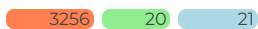


# DR. ALEXANDER SHAKEEL BATES

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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## 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*  
• Helping to lead an international collaboration with Prof. Wei-Chung Allen Lee ↗, flywire ↗ and a set of international groups on the first whole fly central nervous system connectome, open-access
- 01/03/2024 | 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

## FELLOWSHIPS

- 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  
• Also accepted as Life Science Research Foundation fellow
- 01/06/2022 | 01/04/2021 EMBO fellow ↗ European Molecular Biology Organization Europe  
• Also accepted as a International Human Frontier Science Program fellow
- 30/09/2019 | 01/08/2015 Herchel Smith PhD Scholarship ↗ Herchel Smith Foundation Cambridge, UK  
• Also accepted as a International Human Frontier Science Program fellow
- 01/08/2018 | 01/08/2016 Boehringer Ingelheim PhD Scholarship ↗ Boehringer Ingelheim Foundation European  
• Also accepted as a International Human Frontier Science Program fellow

## EDUCATION

- 30/09/2020 | 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 | 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
- 01/09/2012 | 01/09/2010 A levels Woodbridge High School London, UK  
• 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 | 01/09/2008 GCSEs Woodbridge High School London, UK  
• 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 ↗

### Media

- ✉ alexander\_bates@hms.harvard.edu ↗  
🐦 as\_bates ↗  
👤 alexanderbates ↗  
🔗 asbates.com ↗  
🔗 linkedin ↗  
🔗 google scholar ↗  
🆔 0000-0002-1195-0445 ↗  
🔗 researchgate ↗  
🆔 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 ↗  
neupintr ↗  
hemibrain ↗  
mouselightr ↗  
insectbrainr ↗  
crantr ↗  
banrc ↗

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

## REVIEWS

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

## PAPERS

| 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, ...<br>P Schlegel, <b>AS Bates</b> , T Stürner, SR Jagannathan, N Drummond, J Hsu, ...<br><b>AS Bates</b> , P Schlegel, RJV Roberts, N Drummond, IFM Tamimi, ...<br><b>AS Bates</b> , JD Manton, SR Jagannathan, M Costa, P Schlegel, T Rohlfing, ...   | 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, ...<br><b>AS Bates</b> , JD Manton, SR Jagannathan, M Costa, P Schlegel, T Rohlfing, ...  | Curr. Biology                  | 2020 | 179   |
| The natverse, a versatile toolbox for combining and analysing neuroanatomical data ↗  | 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 Toootoonian, MJ Dolan, J Manton, AR Jamasb, ...<br>P Schlegel, Y Yin, <b>AS Bates</b> , S Dorkenwald, K Eichler, P Brooks, DS Han, ...   | eLife                          | 2019 | 105   |
| Whole-brain annotation and multi-connectome cell typing of <i>Drosophila</i> ↗  | DY Adjavon, N Eckstein, <b>AS Bates</b> , GSXE Jefferis, J Funke   | Nature                         | 2024 | 152   |
| Quantitative Attributions with Counterfactuals ↗  | N Eckstein, H Bukhari, <b>AS Bates</b> , GSXE Jefferis, J Funke  | bioRxiv                        | 2024 | 0     |
| Discriminative attribution from paired images ↗   | S Cachero, M Gkantia, <b>AS Bates</b> , S Frechter, L Blackie, A McCarthy, ...   | Euro. Conf. on Computer Vision | 2022 | 7     |
| BACTrace, a tool for retrograde tracing of neuronal circuits in <i>Drosophila</i> ↗   | 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 <i>Drosophila</i> ↗   | A Rayshubskiy, SL Holtz, <b>A 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 <i>Drosophila</i> 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 <i>Drosophila</i> ↗                                     | MJ Dolan, G Belliard-Guerin, <b>AS Bates</b> , S Frechter, A Lampin-Saint-Amaux, ...<br>PH Li, LF Lindsey, M Januszewski, Z Zheng, <b>AS Bates</b> , I Taisz, M Tyka, ...<br>PK Shiu, GR Sterne, N Spiller, R Franconville, A Sandoval, J Zhou, ...<br>A Lin, R Yang, S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, S Yu, ...<br>S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, SC Yu, CE McKellar, ...   | Neuron                         | 2018 | 112   |
| Automated reconstruction of a serial-section EM <i>Drosophila</i> brain with flood-filling networks and local realignment ↗                                   | T Stürner, P Brooks, LS Capdevila, BJ Morris, A Javier, S Fang, M Gkantia, ...   | bioRxiv                        | 2019 | 98    |
| A <i>Drosophila</i> computational brain model reveals sensorimotor processing ↗   | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | Nature                         | 2024 | 33    |
| 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, ...<br>S Dorkenwald, A Matsliah, AR Sterling, P Schlegel, SC Yu, CE McKellar, ...  | Nature                         | 2024 | 53    |
| Neuronal wiring diagram of an adult brain ↗   | T Stürner, P Brooks, LS Capdevila, BJ Morris, A Javier, S Fang, M Gkantia, ...   | Nature                         | 2024 | 218   |
| Comparative connectomics of the descending and ascending neurons of the <i>Drosophila</i> nervous system: stereotypy and sexual dimorphism ↗                  | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | bioRxiv                        | 2024 | 9     |
| 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, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | eLife                          | 2020 | 336   |
| A connectome and analysis of the adult <i>Drosophila</i> central brain ↗  | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | Curr. Biology                  | 2020 | 94    |
| Connectomics analysis reveals first-, second-, and third-order thermosensory and hygrosensory neurons in the adult <i>Drosophila</i> brain ↗                  | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | Curr. Biology                  | 2020 | 73    |
| Input connectivity reveals additional heterogeneity of dopaminergic reinforcement in <i>Drosophila</i> ↗  | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | bioRxiv                        | 2018 | 44    |
| Neural circuit basis of aversive odour processing in <i>Drosophila</i> from sensory input to descending output ↗  | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... | Nature Comm.                   | 2023 | 11    |
| Combinatorial encoding of odors in the mosquito antennal lobe ↗   | F Li, JW Lindsey, EC Marin, N Otto, M Dreher, G Dempsey, I Stark, ...<br>LK Scheffer, CS Xu, M Januszewski, Z Lu, S Takemura, KJ Hayworth, ...<br>EC Marin, L Büld, M Theiss, T Sarkissian, RJV Roberts, R Turnbull, ...<br>N Otto, MW Pleijzier, IC Morgan, AJ Edmondson-Stait, KJ Heinz, I Stark, ...<br>P Huoviala, MJ Dolan, FM Love, P Myers, S Frechter, S Namiki, ...<br>P Singh, S Goyal, S Gupta, S Garg, A Tiwari, V Rajput, <b>AS Bates</b> , ... |                                |      |       |

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.

Rx Most of my work has first been published on bioRxiv

⑧ Much of my work comes with open source R code

## SELECTED TALKS

|      |   |                       |
|------|---|-----------------------|
| 2019 | ECRO meeting<br>European Chemoreception Research Organization | Trieste, Italy        |
| 2018 | Boehringer Ingelheim Meeting<br>Boehringer Ingelheim Fonds    | Hirschegg, Austria    |
| 2017 | MPI Connectomics meeting<br>Max Planck Institute              | Berlin, Germany       |
| 2017 | ECRO meeting<br>European Chemoreception Research Organization | Cambridge, UK         |
| 2017 | Boehringer Ingelheim Meeting<br>Boehringer Ingelheim Fonds    | Hirschegg, Austria    |
| 2016 | Brains and Roses<br>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

- 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

## 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  
• Worked on neuronal structural plasticity in *D. 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

📍 Cambridge, UK

📍 London, UK

📍 London, UK

## ⌚ PEER REVIEWS

| journal reviews |
|-----------------|
| PLoS Comp. Bio. |
| eLife           |
| Nature Comm.    |

Last updated on 2025-03-09.