

Kyle Morrison
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Education

Dartmouth College, Hanover, NH
Graduate Student, Molecular and Cellular Biology
Worcester Polytechnic Institute, Worcester, MA
Bachelor of Science in Biochemistry with High Distinction, May 2017

Publications

1. Liu, P., Luk, K., Shin, M., Idrizi, F., Kwok, S., Roscoe, B., Mintzer, E., Suresh, S., **Morrison, K.**, Frazao, J.B., Bolukbasi, M.F., Ponninselvan, K., Luban, J., Zhu, L.J., Lawson, N.D., Wolfe, S.A. 2019. Enhanced Cas12a editing in mammalian cells and zebrafish. *Nucleic Acids Res.* 47 (8): 4169-4180. doi: 10.1093/nar/gkz184, PMID: PMC6486634
2. Pittala, S., **Morrison, K.S.**, Ackerman, M.E. 2019. Systems serology for decoding infection and vaccine-induced antibody responses to HIV-1. *Curr Opin HIV AIDS*. Epub ahead of print. doi: 10.1097/COH.0000000000000558, PMID: 31033729.

Research Experience

Application of Statistical Analysis and Machine Learning Methods to HIV Vaccine Trial Data, Dartmouth College, Winter 2018-Ongoing, Margaret Ackerman

Taking advantage of the wealth of data generated by other research groups heading HIV vaccine trials in both humans and non-human primates, I am investigating the humoral immune response characteristics that are associated with protection from HIV challenges. By leveraging a growing understanding and strength with the R programming language, as well as continued development in biostatistics, I hope to define trends among subjects that respond well to treatment in order to inform future treatment development efforts.

Analysis of the Overlap Between TERMS and Antigen B-Cell Epitopes, Department of Computer Science, Dartmouth College, Fall 2018, Gevorg Grigoryan

Building on the Grigoryan lab's Tertiary structural Motifs (TERM) hypothesis for three-dimensional protein structure, I was tasked with studying the surface of antigenic proteins to determine what relationship might exist between protein surface TERMS and the location of B-cell epitopes. I gained practical experience with the C++ programming language, the Protein Data Bank (PDB) on a database and file level, and with the process of learning proprietary software libraries.

Network-Based Identification of Cancer-Associated miRNAs, Norris Cotton Cancer Center, Dartmouth Hitchcock Medical Center, Winter 2017-2018, Chao Cheng

Using computational approaches combined with public and proprietary data sets, I sought to predict the likelihood of associations between different microRNAs and cancers. By taking advantage of the scientific toolset in the R programming language libraries, I generated refined data sets and built regression models to identify miRNAs that are statistically relevant to patient survival. I delivered a presentation to the research group summarizing my methodology and findings.

CRISPR/Cas9 High-Throughput Screen Development, Thayer School of Engineering, Dartmouth College, Fall 2017, Karl Griswold

Following the groundwork laid in previous studies, I sought to establish a high-throughput functional screening system for CRISPR/Cas9 mutants. Through the use of standard molecular biology techniques (PCR, bacterial transformation, restriction cloning), I generated *Escherichia coli* strains that expressed Cas9 and made use of this enzyme to survive antibiotic challenge. This system will serve as a starting point for future Cas9 engineering and research. My work was compiled into a technical paper and I delivered a presentation summarizing my efforts.

CRISPR/Cpf1 Gene Regulation Studies, University of Massachusetts Medical School, Academic Year 2016-2017, Scot Wolfe

I investigated the CRISPR/Cpf1 system's effectiveness as a platform for gene regulation in mammalian cells. Through PCR-based mutagenesis and cloning methods, I built nuclease-dead mutants of Cpf1 and designed Cpf1-repressor/activator fusion proteins. These tools were subsequently used to target a cell marker *in vitro* for regulation. I made use of techniques similar to those used in previous research studies (cell culture, flow cytometry, immunofluorescence, western blotting) to address this question. At the end of the academic year, I presented my findings in a technical research paper and at a poster session.

Honors

Dartmouth MCB Fellowship Award, Fall 2017

Provost's Major Qualifying Project Award in Biochemistry, Spring 2017

Dean's List, Worcester Polytechnic Institute, Fall 2015-Spring 2017

Charles O. Thompson Scholar, Worcester Polytechnic Institute, 2014

Dean's List, Worcester Polytechnic Institute, Fall 2013-Fall 2014

References

Available upon request