Aaron C. Ehlinger, Ph.D.

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Career Profile

Versatile life scientist with research proficiency in protein biochemistry and biophysics.

- Expertise in biophysical protein characterization and ligand interactions.
- Improved yields and stability of protein targets though spectroscopic assays and rational engineering.
- Trained in business and management with project leadership responsibilities.
- Award-winning, highly collaborative scientist lauded for scientific innovation and communication.

Research Experience

Postdoctoral Research Fellow – Vanderbilt University, Nashville, TN, (2013-present)
Department of Biochemistry; Center for Structural Biology

- Applied structural and biophysical tools to characterize protein complexes with diverse ligands.
- Developed processes for expression and purification of 11 proteins with 50+ variants, ranging from stable high-throughput antibodies to challenging biomolecular complexes.
- Improved efficiency of 6 unoptimized protein production methods resulting in 3-20x yield gains.
- Led discovery project to characterize molecular mechanisms of proteins involved in genome maintenance.
- Trained and managed laboratory activities of 2 doctoral students and a research technician.
- Advised 2 drug discovery teams on fragment-based screening of oncology targets.
- Awarded $1.4M of external grant funding with $165,000 for direct compensation.
- Collaborated with over 9 research groups resulting in peer-reviewed manuscripts with 4 groups.

Graduate Research Assistant – University of Minnesota, Minneapolis, MN, (2008-2013)
Department of Biochemistry, Molecular Biology & Biophysics

- Characterized the structure, dynamics, and ligand interactions of 9 proteasome and ubiquitin-related proteins resulting in 4 high impact publications.
- Resolved complex interactions to generate data-driven computational models of protein allostery.
- Engineered rational mutations to adjust protein dynamics and folding.
- Operated high-field Nuclear Magnetic Resonance spectrometers (up to 900 MHz) with state-of-the art pulse programs and sample labeling technologies.
- Collaborated with two groups at Harvard Medical School to identify mutant phenotypes and verify structure-function relationships.

Research Assistant – Northwestern University, Evanston, IL, (2003-2007)
Department of Biochemistry, Molecular Biology, & Cell Biology

- Investigated the enzymatic mechanism of a helicase protein with ribosomal RNA.
- Expressed and purified 10 protein variants along with substrate components.
- Analyzed protein binding affinities, enzyme activities, and stoichiometry with RNA ligands.
- Managed inventory of laboratory reagents and processed requisitions.

Education

Ph.D. University of Minnesota, Minneapolis, MN (2013)

- College of Biological Sciences; Major: Biochemistry, Molecular Biology & Biophysics
- Received 4 competitive awards for innovative protein chemistry research, publications, and teaching.

B.A. Northwestern University, Evanston, IL (2007)

- Weinberg College of Arts and Sciences; Majors: Biological Sciences, Mathematics

Technical Skills

Biophysical Characterization

- Nuclear Magnetic Resonance Spectroscopy (NMR)
- Negative-stain Electron Microscopy (EM)
- Small Angle X-ray Scattering (SAXS)
- Crystallization Screening
- Isothermal Titration Calorimetry (ITC)
- Circular Dichroism (CD)
- Dynamic Light Scattering (DLS)
- Computational Modeling and Bioinformatics

Protein Design and Production

- Recombinant Protein Expression
- E. Coli Bacterial Fermentation
- Insect Cell and Baculovirus Culture
- Molecular Cloning and Mutagenesis
- Automated Liquid Handling Robotics
- Affinity, IEX, and Size Exclusion Chromatography
- AKTA FPLC Purification
- Semi-preparative HPLC of peptides
- Dialysis and Lyophilization
- Solubility and Aggregation Screening

Biochemistry and Enzyme Assay Development

- Labeling with Fluorescent and Paramagnetic Tags
- Labeling with Stable and Radioactive Isotopes
- Fluorescence Anisotropy Polarization
- Enzyme Catalysis Activity Assays
- SDS-PAGE, EMSA, and Western Immunoblot
- Size-resolved Light Scattering (SEC-MALS)

Business Credentials

Management and Business Principles for Scientists (2016)
Training module through Vanderbilt University providing didactic lectures on management concepts and a team-based project to generate implementable business plans for a Vanderbilt research core facility. Placed 1st among 6 groups and was featured in a *Science* careers article. (doi: 10.1126/science.opms.r1600168)

TechVenture Challenge (2016)
Technology commercialization competition to research and generate an investor pitch from recently patented Vanderbilt intellectual properties, providing mentored training for entrepreneurship. Placed runner-up in the final pitch competition.

Scientific Communication

Selected Publications (6 published, 2 in press, 1 submitted, 1 in preparation)

- Guilliam, T.A.*, Brissett, N.C.*, **Ehlinger, A.***, Keen, B.A., Taylor, E., Kolesar, P., Bailey, L.J., Lindsay, H., Chazin, W.J., Doherty, A.J. Molecular basis for PrimPol recruitment to replication forks by RPA. (2017) *Nature Communications.* [in press] **(*equal contribution)**
- O'Brien, E., Holt, M.E., Thompson, M.K., Salay, L.E., **Ehlinger, A.C.**, Chazin, W.J., Barton, J.K. The [4Fe4S] cluster of human DNA primase functions as a redox switch using DNA charge transport. (2017) *Science*. Feb 24; 355 (6327): 813.
- **Ehlinger, A.** and Walters, K.J. Structural insights into proteasome activation by the 19S regulatory particle. (2013) *Biochemistry.* May 28; 52 (21):3618–3628.
- **Ehlinger, A.**, Park, S., Fahmy, A., Lary, J.W., Cole, J.L., Finley, D., Walters, K.J. Conformational dynamics of the Rpt6 ATPase in proteasome assembly and Rpn14 binding. (2013) *Structure*. May 7; 21 (5):753-765.
- Zhang, N.*, Wang, Q.*, **Ehlinger, A.***, Randles, L.*, Lary, J.W., Kang, Y., Haririnia, A., Cole, J.L., Fushman, D., Walters, K.J. Structure of S5a:K48 linked diubiquitin and its interactions with Rpn13. (2009) *Molecular Cell*. Aug 14; 35 (3):280-290. **(*equal contribution)**

Selected Research Presentations (from 17 seminars and posters)

- Nucleic Acids Chemical Biology Meeting, Vanderbilt University, TN (2015)
- Invited Speaker for Biophysics Seminar Series. University of Wisconsin-Milwaukee, WI (2013)
- International Conference for Magnetic Resonance in Biological Systems. Cairns, Australia (2010)

Teaching Experience

- Taught Physical Biochemistry-related lectures, workshops, and laboratory courses at 4 universities.

Scientific Journal Reviewing

- Peer reviewer for 4 high-impact scientific journals, including Nature Communications.