

DR. ALEXANDER SHAKEEL BATES

I am a neuroscientist and computational biologist specialising in neuroanatomy, neurophysiology and connectomics of the insect brain. My research focuses on understanding how neural circuits wire and fire to generate complex behaviours, including olfactory processing and animal navigation. I develop open-source tools for neuroanatomical analysis and collaborate internationally on connectomics projects. In the wetlab, I use virtual reality and calcium imaging experiments to interrogate neurobiological circuits in living, behaving flies. I am a UK citizen.

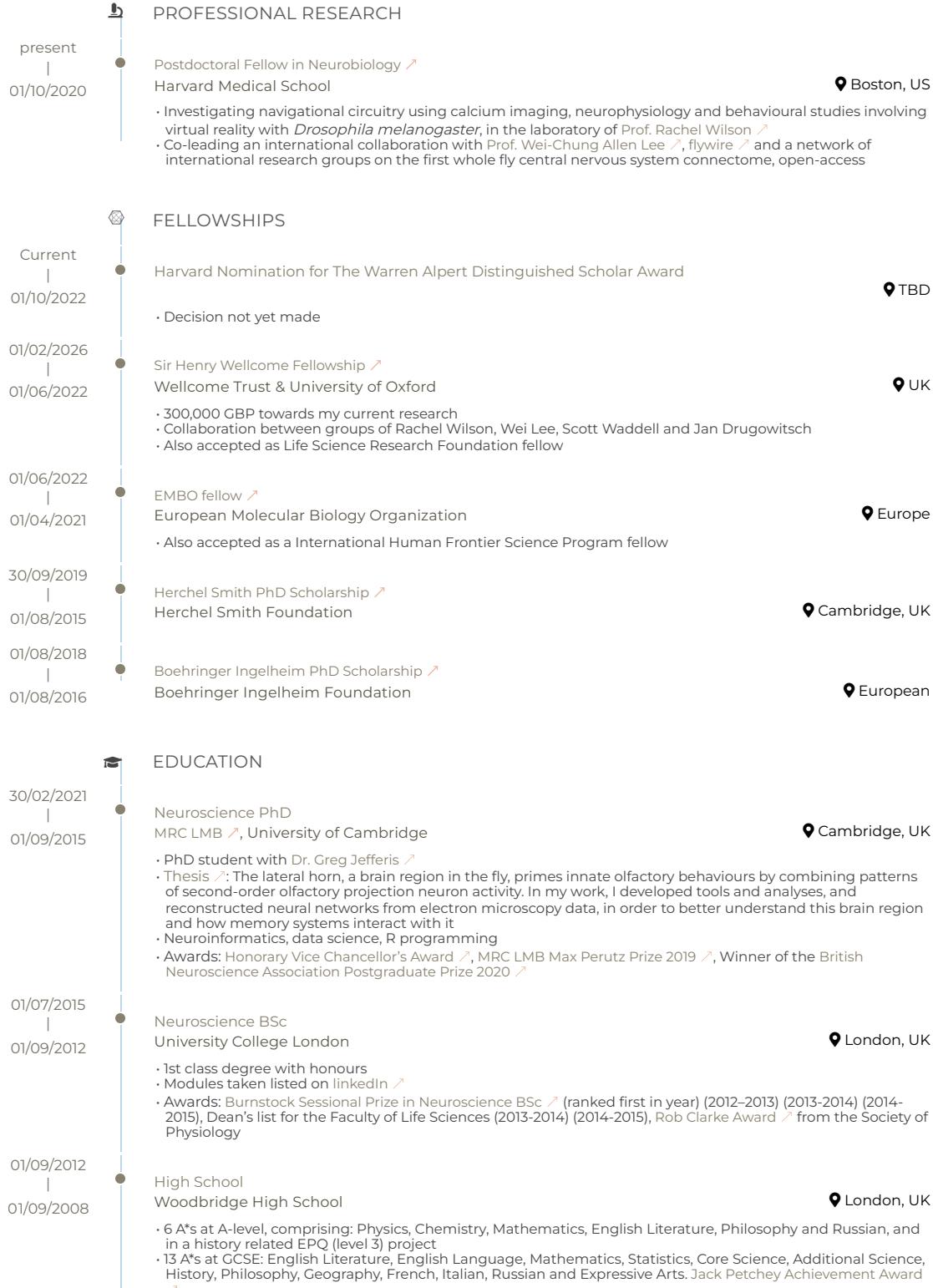
total cites h index i10 index peer reviews

4313

21

24

16



Media

- ✉ alexander_bates @hms.harvard.edu ↗
- ☁ @asbates.bsky.social ↗
- 🐦 as_bates ↗
- 👤 alexanderbates ↗
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- 🔗 google scholar ↗
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- R⁺ researchgate ↗
- P GQQ-6852-2022 ↗

Skills

- QR R
- QP python
- ✓ MATLAB
- Q github
- PG git
- M markdown
- I Illustrator
- I InDesign
- IC communication
- IT text editing
- JA journalistic writing
- CE creative writing
- OA open access

Software

- natverse ↗
- neuromorph ↗
- nat.ggplot ↗
- neuronbridger ↗
- neuprint ↗
- hemibrainr ↗
- mouselightr ↗
- insectbrainr ↗
- cranr ↗
- bancr ↗
- influencer ↗

Referees

- PD PhD Supervisor:
Dr. Gregory Jefferis, MRC Laboratory of Molecular Biology, Cambridge, jefferis@mrc-lmb.cam.ac.uk ↗
- PD Current Supervisor:
Prof. Rachel Wilson, Harvard Medical School, Rachel_Wilson@hms.harvard.edu ↗

- PK Key Collaborator:
Prof. Wei-Chung Allen Lee, Harvard Medical School, Wei-Chung_Lee@hms.harvard.edu ↗

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

- PD Supervisor:
Serene Dhawan, Princeton, PhD student, serenedhawan@gmail.com ↗

PRIMARY RESEARCH

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

	title	author	journal	year	cites
Distributed control circuits across a brain-and-cord connectome ↗	<u>AS Bates</u> ‡, JS Phelps‡, M Kim†, HH Yang†, A Matsliah, Z Ajabi, E Perlman, ...		bioRxiv, <i>in review at</i> <i>Nature</i>	2025	11
Neurotransmitter classification from electron microscopy images at synaptic sites in <i>Drosophila melanogaster</i> ↗	N Eckstein, <u>AS Bates</u> †, A Champion, M Du, Y Yin, P Schlegel, AKY Lu, ...		Cell	2024	205
Information flow, cell types and stereotypy in a full olfactory connectome ↗	P Schlegel†, <u>AS Bates</u> †, T Stürner, SR Jagannathan, N Drummond, J Hsu, ...		eLife	2021	157
Complete connectomic reconstruction of olfactory projection neurons in the fly brain ↗	<u>AS Bates</u> †, P Schlegel†, RJV Roberts, N Drummond, IFM Tamimi, ...		Curr. Biology	2020	207
The natverse, a versatile toolbox for combining and analysing neuroanatomical data ↗	<u>AS Bates</u> †, JD Manton†, SR Jagannathan, M Costa, P Schlegel, T Rohlfing, ...		eLife	2020	206
Analysis and optimization of equitable US cancer clinical trial center access by travel time ↗	H Lee, AS Bates, S Callier, M Chan, N Chambwe, A Marshall, MB Terry, ...		JAMA oncology	2024	14
Functional and anatomical specificity in a higher olfactory centre ↗	S Frechter, AS Bates, S Tootoonian, MJ Dolan, J Manton, AR Jamasb, ...		eLife	2019	115
Neural circuit mechanisms for steering control in walking <i>Drosophila</i> ↗	A Rayshubskiy, SL Holtz, AS Bates, QX Vanderbeck, LS Capdevila, ...		eLife	2025	101
Quantitative Attributions with Counterfactuals ↗	DY Adjavon, N Eckstein, AS Bates, GSXE Jefferis, J Funke		bioRxiv	2024	0
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	333
Discriminative attribution from paired images ↗	N Eckstein, H Bukhari, AS Bates, GSXE Jefferis, J Funke		Euro. Conf. on Computer Vision	2022	8
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	45
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, RJ Roberts, ...		eLife	2019	167
Communication from learned to innate olfactory processing centers is required for memory retrieval in <i>Drosophila</i> ↗	MJ Dolan, G Belliard-Guerin, AS Bates, S Frechter, A Lampin-Saint-Amaux, ...		Neuron	2018	117
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	105
Sexual dimorphism in the complete connectome of the <i>Drosophila</i> male central nervous system ↗	S Berg, IR Beckett, M Costa, P Schlegel, M Januszewski, EC Marin, ...		bioRxiv	2025	4
Comparative connectomics of <i>Drosophila</i> descending and ascending neurons ↗	T Stürner, P Brooks, L Serratosa Capdevila, BJ Morris, A Javier, S Fang, ...		Nature	2025	35
A <i>Drosophila</i> computational brain model reveals sensorimotor processing ↗	PK Shiu, GR Sterne, N Spiller, R Franconville, A Sandoval, J Zhou, ...		Nature	2024	76
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	110
Neuronal wiring diagram of an adult brain ↗	S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, SC Yu, CE McKellar, ...		Nature	2024	480
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	381
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	1113
Connectomics analysis reveals first-, second-, and third-order thermosensory and hygrosensory neurons in the adult <i>Drosophila</i> brain ↗	EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...		Curr. Biology	2020	105
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, ...		Curr. Biology	2020	80
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	48
Combinatorial encoding of odors in the mosquito antennal lobe ↗	P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, AS Bates, ...		Nature Comm.	2023	17

Key: † = first author, ‡ = corresponding author

REVIEWS

	title	author	journal	year	cites
Systems neuroscience: Auditory processing at synaptic resolution ↗	<u>AS Bates</u> ,†, G Jefferis		Curr. Biology	2022	1
Neuronal cell types in the fly: single-cell anatomy meets single-cell genomics ↗	<u>AS Bates</u> †, J Janssens, GS Jefferis, S Aerts		Curr. opinion in neurobiology	2019	72

Peer Review	journal reviews
COSYNE (abstracts)	9
PLoS Comp. Bio.	3
eLife	3
Nature Comm.	1

SELECTED TALKS

2026	4th Asia-Pacific Drosophila Neuroscience Conference (APDNC4) · Invited speaker	Shenzhen, China
2025	CSHL Neurobiology of <i>Drosophila</i> · Invited speaker	Cold Spring Harbor, NY
2025	FlyWire Townhall · Invited speaker · Video of talk ↗	Princeton, NJ
2025	HMS Neurobiology Department Talk · Invited speaker · Video of talk ↗	Boston, MA
2025	CRANTb Connectomics Symposium · Invited speaker	New York, NY

2024	CSHL Neuronal Circuits • Invited speaker	 Cold Spring Harbor, NY
2019	ECRO meeting European Chemoreception Research Organization • Invited speaker	 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
LEADERSHIP		
2026	COSYNE 2026 abstract reviewer COSYNE	
2025	Teaching at the San Juan Winter School for Connectomics San Juan Winter School	 San Juan, Puerto Rico
2023	Attended HFP Leadership and Management Skills Course for Postdocs ↗ HFP Consulting	 remote
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	Officially mentored summer student MRC LMB, University of Cambridge	 Cambridge, UK
01/05/2018 01/09/2017	Officially mentored undergraduate student Dept. Zoology, University of Cambridge • Student won best thesis in year award and two authorships	 Cambridge, UK
2017	Officially 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
2014

- Science Editor, Pi Magazine ↗
University College London
- UCL iGEM 2014 ↗ Advisor
University College London
 - Project planning, oversight, team selection and management
 - Gold medallist

📍 London, UK

Rx Most of my work has first been published on bioRxiv

Ə Much of my work comes with open source R code

OTHER

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

DATA AND CODE

- Public Dataset: BANC Adult Fly Brain Connectome
Harvard Dataverse
 - DOI: 10.7910/DVN/8TFGGB ↗
 - Complete synaptic-resolution connectome of an adult female *Drosophila melanogaster* brain and ventral nerve cord
- Open Source Contributions: natverse
GitHub Organization
 - 20 repositories as contributor
 - Top downloads: nat (82,965), nat.ncbi (39,035)
 - Projects: nat ↗, nat.ncbi ↗, fabseg ↗, natverse ↗, nat.examples ↗, rcatmaid ↗, mouselightr ↗, elmr ↗, hemibrainr ↗, flycircuit ↗, neupintr ↗, nat.ggplot ↗, fishatlas ↗, nat.h5reg ↗, neuromorphr ↗, neuronbridge ↗, influencer ↗, drvid ↗, natverse_hugo ↗, insectbrain ↗
- Open Source Contributions: wilson-lab
GitHub Organization
 - 3 repositories as contributor
 - Projects: design-files ↗, nat-tech ↗, panels-matlab ↗
- Open Source Contributions: htem
GitHub Organization
 - 1 repositories as contributor
 - Projects: BANC-project ↗
- Open Source Contributions: flyconnectome
GitHub Organization
 - 4 repositories as contributor
 - Projects: 2020hemibrain_examples ↗, bancr ↗, hemibrain_olf_data ↗, crantr ↗
- Zenodo Dataset: Connectome Influence Calculator
Zenodo
 - DOI: 10.5281/zenodo.1769383 ↗
 - Downloads: 16
- Zenodo Dataset: Supplementary data to accompany Information flow, cell types and stereotypy in a full olfactory connectome
Zenodo
 - DOI: 10.5281/zenodo.4383228 ↗
 - Downloads: 551

• Zenodo Dataset: Supplemental Files for Eckstein and Bates et al., Cell (2024)

Zenodo

• DOI: [10.5281/zenodo.10593546](https://doi.org/10.5281/zenodo.10593546)

• Downloads: 954

• Zenodo Dataset: BAcTrace a new tool for retrograde tracing of neuronal circuits

Zenodo

• DOI: [10.5281/zenodo.3797211](https://doi.org/10.5281/zenodo.3797211)

• Downloads: 1,491

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