

JOAQUIN CANAL BOSQUE NUNEZ
Curriculum Vitae

Department of Biology
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EDUCATION

Ph.D., Brown University, Providence, RI. 2020
M.Sc., Brown University, Providence, RI. 2018
B.Sc., University of Miami, *Summa Cum Laude*, Coral Gables, FL. 2015
A.A., Miami Dade College, Highest Honors, Miami, FL. 2013

RESEARCH INTERESTS

Ecological and evolutionary genomics, population genetics, molecular evolution, computational biology, reproducible workflows in bioinformatics, biogeography, marine genomics, marine ecology. Focus on understanding the genetic basis of adaptation to highly fluctuating environments. I have conducted case studies in flies (*Drosophila*), barnacles (*Semibalanus*), minnows (*Fundulus*), and water fleas (*Daphnia*).

PROFESSIONAL APPOINTMENTS

08/2020 – Present	Post-Doctoral 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.

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. Lead 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. Lead 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. Lead 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. Lead 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. Lead 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. Lead PI **JCB Nunez**

RESEARCH GRANTS AWARDED TO MENTEES

Undergraduate Mentees

“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

“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

PUBLICATIONS¹

Peer Reviewed Journals

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 investment across an ephemerality gradient in *Daphnia pulex*”, *Molecular Biology and Evolution*, 2022; msac121, <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-Ruiz, 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. Alatortsev, 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 JCB, Rong S., Ferranti DA^U, Damian-Serrano A., Neil K.B., Glenner H., Elyanow R.G., Brown. BRP, Rosenblad MA, Blomberg A., Johannesson K., and Rand DM, ‘From tides to nucleotides: genomic signatures of adaptation to environmental heterogeneity in barnacles.’ *Molecular Ecology*, DOI: <https://doi.org/10.1111/mec.15949>

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

Nunez JCB, Rong S, Damian-Serrano A, Burley JT, Elyanow RG, Ferranti DA^U, Neil KB, Glenner H, Rosenblad MA, Blomberg A, Johannesson K, Rand DM. (2020) "Ecological load and balancing selection in circumboreal barnacles", *Molecular Biology and Evolution*, msaa227, DOI: <https://doi.org/10.1093/molbev/msaa227>

Nunez JCB, Flight PA, Neil KB, Rong S., Ericksson LA, Ferranti DA^U, Ronsenblad MA, Blomberg, A, Rand DM. (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 BRP, **Nunez JCB**, Rand DM. (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 JCB, Biancani L, Flight PA, Rand DM, Crawford DL, and Oleksiak MF. (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 JCB and Oleksiak MF. (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 JCB^E, Seale TP^E, Fraser MA^E, Burton TL^E, Fortson TN^E, Hoover D, Travis J, Oleksiak MF, Crawford DL. (2015) 'Population Genomics of the Euryhaline Teleost *Poecilia latipinna*'. *PLoS ONE* 10(9): e0137077. DOI: <https://doi.org/10.1371/journal.pone.0137077>.

Chapters in Books

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

Nunez, JCB., M. Paris, H. Machado, M. Bogaerts, J. Gonzalez, T. Flatt, M. Coronado, M. Kapun, P. Schmidt, D. Petrov and A. Bergland (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

Professional accolades

DeLill Nasser Award (2022), The Genetics Society of America (GSA)

Scholastic accolades

Honors in Marine Science (2015), President's Honor Roll (2013-2015), Provost's Honor Roll (2013-2015), and Dean's List (2013-2015), University of Miami

Honors in Biology (2013), Dean's List (2011-2013), Miami Dade College

Honorable Mention, Goldwater scholarship competition, Barry M. Goldwater Foundation, 2014

Scholarships

Rosenstiel School General Scholarship, University of Miami, 2014

Phi Theta Kappa (ΦΘΚ) Presidential Scholarship, University of Miami, 2013

SIGMA Scholarship, National Science Foundation & Miami Dade College, 2012

James M. Ragen Jr. Scholarship, Miami Dade College, 2012

ACADEMIC PRESENTATIONS

Invited Talks

2022: University of Oregon, Institute of Ecology and Evolution, Eugene, OR, USA (**Upcoming**)

2021: *DrosEU*: European Drosophila Population Genomics Consortium, Virtual Conference
Miami Dade College, STEM ARCOS Program, Miami, FL, USA

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 Talks

2022: Nunez JCB, A. Bangerter, C. S. Murray, A. O. Bergland., 'The not-so-secret life of flies: seasonal cycles of boom-and-bust demography drive evolution in *Drosophila*. 2022 Evolution meeting. June 24-28, Cleveland, OH, USA

Bergland AO, Nunez JCB, Bangerter A., 'Seasonally varying thermal selection drives supergene-based adaptation in *Drosophila*. 2022 Evolution meeting. June 24-28, Cleveland, OH, USA

Nunez JCB, A. Bangerter, C. S. Murray, Y. Yu, B. A. Lenhart, P. A. Erickson, A. O. Bergland. 'Do supergenes mediate seasonal adaptation in overwintering *Drosophila*?' 63rd Drosophila Research Conference. April 6-10, 2022. San Diego, CA, USA

2019: Nunez JCB, Flight PA, Neil KB, Ferranti DA, Rosenblad MA, Blomberg A, and Rand DM. 'From classic allozymes to whole genomes: characterizing the genetic basis of adaptation to heterogeneous environments in intertidal barnacles.' 2019 Gordon Conference (GRC) and Gordon Research Seminar (GRS): Ecological & Evolutionary Genomics. Southern New Hampshire University, Manchester NH. July 13-19, 2019

Nunez JCB, Flight PA, Neil KB, Ferranti DA, Rosenblad MA, Blomberg A, and Rand DM. 'Ecological genetics of a classic allozyme polymorphism: *Mpi* in intertidal barnacles.' Evolution 2019, Providence RI. June 21-25, 2019

2018: Nunez JCB, and Rand DM. 'Natural selection shapes functional genetic variation at intertidal microhabitats in the Northern Acorn Barnacle'. Marine Evolution 2018, Marcus Wallenberg Symposium.

Centre for Marine Evolutionary Biology at University of Gothenburg, Strömstad, Sweden, May 15 – 17, 2018

Nunez JCB, Elyanow RG, Brown BR, Rand DM. 'Ecological Genomics of microhabitat adaptations in the Northern Acorn Barnacle'. 2018 Annual Binghamton University Biology Department Symposium. Binghamton University, Binghamton, NY, January 12 –13, 2018.

2017: Nunez JCB, Elyanow RG, Brown BR, Rand DM. 'Ecological genomics of thermal adaptation: Genome wide screens in acorn barnacles reveal multiple loci responding to thermal gradients at tidal microhabitats.' 2017 Gordon Conference (GRC): Ecological & Evolutionary Genomics. University of New England, Biddeford, ME, 07/16/2017 - 07/21/2017

2016: Nunez JCB, Elyanow RG, Brown BR, Rand DM. 'Transatlantic population genomics of the northern acorn barnacle (*Semibalanus balanoides*): a comparison of F_{ST} outliers using different reference assemblies.' Evolution 2016, Austin, Texas, June 16 – 21, 2016

Nunez JCB, Barnes L, Flight P, Rand DM, Crawford DL, Oleksiak MF. 'Populations of *Fundulus heteroclitus* adapted to pollution show high levels of genetic diversity'. RI NSF EPSCoR Research Symposium. University of Rhode Island, Narragansett, RI, April 14, 2016.

2015: Nunez JCB, Baris TZ, Crawford DL, Oleksiak MF, 'Genetic Variation in Mitochondrial Genomes from Populations of *Fundulus heteroclitus* Distributed Along a Thermal Cline', Integrative and Comparative Biology 55, E134-E134, January 5, 2015.

2014: Nunez JCB, Baris TZ, Crawford DL, Oleksiak MF, 'Mitochondrial Genomes and Oxidative Phosphorylation from Populations of *Fundulus heteroclitus* Distributed Along a Thermal Cline', American Physiological Society (APS): Comparative Approaches to Grand Challenges in Physiology. San Diego, CA, October 6, 2014.

TEACHING

Instructor of Record:

Evolutionary Genomics (2022 J-term, BIOL4585), University of Virginia, Charlottesville, VA. Upper-level seminar. 10-15 students (awards 3 credits). Course website: <https://www.jcbnunez.org/biol4585j>

Invited co-Instructor:

Ecological Genomics (2019, BIOL2440) University, Providence, RI. Upper-level seminar which I co-taught with my PhD advisor, Prof. David M. Rand. 10-15 students (awards full graduate credit).

Head Teaching Assistant & Invited Lecturer:

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

Biostatistics (2017, BIOL0495), Brown University, Providence, RI. 40 students (awards full undergraduate credit)

Introductory Biology (2014, BIL 161), University of Miami, Coral Gables, FL. Laboratory section. ~20 students (awards 1 credit).

Seminar Leader:

First Readings Seminar (2016), Brown University, Providence. This is a day-long workshop for Brown first-year students. 20 students (No credit awarded, part of new student orientation).

MENTORING

The following are students with whom I work closely and provide support under the guidance of the lab P.I.

Connor S. Murray (2020-Present), Ph.D. *candidate in Biology*, University of Virginia; Faculty advisor/PI: Alan O. Bergland. Project: *Population genomics and biogeography of Daphnids*.

Benedict Adam Lenhart (2020-Present), Ph.D. *candidate in Biology*, University of Virginia; Faculty advisor/PI: Alan O. Bergland. Project: *Population genetics and physiology of starvation resistance in D. melanogaster*.

Yang Yu, (2020-Present), Ph.D. *candidate in Biology*, University of Virginia; Faculty advisor/PI: Alan O. Bergland. Project: *Investigating the role of phenotypic plasticity in responses to seasonality in D. melanogaster*.

David J. Bass (2022-Present), Sc.B. student Statistics, University of Virginia; Faculty advisor/PI: Alan O. Bergland. Project: *Developing a framework for demographic inference using Pool-Seq*. Bass was awarded a Harrison Undergraduate Research Award (HURA) from UVA.

Celina I. Vasquez-Caballero (summer 2022), Sc.B. student Biology, University of Virginia, Part of the Louis Stokes Alliances for Minority Participation (LSAMP) program. Faculty advisor/PI: Alan O. Bergland. Project: *inferring fruit preference for orchard drosophilids*.

Feby S. Abraham (summer 2022), A.A. student Physical and Natural Sciences, Piedmont Virginia Community College, Part of the Louis Stokes Alliances for Minority Participation (LSAMP) program. Faculty advisor/PI: Alan O. Bergland. Project: *investigating drosophilid community composition across an altitude cline*.

Ian Light (2019-2020), Sc.B. Biology, Brown University with honors; Faculty advisor: David M. Rand. Project: *Chromosomal segregation in flies with different mitotypes*. Light's work was recognized with the James Kidwell Prize in Genetics and Population Biology from Brown University

David A. Ferranti (2017-2019), Sc.B. Biology, Brown University with honors; Faculty advisor: David M. Rand. Project: *Trans-arctic demography of the acorn barnacle*. Ferranti was awarded a Karen T. Romer Undergraduate Teaching and Research Awards (UTRA) from Brown University

CERTIFICATIONS

Scientific

"GENETICS Peer Review Training Program". Genetic Society of America (GSA). Jan 19, 2022-Present. The basics of peer-review (Taught by Prof. James Birchler, Editorial Board). **[Certification in process]**

"Reproducible Data Science for Population Genetics." Lead by Dr. Thibaut Jombart and Dr. Zhian Kamvar. Hosted by PR Statistics. October 23rd to 27th, 2017, at Margam Discovery Centre, Wales, United Kingdom.

"Triple A Workshop for Genome Sequence analysis: How to Assemble, Annotate and Analyze whole genome sequence data." Hosted by the Swiss Federal Institute of Technology (*ETH Zürich*) – Congressi Stefano Francini: January 15 to January 20, 2017, Monte Verita, Ascona, Switzerland.

Initiative to Maximize Student Development (IMDS) seminars completed: “Scientific Writing Key Principles” (July 2015), “Reading Scientific Publications” (August 2015), and “The Three Rs: Research Data Management, Reproducibility and Researcher Recognition” (January 2016). “Mentoring in Science” (June 2019). Brown University, Providence, RI.

Teaching

“Teaching Certificate II: course design.” Hosted by the Harriet W. Sheridan Center for Teaching and Learning: Spring 2019. Brown University, Providence, RI.

“Teaching Certificate I: critical reflection and inclusive classrooms, rhetorical practice and classroom, communication, learning design, engaged learning.” Hosted by the Harriet W. Sheridan Center for Teaching and Learning: Fall 2016. Brown University, Providence, RI.

“Teaching with Technology Institute: a weeklong seminar exploring the relationship between pedagogy and technology”. Attended with faculty mentor David M. Rand. May 23 – 27, 2016, Brown University, Providence, RI. This led to re-tooling of the Discussion Sections of the course BIOL048 with more flipped content and active learning materials.

Service

“Introduction to Equity Literacy.” A 4-hour professional course hosted by the Equity Literacy Center. Issued on: 2021-04-24. Certificate ID: <https://www.equitylearn.com/certificates/potnfmvfk>

“Understanding Equity and Inequity.” A 4-hour professional course hosted by the Equity Center Institute. Issued on: 2021-04-24. Certificate ID: <https://www.equitylearn.com/certificates/wtrgszqfbt>

Institutional

“Biomedical Responsible Conduct of Research (RCR)” (ID 48766728). Delivered by the *Collaborative Institutional Training Initiative*. Training on May 4-5, 2022. *Does not expire*. University of Virginia, Charlottesville, VA.

“Conflicts of Interest (COI)” (ID 45507375). Delivered by the *Collaborative Institutional Training Initiative* (CITI training). Training on Oct 6, 2021. Expires Oct 5, 2025. University of Virginia, Charlottesville, VA.

“Undue Foreign Influence: Risks and Mitigations” (ID 45507376). Delivered by the *Collaborative Institutional Training Initiative* (CITI training). Training on Oct 6, 2021. *Does not expire*. University of Virginia, Charlottesville, VA.

SERVICE

To the Profession:

Reviewer for Scientific Journals: *Genetics*, *Molecular Ecology*, *Journal of Heredity*, *Scientific Reports*, *Biological Journal of the Linnean Society*, *Evolutionary Applications*, *Peer J*.

Find all verified reviews at my **Publons profile**: publons.com/a/1534937/

External reviewer for the Woods Hole Sea Grant Competition. <https://seagrant.whoi.edu/>

To the University:

At the University of Virginia:

2021–present: Mentor for the Louis Stokes Alliances for Minority Participation (LSAMP) program.

2021–present: 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: April 28, 2022 (Spring 2022).

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

2021: *Ad hoc* Reviewer, Inclusive Excellence Plan Review Committee”

As part of this assignment, I received training on various topics such as: *employment equity*, *mitigating cognitive errors in hiring*, and *permissible lines of inquiry in employment*.

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

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

2021: Member of the diversity, equity, and inclusion task force “Diversity Influencers”

Organized the 2021 seminar, **COVID in Context**. This was a multidisciplinary discussion bringing together experts from 5 fields: Medicine, Data Science, History, Education, and Media to discuss how misinformation regarding the COVID-19 pandemic exacerbates disparities among historically underrepresented groups. March 31, 2021

At the Brown University:

2016–2018: EEB Brown Bag Seminar Series Organizer, Dept. of Ecology and Evolutionary Biology

2016–2018: Graduate Student Observer to the Faculty Meetings.

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

At Miami Dade College:

2012–2013: Founder and mentor, The Wolf-pack mentoring program.

To the Community

2020–present: Project Coordinator, Backyard Evolution Citizen Science Project, University of Virginia, Charlottesville, VA.

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

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, Miami, FL.