**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Matthew Begley

eRA COMMONS USER NAME (credential, e.g., agency login): M_BEGLEY

POSITION TITLE: Graduate Research Assistant

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| Juniata College Huntingdon, Pennsylvania | B.S. | 05/2012 | Biology, secondary in History |
| University of North Carolina Chapel Hill, North Carolina | Ph.D. | 09/2024 (expected) | Biochemistry and Biophysics |

**A. Personal Statement**

Three letters have always plagued me. One of the most basic words in the English language holds so much power over my thoughts and actions. “Why?” This innocuous question is one of the most terrifying inquiries to hear as a student, and to a professional scientist, it holds even more significance. How is it that three letters can wield such power and be the initial inquisition of anything from malevolence to the most innocent of intentions? Curiosity is a powerful driver and has always been a motivating factor in my life. “Why,” is the first question consistently asked when pertaining to my actions, from both myself and others. Famed mountaineer, George Mallory, was once asked why he was attempting to climb Mount Everest and supposedly responded, “Because it’s there.” To me, that quotation perfectly summarizes why humans should be interested in the biology of the world around us. If humans are to cohabitate with our planet, and not merely dominate it, we must better understand the dynamics of the biotic portion of the world. To me the question of why do I want to study Biology has never been a difficult question to answer, but difficult to convey aptly: because it fascinates me.

Research offers the unique ability to be on the edge of the known and the unknown. It is faced with exclusive challenges and circumstances that can only be experienced and resolved in the pursuit of knowledge. This is what drives and compels me. My career path has been circuitous, experiencing and training across many different disciplines, but I believe this broad range of experience has strengthened my professional development, and has made me a well-rounded scientist. I love incorporating several different aspects of my training and experience from different fields in my research. More frequently than not, I enjoy connecting the larger goals of my research projects to the broader context. This has led to a somewhat “systems biology” approach to how I conduct my experiments and research. My passion and my drive for investigating mechanisms of biology have propelled me to studying biochemistry, and in particular structural biology. Being able to understand, at a molecular level, how biological machinery functions is fascinating in and of itself; but being able to take that knowledge and zoom out to the macro-level causes me to think: “why?” How can something on the scale of atoms influence something one the scale of human beings? That is why I enjoy the rigors of research.

## B. Positions and Honors

### Positions

| | |
|---|---|
| 2019 – Present | Graduate Research Assistant, UNC Chapel Hill |
| 2020 | Teaching Assistant, UNC Chapel Hill |
| 2017 – 2019 | Laboratory Manager, UNC Chapel Hill |
| 2016 – 2017 | Research Assistant, UNC Chapel Hill |
| 2015 – 2016 | Biologist, American Type Culture Collection |
| 2010-2012 | Teaching Assistant, Juniata College |

### Honors

| | |
|---|---|
| 2009-2012 | Graduate of Distinction in Biology; Juniata College |
| 2011 | First Class Honors in Microbiology; Trinity College Dublin |
| 2011 | Beta Beta Beta; Biological Honors Society |
| 2011 | Best Presentation in Section; 3rd Annual Landmark Summer Research Conference |
| 2009-2010 | American Red Cross Educational Scholarship Recipient |
| 2009-2012 | Juniata College Calvert Ellis Scholarship |
| 2007-2009 | Advanced Placement (AP) National Scholar |
| 2009 | Dean's List; Pennsylvania State University |
| 2009 | Eagle Scout, Boy Scouts of America |

## C. Contributions to Science

Publications

Gallichotte et al.2019. *Role of Zika virus envelopeprotein domain III as a target of humanneutralizing antibodies*. mBio 10:e01485-19 (2019) <https://doi.org/10.1128/mBio.01485-19> **2019**

Gorman, et al. *Host and Genetic Viral Adaptations enable Development of an Immunocompetent Mouse Model of Zika Virus Infection.* Cell Host and Microbe. 23.5 (2018) 672-685.e6. <https://doi.org/10.1016/j.chom.2018.04.003> **2018**

Widman, et al. *Transplantation of a Quaternary Structure Neutralizing Antibody Epitope From Dengue Virus Serotype 3 into Serotype 4.* Scientific Reports, 7.1 (2017). 17169 <https://doi.org/10.1038/s41598-017-17355-5> **2017**

Manvilla, et al. *Crystal Structure of Human Methyl-Binding Domain IV Glycosylase Bound to Abasic DNA.* Journal of Molecular Biology 420.3 (2012): 164-175. <https://doi.org/10.1016/j.jmb.2012.04.028> **2012**

Patents

USPTO App# US 2019/0023745 A1 "Methods and compositions for Zika virus vaccines"

WIPO (PCT) PO# WO2018217906A1 "Methods and compositions for dengue virus serotype 4 epitopes"

## D. Additional Information: Research Support and/or Scholastic Performance

University of North Carolina

**Graduate Student: Department of Biochemistry and Biophysics** **2019 – Present**

**Laboratory Manager: Henrik Dohlman, PhD** **2018 – 2019**

- Responsible for maintenance of laboratory equipment and facilities
- Assist in troubleshooting efforts of experiments performed by lab members
- Responsible for safety procedure and policy adherence and compliance

- Oversee and perform training of graduate and undergraduate students

**Laboratory Manager: Nikolay Dokholyan, PhD** **2017 – 2018**

- Primary point-of-contact for all university related operations related to the laboratory
- Oversaw and taught rotation graduate students in a variety of molecular and biochemical techniques
- In charge of training undergraduates in basic laboratory techniques and project assignments
- Served laboratory members in project development and troubleshooting
- Prepared and oversaw procedures for laboratory's closing and transition to different institution

**Research Assistant: Ralph Baric, PhD** **2016 – 2017**

- Designed, engineered, and developed reverse genetics systems of recombinant Flaviviruses
- Performed varying experiments ranging from molecular design through biochemical characterization of live Flaviviruses
- Certain viral infectious clones awarded patent protection (USPTO App#16/040267)

American Type Culture Collection

**Associate Biologist: Department of Bacteriology, Mycology, and Protistology** **2015 – 2016**

- Laboratory Testing Services; Departments of Bacteriology and Mycology
- Performed quality review of bacterial and mycological samples and products
- Experience handling, culturing, and characterizing environmental and pathogenic microorganisms

University of Maryland, Baltimore

**GRA: Department of Microbiology and Immunology** **2012 – 2014**

- Performed and conducted independent Biochemical and Biophysical experiments and data analysis of microbial pathogenicity and immune-system regulatory signaling
- Experience in recombinant protein purification from molecular cloning through purification

**Intern: Alexander Drohat, PhD** **Summer 2011**

- Developed protocol for expression and purification of human DNA glycosylase, Methyl-CpG-Binding Domain 4 (MBD4)
- Characterized and analyzed initial kinetic and structural data of enzyme-product reaction
- Elucidated and published first x-ray crystal structure of MBD4-DNA complex (PDBID: 4DK9)

Juniata College

**Independent Student Researcher: John Matter, PhD** **2010-2012**

- Developed independent multidisciplinary investigations in environmental and agricultural toxicology as well as hyperbaric physiology
- Experimented with the basic techniques of histology from tissue perfusion through histochemical staining
- Conducted IRB approved physiological analysis of effects of extended exposure to hyperbaric environments

Johns Hopkins University

**Intern: J. Marie Hardwick, PhD** **Summer 2010**

- Investigated genetic diversity of the Yeast Knockout Library (YKO) using forward genetic analysis
- Performed assays, experiments, and data analysis independently

| YEAR | COURSE TITLE | GRADE |
|---|---|---|
| | UNIVERSITY OF NORTH CAROLINA CHAPEL HILL | |
| 2021 | Fundamentals of Cryo-EM | Pass |
| 2020 | Scientific Writing | Pass |
| 2020 | Rigor and Reproducibility | Pass |
| 2019 | Advanced Molecular Biology I | Pass |
| 2019 | Analysis in Biochemistry | High Pass |
| 2019 | Macromolecular Crystallography | High Pass |
| 2019 | Contemporary Topics in Phosphorylation | High Pass |
| 2019 | Macromolecular Interactions | Pass |
| 2019 | X-ray Crystallography | High Pass |
| 2019 | Origins of Life | High Pass |

Note: UNC graduate courses are graded as “High Pass,” “Pass,” “Low Pass,” or “Fail.”