

Thomas D. Montenegro-Johnson

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Summary: Early-career researcher specialising in microscale flows, propulsion, and more general mathematical biology. Approximately £600,000 external funding.

Metrics: 21 peer-reviewed journal publications, 223 citations, h-index 9, i10-index 9.

Academic career

Lecturer in Mathematical Biology <i>Sch. Mathematics, U. Birmingham</i>	Aug 2016 –
<ul style="list-style-type: none">• Artificial Transforming Swimmers for Precision Microfluidics Tasks, £283,937.<ul style="list-style-type: none">– PI on EPSRC “Bright Ideas” grant, project runs from 2018 - 2020.• H-Reality, £3,000,000.<ul style="list-style-type: none">– Co-I on H2020 FET grant, project runs from 2018 - 2021.– Lead mathematician receiving £226,260.	
1851 Fellow <i>DAMTP, U. Cambridge</i>	Oct 2014 – Sep 2017
<ul style="list-style-type: none">• Foundations of Biomedical Microrobots, £110,000.<ul style="list-style-type: none">– PI on competitive (~3% success) 1851 Commission Research Fellowship.– Outputs: 15 peer-reviewed journal publications.	
Postdoctoral Research Associate <i>w/ Prof. Eric Lauga, DAMTP, U. Cambridge</i>	Jan 2014 – Sep 2014
Postdoctoral Research Fellow <i>w/ Prof. D. Smith, Sch. Mathematics, U. Birmingham</i>	Jan 2013 – Dec 2013
PhD Applied Mathematics <i>Sch. Mathematics, U. Birmingham, UK</i>	Sep 2009 – Mar 2013
MPhil Earth Sciences <i>The BP Institute, U. Cambridge, UK</i>	Sep 2008 – Aug 2009
BA Mathematics <i>St John’s College, U. Cambridge, UK</i>	Sep 2005 – Jun 2008

Peer-reviewed journal publications

* highlights 1st, joint-1st, and senior author. Supervised students underlined.

***24. Wall stress enhanced exocytosis of exovesicles as a possible mechanism of left-right symmetry-breaking in zebrafish development**

J. Solowiej-Wedderburn, D. J. Smith, S. S. Lopes, and T. D. Montenegro-Johnson, Submitted.

***23. Microtransformers: controlled microscale navigation with flexible robots**

T. D. Montenegro-Johnson, Under Review.

22. Clustering-induced self-propulsion of isotropic autophoretic particles

A. Varma, T. D. Montenegro-Johnson, and S. Michelin, Under Review for Soft Matter.

21. Symmetry breaking cilia-driven flow in embryogenesis

D. J. Smith, T. D. Montenegro-Johnson, and S. S. Lopes, Annual Reviews of Fluid Mechanics, to appear 2019.

***20. Thrifty swimming with shear-thinning: a note on out-of-plane effects for undulatory locomotion through shear-thinning fluids**

D. Gagnon and T. D. Montenegro-Johnson, The ANZIAM Journal, to appear 2018.

***19. Fake μ s: A cautionary tail of shear-thinning locomotion**

T. D. Montenegro-Johnson, Physical Review Fluids, 2017.

***18. Autophoretic flow on a torus**

L. Schmieding, E. Lauga, and T. D. Montenegro-Johnson, Physical Review Fluids, 2017.

- Highlighted with a commentary by Bart Verberck in [Nature Physics](#), 2017.

17. Dynamics of cilia length in left-right development

P. A. Pintado, P. Sampaio, B. Tavares, T. D. Montenegro-Johnson, D. J. Smith and S. S. Lopes, Royal Society Open Science, 2017.

***16. Microscale Flow Dynamics of Ribbons and Sheets**

T. D. Montenegro-Johnson, L. M. Koens, and E. Lauga, Soft Matter, 2017.

- Selected for the issue [front cover](#).

15. In Silico Methods for Cell Annotation, Quantification of Gene Expression, and Cell Geometry at Single-Cell Resolution Using 3DCellAtlas

P. Stamm, S. Strauss, T. D. Montenegro-Johnson, R. Smith and G. W. Bassel, Plant Hormones: Methods and Protocols, 2017.

***14. Flow analysis of swimming *C. Elegans*: experiments and simulations**

T. D. Montenegro-Johnson, D. A. Gagnon, P. E. Arratia and E. Lauga, Physical Review Fluids, 2016.

***13. Three-dimensional flow in Kupffer's Vesicle**

T. D. Montenegro-Johnson, D. I. Baker, D. J. Smith and S. S. Lopes, Journal of Mathematical Biology, 2016.

***12. A regularised singularity approach to phoretic problems**

T. D. Montenegro-Johnson, S. Michelin and E. Lauga, European Physical Journal E, 2015.

- Selected for the issue [front cover](#).

***11. Geometric pumping in autophoretic channels**

S. Michelin, T. D. Montenegro-Johnson, G. De Canio, N. Lobato-Dauzier and E. Lauga, Soft Matter, 2015.

- Selected for the issue [front cover](#).

10. Complex fluids affect low-Reynolds number locomotion in a kinematic-dependent manner

F. A. Godínez, L. Koens, T. D. Montenegro-Johnson, R. Zenit and E. Lauga, Experiments in Fluids, 2015.

***9. Digital single cell analysis of plant organ development using 3DCellAtlas**

T. D. Montenegro-Johnson, P. Stamm, S. Strauss, A. T. Topham, M. Tsagris, A. T. A. Wood, R. S. Smith and G. W. Bassel, The Plant Cell, 2015.

- Selected for an [F1000 recommendation](#).
- [Global Plant Council](#) paper of the month.

***8. Spermatozoa scattering by a microchannel feature: an elasto-hydrodynamic model.**

T. D. Montenegro-Johnson, H. Gadêlha and D. J. Smith, Royal Society Open Science, 2015.

***7. The other optimal Stokes drag profile**

T. D. Montenegro-Johnson and E. Lauga, Journal of Fluid Mechanics, 2015.

6. Organized chaos in Kupffer's vesicle: how a heterogeneous structure achieves consistent left-right patterning

D. J. Smith, T. D. Montenegro-Johnson and S. S. Lopes, BioArchitecture 2014.

***5. Optimal swimming of a sheet**

T. D. Montenegro-Johnson and E. Lauga, Physical Review E, 2014.

4. Left-Right organizer flow dynamics: How much cilia activity reliably yields laterality?

P. Sampaio, R. R. Ferreira, A. Guerrero, P. Pintado, B. Tavares, J. Amaro, A. A. Smith, T. D. Montenegro-Johnson, D. J. Smith, and S. S. Lopes, Developmental Cell, 2014.

***3. Physics of rheologically enhanced propulsion: different strokes in generalized Stokes**

T. D. Montenegro-Johnson, D. J. Smith and D. Loghin, Physics of Fluids, 2013.

- Highlighted with a commentary in the [Journal Club for Condensed Matter Physics](#).

***2. Modelling the fluid mechanics of cilia and flagella in reproduction and development**

T. D. Montenegro-Johnson, A. A. Smith, D. J. Smith, D. Loghin and J. R. Blake, European Physical Journal E, 2012.

***1. Symmetry-breaking cilia-driven flow in the zebrafish embryo**

A. A. Smith, T. D. Johnson, D. J. Smith and J. R. Blake, Journal of Fluid Mechanics, 2012.

Research leadership

Postdoctoral supervision × 2, *U. Birmingham* **2018 - 2021**

- Recruited and managed 2 postdoctoral research associates on distinct projects.

PhD supervision × 3, *U. Birmingham* **2017 -**

- Lead supervisor on EPSRC-funded studentship 2018-2021.
- Co-supervisor on 2 EPSRC-funded studentships 2017-2020.

Masters/undergraduate project supervision × 4, *U. Cambridge and U. Birmingham* **2017 -**

- Lead supervisor on MRes project, 2017-2018.
- Lead supervisor on 3 summer undergraduate research projects (pubs 13, 18, and 24).

School Public Engagement with Research Committee Chair, *U. Birmingham* **2018-**

- Founded School committee, chaired regular meetings, and developed REF-compliant strategy.

Grants and Fellowships mentoring *U. Cambridge and U. Birmingham* **2016 –**
 • Feedback provided on 1851 and EPSRC fellowship and grant applications of colleagues, 2017–,
 • Speaker “Introduction to fellowships” workshop, 2017, U. Birmingham,
 • Leader of “Applying for Grants and Fellowships Workshop”, 2016, DAMTP Cambridge.

EPSRC Mathematics Early Career Forum Member **2016 –**
 • Participate in meetings, and report to department on EPSRC policies.

International/interdisciplinary collaborations

Autophoretic propulsion *E. Lauga, U. Cambridge, S. Michelin, E. Poly., and I. Aronson, Penn. State.* **2015–**
 • Outputs: publications 11, 12, 18, and 22.

Undulatory swimming flow analysis. *E. Lauga, U. Cambridge, P. Arratia, D. Gagnon U. Penn.* **2015 –**
 • Outputs: publications 14, 20.

Embryonic symmetry-breaking in zebrafish *S. Lopes, U.N. de Lisboa.* **2013 –**
 • Outputs: publications 6, 13 (journal IF 10.4), 17, and 21.

Quantitative 3D analysis of plant roots. *Bassel Lab, U. Birmingham, and Strauss lab, MPIPZ.* **2014-2017**
 • Outputs: publications 9 (journal IF 8.5), 15.

Invited lab visits, workshops and talks

Complex Fluids in Biological Systems *BIRS, Banff, Canada - workshop* **July 2018**

DAMTP Biophysics lunch *Cambridge, UK - seminar* **Feb 2018**

Biologically Active Fluids SIG *Birmingham, UK - early career workshop lead* **July 2017**

Mathematical and Computational Biology Seminar *U. Melbourne, Australia - seminar* **Mar 2017**

1851 Alumni Science Evening *London, UK - lecture* **Feb 2017**

UK Fluids Summer School *Imperial College London, UK - lecture* **Jul 2016**

LadHyx Seminar series *École Polytechnique, France - seminar* **Mar 2016**

York Mathematical Biology Group seminar *U. York, UK - seminar* **Dec 2015**

Imperial College Applied Mathematics seminar series *Imperial College London, UK - seminar* **Feb 2015**

Workshop “Collective motion of active swimmers” *U. Nice S. A., France - seminar* **Sep 2013**

Lopes Laboratory *U.N. Lisboa, Portugal - research visit, pub. 4* **Jul 2013**

Birmingham University Applied Mathematics seminar series *U. Birmingham, UK - seminar* **Mar 2013**

Workshop “Left-right symmetry breaking in zebrafish” *CEDOC, U.N. Lisboa, Portugal* **Jun 2012**

BP Institute seminar series *BP Institute, U. Cambridge, UK - seminar* **Dec 2011**

Contributed talks

Mathematics and Big Data Showcase (poster) *U. Cambridge, UK* **Apr 2016**

British Applied Mathematics Colloquium *U. Oxford, UK* **Apr 2016**

STEM for Britain (poster) *The Parliamentary and Scientific Committee* **March 2016**

Flowing Matter 2016 *U. Porto, Portugal* **Jan 2016**

American Physical Society 68th Annual Meeting *Harvard and MIT, USA* **Nov 2015**

British Applied Mathematics Colloquium *U. Cambridge, UK* **Mar 2015**

British Society of Rheology Mid-Winter meeting *U. Durham, UK* **Dec 2014**

British Applied Maths Colloquium *U. Cardiff, UK* **Apr 2014**

American Physical Society 66th Annual Meeting *U. Pittsburgh and Northeastern U. USA* **Nov 2013**

British Andrology Society 35th Annual Meeting *Liverpool Women’s Hospital, UK* **Sep 2013**

Swimming and Complexity at Low Reynolds Number (poster) *Institute of Physics, UK* **Jun 2012**

Centre for Systems Biology seminar series *U. Birmingham, UK* **May 2012**

Biological Flow: A conference in honour of Professor T.J. Pedley *U. Cambridge, UK* **Apr 2012**

Euromech Colloquium: Biomedical Flows at Low Reynolds Numbers *ETH, CH*
British Applied Maths Colloquium *U. Birmingham, UK*

Aug 2011

Apr 2011

Substantial Research Awards

Co-I: H2020 FET - €3,000,000 ERC <ul style="list-style-type: none">• Lead mathematician receiving £226,260.• 2-year PDRA, 20% PI time (3 years).	Sept 2018 - Aug 2021
PI: “Bright Ideas” grant - £283,937 EPSRC <ul style="list-style-type: none">• “Artificial Transforming Swimmers for Precision Microfluidics Tasks”• 2-year PDRA, 20% PI time (2 years). RC contrib. £229,917.	May 2018 - April 2020
PI: Research Fellowship <i>The Royal Commission for the Exhibition of 1851</i> <ul style="list-style-type: none">• “Foundations of Biomedical Microrobots”.• Full salary for 3 years, research expenses, 1 of 7 awards (~3% success).	Oct 2014 - Sept 2017

Other awards

STEM for Britain Silver Medal <i>The Parliamentary and Scientific Committee, £2,000</i>	March 2016
CISM summer school COST Fellowship <i>COST Action MP1305 Flowing Matter, ~£2,000</i>	May 2015
Undergraduate Research Bursary <i>London Mathematical Society, £1,296 for student</i>	Summer 2014
Young Researcher Prize <i>British Andrology Society annual meeting, ~£100</i>	Sep 2013
PGR Development Funding <i>U. Birmingham, £1,200</i>	Mar 2012
Crighton Fellowship <i>DAMTP, U. Cambridge, £2,800</i>	Summer 2011
BP Opportunity Award <i>British Petroleum, £15,000</i>	Mar 2009

Teaching and professional responsibilities

Module design: Led redesign of masters-level mathematical biology course to double the course in size, to begin Oct 2018.

Module lecturer: Masters-level Mathematical Biology course, 27 contact hours, 2017 (100% student satisfaction) and 2018 (to be completed).

Small-group teaching: 12 tutees, continuously 44 contact hours per year. Third year research skills supervision (6 students, 2017-2018), and 4th-year masters project supervision (1 student 2017-2018).

Impact Case Study: collaborating with 2 colleagues for REF 2021 submission.

Referee for the following journals: Computers in Biology and Medicine, European Physical Journal Plus, Journal of Fluids and Structures, Journal of Fluid Mechanics, Journal of Theoretical Biology, Journal of The Royal Society Interface, Mathematical Biosciences, Physics of Fluids, Physical Review Fluids, Physical Review Letters.