THE UNIVERSITY OF RHODE ISLAND
COLLEGE OF THE ENVIRONMENT AND LIFE SCIENCES
COLLEGE OF PHARMACY

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Undergraduate Research Initiative Committee
University of Rhode Island
Kingston, RI 02881

Dear Committee Members,

I am extremely pleased to offer my support to Christina Surace for her undergraduate research project, "Investigating the regulation of a protein required for virulence in a bacterial pathogen." My laboratory studies the molecular mechanisms that lead to pathogenicity of the human intracellular pathogen *Francisella tularensis*. While this organism is highly pathogenic to humans, my laboratory takes advantage of the model organism *F. tularensis* subsp. *holarctica* LVS (Live Vaccine Strain), which does not infect or cause disease in humans and we do not work with any of the highly pathogenic strains.

Christina is an academically excellent upper-level student with a double major in Biotechnology and Cell and Molecular Biology (on the microbiology track) and is also a MARC U*STAR trainee. The goals of the MARC U*STAR program include training students to become critical thinkers, capable researchers, and future scientists, as well as develop a culture of excellence and community in undergraduate research at URI. Acceptance into the MARC U*STAR program is competitive and trainees are well-prepared to begin research. During the fall semester, Christina participated in "rotations," or trials periods, in multiple research laboratories to identify a scientific group to join for her undergraduate research. Christina ultimately chose to join the Ramsey laboratory; we are extremely pleased to welcome her to our group and we are committed to helping her achieve her research and training goals.

When discussing ongoing research in the Ramsey laboratory, Christina expressed interested in a project involving regulation of a gene important for virulence. Previous undergraduates and a graduate student had all made the same unusual observation about expression of this virulence protein, bS21-2. Specifically, in mutant cells that lack bS21-2, there is an increase in the mRNA coding for the bS21-2 protein. This is not surprising, as there are well-established mechanisms for proteins to control their own expression and, when protein levels are low, to increase protein production. What was unexpected is that this increase in mRNA abundance does not lead to corresponding increases in protein abundance. This suggests that other regulatory factors are controlling translation of this mRNA into protein. These are the first studies to examine what controls production of this specific virulence protein in *F. tularensis* and, since Christina is interested in regulation of virulence, she became interested in this unusual mechanism of regulation. Given her interest in understanding why more of this specific mRNA doesn't necessarily lead to more protein, her project goal will be to use a straightforward genetic screen to identify factors limiting translation of this mRNA. It is exciting to me that she is interested in this topic because her work will provide insight into regulation of translation in the human pathogen *F. tularensis*, an understudied topic, and particularly into regulators of translation that could significantly impact virulence. I enthusiastically support the continued development and undertaking of her independent research project.

Together with my graduate students, I will supervise all the proposed work in this project to ensure safety, rigor, and reproducibility. The success of this project will be based on Christina's

ability to (i) learn and implement research protocols, (ii) critically analyze the resulting data, (iii) make connections between the resulting data and the current scientific literature, and (iv) effectively communicate research findings, both within and outside our research group.

Christina is an outstanding student with great enthusiasm for laboratory research. Her undergraduate research experience in my laboratory, including the exciting work proposed here, will prepare her to achieve her future goal of entering graduate school in biomedical research. She is extremely well-prepared to carry out the proposed experiments and I support her application for an undergraduate grant for original student research without reservation and with enthusiasm.

Sincerely,

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University of Rhode Island
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