

DR. ALEXANDER SHAKEEL BATES

I am a neuroscientist and programmer on open-source projects. I work on insect brains. I am interested in how neurons wire together, and how they work together to build complex, innate behaviours. D.O.B. **23/09/1993**.

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2751

19

19



PROFESSIONAL RESEARCH

present
|
01/10/2020

Postdoctoral Fellow in Neurobiology

Harvard Medical School

📍 Boston, US

- Member of the laboratory of [Prof. Rachel Wilson](#)
- Working on navigational circuitry, using calcium imaging, neurophysiology and behavioural studies involving virtual reality with *D. melanogaster*

present
|
01/10/2020

Visiting Scientist

Dept. Zoology, University of Cambridge

📍 remote

- Neuroinformatics work with the [Drosophila Connectomics Group](#)
- Developed R tools for neuroanatomy and connectomics



GRANTS

01/06/2025
|
01/06/2022

Sir Henry Wellcome Fellowship

Wellcome Trust & University of Oxford

📍 UK

- 30,000 GBP towards my current research
- Collaboration between groups of Rachel Wilson, Wei Lee, Scott Waddell and Shaul Druckmann

01/06/2022
|
01/04/2021

EMBO fellow

European Molecular Biology Organization

📍 Europe

2021

Life Science Research Foundation Fellowship

Life Science Research Foundation

📍 US

- Did not pursue

2021

Human Frontiers Fellowship

International Human Frontier Science Program

📍 International

- Did not pursue



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Media



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[R](#) researchgate
[P](#) GQQ-6852-2022

Software

[natverse](#) - co-author

[neuromorphr](#) - author

[neuronbridger](#) - author

[neupintr](#) - author

[hemibrainr](#) - author

[mouselightr](#) - author

[insectbrainr](#) - author

[crantr](#) - author

- 30/09/2019 ● **Herchel Smith PhD Scholarship** 📍 Cambridge, UK
 01/08/2015 Herchel Smith Foundation
- 01/08/2018 ● **Boehringer Ingelheim PhD Scholarship** 📍 European
 01/08/2016 Boehringer Ingelheim Foundation

EDUCATION

- 30/09/2020 ● **Neuroscience PhD** 📍 Cambridge, UK
 01/09/2015 MRC LMB, University of Cambridge
- PhD student with **Dr. Greg Jefferis**
 - **Thesis:** The lateral horn, a brain region in the fly, primes innate olfactory behaviours by combining patterns of second-order olfactory projection neuron activity. In my work, I developed tools and analyses, and reconstructed neural networks from electron microscopy data, in order to better understand this brain region and how memory systems interact with it
 - Neuroinformatics, data science, R programming
 - **Awards:** Honorary Vice Chancellor's Award, MRC LMB Max Perutz Prize 2019, Winner of the British Neuroscience Association Postgraduate Prize 2020
- 01/07/2015 ● **Neuroscience BSc** 📍 London, UK
 01/09/2012 University College London
- 1st class degree with honours
 - Modules taken listed on [linkedIn](#)
 - **Awards:** Burnstock Sessional Prize in Neuroscience BSc (ranked first in year) (2012–2013) (2013-2014) (2014-2015), Dean's list for the Faculty of Life Sciences (2013-2014) (2014-2015), Rob Clarke Award from the Society of Physiology
- 01/09/2012 ● **A levels** 📍 London, UK
 01/09/2010 Woodbridge High School
- 6 A*s at A-level, comprising: Physics, Chemistry, Mathematics, English Literature, Philosophy and Russian, and in a history related EPQ (level 3) project
- 31/08/2010 ● **GCSEs** 📍 London, UK
 01/09/2008 Woodbridge High School
- 13 A*s: English Literature, English Language, Mathematics, Statistics, Core Science, Additional Science, History, Philosophy, Geography, French, Italian, Russian and Expressive Arts. Jack Petchey Achievement Award

REVIEWS

	title	author	journal	year	cites
2	Systems neuroscience: Auditory processing at synaptic resolution	AS Bates , G Jefferis	Current Biology	2022	1
6	Neuronal cell types in the fly: single-cell anatomy meets single-cell genomics	AS Bates , J Janssens, GS Jefferis, S Aerts	Current opinion in neurobiology	2019	62

Skills

R
 python
 MATLAB
 github
 git
 markdown
 Illustrator
 InDesign
 communication
 text editing
 journalistic writing
 creative writing
 open access


Peer Reviews


journal reviews	
PLoS	
Comp.	3
Bio.	
eLife	3
Nature Comm.	1

PAPERS

title	author	journal	year
Neurotransmitter classification from electron microscopy images at synaptic sites in <i>Drosophila melanogaster</i>	N Eckstein, AS Bates , A Champion, M Du, Y Yin, P Schlegel, AKY Lu, ...	Cell	2024
Information flow, cell types and stereotypy in a full olfactory connectome	P Schlegel, AS Bates , T Stürner, SR Jagannathan, N Drummond, J Hsu, ...	Elife	2021
Complete connectomic reconstruction of olfactory projection neurons in the fly brain	AS Bates , P Schlegel, RJV Roberts, N Drummond, IFM Tamimi, ...	Current Biology	2020
The natverse, a versatile toolbox for combining and analysing neuroanatomical data	AS Bates , JD Manton, SR Jagannathan, M Costa, P Schlegel, T Rohlfing, ...	Elife	2020
Functional and anatomical specificity in a higher olfactory centre	S Frechter, AS Bates , S Tootoonian, MJ Dolan, J Manton, AR Jamasb, ...	Elife	2019
Whole-brain annotation and multi-connectome cell typing of <i>Drosophila</i>	P Schlegel, Y Yin, AS Bates , S Dorkenwald, K Eichler, P Brooks, DS Han, ...	Nature	2024
Discriminative attribution from paired images	N Eckstein, H Bukhari, AS Bates , GSXE Jefferis, J Funke	European Conference on Computer Vision	2022
BACTrace, a tool for retrograde tracing of neuronal circuits in <i>Drosophila</i>	S Cachero, M Gkantia, AS Bates , S Frechter, L Blackie, A McCarthy, ...	Nature methods	2020
Neurogenetic dissection of the <i>Drosophila</i> lateral horn reveals major outputs, diverse behavioural functions, and interactions with the mushroom body	MJ Dolan, S Frechter, AS Bates , C Dan, P Huoviala, RJV Roberts, ...	Elife	2019
Communication from learned to innate olfactory processing centers is required for memory retrieval in <i>Drosophila</i>	MJ Dolan, G Belliard-Guérin, AS Bates , S Frechter, A Lampin-Saint-Amaux, ...	Neuron	2018
Automated reconstruction of a serial-section EM <i>Drosophila</i> brain with flood-filling networks and local realignment	PH Li, LF Lindsey, M Januszewski, Z Zheng, AS Bates , I Taisz, M Tyka, ...	bioRxiv	2019
A <i>Drosophila</i> computational brain model reveals sensorimotor processing	PK Shiu, GR Sterne, N Spiller, R Franconville, A Sandoval, J Zhou, ...	Nature	2024
Network statistics of the whole-brain connectome of <i>Drosophila</i>	A Lin, R Yang, S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, S Yu, ...	Nature	2024
Neuronal wiring diagram of an adult brain	S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, SC Yu, CE McKellar, ...	Nature	2024
Comparative connectomics of the descending and ascending neurons of the <i>Drosophila</i> nervous system: stereotypy and sexual dimorphism	T Stürner, P Brooks, L Serratos Capdevila, BJ Morris, A Javier, S Fang, ...	bioRxiv	2024

This table shows all of my work, searchable on pubmed. Author list displays first six. My name in bold, underlining indicates first (co)authorship. Get in contact for information on recent projects.

 Most of my work has first been published on bioRxiv

 Much of my work comes with open source R code

	title	author	journal	year	cites
16	The connectome of the adult <i>Drosophila</i> mushroom body provides insights into function	F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...	Elife	2020	304
17	A connectome and analysis of the adult <i>Drosophila</i> central brain	LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...	elife	2020	869
18	Connectomics analysis reveals first-, second-, and third-order thermosensory and hygosensory neurons in the adult <i>Drosophila</i> brain	EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...	Current Biology	2020	91
19	Input connectivity reveals additional heterogeneity of dopaminergic reinforcement in <i>Drosophila</i>	N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...	Current Biology	2020	67
20	Neural circuit basis of aversive odour processing in <i>Drosophila</i> from sensory input to descending output	P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...	bioRxiv	2018	41
21	Combinatorial encoding of odors in the mosquito antennal lobe	P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, AS Bates, ...	Nature communications	2023	9



SELECTED TALKS

2019	● ECRO meeting	European Chemoreception Research Organization	📍 Trieste, Italy
2018	● Boehringer Ingelheim Meeting	Boehringer Ingelheim Fonds	📍 Hirschegg, Austria
2017	● MPI Connectomics meeting	Max Planck Institute	📍 Berlin, Germany
2017	● ECRO meeting	European Chemoreception Research Organization	📍 Cambridge, UK
2017	● Boehringer Ingelheim Meeting	Boehringer Ingelheim Fonds	📍 Hirschegg, Austria
2016	● Brains and Roses	Schaeffer and Datta group organised	📍 Montserrat, Catalonia



SELECTED POSTERS

2023	● HHMI Investigators' Meeting	HHMI HQ	📍 Chevy Chase
2019	● UK Neural Computation	University of Nottingham	📍 Nottingham, UK

Referees

👤 PhD Supervisor:
Dr. Gregory Jefferis, MRC Laboratory of Molecular Biology, Cambridge,
jefferis@mrclmb.cam.ac.uk

👤 Current Supervisor:
Prof. Rachel Wilson, Harvard Medical School,
Rachel.Wilson@hms.harvard.edu

👤 BSc Tutor at UCL: Dr. Marco Beato, UCL Neuroscience, Physiology and Pharmacology,
m.beato@ucl.ac.uk

👤 Supervisee:
Serene Dhawan, Princeton, PhD student,
serenedhawan@gmail.com




2017	● Boehringer Ingelheim Fonds communication workshop Boehringer Ingelheim Foundation	📍 Mainz, Germany
2016	● Maggot Meeting Janelia Research Campus	📍 Ashburn, US
2016	● High-resolution circuit reconstruction meeting Janelia Research Campus	📍 Ashburn, US
2016	● LMB GSA Symposium MRC LMB, University of Cambridge	📍 Cambridge, UK



LEADERSHIP

01/10/2019 01/01/2016	● President of BlueSci University College London • Lead BlueSci , the University of Cambridge's science media society, through 15 issues of the magazine	📍 London, UK
2018	● Mentored summer student MRC LMB, University of Cambridge	📍 Cambridge, UK
01/05/2018 01/09/2017	● Mentored undergraduate student Dept. Zoology, University of Cambridge • Student won best thesis in year award and two authorships	📍 Cambridge, UK
2017	● Mentored summer student MRC LMB, University of Cambridge	📍 Cambridge, UK
2017	● LMB graduate symposium lead organiser MRC LMB, University of Cambridge	📍 Cambridge, UK
2016	● LMB graduate symposium organiser MRC LMB, University of Cambridge	📍 Cambridge, UK
01/10/2015 01/10/2014	● President of the UCLU Writer's Society University College London	📍 London, UK
01/10/2015 01/10/2014	● Science Editor, Pi Magazine University College London	📍 London, UK
2014	● UCL iGEM 2014 Advisor University College London • Project planning, oversight, team selection and management • Gold medallist	📍 London, UK

OTHER

- 2019 ● **Visiting Scholar**
Janelia Research Campus  Ashburn, US
• Worked in FlyEM, [Dr. Gerry Rubin's Group](#)
• Worked on the hemibrain connectome
- 2018 ● **Paris Spring School in Neuroscience Techniques**
Paris Descartes University  Paris, France
• [A course in](#) Optical Imaging and Electrophysiological Recording in Neuroscience
- 2016 ● **Visiting Scholar**
Janelia Research Campus  Ashburn, US
• Worked with [Dr. Albert Cardona's Group](#)
• Worked on the L1 larval connectome
- 2015 ● **University of Queensland Winter Scholarship**
University of Queensland  Brisbane, Australia
• Worked on tectal activity in zebrafish larvae, light sheet imaging, [Dr. Ethan Scott's Group](#)
- 2014 ● **Amgen Scholarship**
Dept. Zoology, University of Cambridge  Cambridge, UK
• Worked on neuronal structural plasticity in *D. melanogaster* larvae, [Dr. Landgraf's group](#)
- 2013 ● **UCL iGEM 2013 team member**
University College London  London, UK
• Team member, cloning, cell culture, project planning
• Gold medallist
- 2013 ● **Summer student in the biomolecular modelling laboratory**
Cancer Research UK, London Research Institute  London, UK
• Student Placement with [Dr. Tammy Cheng](#), python programming

Made with the R
package
[pagedown](#) and
[datadrivencv](#).

Code available
on  [GitHub](#).

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2024-11-13.