Di (Lydia) Li

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Summary

Highly motivated biochemist with expertise in enzymology, protein engineering, and structural biology, with strong application to bioanalytical method development

- Experienced in developing and optimizing complex enzyme assays with extensive experience in bacterial and mammalian cell culture, protein expression, and DOE-based bioassays and immunoassays
- Proficient in analytical techniques (UHPLC, HRMS, microscopy) for method development and structural-activity characterization and computational modeling
- Successfully managing multiple collaborative research projects while adapting to changing priorities and meeting critical deadlines
- Lead author and co-author on multiple high-impact research articles

Technical Skills

- **Biological:** Mammalian and bacterial cell culture, PCR, DNA and RNA isolation, mutagenesis, protein purification, affinity chromatography, ELISA, western blot, immunofluorescence, immunoprecipitation (IP), gel electrophoresis, enzyme kinetics, microscale thermophoresis (MST), fluorescence polarization (FP)
- **Analytical:** (SEC/AEX)-FPLC, RP-HPLC, LC-HRMS, MALDI-MS, top-down and bottom-up proteomics, hydrophilic interaction liquid chromatography (HILIC), UV-vis
- **Structural:** X-ray crystallography, Cryo-EM, single particle analysis, multi-body refinement
- **Statistical:** MATLAB, R, GraphPad Prism, Agilent MassHunter, DOE, ELN
- **Computational:** Sequence homology analysis (MEGA, Clustal, Cytoscape), Google Colab, CCP4, ChimeraX, PyMOL, Phenix, RELION, Coot, Autodock, Haddock, Alphafold, Adobe illustrator, Cyana

Education

Duke University – Durham, NC **2020 – 2025**

- Ph.D. student, Biochemistry

The Pennsylvania State University – University Park, PA **2016 – 2020**

- B.S. in Biology with Vertebrate Physiology Option
- Minor in Biochemistry and Molecular Biology

Professional Experiences

Graduate Research Assistant – Biochemistry, Duke University **2021 – Present**

- Structural and Mechanistic Characterization of MoaA and MoaC in Molybdenum Cofactor Biosynthesis
  Advisor: Dr. Kenichi Yokoyama
  - Engineered recombinant proteins and developed scaled-up purification protocol, achieving >99% purity via IMAC and AEX-FPLC
  - Discovered and improved the detection limit of novel covalent protein-small molecule conjugates
  - Developed reproducible HRMS-based methods to characterize and validate site-specific protein modifications
  - Solved the first protein-ligand co-crystal structure using X-ray crystallography in collaboration
  - Enhanced protein engineering through computational predictions (AlphaFold and AutoDock) and DOE-driven experimental validation using binding/kinetic assays (MST, FP, etc)
  - Optimized enzymatic reactions to maximize efficiency, developed novel compound purification methods, and identified new compounds and impurities using UV-vis, UHPLC, and HRMS
  - Served as liaison between crystallography, computational, and biochemistry teams to coordinate research efforts, ensuring alignment on project goals, timelines, and technical requirements

Graduate Rotation Student – Biochemistry, Duke University **2021**

- Functional characterization of lipid scramblase TMEM16F in angiogenesis
  Advisor: Dr. Huanghe Yang
    - Visualized scramblase activity through siRNA knockdown and immunofluorescence and cell-based assays, establishing TMEM16F's role in angiogenesis
- Identification of the Role of O-GlcNAcylation in Neurofilament-light Assembly
  Advisor: Dr. Michael Boyce
    - Optimized immunoprecipitation (IP) and Co-IP methods to enhance assay sensitivity and probe interaction between protein complexes in mammalian cells

Research Assistant – Biochemistry and Molecular Biology, The Pennsylvania State University **2018 – 2020**

- Structural reconstitution of Eukaryotic Ribonucleoprotein RNase MRP and RNase P
  Advisor: Dr. Andrey Krasilnikov
    - Computationally modeled protein-RNA Cryo-EM structures of RNase MRP and RNase P

Research Assistant – Shandong Provincial Qianfoshan Hospital, China **2016 – 2018**

- Functional study of CIZ1 expression in Hemangioma of the Tongue
  Advisor: Dr. Ju Liu
    - Performed cancer cell proliferation and migration assays to study the CIZ1 nuclear protein expression
    - Optimized Western blot and ELISA to quantify protein expression levels in cell lysate

Professional Development

OBGE Leadership and Management Training for Biomedical Scientists **2024**

- Completed a comprehensive biomedical leadership program covering professional identity, team dynamics, inclusive culture building, and influence strategies, applying these skills to enhance research collaboration and project management effectiveness

Pharmaceutical Regulatory Affairs Training Program **2023**

- Gained a comprehensive understanding of FDA regulatory frameworks for both drugs and medical devices, including development pathways, clinical study regulations, and submission protocols for IND/IDE applications

Certificate in College Teaching **2022 – 2024**

- Acquired advanced instructional skills through comprehensive pedagogical training, learning practices in teaching, educational technology integration, and reflective teaching approach

Dr. Kenichi Yokoyama's Laboratory – Duke University, Durham, NC **2022 – Present**

Laboratory Safety Coordinator & Chemical Hygiene Officer

- Documented SOPs and ensured laboratory compliance with safety regulations

Publications

1. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. Mechanistic Elaboration of MoaC Catalysis: Structural Evidence for Covalent Intermediates and Phosphate-Containing Modification. (*Manuscript in preparation*)
2. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. Cryptic Covalent Carbon Carrying Mechanism of Pterin Formation in Molybdenum Cofactor Biosynthesis. (*Manuscript under review in Nature Chemistry*)
3. Haoran Pang[1], **Di Li[1]**, Qinglin Wu, Pan Zhang, Weitao Yang, Alexey Silakov, Pei Zhou, Kenichi Yokoyama. Mechanism of controlled radical initiation in radical SAM GTP 3',8-cyclase. (*Co-first Author, Manuscript under minor revision in PNAS*)
4. Duc T. Huynh, Kalina N. Tsolova, Abigail J. Watson, Sai Kwan Khal, Jordan R. Green, **Di Li**, Jimin Hu, Erik J. Soderblom, Jen-Tsan Chi, Chantell S. Evans, Michael Boyce. O-GlcNAcylation regulates

neurofilament-light assembly and function and is perturbed by Charcot-Marie-Tooth disease mutations. *Nat Commun.* 2023 Oct 17. doi: 10.1038/s41467-023-42227-0.

5. Andrey S. Krasilnikov, **Di Li**, Hyunwook Lee, Carol Bator, Igor Berezin, Susan Hafenstein, Anna Perederina. Cryo-EM structure of catalytic ribonucleoprotein complex RNase MRP. *Nat Commun.* 2020 July 10. doi:10.1038/s41467-020-17308-z.
6. Kenichi Yokoyama, **Di Li**, Haoran Pang. Resolving the Multidecade-Long Mystery in MoaA Radical SAM Enzyme Reveals New Opportunities to Tackle Human Health Problems. *ACS Bio & Med Chem Au*. 2021 Dec 13. doi: 10.1021/acsbiomedchemau.1c00046.
7. Yue Wang, Xiaorui Li, Jiahao Zhang, Qiang Liu, Peng Gao, **Di Li**, Shijie Zhang, Ju Liu. CIZ1 Expression Is Upregulated in Hemangioma of the Tongue. *Pathol Oncol Res*. 2018 Nov 19. doi: 10.100227/s12253-018-0495-4.

Selected Conference Presentations

1. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. "Characterization of MoaC mechanism in Molybdenum cofactor biosynthesis." ***Gordon Research Conference***, Waterville Valley, NH (July 2024) [**Poster presentation**]
2. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. "Mechanistic and structural characterization of MoaC in Molybdenum cofactor biosynthesis." ***Annual Bruker/UNC Biosynthesis Symposium***, Chapel Hill, NC (August 2024) [**Oral presentation and received the talk award**]
3. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. "Discovery and characterization of MoaC mechanism in Molybdenum cofactor biosynthesis." ***Duke Biochemistry Retreat***, Wrightsville Beach, NC (October 2023) [**Oral presentation and received the talk award**]
4. **Di Li**, Maria A. Schumacher, Kenichi Yokoyama. "Characterization of MoaC mechanism in Molybdenum cofactor biosynthesis." ***Duke Biochemistry Retreat***, Wrightsville Beach, NC (October 2022) [**Poster presentation and received poster award]**

Leadership & Service

Duke Chinese Student and Scholar Association – Duke University, Durham, NC **2022 – 2024**
Event Manager & Chief Director

- Successfully managed large-scale community events with 500+ attendees

Biochemistry Graduate Student Council – Duke University, Durham, NC **2020 – 2021**
Treasurer & Secretary

- Managed council finances and maintained accurate records of all organizational meetings

Selected Honors and Awards

Bruker/NC Symposium 3-minute Thesis Award **2024**
Kamin Travel Award **2024**
Duke Graduate School Travel Grant **2024**
Department of Biochemistry, Duke School of Medicine 3 Min Thesis Award **2023**
Henry & Dorothy Lingle Kamin Endowment Poster Award **2022**
Christopher R. Dyckman and Susan Scotto Scholarship **2019 – 2020**
Anita M. Collins Undergraduate Student Research Fund **2019 – 2020**
Virginia L. Corson Heading Scholarship **2019 – 2020**