

# Thomas D. Montenegro-Johnson

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## Education

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- PhD Applied Mathematics** *School of Mathematics, U. Birmingham* **Sep 2009 – Mar 2013**
- Thesis: Microscopic Swimming in Biological Fluids
  - Supervisors: Prof. J. Blake and Dr D. Smith
- MPhil Earth Sciences** *The BP Institute, U. Cambridge* **Sep 2008 – Aug 2009**
- Thesis: Flows in Industrial Mixers
  - Supervisor: Prof. C. Caulfield
- BA (II:I) Mathematics** *St John's College, U. Cambridge* **Sep 2005 – Jun 2008**

## Research experience

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- Lecturer in Mathematical Biology** *School of Mathematics, U. Birmingham* **Aug 2016 –**
- Foundations of Biomedical Microrobots - *PI*
  - Modelling autophoresis - *PI*
  - Microscopic swimming - *CoI, international collab (US)*
  - Symmetry-breaking flow in the zebrafish embryo - *CoI, international collab (Portugal)*
  - 3DCellAtlas for the meristem - *CoI, international collab (Germany)*
- 1851 Fellow** *DAMTP, U. Cambridge* **Oct 2014 – Sep 2017**
- Foundations of Biomedical Microrobots - *PI*
- Postdoctoral Research Associate** *w/ Dr Eric Lauga, DAMTP, U. Cambridge* **Jan 2014 – Sep 2014**
- Optimisation in Stokes flow - *Investigator*
- Postdoctoral Research Fellow** *w/ Dr D. Smith, School of Mathematics, U. Birmingham* **Jan 2013 – Dec 2013**
- Modelling the Fluid Mechanics of Propulsion through a Complex Microenvironment - *Investigator*
  - Development of 3DCellAtlas - *CoI, international collab (Germany)*
  - Symmetry-breaking flow in the zebrafish embryo - *Investigator, international collab (Portugal)*

## Peer-reviewed journal publications

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\* highlights first or joint-first author papers. Supervised students underlined:

- 17. The diffusiophoretic torus** *L. Schmieding, E. Lauga, and T. D. Montenegro-Johnson*, Submitted
- \* **16. Microscale Flow Dynamics of Ribbons and Sheets** *T. D. Montenegro-Johnson, L. M. Koens, and E. Lauga*, *sub judice*
- 15. 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*, *sub judice*
- \* **14. Flow analysis of swimming *C. Elegans*: experiments and simulations.** *T. D. Montenegro-Johnson, D. A. Gagnon, P. E. Arratia and E. Lauga*, *Phys. Rev. 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, 38.
- Selected for the issue [front cover](#)
- \* **11. Geometric pumping in autophoretic channels** *S. Michelin, T. D. Montenegro-Johnson (joint first author), G. De Canio, N. Lobato-Dauzier and E. Lauga*, *Soft Matter* 2015 11.
- 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 56(5).
- \* **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*, *Plant Cell* 2015, 27(4).
- 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, 2.
- \*7. The other optimal Stokes drag profile** *T. D. Montenegro-Johnson and E. Lauga*, Journal of Fluid Mechanics 2015, 762.
- 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, 4(3).
- \*5. Optimal swimming of a sheet** *T. D. Montenegro-Johnson and E. Lauga*, Physical Review E. 2014, 89(6).
- 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, 29(6).
- \*3. Physics of rheologically enhanced propulsion: different strokes in generalized Stokes** *T. D. Montenegro-Johnson, D. J. Smith and Daniel Loghin*, Physics of Fluids 2013, 25(8).
- 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, Daniel Loghin and J. R. Blake*, European Physical Journal E 2012, 35(10).
- \*1. Symmetry-breaking cilia-driven flow in the zebrafish embryo** *A. A. Smith, T. D. Johnson (joint first author), D. J. Smith and J. R. Blake*, Journal of Fluid Mechanics 2012, 705.

## Awards

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<b>SET for Britain Silver Medal</b> <i>The Parliamentary and Scientific Committee</i>	<b>March 2016</b>
<ul style="list-style-type: none"> <li>• Presentation title: Microrobotic Swimming</li> </ul>	
<b>CISM summer school COST Fellowship</b> <i>COST Action MP1305 Flowing Matter</i>	<b>May 2015</b>
<ul style="list-style-type: none"> <li>• Course title: Interaction of Microscopic Structures and Organisms with Fluid Flows</li> <li>• Flights, accommodation, registration and subsistence</li> </ul>	
<b>Research Fellowship</b> <i>The Royal Commission for the Exhibition of 1851</i>	<b>Oct 2014 - Sept 2017</b>
<ul style="list-style-type: none"> <li>• Project title: Foundations of Biomedical Microrobots</li> <li>• Full salary for 3 years plus research expenses, one of seven awards total</li> </ul>	
<b>Undergraduate Research Bursary</b> <i>London Mathematical Society</i>	<b>Summer 2014</b>
<ul style="list-style-type: none"> <li>• Project title: Dynamics of cilia observed in developing zebrafish</li> <li>• £1,296 for supervision of undergraduate researcher</li> </ul>	
<b>Young Researcher Prize</b> <i>British Andrology Society annual meeting</i>	<b>Sep 2013</b>
<ul style="list-style-type: none"> <li>• Award for best presentation by a young researcher</li> </ul>	
<b>PGR Development Funding</b> <i>U. Birmingham</i>	<b>Mar 2012</b>
<ul style="list-style-type: none"> <li>• £1,200 to provide CUDA graphics cards for 20 PhD students to learn GPU programming together</li> </ul>	
<b>Crichton Fellowship</b> <i>DAMTP, U. Cambridge</i>	<b>Summer 2011</b>
<ul style="list-style-type: none"> <li>• £2,800 for a 3 month research fellowship, one of three awards total</li> </ul>	
<b>BP Opportunity Award</b> <i>British Petroleum</i>	<b>Mar 2009</b>
<ul style="list-style-type: none"> <li>• £15,000 award for research promise</li> <li>• Distinct from MPhil funding</li> </ul>	
<b>Nuffield Undergraduate Research Bursary</b> <i>Nuffield Foundation, Supervisor, Dr D. Smith</i>	<b>Aug 2007</b>

## Invited lab visits, workshops and talks

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<b>UK Fluids Summer School</b> <i>Imperial College London, UK</i>	<b>Jul 2016</b>
<ul style="list-style-type: none"> <li>• "Interscale interactions in fluid mechanics and beyond" - invited lecture</li> </ul>	
<b>LadHyx Seminar series</b> <i>École Polytechnique, France</i>	<b>Mar 2016</b>
<ul style="list-style-type: none"> <li>• Invited departmental seminar</li> </ul>	
<b>York Mathematical Biology Group seminar</b> <i>U. York, UK</i>	<b>Dec 2015</b>
<ul style="list-style-type: none"> <li>• Invited group seminar and research visit</li> </ul>	
<b>Imperial College Applied Mathematics seminar series</b> <i>Imperial College London, UK</i>	<b>Feb 2015</b>
<ul style="list-style-type: none"> <li>• Invited departmental seminar</li> </ul>	
<b>Workshop "Collective motion of active swimmers"</b> <i>Université de Nice Sophia Antipolis, France</i>	<b>Sep 2013</b>
<ul style="list-style-type: none"> <li>• Invited seminar at week-long colloquium</li> </ul>	

<b>Lopes Laboratory</b> <i>CEDOC, U. Nova de Lisboa, Portugal</i>	<b>Jul 2013</b>
<ul style="list-style-type: none"> <li>• Research visit resulted in publication no. 4</li> <li>• Further collaboration with Lopes lab resulting in publications no. 6,13</li> </ul>	
<b>Birmingham University Applied Mathematics seminar series</b> <i>U. Birmingham, UK</i>	<b>Mar 2013</b>
<ul style="list-style-type: none"> <li>• Invited departmental seminar</li> </ul>	
<b>Workshop “Left-right symmetry breaking in zebrafish”</b> <i>CEDOC, U. Nova de Lisboa, Portugal</i>	<b>Jun 2012</b>
<b>BP Institute seminar series</b> <i>BP Institute, U. Cambridge, UK</i>	<b>Dec 2011</b>
<ul style="list-style-type: none"> <li>• Invited departmental seminar</li> </ul>	

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### Contributed talks

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<b>Mathematics and Big Data Showcase (poster)</b> <i>U. Cambridge, UK</i>	<b>Apr 2016</b>
<b>British Applied Mathematics Colloquium</b> <i>U. Oxford, UK</i>	<b>Apr 2016</b>
<b>Flowing Matter 2016</b> <i>U. Porto, Portugal</i>	<b>Jan 2016</b>
<b>American Physical Society 68th Annual Meeting</b> <i>Harvard and MIT, USA</i>	<b>Nov 2015</b>
<b>British Applied Mathematics Colloquium</b> <i>U. Cambridge, UK</i>	<b>Mar 2015</b>
<b>British Society of Rheology Mid-Winter meeting</b> <i>U. Durham, UK</i>	<b>Dec 2014</b>
<b>British Applied Maths Colloquium</b> <i>U. Cardiff, UK</i>	<b>Apr 2014</b>
<b>American Physical Society 66th Annual Meeting</b> <i>U. Pittsburgh and Northeastern U. USA</i>	<b>Nov 2013</b>
<b>British Andrology Society 35th Annual Meeting</b> <i>Liverpool Women’s Hospital, UK</i>	<b>Sep 2013</b>
<b>Swimming and Complexity at Low Reynolds Number (poster)</b> <i>Institute of Physics, UK</i>	<b>Jun 2012</b>
<b>Centre for Systems Biology seminar series</b> <i>U. Birmingham, UK</i>	<b>May 2012</b>
<b>Biological Flow: A conference in honour of Professor T.J. Pedley</b> <i>U. Cambridge, UK</i>	<b>Apr 2012</b>
<b>Euromech Colloquium: Biomedical Flows at Low Reynolds Numbers</b> <i>ETH, CH</i>	<b>Aug 2011</b>
<b>British Applied Maths Colloquium</b> <i>U. Birmingham, UK</i>	<b>Apr 2011</b>

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### Research supervision

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<b>Supervision of undergraduate summer project</b> <i>U. Cambridge</i>	<b>Jun 2016 – Sep 2016</b>
<ul style="list-style-type: none"> <li>• Project title: The many faces of Janus: modelling phoretic motion with maths and computers</li> <li>• Project resulted in submitted publication no. 16</li> </ul>	
<b>Leader of “Applying for Grants and Fellowships Workshop”</b> <i>U. Cambridge</i>	<b>May 2016</b>
<ul style="list-style-type: none"> <li>• A three hour talk and workshop session on applying for funding</li> </ul>	
<b>Supervision of undergraduate summer project</b> <i>U. Cambridge</i>	<b>Jun 2014 – Sep 2014</b>
<ul style="list-style-type: none"> <li>• Project title: Dynamics of cilia observed in developing zebrafish</li> <li>• Project resulted in publication no. 13</li> </ul>	
<b>Co-supervision of undergraduate summer project</b> <i>U. Birmingham</i>	<b>Jun 2013 – Jul 2013</b>
<ul style="list-style-type: none"> <li>• Project title: GPU accelerated individual-based modelling of collective dynamics in living fluids</li> </ul>	
<b>Assistant supervision of Masters students</b> <i>U. Birmingham</i>	<b>2011 – 2012</b>
<ul style="list-style-type: none"> <li>• Assisted with the programming aspects of three 4th-year projects</li> </ul>	

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### Professional responsibilities

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**EPSRC Mathematics Early Career Forum Member:** Participating in forum meetings from 2016 ff.

**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.