W. Tyler McCleery

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Education

John Innes Centre	**Postdoctoral Fellow, Systems Biology**	*2015-2017*
Vanderbilt University	**Ph.D., Physics**	*2012-2016*
Dissertation: Pulling Through: A Biomechanical Analysis of Normal and Aberrant Embryogenesis in *Drosophila*		*Defense: Sept. 2015*
Mentor: Dr. M. Shane Hutson		
Vanderbilt University	**M.A., Physics**	*2010-2012*
University of Southern Mississippi	**B.S., Physics and Mathematics**	*2006-2010*
Honors Thesis: Analysis of the Motion of a Falling Maple Seed (*Acer species*)		
Mentor: Dr. Lawrence Mead		

Career

Assistant Professor, Physics, University of South Alabama *2017-Present*

Publication and Presentation Highlights

Refereed Journal Articles

1. S.M. Crews*, **W.T. McCleery***, M.S. Hutson "Pathway to a phenocopy: Heat stress effects in early embryogenesis." *Developmental Dynamics*, 245: 402-413, 2016. (*equal effort and authorship)
2. Yan, Y., Jiang, L., Aufderheide, K.J., Wright, G., Terekhov, A., Costa, L., Qin, K., **McCleery, W.T.**, Fellenstein, J.J., Ustione, A., Robertson, B., Johnson, C.H., Piston, D., Hutson, M.S., Wikswo, J.P., Hofmeister, W., Janetopoulos, C. "A Microfludic-Enabled Mechanical Microcompressor for the Immobilization of Live Single- and Multi-Cellular Specimens." *Microscopy and Microanalysis*, 20: 141–151, 2014.

Refereed Review Articles

3. **W.T. McCleery***, N.A. Mohd-Radzmann*, V.A. Grieneisen. "Root Branching Plasticity: Collective Decision-Making Results from Local and Global Signalling." *Current Opinion in Cell Biology*, 44: 51–58, 2017. (*equal effort and authorship; invited for special issue)

Invited Presentations

4. **W.T. McCleery**. "Collective Cellular Decision-Making: A Physical Analysis of Development in Drosophila and Arabidopsis." *Department of Biology Colloquium*, U. South Alabama. March 2018.
5. **W.T. McCleery**, Pedagogical Lecture and Practical Demonstration, *EMBO Practical Course: Multi-level Modelling of Morphogenesis*. John Innes Centre, Norwich, UK, July 2017.

Research Grants

"Development of a Low-Cost Micro-Environment Device for Root-Nutrient Interaction"
OpenPlant Fund
Principal Applicant: **W. Tyler McCleery**; Co-applicants: Ziyi Yu and Zhijun Meng, University of Cambridge, Cambridge, UK; and Veronica A. Grieneisen, John Innes Centre, Norwich, UK
Total Costs: £5000 ($6350); Period of Award: Dec. 2016 – Dec. 2017

Fellowships & Honors

- **National Science Foundation Graduate Research Fellowship** ($92,000 + Tuition), 2010-2015
- Harold Stirling Vanderbilt Graduate Scholarship ($6000), Vanderbilt University, 2010-2015
- *summa cum laude*, University of Southern Mississippi, 2010
- Society of Physics Student Leadership Scholarship ($3000), 2009
- Barry Goldwater Scholarship, *Honorable Mention*, 2008
- Presidential Scholarship (Full Tuition, Room and Board), Univ. of Southern Mississippi, 2006-2010
- Eagle Scout, *Silver Palm*, Boy Scouts of America, 2005

Memberships & Affiliations

Member, American Physical Society (APS-Physics) *2013-Present*
Division of Biological Physics (DBIO)
Topical Group on Physics Education Research (GPER)
Member, British Society of Developmental Biology *2017-Present*

Research Experience

Postdoctoral Scientist, *John Innes Centre, Norwich, UK* *2015-2017*
Grieneisen Computational and Systems Biology Lab

- Designing and fabricating *in vitro* chip platform to modulate root environment
  - Experimental Skills: microfluidic xurography and soft lithography
- Modeling cellular communication via local and global signaling that drives branching decisions in *Arabidopsis* plant root
  - Computational Skills: reaction-diffusion systems of equations; using models to design and interpret wet lab experiments; modeling analysis
- Initiated collaboration with biologist to interpret experimental data, design follow-up experiments, and hypothesize and predict results

Research Assistant, *Vanderbilt University* *2010-2015*
Hutson Biomechanical and Biophotonics Lab

- Experimentally and computationally investigated the mechanics of morphogenesis in fruit fly embryos and larvae
  - Experimental Skills: live cell imaging; confocal microscopy (scanning, spinning disk, multi-photon); laser ablation/microsurgery; fly husbandry and sample preparation for embryos, larvae, and pupa; heat shock; immunofluorescence staining; soft lithography for microfluidics
  - Computational Skills: programming in Mathematica and Python; cell-level finite element models; cellular Potts models (CompuCell3D)
- Assisted in construction of Single Plane Imaging Microscope for 3D *in vivo* imaging
  - Experimental Skills: optical system design, selection, and alignment; mechanical system design and fabrication; microscope automation

Research Experience for Undergraduates, *Cornell University* *2009*
Ralph Lab, Center for Nanoscale Science

- Constructed a diode laser control system that successfully stabilized for ultra-low temperature confocal imaging
  - Experimental Skills: soldering; electronic diagrams; analog PID control circuit

Undergraduate Thesis and Research, *University of Southern Mississippi* *2007-2010*
Mead Theoretical Group & Winstead Optics Lab

- Inferred relationship of seed parameters necessary for auto-rotation during free fall
  - Experimental Skills: dimensional analysis; data processing and correlation
- Assisted in development of an optical detector of radioactivity
  - Computational Skills: LabVIEW, Excel; hardware communication

Teaching Experience

Assistant Professor (Instructor of Record), *Physics, University of South Alabama* *2017-Present*
Taught PH 201 and 202: Introduction to Physics with Calculus I and II, and PH 114: Introduction to Physics with Alg/Trig I (12 contact hours/semester)

Blended and Online Learning Design Fellow, *Center for Teaching, Vanderbilt Univ.* *2014-2015*
Designed and built a 2 week learning module to enhance lecture in Introductory Physics for the Life Sciences course, conducting research on the success of the module in teaching electrostatics

Scientist in the Classroom, *Litton Middle School, Nashville, TN* *2013-2014*
Co-taught 6th and 8th grade science lab with certified teacher weekly

Certificate in College Teaching, *Center for Teaching, Vanderbilt Univ.* *2012*

Teaching Assistant, *Department of Physics and Astronomy, Vanderbilt Univ.* *2011-2012*
Taught and assisted curriculum development for a general physics lab for non-science majors, using an interactive, collaborative teaching strategy to engage students and encourage peer-learning

Mentoring Experience

Undergraduate Students

Koray Akozbek, Biology, Research Assistant at USA *2017-2018*
Jason Creedon, Physics, Research Experience for Undergraduates at Vanderbilt *2014*
Attiyya Houston, Biomedical Engineering, SyBBURE at Vanderbilt *2013*

High School Students

Liam P., Electronics and Programming, Nuffield Research Placement at JIC *2016*

Publications and Presentations

Manuscripts in Preparation

6. **W.T. McCleery**, J. Veldhuis, M.E. Lacy, G.W. Brodland, M.S. Hutson. "Highly elongated amnioserosa cells serve as a morphological memory to drive germband retraction." Under revision, 2018.
7. **W.T. McCleery**, Z. Yu, Z. Meng, V.A. Grieneisen. "Design and Protocol for a Low-Cost Micro-Fluidic Chamber for Live Imaging of Root-Nutrient Interaction." In preparation, 2018.
8. **W.T. McCleery**, V.A. Grieneisen. "A Parsimonious Model of Local and Global Signalling Uncovers Key to Root Branching Plasciticy." In preparation, 2018.
9. N.A. Mohd-Radzmann, **W.T. McCleery**, V.A. Grieneisen. "Cells Coordinate to Pattern Lateral Root Branching in Dynamic Soil Conditions." In preparation, 2018.

Conference Presentations

10. **W.T. McCleery**, N.A. Mohd-Radzmann, V.A. Grieneisen. "Multi-cellular Modelling of Root Development." *ANTS 2016: Tenth International Conference on Swarm Intelligence*, Brussels, Belgium. September 2016.
11. **W.T. McCleery**, J. Veldhuis, G.W. Brodland, S.M. Crews, and M.S. Hutson **"**Modeling the Epithelial Morphogenesis of Germ Band Retraction in Three Dimensions." *American Physical Society March Meeting*, San Antonio, TX, March 2015.
12. **W.T. McCleery**, S.M. Crews, D.N. Mashburn, J. Veldhuis, G.W. Brodland, and M.S. Hutson "3D Forward Modeling of Epithelial Morphogenesis during Germ Band Retraction." *World Congress of Biomechanics*, Boston, MA, July 2014.
13. **W.T. McCleery**, S.M. Crews, D.N. Mashburn, J. Veldhuis, G.W. Brodland, and M.S. Hutson "Finite element modeling of heat shock-induced mechanical failure in Drosophila amnioserosa." *Southeastern Section of the American Physical Society Meeting*, Bowling Green, KY, November 2013.
14. **W.T. McCleery**, K. Peturis, L. Mead "What goes up must go round: Analysis of a falling maple seed." *Journal of the Mississippi Academy of Sciences*, 54:95, January 2009.

Conference Posters

15. **W.T. McCleery**, E.C. Rericha, C.J. Brame, M.S. Hutson "BOLD Learning Module: Electrostatics for Introductory Physics for the Life Sciences." *CIRTL Forum*, College Station, TX, April 2015.
16. **W.T. McCleery**, S.M. Crews, D.N. Mashburn, J. Veldhuis, G.W. Brodland, and M.S. Hutson "Modeling the Morphogenesis of Epidermal Tissues on the Surface of a 3D Last." *American Physical Society March Meeting*, Denver, CO, March 2014.

Training

- 'Signalling Networks: From Data to Modelling', Training Workshop, The Genome Analysis Centre, Norwich, UK
- 'Multi-level Modelling of Morphogenesis', EMBO Practical Course, JIC, Norwich, UK
- 'Developing Multi–Scale, Multi–Cell Biological Simulations with CompuCell3D and SBW', Joint Training Workshop, Hamner Institute for Health Sciences, Research Triangle Park, NC

Science Outreach Leadership

SwarmOrgan Representative, Fundamentals of Collective Adaptive Systems *2016*
www.focas.eu/video-sprint
Vanderbilt Student Volunteers for Science *2011-2012*
Chair, Physics Outreach Fair, Society of Physics Students (USM) *2010*
President, Society of Physics Students, USM Chapter *2008-2009*

Community Leadership

Waterfront Director & Lifeguard, Rap-A-Hope Children's Oncology Summer Camp *2007-2014*
Merit Badge Counselor, Boy Scouts of America (Troop 28 Winter Camp) *2012-2013*
President, Stage Monkeys Improvisational Comedy Troupe *2008-2009*