



Aoife Hughes, B.Sc., Ph.D.







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Education

- 2018 – 2022  **Ph.D., John Innes Centre - Morris Group**
Thesis title: *Computational modelling of information transfer between cells*
Developed mathematical and computational models to explore molecular transport between cells. Setup RNA-seq pipelines for several species. Analysed experimental data. Published multiple simulation frameworks.
- 2014 – 2018  **B.Sc. Computer Science, Aberystwyth University.**
Dissertation title: *Modelling domestication in Wheat through novel computer vision techniques*.
Resulted in publication with new insights into evolution of wheat grains and their domestication.

Employment History



- 2019 –  **Charity Work - The Brilliant Club Charity.** Worked part-time with several high-schools to deliver teaching modules based on my own research.
- 2017 – 2018  **X-ray Image Analyst - Doonan Lab, Aberystwyth University.** Developed novel methods for 3-D X-ray image processing and analysis. Reverse engineered proprietary file formats and created file readers for complex data types. Lead research which resulted in several peer-reviewed publications.
- 2016 – 2017  **Research Assistant - National Plant Phenomics Centre.** Designed phenotyping platforms, analysed -omics data sets for crops.
- 2015 – 2018  **Teaching Assistant - Computer Science Department, Aberystwyth University.**
- 2013 – 2014  **Systems Developer - Belfast Metropolitan College, Northern Ireland, UK.**
- 2010 – 2014  **Gymnastics Coach - Salto National Gymnastics Centre, Northern Ireland, UK.**

Selected Software Projects

X-ray analysis software for wheat grains - https://github.com/NPPC-UK/microCT_grain_analyser
Narrow Escape Simulator - <https://github.com/AoifeHughes/NarrowEscapeSimulator>
Python Crash Course - <https://github.com/AoifeHughes/Python-Crash-Course>
RNA-seq Pipeline - <https://github.com/AoifeHughes/RNA-Seq-pipeline>
Pythogen - A disease modelling framework - <https://github.com/AoifeHughes/Pythogen>

Research Publications

Journal Articles

- 1 Tomkins, M., **Hughes, A.**, & Morris, R. J. (2021). An Update on Passive Transport in and out of Plant Cells. *Plant Physiology*, (kiab406).  doi:10.1093/plphys/kiab406
- 2 **Hughes, A.**, Faulkner, C., Morris, R. J., & Tomkins, M. (2021). Intercellular Communication as a Series of Narrow Escape Problems. *IEEE Transactions on Molecular, Biological and Multi-Scale Communications*, 7(2), 89–93.  doi:10.1109/TMBMC.2021.3083719

- 3 Ohtsu, M., Jennings, J., Johnston, M., Liu, X., **Hughes, A.**, Stark, K., ... Faulkner, C. (2021). Colletotrichum higginsianum effectors exhibit cell to cell hypermobility in plant tissues and modulate intercellular connectivity amongst a variety of cellular processes, 2021.01.13.426415. [doi:10.1101/2021.01.13.426415](https://doi.org/10.1101/2021.01.13.426415)
- 4 **Hughes, A.**, Morris, R. J., & Tomkins, M. (2020). PyEscape: A narrow-escape problem simulation implementation. *Journal of Open Source Software*.
- 5 **Hughes, A.**, Fradgley, N., Oliveira, H., Corke, F., Cockram, J., Doonan, J. H., & Nibau, C. (2019). Grain depth increases during early domestication in small grain cereals. *The Plant Journal*.
- 6 Cook, F., **Hughes, A.**, Nibau, C., Orman-Ligeza, B., Schatłowski, N., Uauy, C., & Trafford, K. (2018). Barley lys3 mutants are unique amongst shrunken-endosperm mutants in having abnormally large embryos. *Journal of Cereal Science*, 82, 16–24.
- 7 **Hughes, A.**, Askew, K., Scotson, C. P., Williams, K., Sauze, C., Corke, F., ... Nibau, C. (2017). Non-Destructive, High-Content Analysis of Wheat Grain Traits Using X-Ray Micro Computed Tomography. *Plant Methods*, 13(1). [doi:10.1186/s13007-017-0229-8](https://doi.org/10.1186/s13007-017-0229-8)

Skills

Coding	Python, R, C/C++, C#, MATLAB, BASH, Java, PHP, SQL, L ^A T _E X, Perl, Lisp, Ruby.
Software Dev	Mobile apps (iOS/Android), Game dev (Unity, SDL, SFML), Computer vision, Machine learning, Desktop apps, Git, Open source, Web dev (Flask, Django, JS).
Databases	MySQL, PostgreSQL, SQLite.
Misc.	Academic research, teaching, training, consultation, data analysis and visualisation.

Miscellaneous

Awards and Achievements

- 2022 **DigiEduHack Climate Change Contest**, Finalist.
- 2019 **UK Open Source Award**, 1st Place.
- 2017 **Genetics Society Research Grant**, Recipient.
- 2016 **UK-RAS Field Robotics Contest**, 2nd Place.
- 2014 **Aberystwyth Excellence Scholarship**, Recipient.

Research Talks

- 2022 **International Conference on Arabidopsis Research**. Research presentation.
- Mendel Early Career Symposium**. Poster presentation.
- Pint of Science**. Public engagement talk.
- 2018 **Genetics Society**. Grant outcome presentation.
- 2017 **FOSDEM**. Main stage talk.
- British Computer Society**. Research Talk.

References

Available on Request