudia Hase &<br>Dr. Anna Jolles | Project: Oysters, Vibrio and its bacteriophages: A model system for understanding population and coevolutionary host-pathogen-hyperpathogen dynamics<br><br>Abstract: The advent of accurate quantitative molecular diagnostic tools and whole genome sequencing techniques offers unprecedented opportunities for the experimental study of ecological and evolutionary population dynamics – especially when applied to fast-replicating, rapidly evolving pathogen populations. Here, we propose to establish an experimental platform for evaluating the trajectory of marine viral -- bacterial – invertebrate host interactions during global climate change, providing a conduit for understanding important aspects of disease emergence in the ocean.<br><br>In phase 1 of this work, we will conduct experiments to parameterize mathematical models representing the bacterial – phage interaction; in phase 2, we will add in bacteria – invertebrate host dynamics, resulting in a model system for studying the ecological and evolutionary dynamics of a system comprising three trophic levels: Host, pathogen, and hyperpathogen.<br><br>This experimental – theoretical platform will allow us to ask crucial questions about the evolutionary trajectory of host – pathogen – phage systems, with relevance to phage therapy in combatting human and animal diseases in general, and aquaculture applications in particular.<br><br>The utility of any therapy agent is limited in time, due to the evolution of resistance in the pathogen population; however, in the case of phages as therapy, two rapidly evolving components are at play – phages and their bacterial targets. We hope to establish empirical and theoretical foundations to address knowledge gaps, such as: How quickly will bacteria evolve resistance against phages, and phages evolve reduced pathogenicity? How might resistance evolution be attenuated? |

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| | We have assembled a team including specialists in disease ecology & evolution (Jolles), marine pathogens (Hase), and multi-scale mathematical modeling of infectious diseases (Gulbudak) to tackle this work. We will leverage this model system to solicit federal funding via the interagency (NSF / NIH / USDA) program in Ecology and Evolution of infectious diseases, USDA programs focused on food safety (aquaculture), and NSF's programs in Mathematical Biology. |
| Dr. Brianna Beechler | Wildlife Research Projects: I will have several projects available to students that involve wildlife research work, including research on bighorn sheep, sea lions and African buffalo. Very few projects will involve direct animal handling, but will work with samples collected from the projects. All will involve lab work and data analysis, and all can result in a paper if students are interested. Interested students should come talk to me so we can design a project that fits their needs and interests. |
| Dr. Lacy Kamm | Several data collection projects are needed:<br><br>Project 1: Perform follow up emails with horse owners and veterinarians regarding the current health of their horse after mesenchymal stromal cell therapy.<br><br>Project 2: Cross reference drugs and drug doses to create a referenced drug formulary excel spreadsheet.<br><br>Project 3: Read and assess journal articles for outcome measurements. These will be publications relating to horse osteoarthritis and surgery. Knowledge and capability in using publication databases is needed.<br><br>Students with good reading information analysis, computer database, and Excel skills are encouraged to apply. All work can be completed from home with access to a computer and the library's database.<br><br>Contact: lacy.kamm@oregonstate.edu |
| Dr. Stacie Summers | Project: Effect of trazadone to reduce signs of stress in cats in the hospital<br><br>Summary: The objective of the study is to evaluate the effectiveness of trazadone on reducing signs of stress in cats when administered in hospital. This is a placebo-controlled, blinded clinical trial. Cats will receive either trazadone or a placebo capsule in hospital. The cat will be observed for signs of stress in the kennel and during a physical examination and blood draw. The summer student will be responsible for client communication, hospital intake and discharge, obtaining stress scores, blood collection, completion of medical record, and sample processing. Experience with feline restraint and blood draws is preferred, but not required. |

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| Dr. Brian Dolan | Project: Investigating susceptibility of cervid species to SARS-CoV2 infection<br><br>Summary: Use molecular biology and cell biology techniques to determine if cervid species may be susceptible to SARS-CoV2 infection. Depending on accomplishments, study may expand to other species of concern as well. |
| Dr. Benji Alcantar (Wildlife Safari) | Project 1: Basic vaginal microbiome in cheetahs<br><br>Project 2: Animal welfare/behavioral study in cheetahs and hoofstock<br><br>Project 3: Disease monitoring in Hoofstock with Bank serum<br><br>For more information on the projects, please contact Dr. Alcantar at balcantar@wildlifesafari.net |
| Dr. Daniel Rockey | Project: Important antigens for vaccination of sheep against *Chlamydia abortus*<br><br>Summary: Ovine Enzootic Abortion (OEA) is a disease associated with infection of pregnant ewes by the bacterial pathogen *Chlamydia abortus*. This pathogen is present in sheep flocks in most countries and can be a very significant burden both in terms of sheep health and economic productivity. Vaccines are available but there is considerable variation in efficacy among different products. We are developing a long-term program that will examine vaccine strains and their specific antigenic profile, with a goal of identifying antigens that are critically important for protection. We are interested in having summer students explore this issue by conducting lab-based analysis of the sheep antibody response following vaccination. |
| Dr. Lia Danelishvili | Project abstract: Antibiotic treatment of cattle infected with *Mycobacterium avium* subsp. *paratuberculosis* (MAP), the causative of Johne's disease, is not practical, economical, or effective. Bacteriophages (phages) are natural enemies of bacteria and present one of the most promising new opportunities to fight infectious diseases in livestock. Phages can serve as a cost-effective intervention for prophylaxis, treatment, and control of Johne's disease, and can be formulated as "probiotic-like" preparations for use in water and/or feed. To create effective probiotics, it is necessary to characterize phages, and goals of the summer project are to identify the host range specificity of MAP-specific phages that have been already identified, establish their stability under different conditions including in the rumen fluid environment, and understand phage resistance frequency in MAP pathogen. |
| Dr. Ling Jin | Project Summary/Abstract: Herpesviruses can be found in almost all vertebrates, and regardless of the host species, they can become latent and reactivate from latency under various stressful conditions. During latency, the viral genomes are dormant, exist in a repressed heterochromatin state in nuclei as episomes. In humans, reactivation of the latent herpes simplex virus type 1 (HSV-1) infection can cause acute diseases such as encephalitis and corneal epithelial keratitis. In koi, reactivation of the latent |

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| | koi herpesvirus (KHV) infection can cause inflammation in various tissues, gill necrosis, and sudden death (9, 14). Reactivation of latent human herpesvirus, such as cytomegalovirus (CMV), remains a challenge in the clinical management of transplant recipients. No treatment or drug is available that can prevent diseases associated with herpesvirus reactivation from latency. Therefore, there is an urgent need to understand the mechanism of herpesvirus reactivation from latency before an effective therapy can be developed.<br><br>When the host is subject to various stresses, such as high temperature and injury, physiological stress can lead to various cellular stress responses, such as oxidative stress and ER stress, to maintain homeostasis. A growing body of evidence shows that various cellular stress responses are activated in the presence of virus infections, and stresses are actively involved in the process of virus replications. There is also evidences that stress responses are contributing factors to herpesvirus reactivation from latency. However, there is very little understanding of how various stress responses lead to herpesvirus reactivation within the latently infected cells. It is known that the conversion of dormant chromatin (heterochromatin) to active chromatin (euchromatin) took place before herpesvirus reactivation from latency, and histone modification enzymes mediate this chromatin remodeling. The question is, how do those enzymes become activated during the stress responses? Here, we hypothesize that histone modification enzymes were activated by cellular stress responses, especially oxidative stress. To test these hypotheses, expressions of enzymes associated with histone modification, such as LSD1 and JMJd2, will be examined at both mRNA and protein levels before and after stresses that lead to herpesvirus reactivation from latency. In addition, we also plan to examine the relationship between oxidative stress and the expression of histone demethylases by using NADPH oxidase inhibitor or antioxidant during herpesvirus reactivation from latency. |
| Dr. Michael Kent | Project: Zebrafish Diseases<br><br>The student would participate in two projects in the Kent lab. Working with us on the development of a nematode model (Pseudocapillaria) in zebrafish – in vitro culture, infecting larval fish, etc. Project 2: Retrospective review of neoplasia in the Zebrafish Intl. Resource Center Diagnostic Service; archives of histologic slides from this diagnostic service – 100's of tumors, many types, in our collection of slides from some 15,000 fish from 300 labs since 2000. |