

JOAQUIN CANAL BOSQUE NUNEZ

Henderson-Harris Fellow in Biology, University of Vermont
Curriculum Vitae

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EDUCATION

Post-Doc., University of Virginia, Charlottesville, VA (2020-2023)
 Ph.D., Brown University, Providence, RI (2015-2020)
 M.Sc., Brown University, Providence, RI (2015-2018)
 B.Sc., University of Miami, *Summa Cum Laude*, Coral Gables, FL (2013-2015)
 A.A., Miami Dade College, Highest Honors, Miami, FL (2011-2013)

RESEARCH INTERESTS

Fields of expertise: Evolutionary genomics, statistical genomics, population genetics, molecular evolution, computational biology, biogeography, phylogenomics, demographic inference.

Study systems/models: Barnacles (*Semibalanus sp.*), fruit flies (*Drosophila melanogaster*; other *drosophilids*), minnows (*Fundulus*), water fleas (*Daphnia*), sea urchins (*Strongylocentrotus*), ants (*Veromessor*)

PROFESSIONAL APPOINTMENTS

08/2023 – Present	Henderson-Harris Fellow & Principal Investigator, Dept. of Biology, University of Vermont, Burlington, VT.
08/2020 – 07/2023	Research Associate, Dept. of Biology, University of Virginia, Charlottesville, VA.
07/2017 – 07/2020	NSF Graduate Research Fellow, Dept. of Ecology and Evolutionary Biology, Brown University, Providence, RI.
07/2019 – 10/2019	Visiting Research Fellow, <i>Sven Lovén centrum för marin infrastruktur</i> , University of Gothenburg, <i>Tjärnö</i> , Sweden.
07/2015 – 07/2017	Reverse Ecology Research Fellow, IGERT traineeship, Dept. of Ecology and Evolutionary Biology, Brown University, Providence, RI.

LEADERSHIP POSITIONS

09/2023 – Present	Member of the Leadership Team, Biological Data Science (BiIDS) program, University of Vermont, Burlington, VT.
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RESEARCH SUPPORT

“Ontogenetically mediated selection in response to environmental heterogeneity in the acorn barnacle (*Semibalanus balanoides*)”, Doctoral Dissertation Enhancement Grant (DDEG), Brown University, Dept. of Ecology and Evolutionary Biology. US \$10,000; 2/1/2019 - 2/1/2020. PI(s) **JCB Nunez** and DM Rand

“Evolutionary Genomics of the Northern Acorn Barnacle (*Semibalanus balanoides*)”, Graduate Research Fellowship (GRFP). National Science Foundation (NSF), US \$138,000; 05/1/2015 - 05/1/2020. PI **JCB Nunez**

“Parallel evolution in the intertidal: investigating genetic responses to zonation”, Graduate Research Opportunities Worldwide (GROW). A joint grant from the U.S. National Science Foundation (NSF), and the Swedish Research Council (*Vetenskapsrådet*), US \$5,000 and SE *kr* 26,000. 7/2019 – 10/2019. PI(s) **JCB Nunez**, DM Rand, K Johannesson and A Blomberg.

“Tidally-zonated polymorphisms in the northern acorn barnacle in the North Atlantic: parallel evolution or ancient polymorphism?” *Kungliga Vetenskapsakademien (KVA)* fund for internationalization and scientific renewal at the Sven Lovén Centre. The Royal Swedish Academy of Sciences, SE *kr* 64,100; 12/21/2018 - 12/1/2019. PI(s) **JCB Nunez** and K Johannesson

“Evolutionary Genomics of the Mitochondrial Genome in *Fundulus*”, Small Undergraduate Research Grant Experience (SURGE). Rosenstiel School of Marine and Atmospheric Science, Amount: US \$1500; 1/20/2015 - 5/1/2015. PI **JCB Nunez**

“Searching for signatures of natural selection in the mitochondrial genome in *Fundulus heteroclitus*”, Small Undergraduate Research Grant Experience (SURGE). Rosenstiel School of Marine and Atmospheric Science, Amount: US \$1500; 1/20/2014 - 5/1/2014. PI **JCB Nunez**

RESEARCH GRANTS AWARDED TO MENTEES

“Quantifying settlement patterns and genetic changes across a time-series sample of the intertidal barnacle (*Semibalanus balanoides*.)” Funded by the Kay, Klieman, and Larrabee Summer Undergraduate Research Award (2024), US \$5000. Awarded to Katelyn Sullivan at the University of Vermont.

“Characterizing the potential of Pool-Seq data for demographic inference.” Funded by the Harrison Undergraduate Research Awards (HURA; 2022), US \$5,000. Awarded to David J. Bass. Co-mentored with Alan O. Bergland at the University of Virginia.

“Investigating Thermal Selection in the Mitochondria of the Northern Acorn Barnacle.” Funded by the Karen T. Romer Undergraduate Teaching and Research Awards (UTRA; 2018), US \$3,500, Awarded to David A. Ferranti. Co-mentored with David M. Rand at Brown University.

PUBLICATIONS¹

Refereed Journals (Published and Peer Reviewed)

Nunez J.C.B., Lenhart B.A., Bangerter A., Murray C.S., Mazzeo G.R.^U, Yu Y., Nystrom T.L., Tern C., Erickson P.A., Bergland A.O., “A cosmopolitan inversion drives seasonal adaptation in overwintering *Drosophila*.” *Genetics*, Volume 226, Issue 2, February 2024, iyad207. DOI: <https://doi.org/10.1093/genetics/iyad207>

Rand D. M., **Nunez J.C.B.**, Williams S., Rong S., Burley J.T., Neil K.B., Spierer A.N., McKerrow W., Johnson D.S., Raynes Y., Fayton T.J., Skvir N., Ferranti D.A.^U, Zeff M. G.^U, Lyons A. ^U, Okami N. ^U, Morgan D.M., Kinney K., Brown B.R., Giblin A.E., Cardon Z.G. (2023). Parasite manipulation of host phenotypes inferred from transcriptional analyses in a trematode-amphipod system. *Molecular Ecology*, DOI: <https://doi.org/10.1111/mec.17093>

Barnard-Kubow K. B., Becker D., Murray C.S., Porter R., Gutierrez G., Erickson P., **Nunez J.C.B.**, Voss E., Suryamohan K., Ratan A., Beckerman A., Bergland A. O., “Genetic variation in reproductive

¹ Underlined authors are mentees, undergraduates are indicated as ^U. Equal author contributions are indicated as ^E.

investment across an ephemerality gradient in *Daphnia pulex*", *Molecular Biology and Evolution*, 2022; msac121, DOI: <https://doi.org/10.1093/molbev/msac121>

Kapun, M^E., **J. C. B. Nunez**^E, M. Bogaerts-Márquez^E, J. Murga-Moreno^E, M. Paris^E, J. Outten, M. Coronado-Zamora, C. Tern, O. Rota-Stabelli, M. P. G. Guerreiro, S. Casillas, D. J. Orenge, E. Puerma, M. Kankare, L. Ometto, V. Loeschcke, B. S. Onder, J. K. Abbott, S. W. Schaeffer, S. Rajpurohit, E. L. Behrman, M. F. Schou, T. J. S. Merritt, B. P. Lazzaro, A. Glaser-Schmitt, E. Argyridou, F. Staubach, Y. Wang, E. Tauber, S. V. Serga, D. K. Fabian, K. A. Dyer, C. W. Wheat, J. Parsch, S. Grath, M. S. Veselinovic, M. Stamenkovic-Radak, M. Jelic, A. J. Buendía-Ruíz, M. J. Gómez-Julián, M. L. Espinosa-Jimenez, F. D. Gallardo-Jiménez, A. Patenkovic, K. Eric, M. Tanaskovic, A. Ullastres, L. Guio, M. Merenciano, S. Guirao-Rico, V. Horváth, D. J. Obbard, E. Pasyukova, V. E. Alatorsev, C. P. Vieira, J. Vieira, J. R. Torres, I. Kozeretska, O. M. Maistrenko, C. Montchamp-Moreau, D. V. Mukha, H. E. Machado, A. Barbadilla, D. Petrov, P. Schmidt, J. Gonzalez, T. Flatt and A. O. Bergland (2021). "Drosophila Evolution over Space and Time (DEST) - A New Population Genomics Resource." *Molecular Biology and Evolution*, msab259, DOI: <https://doi.org/10.1093/molbev/msab259>. **Featured as the Journal Cover of the Feb 2022 Issue (Volume 39, Issue 2)**

Nunez J.C.B., Rong S., Ferranti D.A.^U, Damian-Serrano A., Neil K.B., Glenner H., Elyanow R.G., Brown B.R.P., Rosenblad M.A., Blomberg A., Johannesson K., and Rand D.M. (2021) 'From tides to nucleotides: genomic signatures of adaptation to environmental heterogeneity in barnacles.' *Molecular Ecology*, DOI: <https://doi.org/10.1111/mec.15949>

Nunez J.C.B., Rong S., Damian-Serrano A., Burley J.T., Elyanow R.G., Ferranti D.A.^U, Neil K.B., Glenner H., Rosenblad M.A., Blomberg A., Johannesson K., Rand D.M. (2020) "Ecological load and balancing selection in circumboreal barnacles", *Molecular Biology and Evolution*, msaa227, DOI: <https://doi.org/10.1093/molbev/msaa227>

Nunez J.C.B., Flight P.A., Neil K.B., Rong S., Ericksson L.A., Ferranti D.A.^U, Rosenblad M.A., Blomberg, A., Rand D.M. (2020) "Footprints of natural selection at the mannose-6-phosphate isomerase locus in barnacles." *Proc Natl Acad Sci USA*. 201918232. DOI: www.pnas.org/cgi/doi/10.1073/pnas.1918232117.

Media coverage: [News from Brown: Barnacles offer genetic clues on how organisms adapt to changing environments \(Mar 2020\)](#); [Brown University Kudos \(Feb 2020\)](#); [NSF YouTube channel: How do barnacles survive environmental changes?](#)

Brown B.R.P., **Nunez J.C.B.**, Rand D.M. (2020) 'Characterizing the cirri and gut microbiomes of the intertidal barnacle *Semibalanus balanoides*.' *anim microbiome* 2, 41. DOI: <https://doi.org/10.1186/s42523-020-00058-0>

Nunez J.C.B., Biancani L., Flight P.A., Rand D.M., Crawford D.L., and Oleksiak M.F. (2018) 'Stable genetic structure and connectivity in pollution-adapted and nearby pollution-sensitive populations of *Fundulus heteroclitus*.' *Royal Society Open Science* (5): 171532. DOI: <http://dx.doi.org/10.1098/rsos.171532>.

Nunez J.C.B. and Oleksiak M.F. (2016) 'A Cost-Effective Approach to Sequence Hundreds of Complete Mitochondrial Genomes'. *PLoS ONE* 11(8): e0160958. DOI: <https://doi.org/10.1371/journal.pone.0160958>.

Nunez J.C.B.^E, Seale T.P.^E, Fraser M.A.^E, Burton T.L.^E, Fortson T.N.^E, Hoover D., Travis J., Oleksiak M.F., Crawford D.L. (2015) 'Population Genomics of the Euryhaline Teleost *Poecilia latipinna*'. *PLoS ONE* 10(9): e0137077. DOI: <https://doi.org/10.1371/journal.pone.0137077>.

Nunez JCB, Elyanow RG, Ferranti DA^U, Rand DM, 'Population Genomics and Biogeography of the Northern Acorn Barnacle (*Semibalanus balanoides*) using Pooled-Sequencing Approaches.' In *Population Genomics: Marine Organisms Series*, edited by Marjorie Oleksiak and Om Rajora, Springer, Cham. DOI: https://doi.org/10.1007/13836_2018_58.

Technical Notes and Preprints (Not Published, Not Peer Reviewed)

Nunez, JCB., Paris M., Machado H., Bogaerts M., Gonzalez J., Flatt T., Coronado M., Kapun M., Schmidt P., Petrov D., Bergland A. (2021). "Note: Updating the metadata of four misidentified samples in the DrosRTEC dataset." bioRxiv 2021.01.26.428249. DOI: <https://doi.org/10.1101/2021.01.26.428249>

AWARDS & ACCOLADES

Accolades

- 2023 Elected co-chair of the 2025 *Gordon Research Seminar* on Ecological and Evolutionary Genomics
- 2022 Future Faculty Program, University of Vermont (UVM)
- 2022 DeLill Nasser Award, The Genetics Society of America (GSA)
- 2015 Honors in Marine Science, University of Miami
- 2014 Honorable Mention, Goldwater scholarship competition, Barry M. Goldwater Foundation
- 2013 Honors in Biology, Miami Dade College

Scholarships

- 2014 Rosenstiel School General Scholarship, University of Miami
- 2013 *Phi Theta Kappa* (ΦΘΚ) Presidential Scholarship, University of Miami
- 2012 SIGMA Scholarship, National Science Foundation & Miami Dade College,
James M. Ragen Jr. Scholarship, Miami Dade College

ACADEMIC PRESENTATIONS

Invited Talks

- 2024: University at Buffalo, Chromosomal Inversions Seminar, Dept. of Biology, NY, USA (Virtual)
European *Drosophila* Population Genomics Consortium, 14th annual conference, Barcelona, Spain
University of Vermont, Henderson-Harris Public Lecture to the College of Arts and Sciences, VT, USA
University of Vermont, eSTEM seminar, VT, USA
- 2022: University of Oregon, Institute of Ecology and Evolution, OR, USA
University of Virginia, Department of Biology, EEB seminar, VA, USA
- 2021: European *Drosophila* Population Genomics Consortium, 11th annual conference, Virtual due to COVID
Miami Dade College, STEM ARCOS Program, Keynote, Virtual due to COVID
- 2020: University of Virginia, Department of Biology, EEB seminar, VA, USA

2019: University of Gothenburg, *Tjärnö* Marine Laboratory, Sweden
 University of Gothenburg, Department of Chemistry and Molecular Biology, Sweden
 University of Vermont, Department of Biology, VT, USA

Contributed Abstracts (T = Talk; P = Poster)

2024: TDB-Upcoming: 'Title TBA' 2024 Evolution Meeting (Montreal, Canada)

P: 'DEST 2.0: An Expanded Genomic Resource Reveals New Insights on Fly Phylogeography and Adaptation' TAGC: The Allied Genomics Conference (Washington DC, USA)

2023: P: 'A chromosomal Inversion facilitates seasonal adaptation in *Drosophila*' Gordon Research Conference and Seminar (GRC/GRS): Ecological & Evolutionary Genomics (Rhode Island, USA).

2022: T: 'The not-so-secret life of flies: seasonal cycles of boom-and-bust demography drive evolution in *Drosophila*. Evolution meeting (Ohio, USA).

T: 'Do supergenes mediate seasonal adaptation in overwintering *Drosophila*?' 63rd *Drosophila* Research Conference (California, USA).

2019: P: 'From classic allozymes to whole genomes: characterizing the genetic basis of adaptation to heterogeneous environments in intertidal barnacles.' Gordon Research Conference and Seminar (GRC/GRS): Ecological & Evolutionary Genomics (New Hampshire, USA).

T: 'Ecological genetics of a classic allozyme polymorphism: *Mpi* in intertidal barnacles.' Evolution meeting (Rhode Island, USA).

2018: T: 'Natural selection shapes functional genetic variation at intertidal microhabitats in the Northern Acorn Barnacle'. Marine Evolution 2018 (Strömstad, Sweden)

T: 'Ecological Genomics of microhabitat adaptations in the Northern Acorn Barnacle'. Annual Binghamton University Biology Department Symposium (NY, USA).

2017: T: 'Ecological genomics of thermal adaptation: Genome wide screens in acorn barnacles reveal multiple loci responding to thermal gradients at tidal microhabitats.' Gordon Research Conference and Seminar (GRC/GRS): Ecological & Evolutionary Genomics (Maine, USA)

2016: P: 'Transatlantic population genomics of the northern acorn barnacle (*Semibalanus balanoides*): a comparison of F_{ST} outliers using different reference assemblies.' Evolution meeting (Texas, USA).

P: 'Populations of *Fundulus heteroclitus* adapted to pollution show high levels of genetic diversity'. RI NSF EPSCoR Research Symposium (Rhode Island, USA)

2015: T: 'Genetic Variation in Mitochondrial Genomes from Populations of *Fundulus heteroclitus* Distributed Along a Thermal Cline', Society of Integrative and Comparative Biology (Florida, USA).

2014: P: 'Mitochondrial Genomes and Oxidative Phosphorylation from Populations of *Fundulus heteroclitus* Distributed Along a Thermal Cline', American Physiological Society (California, USA).

TEACHING

Instructor of Record:

Foundations of Quantitative Reasoning (2024 Spring, BIOL 6990), University of Vermont. 15 Graduate Students (3 credits). Course website: <https://www.jcbnunez.org/questfqr>

Evolutionary Biology (2023 Fall, BIOL1305), University of Vermont. 40 Undergraduate Students (3 credits). Course website: <https://www.jcbnunez.org/biol1305>

Evolutionary Genomics (2022 January term, BIOL4585), University of Virginia. 10 Undergraduate Students (3 credits). Course website: <https://www.jcbnunez.org/biol4585j>

Teaching Assistantships:

Evolutionary Biology (2015-2018, BIOL048), Brown University. 60-80 students (undergraduate credit).

Biostatistics (2017, BIOL0495), Brown University. 40 students (undergraduate credit)

Introductory Biology (2014, BIL161), University of Miami. Laboratory section. 20 students (1 credit).

MENTORING

Graduate Students:

Andrew McCracken (2023-Present), Ph.D. student in Biology, University of Vermont; Co-advised with Melissa Pespeni. Project: *Evolutionary genomics of purple urchins*.

Graduate Committees:

Jacqueline Guillemain (2024-Present), Ph.D. student in Biology, University of Vermont.

Primary advisor: Molly Stanley

Megan O'Connor (2024-Present), AMP. student in Biology, University of Vermont.

Primary advisor: Laura May-Collado

Undergraduate research mentees and honors projects:

Luke Proud (2023-present), B.Sc. student Biology, University of Vermont; Project: *Characterizing the role of the cosmopolitan inversion In(2L)t the thermally dependent food-choice behaviors of Drosophila melanogaster*.

Miles Garvin (2023-present), B.Sc. student Biology, University of Vermont; Project: *Characterizing the role of epigenetic methylation in barnacle zonation*.

Eliza Bufferd (2023-present), B.Sc. student Biology, University of Vermont; Project: *Characterizing the role of the cosmopolitan inversion In(2R)NS in embryonic thermal tolerance of Drosophila melanogaster*.

Katelyn Sullivan (2023-present), B.Sc. student Biology, University of Vermont; Project: *Settlement dynamics in barnacles*.

Jake Bair (2023-present), B.Sc. student Biology, University of Vermont; Project: *Bioinformatic analyses of seasonal genetic variation in Drosophila*.

Giovanni Mazzeo (2023-present), B.Sc. student Mathematical and Biology, University of Virginia; Co-advised with Alan O. Bergland. Project: *Assessing the role of chromosomal inversion in relatedness matrices in selection inference.*

David J. Bass (2022-2023), B.Sc. Statistics, University of Virginia; Co-advised with Alan O. Bergland. Project: *Developing a framework for demographic inference using Pool-Seq.*

David A. Ferranti (2017-2019), Sc.B. Biology, Brown University with honors; Co-advised with David M. Rand. Project: *Trans-arctic demography of the acorn barnacle.*

CERTIFICATIONS

Scientific

2022 “GENETICS Peer Review Training Program”. Genetic Society of America.

2017 “Reproducible Data Science for Population Genetics.” PR statistics, Wales, United Kingdom.

“Triple A Workshop for Genome Sequence analysis: How to Assemble, Annotate and Analyze whole genome sequence data.” Swiss Federal Institute of Technology (*ETH Zürich*) Ascona, Switzerland.

Teaching

2019 “Teaching Certificate II: course design.” Brown University

2016 “Teaching Certificate I: critical reflection and inclusive classrooms, rhetorical practice and classroom, communication, learning design, engaged learning.” Brown University

“Teaching with Technology Institute: a weeklong seminar exploring the relationship between pedagogy and technology”. Brown University

Service

2022 “Ending genetics essentialism through genetics education.” University of Virginia

2021 “Introduction to Equity Literacy.” Certificate ID: <https://www.equitylearn.com/certificates/potnnfmvfk>

“Understanding Equity and Inequity.” Certificate ID: <https://www.equitylearn.com/certificates/wtrgszqfbt>

Institutional

2022 “Biomedical Responsible Conduct of Research (RCR)” (ID 48766728).

2021 “Conflicts of Interest (COI)” (ID 45507375).

“Undue Foreign Influence: Risks and Mitigations” (ID 45507376).

SERVICE

To the Profession:

Proposal review:

National Science Foundation (NSF):

- Division of Environmental Biology: 2022 (*ad hoc*)
- Division of Biological Infrastructure: 2024 (*panelist*)

National Oceanic and Atmospheric Administration (NOAA):

- Sea Grant: 2021(*ad hoc*)

Scientific journal review:

Science Advances, Molecular Ecology, Genetics, Trends in Genetics, Journal of Heredity, Scientific Reports, Biological Journal of the Linnean Society, Evolutionary Applications, Peer J.

Conferences and Symposia:

2025: Conference planning for the *Gordon Research Seminar (GRS)* in Ecological and Evolutionary Genomics. Joint co-chair with Dr. Charikleia Karageorgiou. Tuscany, Italy.

To the University:

2023–present **UVM-GO** Iceland program, Office of International Programs, University of Vermont.

2023–present Member of the media committee, Dept. of Biology, University of Vermont.
Chair: Molly Stanly (2023-Present).

2022–2023 Member of the building community committee, Biology Department, UVA

2022 Mentor for the Louis Stokes Alliances for Minority Participation program, UVA

2021–2023 Co-instructor and member of the planning committee for the *leadership essentials* training module: *The Myth of Biological of Race in the USA* (With Alan O. Bergland). Courses taught on: Spring 2022, Fall 2022, Spring 2023, Upcoming Fall 2023. At UVA.

2021: Executive organizing committee for the 2021 UVA post-doc research symposium. UVA

2021: *Ad hoc* Reviewer, Inclusive Excellence Plan Review committee. UVA

2021: Member of the diversity, equity, and inclusion task force “Diversity Influencers”
Organized the 2021 seminar, **COVID in Context**: how the COVID-19 pandemic exacerbates disparities among historically underrepresented groups. UVA

2020–2021 Member of the Postdoctoral diversity, equity, and inclusion committee, UVA

2020–2021 *Ad hoc* Reviewer, job search for the Director of Diversity Education at UVA

2016–2018 Dept. Seminar Organizer, Dept. of Ecology and Evolutionary Biology, Brown

2016–2018 Graduate Student Observer to the Faculty Meetings, Brown

2016–2017 Graduate Student Council Representative for dept. of Ecology and Evolutionary Biology, Brown

2012–2013 Founder and mentor, The Wolf-pack mentoring program. Miami Dade College

To the Community

2020–2023 Project Coordinator, Backyard Evolution Citizen Science Project, University of Virginia

2019, 2022 Mentor to undergraduate students. Undergraduate Diversity program of the Society for the Study of Evolution

2016–2017 Brown Junior Researcher Program (BJRP) with Boys & Girls Club of Providence, East Providence and Providence, RI.

2015 SACNAS Educational Outreach Program with 1st Grade Students, Hennessey Elementary, East Providence, RI

2015 Invited Lecture for High School Students: The Wheeler School, Providence, RI.

2012–2015 Mentor for High School Students, STEM FYE program, Miami Dade College