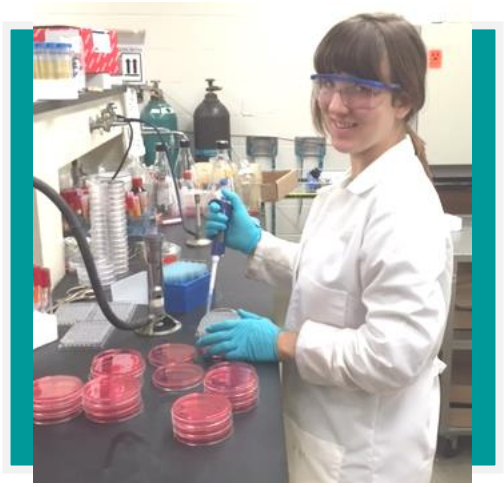
ANSC Undergraduates Conducting Research

Leanne Jankelunas, Leanne Jankelunas, an ANSC undergrad and University Scholar recipient, has been working in **Dr. Kumar Venkitanarayanan's** lab on her University Scholar thesis project. Leanne has been researching alternative methods to control bacterial foodborne contamination and illness since the spring of her freshman year. Recently awarded a 2015 Wyand Family Honors Scholarship SURF Grant, she spent this summer researching the effects of phytochemicals on methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Staphylococcus aureus* (VRSA).



Staphylococcus aureus is a bacterium found on human skin and in the respiratory tract of healthy people. When an individual's dermis is damaged or a person ingests contaminated food, this bacterium is able to enter the host. Once inside, the pathogen can multiply in the bloodstream causing conditions such as endocarditis, sepsis, and toxic shock syndrome. Typically, this infection is quickly resolved with treatment using standard antibiotics; however, recent genetic mutations have led to antibiotic resistance in *S.aureus* thereby resulting in methicillin-resistant *S. aureus* (MRSA) and vancomycin-resistant *S. aureus* (VRSA). To combat these recently evolved microorganisms, Leanne has been evaluating the potential use of phytochemicals as an alternative method.

Phytochemicals are natural compounds derived from plants and generally recognized as safe by the FDA. Leanne screened three phytochemicals at different concentrations that would inhibit growth but not kill the bacteria. She then combined these compound concentrations with either methicillin or vancomycin and studied the effect on growth of MRSA or VRSA respectively. Following this, Leanne plans to evaluate gene expression using RT-PCR to determine if these compounds have any effect on the activity of the resistant genes in MRSA and VRSA. This fall Leanne will continue her research with a variety of other phytochemicals in the hopes of assisting medical professionals and scientists to develop novel therapies for treatment of MRSA and VRSA infections.

Linkai Zhu, an ANSC undergrad and member of the UCONN/SCU (Sichuan University) "China 3 + 1+1 program'', has been working in **Dr. Xiuchun (Cindy) Tian's** lab since the beginning of his senior year. Linkai, known to his friends as Link, received a prestigious Everest Scholarship from The Ministry of Education in the People's Republic of China. This scholarship supported him for one year so he could study and conduct research at UConn as a visiting student. He was given an independent research project on characterizing the transcriptional profiles of histone and histone modifying enzymes in bovine *in vivo* produced pre-implantation embryos. Mounting research has been conducted on the structure of histone octamer and its interaction with DNA in regulating gene expression, but less is known about chromatin assembling during early embryogenesis. With data generated in Dr. Tian's lab on RNA-sequencing, Link is establishing stage-specific expression patterns of histone and histone modification enzymes genes in early bovine embryos. This study of assisted reproductive technologies such as in vitro fertilization and animal cloning where low success rates and/or abnormal gene expression have been observed, is of great importance. Meanwhile, Link also assisted fellow researchers in the lab in real-time RT-PCR and molecular cloning. His work in the lab has exposed him to several machines and procedures

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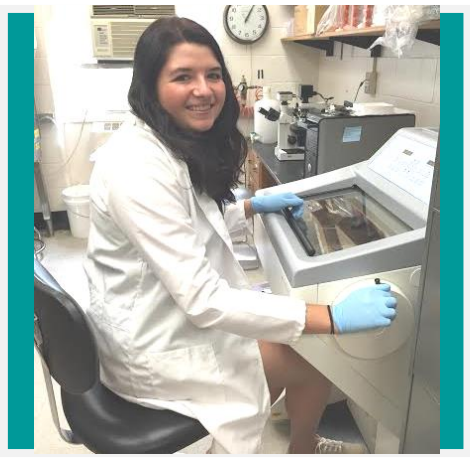
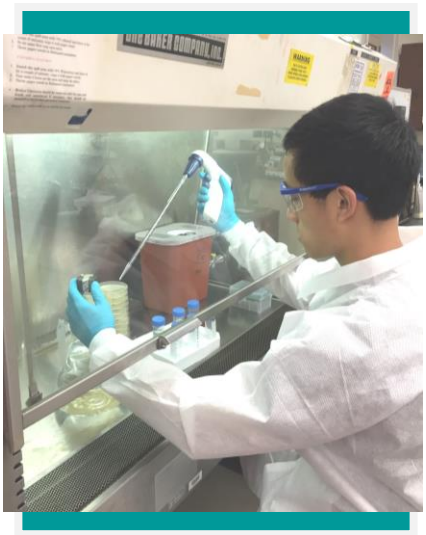
including the PCR machine to do molecular cloning; enzyme digestion, ligation and transformation to amplify specific sequences; transfection to introduce plasmids or linear DNA into mammalian cells and cell culture and real time quantitative PCR which is used to count the amount of DNA or transcribed RNA. He is excited to continue his study at UConn now that he has been accepted to the Department of Animal Science's PhD program under Dr. Tian's guidance. The major focus of his PhD work will be trans-differentiation of somatic cells into stem cells.



Dominique Martin, an ANSC undergrad, is a member of the honors program and has been working in **Dr. Sarah Reeds's** lab since December 2014. Dominique originally started by assisting on the maternal nutrition sheep study and with general lab work. She is currently working on her honors thesis that focuses on changes in muscle during regeneration in mice experiencing cancer cachexia.

Cancer cachexia is the progressive loss of body mass in cancer patients. Cachexia leads to poor response to chemotherapy, reduced muscle mass, and increased mortality rates. With cachexia, the loss of muscle mass results from increased protein degradation and decreased protein synthesis. Muscle loss during cachexia is regulated by specific cytokines such as Interleukin (IL)-6. Elevated levels of IL-6 in cancer patients are associated with weight loss and reduced chance of survival. It is hypothesized that the inhibition of IL-6 signaling will inhibit muscle atrophy in tumor bearing animals and increase satellite cell activity in regenerating muscles, improving regeneration.

Through analysis of cross sectional area and the satellite cells in muscle, Dominique plans to better understand how cachexia alters satellite cell function during muscle regeneration and the overall role of IL-6 in tumor bearing animals. After graduating from UConn and completing her research, Dominique plans to attend vet school.



Patrick Lau, an Honors undergrad majoring in molecular and cell biology, has been working in **Dr. Kumar Venkitanarayanan's** laboratory since his sophomore year. After taking all biosafety trainings, Patrick was initially involved in projects that investigated the antimicrobial potential of several natural phytochemicals on foodborne pathogens. This provided Patrick hands on experience in working with a variety of infectious bacteria, besides equipping him with techniques in microbiology, molecular biology and cell culture.

Patrick's honors research project will focus on Methicillin-resistant *Staphylococcus aureus* (MRSA), which is a pathogenic bacterium resistant to antibiotics like penicillin and its derivatives. The symptoms of MRSA are similar to other staphylococcal infections, including various skin infections, toxic shock syndrome, and necrotizing pneumonia. The majority of MRSA infections start in wounds and other breaches to the integrity of the skin usually caused by trauma, surgery, or medical devices. Because of the difficulty in treating MRSA with antibiotics, alternative methods are important in combating the bacterium. Patrick's project will investigate the efficacy of several natural dietary minerals such as zinc, selenium and manganese in treating wound infections of MRSA. This will be achieved using cell culture and *in vitro* wound models. In addition to determining the antimicrobial efficacy on MRSA, mechanistic studies to investigate the effect of minerals on genes encoding antibiotic resistance in the bacterium will be conducted. Patrick's work in the lab taught him how research experiments are designed and conducted, besides introducing him to the fascinating field of microbiology, specifically as it relates to human health. Patrick is planning to use this research experience in his pursuit to practice medicine.