curriculum vitæ of

Murillo F. Rodrigues

PhD Candidate · Institute of Ecology and Evolution · University of Oregon

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Education

2018 – present **Ph.D.** in Biology — University of Oregon, United States
Provisional dissertation title: "Simulation-based inference in population genetics: tools, methods and applications". Expected to defend by January 2024.

2016 – 2018 **M.Sc.** in Genetics and Evolutionary Biology — Universidade de São Paulo, Brasil
Thesis title: "Adaptive or neutral clines? Integrating genome-wide clinal and seasonal variation to infer natural selection in Drosophila melanogaster".

2012 – 2015 **B.Sc.** in Biology — Universidade de São Paulo, Brasil
Thesis title: "Diversity and phylogenetic positioning of freshwater lineages of *Rhinebotrhium* Linton, 1890 from Lake Maracaibo and Orinoco basin, Venezuela".

Skills

Coding — Python, R, Bash, C++.

Computing — Unix, HPC, SLURM, Snakemake (workflow management), Git.

Bioinformatics — Next-gen sequencing data quality control and preprocessing, genome and transcriptome alignment, SNP calling, differential expression analysis.

Statistics — Frequentist and bayesian statistics (using R and Stan), simulation-based inference, machine learning (mostly using PyTorch – CNN, RNN and GraphNN).

Publications

[7] Lauterbur, M. E., Cavassim, M. I. A., Gladstein, A. L., Gower, G., Pope, N. S., Tsambos, G., Adrion, J., Belsare, S., Biddanda, A., Caudill, V., Cury, J., Echevarria, I., Haller, B. C., Hasan, A. R., Huang, X., Iasi, L. N. M., Noskova, E., Obsteter, J., Pavinato, V. A. C., Pearson, A., Peede, D., Perez, M. F., **Rodrigues, M. F.**, Smith, C. C., Spence, J. P., Teterina, A., Tittes, S., Unneberg, P., Vazquez, J. M., Waples, R. K., Wohns, A. W., Wong, Y., Baumdicker, F., Cartwright, R. A., Gorjanc, G., Gutenkunst, R. N., Kelleher, J., Kern, A. D., Ragsdale, A. P., Ralph, P. L., Schrider, D. R., Gronau, I. "Expanding the stdpopsim species catalog, and lessons learned for realistic genome simulations". In: *eLife* 12 (June 2023). Ed. by Ziyue Gao and Molly Przeworski.

[6] **Rodrigues, M. F.**, Kern, A. D., Ralph, P. L. "Shared evolutionary processes shape landscapes of genomic variation in the great apes". In: *bioRxiv* (2023), pp. 2023–02.

[5] Baumdicker, F., Bisschop, G., Goldstein, D., Gower, G., Ragsdale, A. P., Tsambos, G., Zhu, S., Eldon, B., Ellerman, E. C., Galloway, J. G., Gladstein, A. L., Gorjanc, G., Guo, B., Jeffery, B., Kretzschumar, W. W., Lohse, K., Matschiner, M., Nelson, D., Pope, N. S., Quinto-Cortés, C. D., **Rodrigues, M. F.**, Saunack, K., Sellinger, T., Thornton, K., Kemenade, H., Wohns, A. W., Wong, Y., Gravel, S., Kern, A. D., Koskela, J., Ralph, P. L., Kelleher, J. "Efficient ancestry and mutation simulation with msprime 1.0". In: *Genetics* 220.3 (Dec. 2021), iyab229.

[4] Estevez-Castro, C. F., **Rodrigues, M. F.**, Babarit, A., Ferreira, F. V., Marois, E., Cogni, R., Marques, J. T., Olmo, R. P. "The origin and evolution of loqs2: a gene encoding an antiviral dsRNA binding protein in Aedes mosquitoes". In: *bioRxiv* (2021), pp. 2021–12.

[3] **Rodrigues, M. F.**, Cogni, R. "Genomic Responses to Climate Change: Making the Most of the Drosophila Model". In: *Frontiers in Genetics* 12 (2021), p. 676218.

[2] **Rodrigues, M. F.**, Vibranovski, M. D., Cogni, R. "Clinal and seasonal changes are correlated in Drosophila melanogaster natural populations". In: *Evolution* 75.8 (2021), pp. 2042–2054.

[1] Stankowski, S., Chase, M. A., Fuiten, A. M., **Rodrigues, M. F.**, Ralph, P. L., Streisfeld, M. A. "Widespread selection and gene flow shape the genomic landscape during a radiation of monkeyflowers". In: *PLoS biology* 17.7 (2019), e3000391.

Research Experience

2018 – present **PhD Student** University of Oregon, United States

- Developed open source population genetics simulation tools within the tskit and stdpopsim communities (mostly in Python and C++).
- Analyzed population genomic data and used simulations to gain insights into the role of natural selection in shaping genetic variation in the great apes
- Developed a machine learning framework that takes tree sequences as input to infer evolutionary processes.

Advised by Drs. Andrew Kern and Peter Ralph.

2017 – 2018 **Visiting Researcher** University of Wisconsin, United States

- Identified differences in immunity phenotype between *D. melanogaster* populations.
- Analyzed population genomic data to find unusually differentiated immunity genes.

Advised by Dr. John Pool.

2016 – 2018 **Master's Student** Universidade de São Paulo, Brasil

- Implemented a pipeline to analyze Pool-seq dataset of geographically distributed samples.
- Evaluated the association between spatial and temporal variation in allele frequencies to understand the importance of selection in structuring clinal patterns.

Advised by Drs. Rodrigo Cogni and Maria Vibranovski.

2013 – 2014 **Undergraduate Researcher** Universidade de São Paulo, Brasil

- Performed DNA extraction and Sanger sequencing of animal samples.
- Analyzed DNA sequence data to build a new phylogeny for *Rhinebothrium*, a genus of tapeworms found in freshwater stingrays.

Advised by Dr. Fernando Portella de Luna Marques.

Teaching

2019 Introduction to Programming for Biologists University of Oregon, United States
Teaching assistant for consecutive terms (12h/week for 10 weeks).

2018 General Biology III: Populations University of Oregon, United States
Teaching assistant (12h/week for 10 weeks).

2017 Molecular Ecology Universidade de São Paulo, Brasil
Teaching assistant (6h/week for 16 weeks).

2016 Evolutionary Processes Universidade de São Paulo, Brasil
Teaching assistant (6h/week for 16 weeks).

2015 Introduction to Biotatistics Universidade de São Paulo, Brasil
Invited to give a short course on Biostatistics in Semana Temática da Biologia – IB/USP (12h)

2015 Introduction to Statistics Universidade de São Paulo, Brasil
Undergraduate teaching assistant (6h/week for 16 weeks).

2013 Introduction to Systematics and Biogeography Universidade de São Paulo, Brasil
Undergraduate teaching assistant (6h/week for 16 weeks).

Scholarships and Awards

2022 – 2023 Harvey E Lee Graduate Scholarship University of Oregon

2022 – 2023 Marthe E. Smith Memorial Science Scholarship CAS, University of Oregon

2019 – 2020 Hill Fund Award CAS, University of Oregon

2019 – 2021 Genetics Training Grant CAS, University of Oregon

2017 – 2018 Research Internship Abroad Fellowship The São Paulo Research Foundation

2016 – 2018 Master's Fellowship The São Paulo Research Foundation

2013 – 2014 Undergraduate Research Fellowship The São Paulo Research Foundation

Presentations and posters

2023 SMBE2023 organized by the Society for Molecular Biology and Evolution, held in Ferrara, Italy.
Talk title: Shared evolutionary processes shape genomic variation in the great apes. See slides here.

2022 Population, Evolutionary, and Quantitative Genetics Conference organized by the Genetics Society of America, held in Californa, United States.
Poster title: Why are landscapes of diversity correlated in the great apes? See poster here.

2021 SMBEv2021 organized by the Society for Molecular Biology and Evolution, held virtually.
Poster title: Natural selection and landscapes of diversity in the great apes.

2021 Probabilistic Modeling in Genomics organized by Cold Spring Harbor Laboratories, held virtually.
Poster title: Natural selection and landscapes of diversity in the great apes. See poster here.

2020 The Allied Genetics Conference organized by the Genetics Society of America, held virtually.

2014 8th Workshop on Cestode Systematics and Phylogeny Universidade de São Paulo, Brasil

Service

Reviewing GENETICS, Molecular Ecology Resources, G3, Proceedings of the Royal Society B: Biological Sciences

Treasurer Graduate Evolutionary Biology and Ecology Students
A student led organization that aims to provide career-building activities to graduate students and to promote outreach programs to the general community.

Developer tskit
Part of a community of developers that maintain different population genetics open-source software.