Joana L. Rocha, PhD

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EDUCATION & TRAINING

Postdoctoral Researcher in Integrative Biology | University of California, Berkeley   2021-present
  Advisor: Peter H. Sudmant, University of California, Berkeley, U.S.A

PhD in Biodiversity, Genetics and Evolution | Faculty of Sciences, University of Porto   2016-2021
  Advisor: Raquel Godinho, BIOPOLIS-CIBIO, University of Porto, Portugal
  Advisor: Rasmus Nielsen, University of California, Berkeley, U.S.A

Research Assistant in Conservation genomics | University of Porto   2015-2016
  Advisor: Raquel Godinho, BIOPOLIS-CIBIO, University of Porto, Portugal

MSc in Biodiversity, Genetics and Evolution | Faculty of Sciences, University of Porto   2012-2014
  Advisor: Raquel Godinho, BIOPOLIS-CIBIO, University of Porto, Portugal

Research intern in Ancient DNA | Max Plank Institute for Evolutionary Anthropology   2012-2013
  Mentor: Matthias Meyer, MPI-EVA, Leipzig, Germany

BSc in Biology | Faculty of Sciences, University of Porto.   2009-2012

AWARDS & SCOLARSHIPS

Award for Best Talk runner-up   2022
  Center for Computational Biology, University of California Berkeley (100 USD)
Doctoral Grant   2016-2020
  Foundation for Science and Technology, FCT (60,000 €),
Doctoral Grant*   2016-2020
  Biodiversity, Genetics and Evolution Doctoral Program Scholarship (60,000 €)
  *Denotes awarded but not accepted to receive an FCT grant.
Research Grant: Conservation of the Giant Sable antelope of Angola   2015-2016
  Foundation for Science and Technology, FCT. Project (9000 USD).
Award for outstanding academic achievement during MSc dissertation   2013-2014
  Faculty of Sciences at the University of Porto (3000 €)

PUBLICATIONS & PREPRINTS

* Denotes co-first author | Peer-reviewed = 7; First/co-first author = 6 | Co-authored preprints = 4

2024 Davide Bolognini* Alma Halgren*, Runyang Nicolas Lou*, Alessandro Raveane*, **Joana L. Rocha*,** Andrea Guarracino, Nicole Soranzo, Jason Chin, Erik Garrison, Peter H Sudmant: Recurrent evolution and selection shape structural diversity at the amylase locus (*Nature,* DOI: https://doi.org/10.1038/s41586-024-07911-1) ** co-first by last name alphabetical order*

2024 DongAhn Yoo, Arang Rhie, (…) **Joana L. Rocha**, (…), Adam M. Phillippy, Evan E. Eichler: Complete sequencing of ape genomes (**under review in** *Nature*, *bioRxiv preprint*; DOI: https://doi.org/10.1101/2024.07.31.605654)

2024   Alexandre Legrand, Amandine Chantharath, (...), **Joana L. Rocha**, (...), Peter H Sudmant, Lucie Etienne: Conservation and functional adaptation from prokaryotes to primates identify SAMD9 gene family as a major antiviral defense (**under review in *Nature Ecology and Evolution***).

2024   Carolina de Lima Adam, **Joana L. Rocha**, Peter H. Sudmant, Rori Rohlfs: TRACKing Tandem Repeats: a customizable pipeline for identification and cross-species comparisons (**under review in *Bioinformatics Advances**, bioRxiv preprint*; DOI: https://doi.org/10.1101/2024.09.27.615531).

2024   **Joana L. Rocha*,** Runyang Nicolas Lou*, Peter H Sudmant: Structural variation in humans and our primate kin in the era of T2T genomes and pangenomics (***Current Opinion in Genetics and Development***, DOI: https://doi.org/10.1016/j.gde.2024.102233)

2024   Kateryna D Makova, Brandon D Pickett, (…) **Joana L. Rocha**, (…) Evan E Eichler, Adam M Phillippy: The complete sequence and comparative analysis of ape sex chromosomes (***Nature***; DOI: https://doi.org/10.1038/s41586-024-07473-2)

2023   **Joana L. Rocha**, Pedro Silva, Nuno Santos, Monia Nakamura, Sandra Afonso, Abdeljebbar Qninba, Zbyszek Boratynski, Peter H. Sudmant, Jose C. Brito, Rasmus Nielsen‡ and Raquel Godinho‡: North-African fox genomes show signatures of repeated introgression and adaptation to life in deserts (**COVER** of *Nature Ecology and Evolution*; Chapter III of PhD thesis; DOI: https://doi.org/10.1038/s41559-023-02094-w)

2023   Tyler Linderoth, Diana Aguilar Gómez, Emily White, Evan Twomey, Adam Stuckert, Ke Bi, Amy Ko, Natalie Graham, **Joana L. Rocha**, Jason Chang, Matthew D. MacManes, Kyle Summers, Rasmus Nielsen: Genetic basis of aposematic coloration in a mimetic radiation of poison frogs (**under review in *Science**, biorxiv preprint*; DOI: https://doi.org/10.1101/2023.04.20.537757)

2022   **Joana L. Rocha***, Pedro Vaz Pinto*, Hans R. Siegismund, Matthias Meyer, Bettine Jansen van Vuuren, Luis Verismo, Nuno Ferrand, Raquel Godinho: African Climate and geomorphology drive evolution and ghost introgression in sable antelope (**COVER** of *Molecular Ecology*; published version of MSc thesis; DOI: https://doi.org/10.1111/mec.16427)

2021   **Joana L. Rocha**, Raquel Godinho, Jose C. Brito and Rasmus Nielsen: Life in deserts: the genetic basis of mammalian desert adaptation (***Trends and Ecology and Evolution***; Chapter I of PhD thesis; DOI: https://doi.org/10.1016/j.tree.2021.03.007)

2021   **Joana L. Rocha**, Jose C. Brito, Rasmus Nielsen, and Raquel Godinho: Convergent evolution of increased urine concentrating ability in desert mammals (***Mammal Review***, Chapter II of PhD thesis; DOI: https://doi.org/10.1111/mam.12244)

MEDIA HIGHLIGHTS & PRESS COVERAGE

2024   "**Selection on structural variation in the amylase locus**", Research Highlight article by Kirsty Minton for **Nature Reviews Genetics**.

2024   "**Humans have evolved to digest starch more easily since the advent of farming**", Briefing and Behind the Scenes article by **J.L. Rocha** and R.N. Lou for **Nature Research briefing**.

2024   "**Agriculture accelerated human genome evolution to capture energy from starchy foods**", science communication article by Robert Sanders for **UC Berkeley News**.

2024 "**Exciting times for evolutionary biology**", Editorial article for **Nature Ecology and Evolution** highlighting the work on desert adaptation in North-African foxes as a relevant contribution to advance fundamental questions in evolution.

2023 "**Handling the heat: Desert collaborations unveil the genetic history of how foxes have adapted to a warming climate**", science communication article by PhD student Samvardhini Sridharan for **Berkeley Science Review**

2023 "**Genetic variation, selection and hybridization all contribute to desert adaptation in foxes**", science communication article by Justin Jackson in **Phys.org**

2023 "**Genetics: How foxes adapted to life in the Sahara Desert**", highlight by **Nature Japan**

2022 "**These rare adaptations help animals survive in the desert**", science communication article by Jason P. Dinh **for Discover Magazine, Planet Earth**

2020 "**Searching for adaptation secrets in the Sahara Desert**", science communication article by Diana Aguilar-Gomez, PhD student in Computational Biology at UC Berkeley for **Berkeley QB3 News**

2016 "**Whole mitochondrial genome sequencing provides clues about the evolutionary history of the sable antelope and other savannah-adapted African ungulate**s". Chapter co-writen by **Joana L. Rocha**, Pedro Vaz Pinto and Raquel Godinho. In: "Next Generation Sequencing projects at CIBIO-InBIO-Evolution". CIBIO-InBIO/University of Porto, Portugal.

2016 "**Conservation of the Giant Sable Antelope of Angola**". Chapter by **Joana L. Rocha**, Pedro Vaz Pinto and Raquel Godinho. In: "Next Generation Sequencing projects at CIBIO-InBIO-Conservation & Metagenomics"; CIBIO-InBIO/University of Porto, Portugal.

INVITED TALKS & PRESENTATIONS

2024 **Annual meeting of the Society for Molecular Biology and Evolution, SMBE** (Puerto Vallarta, Mexico). Symposium: Human genetic variability in the Pangenomic era. Talk: "PANPANGENOME: Capturing the full spectrum of genetic variation in humans, chimpanzees and bonobos"

2023 **Panelist at the Annual Retreat for the Center of Computational Biology** at University of California, Berkeley. Topic: "Academia vs Industry".

2023 **The Biology of Genomes** (Cold Spring Harbor Laboratory, U.S.A). Talk: "PAN-PANGENOMICS: Unravelling structural variation, haplotype diversity and trans-species polymorphisms in humans, chimpanzees & bonobos"

2023 **CTEG seminar**, The Center for Theoretical and Evolutionary Genetics (University of California, Berkeley, U.S.A). Talk: "The role of structural variation in species diversification and adaptation to environmental change: insights from desert foxes and great apes"

2022 **Annual Retreat for the Center of Computational Biology** at University of California, Berkeley. Talk: "A Pan-pangenome captures the full spectrum of genetic variation and ancient trans-species structural polymorphism in humans, chimpanzees and bonobos"

2022 **T2T meeting** (UC Santa Cruz, U.S.A). Talk: "A Pan-pangenome captures the full spectrum of genetic variation and ancient trans-species structural polymorphism in humans, chimpanzees and bonobos."

2021   **Evolution**. Talk: "North-African fox genomes reveal signatures of ancient introgression and adaptation to life in deserts"

2019   **Bay Area Population Genetics** (UC-Berkeley, California, U.S.A). Poster: "Life in the desert: the genetic basis of extreme-environment adaptation in North African foxes"

2015   **Annual meeting of the Society for Molecular Biology and Evolution, SMBE** (Vienna, Austria). Poster: "The evolutionary history of the sable antelope inferred from the genomic analysis of complete mitochondrial sequences".

2014   **Student Conference on Conservation Science** at the University of Cambridge, UK. Poster: "Mitogenomic and conservation of sable antelopes".

TEACHING

2024   *Human Genetics and Genomics*: **INTEGBI 164 001**, UC Berkeley. Lecturer.

2024   *Practical Genomics*: **INTEGBI 134L 001**, UC Berkeley. Lecturer.

2022   *Berkeley Connect in Computational Biology*: **CMPBIO 98BC**, UC Berkeley. Guest Lecturer.

2019   *Cal genomics Summer Research Experience*, UC Berkeley. Guest Lecturer.

2016   *Molecular Methods in Biological Diversity Analysis*: **B4038**, University of Porto. Teaching Assistant

MENTORSHIP

2021-present   **Mentor and co-grantsmanship**: Samvardhini Sridharan, PhD student in the Department of Molecular and Cell Biology at the University of California, Berkeley. I trained them in principles of population genetics during their preparation for the qualifying exam and guided them on how to implement population genetic statistics using large human and non-human primate datasets. I also helped them write their *Leakey Foundation Grant*, where I am featured as co-investigator.

2021-2024   **Mentor and co-author**: Alexandre LeGrand, PhD student from the University of Lyon visiting the Department of Integrative Biology at the University of California, Berkeley. I trained them in basic programming in R, and in how to use and compute in a high-performance computing cluster using *bash* and *slurm* for population genetic analysis. Co-authorship in a manuscript *under review* in *Nature Ecology and Evolution*.

2019-2021   **Co-advisor:** Gonçalo Ferraz, MSc student in Biodiversity, Genetics and Evolution at University of Porto. Supervised them as they learned skills in population genetic analysis from short-read next generation sequencing whole-genome datasets to study the selective and demographic history of the critically endangered Giant Sable of Angola. Co-authorship in a manuscript *in preparation*.

PEDAGOGICAL DEVELOPMENT & SERVICE

PEDAGOGICAL TRAINING

1. "Teaching inclusively from day one in small classes", UC Berkeley

2. "Setting the stage: fostering student engagement throughout the semester", UC Berkeley

3. "Teaching inclusively from day one in large classes", UC Berkeley
4. "Exploring Equity via metacognitive practice", UC Berkeley
5. "Active learning in large classes: What's possible?", UC Berkeley
6. "Crafting equitable assessments with every student in mind", UC Berkeley
7. "Rethinking our content coverage goals", UC Berkeley
8. "Faculty perspectives on adapting to active learning", UC Berkeley
9. "Pathways to Scientific Teaching, UC Berkeley

LEADERSHIP AND MANAGEMENT

Scientific Leadership and Management Skills Workshop for Postdocs, Visiting Scholar and Postdoc Affairs Program (VSPA), University of California Berkeley.

COMMUNITY SERVICE FOR SCIENCE

1. **BE A SCIENTIST** initiative at Berkeley: served as mentor and STEM role model, supporting and guiding 7th grade students from Spanish-speaking and historically marginalized communities as they designed, carried out, and reported on their own independent scientific investigations.
2. Museum interpreter for *Natural History Museum of Porto*, during PhD and MSc.
3. Volunteer in science fairs and exhibitions: *Mostra-UP*, *Serralves Museum* during BSc.

PROFESSIONAL SKILLS

FIELD

Campaign organization and field expeditions for sampling and phenotyping of wild mammalian specimens and museum collections.

BENCH

Ancient, historical, modern and High-Molecular Weight genomic DNA extraction from bone, blood, tissue and cell cultures. RNA extraction from blood and tissue. Library preparation for Next Generation Sequencing (Illumina NovaSeq | Illumina HIC | PacBio HiFi | Oxford Nanopore Technology). Quality control methods (Qubit, FEMTO Pulse, TapeStation, qPCR).

COMPUTATIONAL

Bash, Python and R. Familiarity with git and computing in a High-Performance Computing cluster (HPC) using bash and slurm. *De Novo* genome assembly and annotation. Short-read (Illumina) and long-read (PacBio HiFi, ONT) sequencing whole genome data processing and analysis. Gene expression analysis from transcriptome data. Statistical phylogenetics and population genetics. Phylogenetic comparative methods using phenotypic and climatic data. Genotype-phenotype associations. Read-mapping and assembly-mapping to reference genomes. Pangenome-based methods.

LANGUAGE

Portuguese (Native) | English (Fluent) | Spanish (Fluent) | French (Basic)

PEER-REVIEW

Communications Biology | Nature Ecology and Evolution
Genome Biology and Evolution | Heredity | Current Biology

SOCIETY MEMBERSHIPS

2021-present: EVOLUTION, Society for the study of Evolution

2015-present: SMBE, Society for Molecular Biology and Evolution

REFERENCES

1. Dr. Peter H. Sudmant (Postdoctoral advisor); psudmant@berkeley.edu

2. Dr. Rasmus Nielsen (PhD advisor); rasmus_nielsen@berkeley.edu

3. Dr. Raquel Godinho (PhD advisor); raquelferrand@gmail.com | rgodinho@cibio.up.pt

4. Dr. Klaus Peter-Koepfli (Collaborator; PhD thesis committee jury); kkoepfli@gmu.edu