

# DR. ALEXANDER SHAKEEL BATES

I am a neuroscientist and computational biologist specialising in neuroanatomy and connectomics of the insect brain. My research focuses on understanding how neural circuits wire together to generate complex, innate behaviours. I develop open-source tools for neuroanatomical analysis and collaborate internationally on connectomics projects.

total cites h index i10 index peer reviews



## PROFESSIONAL RESEARCH

present  
I  
01/10/2020

Postdoctoral Fellow in Neurobiology ↗  
Harvard Medical School

📍 Boston, US

- Member of the laboratory of Prof. Rachel Wilson ↗
- Investigating navigational circuitry using calcium imaging, neurophysiology and behavioural studies involving virtual reality with *Drosophila melanogaster*
- Co-leading an international collaboration with Prof. Wei-Chung Allen Lee ↗, flywire ↗ and a network of international research groups on the first whole fly central nervous system connectome, open-access

01/03/2024  
I  
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, organised international collaborators

## FELLOWSHIPS

01/06/2025  
I  
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
- Also accepted as Life Science Research Foundation fellow

01/06/2022  
I  
01/04/2021

EMBO fellow ↗  
European Molecular Biology Organization

📍 Europe

- Also accepted as a International Human Frontier Science Program fellow

30/09/2019  
I  
01/08/2015

Herchel Smith PhD Scholarship ↗  
Herchel Smith Foundation

📍 Cambridge, UK

01/08/2018  
I  
01/08/2016

Boehringer Ingelheim PhD Scholarship ↗  
Boehringer Ingelheim Foundation

📍 European

## EDUCATION

30/09/2020  
I  
01/09/2015

Neuroscience PhD  
MRC LMB ↗, University of Cambridge

📍 Cambridge, UK

- 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  
I  
01/09/2012

Neuroscience BSc  
University College London

📍 London, UK

- 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

## PRIMARY RESEARCH

title	author	journal	year	cites
Neurotransmitter classification from electron microscopy images at synaptic sites in <i>Drosophila melanogaster</i> ↗	N Eckstein, <b>AS Bates</b> , A Champion, M Du, Y Yin, P Schlegel, AKY Lu, ...	Cell	2024	138
Information flow, cell types and stereotypy in a full olfactory connectome ↗	P Schlegel, <b>AS Bates</b> , T Stürner, SR Jagannathan, N Drummond, J Hsu, ...	Elife	2021	124
Complete connectomic reconstruction of olfactory projection neurons in the fly brain ↗	<b>AS Bates</b> , P Schlegel, RJV Roberts, N Drummond, IFM Tamimi, ...	Curr. Biology	2020	179
The natverse, a versatile toolbox for combining and analysing neuroanatomical data ↗	<b>AS Bates</b> , JD Manton, SR Jagannathan, M Costa, P Schlegel, T Rohlfing, ...	Elife	2020	173
Analysis and optimization of equitable US cancer clinical trial center access by travel time ↗	H Lee, <b>AS Bates</b> , S Callier, M Chan, N Chambwe, A Marshall, MB Terry, ...	JAMA oncology	2024	8
Analysis and optimization of equitable US cancer clinical trial center access by travel time. ↗	H Lee, <b>A Bates</b> , A Marshall, S Callier, N Chambwe, T Janowitz	J. of Clinical Oncology	2023	0
Analysis of methods to improve engagement of under-represented and socioeconomically deprived patients in clinical research ↗	H Lee, <b>AS Bates</b> , R Dima, S Nadella, N Jordan-Martin, C Brennan, ...	Cancer Res.	2022	0
Functional and anatomical specificity in a higher olfactory centre ↗	S Frechter, <b>AS Bates</b> , S Tootoonian, MJ			

## Media

- ✉ alexander\_bates @hms.harvard.edu ↗
- ☁ @asbates.bsky.social ↗
- 🐦 as\_bates ↗
- 👤 alexanderbates ↗
- 🔗 asbates.com ↗
- 👤 linkedIn ↗
- 🔗 google scholar ↗
- >ID 0000-0002-1195-0445 ↗
- R<sup>+</sup> researchgate ↗
- P GQQ-6852-2022 ↗

## Skills

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

## Software

- natverse ↗
- neuromorpho ↗
- neuronbridger ↗
- neuprint ↗
- hemibrain ↗
- mouselightr ↗
- insectbrainr ↗
- crantr ↗
- bancr ↗

## Referees

- ✉ PhD Supervisor:  
Dr. Gregory Jefferis, MRC Laboratory of Molecular Biology, Cambridge, jefferis@mrc-lmb.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 ↗

Publication table displays first six authors, my name in bold, underlining indicates (co-)first authorship

title	author	journal	year	cites
Dolan, J Manton, AR Jamasb, ...	eLife	2019	105	
Whole-brain annotation and multi-connectome cell typing of Drosophila ↗	P Schlegel, Y Yin, <b>AS Bates</b> , S Dorkenwald, K Eichler, P Brooks, DS Han, ...	Nature	2024	152
Quantitative Attributions with Counterfactuals ↗	DY Adjavon, N Eckstein, <b>AS Bates</b> , GSXE Jefferis, J Funke	bioRxiv	2024	0
Discriminative attribution from paired images ↗	N Eckstein, H Bukhari, <b>AS Bates</b> , GSXE Jefferis, J Funke	Euro. Conf. on Computer Vision	2022	7
BAcTrace, a tool for retrograde tracing of neuronal circuits in Drosophila ↗	S Cachero, M Gkantia, <b>AS Bates</b> , S Frechter, L Blackie, A McCarthy, ...	Nature methods	2020	35
Neural circuit mechanisms for steering control in walking Drosophila ↗	A Rayshubski, SL Holtz, <b>AS Bates</b> , QX Vanderbeck, LS Capdevila, ...	bioRxiv	2020	68
BAcTrace a new tool for retrograde tracing of neuronal circuits ↗	S Cachero, M Gkantia, <b>AS Bates</b> , S Frechter, L Blackie, A McCarthy, ...	bioRxiv	2020	6
Neurogenetic dissection of the Drosophila lateral horn reveals major outputs, diverse behavioural functions, and interactions with the mushroom body ↗	MJ Dolan, S Frechter, <b>AS Bates</b> , C Dan, P Huoviala, RJ Roberts, ...	eLife	2019	158
Communication from learned to innate olfactory processing centers is required for memory retrieval in Drosophila ↗	MJ Dolan, G Belliart-Guérin, <b>AS Bates</b> , S Frechter, A Lampin-Saint-Amaux, ...	Neuron	2018	112
Automated reconstruction of a serial-section EM Drosophila brain with flood-filling networks and local realignment ↗	PH Li, LF Lindsey, M Januszewski, Z Zheng, <b>AS Bates</b> , I Taisz, M Tyka, ...	bioRxiv	2019	98
A Drosophila computational brain model reveals sensorimotor processing ↗	PK Shiu, GR Sterne, N Spiller, R Franconville, A Sandoval, J Zhou, ...	Nature	2024	33
Network statistics of the whole-brain connectome of Drosophila ↗	A Lin, R Yang, S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, S Yu, ...	Nature	2024	53
Neuronal wiring diagram of an adult brain ↗	S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, SC Yu, CE McKellar, ...	Nature	2024	218
Comparative connectomics of the descending and ascending neurons of the Drosophila nervous system: stereotypy and sexual dimorphism ↗	T Stürner, P Brooks, LS Capdevila, BJ Morris, A Javier, S Fang, M Gkantia, ...	bioRxiv	2024	9
The connectome of the adult Drosophila mushroom body provides insights into function ↗	F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...	eLife	2020	336
A connectome and analysis of the adult Drosophila central brain ↗	LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...	eLife	2020	955
Connectomics analysis reveals first-, second-, and third-order thermosensory and hygrosensory neurons in the adult Drosophila brain ↗	EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...	Curr. Biology	2020	94
Input connectivity reveals additional heterogeneity of dopaminergic reinforcement in Drosophila ↗	N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...	Curr. Biology	2020	73
Neural circuit basis of aversive odour processing in Drosophila from sensory input to descending output ↗	P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...	bioRxiv	2018	44
Combinatorial encoding of odors in the mosquito antennal lobe ↗	P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ...	Nature Comm.	2023	11



## REVIEWS

title	author	journal	year	cites
Systems neuroscience: Auditory processing at synaptic resolution ↗	<b>AS Bates</b> , G Jefferis	Curr. Biology	2022	1
Neuronal cell types in the fly: single-cell anatomy meets single-cell genomics ↗	<b>AS Bates</b> , J Janssens, GS Jefferis, S Aerts	Curr. opinion in neurobiology	2019	65

## Peer Review

journal reviews
PLoS Comp. Bio.
eLife
Nature Comm.



## 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
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
<b>LEADERSHIP</b>		
01/10/2019	President of BlueSci ↗ University College London	 London, UK
01/01/2016	· Lead BlueSci ↗, the University of Cambridge's science media society, through 15 issues of the magazine ↗	
2018	Mentored summer student MRC LMB, University of Cambridge	 Cambridge, UK
01/05/2018	Mentored undergraduate student Dept. Zoology, University of Cambridge	 Cambridge, UK
01/09/2017	· Student won best thesis in year award and two authorships	
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	President of the UCLU Writer's Society ↗ University College London	 London, UK
01/10/2014		
01/10/2015	Science Editor, Pi Magazine ↗ University College London	 London, UK
01/10/2014		
2014	UCL iGEM 2014 ↗ Advisor University College London	 London, UK
	· Project planning, oversight, team selection and management	
	· Gold medallist	
Rx Most of my work has first been published on bioRxiv		
Ə Much of my work comes with open source R code		
<b>OTHER</b>		
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 <i>Drosophila melanogaster</i> 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	
		Updated on 09/03/2025