Alan O. Bergland

Department of Biology
University of Virginia
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POSITIONS

Assistant Professor — **University of Virginia**
Department of Biology — 2016 - current

Research Associate — **Stanford University**
Petrov Lab, Department of Biology — 2014 - 2015

Post-doctoral Fellow — **Stanford University**
Petrov Lab, Department of Biology — 2010 - 2014

EDUCATION

Ph.D. — **Brown University**
Tatar Lab, Dept. of Ecology and Evolution — 2004 - 2010

B.S. with Honors — **Univ. of Oregon**
Bradshaw-Holzapfel Lab, Dept. of Biology — 2000-2004

B.S. — **Univ. of Oregon**
Dept. of Philosophy — 2000-2004

GRANTS AWARDED SINCE ARRIVING AT UVA

2022 – 2027: NSF CAREER "Backyard Evolution across a Seasonal Metapopulation in Drosophila" $757,988 in total direct costs.

2016 – 2021: NIH R35 "The genetic and physiological architecture of rapid and cyclic adaptation" sole PI. $1,250,000 in total direct costs.

AWARDS

2019: Dept. of Biology Teaching Award, University of Virginia

GRANTS AND FELLOWSHIPS PRIOR TO ARRIVING AT UVA

2013: Stanford Center for Computational, Evolutionary and Human Genomics trainee research grant, "Physiological mechanisms underlying rapid adaptive evolution"

2012: NESCent Catalysis meeting grant, "Tracking the biotic response to global climate change through genomic analysis;" Co-PI along with D. Petrov & P. Schmidt

2011 – 2014: NIH NRSA post-doctoral fellowship, "Genomics of Natural Populations"

2007 – 2008: Oliver Cromwell Gorton Arnold Biological Fellow, Brown Univ.

ARTICLES IN REVISION/REVIEW/PREPRINTS

(† = undergraduate mentee; * = equal contribution; **member of the Bergland lab**)

Becker D, Barnard-Kubow K, Porter R, Edwards A, Beckerman A, **Bergland AO**. Stabilizing selection shapes variation in phenotypic plasticity. In revision at Nature Ecology and Evolution. bioRxiv: 10.1101/2021.07.29.454146

Barnard-Kubow K, Becker D, Murray C, Porter R, Gutierrez G†, Erickson P, Nunez JCB, Voss E, Suryamohan K, Ratan A Beckerman A, **Bergland AO**. Polygenic variation in sexual investment across an ephemerality gradient in *Daphnia pulex*. In review Molecular Biology and Evolution. bioRxiv 10.1101/2021.06.23.449662.

Akhund-Zade J, Yoon D, **Bangerter A**, Polizos N, **Campbell† M**, Soloshenko A, Zhang T, Wice E, Albright A, Narayanan A, Schmidt P, Saltz J, Ayroles J, Klein M, **Bergland AO**, B de Bivort. Wild flies hedge their thermal preference bets in response to seasonal fluctuations. bioRxiv doi:10.1101/2020.09.16.300731.

Yu Y & Bergland AO. Unique signals of clinal and seasonal allele frequency change at eQTLs in *Drosophila melanogaster*. In revision at Evolution. bioRxiv: 10.1101/2021.07.30.454552

PUBLISHED ARTICLES SINCE ARRIVING AT UVA

(† = undergraduate mentee; * = equal contribution; **member of the Bergland lab**)

31. Kapun M*, **Nunez JCB***, Bogaerts-Márquez M, Murga-Moreno J, Paris M, **Outten J**, Coronado-Zamora M, **Tern C**†, (+40 others), & **Bergland AO**. Drosophila Evolution over Space and Time (DEST) - A New Population Genomics Resource. Molecular Biology and Evolution: 10.1093/molbev/msab259

30. Machado H*, **AO Bergland***, R Taylor, S Tilk, E Behrman, K Dyer, D Fabian, T Flatt, J Gonzalez, T Karasov, O Kozeretska, B Lazzaro, T Merritt, J Pool, K O'Brien, S Rajpurohit, P Roy, S Schaeffer, S Serga, P Schmidt, D Petrov. Broad geographic sampling reveals predictable and pervasive seasonal adaptation in Drosophila. eLife: 10: e67577 DOI: 10.7554/eLife.67577

29. **Weller C**, Tilk S, Rajpurohit S, **Bergland AO**. 2021. Accurate, ultra-low coverage genome reconstruction and association studies in Hybrid Swarm mapping populations. G3: 10.1093/g3journal/jkab062.

28. Fu Z, Meier AR, Epstein B, **Bergland AO**, Castillo Carrillo CI, Cooper W, Cruzado RK, Horton DR, Jensen AS, Kelley JL, Rashed A, Reitz SR, Rondon S, Thinakaran J, Wenninger EJ, Wohleb CH, Crowder DW, Snyder WE. 2020. Host plants and endosymbionts shape the population genetics of sympatric vectors. Evolutionary Applications: 13(10):2740-2753.

27. **Erickson PA, Weller CA, Song DY†, Bangerter-Black A**, Schmidt PS, **Bergland AO**. 2020. Unique genetic signatures of local adaptation over space and time for diapause, an ecologically relevant complex trait, in *Drosophila melanogaster*. PLoS Genetics: 16(11):e1009110

26. Kapun M, MG Barrón, F Staubach, DJ Obbard, RAW Wiberg, J Vieira, C Goubert, O Rota-Stabelli, M Kankare, M Bogaerts-Márquez, A Haudry, L Waidele, I Kozeretska, E G Pasyukova, V Loeschcke, M Pascual, C P Vieira, S Serga, C Montchamp-Moreau, J

Abbott, P Gibert, D Porcelli, N Posnien, A Sánchez-Gracia, S Grath, E Sucena, **AO Bergland**, M Pilar Garcia Guerreiro, B Sebnem Onder, E Argyridou, L Guio, M Fristrup Schou, B Deplancke, C Vieira, M G Ritchie, B J Zwaan, E Tauber, D J Orengo, E Puerma, M Aguadé, P Schmidt, J Parsch, A J Betancourt, T Flatt, J González 2020. Genomic analysis of European Drosophila populations reveals longitudinal structure and continent-wide selection. 2020. Molecular Biology and Evolution 37(9):2661-2678

25. Waldvogel AM, Feldmeyer B, Rolshausen G, Exposito-Alonso M, Rellstab C, Kofler R, Mock T, Schmid K, Schmitt I, Bataillon T, Savolainen O, **Bergland AO**, Flatt T, Guillaume F, Pfenninger M. 2020. Evolutionary genomics can improve prediction of species' responses to climate change. Evolution Letters: 10.1002/evl3.154
24. **Stone† HM, Erickson* PA, Bergland* AO**. 2020. Phenotypic plasticity, but not adaptive tracking, underlies seasonal variation in post-cold hardening freeze tolerance of *Drosophila melanogaster*. Ecology and Evolution: 10.1002/ece3.5887
23. Wang Y, Kapun M, Waidele L, Kuenzel S, **Bergland AO**, Staubach F. 2020. Common structuring principles of the *Drosophila melanogaster* microbiome on a continental scale and between host and substrate. Environmental Microbiology Reports: doi:10.1111/1758-2229.12826
22. Tilk S, **Bergland AO**, Goodman A, Schmidt P, Petrov D, Greeblum S. 2019. Accurate allele frequencies from ultra-low coverage pool-seq samples in evolve-and-resequence experiments. G3: 10.1534/g3.119.400755
21. Rajpurohit S, Gefen E, **Bergland AO**, Petrov DA, Gibbs AG, Schmidt PS. 2018. Spatiotemporal dynamics and genome-wide association analysis of desiccation tolerance in *Drosophila melanogaster*. Molecular Ecology: 27 (17), 3525-3540
20. Behrman EL, Howick VM, Kapun M, Staubach F, **Bergland AO**, Petrov DA, Lazzaro BP, Schmidt PS. 2018. Rapid seasonal evolution in innate immunity of wild Drosophila melanogaster. Proc. R. Soc. B 285: 20172599.
19. Anderson C, Reiss I, Zhou C, Cho A, Siddiqi H, Mormann B, Avelis C, Deford P, **Bergland AO**, Roberts E, Taylor J, Vasiliauskas D, Johnston R. 2017. Natural variation in stochastic photoreceptor specification and color preference in *Drosophila*. eLife. doi:10.7554/eLife.29593
18. Wittmann MJ, **Bergland AO**, MW Feldman, PS Schmidt, DA Petrov. 2017. Segregation lift: A general mechanism for the maintenance of polygenic variation under seasonally fluctuating selection. PNAS. doi: 10.1073/pnas.1702994114
17. Fu Z, Epstein B, Kelley JL, Zheng Q, **Bergland AO**, et al. 2017. Using NextRAD sequencing to infer movement of herbivores among host plants. PLOS ONE 12(5): e0177742.
16. Akhund-Zade J†, **Bergland AO**, Crowe SO, Unckless R. 2017. The Genetic Basis of Natural Variation in Drosophila (Diptera: Drosophilidae) Virgin Egg Retention. Journal of Insect Science: doi: 10.1093/jisesa/iew094
15. Rajpurohit S, Hanus R, Vrkoslav V, Behrman EL, **Bergland AO**, Petrov D, Cvacka J, Schmidt PS. 2016. Adaptive dynamics of cuticular hydrocarbons in Drosophila. Journal of Evolutionary Biology: doi: 10.1111/jeb.12988.
14. Beckerman AP, Childs DZ, **Bergland AO**. 2016. Eco-evolutionary Biology: Feeding and

Feedback Loops. Current Biology, doi: 10.1016/j.cub.2016.01.013.

PUBLISHED ARTICLES PRIOR TO ARRIVING AT UVA

(† = undergraduate mentee; * = equal contribution)

13. Tuttle EA*, **Bergland AO*,** Gonser R, Karody M, Lear T, Houck M, Ryder O, Romanov M, Warren WC, Balakrishnan CN. 2016. Divergence and functional degradation of a sex-chromosome like super-gene. Current Biology, doi:10.1016/j.cub.2015.11.069.
12. Machado HE, **Bergland AO**, O'Brien K, Behrman EL, Schmidt PS, Petrov DA. 2016. Comparative population genomic analysis of latitudinal variation in *D. simulans* and *D. melanogaster*. Molecular Ecology, doi: 10.1111/mec.13446.
11. **Bergland AO**, Tobler R, González J, Schmidt P & Petrov D. 2016. Secondary contact and local adaptation contribute to genome-wide patterns of clinal variation in *Drosophila melanogaster*. Molecular Ecology, doi: 10.1111/mec.13455
10. Zhao X, Behrman EL, **Bergland AO**, Gregory BD, Petrov DA, Schmidt PS. 2015. Global transcriptional profiles of diapause in *Drosophila melanogaster* reveal evidence of seasonal adaptation. Molecular Biology and Evolution, doi: 10.1093/molbev/msv263
9. **Bergland AO**, E Behrman, K O'Brien, P Schmidt & D Petrov. 2014. Genomic evidence of rapid and stable adaptive oscillations over seasonal time scales in Drosophila. PLoS Genetics 10(11): e1004775. doi:10.1371/journal.pgen.1004775
8. Paaby AB, **Bergland AO**, Behrman EL, Schmidt PS. 2014. An amino acid polymorphism in the *Drosophila* Insulin Receptor demonstrates pleiotropic and adaptive function in life-history traits. Evolution (68): 3395-3409
7. Adrion J, Pascual M, Burrack H, Haddad N, **Bergland AO**, Machado H, Sackton T, Schlenke T, Watada M & Singh N. 2014. Reconstructing the invasion history of *Drosophila suzukii* using multilocus sequence data. Molecular Biology Evolution: doi:10.1093/molbev/msu246
6. Feder A†, Petrov D & **Bergland AO**. 2012. LDx: Estimation of linkage disequilibrium from high-throughput pooled resequencing data. PLoS ONE 7(11): e48588
5. Zhu Y, **Bergland AO**, Gonzalez-Perez J & Petrov D. 2012. Empirical validation of pooled whole genome population re-sequencing in *Drosophila melanogaster*. PLoS ONE 7(7): e41901
4. **Bergland AO,** Chae HS, Kim YJ & Tatar M. 2012. Fine scale mapping of natural variation in fly fecundity identifies neuronal domain of expression and function of an aquaporin. PLoS Genetics 8(4): e1002631
3. **Bergland AO.** Mechanisms and ecological genetics of reproduction in Dipteran insects, 2011. In *Molecular mechanisms of life history evolution*, eds. Flatt, T. & A. Heyland. Oxford University Press, Oxford, UK
2. **Bergland AO**, Genissel A, Nuzhdin SV & Tatar M. 2008. Quantitative trait loci affecting phenotypic plasticity and the allometric relationship of ovariole number and thorax length in *Drosophila melanogaster*. Genetics 180: 576-582

1. **Bergland AO**, Agotsch M, Mathias D, Bradshaw WE & Holzapfel CM. 2005. Factors influencing the seasonal life history of the pitcher plant mosquito, *Wyeomyia smithii*. Ecological Entomology 30:129-137

INVITED PRESENTATIONS SINCE ARRIVING AT UVA

(* = departmental seminar; † = conference)

2021: Dept. of Biology, University of Virginia (Promotion/Tenure seminar)
11th DrosEU Meeting – Virtual

2020: Penn State University, State College, PA*
Department of Evolutionary Biology, University of Zurich, Zurich, Switzerland*
EAWAG Kastanienbaum, Luzern, Switzerland*
10th DrosEU Meeting, Instituto Gulbenkian, Lisbon, Portugal†

2019: 9th DrosEU Meeting, ESEB STN, Turku, Finland†
European Society for Evolutionary Biology, Turku, Finland†
8th. DrosEU Meeting, Universitat Pompeu Fabra, Barcelona, Spain†
Society for the Study of Evolution Meeting, Providence, RI†
Dept. of Biology, James Madison University*
Dept. of Biology, Washington State University*

2018: Museum of Comparative Zoology, Harvard University*
Dept. of Ecology and Evolution, Brown University*
Dept. of Biology, College of William and Mary*
7th DrosEU Meeting, Institute in San Michele all' Adige (Keynote address)†
Dept. of Biology, Johns Hopkins University*
Center for Public Health Genomics, UVA*
Senckenberg Nat. History Museum, Genomics of Climate Change (Keynote address)†

2017: Entomological Society Meeting, Pacific Branch†
Dept. of Biology, East Carolina University*

2016: Mind the Gap Conference, Vienna, Austria†
Neuroscience Graduate Program, University of Virginia*

INVITED PRESENTATIONS PRIOR TO ARRIVING AT UVA

(* = departmental seminar; † = conference)

2015: Institut Jacques Monod, Université Paris Diderot, Paris, France*
Dept. of Biology, Indiana State University (Double Helix Speaker)*
University of Sheffield, Sheffield, United Kingdom*
3rd DrosEU meeting, Barcelona, Spain
Universitat Pompeu Fabra, Barcelona, Spain*
Dept. of Molecular Biosciences, University of Kansas*
Dept. of Biology, University of Virginia*

2014: Entomological Society of America, Portland, OR†

2012: Bay Area Population Genetics VI, Univ. of California, Davis†

rEvolution, Stanford University†

2011: University of Pennsylvania*

2008: Uppsala University, Uppsala, Sweden*

Interdisciplinary Graduate Student Seminar Series, Brown University†

SUBMITTED PRESENTATIONS SINCE ARRIVING AT UVA

2020: "A population genetic model of polymorphism in parthenogenesis with implications for of diversity." The Allied Genetics Conference, Washington, D.C.

2017: "The genetic basis of rapid adaptive shifts in pigmentation over seasonal time scales." Drosophila Research Conference, San Diego

SYMPOSIA/WORKSHOPS ORGANIZED SINCE ARRIVING AT UVA

2021: Drosophila Research Conference workshop. "A community-based approach to understanding Drosophila Evolution through Space and Time." Co-organized with Josefa Gonzalez (Universitat Pompeu Fabra, Barcelona) and Martin Kapun (University of Zurich, Zurich)

2019: American Society of Naturalists Special Symposium at the joint ASN/SSE/SSB meeting. "Causes and consequences of temporally fluctuating selection in the wild." Co-organized with Zach Gompert (Utah State University)

PUBLIC OUTREACH SINCE ARRIVING AT UVA

July 2021: Backyard Evolution Demonstration at Staunton Farmers Market

June 2021: Backyard Evolution Demonstration at Harrisonburg Farmers Market

Summer/Fall 2021: 2nd year of Backyard Evolution (16 participants)

May 2021: Invited discussion at Central Shenandoah Valley Master Gardeners Association

Fall 2020: Teamed up with faculty at Piedmont Virginia Community College to develop capstone project collecting flies at local orchard (3 students).

Summer/Fall 2020: Initiated "Backyard Evolution" Citizen Science project (13 participants)

Feb. 2020: Invited seminar at Central Shenandoah Valley Master Gardeners Association, Blue Ridge CC, Bridgewater, VA

2017, 2018, 2019: Presentation to 5th grade class about pollinators at McSwain Elementary, Staunton, VA

2018: Interviewed by Staunton News Leader for story about insect diversity

COURSES TAUGHT AT UVA

S17, S18, S19, S21: *Molecular Evolution – Diversity, Mutants, and the Biological Myth of Race (*BIOL4610)

F21, S21: *Professional Skills in the Life Sciences* (BIOL8240/BIOL8250)

F18, F20: *Colloquium in Population Biology* (BIOL8070)

S17: *Communicating in Science* (BIOL8020)

F17, F19: *Advanced Ecology and Evolution* (BIOL8083)

TEACHING EXPERIENCE PRIOR TO UVA

(† = lead organizer; * = teaching assistant; ◊ = guest lecture)

2013†, '14†: *Evolutionary Genetics Directed Reading*, Dept. of Biology, Stanford Univ.
2009†: *Mycology Group Independent Study*, Dept. of Ecology and Evolution, Brown Univ.
2009◊: *Experimental Design,* Dept. of Ecology and Evolution, Brown Univ.
2009◊: *Introductory Genetics,* Dept. of Sci. and Technology, Bryant Univ.
2006*, '07*: *Ecology*, Dept. of Ecology and Evolution, Brown Univ.
2006*: *Genetics*, Dept. of Biology, Brown Univ.
2004*, '05*◊, '06*, '07◊, '08*◊: *Evolution*, Dept. of Ecology and Evolution, Brown Univ.
2005*: *Insect Biology*, Dept. of Ecology and Evolution, Brown Univ.
2004*: *Organismal Biology*, Dept. of Biology, Univ. of Oregon
2003*: *Biochemistry and Genetics*, Dept. of Biology, Univ. of Oregon

PROFESSIONAL DEVELOPMENT ACTIVITIES

Summer 2019: Return Panelist at Teaching Race at UVA workshop, University of Virginia
May 2019: Faculty Seminar on the Teaching of Writing, University of Virginia
Summer 2018: Teaching Race at UVA workshop, University of Virginia
January 2017: Course Development Institute, University of Virginia

MENTEES SINCE ARRIVING AT UVA

Post-docs (3 former, 1 current):

Karen Barnard-Kubow (2016-2020) Assistant Professor (research) and Director of the Genomics Core, James Madison University
Priscilla Erickson (2016-2021) Assistant Professor, Univ. of Richmond starting Fall 2021
Dörthe Becker (2016-2020) Visiting Assistant Professor, University of Marbug, Germany starting Fall 2021
Joaquin Nunez (2020-current)

PhD Students (2 former, 5 current):

Cory Weller (2016-2019) Thesis: The Evolutionary Implications of Adaptations to Stressful Environments on Time Scales Spanning Days to Millennia (now post-doc at NIH)
Alyssa Bangerter (2016-2021) Thesis: Temporally Varying Selection and the Maintenance of Genetic Variation
Yang Yu (2017-current) Thesis: Adaptive dynamics of seasonal and spatial gene expression plasticity in Drosophila
Connor Murray (2019-current), Thesis: The evolutionary history and ecological genetics of *Daphnia pulex*
Adam Lenhart (2019-current) Thesis: Natural variation and nutritional specificity in fasting-induced starvation resistance among *Drosophila* populations
Taylor Nystrom (2019-current) Co-advised with Sarah Siegrist, Thesis: Elucidating how nutrition and underlying genetic variation interact to influence brain development and function
Robert Porter (2020-current) Thesis: Evolution and genetics of diapause termination in

Daphnia

Graduate Rotation Students (7 former): Pramod Kahdka (2017), Yang Yu (2017), Hannah Makowski (2018), Connor Murray (2019), Sarah McPeek (2019), Adam (Benedict) Lenhart (2020), Taylor Nystrom (2020), Robert Porter (2020)

Thesis committee membership (18 total, 12 current, 2 external, 4 first reader): Aaron Reedy (2016-2018), Ajay Chatrath (2019-2020; Med School), Anna Way (2017-2021; First Reader), Audrey Brown (2018-current; First Reader), Caroline Bush (2020-current), Catherine Debban (2016-2019), Catherine Vincent (2017-2020; EnviSci), Christopher Robinson (2020-curent), Daniel Nondorf (2020-current; First Reader), Erin Fegley (2018-2019), Hanna Makowski (2020-current), Israel Angosor (2018-current), Keric Lamb (2020-current), Phoebe Cook (2019-current), Rachana Bhave (2018-current), Ryan Sangson (2017-current; First Reader), Yingnan Gao (2017-current), Yuanming Liu (2021-current)

Distinguished Major Students (2 former, 1 current): Cynthia Ong (2016-2018)**,** Helen Stone (2017-2019), William (Liam) Miller (2021-)

Independent Undergraduate Researchers (18 former, 3 *current*, 5 Harrison Award Winners*): Cynthia Ong* (2016-2018), Daniel Song (2016-2019), Warren Wheaton (2016-2018), Anne Saunders (2017-2019), Helen Stone* (2017-2019), Matt Cambell (2017-2019), Dakota Delong-Maxey* (2017-2020), Grace Gutierrez (2018-2020), Hanzhang Li (2018-2020), Robert Porter (2017-2020), Sasha Bilal* (2018-2020), Sharon Hueston (2018-2020), Skylar Lee (2018-2020), Teja Muagala (2019-2020), Yasmin Khodaei (2019-2020), Zach Williams (2019-2020), *William (Liam) Miller** (2018-current), Kisal Batuwangala (2018-2021), *Courtney Tern* (2018-current), *Daria Gundermann (2021-current*)

VA-NC Alliance for Minority Participation Summer Students: Yasmin John (2017), Kojo Agyeman-Prempeh (2018)

Lab technicians: Erin Voss (2016-2018, now PhD student at UC Berkeley), Austin Edwards (2016-2018, now technician at UCSF), Robert Porter (2018-20219, now PhD student at UVA), Grace Gutierrez (2020-2021, now MS student at Penn. State Univ.)

DEPARTMENTAL SERVICE

2020-: Steering Committee
2019-: *Ad hoc* Community Committee
2018, 2019: Faculty organizer of the Departmental Retreat, UVA
2018/2019: Undergraduate Committee, UVA
2016/2017, 2017/2018, 2021/2022: Graduate Committee, UVA
2007/2008: Organizer, Graduate student invited speaker series, Brown Univ.
2006/2007: Graduate student liaison to the faculty, Brown Univ.
2006/2007: Organizer, Brown bag seminar, Brown Univ.
2005/2006: Organizer, Weekly Ecology and Evolution Discussion Seminar, Brown Univ.

PROFESSIONAL SERVICE

2014, 2015, 2016: NSF DEB Evolutionary Processes Panel (pre- & full-)
2017: GRFP proposal panels
2015: Genetics Society of America 100 Year Anniversary committee
2013 – 2014: Post-doc representative, Genetics Society of America Awards committee

Guest Editor:
PLoS Genetics

Ad-hoc Reviewer:
• **Scientific journals:** *Aging Cell, The American Naturalist, BMC Biology, Developmental Biology, eLife, Ecological Entomology, Ecology and Evolution, Ecosphere, Environmental Entomology, Evolution, Evolution Letters, Evolution & Development, Evolution Letters, Functional Ecology, Genetics, Genome Biology and Evolution, G3, Heredity, Journal of Evolutionary Biology, Journal of Heredity, Molecular Ecology, Molecular Biology and Evolution, Nature Ecology and Evolution, PeerJ, Physiological Entomology, PLoS Genetics, PLoS One, PNAS, Proc. Royal Soc. B., Trends in Genetics*

• **Funding agencies:** *Austria (ASF), France (INR), United Kingdom (BBSRC), United States (NSF DEB* Evolutionary Processes*), Netherlands (NWO), Graduate Women in Science, UVA DoubleHoos, NSF DEB*