

Luke McLean Evans, Ph.D.
Faculty Fellow, Institute for Behavioral Genetics
Assistant Professor, Department of Ecology and Evolutionary Biology, University of Colorado
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POSITIONS AND EDUCATION

2018-present Faculty Fellow, Institute for Behavioral Genetics, and Assistant Professor, Ecology and Evolutionary Biology, University of Colorado, Boulder, CO.
2015-2018 Postdoctoral Fellow, Institute for Behavioral Genetics, University of Colorado Boulder, CO. Supervisor Dr. Matthew C. Keller
2012-2015 Postdoctoral Fellow, Department of Biology, West Virginia University Morgantown, WV. Supervisor Dr. Stephen P. DiFazio
2012 Ph.D. in Biology, with distinction
Northern Arizona University, Flagstaff, AZ. Major Advisors: Drs. Tom Whitham, Gery Allan
2007 M.S. in Biology
Northern Arizona University, Flagstaff, AZ. Major Advisors: Drs. Tom Whitham, Gery Allan
2005 B.A. in Environmental and Evolutionary Biology, *cum laude*
Dartmouth College, Hanover, NH

GRANTS AND FELLOWSHIPS

2015 NSF Dimensions US-China: Collaborative Research: Sex chromosomes and dioecy in plants as drivers of multi-level biodiversity. \$1,945,825 total. P.I. Matt Olson, Texas Tech. CoPIs DiFazio, Evans, Smart, Keefover-Ring. Disbursed after I left WVU. NSF DEB 1542509.
2014 Faculty Senate Travel Award, WVU. \$400
2010-2012 NSF Dissertation Improvement Grant, "Climate change and candidate gene variation in *Populus*: Impacts on dependent communities and biotic interactions." \$15,000 NSF DEB 1011554
2007-2012 Science Foundation Arizona Graduate Fellowship
2007-2012 NSF IGERT Traineeship
2004 Paul K. Richter and Evalyn E. Cook Richter Memorial Fund, Dartmouth College

ACADEMIC AWARDS

2012 Best Dissertation Award, NAU Biology Department
2009 Best Graduate Student Paper, NAU Biology Department
2006 1st Place Student Presentation Competition, Natural Areas Conf., Flagstaff, AZ
2005 Christopher B. Reed Biologist Award, Dartmouth College
2004 Academic Citation, *Introd. to Problems of Philosophy*, Dartmouth College

PUBLICATIONS

Border R, A Smolen, R Crowley, M Stallings, S Brown, RD Conger, J Derringer, MB Donnellan, BC Haberstick, J Hewitt, C Hopper, K Krauter, MB McQueen, TL Wall, MC Keller, **LM Evans**. Imputation of behavioral candidate gene repeat variants in 486,565 publicly-available UK Biobank individuals. *Accepted at European Journal of Human Genetics*. Preprint on BioRxiv: <https://doi.org/10.1101/358267>

Border R, EC Johnson, **LM Evans**, A Smolen, N Berley, PF Sullivan, MC Keller. No support for candidate gene or candidate gene-by-interaction hypotheses for major depression across multiple large samples. *Accepted at American Journal of Psychiatry*.

Zhou R, Macaya-Sanz D, Rodgers-Melnick E, Carlson CH, Gouker FE, **Evans LM**, Schmutz J, Jenkins JW, Yan J, Tuskan JA, Smart LB, DiFazio SP. *Accepted*. Characterization of a large sexually dimorphic genome interval in *Salix purpurea* L. (Salicaceae). *Molecular Genetics and Genomics*.

Evans, LM, R Tahmasbi, SI Vrieze, G Abecasis, S Das, D Bjelland, T DeCandia, Haplotype Reference Consortium, ME Goddard, BM Neale, J Yang, PM Visscher, MC Keller. 2018 Comparison of methods that use whole genome data to estimate the heritability and genetic architecture of complex traits. *Nature Genetics*. 50:737-745. DOI: 10.1038/s41588-018-0108-x. PMC5934350

Evans, LM, R Tahmasbi, SI Vrieze, G Abecasis, S Das, D Bjelland, T DeCandia, Haplotype Reference Consortium, ME Goddard, J Yang, PM Visscher, MC Keller. 2018. Narrow-sense heritability estimation of complex traits using identity-by-descent information. *Heredity*. 121:616-630. DOI:10.1038/s41437-018-0067-0. PMC6221881.

Evans, LM, MC Keller. 2018. Correspondence: Using partitioned heritability methods to explore genetic architecture. *Nature Reviews Genetics*. DOI:10.1038/nrg.2018.6

- Johnson, EC, **LM Evans**, MC Keller. 2018 Relationship between estimated autozygosity and complex traits in the UK Biobank. *PLoS Genetics*. 14(7):e1007556. DOI:10.1371/journal.pgen.1007556.
- Chhatre, VE, **LM Evans**, SP DiFazio, SR Keller. 2018. Adaptive introgression and maintenance of a trispecies hybrid complex in range-edge populations of *Populus*. *Molecular Ecology*. 27:4820-4838. DOI: 10.1111/mec.14820
- Xie, M, W Muchero, AC Bryan, K Yee, H-B Guo, J Zhang, TJ Tschaplinski, VR Singan, E Lindquist, RS Payyavula, J Barros-Rios, R Dixon, N Engle, RW Sykes, M Davis, SS Jawdy, LE Gunter, O Thompson, SP DiFazio, **LM Evans**, K Winkeler, C Collins, J Schmutz, H Guo, U Kalluri, M Rodriguez, K Feng, J-G Chen, GA Tuskan. 2018. A 5-Enolpyruvylshikimate 3-Phosphate Synthase Functions as a Transcriptional Repressor in *Populus*. *The Plant Cell*. 30:1645-1660. DOI:10.1105/tpc.18.00168
- Wills, AG, **LM Evans**, C Hopfer. 2017. Phenotypic and genetic relationship between BMI and drinking in a sample of UK adults. *Behavior Genetics*. 47(3):290-297. DOI:10.1007/s10519-017-9838-2. PMC5546738.
- Bothwell, HM, SA Cushman, SA Woolbright, EI Hersch-Green, **LM Evans**, TG Whitham, GJ Allan. 2017. Conserving threatened riparian ecosystems in the American West: Precipitation gradients and river networks drive genetic connectivity and diversity in a foundation riparian tree (*Populus angustifolia*). *Molecular Ecology*. 26:5114-5132.
- Evans, LM**, S Kaluthota, DW Pearce, GJ Allan, K Floate, SB Rood, TG Whitham. 2016. Bud phenology and growth are subject to divergent selection across a latitudinal gradient in *Populus angustifolia* and impact adaptation across the distributional range and associated arthropods. *Ecology and Evolution*. 6:2565-4582. DOI:10.1002/ece3.2222
- Evans LM**, GJ Allan, SP DiFazio, GT Slavov, JA Wilder, SB Rood, KD Floate, TG Whitham. 2015. Geographical barriers and climate influence demographic history in narrowleaf cottonwoods. *Heredity*. 114:387-396. DOI:10.1038/hdy.2014.115
- Kaluthota, S, DW Pearce, **LM Evans**, MG Letts, TG Whitham, SB Rood. 2015. Higher photosynthetic capacity from higher latitude: foliar characteristics and gas exchange of southern, central and northern populations of *Populus angustifolia*. *Tree Physiology*. 35:936-948. DOI: 10.1093/treephys/tpv069
- Evans LM**, GT Slavov, E Rodgers-Melnick, J Martin, P Ranjan, W Muchero, AM Brunner, W Schackwitz, L Gunter, J-G Chen, GA Tuskan, SP DiFazio. 2014. Population genomics of *Populus trichocarpa* identifies signatures of selection and adaptive trait associations. *Nature Genetics*. 46:1089-1096. DOI:10.1038/ng.3075 **Press release at: <http://jgi.doe.gov/signatures-selection-inscribed-poplar-genomes/>
- Muchero W, J Guo, SP DiFazio, J-G Chen, PRanjan, GT Slavov, LE Gunter, S Jawdy, AC Bryan, R Sykes, A Ziebell, I Porth, O Skyba, F Unda, YA El-Kassaby, CJ Douglas, SD Mansfield, J Martin, W Schackwitz, **LM Evans**, O Czarnecki, GA Tuskan. 2014. Multi-environment Identification and Molecular Validation of Allelic Variants Associated With Cell Wall Chemistry in *Populus*. *BMC Genomics*. 16:24.
- Brunner AM, **LM Evans**, C-Y Hsu, S Xiaoyan. 2014. Vernalization and the chilling requirement to exit bud dormancy: shared or separate regulation? *Frontiers in Plant Science*. 5:732. DOI: 10.3389/fpls.2014.00732
- Cushman, SA, T Max, N Meneses, **LM Evans**, SM Ferrier, B Honchak, TG Whitham, GJ Allan. 2014. Landscape genetic connectivity in a riparian foundation tree is jointly driven by climatic gradients and river networks. *Ecological Applications*. 24:1000-1014.
- Bangert RK, SM Ferrier, **LM Evans**, K Kennedy, KC Grady, GJ Allan, TG Whitham. 2013. The proportion of three foundation plant species and their genotypes influence an arthropod community: restoration implications for the endangered southwestern willow flycatcher. *Restoration Ecology* 21:447-456.
- Evans LM**, GJ Allan, N Meneses, TL Max, TG Whitham. 2013. Herbivore host-associated genetic differentiation depends on the scale of plant genetic variation examined. *Evolutionary Ecology* 27:65-81.
- Evans LM**, GJ Allan, and TG Whitham. 2012. *Populus* hybrid hosts drive divergence in the herbivorous mite, *Aceria parapopuli*: Implications for conservation of plant hybrid zones as essential habitat. *Conservation Genetics* 13:1601-1609.
- Evans, LM**, JS Clark, AV Whipple, TG Whitham. 2012. The relative influences of host plant genotype and yearly abiotic variability in determining herbivore abundance. *Oecologia*. 168: 483-489.
- Whitham, TG, CA Gehring, LJ Lamit, T Wojtowicz, **LM Evans**, AR Keith, DS Smith. 2012. Community specificity: life and afterlife effects of genes. *Trends in Plant Science* 17: 271-281.
- Evans, LM**, RW Hofstetter, MP Ayres, KD Klepzig. 2011. Temperature alters the relative abundance and population growth rates of species within the *Dendroctonus frontalis* (Coleoptera: Curculionidae) community. *Environmental Entomology* 40: 824-834.
- Whitham TG, CA Gehring, **LM Evans**, CJ LeRoy, RK Bangert, JA Schweitzer, GJ Allan, RC Barbour, DG Fischer, BM Potts, JK Bailey. 2010. A community and ecosystem genetics approach to conservation biology and management. Pp. 50-73. In *Molecular Approaches in Natural Resource Conservation* (J.A DeWoody, J.W. Bickham, C. Michler, K. Nichols, O.E. Rhodes, and K. Woeste, eds.). Cambridge University Press.
- Evans, LM**, GJ Allan, S Woolbright, S Shuster, TG Whitham. 2008. Hybridization and genotypic variation in a foundation tree drive cryptic speciation of a specialist herbivore. *Evolution* 62: 3027-3040.

Preprints, In Review, and In Preparation:

- Chhetri, HB, D Macaya-Sanz, D Kainer, **LM Evans**, K Ault, T Rosentiel, SH Strauss, D Jacobson, TJ Tschaplinski, GA Tuskan, SP DiFazio. Genome-wide association analysis of *Populus trichocarpa* identifies key polymorphisms controlling morphological and physiological traits. *Submitted to New Phytologist*.
- Carlson, C, F Gouker, C Crowell, **L Evans**, S DiFazio, C Smart, L Smart. Joint linkage and association mapping of complex traits in shrub willow (*Salix purpurea* L.). *Submitted to Annals of Botany*.
- Tahmasbi, R, **LM Evans**, E Turkheimer, MC Keller. Testing the moderation of quantitative gene by environment interactions in unrelated individuals. *In preparation*. Preprint on BioRxiv: <https://doi.org/10.1101/191080>

PROFESSIONAL TALKS AND PRESENTATIONS

- Evans, LM.** *Invited seminar.* Exploring the genetic architecture of nicotine use and identifying novel associations. Presented at the PAGE SC Meeting, January 10, 2018, Colorado Center for Personalized Medicine - CU Anschutz Medical Center, Aurora, CO.
- Evans, LM.** *Talk.* Exploring the genetic architecture of psychiatric disorders using partitioned heritability approaches. Presented at the World Congress of Psychiatric Genetics, October 13, 2018, Glasgow, Scotland.
- Evans, LM.** *Invited talk.* Exploring the genetic architecture of psychiatric disorders using partitioned heritability approaches. Presented at the Colorado Center for Personalized Medicine and Biobank Retreat, September, 14, 2018, Vail, CO.
- Ehringer, MA, MS Powers, **LM Evans**, JC DeFries (2018) Whole genome sequencing of replicate inbred strains of mice selected for high and low open-field activity. 20th Annual Meeting of the International Behavioural and Neural Genetics Society. *Selected talk
- Evans, LM**, R Tahmasbi, SI Vrieze, G Abecasis, S Das, D Bjelland, T DeCandia, M Goddard, B Neale, J Yang, P Visscher, MC Keller, Haplotype Reference Consortium. Methods to estimate heritability of complex traits under a variety of complex genetic architectures. Poster 2881. Presented at the 67th Annual Meeting of The American Society of Human Genetics, October 18, 2017, Orlando, Florida.
- Evans, LM**, R Tahmasbi, P Visscher, J Yang, M Goddard, SI Vrieze, G Abecasis, S Das, D Bjelland, T DeCandia, B Neale, Haplotype Reference Consortium, MC Keller. Utility and biases of multiple whole genome methods to estimate heritability and examine genetic architecture of complex traits. Poster 509. Presented at the 66th Annual Meeting of The American Society of Human Genetics, October 19, 2016, Vancouver Canada.
- Evans LM**, W Muchero, G Tuskan, and SP DiFazio. *Talk.* Quaternary demography of *Populus trichocarpa* throughout its range. International Poplar Symposium VI. July 20-24, 2014. Vancouver, BC.
- Evans LM**, GT Slavov, E Rodgers-Melnick, J Martin, P Ranjan, W Muchero, A Brunner, W Schackwitz, J-G Chen, L Gunter, G Howe, G Tuskan, and SP DiFazio. Genome resequencing in an ecologically and economically important forest tree, *Populus trichocarpa*: selection and association genetics. *Talk.* International Plant & Animal Genome XXII. January 11-15, 2014. San Diego, CA.
- INVITED SEMINAR: **Evans LM.** Genome resequencing in an ecologically and economically important forest tree, *Populus trichocarpa*: selection and demographic history. Virginia Tech Department of Forest Resources and Environmental Conservation. September 23, 2013. Blacksburg, VA.
- Evans LM**, SP DiFazio, GT Slavov, J Martin, W Muchero, W Shackwitz, E Rodgers-Melnick, G Howe, G Tuskan. *Talk.* Adaptive trait quantitative genetics and population genomics of *Populus trichocarpa* across its latitudinal range. IUFRO Tree Biotechnology, May 26-June 1, 2013. Asheville, NC.
- Evans LM**, GT Slavov, G Allan, T Whitham, G Tuskan, W Muchero, J Martin, W Schackwitz, SP DiFazio. *Talk.* Comparative genetics of *Populus angustifolia* and *P. trichocarpa* across their similar latitudinal ranges. International Plant & Animal Genome XXI. January 12-16, 2013. San Diego, CA.
- Evans LM**, GT Slavov, SP DiFazio, W Muchero, J Chen, LE Gunter, S Kolpak, GT Howe, and GA Tuskan. *Poster.* Climate-driven productivity in *Populus trichocarpa*. Bioenergy Science Center Science Retreat. Chattanooga, TN. July 15-19, 2012.
- INVITED POSTER: **Evans LM**, Whitham TG, Pearce D, Rood S, Allan GJ, DiFazio SP, Slavov G, Floate K, and Max T. Molecular and phenotypic evidence of climate-driven selection in a dominant riparian tree, *Populus angustifolia*. AZ Board of Regents Meeting, Tempe, AZ. Aug. 4, 2011.
- INVITED TALK: **Evans LM**, GJ Allan, and TG Whitham. Herbivore differentiation along a scale of host plant genetic variation. Entomological Society of America Annual Meeting, San Diego, CA. December, 2010.
- INVITED TALK: **Evans, LM**, GJ Allan, and TG Whitham. Natural forest hybrid zones drive cryptic speciation in arthropods. Western Forest Insect Work Conference. Flagstaff, AZ. April 6-8, 2010.
- Evans, LM**, GJ Allan, N Meneses, and TG Whitham. *Poster.* Comparative population structure of a common herbivore and its host. Gordon Research Conference Plant-Herbivore Interaction. Galveston, TX. February 21-26, 2010.
- Evans, LM**, GJ Allan, S Woolbright, SM Shuster, and TG Whitham. Hybridization and genotypic variation in a foundation tree drive cryptic speciation of a specialist herbivore. Evolution Conference. Christchurch, New Zealand. June 2007.
- Evans, LM**, GJ Allan, S Woolbright, S Shuster, and TG Whitham. *Talk.* Morphologically cryptic host race formation in the poplar bud gall mite, *Aceria parapopuli*. Natural Areas Conference. Flagstaff, AZ September 2006.

TEACHING EXPERIENCE AND OUTREACH

- 2017 Statistical Genetic Methods for Human Complex Traits Workshop. Junior Faculty. "Marker heritability: Biases, confounding factors, current methods, and best practices." Boulder, CO.
- 2014 "Sensing the Seasons" public talk and walk at West Virginia Botanic Gardens
- 2011 Population and Quantitative Genetics, Northern Arizona University
Two lectures on signatures of natural selection. Professor: Dr. Phil Service
- 2009 Public Outreach Intern, Arboretum at Flagstaff, AZ
Designed exhibits and curricula on biodiversity, led visitor tours of the arboretum, and taught visiting school groups. Supervisor: Rachel Edelstein
- 2007 Laboratory Assistant, Molecular Techniques, Northern Arizona University
Helped setup, lead, and cleanup laboratory course of molecular techniques including DNA extraction, PCR, sequencing, gel visualization. Supervisor: Dr. Gery Allan
- 2005, 2006 Teaching Assistant, Northern Arizona University, Flagstaff, AZ
Human Anatomy and Physiology. Supervisor: Lara Dickson
- 2005 Undergraduate Teaching Assistant, Dartmouth College, Hanover, NH
Physiological Ecology. Supervisor: Dr. Matthew P. Ayres
- 2003 Assistant to the Laboratory Coordinator, Biology Department, Dartmouth College
Assisted in experiment organization and set-up. Supervisor: Craig Layne

REVIEWER

Nature Genetics; Heredity; Molecular Ecology; Ecology & Evolution; Genes, Brain & Behavior; Addiction Biology; Behavior Genetics; Nature Communications

PROFESSIONAL MEMBERSHIPS

American Society of Human Genetics, International Society of Psychiatric Genetics, Human Behavior and Evolution Society

PROGRAMMING PROFICIENCY

linux/unix, R, perl, and many standard bioinformatics tools, including bcftools/samtools, vcftools, EIGENSOFT, PLINK2, GCTA, EMMAX, GEMMA, etc.