Andrew M. Mountcastle

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Department of Biology
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Lewiston, ME 04240

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Education

PhD, Zoology, University of Washington, Seattle, WA, 2010

AB, *cum laude*, Physics-Environmental Studies, Bowdoin College, Brunswick, ME, 2001

Professional Experience

Bates College, Lewiston, ME, 2016–present
Assistant Professor, Department of Biology

Harvard University, Cambridge, MA, 2015–2016
Research Associate, School of Engineering and Applied Sciences

Harvard University, Cambridge, MA, 2013–2015
Research Associate, Department of Organismic and Evolutionary Biology

Harvard University, Cambridge, MA, 2010–2013
Postdoctoral Fellow, Department of Organismic and Evolutionary Biology

University of Washington, Seattle, WA, Summer 2005
Research Assistant, Department of Biology

The Lobster Conservancy, Friendship, ME, 2003–2005
Research Assistant

Fellowships

Postdoctoral Fellowship, Harvard University, Cambridge, MA, 2010–2013

NSF Graduate Research Fellowship, University of Washington, Seattle, WA, 2007–2010

Island Institute Fellowship, The Lobster Conservancy, Friendship, ME, 2003–2005

Thomas J. Watson Fellowship, seven countries, 2001–2002

NSF Research Experience for Undergraduates, University of Hawaii, Manoa, HI, 2000

Publications

(underlined names = undergraduate co-authors under my supervision)

Mountcastle AM, Farrel E and Wood RJ (2019) An insect-inspired collapsible wing hinge dampens collision-induced body rotation rates in a microrobot. *Journal of the Royal Society Interface* 16(150):20180618.

Crall JD, Gravish N, **Mountcastle AM**, Kocher SD, Oppenheimer RL, Pierce NE and Combes SA (2018) Spatial fidelity of workers predicts collective response to disturbance in a social insect. *Nature Communications* 9(1):1201.

Clark CJ, **Mountcastle AM**, Mistick EA and Elias DO (2017) Resonance frequencies of honeybee (*Apis mellifera*) wings. *Journal of Experimental Biology* doi:10.1242/jeb.154609.

Mistick EA, **Mountcastle AM** and Combes SA (2016) Wing flexibility improves bumblebee flight stability. *Journal of Experimental Biology* 219(21):3384–3390.

Mountcastle AM, Alexander TM, Switzer C and Combes SA (2016) Wing wear reduces bumblebee flight performance in a dynamic obstacle course. *Biology Letters* 12(6).

Mountcastle AM, Ravi S and Combes SA (2015) Nectar vs. pollen loading affects the trade-off between flight stability and maneuverability in bumblebees. *Proceedings of the National Academy of Sciences* 112(33):10527–10532.

Crall JD, Ravi S, **Mountcastle AM** and Combes SA (2015). Bumblebee flight performance in cluttered environments: Effects of obstacle orientation, body size, and acceleration. *Journal of Experimental Biology* 218:2728–2737.

Crall JD, Gravish N, **Mountcastle AM** and Combes SA (2015). BEEtag: a low-cost, image-based tracking system for the study of animal behavior and locomotion. *PLoS ONE* 10(9):e0136487.

Mountcastle AM and Combes SA (2014) Biomechanical strategies for mitigating collision damage in insect wings: structural design versus embedded elastic materials. *Journal of Experimental Biology* 217(7):1108–1115.

Mountcastle AM and Combes SA (2013) Wing flexibility enhances load-lifting capacity in bumblebees. *Proceedings of the Royal Society B* 280(1759).

Mountcastle AM and Daniel TL (2010) Vortexlet models of flapping flexible wings show tuning for force production and control. *Bioinspiration & Biomimetics* 5(4):045005.

Mountcastle AM and Daniel TL (2009) Aerodynamic and functional consequences of wing compliance. *Experiments in Fluids* 46(5):873–882.

Daniel TL, Aldworth Z, Fox JL, Hinterwirth A, **Mountcastle AM** (2009) Biologically inspired design: blurring the boundary between sensors and actuators. *Proceedings of the International Workshop on Bio-Inspired Sensing and Bio-Inspired Actuation Technology* 38–48.

Cowan DF, Watson WH, Solow A and **Mountcastle AM** (2007) Thermal histories of brooding lobsters. *Marine Biology* 150(3):463–470.

Welsford IG, Whittemore SL and **Mountcastle AM** (1997) Evidence for the involvement of HSP60 and C-FOS genes in osmoregulation in *Fundulus heteroclitus*. *The Bulletin: MDIBL* 36:23–24.

Published Abstracts and Presentations

(underlined names = undergraduate co-authors under my supervision, * = Bates College student)

Jankauski MA, Schwab R, Casey C, **Mountcastle AM** (2021) Insect wing buckling influences stress and stability during collisions. *IDETC-CIE* 58:E289IDETC2021-70551. Presented at the IDETC-CIE annual meeting,

Virtual, 2021.

Carter AW* and **Mountcastle AM** (2018) Mapping resilin distribution in the wings of bees and wasps. *Integr Comp Biol* 58:E289. Presented at the Society for Integrative and Comparative Biology (SICB) annual meeting, San Francisco, CA, 2018.

Ahlholm PD* and **Mountcastle AM** (2018) Effect of collision speed on rate of wing wear in *Bombus impatiens* bumblebees. *Integr Comp Biol* 58:E266. Presented at the SICB annual meeting, San Francisco, CA, 2018.

Mountcastle AM, Pai SN*, Helbling EF and Wood RJ (2018) A wasp-inspired collapsible wing hinge dampens collision-induced body torques in a microrobot. *Integr Comp Biol* 58:E160. Presented at the SICB annual meeting, San Francisco, CA, 2018.

Mountcastle AM, Gravish N, Combes SA and Wood RJ (2016) Collapsible wing joints reduce collision costs in insects and insect-scale microrobots. *Integr Comp Biol* 56:E156. Presented at the SICB annual meeting, Portland, OR, 2016.

Crall JD, Gravish N, **Mountcastle AM**, Kocher SD, Oppenheimer R, Kao AB, Pierce N and Combes SA (2016) Automated tracking reveals the importance of individual variation for division of labor in primitively eusocial bumblebees (*Bombus impatiens*). *Integr Comp Biol* 56:E45. Presented at the SICB annual meeting, Portland, OR, 2016.

Gravish N, **Mountcastle AM**, Crall JD, Wood RJ and Combes SA (2016) The role of roll: rapid collision avoidance in cluttered aerial environments. *Integr Comp Biol* 56:E79. Presented at the SICB annual meeting, Portland, OR, 2016.

Mistick EA, **Mountcastle AM** and Combes SA (2015) Effects of wing flexibility on bumblebee flight in turbulent airflow. *Integr Comp Biol* 55:E305. Presented at the SICB annual meeting, West Palm Beach, FL, 2015.

Ravi S, **Mountcastle AM** and Combes SA (2015) Influence of load type on flight stability and maneuverability of bumblebees. *Integr Comp Biol* 55:E149. Presented at the SICB annual meeting, West Palm Beach, FL, 2015.

Gravish N, Crall JD, **Mountcastle AM**, Wood RJ and Combes SA (2015) Data driven study of flight in aerial clutter. *Integr Comp Biol* 55:E70. Presented at the SICB annual meeting, West Palm Beach, FL, 2015.

Crall JD, Gravish N, **Mountcastle AM** and Combes SA (2015) Portrait of a hive: Linking division of labor, foraging ecology, and flight performance using automated tracking in bumblebees. *Integr Comp Biol* 55:E37. Presented at the SICB annual meeting, West Palm Beach, FL, 2015.

Mountcastle AM, Alexander TM and Combes SA (2014) Don't stop bee-weavin': Effects of wing wear on flight maneuverability in bumblebees. *Integr Comp Biol* 54:E147. Presented at the SICB annual meeting, Austin, TX, 2014.

Crall JD, Ravi S, **Mountcastle AM** and Combes SA (2014) Bigger but not always better: Tradeoffs between maneuverability and flight speed with body size in bumblebees. *Integr Comp Biol* 54:E44. Presented at the SICB annual meeting, Austin, TX, 2014.

Mountcastle AM and Combes SA (2013) When wings collide: How collisions cause wing wear in bees and wasps. *Integr Comp Biol* 53:E150. Presented at the SICB annual meeting, San Francisco, CA, 2013.

Eberle, AL, Reinhall PG, **Mountcastle AM** and Daniel TL (2013) Fluid-solid coupled model of flapping flexing insect wings reveals multiple maxima for flight forces. *Integr Comp Biol* 53:E60. Presented at the SICB annual meeting, San Francisco, CA, 2013.

Mountcastle AM and Combes SA (2012) Insect wing flexibility enhances aerodynamic force production. Presented at the Society for Experimental Biology annual meeting, Salzburg, Austria, 2012.

Mountcastle AM and Combes SA (2012) Resilin and the morphological basis of flexible wing dynamics in flying insects. *Integr Comp Biol* 52:E125. Presented at the SICB annual meeting, Charleston, SC, 2012.

Mountcastle AM and Daniel TL (2011) Vortexlet models of flapping flexible wings show tuning for force production and control. *Integr Comp Biol* 51:E96. Presented at the SICB annual meeting, Salt Lake City, UT, 2011.

Mountcastle AM and Daniel TL (2010) Unsteady forces occur at ventral stroke reversal in the hawkmoth, *Manduca sexta*. *Integr Comp Biol* 50:E122. Presented at the SICB annual meeting, Seattle, WA, 2010.

Mountcastle AM, Tull C and Daniel TL (2009) Wing stiffness affects mean advective flows of *Manduca sexta*, with wing overlap a potential contributor. *Integr Comp Biol* 49:E120. Presented at the SICB annual meeting, Boston, MA, 2009.

Mountcastle AM and Daniel TL (2007) Wing bending is modulated during flight and affects the induced flow field of *Manduca sexta*. *Integr Comp Biol* 47:E86. Presented at the SICB annual meeting, San Antonio, TX, 2008.

Mountcastle AM and Daniel TL (2006) A new insect flight model is just around the bend. *Integr Comp Biol* 46:E101. Presented at the SICB annual meeting, Phoenix, AZ, 2007.

Invited Seminars

University of Massachussetts Lowell, Department of Biology Seminar, Lowell, MA, 2018

Bowdoin College, Department of Biology Seminar, Brunswick, ME, 2017

Morgan State University, Interdisciplinary Seminar Series, Baltimore, MD, 2014

Johns Hopkins University, LIMBS laboratory seminar, Baltimore, MD, 2014

Tufts Medical Center, Mechanical Forces in Development Seminar, Boston, MA, 2014

The Cambridge Entomological Club, Cambridge, MA, 2013

Muhlenberg College, Department of Biology Seminar, Allentown, PA, 2012

Bowdoin College, Department of Biology Seminar, Brunswick, ME, 2011

St. Mark's School, Mathematicians at Work Seminar Series, Southboro, MA, 2011

University of Massachusetts, Department of Biology Seminar, Boston, MA, 2011

4th World Congress on Biomechanics, Singapore, 2010

Teaching Experience

Bates College

Science Communication (BIO 126)

Organismal Biology (BIO 190)

Lab-Based Biological Inquiry: Sponge Fluid Dynamics (BIO 195)

Bioinspiration (BIO 203)

Biomechanics (BIO 205)

Comparative Anatomy of the Chordates (BIO 311)

Seminar and Research in Physiology (BIO 472)

Organismal Biology Redesign (BIO S51A)

Communicating Science to the Public (FYS 465)

Harvard University Extension School

Teaching Fellow, Human Anatomy and Physiology

University of Washington

Teaching Assistant, Biomechanics

Teaching Assistant, Introductory Biology

Outreach

Co-Creator of BatesConnect, 2018–present
An innovative outreach program that serves local school teachers with educational enrichment modules created by Bates College students

Creator of an educational website (www.andrewmountcastle.org), 2009–present
Presenting insect flight research to the general public, currently averaging 230 monthly visitors

Creator and Director of Gradwagon, 2012–2016
An outreach program connecting Boston-area science teachers with Harvard graduate students and postdoctoral fellows for educational enrichment services

Created museum exhibit on insect flight, Pacific Science Center, Seattle, WA, 2007–2009