Arin Wongprommoon

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I am committed to improving health outcomes in socioeconomically disadvantaged and underrepresented populations by using data-intensive methods that identify clinical and biological markers of disease. Using my broad experience and skills in computational biology and data science, I investigate host-pathogen interactions in melioidosis — a neglected tropical disease caused by a bacterium and endemic to Thailand — that may inform patient stratification and therapies.

Education

Oct 2019 – Jan 2024 • **PhD in Quantitative Biology, Biochemistry, and Biotechnology**, University of Edinburgh, United Kingdom.
Thesis title: *Single-cell time-series analysis of metabolic rhythms in yeast*
Funded by Edinburgh Global Scholarship and School of Biological Sciences, University of Edinburgh.

Oct 2016 – Jun 2019 • **BA Hons Natural Sciences (Biochemistry)**, University of Cambridge, United Kingdom.
Final-year research project title: *Sequence Preferences of the Nucleosome and PCR Enzymes*
Funded by King's Scholarship (Royal Thai Government).

Employment

Jan 2024 – present • **Postdoctoral Fellow,** Wellcome Sanger Institute, Hinxton, United Kingdom (jointly a visiting researcher at the Mahidol-Oxford Tropical Medicine Unit, Bangkok, Thailand).
Quantifying how bacterial pathogen genetics and human host biomarkers contribute to severity of melioidosis, a neglected tropical disease. Identified risk factors that affect survival from melioidosis from clinical data. Identifying the effect of the interaction between diabetes mellitus and melioidosis on gene expression and alternative splicing of transcripts from whole-blood bulk RNA sequencing data.

Publications

1. Lazaro Ibañez, J., **Wongprommoon, A.,** Júlvez, J. & Oliver, S. G. Enhancing the accuracy of genome-scale metabolic models with kinetic information. *Manuscript under review* (*mSystems*), 1–1 (2024).
2. Pakdeerat, S., Chomkatekaew, C., Boonklang, P., **Wongprommoon, A.,** Angchagun, K., Dokket, Y., Faosap, A., Wongsuwan, G., Amornchai, P., Wuthiekanun, V., Changklom, J., Siriboon, S., Chamnan, P., Peacock, S., Corander, J., Day, N. P., Thomson, N., Uttamapinant, C., Wongpalee, S. P. & Chewapreecha, C. Environmental Detection of Burkholderia Pseudomallei and Associated Melioidosis Risk: A Molecular Detection and Case-Control Cohort Study. *medRxiv*, 2024.11.21.24317607. doi:10.1101/2024.11.21.24317607 (2024).
3. **Wongprommoon, A.,** Chomkatekaew, C. & Chewapreecha, C. Monitoring Pathogens in Wastewater. *Nature Reviews Microbiology*, 1–1. doi:10.1038/s41579-024-01033-1 (2024).
4. **Wongprommoon, A.,** Muñoz González, A. F., Oyarzún, D. A. & Swain, P. S. Single-Cell Metabolic Oscillations Are Pervasive and May Alleviate a Proteome Constraint. *bioRxiv*, 2024.11.25.625147. doi:10.1101/2024.11.25.625147 (2024).
5. Nikolados, E.-M., **Wongprommoon, A.,** Aodha, O. M., Cambray, G. & Oyarzún, D. A. Accuracy and Data Efficiency in Deep Learning Models of Protein Expression. *Nature Communications* **13,** 7755. doi:10.1038/s41467-022-34902-5 (2022).
6. Jia, B. & **Wongprommoon, A.** Synthetic Biology: Engineering Order in Organisms across Scales and Species. *BioTechniques* **65,** 113–119. doi:10.2144/btn-2018-0121 (2018).
7. Tipgomut, C., **Wongprommoon, A.,** Takeo, E., Ittiudomrak, T., Puthong, S. & Chanchao, C. Melittin Induced G1 Cell Cycle Arrest and Apoptosis in Chago-K1 Human Bronchogenic Carcinoma Cells and Inhibited the Differentiation of THP-1 Cells into Tumour- Associated Macrophages. *Asian Pacific journal of cancer prevention: APJCP* **19,** 3427–3434. doi:10.31557/APJCP.2018.19.12.3427. pmid: 30583665 (2018).

Peer review

Jan 2024 – present • *Current Microbiology* (1 manuscript).

Skills

Bioinformatics	• differential gene expression (`edgeR`, `limma`), RNA splicing (`leafcutter`), gene set enrichment analysis (Gene Ontology, `XGR`)
	• flux balance analysis & genome-scale metabolic models (`cobra`, `roadrunner`, `libsbml`)
Computing concepts	• machine learning (`tensorflow`, `scikit-learn`)
	• data analysis & visualisation (Python `pandas`, `seaborn`; R `tidyverse`, `ggplot2`)
	• high-performance computing & parallelisation, secure research environments, continuous integration
	• workflow management (`snakemake`), object-oriented programming,
Programming languages	• Python, R, Bash, MATLAB, C
Software	• Git/GitHub/GitLab (version control & collaborative coding), Docker (virtualisation), LaTeX(typesetting), Inkscape (graphic design), UNIX-based operating systems (Linux, Arch and Ubuntu distributions; macOS)
Spoken languages	• English (IELTS 8.5/9, 2015) and Thai (native)

Research experience

Oct 2019 – Oct 2023 • **PhD project with Biomolecular Control Group (Dr Diego Oyarzún) & Prof Peter Swain's Group, Centre for Engineering Biology, University of Edinburgh**, United Kingdom.
Showed that metabolic cycles in single *Saccharomyces cerevisiae* cells are autonomous from the cell division cycle and are persistent across nutrient conditions and gene deletions, using single-cell microfluidics and time series analysis. Part of a team to maintain an image analysis software pipeline. Predicted that biosynthesis of biomass components in sequence is a time-efficient use of limited enzyme-available proteome resources, using flux balance analysis.

Dec 2022 • **Alan Turing Institute Data Study Group**, London, United Kingdom.
Five-day fully-funded collaborative hackathon: worked with a team of 12 researchers and data scientists to engineer a machine learning model to predict sound annoyance of 2,980 urban sound recordings; my focus was on development infrastructure and final presentation. Found that a pre-trained audio neural network trained on high-resolution spectrograms had best prediction ability.

Jan 2019 – Mar 2019 • **Final-year undergraduate research project, under the supervision of Dr Fangjie Zhu, with Prof Jussi Taipale's group, Department of Biochemistry, University of Cambridge**, United Kingdom.
Used nucleosome EMSA-SELEX to confirm rules for nucleosome positioning and showed that C-methylation aligns phases of dinucleotides with cytosines. Showed that enzyme-introduced biases were most responsible for PCR bias by comparing *k*-mer fold changes of sequencing libraries.

Jun 2018 – Sep 2019 • **Internship, under the supervision of Prof Jorge Júlvez, with Prof Steve Oliver's group, Cambridge Systems Biology Centre, University of Cambridge**, United Kingdom.
Extended a kinetic model for *E. coli* metabolism to investigate reaction fluxes and enriched a stoichiometric model. Used a genetic algorithm to optimise parameters.

Jul 2017 – Sep 2019 • **Internship, with Asst Prof Maria Spletter's group, Department of Physiological Chemistry, Ludwig-Maximillian University**, Munich, Germany.
Studied role of the splicing factor Aret in development of indirect flight muscle (IFMs) in *Drosophila melanogaster*. Found that in Aret null mutants, IFM density decreased and IFMs fused during pupal development. Poster presentation at Amgen Scholars Symposium in Cambridge won second prize among 19 LMU Munich scholars. Funded by Amgen Scholars Programme Europe.

Research experience (continued)

Aug 2016 – Sep 2016
- **Internship, with Prof Chanpen Chanchao's group, Department of Biology, Chulalongkorn University**, Bangkok, Thailand.
  Studied effect of melittin on ChaGo-K-1 lung cancer and Wi-38 lung fibroblast cells. Found that IC_{50} is likely $4\,\mu g\,mL^{-1}$ to $8\,\mu g\,mL^{-1}$ and Wi-38 survived at higher melittin concentrations compared to ChaGo-K-1.

Conferences

Jun 2024
- **Hinxton Immunogenomics Day**, Hinxton, United Kingdom.
  Oral presentation: *Effect of diabetes on host gene expression and transcript splicing responses to melioidosis in Northeast Thailand*

May 2024
- **Health Challenge Thailand**, London, United Kingdom.
  Oral presentation: *Prevalence of undiagnosed diabetes and its effects on human host response to melioidosis in Northeast Thailand*

Apr 2022
- **Microbiology Society Annual Conference**, Belfast, United Kingdom.
  Poster: *Metabolic cycles are robust and respond to nutrient changes in single cells of budding yeast*
  Awarded Microbiology Society Grant (£360), partly covering registration and travel expenses.

Dec 2021
- **British Yeast Group Meeting on *the Future of Yeast Research***, Cambridge, United Kingdom.
  Poster: *Single-cell analysis shows that flavin-based yeast metabolic cycles are robust and respond to nutrient changes*
  Best Poster (Graduate Student) Prize (3 recipients out of 43 posters), £150.

Jun 2021
- **Cold Spring Harbor Laboratories Symposium on Quantitative Biology on *Biological Timekeeping***, Laurel Hollow, New York, United States.
  Poster: *Single-cell analysis shows that flavin-based yeast metabolic cycles are robust and respond to nutrient changes*

Teaching

Jan 2023 – Apr 2023
- **Demonstrator & marker for *Practical Systems Biology***, University of Edinburgh.
  Masters-level course on modelling biological systems using differential equations and stochastic simulations via Python.

Sep 2022 – Dec 2022
- **Demonstrator for *Biology 1A: Variation***, University of Edinburgh.
  First-year undergraduate course on genetics and evolution; covered scientific skills, hypothesis testing, and Python.

Jan 2022 – Mar 2022
- **Demonstrator for *Genes & Gene Action 2***, University of Edinburgh.
  Second-year undergraduate course on genetics; covered basic bench biology.

Leadership experience

Jun 2022 – Oct 2022
- **Advisor for University of Edinburgh-UHAS Ghana team,** International Genetically Engineered Machine (iGEM) competition.
  Advised a nine-member undergraduate team that constructed and modelled cell-free solutions to mitigate plastic and heavy metal pollution in bodies of water in Ghana. Part of a three-advisor team; my focus was on structural modelling of proteins, documentation, and webpage development with version control. Team won gold medal (173 out of 350+ teams, scored against a rubric) and was nominated for best environmental project.

Sep 2021 – Sep 2022
- **PhD Student Representative for Institute of Quantitative Biology**, Graduate School Staff-Student Liaison Committee.
  One of two representatives of 77 PhD students in my institute among a team of 14 across the School of Biological Sciences (333 students). Proposed policies to ensure Equality, Diversity, and Inclusion and Widening Participation in a Graduate School internal review. Successfully advocated for formal recognition of student representative role. Conducted a survey of all Biological Sciences PhD students to propose measures to help with rising costs of living in Sep 2022. Organised community-building events, e.g. board games.

Leadership experience (continued)

Jan 2019 – Nov 2019
- **Project Manager for *Evolving spatially-defined ecological interactions***, Cambridge University Synthetic Biology Society.
  Supervised small student teams and encouraged them to work independently to engineer sets of physical and social interactions in *E. coli*. Verified aggregation of adhesion strains described by Glass & Riedel-Kruse (2018). In this framework, teams verified the auxotrophy of ecological strains from the Ackermann Lab (Eawag, Switzerland).

Oct 2017 – Mar 2019
- **Project Manager for *Bacterial edge detection***, Cambridge University Synthetic Biology Society.
  Engineered a double genetic circuit in *E. coli* that enabled photography and edge detection, reproducing Tabor et al. (2009). The project evolved into five weekly workshops on molecular techniques in Oct–Nov 2018. 10–30 participants with biological, chemical, medical, and engineering backgrounds participated in each workshop.