BIOGRAPHICAL SKETCH

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NAME: Nicole A. Perry
eRA COMMONS USER NAME (credential, e.g., agency login)**: perryna**
POSITION TITLE: Graduate Student
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)	START DATE MM/YYYY	END DATE (or expected end date) MM/YYYY	FIELD OF STUDY
Wittenberg University, Springfield, OH	B.S./B.A.	08/2010	05/2014	Biology/Chemistry
Vanderbilt University, Nashville, TN	Ph.D.	08/2014	05/2019	Pharmacology

NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.

A. **Personal Statement**

Following graduation from Wittenberg University, I began my graduate studies at Vanderbilt University. After completing four rotations, I chose to pursue my thesis work in the Pharmacology Department under the co-mentorship of Dr. Gurevich and Dr. Iverson, whose labs I officially joined in April 2015. My chosen thesis research, which is to elucidate arrestin interactions with effectors, is based on evidence from both of my labs and current publications in the field. As a member of two labs, I am presented with the unique opportunity to approach my scientific questions from two angles: biochemical assays, which allow me to conduct studies of arrestin function, and X-ray crystallography, which I use to determine different arrestin complex structures. This arrangement enables me to develop novel functional experiments with the help of solved crystal structures, a process that usually requires extensive collaboration. It also exposes me to a wide variety of experimental techniques, which range from basic molecular and cell biology to advanced instrumental study. I believe that this gives me an advantage over other students because I have a greater understanding of the assays available to investigate scientific questions.

Publications

1. Chen, Q., Gilbert, N.C., **Perry, N.A.**, Berndt, S., Zhuo, Y., Vishniveteskiy, S., Klug, C.S., Gurevich, V.V., Iverson, T.M. 2015. The structure of activated arrestin3. Cell. Submitted.
2. Zhan, X., Stoy, H., Kauod, T.S., **Perry, N.A.,** Chen, Q., Perez, A., Els-Heindl, S., Slagis, J.V., Iverson, T.M., Beck-Sickinger, A.G., Gurevich, E.V., Dalby, K.N.,and Gurevich, V.V. 2015. Peptide mini-scaffolds facilitates JNK3 activation in cells. Scientific Reports. Revised and re-submitted.
3. Xu T, **Perry N,** Chauhan A, Sayler G, Ripp S. 2014. Microbial indicators for monitoring pollution and bioremediation, p.115-132. *In* Das S (ed.), Microbial Biodegradation and Bioremediation. Elsevier, New York, NY.

B. **Positions and Honors**

ACTIVITY/OCCUPATION	START DATE MM/YYYY	END DATE MM/YYYY	FIELD	INSTITUTION/COMPANY	SUPERVISOR/EMPLOYER
Undergraduate Research	08/2011	12/2011	Microbiology	Wittenberg University	Dr. Jay Yoder
Undergraduate Research	06/2012	12/2012	Organic Chemistry	Wittenberg University	Dr. Peter Hanson
Undergraduate Research	01/2013	12/2013	Developmental Biology	Wittenberg University	Dr. Michelle McWhorter
NSF REU	05/2013	08/2013	Microbial Ecology	University of Tennessee Knoxville	Dr. Gary Sayler/Dr. Steven Ripp
Graduate Research	09/2014	10/2014	Microbiology	Vanderbilt University	Dr. Jim Cassat
Graduate Research	11/2014	12/2014	Biological Sciences	Vanderbilt University	Dr. Jim Patton
Graduate Research	01/2014	Present	Pharmacology	Vanderbilt University	Dr. Vsevolod Gurevich/Dr. Tina Iverson

Academic and Professional Honors

AWARDS

2015 T32 Training Program in Pharmacological Science (training grant)
Second place oral presentation at the Vanderbilt Pharmacology Retreat
2014 Alternate for Fulbright U.S. Student Program Research Grant in Argentina
Mortar Board Fellow ($5,000 stipend)
James T. Gregory Award for Outstanding Research Potential ($400 stipend)
Summa Cum Laude
Dean's List
2013 Presidential Scholar (Top 13 of the class)
NSF Grant REU at the University of Tennessee Knoxville for Microbial Ecology
Recipient of the Outstanding Biology Student Award
Dean's List
2012 Omicron Delta Kappa Sophomore Involvement Award
Dean's List
2011 Alpha Lambda Delta Honor Society
Dean's List
2010 Kiwanis Club Scholarship ($4,000 stipend)
Rotary Club Scholarship ($500 stipend)
Wittenberg Scholar Award

SOCIETY MEMBERSHIPS

2015 American Association for the Advancement of Science (AAAS)
2013 Phi Beta Kappa (PBK)
University Honors Program
Departmental Honors in Biology
Omicron Delta Kappa (ODK)
Mortar Board Arrow and Mask chapter
2012 Beta Beta Beta Biological Honorary Society
2010 Alpha Lambda Delta Honor Society (ALD)

C. **Contributions to Science (for predoctoral students and more advanced candidates only; high school students, undergraduates, and postbaccalaureates should skip this section)**

1. Chen, Q., Gilbert, N.C., **Perry, N.A.**, Berndt, S., Zhuo, Y., Vishniveteskiy, S., Klug, C.S., Gurevich, V.V., Iverson, T.M. 2015. The structure of activated arrestin3. Cell. Submitted.

Although my co-mentorship affords me the opportunity to learn a number of experimental techniques, I realize that good science cannot be accomplished without strong scientific collaborations. In May I was given the opportunity to visit Georgia Regents University to learn a new scientific technique for my lab, indirect bioluminescence resonance energy transfer (BRET), from a leading expert, Dr. Nevin Lambert. I worked with Dr. Lambert to modify the technique for my laboratory and was able to use this method to functionally test the predictions of the crystal structure of IP6-activated arrestin-3 that Dr. Chen had determined.

2. **Perry, N.A.,** Gurevich, E.V., Stoy, H., Zhan, X., Chen, Q., Iverson, T.M. and Gurevich, V.V. N-terminal arrestin-3-derived peptide mini-scaffolds of the ASK1-MKK4/7-JNK3 cascade. In preparation.

I am currently in the process of writing a manuscript for work I completed during my rotation in the Gurevich lab. MAP kinase c-Jun N-terminal kinase 3 (JNK3) is the final effector in the ASK1-MKK4/7-JNK3 cascade, which is implicated in cellular development and apoptosis. Earlier studies have shown that both arrestin-2 and arrestin-3 bind all three kinases of the cascade; however, only arrestin-3 facilitates the activation of JNK3. This suggests that in addition to binding all components of a MAPK cascade, individual kinases must also assemble in optimal relative orientations on arrestin to permit activation. It was shown by the Gurevich lab that the first 25 amino acid residues of arrestin-3 (T1A) bind the complete JNK3 cascade and facilitate JNK3 activation in cells. I used shorter T1A-derived peptides to isolate the arrestin-3 residues that interact with individual kinases of the ASK1-MKK4/7-JNK3 cascade, and showed that a 16-residue peptide binds all kinases and facilitates JNK3 activation in cells.

3. Zhan, X., Stoy, H., Kauod, T.S., **Perry, N.A.,** Chen, Q., Perez, A., Els-Heindl, S., Slagis, J.V., Iverson, T.M., Beck-Sickinger, A.G., Gurevich, E.V., Dalby, K.N.,and Gurevich, V.V. 2015. Peptide mini-scaffolds facilitates JNK3 activation in cells. Scientific Reports. Revised and re-submitted.

My work with the arrestin-3-derived peptides (see above) also afforded me the opportunity to contribute to the original T1A paper. I used a series of pull-down assays to assess binding of the kinases MKK4 and MKK7 to wild-type arrestin-3, T1A, and B1A, arrestin-2-derived peptide homologous to T1A. I also contributed to the writing process of the manuscript as well as developed figures for the paper.

4. Prokop, S., Vishnivetskiy, S.A., **Perry, N.A.,** Hunyady, L., Iverson, T.M., and Gurevich, V.V. Differential manipulation of basal and agonist-induced arrestin-3 binding to GPCRs. Journal of Biological Chemistry. Submitted.

Even though I am still at an early stage in my career, I consider training the next generation of scientists very important. This summer in Dr. Gurevich's lab I supervised a medical student from Hungary, Susanne Prokop, who worked with me on a new assay for receptor specificity. This paper is the result of that mentorship, and is the first to use the new BRET technique that I learned and optimized for our laboratory.

5. Xu T, **Perry N,** Chauhan A, Sayler G, Ripp S. 2014. Microbial indicators for monitoring pollution and bioremediation, p.115-132. *In* Das S (ed.), Microbial Biodegradation and Bioremediation. Elsevier, New York, NY.

The summer before my senior year I was admitted into a competitive National Science Foundation funded Research Experience for Undergraduates (REU) program sponsored by the University of Tennessee Knoxville. I conducted research under Dr. Gary Sayler that focused on how temperature affects cold shock protein A (*cspA)* gene expression in the psychrotroph *Pseudomonas fluorescens* HK44, which was genetically engineered by the lab to bioluminesce upon exposure to naphthalene and can be used to monitor naphthalene biodegradation in the soil. An enhanced understanding of regulatory controls for the *cspA* genes allows for better risk assessment of introducing *P. fluorescens* HK44 into the environment. I found that shifts in temperature from 4°C to 28°C had an effect on the log phase gene expression of *cspA*1168, which indicated that the organism's optimal growth occurred at warmer temperatures. Throughout my research, I became acquainted with a new, more sophisticated array of instrumentation and techniques than I had previously known. I was able to publish the above review during my time in the laboratory as well as present a comprehensive honors thesis based on my work.

D. **Scholastic Performance**

S: C- through A+ inclusive

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
2010	Concepts of Biology I	A	2010	Introduction to Expository Writing	A
2010	Concepts of Biology Lab	S	2010	Artistic Excursions	A+
2010	Models of Chemical Systems	A	2010	Applied Viola	A
2010	Calculus I	S	2010	Chamber Orchestra	S
2010	Topics in Biology	S	2010	Themes-Traditions Literature	S
2011	Concepts of Biology II	A	2011	El Arte de la Traduccion	A
2011	Concepts of Biology Lab	S	2011	Social Dance	S
2011	Chemical Structure and Analysis	A	2011	Applied Viola	A
2011	Calculus II	A	2011	Community Service	S
2011	Developmental Biology	A+	2011	Serving and Support Child	A
2011	Biological Literacy	A	2011	Introduction to Psychology	A
2011	Organic Chemistry I	A	2011	Race, Gender, Science and Med	A
2012	Interm. Organic Chemistry	A-	2011	Chamber Orchestra	A
2012	Mechanics and Waves	A	2011	Applied Viola	A-
2012	Analytical Chemistry	A-	2012	Understanding Music	A
2012	Chemistry, Junior Seminar	A	2012	Chamber Ensemble	A
2012	Human Anatomy and Phys.	A	2012	Chamber Orchestra	A
2012	Introductory Electromagnetism	A	2012	Japanese Women's Literature	A
2012	Independent Research	A	2012	Applied Viola	A
2013	Chemistry, Junior Seminar	A	2012	Chamber Orchestra	A
2013	Microbiology	A	2013	Weight Training	S

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
2013	Directed Research	S	2013	Elementary Music Theory	A
2013	Chemistry, Senior Seminar	A	2013	Chamber Orchestra	A
2013	Thermodynamics and Kinetics	A-	2013	Sexuality/Athleticism Ancient Greek	A+
2013	Honors Thesis/Project	A	2013	Applied Viola	A
2013	Principles of Biochemistry	A	2013	Beatles and Their Predecessors	A
2014	Senior Capstone	A+	2013	Applied Viola	A
2014	Statistics	A	2013	Chamber Orchestra	A
2014	Chemistry, Senior Seminar	A	2014	History of Western Music	A
2014	Bioregulation I	A	2014	El Mundo Fisico	A
2014	Non-candidate Research	S	2014	Applied Viola	A
2015	Introduction to Modern Bio Microscopy	A	2014	Chamber Orchestra	A
2015	Special Topics in Cell Biology	A			
2015	Bioregulation II	A-			
2015	Non-candidate Research	S			
2015	Receptor Theory Cell Surface	A			
2015	Pharm 320A	A			