Nathan C Layman, PhD

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Research Interests

My research focuses on using mathematical modeling and computational science to unpack the demographic and evolutionary history of populations using large scale genomic data. I am particularly fascinated by subjects such as mating system diversification, whole genome duplication and historical demography which leave genome-wide signatures of evolution. These processes are so interesting because they play a key role in shaping the rich pattern of diversity we see around us every day.

Education

2018 PhD Biology, Washington State University

2011 BS Biology, University of Washington

2011 BA Environmental Studies, University of Washington

Publications

Published

Koski, M.H., **Layman, N.C.**, Prior, C.J., Busch, JW., Galloway, L.F. *Selfing ability and drift load evolve with range expansion. 2019* Evolution Letters, 3-5: 500–512. doi:10.1002/evl3.136

Layman, N.C., Busch, J.W. 2018. *Bottlenecks and inbreeding depression in autotetraploids.* Evolution, 72-10: 2025–2037. doi:10.1111/evo.13587

Layman, N.C., Fernando, T.R., Herlihy, C.R., Busch, J.W. 2017. *Costs of selfing prevent the spread of a self-compatibility mutation that causes reproductive assurance.* Evolution, 71: 884-897. doi:10.1111/evo.13167

Submitted

Layman, N.C., Tuschhoff, B.M., Basinski, A., Reimen, C., Bull, J., Nuismer, S. *Controlling evolution in genetically engineered systems through repeated introduction.* Evolutionary Applications.

Nuismer, S. L., Remien, C. H., Basinksi, A. J., Varrelman, T., **Layman, N. C.**, Rosenke, K., Bird, B., Jarvis, M., Barry, P., Fichet-Calvet, E. *Bayesian estimation of Lassa virus epidemiological parameters: implications for spillover prevention using wildlife vaccination.* PLOS Neglected Tropical Diseases. **bioRXive link.**

Prior, C.P.*, **Layman, N.C.***, Koski, M.H., Galloway, L.F., Busch, J.W. *Species range expansion involved colonization routes from two mid-latitude origins in a North American forest herb.* Molecular Ecology.

*Shared first authorship

In prep

Layman, N.C., Tuschhoff, B.M., Basinski, A.J., Reimen, C.H., Bull, J., Nuismer, S.L. *Multi-strain transmissible vaccines with antigenic decay.* Target: Vaccine.

Basinski, A.J., Fichet-Calvet, E., Sjodin, A.R., Varrelman, T.J., Remien, C.H., **Layman, N.C.**, Nuismer, S.L. *Bridging the gap: Using reservoir ecology and human sero-surveys to estimate Lassa incidence in West Africa.* Target: Proceedings of the Royal Society B.

Press

Feb 2017 Harkness, A. *Digest: Prudent self-denial: the advantage of incompatibility in Leavenworthia alabamica.* Evolution. Reviews Layman et al 2017

Grants and selected awards

2017 Rexford Daubenmire Award for Graduate Education - $30,000

2016 NSF Doctoral Dissertation Improvement Grant (DDIG) - $20,00

2013-2017 Higinbotham Award - $12,000

2012-2014 Aase Fellowship - $4,000

Mentoring

2017-2020 Mentored UIdaho and WSU graduate students in parallel computing as well as coding in R, Python and C++.

2018-2019 Mentored UIdaho undergraduates in modeling, computational biology, coding, and the Gillespie algorithm.

2017-2016 Mentored WSU undergraduates in multiplex PCR, microsatellite analysis, RADseq and general lab work

Teaching

2013-2018 20-30 hours per week designing, teaching and grading lab sections for the following courses

Principles of Organic Evolution

Origins in the Natural World

Dynamic Systems in the Natural World

Introductory Biology

Presentations and invited seminars

2019 Spotlight session: *Swamping prevents post-release evolution in genetically modified organisms.*
Evolution 2019, Providence, RI

2017 Invited speaker: *The fitness effects of an initial self-compatibility mutation in Leavenworthia alabamica.*
International Botanical Congress 2017, Shenzhen, China

2017 Co-author, invited talk: *Population-genetic expectations for trait filtering of self-incompatibility on islands.*
International Botanical Congress 2017, Shenzhen, China

2017 Invited speaker: *Inbreeding depression and polyploidy as a genetic island.*
Evolution 2017, Portland, OR

2017 Co-author, invited talk: *Population-genetic expectations for trait filtering of self-incompatibility on islands.*
Evolution 2017, Portland, OR

2017 Contributed poster: *Why is self-compatibility common on islands?*
Washington State University School of Biological Sciences 2017, Pullman, WA

2016 Contributed talk: *Inbreeding depression and the spread of selfing in polyploids.*
EVO-WIBO 2016, Port Townsend, WA

2016 Contributed talk: *Inbreeding depression and the spread of selfing in polyploids.*
Washington State University School of Biological Sciences Recruitment Seminar 2016, Pullman, WA

2015 Contributed talk: *Inbreeding depression and the spread of selfing in polyploids.*
Botany 2015, Edmonton, AL, CA

2014 Contributed poster: *Challenging the Link Between Polyploidy and Self-compatibility.*
Botany 2014, Boise, ID

Expertise

Mathematical modelling. Development and analysis of a variety of evolutionary mathematical models.

Fieldwork - Designed and implemented multi-year field experiments in northern Alabama.

Programming - Proficient in modeling techniques and the analysis of large data sets using R, Python, C++, and Mathematica.

Next generation sequence data analysis - RADseq analysis and reference assembly

PCR optimization, DNA extraction, SSCP-PAGE, microsatellite analysis, Sanger sequencing

Phylogenetic analysis

GIS (ARCGIS, QGIS, custom Python scripting)

Other academic activities

Service

2017-2020	Reviewed articles for Evolution, The Journal of Evolutionary Biology, The Journal of Heredity, and PLOS
2017	Presented introduction to programming workshop series for Washington State University graduate students
2016-2017	Washington State University, School of Biological Sciences - Coordinator for the weekly seminar series, Biolunch

Organizations

2015–2019	Society of American Naturalists
2015–2016	Washington State University - Biology Graduate Student Association faculty liaison
2010-2011	University of Washington - Tri-Beta Biology Honor Society

Employment history

2018–2019	Postdoctoral Researcher, University of Idaho. *Modeling the stability of transmissible vaccines.* Co-designed and implemented multi-year field experiments - Moulton AL.
2014–2017	Research Assistant, Washington State University. *Challenging the reproductive assurance hypothesis.* Co-designed and implemented large scale field experiment - Moulton AL.
2011–2012	Fisheries Technician, Washington Department of Fish and Wildlife. *Maintained, evaluated, and transported fish stocks in central Washington.* - Chelan, WA
2011-2012	Botany Technician, United States Forest Service. Supervisor: Brigitte Ranne. *Plant inventory and monitoring in Washington forests.* Supervised a 4 person field crew - Entiat, WA

References

Scott Nuismer, Associate Professor, Department of Biological Sciences, University of Idaho
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Jeremiah Busch, Associate Professor, School of Biological Sciences, Washington State University
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Richard Gomulkeiwicz, Professor, School of Biological Sciences, Washington State University
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