Salvador Buse

Bioengineering PhD Student at Caltech

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Education

California Institute of Technology (Caltech) — *Pasadena, California*

PhD in Bioengineering — *Sep 2020 -*

- Studying synthetic biology: rotating in Erik Winfree's group, researching pattern formation in cellular automata
- G1 courses: data analysis and statistical inference in Python, biomolecular computation, mathematical biology, algorithmic decidability

University of Cambridge, Trinity College — *Cambridge, UK*

MSci in Natural Sciences (Systems Biology) – First Class, 76% — *Oct 2019 - Jul 2020*

BA in Natural Sciences (Chemistry) – Upper Second Class, 68% — *Oct 2016 - Jul 2019*

Research Experience

California Institute of Technology (Caltech) — *Pasadena, California (Remote)*

PhD Rotation Student, Erik Winfree Lab — *Sep 2020 -*

- Researching pattern formation and morphogenesis in cellular automata. Currently working remotely from Cambridge, UK.

Laboratory of Molecular Biology — *Cambridge, UK*

Master's Thesis Student, Jason Chin Lab — *Nov 2019 - Apr 2020*

- To enable bacteria to make proteins containing up to three unnatural amino acids, the Chin lab built 'Syn61', an *E. coli* strain whose genome uses only 61 of 64 codons, and is the largest synthesised to date. This works by 'recoding': synonymously replacing all instances of three codons. I found that Syn61 still contains some recoded codons, and and studied their implications for Syn61 and future recoded genomes.

Medical Research Council Summer Student, Jason Chin Lab — *Jun 2019 - Sep 2019*

- In Syn61, recoded codons are 'blank': they do not encode natural amino acids, so can be assigned to unnatural amino acids. First, however, the tRNAs recognising recoded codons must be removed. I deleted those tRNAs and found the new Syn61 strain to be viable, but less fit.

Stanford University, Chemical and Systems Biology — *Palo Alto, California*

Summer Research Intern, Jim Ferrell Lab — *Jun 2018 - Aug 2018*

- Studied the role of an APC/C subunit in cell cycle regulation using two approaches: first, finding interaction partners of the subunit in *Xenopus* egg extracts, and second, identifying any altered phenotypes in cultured human cells with mutant versions of the subunit.

University of Cambridge, Physiology Department — *Cambridge, UK*

Summer Research Intern, Bill Harris Lab — *Jul 2017 - Sep 2017*

- Used two-photon microscopes to generate 3D time-lapse movies of the retinas of developing zebrafish. Wrote code (in MATLAB) to extract data from those movies and analyse the motion of the cell nuclei, to study the role of nuclear migration in retinal development.

Leadership

Cambridge University Scientific Society — *Cambridge, UK*

Co-President — *Mar 2018 - Mar 2019*

- Arranged a weekly lecture series of 15 leading scientists, and co-chaired a research internships event. Helped to renew our relationship with Oxford's Science Society, and jointly arranged a formal dinner in Cambridge and a field trip to the London Natural History Museum.

Trinity College Science Society — *Cambridge, UK*

President — *Mar 2017 - Mar 2018*

- Arranged a weekly lecture series of 17 pre-eminent scientists, which was near gender-balanced and featured Sir Paul Nurse & Dame Ottoline Leyser. Organised a research internships event, which now occurs annually, and a symposium showcasing research at Trinity.

Writing and Publications

- Azizi, A., Herrmann, A., Wan, Y., **Buse, S.**, Keller, P. J., Goldstein, R., & Harris, W. A. (Oct 2020). Nuclear crowding and nonlinear diffusion during interkinetic nuclear migration in the zebrafish retina. eLife. DOI: 10.7554/eLife.58635
- The Wilberforce Society. (Unpublished). 'Intentional Disinformation in Political Processes'. I am researching how synthetic media (e.g. deepfakes, GTP-3 text) might change the disinformation problem, and what we can do about it, for a paper for this student-run think tank.

Profile

Interested in using synthetic biology to understand life and build technologies which benefit humanity. I've long wanted to be a scientist, and completed research projects every summer since turning 16. I won a Silver Medal at the International Biology Olympiad in 2016, and Gold Medals in the national Physics, Chemistry, and Biology Olympiads in 2015 & 16. I can write in Python and a little Mathematica. I love puzzles and crosswords, and represented Trinity in the Cambridge College Quiz. I love to travel and am fascinated by world history, and am lucky enough to have visited more than 40 countries. I've taken cooking classes in eight of them.

December 20, 2020