BIOGRAPHICAL SKETCH

NAME: Roy, Raktim

eRA COMMONS USERNAME (credential, e.g., agency login): RROY17

POSITION TITLE: Scripps Fellow (Early Independence Investigator)

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
Presidency College, Kolkata, India	BS	07/2010	Chemistry
Tata Institute of Fundamental Research, Mumbai, India	MS	08/2013	Biology
Yale University, New Haven, USA	MS	05/2015	Structural Biology
Yale University, New Haven, USA (Prof. T. Steitz)	PHD	05/2019	Structural Biology
Oak Ridge National Laboratory, USA (Dr. Leighton Coates)	NA	09/2019	Structural Biology
Scripps-Fellow (PI) The Scripps Research Institute, Florida, USA	NA	Present	Structural Biology

A. PERSONAL STATEMENT

I am the Principal Investigator of this project. I qualify as NIH New/Early-Stage Investigator.
I was trained as chemistry major during my baccalaureate degree at the Presidency College of Kolkata, Calcutta University, India. Following my undergraduate degree, I moved to Tata Institute of Fundamental Research, India; the premier research institute of India, which fosters research in basic science. I was one of the eight students selected from a pool of thousands for a master's degree program through research. My scientific career has been focused on studying protein structure and function for the past ten years with a heavy focus on structural characterizations of peptide-synthesizing machineries. As a graduate student at Yale University, I worked with Nobel-laureate Prof. Thomas Steitz and was involved in the ground-breaking work on anti-microbial peptides and elucidation of their mechanism of action. Prof. Steitz's untimely death in 2018 led to a cascade of project freezes with two of the publications still stuck in pipeline from my graduate work. After graduating from Yale University, I joined the Neutron Sciences Division in Oak Ridge National laboratory (ORNL) to work with Dr. Leighton Coates. Within 2 months of my position at ORNL, I solved a structure of the complex of Na-K ion channel bound to its ligands which was published in *IuCR-J*. I was able to explain the nature of structural plasticity in the selectivity filter which created a foundation for my innovation and independent work on understanding allosteric regulation in Non-Ribosomal Peptide Synthetases (NRPS). I was offered to join Scripps-Florida, as an Independent PI, 3 months after my graduation from Yale while I was a Fellow at ORNL. I accepted the independent Scripps Fellow position as a junior faculty and started with my independent Laboratory in Sept 2019. In the last 2 years at Scripps, I have built my research team with a talented female graduate student, 1 outstanding post-doctoral associate with years of expertise in enzymology and several visiting interns from ORNL, Yale and other premier institutes. My current research is focused on understanding the catalytic and allosteric mechanisms regulating the NRPS enzymes with the vision of building structure-dependent novel enzymatic scaffold. My team is intricately involved in solving structures through conventional X-ray crystallography as well as Cryo-Electron Microscopy while performing parallel characterizations through other biophysical and biochemical techniques. Even during the course of a global

pandemic, I have maintained a constant productivity of publications every year which are cited in a list below in section C under 'Contributions to Science'.

Ongoing Research Support

Scripps Fellow Start-Up (Dr. Raktim Roy) 09/16/2019 – present
Title: *Structural and Mechanistic studies on the macromolecular complexes of Non-Ribosomal Peptide Synthetases.*
The goal of this program is to determine and characterise the catalytic as well as regulatory mechanisms associated with high-fidelity enzymatic functions of Non-Ribosomal Peptide Synthetases and other assembly-line enzyme complexes.
Role: PD/PI

Completed Research Support

None

B. Positions, Scientific Appointments, and Honors

POSITION and EMPLOYMENT

2019-Present Scripps Fellow and PI, Department of Integrative Structural and Computational Biology, Scripps Florida, USA
2019 Short-Term Research Fellow with Dr. Leighton Coates, Neutron Sciences Division, Oak Ridge National Laboratory, USA
2013-2019 Graduate Researcher with Prof. Thomas A. Steitz, Department of Molecular Biophysics and Biochemistry, Yale University, USA
2010-2013 Master's Researcher with Dr. Shobhona Sharma, Tata Institute of Fundamental Research, Mumbai, India
2007-2010 Undergraduate Researcher at Presidency College, Calcutta University, India

AWARDS and HONORS

2019-Present Scripps Fellow, Department of Integrative Structural and Computational Biology, Scripps Florida, USA
2017 Chapter Officer of Yale University of EAM Honor Society
2017 Poster Winner: EAM Honor Society IVY STAR Competition Epsilon Alpha Mu Honor Society, Columbia University
2016 Outstanding Travel Bursary Australian Microscopy and Microanalysis Society, Melbourne, Australia
2016 Sigma-Aldrich Alfred R. Bader Student Innovation Award, USA – Biochemistry and Biophysics Category, Milwaukee, Wisconsin

PRESENTATIONS and INVITED SEMINARS

2019 Invited Seminar titled, "Translation Inhibition in Bacteria through Antimicrobial Peptides and Hibernation Factors" at the **77th Annual Pittsburgh Diffraction Conference**, ORNL, Oak Ridge, Tennessee
2019 Invited Seminar titled, "Structural Studies on the Regulation of Bacterial Translation" at **The University of Alabama in Huntsville**
2017 Poster Presentation: **67th Lindau Nobel Laureate Meeting** "Young Scientist" Participant, Lindau, Germany
2016 Poster Presentation: Mechanism of Inhibition of Protein Synthesis by Proline-Rich Antimicrobial Peptides. **Ribosome Structure and Function**, Strasbourg, France
2016 Speaker: Ribosome inactivating polypeptides and the conserved mechanism of inhibition, **24th Annual Conference on Microscopy and Microanalysis**, Melbourne, Australia
2012 Poster Presentation: Single Molecule Studies on Malarial Circumsporozoite protein. GRC on **Single Molecule Approaches to Biology**, Mt. Snow, Vermont, USA

Professional Membership

2019- Biophysical Society – www.biophysics.org
2019- International Union of Crystallography – www.iucr.org – IUCr ID: IUCr31057
2019- American Crystallographic Association – www.acas.memberclicks.net

C. Contributions to Science

1. **Training: Structural Biology and Biophysics.** My training as a graduate student was in the field of structural biology with Nobel Laureate Dr. Thomas A. Steitz at Yale University. I worked on several high-profile projects using crystallography to probe the canonical translation machinery; the ribosome. While in my second year as a graduate student I solved several structures of several antimicrobial peptides in complex with the bacterial ribosome, explaining a novel mode of translation inhibition.

    a. **Roy RN***, Lomakin IB*, Gagnon MG*, Steitz TA (2015). The mechanism of inhibition of protein synthesis by the proline-rich peptide oncocin. **Nat. Struct. Mol. Biol. 22**: 466–469.

    b. Gagnon MG*, **Roy RN***, Lomakin IB, Florin T, Mankin AS, Steitz TA (2016). Structures of proline-rich peptides bound to the ribosome reveal a common mechanism of protein synthesis inhibition. **Nucleic Acids Res.44**: 2439–2450.

2. **Training and Fellow Position at Oak Ridge National Laboratory:** After the sudden death of Prof. Steitz, I was hired as a Short-term Fellow at Oak Ridge National Laboratory where I worked with Dr. Leighton Coates for studying the selectivity filter in non-specific Na-K ion channels. I became interested in understanding the origin of substrate selectivity and solved a set of structures within my two months of tenure while I interviewed at Scripps Research Institute for Independent Fellow position. During this time, I also worked on a separate independent project, which identifies a novel fail-safe mechanism for the autocatalysis of Pistol ribozymes through in-silico molecular dynamics studies.

    a. **Roy RN***, Hendricks K, Kopec W, Abdolvand S, Weiss KL, de Groot BL, Lange A, Sun H, and Coates L. **(2021)**. Structural Plasticity of the Selectivity Filter in Nonselective Ion Channel. **IUCr-J.**

    b. Joseph NN*, **Roy RN*** and Steitz TA. **(2020)**. Molecular Dynamics Analysis of Mg2+-dependent Cleavage of Pistol Ribozyme Reveals Fail-safe Secondary Ion for Catalysis. **Journal of Computational Chemistry.** https://doi.org/10.1002/jcc.26179

3. **Independent Laboratory and Collaborative Works:** I have continued to mentor two students during this transitional period (Jake Sumner from Oak Ridge National Lab and Newlyn Joseph from UConn School of Medicine), and we have two manuscripts in the pipeline regarding substrate selectivity and NRPS regulations. I have also solved several Cryo-EM structures for factors explaining the mode of ribosome anchoring in stress dependent hibernating 70S. This manuscript is currently under preparation in collaboration with Dr. Bin Liu from the Hormel Institute in Minnesota. I have also been working on collaborative projects on molecular dynamics simulations and molecular docking.

    a. Joseph NN and Roy RN (Manuscript under revision) *pdbmine: A Node.js* API for the RSCB Protein Data Bank (PDB). https://arxiv.org/abs/1904.03801.

    b. **Roy RN***, and Liu B **(Manuscript in preparation)**. Cryo EM studies on YqjD bound to the 70S ribosome shows a novel paradigm of ribosome sequestration.

    c. Dobeen Hwang, Napon Nilchan, HaJeung Park, Raktim N. Roy, Terrence R. Burke, Jr., and Christoph Rader **(Submitted to Bioconjugate Chemistry)**. Sculpting a uniquely reactive cysteine residue for site-specific antibody conjugation.

Complete List of Published Work in My Bibliography:
https://pubmed.ncbi.nlm.nih.gov/?term=Roy.Raktim.N&sort=pubdate&size=20

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: Brittany Wheatley

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

POSITION TITLE: PhD Candidate, 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)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Maryland, College Park MD 20742	B.S.	August 2016	Neurobiology and Physiology, Biology (Minors: Physics, Astronomy)
Scripps Research Institute, Jupiter FL 33458 *PhD Candidate (August 2019-present)*			Structural Biology

A. Personal Statement

My previous experience in high-resolution light microscopy techniques (TIRF, iSIM), negative-stain EM (Tecnai TEM at MPFI) and cryo-EM (CryoARM300-GatanK3 at Scripps Florida) have made me familiar in working with different instruments and prepared me to make the most of new experiences in different types of microscopy. As a rising third year graduate student at Scripps Research, I have honed my skills in crystallography and recently begun training to begin implementing cryo-EM in my thesis research on non-ribosomal peptide synthetases (NRPS).

B. Positions, Scientific Appointments, and Honors

Positions

Department of Integrative Structural and Computational Biology, Scripps Research, Jupiter, FL
Graduate Student (PhD), 2019-present
Teaching Assistant (Molecular Biology), 2019-2020
Graduate Student Council (President), 2020-present

Institute for Physical Science and Technology, University of Maryland, College Park, MD
Post baccalaureate Research Assistant, Lab Manager 2016-2019
Supervisor: Arpita Upadhyaya, Dr./PhD.

Vitreous State Laboratories, Catholic University of America, Washington, DC
Summer Intern, Laboratory of Single-Molecule Biophysics*,* 2016
Supervisor: Abhijit Sarkar, Dr./PhD.

Honors
Skaggs Graduate Fellowship, 2019-present
CTW Foundation Fellowship for cryo-EM, 2021-present

C. Contributions to Science

Rey-Suarez, I., **Wheatley, B.A.,** Koo, P., Bhanja, A., Shu, Z., Mochrie, S., Song, W., Shroff, H., & Upadhyaya, A. (2020). WASP family proteins regulate the mobility of the B cell receptor during signaling activation. *Nature Communications*, *11*(1), 1–14. https://doi.org/10.1038/s41467-020-14335-8

Wagh, K., **Wheatley, B. A**., Traver, M. K., Hussain, I., Schaefer, B. C., & Upadhyaya, A. (2020). Bcl10 regulates actin dynamics at the T cell immune synapse. *Cellular Immunology*, 104161. https://doi.org/10.1016/j.cellimm.2020.104161

Rey I., Garcia D.A., **Wheatley B.A.**, Song W., Upadhyaya A. (2018) Biophysical Techniques to Study B Cell Activation: Single-Molecule Imaging and Force Measurements. In: Liu C. (eds) *B Cell Receptor Signaling. Methods in Molecular Biology*, vol 1707. Humana Press, New York, NY