

MOLLY E. CUMMINGS, PH.D.
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APPOINTMENTS

- 2010 - • Associate Professor
Section of Integrative Biology, University of Texas at Austin
- 2004 -2010 • Assistant Professor
Section of Integrative Biology, University of Texas at Austin

EDUCATION

- 2002-2003 Postdoctoral Research Fellow,
Section of Integrative Biology, University of Texas at Austin
- 2001 • Doctor of Philosophy
University of California, Santa Barbara, Ecology, Evolution and Marine Biology Dept.
- 1993 • Post-Graduate Diploma in Marine Science.
James Cook University, Queensland, Australia
- 1990 • B.A. Human Biology (Marine Science Concentration)
Stanford University, Stanford, California

RESEARCH INTERESTS

- Environmental physiology of sensory systems
- Origins and mechanisms of female preference behavior
- Coevolution of sensory and signaling traits
- Evolution of aposematic signals & mimicry dynamics
- Physiology of signaling traits
- Behavioral genomics of mate choice

PUBLICATIONS * denotes undergraduate student

2010 Brady P & **Cummings** ME (2010) Differential response to circularly polarized light by the jewel scarab beetle (*Chrysina gloriosa*). *The American Naturalist*, 175(5): 614-620.

Brown JL, Maan ME, **Cummings** ME, Summers K (2010) Evidence for strong selection on color pattern in Panamanian poison frogs: a coalescent approach. *Journal of Biogeography*, 37: 891-901.

Richards-Zawacki CL, **Cummings** ME (*in press*) Intraspecific reproductive character displacement in a polymorphic poison dart frog, *Dendrobates pumilio*. *Evolution*

Crothers L, Gering E, **Cummings** ME (*in press*) Aposematic signal variation predicts male-male interactions in a polymorphic poison frog. *Evolution*

Ramsey MR, Wong RY, **Cummings** ME (*in review*) Evidence for dissociated reproductive system in a live-bearing fish: estrogen, reproductive cycle, and preference behavior

Wong RY, Ramsey MR, **Cummings** ME (*in revision*) Predicting variation in female preference response with immediate early gene expression in telencephalic nuclei in swordtails (*Xiphophorus nigrensis*)

- 2009** * **Cummings**, ME & Gelineau-Kattner R (2009) The metabolic cost of alternative male reproductive strategies in *Xiphophorus nigrensis*. *Journal of Comparative Physiology A*, 195: 935-946

Maan ME, & **Cummings** ME (2009) Sexual dimorphism and directional sexual selection on aposematic signals in a poison frog. *Proceedings of the National Academy of Sciences*, 106: 19072-19077.

- 2008** **Cummings** ME, Larkins-Ford J, Reilly CRL, Wong RY, Ramsey M & Hofmann HA. (2008) Sexual and social stimuli elicit rapid and contrasting genomic responses. *Proceedings of the Royal Society of London B*, 275: 393-402.

Maan ME, & **Cummings** ME (2008) Female preferences for aposematic signal components in a polymorphic poison frog. *Evolution*, 62: 2334-2345.

Cummings ME, Jordao J, Cronin T, & Oliviera R. (2008) Visual ecology of the fiddler crab *Uca tangeri*: effects of sex, viewer and background on conspicuousness. *Animal Behaviour*, 75: 175-188.

Cummings ME, Bernal X, *Reynaga R, Rand AS, & Ryan MJ. (2008). Visual sensitivity to a conspicuous male cue varies by reproductive state in *Physalaemus pustulosus* females. *Journal of Experimental Biology*, 211: 1203-1210.

- 2007** **Cummings** ME (2007) Sensory trade-offs predicts signal divergence in surfperch. *Evolution*, 61 (3): 530-545.

[Featured in the Textbook: *Perspectives on Animal Behavior*, J. Goodenough, B. McGuire, and E. Jakob, Wiley and Sons, 2009]

Cummings ME & Johnsen S (2007) Light, Effects of. In: Encyclopedia of Tidepools and Rocky Shores. Denny, M., Gaines, S. (Eds). University of California Press. p325-329.

- 2006** Darst CR. & **Cummings** ME. (2006) Predator learning favors mimicry of a less toxic model in poison frogs. *Nature*, 440: 208-211.

[Featured in an Animal Behavior Textbook: *BBC Radio March 2006*]

Darst CR, **Cummings** ME. & Cannatella DC. (2006) A mechanism for diversity in warning signals: conspicuousness versus toxicity in poison frogs. *Proceedings of the National Academy of Sciences*, 103: 5852-5857.

Cummings ME. & *Mollaghan DM. (2006) Repeatability and consistency of female preference behaviours in a northern swordtail, *Xiphophorus nigrensis*. *Animal Behaviour*, 72: 217-224.

- Cummings ME, Garcia de Leon FJ, *Mollaghan DM & Ryan MJ. (2006)** Is UV ornamentation an amplifier in swordtails? *Zebrafish*, 3:91-100.
- 2005** Grether GG, **Cummings ME** & Hudon J. (2005) Countergradient variation in the sexual coloration of guppies (*Poecilia reticulata*): droserpterin synthesis balances carotenoid availability. *Evolution*, 59: 175-188
- Ryan MJ. & **Cummings ME** (2005) Animal signals and the overlooked costs of efficacy. *Evolution*, 59: 1160-1161 [Book Review]
- 2004** **Cummings ME** (2004) Modelling divergence in luminance and chromatic detection performances across measured divergence in surfperch (Embiotocidae) habitats. *Vision Research* 44:1127-1145.
- 2003** **Cummings ME, Rosenthal GG & Ryan MJ. (2003)** A private ultraviolet channel in visual communication. *Proceedings of the Royal Society of London B*, 270: 897-904.
[Featured in *Science Now*; and on *Canadian Science Radio*]
- Cummings ME & Zimmerman RC. (2003)** Light harvesting and the package effect in the seagrasses *Thalassia testudinum* Konig and *Zostera marina* L.: Optical constraints on photoacclimation. *Aquatic Botany*, 75: 261-274.
- 2001** **Cummings ME & Partridge JC. (2001)** Visual pigments and optical habitats of surfperch (Embiotocidae) in the California kelp forest. *Journal of Comparative Physiology A* 187: 875-889.
- 1999** Partridge JC & **Cummings ME** (1999) Adaptation of visual pigments to the aquatic environment. In: Adaptive Mechanisms in the Ecology of Vision. Archer, S.N., Damgoz, M.B.A., Loew, E.R., Partridge, J.C., Valerga, S. (Eds) Kluwer Academic Publishers. Great Britain. Pp. 251-283.

MANUSCRIPTS IN PREPARATION * denotes undergraduate student

- Cummings, M.E.** Sensory drive drives courtship divergence in surfperch.
- Maan, ME & **Cummings, ME.** The relationship between signal conspicuousness and toxicity in the strawberry poison frog.
- Cummings, ME, Martell, C, & ME Maan.** Predator generalization and the maintenance of aposematic diversity: a test using domestic predators in a poison frog archipelago.
- Cummings, M.E., Bonachea, L., Petrie*, M., Ruddick*, K., & Ryan, M.J.** Divergent preferences without divergent sensory biases in swordtails.

AWARDS & HONORS

- Young Investigator Award, *Animal Behavior Society*, 2009
- Teaching Excellence Award, College of Natural Sciences, UT, 2008
- Invited Speaker, Society for Neuroscience “*In Celebration of Darwin: Evolution of Brain and Behavior*” Public Symposium, Chicago, IL, October, 2009

- Indo-US Kavli Frontiers of Science Symposium, National Academy of Sciences, Organizing Committee Member, Macro-Biology Panel, 2008-2009

TEACHING EXPERIENCE

2004-2010• University of Texas, Section of Integrative Biology, Austin, TX
Principles of Animal Behavior (60-70 students) [2005, 2006, 2007, 2008, 2009]
Introduction to Ecology, Evolution and Behavior II (15 graduate students) [2006, 2007, 2008, 2009]
Physiology and Behavior Seminar (15 students, co-organize) [2006, 2007, 2008, 2009]
Undergraduate Independent Research (~5 students/sem.; 9 hrs/week; 2004 - 2010)

MENTORING AND ADVISING

- Dr. Kathleen Lynch, Postdoctoral Researcher, Major Advisor
- Dr. Parrish Brady, Postdoctoral Researcher, Major Advisor
- Dr. Tara Maginnis, Postdoctoral Researcher, Major Advisor
- Dr. Martine Maan, Postdoctoral Researcher, Major Advisor
- Dr. Mary Ramsey, Postdoctoral Researcher, Major Advisor
- Dr. Catherine Darst, Ph.D., Major Advisor
- Ryan Wong, Doctoral Candidate, Major Advisor
- Eben Gering, Doctoral Candidate, Major Advisor
- Laura Crothers, Doctoral Candidate, Major Advisor
- Chad Brock, Doctoral Candidate, Co-Advisor
- Rose Gelineau-Kattner, Senior Honors Thesis Project, Major Advisor
- Rebecca Symula, Ph.D. Candidate, Committee Member
- Catalina Estrada, Ph.D. Candidate, Committee Member
- Karin Akre, Ph.D. Candidate, Committee Member
- Juan Carlos Santos, Ph.D. Candidate, Committee Member
- Ximena Bernal, Ph.D. Candidate, Committee Member
- Nikhil Advani, Ph.D. Candidate, Committee Member
- Shinnosuke Nakayama, Ph.D. Candidate, Committee Member
- Hayley Gillespie, Ph.D. Candidate, Committee Member
- David Ing, Ph.D. Candidate, Committee Member (Psychology Department)
- Carrie Veilleux, Ph.D. Candidate, Committee Member (Anthropology Department)
- Undergraduate Independent Research Supervisor for the following:
 Brittany Ford, Sarah Holloway, Tiffany Harvey, Maxwell Petrie, Bryan Lai, Abheek Sen,
 Natasha Rajeha, Sang Park, Justin O'Brien, Gabriel Axelrud, Katherine Chastain, Amanda Lea,
 Kate Chae, Ashley Lamb, Jerry James, Justin Torentino, Anne Terry, Courtney Garry, Rachael
 Anderson, Daniel Holmes, and Wendy Vu

UNIVERSITY & ACADEMIC SERVICE

- *Evolutionary Ecology*, Associate Editor, since 2010
- UT Director of Fisheries and Mariculture Laboratory Search Committee 2010
- University of Texas, Faculty Council, *Educational Policy Committee*: 2010-2011
- University of Texas, Faculty Council, *Faculty Advisory Committee on Budgets*: 2010-2011
- *Frontiers in Neurogenomics*, Editorial Board Member, since 2009
- *Journal of Comparative Physiology A*, Editorial Board Member, since 2008
- University of Texas, Faculty Council, *Admissions and Registration Committee*: 2009-2010
- University of Texas, Faculty Council, *Faculty Building Advisory Committee*: 2009-2010
- NSF DDIG Panelist for Evolutionary and Population Processes 2008
- Integrative Biology Department Neuroethologist Search Committee 2008
- University of Texas, Faculty Council, *Assistant Professor at Large*, 2007-2009
- Faculty Council, Brackenridge Field Tract Advisor Committee, 2008-2009

- University of Texas, Commencement and Academic Ceremonies Committee, 2007-2009
- EEB Graduate Fellowship Committee, 2004-2005; 2005-2006
- EEB Graduate Admissions Committee, 2005-2006; 2006-2007
- School of Biological Sciences Electronics Technician Search Committee 2006-2007
- Integrative Biology Department Neuroethologist Search Committee 2006-2007
- Co-organizer of Winter Animal Behavior Conference, WABC 2007 (with Michael J. Ryan)
- Spring Undergraduate Research Poster Competition Judge 2006
- Plan II Thesis Symposium Moderator 2007
- Science Undergraduate Research Group (SURGe) panelist (2005)
- Dean's Scholar Lunch Science Seminar Speaker for undergraduates (2005)
- Refereed papers and proposals for 15+ journals including *Science* and *Nature*, and for three different panels of the *National Science Foundation* and *US-Israel Binational Science Foundation*

PROFESSIONAL ASSOCIATIONS

- American Genetics Association
- Society for the Study of Evolution
- International Society for Behavioral Ecology
- Animal Behavior Society
- Center for Perceptual Systems (UT)
- Center for Behavioral Neuroendocrinology (UT)

PRESENTATIONS (2004 -)

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| 2010 | • International Society for Neuroethology Congress, <i>Salamanca, Spain, <u>Invited Symposium Speaker</u></i> |
| 2010 | • Gordon Research Conference, <i>Genes and Behavior</i> , Ventura, CA, <i><u>Invited Symposium Speaker</u></i> |
| 2010 | • University of California, Davis, <i>Biology Department, Department Seminar</i> |
| 2010 | • University of Illinois, Urbana <i>Neuroscience Program, Department Seminar</i> |
| 2010 | • Yale University, New Haven, CT, <i>Biology Department, Department Seminar</i> |
| 2010 | • Sam Houston State University, Huntsville, TX, <i>Biology Department, Department Seminar</i> |
| 2009 | • Society for Neuroscience "In Celebration of Darwin: Evolution of Brain and Behavior" Symposium, Chicago, IL, <i><u>Invited Symposium Speaker</u></i> |
| 2009 | • National Academy of Sciences "India-American Kavli Frontiers of Science" Symposium; Macro Biology Session, <i>The Changing Brain, Coordinator & Presenter</i> |
| 2009 | • Tulane University, Biology Department, <i>Department Seminar</i> |
| 2009 | • Kellogg Biological Station at Michigan State University, <i>Department Seminar</i> |
| 2009 | • Michigan State University, Ecology, Evolutionary Biology and Behavior, <i>Department Seminar</i> |
| 2009 | • Animal Behavior Society, <i>An integrative evaluation of the production, perception, transmission, and evolution of color visual signals, <u>Symposium Speaker</u></i> |
| 2008 | • Ocean Optics, International Society for Optical Engineering, Barga, Italy, <i><u>Plenary Speaker</u></i> |
| 2008 | • University of Chicago, Dept. of Ecology and Evolution, <i>Department Seminar</i> |
| 2008 | • Indiana University, Dept. of Ecology, Evolution and Behavior, <i>Department Seminar</i> |
| 2008 | • International Society for Behavioral Ecology, Cornell University, NY <i>Contributed talk</i> |
| 2008 | • American Genetic Association Symposium, <i>Genetics and Genomics of Behavior, NC Contributed talk</i> |
| 2008 | • Gordon Research Conference, <i>Genes and Behavior, Barga, Italy Contributed Poster</i> |
| 2007 | • National Academy of Sciences & Alexander von Humboldt Foundation "German-American Kavli Frontiers of Science" <i><u>Symposium Speaker</u></i> |
| 2007 | • Baylor College of Medicine, Neuroscience Dept., <i>Department Seminar</i> |
| 2007 | • Trinity University, San Antonio, TX, <i>Department Seminar</i> |
| 2007 | • University of Nebraska, Lincoln, School of Biological Sciences, <i>Department Seminar</i> |
| 2007 | • University of Massachusetts, Amherst, Organismic and Evolutionary Biology, <i>Department Seminar</i> |
| 2007 | • University of Maryland, Baltimore County, Biology Dept., <i>Department Seminar</i> |
| 2006 | • Smithsonian Tropical Research Institute, Bocas Del Toro, Panama, <i>Department Seminar</i> |
| 2006 | • University of New Mexico, Biology Dept., Albuquerque, NM, <i>Department Seminar</i> |
| 2006 | • Baylor University, Biology Dept. Waco, TX, <i>Department Seminar</i> |

- 2006 • Winter Animal Behavior Conference, WABC, Steamboat, CO, *Contributed talk*
- 2006 • Gordon Research Conference, *Genes and Behavior*, *Contributed talk*
- 2006 • Animal Behavior Society Meeting, Snowbird, Utah, *Evolution of Sensory and Signaling Systems*,
Symposium Invited Speaker
- 2005 • European conference of Poeciliid Biologists, Trondheim, Norway, *Contributed talk*
- 2005 • Society for the Study of Evolution, Fairbanks, Alaska, *Contributed talk*
- 2005 • Trinity University, San Antonio, TX, *Department Seminar*
- 2005 • Haskell Indian Nations University, Lawrence, KS, *Department Seminar*
- 2004 • Duke University, Dept. of Biology, Durham, NC *Department Seminar*
- 2004 • Animal Behavior Society Meeting, Oaxaca, Mexico: *Evolution of Tungara Communication* ,
Symposium Invited Speaker
- 2004 • International Society for Behavioral Ecology, Jyväskylä, Finland *Contributed poster*
- 2004 • Symposium: ISBE *Color Signalling*. *Symposium Invited Speaker*

AWARDS & FUNDING

- 2009-2014 • Office of Naval Research (ONR) Multi-University Research Initiative \$6,920,000
Biological response to the dynamic spectral-polarized underwater light field
Lead PI: Cummings (5 other institutions as sub-awards)
- 2009-2013 • National Science Foundation (IOS), Animal Behavior \$410,000
Behavioral genomics of preference: a mechanistic approach using swordtails
- 2009-2011 • Indo-US Science & Technology Forum; Co- PI Dr. Vidita Vaidya \$25,000
Tracing Preference in the Brain
- 2008-2009 • National Science Foundation (IOS), Animal Behavior \$81,000
Distinguishing the genomics of female mate choice from receptivity: a test with swordtails
- 2008-2009 • University of Texas Research Award \$6,000
- 2008 • Teaching Excellence Award, College of Natural Sciences, UT \$500
- 2007-2008 • University of Texas Reeder Fellow \$10,000
- 2006-08 • RUBICON, Netherlands Science Foundation \$90,000
Poison or Passion: warning and attraction in a colour polymorphic frog
Lead PI: M. Maan (Cummings; co-authored grant; postdoc advisor)
- 2006-2007 • University of Texas Reeder Fellow \$10,000
- 2006-2007 • University of Texas Research Award \$6,000
- 2005-2006 • University of Texas Summer Research Award \$13,000
- 2002-2004 • Texas Advanced Research Program Award, PI: M.Ryan \$168,000
Ultraviolet communication in swordtails (Cummings: co-authored grant, postdoc)
- 2000 • UCSB Dissertation Fellowship \$5,000
- 2000 • Smithsonian Tropical Research Fellowship \$2,000
- 2000 • Ellen Schamberg Burley Graduate Scholarship \$3,000
- 1999 • UCSB travel award \$2,000
- 1998-2000 • National Science Foundation Doctoral Dissertation Improvement Grant \$8,500
- 1997 • National Science Foundation International Travel Award \$3,000
- 1996 • UCSB/NSF Research Equipment Award \$3,000
- 1996 • Myers Oceanographic and Marine Biology Trust \$2,000
- 1995 • Myers Oceanographic and Marine Biology Trust \$2,000
- 1995 • PADI Foundation Scholarship \$3,000
- 1995 • American Museum of Natural History, Lerner-Gray Fund \$1,000
- 1994 • UCSB/NSF Research Equipment Award \$4,000
- 1994- 1997 • National Science Foundation Pre-Doctoral Fellowship \$45,000

OUTREACH

- 2007 Bocas Del Toro Gradeschools presentation on Poison Frogs and Mimicry
- 2007 UT Parents' Day
- 2008 Provided data for the Panamanian Government's ANAM policies regarding poison frogs
- 2008 Outreach Lectures on Evolution—Pre-Evolution Interactive Events on Aposematism
- 2008 *History Channel* Coverage on Poison Frogs for Episode on *Evolution of Communication*
- 2008 Interviews with the Daily Texan regarding "Intelligent Design"
- 2008 Clayton Elementary 4th grade class presentation: "*Studying Evolution with Fish and Frogs*"
- 2008 Bocas Del Toro Community Outreach Talks, Isla Colon: "*Pasion o veneno: Peligro y atraccion en una rana de color polimorfico*"
- 2009 UT LAMP (Learning Activities for Mature People) Lecture: "*Poisson and Passion: Evolutionary Mechanisms in Poison Frogs and Swordtail Fishes*"
- 2009 Darwin's Day Lecture: "*What Evolution can tell us about Behavior*", University of Texas
- 2009 Clayton Elementary 4th grade science class presentation: "*Studying Evolution with Fish and Frogs*"
- 2010 Stanford Alumni Lecture "*Mate Choice: the Evolutionary & Genomic Mechanisms Behind it*"
- 2010 Port Aransas Independent School District & MSI Summer Science Program, "*Studying Camouflage in the Field*"