MATTHEW M. OSMOND

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Research Interests

I enjoy investigating how ecological and genetic factors influence the evolutionary process, and *vice versa*. Recent/ongoing projects use mathematical models to investigate (*i*) the role of sex and epistasis in shaping genetic signatures of evolutionary rescue, (*ii*) the impact of haploid selection on the lability of sex determination systems, (*iii*) the effect of species interactions on evolution and persistence in changing environments, and (*iv*) how non-Mendelian inheritance affects the likelihood of crossing valleys of fitness created by epistasis. Past projects involved actual fieldwork on real plant communities and wild birds.

Research positions

Post-doc Center for Population Biology & NSERC, University of California - Davis 2018 -

Education

Ph.D.	Zoology, University of British Columbia Title: *Adaptive challenges: fitness valleys and evolutionary rescue* Supervisor: **Sarah Otto** Committee: Amy Angert, Michael Doebeli, Michael Whitlock	2013 - 2018
M.Sc.	Biology, McGill University Title: *Eco-evolutionary rescue: an adaptive dynamic analysis* Supervisor: **Claire de Mazancourt** Committee: Michel Loreau, Frédéric Guichard	2010 - 2012
B.Sc.H.	Mathematics & Biology, Queen's University Honours title: *The meaning of female coloration in the American redstart* Honours Supervisor: **Laurene Ratcliffe** Committee: Paul Martin	2004 - 2008

Publications

9. Edwards K, Kremer C, Miller E, **Osmond M**, Litchman E, Klausmeier C. Accepted. Evolutionary stable communities: a framework for understanding the role of trait evolution in the maintenance of diversity *Ecology Letters*.
8. Scott M, **Osmond M**, Otto S. 2018. Haploid selection, sex ratio bias, and transitions between sex-determining systems. *PLoS Biology* 16:e2005609.
7. **Osmond M**, Klausmeier C. 2017. An evolutionary tipping point in a changing environment. *Evolution* 71:2930-2941.

6. **Osmond M**, Otto S, Klausmeier C. 2017. When predators help prey adapt and persist in a changing environment. *The American Naturalist* 190:83-98. [F1000Prime Recommended]
5. **Osmond M**, Barbour M, Bernhardt J, Pennell M, Sunday J, O'Connor M. 2017. Warming induced changes to body size stabilize consumer-resource dynamics. *The American Naturalist* 189:718-725.
4. Toews D, Delmore K, **Osmond M**, Taylor P, Irwin D. 2017. Migratory orientation in a narrow avian hybrid zone. *PeerJ* 5:e3201.
3. **Osmond M**, Otto S. 2015. Fitness-valley crossing with generalized parent-offspring transmission. *Theoretical Population Biology* 105:1-16.
2. **Osmond M**, Reudink M, Marra P, Germain R, Nocera J, Boag P, Ratcliffe L. 2013. Relationships between carotenoid-based female plumage and age, reproduction, and mate colour in the American Redstart. *Canadian Journal of Zoology* 91:589-595.
1. **Osmond M**, de Mazancourt C. 2013. How competition affects evolutionary rescue. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368:20120085.

Preprints

1. Thompson K, **Osmond M**, Schluter D. 2018. Patterns of speciation and parallel genetic evolution under adaptation from standing variation. *bioRXiv* 368324.

Selected Awards, Grants, and Fellowships

2019-2020	Post-Doctoral Fellowship, NSERC	$90,000
2018-	Center for Population Biology Post-Doctoral Fellowship, UC Davis	$48,200
2017-2018	Graduate Student Fellowship, University of British Columbia	$16,500
2013-2017	Alexander Graham Bell Canada Graduate Scholarship (CGS-D), NSERC	$105,000
2013-2014	Faculty of Science Graduate Award, University of British Columbia	$6,000
2013-2018	Four Year Fellowship, University of British Columbia	$18,000
2013-2014	BRITE Fellowship, University of British Columbia & NSERC	$6,000
2011-2012	Dr. Neal Simon Memorial Scholarship	$1,000
2011-2012	Alexander Graham Bell Canada Graduate Scholarship (CGS-M), NSERC	$17,500
2011-2012	Excellence Award, Quebec Centre for Biodiversity Science	$2,500
2010-2011	Science and Technology Award, Ontario Graduate Scholarship	$5,000
2007	Undergraduate Student Research Award (USRA), NSERC	$4,500

Professional Experience

2016	**Visiting researcher** University of Montpellier and CNRS (O. Ronce, T. Lenormand)
2016	**Participant** Stochastic Models in Evolution workshop (M. Kirkpatrick, T. Day, *et al.*)
2013	**Post-M.Sc.** Michigan State University (C. Klausmeier, E. Litchman)
2012, 2013, 2014	**Visiting researcher** University of Helsinki (S. Geritz, E. Kisdi)
2012	**Research assistant** University of British Columbia (D. Irwin)
2010-2012	**Member** Eco-evolutionary working group (A. Gonzalez *et al.*)
2010	**Research assistant** USGS (J. Piatt) and University of Victoria (A. Burger)
2009-2010	**M.Sc.** (withdrew) Lakehead University (A. Mallik)
2007-2008	**B.Sc. thesis** Queen's University (M. Reudink, L. Ratcliffe)

Community Involvement

Referee *The American Naturalist* (5), *Genetics* (2), *Journal of Theoretical Biology* (2), *Theoretical Population Biology* (2), *Biological Journal of the Lineann Society* (1), *Ecology* (1), *Evolution* (1), *Philosophical Transactions of the Royal Society B* (1), *Journal of Statistical Mechanics* (1)

2017-	**Secretary** Zoology Graduate Student Society, University of British Columbia
2017	**Volunteer** Eco-Evo Retreat, Squamish, British Columbia
2016-2017	**Organizer** Let's Assume (evol. theory discussion group), University of British Columbia
2014	**Organizer** Vancouver Evolution Group (regional journal club), Vancouver
2010-2012	**Organizer** Eco-Theoretic Cafe (mathematical ecology discussion group), McGill University
2007	**Volunteer** Society of Canadian Ornithologists meeting, Queen's University

Teaching Experience

2014, 2016, 2017	**Marker** Population Genetics, University of British Columbia
2011	**Mentor** for work-study undergraduate student, McGill University
2010	**Teaching Assistant** Math Models in Biology, McGill University
2010	**Teaching Assistant** Organismal Biology, McGill University
2010	**Teaching Assistant** Evolutionary Concepts, Lakehead University
2009	**Teaching Assistant** Ecology, Lakehead University

Selected Presentations

Osmond M, Martin G, Ronce O, Otto S. 2018. Genetic paths to evolutionary rescue. Poster, Population and Evolutionary Quantitative Genetics, Madison, USA. ***Poster award**

Osmond M, Martin G, Ronce O, Otto S. 2018. Predicting the genetic paths evolutionary rescue will take. Talk, Evo-WIBO, Port Townsend, USA. ***Talk award**

Osmond M. 2018. Evolutionary rescue: integrating ecological and evolutionary theory. Talk, CPB post-doctoral fellowship interview, UC Davis, USA.

Osmond M, Scott M, Otto S. 2017. Gametic competition, meiotic drive, sex ratio selection, and transitions between sex determination systems. Talk, Evolution conference, Portland, USA.

Osmond M, Klausmeier C. 2017. Evolutionary tipping points in changing environments. Talk, Canadian Society for Ecology and Evolution conference, Victoria, Canada.

Osmond M, Martin G, Otto S, Ronce O. 2016. Genetic signatures of evolutionary rescue with sex. Invited talk, Stochastic Models for the Inference of Life Evolution group, College de France, Paris, France.

Osmond M, Otto S. 2016. Subcritical adaptation: fitness valleys and evolutionary rescue. Invited talk, Stochastic and Deterministic Models for Evolutionary Biology workshop, Oaxaca, Mexico.

Osmond M, Otto S, Klausmeier C. 2016. When predators help prey adapt and persist. Talk, Evolution conference, Austin, USA.

Osmond M, Otto S. 2015. Crossing fitness-valleys without the help of Mendel: extending theory. Talk, Canadian Society for Ecology and Evolution conference, Saskatoon, Canada. ***Talk award**

Osmond M, Otto S. 2014. Crossing fitness-valleys without the help of Mendel. Poster, Evolution conference, Raleigh, USA.

Osmond M, Weigang H. 2012. Shorter generation times, slower evolution? Impact of life-history on evolution. Poster, Swedish Meeting on Mathematics in Biology, Lund, Sweden.

Osmond M, de Mazancourt C. 2012. How competition affects evolutionary rescue. Talk, Joint Congress on Evolutionary Biology, Ottawa, Canada.

Osmond M, de Mazancourt C. 2011. To adapt and persist in a changing environment. Invited talk, Mick Follows lab, Massachusetts Institute of Technology, Boston, USA.

Selected Courses Taken

2017	Evolutionary Quantitative Genetics	J. Felsenstein, S. Arnold, *et al.*
2016	Bioinformatics for Evolutionary Biology	G. Owens, K. Hodgins
2015	Complex Systems Summer School	Sante Fe Institute
2015	Population Ecology	A. Angert
2013	Population Genetics	M. Whitlock
2013	Metacommunities	M. Leibold & C. Klausmeier
2012	Advanced Evolutionary Ecology	A. Hendry
2011	Adaptive Dynamics	S. Geritz & C. Klausmeier
2010	Linking Community and Ecosystem Ecology	M. Loreau

Programming Languages

Mathematica, LaTeX, `python`, `R`, UNIX