

## Sam Yeaman, Ph.D.

Department of Biological Sciences  
University of Calgary  
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### EDUCATION

Ph.D. 2004-2009

Department of Zoology. Supervisor: Dr. Michael Whitlock  
University of British Columbia, Vancouver, Canada

B.Sc. 1998-2003

Joint major: Biology / Environmental and Resource Sciences (honours)  
Trent University, Peterborough, Canada

### ACADEMIC EMPLOYMENT

Assistant professor, AIHS Chair in bioinformatics and computational biology  
University of Calgary, Canada. August 2015-present

Adjunct professor, Department of Biochemistry and Molecular Biology  
University of Calgary, Canada. November 2015-present

Post-doctoral fellow, University of British Columbia, Vancouver, Canada  
Supervisors: Sally Aitken & Loren Rieseberg. July 2011-June 2015  
Project: Bioinformatics and sequence analysis of >1200 exomes

Post-doctoral fellow, University of Neuchâtel, Neuchâtel, Switzerland  
Supervisor: Laurent Lehmann. March 2010-May 2011  
Project: Cultural evolution in spatially structured populations

### GRANTS

Application success rate = 86%

Funding period	Funding agency & role	Total grant amount	Amount to Yeaman lab
2017-2019	US-NSF Evolutionary Genetics. <i>Collaborator</i>	\$556,108 (USD)	\$5000 (USD)
2017-2022	NSERC Discovery. <i>PI</i>	\$165,000	\$165,000
2016-2020	Genome Canada LSARP. <i>Co-PI</i>	\$5,701,973	\$1,249,128
2016-2018	University of Calgary, VPR: Infections, Inflammation and Chronic Diseases <i>Collaborator</i>	\$200,000	\$22,500
2015-2019	Genome Canada LSARP. <i>Co-applicant</i>	\$8,039,771	\$199,446
2015-2022	AIHS Translational chair. <i>PI</i>	\$2,275,000	\$2,275,000
<b>TOTAL</b>		<b>\$17,076,879</b>	<b>\$3,917,324</b>

## AWARDS AND FELLOWSHIPS

- 2015 Canadian Society for Ecology and Evolution Early Career Award
- 2012 NSERC Post Doctoral Fellowship (declined)
- 2010 Society for the Study of Evolution travel award
- 2009 University of British Columbia Graduate Fellowship
- 2006 NSERC Post Graduate Scholarship (Doctoral, three years)
- 2005 NSERC Canada Graduate Scholarship (Masters, one year)
- 2004 University of British Columbia, Graduate Entrance Scholarship
- 2002 Trent University, Historical Essay Prize
- 2001 Trent University, R.J.D. Prize
- 2000 Trent University, J. Percy McNaughton Prize
- 2000 Trent University, Biology Department Book Prize
- 1998 Carleton University, Entrance Scholarship (declined)
- 1998 Trent University, Entrance Scholarship

## PUBLICATIONS

- High standard contributions (2012 ISI impact factors: Science 31.0, Nature Communications 10.0, PNAS 9.7, New Phytologist 6.7, Phil Trans Roy Soc B 6.2, Global Change Biology 6.9, Molecular Ecology 6.3, Proc Roy Soc B 5.7, Evolution 4.9, Evolutionary Applications 4.2)
  - Two papers selected by the Faculty of 1000 (2011; 2015)
  - Co-authored the most highly cited paper in the journal Evolutionary Applications
  - Productivity and impact of work: h-index = 14 (ISI Thomson Reuter) to 17 (Google Scholar), total citations: 1563 (ISI) to 2346 (Google Scholar)
1. Conte GL, Hodgins KA, **Yeaman S**, Degner JC, Aitken SN, Rieseberg LH, Whitlock MC. Bioinformatically predicted deleterious mutations reveal complementation in the interior spruce hybrid complex. *BMC Genomics*. (in press).
  2. Owens GL, Todesco M, Drummond EBM, **Yeaman S**, Rieseberg LH. A novel post hoc method for detecting index switching finds no evidence for increased switching on the Illumina HiSeqX. *Molecular Ecology Resources* (in press).
  3. MacLachlan I, **Yeaman S**, Aitken S. Growth gains from selective breeding in a spruce hybrid zone do not compromise local adaptation to climate. *Evolutionary Applications* (in press).
  4. Lindtke D, **Yeaman S**. Identifying the loci of speciation: the challenge beyond genome scans. *Journal of Evolutionary Biology*. 30:1478-1481.
  5. **Yeaman S**, Hodgins KA, Lotterhos KE, Suren H, Nadeau S, Degner JC, Nurkowski KA, Smets P, Wang T, Gray LK, Liepe K, Hamann A, Holliday JA, Whitlock MC, Rieseberg LH, Aitken SN. Convergent local adaptation to climate in distantly related conifers. *Science*. 353:1431-1433.

6. Suren H, Hodgins KA, **Yeaman S**, Nurkowski K, Smets P, Rieseberg LH, Aitken SN, Holliday JA. 2016. Exome capture from the spruce and pine giga-genomes. *Molecular Ecology Resources*. 16:1136-1146.
7. **Yeaman S**, Aeschbacher S, Bürger R. 2016. The evolution of genomic islands by increased establishment probability of linked alleles. *Molecular Ecology*. 25:2542-2558.
8. Hodgins KA, **Yeaman S**, Nurkowski K, Rieseberg LH, Aitken SH. 2016. Expression divergence is correlated with sequence evolution but not positive selection in conifers. *Molecular Biology and Evolution*. 33:1502-1516.
9. **Yeaman S**. 2015. Local adaptation by alleles of small effect. *American Naturalist*. 186:S74-S89. [Recommended read on Faculty of 1000; 7<sup>th</sup> most highly cited Am Nat paper in 2015]
10. Debarre F, **Yeaman S**, Guillaume F. 2015. Evolution of Quantitative Traits under a Migration-Selection Balance: When Does Skew Matter? *American Naturalist*. 186:S37-S47.
11. **Yeaman S**, Hodgins KA, Nurkowski K, Holliday JA, Rieseberg LH, Aitken SN. 2014. Conservation and divergence of gene expression plasticity over ~140 million years of evolution in lodgepole pine (*Pinus contorta*) and interior spruce (*Picea glauca* x *Picea engelmannii* and their hybrids). *New Phytologist*. 203:578-591.
12. Condon C, Cooper BS, **Yeaman S**, Angilletta MJ. 2014. Temporal variation favors the evolution of generalists in experimental populations of *Drosophila melanogaster*. *Evolution*. 68:720-728.
13. **Yeaman S**. 2013. Hybridization and the porous genome: patterns of isolation and introgression in manakins. *Molecular Ecology*. 22:3195-3197.
14. Renaut S, Grassa CJ, **Yeaman S**, Moyers BT, Lai Z, Kane NC, Bowers JE, Burke JM, Rieseberg LH. 2013. Genomic islands of divergence are not affected by geography of speciation in sunflowers. *Nature Communications*. 4:1827.
15. **Yeaman S**. 2013. Genomic rearrangements and the evolution of clusters of locally adapted loci. *Proceedings of the National Academy of Sciences*. 110:E1743-E1751.
16. Alberto F, Aitken S, Alia R, González-Martínez S, Hanninen H, Kremer A, Lefèvre F, Lenormand T, **Yeaman S**, Whetten R, Savolainen O. 2013. Potential for evolutionary response to climate change - evidence from tree populations. *Global Change Biology*. 19:1645-1661.
17. Vines TH, Andrew RL, Bock DG, Franklin M, Gilbert KJ, Kane NC, Kleynhans EJ, Moore J-S, Moyers BT, Renaut S, Rennison DJ, Veen T, **Yeaman S**. 2013. Mandated data archiving

greatly improves access to research data. *FASEB Journal*. 27:1304-1308.

18. **Yeaman S**, Schick A, Lehmann L. 2012. Social network architecture and the maintenance of deleterious cultural traits. *Journal of the Royal Society Interface*. 9:848-858.
19. Feder JL, Gejji R, **Yeaman S**, Nosil P. 2012. Establishment of new mutations under divergence and genome hitchhiking. *Philosophical Transactions of the Royal Society, B*. 367:461-474.
20. **Yeaman S**, Bshary R, Lehmann L. 2011. The effect of innovation and sex-specific migration on neutral cultural differentiation. *Animal Behaviour*. 82:101-112.
21. **Yeaman S** and Otto SP. 2011. Local adaptation under migration, selection, and drift. *Evolution*. 65:2123-2129. [Recommended read on Faculty of 1000]
22. **Yeaman S** and Whitlock MC. 2011. The genetic architecture of adaptation under migration-selection balance. *Evolution*. 65:1897-1911. [2<sup>nd</sup> most highly cited Evolution paper in 2011]
23. **Yeaman S**, Chen Y, Whitlock MC. 2010. Maintenance of genetic variation in heterogeneous environments: wing size evolution in experimental populations of *Drosophila melanogaster*. *Evolution*. 64:3398-3408.
24. Correia L, **Yeaman S**, Whitlock MC. 2010. Local adaptation does not always predict high mating success. *Journal of Evolutionary Biology*. 23:875-878.
25. **Yeaman S** and Guillaume F. 2009. Predicting adaptation under migration load: the role of genetic skew. *Evolution*. 63:2926-2938.
26. Aitken SN, **Yeaman S**, Holliday JA, Wang T, Curtis-McLane S. 2008. Adaptation, migration, or extirpation: climate change outcomes for tree populations. *Evolutionary Applications*. 1:95:111. [Most highly cited paper of all time in journal]
27. Whitlock MC, Davis BH, **Yeaman S**. 2007. The costs and benefits of resource sharing: reciprocity requires resource heterogeneity. *Journal of Evolutionary Biology*. 20:1772-1782.
28. Currat M, Excoffier L, Maddison W, Otto SP, Ray N, Whitlock MC, **Yeaman S**. 2006. Comment on "Ongoing adaptive evolution of ASPM, a brain size determinant in Homo sapiens" and "Microcephalin, a gene regulating brain size, continues to evolve adaptively in humans. *Science*. 313:172-173.
29. **Yeaman S** and Jarvis A. 2006. Regional heterogeneity and gene flow maintain variance in a quantitative trait within populations of lodgepole pine. *Proceedings of the Royal Society, B*. 273:1587-1593.

30. Jarvis A, **Yeaman S**, Guarino L, Tohme J. 2005. The role of geographic analysis in locating, understanding, and using plant genetic diversity. *Methods in Enzymology*. 395:279-298.

## **MENTORING AND SUPERVISION**

### Postdoctoral

- Shagyegh Soudi, Postdoctoral Fellow, 2017-present
- Mengment Lu, Postdoctoral Fellow, 2017-present
- Dorothea Lindtke, Postdoctoral Fellow, 2016-present
- Sukanya Ramasamy, Postdoctoral Fellow, 2016-present
- Qiushi Li, Postdoctoral Fellow, 2015-present
- Mason Kulbaba, Postdoctoral Fellow, 2015-2016
- Jonathan Mee, Postdoctoral Fellow, 2016

### Graduate

- Tegan McDonald, Masters student, 2017-present
- James Reeve, Masters student, 2017-present

### Undergraduate

- Russel Jasper, Undergraduate honours thesis, 2017-present
- Tegan McDonald, Undergraduate honours thesis, 2016-2017
- Yukon Chen, Undergraduate Research Assistant, 2008-2010
- Michelle Wood, Undergraduate Research Assistant, 2008
- Lisa Correia, NSERC Undergraduate Student Research Award, 2008
- Nir Avgay, High School Student Research Assistant, 2008
- Brock Glover, Undergraduate Research Assistant, 2007-2008
- Iris Chen, Research Undergraduate Assistant, 2006-2007
- UBC Department of Zoology graduate mentorship program (2007 – 2009)

## **TEACHING EXPERIENCE**

### Full courses:

- 2017 (18 lecture-hours) ECOL 501. Ecological and evolutionary applications. University of Calgary
- 2017 (18 lecture-hours) BIOL 401. Evolution. University of Calgary
- 2017 (instructor of record) BIOL 627. R-Wizardry. University of Calgary
- 2016 (18 lecture-hours) BIOL 401. Evolution. University of Calgary

### Workshops and short courses:

- Symposium on Polygenic adaptation. Zurich, Switzerland (3 days)
- RNAseq workshop. University of Calgary (2 afternoons; August 2016)
- ConGenOmics course on bioinformatics applications for local adaptation (1-day lecture + workshop; March 2015; Switzerland)
- BIOL 525D. Bioinformatics (two-week co-taught course; January 2015; University of

British Columbia)

- Guest lecture in Current topics in Ecology and Evolution (Mount Royal University; 2017)
- Guest lecture in DNA, Inheritance & Evolution (BIOL 243; University of Calgary; 2017)
- Guest lecture in Evolution course (University of the Fraser Valley; 2012)
- Guest lecture on Genome Evolution (Quest University; 2012)
- Class on biology, genetics and the philosophy of science for aboriginal youth at Cedar Summer Science Camp (2005; 2007)
- Workshop: Multivariate data analysis for plant genetic resource purposes, National Institute of Agricultural Research, Lima, Peru (2004)

Teaching assistantships:

- Molecular Genetics (2008; University of British Columbia)
- Biometrics (2005, 2006; University of British Columbia)
- Genetics (2007; University of British Columbia)
- Evolutionary Genetics (2005; University of British Columbia)
- Population Genetics (2003; Trent University)

#### INVITED PRESENTATIONS

1. Duke University, Durham, USA (**November 2017**) *A tale of two architectures: what can convergent local adaptation tell us about evolution?*
2. Virginia Tech University, Blacksburg, USA (**November 2017**) *A tale of two architectures: what can convergent local adaptation tell us about evolution?*
3. Student invited speaker, VetMedUni, Austria (**October 2017**) *A tale of two architectures: what can convergent local adaptation tell us about evolution?*
4. Institute for Science and Technology, Austria (**October 2017**) *The architecture of local adaptation: theoretical predictions in the era of genome scans.*
5. Polygenic adaptation symposium, Zurich, Switzerland (**August 2017**) *Detecting and interpreting the genomic basis of convergent local adaptation.*
6. Forest Genetics, Edmonton, AB (**June 2017**) *The genomic basis of adaptive and plastic responses to climate in conifers.* [Keynote talk]
7. Northeastern University Seminar series, Boston (**April 2017**) *Adaptation under migration-selection balance: a tale of two architectures.*
8. Social evolution and genome complexity, New York (**February 2017**) *Balancing selection and genome evolution: how commonly does positive selection act upon gene order?*
9. Plant and Animal Genomes, San Diego (**January 2017**) *Using Comparative Population Genomics to Find the Genes Driving Convergent Local Adaptation.*
10. Norwegian University of Life Sciences (**December 2016**) *The architecture of local adaptation: Theoretical predictions and empirical patterns in lodgepole pine and interior spruce.*
11. Queens University Ecology and Evolution Seminar series (**October 2016**) *The architecture of local adaptation: Theoretical predictions and empirical patterns in lodgepole pine and interior spruce.*
12. Canadian Society for Ecology and Evolution, St. John's (**July 2016**) *The genomic basis of*

*convergent local adaptation to temperature in lodgepole pine and interior spruce.*

13. University of Uppsala (**November 2015**) *The architecture of local adaptation: Theoretical predictions and empirical patterns in lodgepole pine and interior spruce.*
14. Canadian Society for Ecology and Evolution, Saskatoon (**May 2015**) *Local adaptation and the evolution of genetic and genomic architecture.*
15. University of Bern (**March 2015**) *The architecture of local adaptation: transient alleles and long-term genomic repatterning.*
16. Université Laval (**November 2014**) *The architecture of local adaptation: transient alleles and long-term genomic repatterning.*
17. American Naturalist Vice President's Symposium, Raleigh (**June 2014**) *Reconciling population and quantitative genetic models of local adaptation: Critical assumptions about genetic architecture.*
18. University of Idaho (**November 2013**). *Environmental heterogeneity and the genomic architecture of local adaptation.*
19. IUFRO Tree Biotechnology, Asheville (**May 2013**). *The genomic architecture of local adaptation: Theoretical predictions and empirical tests in lodgepole pine and interior spruce.*
20. University of Calgary (**January 2013**). *Environmental heterogeneity and the architecture of local adaptation.*
21. Simon Fraser University Archaeology Seminar Series (**November 2011**) *The evolution of cultural traits: population differentiation and the maintenance of misinformation.*
22. EvolVienna seminar, Vienna (**November 2010**). *Some genetic consequences of evolution under migration, selection, and drift.*
23. FoResTTraC Workshop, Saariselkä (**October 2010**). *Adaptation to climate change: The maintenance of quantitative genetic variance and evolvability.*

#### **SELECTED CONTRIBUTED PRESENTATIONS**

24. Society for the Study of Evolution, Portland, OR (**June 2017**). *Why convergence? Inferring constraint from comparative genomic studies of local adaptation.*
25. Society for the Study of Evolution, Austin, TX (**June 2016**). *Convergent local adaptation to climate in conifers: exome sequencing reveals an unexpected role for gene duplication.*
26. Centre for Molecular Simulation Seminar Series, University of Calgary (**November 2015**) *The architecture of local adaptation: Theoretical predictions and empirical patterns in lodgepole pine and interior spruce.*
27. Department of Biochemistry and Molecular Biology Seminar Series, University of Calgary (**October 2015**). *Local adaptation and the evolution of genome architecture: Do clusters of functionally related genes evolve via positive selection?*
28. Plant and Animal Genomes, San Diego (**January 2015**). *Contrasting genomic signatures of local adaptation in lodgepole pine (*Pinus contorta*) and interior spruce (*Picea glauca* x *Picea engelmannii*).*
29. Forest Genetics. Whistler, British Columbia (**July 2013**). *Using RNAseq to characterize gene expression in lodgepole pine and interior spruce.*
30. Joint meeting of Evolution societies: SSE/SSB/ASN/CSEE/ESEB. Ottawa, Canada (**July 2012**). *The importance of genomic rearrangements for the evolution of islands of divergence under migration-selection balance.*

31. Social decision making. Ascona, Switzerland (**April 2011**). *Network architecture and cultural load.*
32. EEB Seminar. University Neuchâtel, Switzerland (**March 2011**). *Some genetic consequences of evolution under migration, selection, and drift.*
33. Evolutionary and Ecological Genomics of Adaptation workshop. Fribourg, Switzerland (**September 2010**). *The genetic architecture of adaptation under migration-selection balance.*
34. Society for the Study of Evolution, Portland, OR (**June 2010**). *The genetic architecture of adaptation under migration-selection balance.*
35. Evolution in Metapopulations workshop. La Folly, Switzerland (**September 2009**). *Architecture of multi-locus adaptation under migration-selection balance: allele effect size and number.*
36. European Society for Evolutionary Biology, Turin, Italy (**August 2009**). *Multi-locus adaptation under migration-selection balance and the accuracy of the Gaussian approximation.*
37. Society for the Study of Evolution, Moscow, ID (**June 2009**). *No effect of environmental heterogeneity on the maintenance of genetic variation for wing shape in *Drosophila melanogaster*.*
38. Society for the Study of Evolution, Minneapolis, MN (**June, 2008**). *Overwhelmed by gene flow? A theoretical exploration of adaptive constraint.*
39. Canadian Society for Ecology and Evolution. Vancouver, BC (**May 2008**). *Explorations at the migration-selection threshold: Evolution in quantitative traits.*
40. Canadian Society for Ecology and Evolution, Toronto, ON (**May 2007**). *Genetic diversity in heterogeneous environments: Reconciling theoretical predictions and empirical observations.*
41. Evo-Wibo, Port Townsend, WA (**April 2006**). *Regional heterogeneity and gene flow maintain variance in a quantitative trait within populations of lodgepole pine.*
42. Tree breeders workshop with BC Ministry of Forests and Range (**February 2006**). *Regional heterogeneity and gene flow maintain variance in a quantitative trait within populations of lodgepole pine.*
43. Society for the Study of Evolution, Fairbanks, AK (**June 2005**). *Maintenance of diversity in a heterogeneous environment: Landscape predicts variance within populations of lodgepole pine.*

#### **CONTRIBUTED PRESENTATIONS BY TRAINEES (in bold)**

44. **McDonald T.** Society for the Study of Evolution, Portland, OR (**June 2017**). *The effect of migration and environmental heterogeneity on the maintenance of standing genetic variation: a simulation study.*
45. **Mee J, Yeaman S.** Society for the Study of Evolution, Austin, TX (**June 2016**). *Local adaptation without beneficial mutations: conditionally deleterious mutations and genomic signatures of selection.*

#### **PROFESSIONAL SERVICE**

- Reviewer for Peer Community in Evolutionary Biology



- Associate Editor for Ecology and Evolution (Wiley-Blackwell)
- Guest Editor for Axios review service
- Reviewer for 36 journals & granting agencies: PNAS; Molecular Ecology; Evolution; Evolution Letters; Genetics; Proceedings of the Royal Society B; Philosophical Transactions of the Royal Society B; Scientific Reports; Evolutionary Applications; Nature Communications; Genetica; Journal of Evolutionary Biology; American Naturalist; BMC Evolutionary Biology; BMC Biology; Heredity; Journal of Theoretical Biology; Theoretical Population Biology; Journal of Mathematical Biology; Nature Ecology & Evolution; Tree Genetics and Genomes; PLoSOne; PLoS Genetics; Annals of Botany; Theoretical and Applied Genetics; Trends in Ecology and Evolution; Molecular Biology and Evolution; Molecular Medicine; Biology Letters; Swiss National Science Foundation; US NSF; Austrian Science Fund; Human Frontier Science Program; Research Foundation–Flanders (FWO), Natural Sciences and Engineering Research Council (Canada), Mitacs (Canada), France Genomique (France).
- Founded the Evolution of Genomic and Genetic Architecture journal club (UBC, 2012-2013)
- Invited expert at European FoResTTraC Workshop on evolutionary response to climate change (Saariselkä, Finland, 2010)
- Organizer for Whistler Forest Genetics (2013), Vancouver Evolution Festival (2009), EEB Evolution Lecture (UBC, 2006), SOWD Lunch research group meetings (UBC, 2005-2006), DIRT Lunch seminar series (UBC, 2005-2006)
- Judge: Greater Vancouver Science Fair and Canada Wide Science Fair (2005; 2006)
- Zoology Department ‘Beer Baron’ (UBC, 2005-2006)
- President of the Visiting Researchers group (CIAT, 2003-2004)

#### **TECHNICAL AND COMMUNICATION SKILLS**

- Bioinformatics: extensive experience with RNAseq, sequence capture design, SNP calling (GATK), Linux, PERL, BWA, Trinity, samtools, and many other bioinformatic tools
- R and C++ for statistics and programming, Mathematica for analytical modeling
- Geographical Information Systems (GIS)
- Fluent in Spanish and intermediate fluency in French

#### **SOCIETY MEMBERSHIPS**

- Society for the Study of Evolution (lifetime)
- Canadian Society for Ecology and Evolution (honourary 10-year member)

#### **RELATED INTERESTS**

- Animation and computer games as a tool for communicating scientific ideas, especially to the general public
- Bio-ethics and regulation of emerging genomic technologies