NAME: Hayes, Sania

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EDUCATION/TRAINING *(Begin with bachelors 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 |
| --- | --- | --- | --- |
| University of California, Berkeley | BS | 05/2003 | Psychology |
| University of Vermont | PHD | 05/2009 | Experimental Psychology |
| University of California, Berkeley | Postdoctoral | 08/2013 | Public Health and Epidemiology |

**A. Personal Statement**

My academic training and research experience have provided me with an excellent background in multiple biological disciplines including molecular biology, microbiology, biochemistry, and genetics. As an undergraduate, I conducted research with Dr. Xavier Factor on the mechanisms of action of a new class of antibiotics. As a predoctoral student with Dr. Tanti Auguri, my research focused on the regulation of transcription in yeast, and I gained expertise in the isolation and biochemical characterization of transcription complexes. I developed a novel protocol for the purification of components of large transcription complexes. I was first author of the initial description of the Most Novel Complex. A subsequent first author publication challenged a key paradigm of transcription elongation and was a featured article in a major journal. During my undergraduate and graduate careers, I received several academic and teaching awards. For my postdoctoral training, I will continue to build on my previous training in transcriptional controls by moving into a mammalian system that will allow me to address additional questions regarding the regulation of differentiation and development. My sponsor Dr. I.M. Creative is an internationally recognized leader in the transcription/chromatin field and has an extensive record of training postdoctoral fellows. The proposed research will provide me with new conceptual and technical training in developmental biology and whole genome analysis. In addition, the proposed training plan outlines a set of career development activities and workshops – e.g. grant writing, public speaking, lab management, and mentoring students – designed to enhance my ability to become an independent investigator. My choice of sponsor, research project, and training will give me a solid foundation to reach my goal of studying developmental diseases in humans. During my second postdoctoral year in Dr. Creative’s lab, my father had a severe stroke that eventually ended his life. I was out of the lab for six months dealing with my father’s incapacitating illness and end-of-life issues. This hiatus in training reduced my scientific productivity. I am confident this proposed research project and training plan will enhance my scientific portfolio and will help recuperate my scientific productivity. My long-term research goals involve becoming an independent researcher and developing a comprehensive understanding of key developmental pathways and how alterations in gene expression contribute to human disease.

* 1. **Hayes S**, Schneider K, Chen M, Auguri T. Rapid isolation and characterization of a novel transcription complex in Saccharomyces cerevisiae and its role in transcription elongation. Journal of Cell Biology. 2016; 128:770.
  2. **Hayes S**, Auguri T. A tandem affinity purification tag approach allows for isolation of interacting proteins in Saccharomyces cerevisiae. Proceedings of the National Academy of Sciences of the United States of America. 2019; 98:151.
  3. Yao M, Dionne CF, **Hayes S**, Murray GC. Up-regulation of Drosophila innate immunity genes in response to stress. Science (New York, N.Y.). 2020; 304:1754.
  4. **Hayes S**, Cescaloo Q, Murray GC. Structural analysis of Drosophila Rtc. Nature. Forthcoming 2021.

**B. Positions, Scientific Appointments, and Honors**

**Positions and Scientific Appointments**

2019 – Present Postdoctoral Researcher, Michigan State University

2015 – 2018 Predoctoral Fellowship for Minorities, Ford Foundation

2013 – 2019 Graduate Research Assistant, Georgetown University

2012 – Present Member, National Society for Bioinformatics and Biotechnology

2010 – Present Member, Association for Women in Science

2010 – 2012 Engineer, The IBeam Group Program

2009 – Present Member, Sigma Xi

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| **Honors** |

2013 B.S. awarded with high honors, Wake Forest University

2013 Paula F. Laufenberg Award for best senior project in the Department of Engineering, Wake Forest University

2013 STAR award for public service in engineering, The IBeam Group

2010 – 2011 Scholarship, National Merit Scholarship Pr2009 – 2011 Scholarship, Daughters of Hawaii Society

**C. Contributions to Science**

1. **Early Career:** My early career contributions were focused on applying my knowledge of structural engineering to improving the design and integrity of tensile structures. More specifically, I worked with a team of engineers at the IBeam Group to develop concrete with a higher tensile strength that could be utilized in large structures such as suspension bridges. My particular role in the project was to identify candidate polymers, determine the ultimate tensile strength of these polymers, and make recommendations as to which polymer would afford concrete the most structural integrity under various stresses.
   1. **Hayes S**, Janessa AJ. Redesigning the Golden Gate bridge. National Undergraduate Symposium on Science and Engineering; 2011; Baltimore, MD.
   2. Lorentson C, **Hayes S**, Sauer N, Mehta S. Use of high-tensile concrete in cantilevered structures. J Applied Engineering. 2012; 63:413.
2. **Graduate Career:** My graduate research contributions focused on transcriptional gene regulation in Saccharomyces cerevisiae. Results from my research were highly relevant as they provided new details into the workings of complex biological systems and allowed for further extrapolations into the development of certain diseases and their progression. I originally developed a novel protocol for the purification of components of large protein complexes. A subsequent publication, in which I isolated and characterized a long sought-after transcription complex, challenged a key paradigm of transcription elongation and was a featured article in a major journal.
   1. **Hayes S**, Schneider K, Chen M, Auguri T. Rapid isolation and characterization of the most novel transcription complex in Saccharomyces cerevisiae and its role in transcription elongation. CSHL Meeting on Mechanisms of Eukaryotic Transcription; 2015 August; Cold Spring Harbor, NY.
   2. **Hayes S**, Schneider K, Chen M, Auguri T. Rapid isolation and characterization of a novel transcription complex in Saccharomyces cerevisiae and its role in transcription elongation. Journal of Cell Biology. 2016; 128:770.
   3. **Hayes S**, Auguri T. A tandem affinity purification tag approach allows for isolation of interacting proteins in Saccharomyces cerevisiae. Proceedings of the National Academy of Sciences of the United States of America. 2019; 98:151.
3. **Postdoctoral Career:** As a postdoctoral fellow, my research has provided a compelling link between mutations arising in stress response proteins and the development of various autoimmune diseases in humans. Previous studies have shown dysregulation in the innate immune response lead to autoimmune diseases in humans. A few Rtc homologues have now been identified in humans and appear to play a role in the regulation of genes in the innate immune response. My research is focused on the transcriptional regulator Rtc from Drosophila melanogaster.
   1. **Hayes S**, Yager LN, Murray GC. Rtc is an essential component of the Drosophila innate immune response. Genetics. 2019; 145:884.
   2. Yao M, Dionne CF, **Hayes S**, Murray GC. Up-regulation of Drosophila innate immunity genes in response to stress. Science. 2020; 304:1754.
   3. **Hayes S**, Murray GC. Stress, flies, and videotape: the Drosophila stress response. Annual review of physiology. 2020; 346:223.
   4. **Hayes S**, Cescaloo Q, Murray GC. Structural analysis of Drosophila Rtc. Nature. Forthcoming 2021.

Complete List of Published Work in My Bibliography:  
<https://www.ncbi.nlm.nih.gov/myncbi/1VgYzYESn3Nke9/bibliography/public/>

**D. Scholastic Performance**

| YEAR | COURSE TITLE | GRADE |
| --- | --- | --- |
|  | UC Berkeley |  |
| 2014 | Introductory Biology | A |
| 2014 | Introductory Biology Lab | A |
| 2014 | Foundations of Chemical Principles | A |
| 2014 | French and Francophone World | A |
| 2014 | Ethics, Religion, and Culture Today | A |
| 2015 | Organismal and Population Biology | B |
| 2015 | Omics | B |
| 2015 | First Year Seminar: Nation and Migration | A |
| 2015 | Statistics, Probability, and Reliability | A |
| 2015 | Calculus I | B |
| 2015 | General Physics I | B |
| 2015 | Introductory Chemistry | A |
| 2015 | Population & Ecol Genetics | A |
| 2015 | Organic Chemistry | B |
| 2016 | American Literature | B |
| 2016 | General Physics II | B |
| 2016 | Organic Chemistry II | B |
| 2016 | Microbial Pathogenesis and the Immune Response | A |
| 2016 | Introduction to Cognitive Science | A |
| 2016 | Self Defense | P |
| 2016 | Biological Chemistry | B |
| 2017 | Anthropology of Childhood and the Family | A |
| 2017 | Disease, Culture, and Society in the Modern World | A |
| 2017 | Intro to Psychology | A |
| 2017 | Health & Fitness Walking | P |
| 2017 | State & Local Govt | A |
| 2017 | Human Genetic20 | A |
| 2017 | Senior Project | A |
| 2017 | Bioinformatics | B |
| 2018 | Cell Biology | A |
| 2018 | Quantitative Analysis | B |
| 2018 | Quantitative Analysis Lab | A |
| 2018 | Physics in Modern Medicine | A |
| 2018 | Ethical Principles in Law and Economics | B |
| 2018 | Bowling | P |
| 2018 | Genomics and Systems Biology | A |
| 2018 | Senior Project | A |
|  | University of Vermont |  |
| 2018 | Seminar in Genetics | P |
| 2018 | Statistics for the Life Sciences | P |
| 2018 | Ethics in Biological Research | CRE |
| 2019 | Seminar in Physiology and Behavior | P |
| 2019 | Cancer Immunology | P |
| 2020 | Mechanisms of Cell Motility | P |
| 2020 | Biochemical Mechanisms of Cancer Cells | P |
| 2020 | Toxicology | P |
| 2020 | Physiology for the Molecular Biologist | P |

Except for the scientific ethics course, Vermont graduate courses are graded P (pass) or F (fail). Passing is C plus or better. The scientific ethics course is graded CRE (credit) or NC (no credit). Students must attend at least seven of the eight presentation/discussion sessions for credit.