

## Q. Tyrell Davis

See <https://github.com/rivesunder> for ongoing projects.

### Skills & Tools

**Daily use:** Python[numpy, pytorch, autograd, tensorflow, jax, gym, mpi4py ...],  
Git, vim

**Proficient:** Julia language, Octave/MATLAB, OpenSCAD, Autodesk Inventor, L<sup>A</sup>T<sub>E</sub>X

**Some experience:** bash, R, PyMol, C++, SolidWorks, AWS Robomaker, molecular docking[smina, vina, Autodock-GPU], GCP Compute Engine

### Work Experience

- **Post Doctoral Associate** (Complex systems, evolutionary algorithms, machine learning), University of Vermont Morphology, Evolution, and Cognition Lab. November 2021 to Present.
- **Senior Scientific Software Engineer** Macromoltek, Inc. March 2021 to October 2021.
- **Consulting Scientist and Writer, Machine Learning and Molecular Biology** Self-Employed. June 2018 to Present.
- **Machine Learning Microscopy Data Scientist**, Oxford Nano Imaging. January 2019 to November 2019.
- **Postdoctoral Researcher in Optical Microscope Development**, University of Oxford, Dynamic Optics and Photonics Group. April 2018 to January 2019.
- **Marie Curie Early Stage Researcher:** PHOtonic tools for Quantitative imaging in tissUeS (PHOQUS), University of Dundee. August 2014 to February 2018.

### Education

- **PhD Life Sciences**, University of Dundee Thesis: Cognitive Computational Microscopy — Awarded 2018 June
- **MSc Molecular Biology**, University of Wyoming—. Thesis: *Acanthamoeba castellanii* feeding decisions as a predictor of bacterial virulence — Awarded August 2012
- **BSc Electrical Engineering**, and **BSc Molecular Biology**, University of Wyoming — May 2010

## Awards

- 2019 **10th** and **12th** place in “**NeurIPS 2019: Learn to Move - Walk Around**” ([https://bit.ly/NeurIPS2019\\_L2M\\_msft](https://bit.ly/NeurIPS2019_L2M_msft)) and “**Flatland Challenge**” ([https://bit.ly/flatland\\_msft](https://bit.ly/flatland_msft)), respectively.
- 2014 to 2017 **Marie Curie Fellowship** ([https://bit.ly/phoqus\\_qtd](https://bit.ly/phoqus_qtd))
- 2009 to 2010 **Wyoming NASA Space Grant Consortium undergraduate research fellowship** ([https://bit.ly/qtd\\_ewtr](https://bit.ly/qtd_ewtr))

## Publications

### Peer-Reviewed

- **Q. Tyrell Davis**, Josh Bongard; **July 18–22, 2022**. “Step Size is a Consequential Parameter in Continuous Cellular Automata.” Proceedings of the ALIFE 2022: The 2022 Conference on Artificial Life. ALIFE 2022: The 2022 Conference on Artificial Life. Online. (pp. 43). ASME. [https://doi.org/10.1162/isal\\_a\\_00526](https://doi.org/10.1162/isal_a_00526) <https://arxiv.org/abs/2205.12728>
- **Q. Tyrell Davis**, Josh Bongard; **July 18–22, 2022**. “Glaberish: Generalizing the Continuously-Valued Lenia Framework to Arbitrary Life-Like Cellular Automata.” Proceedings of the ALIFE 2022: The 2022 Conference on Artificial Life. ALIFE 2022: The 2022 Conference on Artificial Life. Online. (pp. 47). ASME. [https://doi.org/10.1162/isal\\_a\\_00530](https://doi.org/10.1162/isal_a_00530) <https://arxiv.org/abs/2205.10463>
- **Q. Tyrell Davis** and Josh Bongard. **July 2022**. “Selecting continuous life-like cellular automata for halting unpredictability: evolving for abiogenesis.” In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO ’22). Association for Computing Machinery, New York, NY, USA, 104–107. <https://doi.org/10.1145/3520304.3529037> <https://arxiv.org/abs/2204.07541>
- **Q. Tyrell Davis**. **August 2021**. “Carle’s Game: An Open-Ended Challenge in Exploratory Machine Creativity.” 2021 IEEE Conference on Games (CoG), pp. 01–08, <https://doi.org/10.1109/CoG52621.2021.9619011>, <https://arxiv.org/abs/2107.05786>
- Sven A. Szilagyi, Moritz Burmeister, **Q. Tyrell Davis**, Gero L. Hermsdorf, Suman De, Erik Schiäffer, Anita Jannasch. **June 2020**. “Fast 3D imaging of giant unilamellar vesicles using reflected light-sheet microscopy with single molecule sensitivity.” <https://doi.org/10.1101/2020.06.26.174102>

### Others

- **Davis, Q. Tyrell**. Intention to explore the role of discretization in the emergence of self-organization in certain approximations of continuous cellular automata and other complex dynamic systems. (2022). <https://arxiv.org/abs/2208.09444> <https://rivesunder.github.io/DisContinuous>

- **Q. Tyrell Davis. July 2017.** Transport of Intensity Equation Microscopy for Dynamic Microtubules. <https://arxiv.org/abs/1707.04139>
- **Q. Tyrell Davis. April 2016** D2.3: Demonstration of force measurement on single molecule systems using optical tweezers. (pdf: [https://bit.ly/phoqus2\\_qtd](https://bit.ly/phoqus2_qtd))
- **Q. Tyrell Davis. September 2012.** Phase Imaging From Defocus Information in a Light Field. <https://arxiv.org/abs/1209.1744>