# James P. Lingford

Website: jameslingford.com
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## Education

02/2009 – 11/2012 **University of Western Australia**
B.Sc. (Hons) in Genetics

## Research positions

01/2023 – Present **Monash Biomedicine Discovery Institute**, VIC
Research Officer – Greening Lab
The structural biology of enzymes that extract energy from air

08/2016 – 08/2021 **Walter and Eliza Hall Institute of Medical Research**, VIC
Research Assistant – Goddard-Borger Lab
The structural biology of mucosal proteins and sulfoglycolysis

08/2015 **Children's Medical Research Institute**, NSW
Visiting Scientist – Host: Dr. Scott B. Cohen
Learning how to run a direct telomerase activity assay

02/2014 – 08/2016 **Harry Perkins Institute of Medical Research**, WA
Research Assistant – Rackham Lab
Designing PPR proteins for programmable nucleic acid binding

## Honours & awards

2024 Chemistry Biology Interface Horizon Prize: Rita and John Cornforth Award – Royal Society of Chemistry. *For developing an understanding of sulfosugar metabolism and the discovery of new enzymes and pathways of sulfur recycling.* [html]

2012 Honours stipend scholarship – ARC Centre for Plant Energy Biology, The University of Western Australia.

## Publications

### Journal Articles

18. Leung PM†, Grinter R, Tudor-Matthew E, **Lingford JP**, Jimenez L, Lee H-C, Milton M, Hanchapola I, Tanuwidjaya E, Kropp A, Peach HA, Carere CR, Stott MB, Schittenhelm RB, Greening C†. Trace gas oxidation sustains energy needs of a thermophilic archaeon at suboptimal temperatures. *Nature Communications*. **2024**. [html]

17. Arumapperuma T, Lee M, Sharma M, Zhang Y, Snow AJD, **Lingford JP**, Goddard-Borger ED†, Davies GJ†, Williams SJ†. Capture-and-release of a sulfoquinovose-binding protein on sulfoquinovose-modified agarose. *Organic & Biomolecular Chemistry*. **2024**. [html] [pdf]

16. Sharma M, Kaur A, Soler NM, **Lingford JP**, Epa R, Goddard-Borger ED, Davies GJ†, Williams SJ†. Defining the molecular architecture, metal dependence, and distribution of metal-dependent class II sulfofructose-1-phosphate aldolases. *Journal of Biological Chemistry*. **2023**. [html]

15. Snow AJD, Sharma M, **Lingford JP**, Zhang Y, Mui JWY, Epa R, Goddard-Borger ED, Williams SJ, Davies GJ†. The sulfoquinovosyl glycerol binding protein SmoF binds and accommodates plant sulfolipids. *Current Research in Structural Biology*. **2022**. [html]

14. Sharma M, **Lingford JP**, Petricevic M, Snow AJD, Zhang Y, Järvå MA, Mui JWY, Scott NE, Saunders EC, Mao R, Epa R, da Silva BM, Pires DEV, Ascher DB, McConville MJ, Davies GJ, Williams SJ, Goddard-Borger ED. Oxidative desulfurization pathway for complete catabolism of sulfoquinovose by bacteria. *Proceedings of the National Academy of Sciences*. **2022**. [html]

13. Mao R, Xi S, Shah S, Roy MJ, John A, **Lingford JP**, Gäde G, Scott NE, Goddard- Borger ED†. Synthesis of C-mannosylated glycopeptides enabled by Ni-catalyzed photoreductive cross-coupling reactions. *JACS*. **2021**. [html] [pdf]

12. Sharma M, Abayakoon P, Jin Y, Epa R, **Lingford JP**, Shimada T, Nakano M, Mui J, Ishihama A, Goddard-Borger ED†, Davies GJ†, Williams SJ†. The Molecular Basis of Sulfosugar Selectivity in Sulfoglycolysis. *ACS Central Science*. **2021**. [html]

11. Li J, Epa R, **Lingford JP**, Scott NE, Skonesczny D, Sharma M, Snow A, Goddard- Borger ED, Davies GJ, McConville MJ, Williams SJ†. A sulfoglycolytic Entner- Doudoroff pathway in *Rhizobium leguminosarum* bv. *trifolii* SRDI565. *Applied and Environmental Microbiology*. **2020**. [html]

10. Järvå MA, **Lingford JP**, John A, Scott NE, Goddard-Borger ED†. Trefoil factors share a lectin activity that defines their role in mucus. *Nature Communications*. **2020**. [html]

9. Järvå MA*, Dramicanin M*, **Lingford JP**, Mao R, John A, Jarman K, Grinter RW, Goddard-Borger ED†. Structural basis of substrate recognition and catalysis by fucosyltransferase 8. *Journal of Biological Chemistry*. **2020**. [html]

8. Sharma M, Abayakoon P, **Lingford JP**, Jin Y, Epa R, Goddard-Borger ED†, Davies GJ†, Williams SJ†. Dynamic structural changes accompany the production of dihydroxypropanesulfonate by sulfolactaldehyde reductase. *ACS Catalysis*. **2020**. [html] [pdf]

7. Zhang Y*, Mui J*, Arumaperuma T, **Lingford JP**, Goddard-Borger ED, White J, Williams SJ†. Concise synthesis of sulfoquinovose and sulfoquinovosyl diacylglycerides, and development of a fluorogenic substrate for sulfoquinovosidases. *Organic & Biomolecular Chemistry*. **2020**. [html] [pdf]

6. Abayakoon P, Ruwan E, Petricevic M, Christopher C, Mui J, van der Peet P, Zhang Y, **Lingford JP**, White J, Goddard-Borger ED, Williams SJ†. Comprehensive synthesis of substrates, intermediates and products of the sulfoglycolytic Embden-Meyerhoff-Parnas pathway. *The Journal of Organic Chemistry*. **2019**. [html] [pdf]

5. Abayakoon P*, Jin Y*, **Lingford JP**, Petricevic M, John A, Ryan E, Wai-Ying Mui J, Pires DEV, Ascher DB, Davies GJ†, Goddard-Borger ED†, Williams SJ†. Structural and biochemical insights into the function and evolution of sulfoquinovosidases. *ACS*

*Central Science*. **2018**. [html]

4. Spåhr H*, Chia T*, **Lingford JP**, Siira SJ, Cohen SB, Filipovska A, Rackham O†. Modular ssDNA binding and inhibition of telomerase activity by designer PPR proteins. *Nature Communications*. **2018**. [html]

3. Abayakoon P, **Lingford JP**, Jin Y, Bengt C, Davies GJ, Yao S†, Goddard-Borger ED†, Williams SJ†. Discovery and characterization of a sulfoquinovose mutarotase using kinetic analysis at equilibrium by exchange spectroscopy. *Biochemical Journal*. **2018**. [html]

2. Lopaticki S*, Yang ASP*, John A, Scott NE, **Lingford JP**, O'Neill MT, Erickson SM, McKenzie NC, Jennison C, Whitehead LW, Douglas DN, Kneteman NM, Goddard-Borger ED†, Boddey JA†. Protein O-fucosylation in Plasmodium falciparum ensures efficient infection of mosquito and vertebrate hosts. *Nature Communications*. **2017**. [html]

1. Coquille S*, Filipovska A*, Chia T, Rajappa L, **Lingford JP**, Razif MF, Thore S, Rackham O†. An artificial PPR scaffold for programmable RNA recognition. *Nature Communications*. **2014**. [html]

### Preprints

1. Kropp A*, Gillett GL*, Venugopal H, Gonzálvez MA, **Lingford JP**, Barlow CK, Zhang J, Greening G†, Grinter R†. Quinone extraction drives atmospheric carbon monoxide oxidation in bacteria. *bioRxiv*. **2024**. [html]

* *denotes equal contribution* | † *denotes corresponding author*

### In Popular Media

06/2024 Samorodnitsky D, Bird K, Carlson J, **Lingford J**, Phillips J, Sear R, Townsend C. Journals that published Richard Lynn's racist 'research' articles should retract them. *STAT*. [html]

## Conference poster presentations

02/2019 Structural, mechanistic, and evolutionary insights into sulfoglycolysis. *44th Lorne Conference on Protein Structure and Function*, VIC. [html]

02/2018 Sulfoquinovosidases as the gatekeepers to sulfoglycolysis: insight into structure, function, mechanism, and evolution. *43rd Lorne Conference on Protein Structure and Function*, VIC.

## Seminar presentations

08/2019 The structural biology of cysteine rich mucin domains. *ACRF Chemical Biology Divisional Seminar — Walter and Eliza Hall Institute of Medical Research*, VIC.

08/2017 What controls mucus viscoelasticity? *ACRF Chemical Biology Divisional Seminar — Walter and Eliza Hall Institute of Medical Research*, VIC.

## Student mentorship & supervision

2021

– Sean Smyth, Masters student.

2018 – 2019 – Runyu Mao, PH.D. candidate.

2018 – Hanna Mayerhofer, Masters student.

2018 – Keyu Su, InSPIRE program student.

2016 – Dana Tabara, Honours student.

2016 – Kimberley Callaghan, Honours student.

2015 – Peter Alfrich, Honours student.

2012 – Undergraduate laboratory demonstrator, Course: UWA GENE3330

## Service

2024 – – Organising committee member of the Monash Structural Biology Symposium. [html]

2017 – 2021 – Safety Officer, Walter and Eliza Hall Institute.

2017 – 2021 – Fire Warden, Walter and Eliza Hall Institute.

2014 – 2016 – Safety Committee member representing the Rackham lab.

## Public outreach

2019 – Tour guide: Public Discovery Tour, Walter and Eliza Hall Institute.

2018 – Tour guide: SEAMS Discovery Tour, Walter and Eliza Hall Institute.

## Skills

Structural Biology
Cryo-EM training at the Monash Ramaciotti Centre for Cryo-Electron Microscopy, VIC.
Cryo-EM three-day training workshop at the ARC CCeMMP facility, VIC.
MX2 Beamline training at the Australian Synchrotron, VIC.
Crystallography basics: crystallisation trials and fishing crystals.

Biophysics
Surface plasmon resonance (SPR).
Isothermal titration calorimetry (ITC).
Mass photometry.

Protein Biochemistry
Recombinant protein expression and purification.
Membrane protein purification, including ultracentrifugation of membrane fractions.
Eukaryotic recombinant protein expression in *Sf* 21 insect cells.
Anaerobic protein expression in *E. coli*.
Affinity chromatography.
Size exclusion chromatography (SEC).
Ion exchange chromatography (IEX).
ÄKTA Pure System: handling, method design, and basic maintenance.
Direct telomerase activity assay with radioisotopes.
Michaelis-Menten kinetic analysis with spectrophotometric plate readers.
Blue native polyacrylamide electrophoresis (BN-PAGE).
Electrophoretic mobility shift assays (EMSA).
Protein quantification: BCA assay, Bradford assay, and nanodrop.
SDS-PAGE and silver staining.
Gas chromatography.

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| Molecular Biology | Recombinant construct design for protein expression and purification.<br>Primer design and PCR.<br>Traditional molecular cloning and Gibson assembly cloning.<br>Plasmid minipreps and maxi-preps.<br>Site-directed mutagenesis: overlap extension PCR and QuickChange PCR.<br>Preparation of competent *E. coli* cells. |
| Cellular Biology | Working in a laminar flow hood with correct ascetic technique.<br>Passaging, monitoring, and counting mammalian cell lines.<br>Transfecting CHO cells (non-lentiviral work). |
| Computational Biology | Working with a Linux command-line interface.<br>Programming and scripting basics: Bash, Python, R.<br>Data analysis basics: Python (JupyterLab), R.<br>High Performance Computing: `ssh`, `sbatch` scripting, Singularity containers.<br>Workflow tools: `git`, `conda`, Vim/Neovim, Markdown, LaTeX.<br>Protein structure modelling and analysis: AlphaFold2, FoldSeek, UCSF ChimeraX.<br>Figure design: UCSF ChimeraX, Inkscape, GIMP image software. |
| Lab Management | Ordering lab reagents and supplies.<br>Making and autoclaving liquid media and buffers.<br>Calibrating pH meters.<br>Adhering to PC2 safety precautions. |

## Other information

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