

Paula Ramos-Silva, PhD



Leiden, The Netherlands



(+31)628412622



paula.srs@gmail.com



@GoogleScholar



@GitHub



@ORCID



@Website

I am an evolutionary biologist passionate about **bioinformatics**, **biodiversity**, **research** and **education**. My work has a strong focus on **genes** and **proteins**, from **bacteria to animals**. In my teaching and research, I integrate multiple approaches ranging from molecular biology and microscopy to large-scale **computational analyses** of **genomics**, **transcriptomics** and **proteomics** data. Therefore, I see myself as a combination of an experimental and a computational biologist.

EMPLOYMENT HISTORY

01/07/2018 - 31/08/2022

Postdoctoral Researcher

Affiliations: Plankton Diversity and Evolution Group, Naturalis Biodiversity Center & Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, The Netherlands

Project: Evolution of planktonic gastropod calcification (**EPIC**)

Advisor: Dr. Katja Peijnenburg

01/11/2019 - 30/04/2020

Maternity Leave (6 months)

01/03/2014 - 30/04/2018

Postdoctoral Researcher

Affiliation: Computational Genomics Group, Instituto Gulbenkian de Ciência, Portugal

Project: Understanding the evolutionary history and the diversity of bacterial endospore formation (**EvoSpore**)

Advisors: Dr. José Pereira-Leal and Dr. Adriano O. Henriques

09/01/2009 - 19/12/2013

PhD Candidate

Affiliations: Computational Science Section, University of Amsterdam, The Netherlands & Biogéosciences, University of Burgundy, France

Project: Marie Curie ITN Biomineralization: understanding of basic mechanisms for the design of novel strategies in nanobiotechnology (**BIOMINTEC**)

Promotor: Prof. Peter Slood

Supervisors: Dr. Jaap Kaandorp and Dr. Frédéric Marin

01/11/2007 - 30/11/2008

Research Analyst

Affiliation: Centre of Biological and Chemical Engineering, Instituto Superior Técnico, University of Lisbon, Portugal

EDUCATION

09/01/2009 - 19/12/2013

PhD in Biology - Bioinformatics

Informatics Institute, University of Amsterdam, The Netherlands

Thesis: Biocalcification of mollusk shells and coral skeletons. Integrating molecular, proteomics and bioinformatics methods

[Link](#)

01/09/2001 - 10/10/2007

Integrated MSc (BSc + MSc) in Biological Engineering

Instituto Superior Técnico, University of Lisbon, Portugal &
Faculty of Engineering, Lund University, Sweden

Thesis: Removal of 17 β -estradiol from water using molecularly
imprinted polyethersulfone microspheres [Link](#)

PUBLICATIONS

Peer-reviewed articles

1. Checa AG, Pimentel C, Berent K, [Ramos-Silva P](#), Rodríguez-Navarro AB, Cartwright JHE, Sainz-Díaz CI. Evidence for helical microstructure of aragonite fibers in pteropod shells. **MRS Bulletin** 2022; <https://doi.org/10.1557/s43577-022-00418-y>
2. Berent K, Cartwright JHE, Checa AG, Pimentel C, [Ramos-Silva P](#), Sainz-Díaz CI. Helical microstructures in molluscan biomineralization are a biological example of close packed helices that may form from a colloidal liquid crystal precursor in a twist–bend nematic phase. **Physical Review Materials** 2022; 105601: 1–9. <https://doi.org/10.1103/PhysRevMaterials.6.105601>
3. [Ramos-Silva P*](#), Odendaal M-L*, Wall-Palmer D, Mekkes L, Peijnenburg KTCA. Transcriptomic responses of adult versus juvenile atlantids to ocean acidification. **Frontiers in Marine Science**, 2022; 9:801458. (*co-authors) <https://doi.org/10.3389/fmars.2022.801458>
4. [Ramos-Silva P](#), Wall-Palmer D, Marlétaz F, Marin F, Peijnenburg KTCA. Evolution and biomineralization of pteropod shells. **Journal of Structural Biology**, 2021; 213(4):107779. <https://doi.org/10.1016/j.jsb.2021.107779>
5. Wall-Palmer D, Mekkes L, [Ramos-Silva P](#), Dämmer LK, Goetze E, Bakker K, Duijm E, Peijnenburg, KTCA. The impacts of past, present and future ocean chemistry on predatory planktonic snails. **Royal Society Open Science**, 2021; 8:202265. <https://doi.org/10.1098/rsos.202265>
6. Choo LQ, Bal TMP, Choquet M, Smolina I, [Ramos-Silva P](#), Marlétaz F, Kopp, M, Hoarau G, Peijnenburg KTCA. Novel genomic resources for shelled pteropods: a draft genome and target capture probes for *Limacina bulimoides*, tested for cross-species relevance. **BMC Genomics**, 2020; 21(1):11. <https://doi.org/10.1186/s12864-019-6372-z>
7. [Ramos-Silva P](#), Serrano M, Henriques AO. From root to tips: sporulation evolution and specialization in *Bacillus subtilis* and the intestinal pathogen *Clostridioides difficile*. **Molecular Biology and Evolution**, 2019; 36(12):2714-36. <https://doi.org/10.1093/molbev/msz175>
8. Le Roy N, Jackson D, Marie B, [Ramos-Silva P](#), Marin F. The evolution of metazoan alpha-carbonic anhydrases and their roles in calcium carbonate biomineralization. **Frontiers in Zoology**, 2014; 11(1):75. <https://doi.org/10.1186/s12983-014-0075-8>
9. [Ramos-Silva P](#), Kaandorp J, Herbst F, Plasseraud L, Alcaraz G, Stern C, Corneillat M, Guichard N, Durlet C, Luquet G, Marin F. The skeleton of the staghorn coral *Acropora millepora*: molecular and structural characterization. **PLoS One**, 2014; 9(6):e97454. <https://doi.org/10.1371/journal.pone.0097454>
10. Marin F, Le Roy N, Marie B, [Ramos-Silva P](#), Bundelewa I, Guichard N, Immel F. Metazoan calcium carbonate biomineralizations: macroevolutionary trends—challenges for the coming decade. **Bulletin de la Société Géologique de France**, 2014; 185(4):217-32. <https://doi.org/10.2113/gssgfbull.185.4.217>

11. Marie B, Ramos-Silva P, Marin F, Marie A. Proteomics of CaCO₃ biomineral-associated proteins: how to properly address their analysis. **Proteomics**, 2013; 13(21):3109-16. <https://doi.org/10.1002/pmic.201300162>
12. Ramos-Silva P, Kaandorp J, Huisman L, Marie B, Zanella-Cléon I, Guichard N, Miller DJ, Marin F. The skeletal proteome of the coral *Acropora millepora*: the evolution of calcification by co-option and domain shuffling. **Molecular Biology and Evolution**, 2013; 30(9):2099-112. <https://doi.org/10.1093/molbev/mst109>
13. Marie B, Jackson DJ, Ramos-Silva P, Zanella-Cléon I, Guichard N, Marin F. The shell-forming proteome of *Lottia gigantea* reveals both deep conservations and lineage-specific novelties. **The FEBS Journal**, 2013; 280(1):214-32. <https://doi.org/10.1111/febs.12062>
14. Ramos-Silva P, Benhamada S, Le Roy N, Marie B, Guichard N, Zanella-Cléon I, Plasseraud L, Corneillat M, Alcaraz G, Kaandorp J, Marin F. Novel molluscan biomineralization proteins retrieved from proteomics: a case study with *Urosalpinx*. **ChemBioChem**, 2012; 13(7):1067-78. <https://doi.org/10.1002/cbic.201100708>

Letters and reports

15. Ramos-Silva P, Brito PH, Serrano M, Henriques AO, Pereira-Leal JB. Rethinking the niche of upper-atmosphere bacteria: draft genome sequences of *Bacillus aryabhattai* C765 and *Bacillus aerophilus* C772, isolated from rice fields. **Genome Announcements**, 2015; 3(2): e00094-15. PubMed <https://doi.org/10.1128/genomeA.00094-15>
16. Ramos-Silva P, Marin F, Kaandorp J, Marie B. Biomineralization toolkit: the importance of sample cleaning prior to the characterization of biomineral proteomes. **Proceedings of the National Academy of Sciences USA**, 2013; 110(24):E2144-6. <https://doi.org/10.1073/pnas.1303657110>

Book chapters & conference papers

17. Deutekom ES, Konglerd P, Ramos-Silva P, Kaandorp JA. From Molecules to Morphologies, a Multiscale Modeling Approach to Unravel the Complex System of Coral Calcification. The Cnidaria, Past Present and Future, Springer, 2016; pp 223-36. https://doi.org/10.1007/978-3-319-31305-4_14
18. Ramos-Silva P, Marin F. Proteins as functional units of biocalcification - an overview. Biomineralization: From Fundamentals to Biomaterials and Environmental Issues, Key Engineering Materials, 2016; 672:183-90. <https://doi.org/10.4028/www.scientific.net/KEM.672.183>
19. Le Roy N, Jackson DJ, Marie B, Ramos-Silva P, Marin F. Carbonic anhydrase and metazoan biocalcification: a focus on molluscs. Biomineralization: From Fundamentals to Biomaterials and Environmental Issues, Key Engineering Materials, 2016; 672:151-157. <https://doi.org/10.4028/www.scientific.net/KEM.672.151>
20. Marin F, Le Roy N, Marie B, Ramos-Silva P, Wolf S, Benhamada S, Guichard N, Immel F. Synthesis of Calcium Carbonate Biological Materials: How Many Proteins are Needed? Bioceramics 25, Key Engineering Materials, 2014; 614:52-61. <https://doi.org/10.4028/www.scientific.net/KEM.614.52>
21. Marin F, Marie B, Benhamada S, Ramos-Silva P, Le Roy N, Guichard N, Wolf S, Montagnani C, Joubert C, Piquemal D, Saulnier D, Gueguen Y. 'Shellome': proteins involved in mollusc shell biomineralization - diversity, functions. International Symposium on Pearl Research, Terrapub, 2013; pp 149-16. <https://hal.archives-ouvertes.fr/hal-00793668>

TEACHING

11/2020 - Present	Guest lecturer in bioinformatics for the course Biological Oceanography , MSc level, University of Amsterdam, The Netherlands (~6 hours)
11/2020 - Present	Teaching assistant in laboratory practicals for the course Biological Oceanography , MSc level, University of Amsterdam, The Netherlands (24 hours)
10/2018	Lecturer of the module Computational Biology and Bioinformatics at the Tirana Mathematical and Computational Biology Workshop, Albania (4 hours)
07/2014 - 07/2015	Guest lecturer, journal club coordinator and evaluator of final presentations for the course Research in Bioinformatics , MSc level, University of Lisbon, Portugal (12 hours)
01/2014 - 03/2015	Lecturer of Applied Genetics and Statistics , BSc level, University of the Nouvelle Grand'Anse, Haiti. This teaching was part of a program organized by the NGO Haitian Connection (haitianconnection.org). (140 hours)

SUPERVISION & MENTORING

03/2021 - 06/2022	Gloria Casas Canales MSc Freshwater & Marine Biology, University of Amsterdam Project: Transcriptomic responses of the sub-Antarctic pteropod <i>Limacina retroversa</i> to ocean acidification: adults vs juveniles
09/2021 - 10/2021	Héloïse Ribot MSc Science Education and Communication, Utrecht University Project: "Seashells inspire CO ₂ storage" - popular science article
05/2020 - 11/2020	Mari-Lee Odendaal MSc Biology, Wageningen University & Research Project: Transcriptomic responses of juvenile versus adult shelled heteropods under decreasing ocean pH
01/2019 - 09/2019	Jack Smith MSc Biology, Leiden University Project: Screening for fast-evolving genes in pteropod species

INVITED TALKS & SEMINARS

03/2022	' <i>Biom mineralization in holoplanktonic gastropods: from genes to shells</i> ' Colloquium Live at Tribune, Naturalis Biodiversity Center, Leiden, The Netherlands
03/2022	' <i>Pteropod biom mineralization – from shell microstructures to proteins</i> ' Marine Genomics & Evolution Symposium, Naturalis Biodiversity Center, Leiden, The Netherlands
07/2019	' <i>Evolution of planktonic gastropod biom mineralization</i> ' Meeting: Understanding biom mineralisation and the impact of global change in marine organisms, Institute for Advanced Study, Amsterdam, The Netherlands
10/2018	' <i>Sporulation from root to tips: evolution in Bacillus subtilis and Clostridioides difficile</i> ' Tirana Mathematical and Computational Biology Workshop, Tirana, Albania
10/2013	' <i>On biom mineralization of mollusk shells and coral skeletons</i> ' Research Seminar, Thomas E. Starzl Transplantation Institute, University of Pittsburgh, USA

CONFERENCE PRESENTATIONS

06/2022	Meeting of the Netherlands Society for Evolutionary Biology, Ede, The Netherlands
03/2022	Ocean Sciences Meeting, Hawaii, virtual
09/2019	15 th International Symposium on Biomineralization, Munich, Germany
04/2019	Poster pitch at The Conference of the Netherlands Society for Evolutionary Biology, Ede, The Netherlands
08/2013	12 th International Symposium on Biomineralization, Freiberg, Germany
08/2013	5 th Meeting - COST Action Biomineralix, Bologna, Italy
09/2012	4 th Meeting - COST Action Biomineralix, Aarhus, Denmark
02/2011	Biomintec International Workshop - Molecular Biomineralization in Marine Organisms: Nanobiotechnology and Biomedical Applications, Palermo, Italy,
06/2010	French Conference on Biology of the Mineralized Tissues (12 ^{èmes} JFBTM), Saint Étienne, France
04/2010	7 th International Symposium on Networks in Bioinformatics (ISNB 2010), Amsterdam, The Netherlands

CONFERENCE POSTERS

09/2019	Pearls of Wisdom: synergising leadership and expertise in molluscan genomics, Kavli Royal Society Centre, Chicheley Hall, UK
05/2019	NWO Life Congress, Bunnik, The Netherlands
04/2019	Meeting of the Netherlands Society for Evolutionary Biology, Ede, The Netherlands
08/2017	16 th Congress of the European Society for Evolutionary Biology, Groningen, The Netherlands
12/2010	Euro ISRS symposium, Wageningen, The Netherlands
07/2010	French Conference on Biology, Computer Science and Mathematics (JOBIM 2010), Montpellier, France

PERSONAL GRANTS

02/2019	Marie Skłodowska-Curie Individual Fellowship Project: EPIC - Evolution of planktonic gastropod calcification, Grant No.: 844345 Funding Source: European Commission Amount and duration: 176k €, 2.5 years Host: Naturalis Biodiversity Center
02/2015	FCT Postdoctoral Fellowship Project: EvoSpore - Understanding the evolutionary history and the diversity of bacterial endosporulation Funding Source: Portuguese Foundation for Science and Technology – FCT Grant No.: SFRH/BPD/103171/2014 Amount and duration: 55k €, 3 years Host: Instituto Gulbenkian de Ciência

AWARDS

01/2019	<u>Travel Award</u> by the Malacological Society of London for the project ‘ Shell structures of three pelagic mollusks ’, UK
05/2017	<u>2nd Martin Fellowship</u> by Naturalis Biodiversity Center for the project ‘ Shell proteomes in planktonic gastropods ’, The Netherlands
02/2017	<u>Award</u> by The Society of Molecular Biology and Evolution for the SMBE 2017 with the presentation ‘ Tracing endosporulation evolution: the ancestral genes and lineage specific novelties ’, USA (declined)
10/2016	<u>1st Martin Fellowship</u> by Naturalis Biodiversity Center for the project ‘ Biomineralization genes in planktonic gastropods ’, The Netherlands

- 07/2013 [Scholarship Award](#) from the National Institutes of Health & Howard Hughes Institute for the course '**Frontiers in Stem Cells & Regeneration**', USA
- 02/2007 [ERASMUS Scholarship](#) by the University of Lisbon for **MSc research project in Bioremediation** at the Faculty of Engineering, Lund University, Sweden

CERTIFICATIONS & TRAINING

In bioinformatics

- 03/2022 Genome Assembly and Annotation, physalia-courses.org (online)
- 11/2021 Ecological and Evolutionary Studies on DNA Methylation in Plants and Animals, physalia-courses.org (online)

I participated in six intensive courses organized by The Gulbenkian Training Program in Bioinformatics (gtpb.igc.gulbenkian.pt):

- 04/2018 Analysis of Differential Expression with RNAseq
- 04/2017 Advanced Biostatistics for Bioinformatics Tool Users using R
- 03/2017 Population Genetics and Demographic History: model-based approaches
- 03/2016 NGS Data Analysis, RNAseq, ChIPseq
- 11/2014 Bioinformatics using Python for Biologists
- 10/2014 Transcriptome Analysis, Automatic Function Annotation and Data Mining

Others

- 04/2022 Didactical modules 1-3 and 6, Teaching and Learning Centre FNWI, University of Amsterdam
- 11/2020 EMBO Lab Leadership course for Postdocs by embo.org
- 07/2016 eLife Workshop on Peer Review
- 08/2015 PADI Open Water Diver
- 04/2014 Biosafety Levels 2 and 3, Instituto Gulbenkian de Ciência
- 09/2013 Frontiers in Stem Cells & Regeneration, Marine Biological Laboratory, Woods Hole, MA, USA

PEER-REVIEW

Scientific Reports, Frontiers in Genetics, Genome Biology and Evolution, Journal of Proteome Research, Plos One, F1000Research

SOCIETY MEMBERSHIPS

- 2017-Present Society for Molecular Biology and Evolution (SMBE)
- 2019-Present Netherlands Society for Evolutionary Biology (NLSEB)

OUTREACH

- 09/2022 Spotlight: 'The amazing shells of sea butterflies' in the LiveScience showroom at Naturalis Biodiversity Center
- 09/2021 [Promotional video](#) of the publication *Evolution and biomineralization of pteropod shells* in collaboration with VJs from [Studio de Maan](#)
- 08/2019 "Shell microstructures of planktonic gastropods" in the Bulletin of The Malacological Society of London Nr 73, The Malacologist (ISSN 1759-1406)
- 2014-17 I participated in several microscope demonstrations, science games and one-on-one speed dates about computational biology, bioinformatics, genes and evolution at the annual NOS Alive Music Festival, Lisbon, Portugal

- 10/2016 Open Day at the Instituto Gulbenkian de Ciência - I participated in this event by creating an interactive game introducing evolutionary thinking to children and teenagers named “How are animals related?”, Oeiras, Portugal
- 01/2015 I presented ‘A mobility experience’ to share my experience living and working abroad as a PhD candidate to the students of the University of Trás-os-Montes and Alto Douro (UTAD), during the EURAXESS Roadshow in Vila Real, Portugal
- 09/2012 Radio interview for the programme “Portuguese in the World”, Antena 1, to share my experience in France and The Netherlands and explain my research in biomineralization.

ACADEMIC SERVICES

- 09/2022-Present Expert Evaluator and Rapporteur of Marie Skłodowska-Curie postdoc proposals for the European Commission
- 05/2021-Present Manager of the high memory server for the Plankton Diversity and Evolution group at Naturalis. Tasks: bridge between researchers and IT unit, maintain system up to date, write documentation install/update software, manage user accounts, technical support to users
- 05/2017-05/2018 Manager of the high memory server from the Computational Genomics Laboratory at Instituto Gulbenkian de Ciência. Tasks: maintain system up to date, install software, manage user accounts, technical support to users, install and manage a graphical interface to access the server
- 11/2014-10/2015 Postdoc Committee member, Instituto Gulbenkian de Ciência, Portugal
Main roles:
 - Organizer of the monthly Careers in Science Seminar Series.
 - Organizer of 2nd Annual Joint Postdoctoral Meeting, Setúbal, Portugal, November 4-6, 2015 with approx. 100 participants
 - Postdocs’ spokesperson

SKILLS

- **Programming/Scripting:** R, Python, bash, sh, RMarkdown, Quarto, RStudio, Git, PyCharm, SLURM
- **Bioinformatics:** RNAseq, genome and transcriptome sequencing, sequence alignments, blast, phylogenetics (Bayesian, ML, MEGA), orthology/paralogy (bi-directional blast, COG and OrthoMCL), differential gene expression (edgeR, DESeq), proteomics, protein structure (AlphaFold, Modeller, Chimera), biological databases (PFAM, NCBI, UniprotKB, InterProScan, KEGG), functional annotation (Trinotate), Galaxy server, Bioconductor, BioPython, BioPerl.
- **Molecular Biology:** DNA/RNA/Protein extractions, PCR (basic, real-time, 3’ 5’ race), DNA cloning, library preparations for Illumina platforms
- **Biochemistry:** SDS PAGE, protein assays
- **Microbiology:** Bacterial culturing (plate and microbioreactors)
- **Microscopy:** resin embedding and other preparations for Scanning Electron Microscopy

LANGUAGES

Portuguese (native), English (full - C2*), French (full – C2*), Dutch (limited – B1*)

* Levels according to the Common European Framework of Reference