**KEVIN ROSE**
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## RESEARCH INTERESTS

Structural Biology | Cryo- electron Tomography | Cell Biology | Molecular Biology | Neurodegenerative Diseases

## EDUCATION

GRADUATE - UNIVERSITY OF CALIFORNIA, BERKELEY — Aug 2020-2025
Doctor of Philosophy in Molecular and Cell Biology — GPA: 3.902

UNDERGRADUATE - UNIVERSITY OF MARYLAND, COLLEGE PARK — Aug 2014-May 2018
Bachelors of Science with High Honors in Cell Biology and Genetics — Science GPA: 3.514
Major: Microbiology; Minor: Technology Entrepreneurship — Overall GPA: 3.649

## EXPERIENCE

STANFORD UNIVERSITY, SCHOOL OF MEDICINE — Aug 2025-PRESENT
**Project Title: pH-Correlated ultrastructure of lysosomes**
*Dr. Peter Dahlberg, Professor of Structural Biology*

- Generated several biosensor cell lines in human cells for correlative cryo-ET experiments
- Developed protocols to perform correlative cryo-ET by integrating fluorescence-guided sample preparation with tomography
- Established sub-tomogram averaging pipelines for numerous endogenous protein complexes

**Significant Findings**: Contributed correlative cryo-ET data to a manuscript as second author

UNIVERSITY OF CALIFORNIA, BERKELEY — Aug 2020-2025
**Project Title: Ultrastructural characterization of damaged organelles by cryo-Electron Tomography**
*Dr. James Hurley, Kirsch Springer Chair in Biological Sciences and Professor of Cell Biology*

- Cultured and maintained immortalized cells and human primary astrocytes and neurons isolated from human brain
- Performed cryo-electron tomography on virus-infected cells
- Generated lamellae for tomography using fluorescence-guided cryo-FIB milling with immortalized and primary human cells
- Performed sub-tomogram averaging on native protein complexes

**Significant Findings**: 2 first author papers on cell responses to organelle damage and contributions to 6 additional manuscripts

NATIONAL INSTITUTES OF ALLERGY AND INFECTIOUS DISEASES INTRAMURAL RESEARCH TRAINING AWARD FELLOW — June 2018-2020
**Project Title: Characterization of a Novel Function of the HIV Restriction Factor TRIM5α**
*Dr. Vanessa Hirsch, Chief, Nonhuman Primate Virology*

- Cultured and maintained several different human and rhesus cell lines for DNA and RNAi transfections
- Harvested infectious virus from cell culture in a BSL-3 environment
- Prepared cell lysates and analyzed their protein expression via Western Blotting and Immunoprecipitation
- Amplified and isolated human and viral proteins from plasmid vectors
- Monitored human and viral protein activities using Immunofluorescence Assays and live cell imaging

**Significant Findings**: 4 manuscripts on the various roles of host proteins in HIV entry and release

UNIVERSITY OF MARYLAND, PATHOGEN RESEARCH INSTITUTE — Feb 2017-June 2018
**Project Title: Selection and Characterization of a Xeno-Nucleic Acid Aptamer that Binds HIV Integrase with Picomolar Affinity**
*Dr. Jeffrey DeStefano, Professor of Cell Biology and Molecular Genetics*

- Generated a random library of Xeno-Nucleic Acid using a multi-step PCR protocol
- Isolated short nucleic acids (aptamers) that bind HIV Integrase
- Determined dissociation kinetics of various aptamers to HIV proteins
- Characterized protein-nucleic acid interactions with various biochemical assays
- Cultured, maintained, and transfected TZM-bl HIV reporter cells

**Significant Findings:** 1 first author publication on Xeno-Nucleic Acid aptamers that bind to and inhibit HIV Integrase

CHILDREN'S NATIONAL MEDICAL CENTER, WASHINGTON D.C. June 2015-Feb 2017

**Project Title: Purification and Characterization of Bacterial Proteins that may Mitigate Human Genetic Diseases**

*Dr. Marshall Summar, Division Chief, Genetics and Metabolism* Sep 2016-Feb 2017

*Dr. Mendel Tuchman, Chief of Research* June 2015-Sep 2016

- Transformed bacteria for amplification and over-expression of recombinant plasmids
- Purified recombinant proteins via High Pressure Liquid Chromatography
- Elucidated Michaelis-Menten kinetics of multiple enzymes to characterize substrate affinities and velocities via colorimetric assays
- Assessed protein activity through Liquid Chromatography-Mass Spectrometry analysis of resultant products

**Significant Findings:** Successfully crystallized a novel bacterial transcarbamylase protein

## PUBLICATIONS AND PRE-PRINTS

- *Rose KM, Alves Ferreira-Bravo I, Li M, Craigie R, Ditzler MA, Holliger P, DeStefano JJ. Selection of 2'-Deoxy-2'-Fluoroarabino Nucleic Acid (FANA) Aptamers That Bind HIV-1 Integrase with Picomolar Affinity. ACS Chem Biol. 2019 Oct 18;14(10):2166-2175. doi: 10.1021/acschembio.9b00237*
- *Flower TG, Takahashi Y, Hudait A, Rose KM, Tjahjono N, Pak AJ, Yokom AL, Liang X, Wang HG, Bouamr F, Voth GA, Hurley JH. A helical assembly of human ESCRT-I scaffolds reverse-topology membrane scission. Nat Struct Mol Biol. 2020 Jun;27(6):570-580. doi: 10.1038/s41594-020-0426-4*
- *Rose KM, Hirsch VM, Bouamr F. Budding of a Retrovirus: Some Assemblies Required. Viruses. 2020 Oct 20;12(10):1188. doi: 10.3390/v12101188*
- *Rose KM, Spada SJ, Broeckel R, McNally KL, Hirsch VM, Best SM, Bouamr F. From Capsids to Complexes: Expanding the Role of TRIM5α in the Restriction of Divergent RNA Viruses and Elements. Viruses. 2021 Mar 10;13(3):446. doi: 10.3390/v13030446*
- *Rose, KM, Spada, S.J, Hirsch, V.M, Bouamr, F. When in Need of an ESCRT: The Nature of Virus Assembly Sites Suggests Mechanistic Parallels between Nuclear Virus Egress and Retroviral Budding. Viruses 2021, 13, 1138. https://doi.org/10.3390/v13061138*
- *Shukla S, Larsen KP, Ou C, Rose KM, Hurley JH. In vitro reconstitution of calcium-dependent recruitment of the human ESCRT machinery in lysosomal membrane repair. Proc Natl Acad Sci U S A. 2022 Aug 30;119(35):e2205590119. doi: 10.1073/pnas.2205590119*
- *Tudorica DA, Basek B, Puerto Cordova A, Khuu G, Rose KM, Lazarou M, Holzbaur ELF, Hurley JH. A Rab7A Phosphoswitch Coordinates Rubicon Homology Protein Regulation of PINKI/Parkin-Dependent Mitophagy. JCB. 2024 doi; 10.1101/2023.08.28.555228*
- *Rose KM, Jepson T, Shukla S, Maya-Romero A, Kampmann M, Xu K, Hurley JH. Tau fibrils induce nanoscale membrane damage and nucleate cytosolic tau at lysosomes. PNAS. 2024 doi: 10.1101/2023.08.28.555157*
- *Stephanie J. Spada, Kevin M. Rose, Paola Sette, Sarah K. O'Connor, Vincent Dussupt, V. Siddartha Yerramilli, Kunio Nagashima, Virginie Helle Sjoelund, Phillip Cruz, Juraj Kabat, Sundar Ganesan, Margery Smelkinson, Aleksandra Nita-Lazar, Forrest Hoyt, Suzanne Scarlata, Vanessa Hirsch, Sonja M. Best, Michael E. Grigg, Fadila Bouamr. Human ESCRT-I and ALIX function as scaffolding helical filaments in vivo. Biorxiv. 2024 doi: 10.1101/2024.05.01.592080*
- *Rose K, Herrmann E, Kakudji E, Lizarrondo J, Celebi A.Y, Wilfling F, Lewis S.C, Hurley J. In situ cryo-ET visualization of mitochondrial depolarization and mitophagic engulfment. Proceedings of the National Academy of Sciences. 2025 July 31; 122(31):-. Available from: https://www.pnas.org/doi/10.1073/pnas.2511890122 DOI: 10.1073/pnas.2511890122*
- *Herrmann E, Rose K, Hurley J. Matters Arising: Forced Symmetry Artifacts in a Prohibitin Complex Structure. Biorxiv. 2025 doi: 10.1101/2025.05.16.653159*
- *Herrmann E, Tan S, Rose KM, Hooy R, Hurley J. Structural Mechanism and Cellular Restriction of Tau Seeding from Endolysosomes. Biorxiv. 2026 doi: 10.64898/2026.06.08.731026*

## HONORS AND AWARDS

- *Molecular Biophysics Training Grant, University of California Berkeley* *2020-2022*
- *Intramural Research Training Award, National Institutes of Allergy and Infectious Diseases* *2018-2020*
- *High Honors in Cell Biology and Molecular Genetics, University of Maryland, College Park* *2018*
- Inducted into the American Society for Microbiology Honors Society (Sigma Alpha Omicron) 2018
- *Dr. Laffer Scholarship, University of Maryland, College Park* *2017*
- *Bright Futures Scholarship, University of Maryland, College Park* *2017*