

UNIVERSITY OF MILAN

Public selection for recruiting 1 tenure track researcher(s) (RTT) for competition sector 05/A1 - Botany, (scientific-disciplinary sector BIO/02 - Systematic Botany (05/BIOS-01 - Botany), BIOS-01/B - Systematic Botany) at the Department of Biosciences, (announcement published in Official Gazette No. 4011/2024 of 12/06/2024) - Competition code 5569

## Ricardo Manuel Arraiano Castilho

### CURRICULUM VITAE

#### PERSONAL DATA

SURNAME	ARRAIANO CASTILHO
NAME	RICARDO MANUEL
DATE OF BIRTH	29/06/1988

#### SUMMARY

Ricardo is an interdisciplinary scientist, passionate by natural communities, their Ecology and Evolution. He graduated in Biology at the University of Évora and holds a master degree (MSc) in Biodiversity, Genetics and Evolution at CIBIO-BIOPOLIS from the University of Porto, where he studied the phylogeographic traits and distribution patterns of *Amanita ponderosa* in Iberian Peninsula. In 2020, he obtained his PhD from Imperial College London in collaboration with the Royal Botanic Gardens, Kew where he developed his research on plant-fungal interactions in alpine ecosystems. Currently he is a Postdoctoral researcher in the Department of Ecology and Evolution at the University of Lausanne and he is also a member of the Swiss National Centre of Competence in Research (NCCR) in Microbiomes where he investigates how soil fungal communities interact with other members of the soil microbiome and how the outcome of these interactions influences ecosystem processes. Passionate about Fungi, his research interests are the diversity, ecology, and evolution of these organisms and how they interact with their surrounding environment. His research background and interests are very in line to the field of Plant Sciences, using multidisciplinary approaches and cutting edge genomic and bioinformatic tools to answer ecological and evolutionary relevant questions.

## QUALIFICATIONS

### EDUCATION

2020	<b>PhD in Fungal Ecology &amp; Evolution</b> - Imperial College London & Royal Botanic Gardens, Kew
Title	<i>“Plant-Fungal interactions in alpine ecosystems”</i>
Topics	1 - Assessment of the biotic and abiotic drivers of ectomycorrhizal fungi across the European Alps 2 - Influence of plant host genotype in ectomycorrhizal fungal community structure and composition 3 - Impacts of climate change in alpine ectomycorrhizal fungal communities
Supervisors	Prof. Martin I. Bidartondo - Imperial College London Dr. Laura Martinez-Suz & Dr. Tuula Niskanen - Royal Botanic Gardens, Kew
2013	<b>MSc in Biodiversity, Genetics and Evolution</b> - Faculty of Sciences, University of Porto
Title	<i>“Assessing the phylogeographic traits and distribution patterns of <i>Amanita ponderosa</i> (Malençon &amp; R. Heim) in Iberian Peninsula”</i>
Topics	1 - Next-generation RAD sequencing: a tool for evaluation of population structure of <i>Amanita ponderosa</i> in Iberian Peninsula 2 - Habitat modelling and distribution patterns of <i>Amanita ponderosa</i> in Iberian Peninsula
Supervisors	Prof. Albano Beja-Pereira - University of Porto & CIBIO-BIOPOLIS - Research Centre in Biodiversity and Genetic Resources
2011	<b>BSc (<i>Licenciatura</i>) in Biology</b> - University of Évora
Title	<i>“Isolation of ectomycorrhizal fungi associated with <i>Pinus pinea</i> L.”</i>
Supervisors	Prof. Paulo de Oliveira - University of Évora & CIBIO-BIOPOLIS - Research Centre in Biodiversity and Genetic Resources

### WORK EXPERIENCE

2021 - Present	<b>Postdoctoral researcher</b> - Dep. of Ecology and Evolution - University of Lausanne & Swiss National Centre of Competence in Research (NCCR) in Microbiomes. Tasks: Conducting independent research, PhD and MSc student supervision, Teaching activities, Funds and project management, Outreach.
2016 - 2020	<b>Research assistant (PhD programme)</b> - Imperial College London & Royal Botanic Gardens Kew. Tasks: Design and conduct field work campaigns, Generate and analyse ecological and molecular data, Teaching assistant and student mentoring, Outreach.
2014 - 2016	<b>Research assistant</b> - CIBIO-BIOPOLIS, University of Porto Tasks: Bioinformatician at AGRIGENOMICS research group
2013	<b>Lab technician</b> - CIBIO-BIOPOLIS, University of Porto Tasks: Molecular biology assistant: DNA extraction, quantification and amplification
2010 - 2012	<b>Independent contractor (Mycologist)</b> - Mértola's Heritage Defence Association (ADPM) Tasks: Survey and identification of macrofungal communities in southern Portugal

## TEACHING EXPERIENCE

### Organizer & lecturer

2023 - present **Secondary Data Analysis** - NCCR & CUSO PhD programme at University of Lausanne

### Teaching Assistant

2021 - present **Molecular Methods in Ecology and Evolution** - MSc in Behaviour, Evolution and Conservation at University of Lausanne

2021 - present **Phylogeography** - MSc in Behaviour, Evolution and Conservation at University of Lausanne

2021 - present **Microbiology (Fungi Module)** - BSc in Biology at University of Lausanne

2017 - 2019 **Module of Ectomycorrhizal Fungi (BIO743P)** - MSc in Plant and Fungal Taxonomy, Diversity and Conservation - Queen Mary, University of London & Royal Botanic Gardens, Kew

2017 - 2018 **Bioinformatics and Phylogenies** - BSc in Biological Sciences at Imperial College London

## STUDENTS SUPERVISION AND MENTORING

2024 - present **Rose Gooda** (Mentor), PhD student in Life Sciences, Imperial College London

2024 - present **Fanny Bulliard** (Supervisor), MSc student in Behaviour, Evolution and Conservation, University of Lausanne

2024 - present **Cecília Torres** (Supervisor), MSc student in Behaviour, Evolution and Conservation, University of Lausanne

2023 - 2024 **Dylan Stephens** (Supervisor), MSc student in Behaviour, Evolution and Conservation, University of Lausanne

2022 - 2023 **Marianna Tzivanopoulou** (Supervisor), MSc student in Behaviour, Evolution and Conservation, University of Lausanne

2021 - present **Fergus Wright** (Supervisor), PhD student in Life Sciences, University of Lausanne

2021 - present **Nora Khelidj** (Mentor), PhD student in Environmental Science, University of Lausanne

2021 **Muyao Qi** (Mentor), PhD student in Life Sciences, Imperial College London

2017 **James Westgate** (Mentor), MSc student in Ecology and Evolutionary Biology, Imperial College London

## COLLABORATION AND PARTICIPATION IN RESEARCH PROJECTS

2024 - present Associate scientist - Society for the Protection of Underground Networks (SPUN).

2024 - present Natural Capital and Ecosystems assessment programme - PI: Dr. Laura Martinez Suz - Royal Botanic Gardens, Kew.

2023 - present Comparative biogeography and spatial modelling of soil microbial communities in the Swiss Alps (SOMETALP). PI: Prof. Antoine Guisan, University of Lausanne.

2023 - present External collaborator in Biogeography and Evolution of Plants and Ecosystems group at CIBIO-BIOPOLIS, University of Porto.

2022 - present	Forecasting the impact of glacier retreat on network dynamics and ecosystem functions (IceNet). PI: Dr. Gianalberto Losapio, University of Lausanne.
2021 - present	Assessing the role of the soil microbiome in the mycorrhizal symbiosis. WP3 and WP4 of the Swiss National Centre of Competence in Research (NCCR) in Microbiomes. PI: Prof. Ian Sanders & Prof. Jan van der Meer, University of Lausanne.
2019 - present	Phylogeography and hybrid swarms across oak species ( <i>Quercus</i> spp. Subsection <i>Macrantherae</i> ) in Iberian Peninsula. PI: Dr. Carlos Vila-Viçosa, CIBIO-BIOPOLIS.
2010 - 2015	Diversity and phylogeographic traits of the <i>Amidela</i> clade ( <i>Amanita</i> ) in Iberian Peninsula. PI: Prof. Paulo de Oliveira, University of Évora

## RELEVANT COMPLEMENTARY FORMATION & TRAINING

2024 - Mar	Methods in microbiomics - Metatranscriptomics, WP6-NCCR microbiomes, Bern
2022 - Apr	Methods in microbiomics - Metagenomics, WP6-NCCR microbiomes, Bern
2019 - Dec	Data Science Course: Python with Pandas by Adam Townsend at Imperial College London
2019 - Nov	Genomics and Bioinformatics by Matteo Fumagalli at Imperial College London
2019 - Jan	Identifying and publishing HTS/Sanger DNA sequence datasets by Urmas Kõljalg, Henrik Nilsson, Kessy Abarenkov, Thomas Jeppesen, Dmitry Schigel & Laura Russell from UNITE and GBIF platforms at Dragør (Denmark)
2018 - Nov	Soil metagenomics data analysis by Beat Frey & Aline Frossard at WSL, Birmensdorf
2018 - Feb	Advanced Statistics by Cristina Banks-Leite, Miguel Matias & Samraat Pawa at Imperial College London
2018 - Jan	Statistics in R & Regression analysis by Julia Schroeder at Imperial College London
2017 - May	Hyb-Seq: wet-lab tips and dry-lab skills by Norm Wickett, Matt Johnson & Elliot Gardner at Royal Botanic Gardens, Kew
2015 Apr-Jun	Visiting researcher (3 months) at University of California, Davis hosted by Prof. Michael R. Miller for advanced RAD - Seq. data analysis training
2014 - May	Programming for everybody, Python by Coursera
2013 - Oct	Computing for data analysis, R environment by Coursera
2012 - Nov	Mycology technician accredited by DGADR (Direcção-Geral Agricultura e Desenvolvimento Rural - Ministério da Agricultura e do Mar)
2011 - Mar	Spatial Analyst, ArcGIS (ESRI) by Nuno de Sousa Neves at University of Évora
2011 - May	Erasmus-Intensive Programme, “SUSTMONT - Sustainable Monitoring of European Mountain Regions” by Prof. Alexander Cernusca at University of Innsbruck
2008 - Nov	Mushroom production by EPDRA & Ecofungos

## COMPUTER & BIOINFORMATIC SKILLS

OS	Linux (Very good); MacOS (Very good); Microsoft windows (Very good)
Programming	R (Very good); Bash (Very good); Python (Good)
Data analysis	Community ecology, Multivariate statistics, Ecological niche modelling, Network analysis, Clustering and species delimitation methods, Phylogenetic analysis, Population genetics, Metabarcoding, Metagenomics, Metatranscriptomics and Data-Science

## SCIENTIFIC PRODUCTION

### MANUSCRIPTS

- [8] Wright F., Grand S., Sanders I.R., **Arraiano-Castilho R.** (*in prep*) Arbuscular mycorrhizal fungi controls soil microbial community taxonomical and functional composition across different soil compartments while enhancing plant nutrient uptake. Target Journal: ISME
- [7] Vila-Viçosa C\*, **Arraiano-Castilho R.\***, Hipp A., Vázquez F. M., Almeida R., García C., Beja-Pereira A., Azevedo H. (*in prep.*) The Iberian White-Oaks' Syngameon as a legacy of introgression in southern Europe. Target Journal: New Phytologist \**Equal contribution*
- [6] Oliveira P. & **Arraiano-Castilho R.** (*in prep.*) Charting Taxa in *Amanita* Section *Amidella* (Basidiomycota: *Amanitaceae*). Target Journal: Fungal diversity
- [5] **Arraiano-Castilho R.**, Bidartondo M. I., Niskanen T., Brunner I., Zimmermann S. Senn-Irlet, B. Frey, B., Peintner U., Mrak T., & Suz L. M. (2024). "Climatic shifts threaten alpine mycorrhizal communities above the treeline". Fungal Ecology, 67, 101300. <https://doi.org/10.1016/J.FUNECO.2023.101300>
- [4] Liang S., **Arraiano-Castilho R.**, Neuenkamp L., Li H., Bai Z., Zhang M., Yin, J., Yuan Z. & Wang X. (2023) Rhizosphere fungal community assembly varied across functional guilds in a temperate forest. Ecological Processes 12, 6. <https://doi.org/10.1186/s13717-023-00417-0>
- [3] **Arraiano-Castilho R.**, Silva A. C., Vila-Viçosa C., Castro M. R., Morgado L. N. & Oliveira P. (2022). – The *Amidella* clade in Europe (Basidiomycota: *Amanitaceae*): clarification of the contentious *Amanita valens* (E.-J.Gilbert) Bertault and the importance of taxon-specific PCR primers for identification. Cryptogamie, Mycologie 2022 (6): 139-157. <https://doi.org/10.5252/cryptogamie-mycologie2022v43a6>
- [2] **Arraiano-Castilho R.**, Bidartondo M.I., Niskanen T., Clarkson J.J., Brunner I., Zimmermann S., Senn-Irlet B., Frey B., Peintner U., Mrak T. and Suz L.M. (2021), "Habitat specialisation controls ectomycorrhizal fungi above the treeline in the European Alps." New Phytologist, 229: 2901-2916. <https://doi.org/10.1111/nph.17033>
- [1] **Arraiano-Castilho R.**, Bidartondo M.I., Niskanen T., Zimmermann S., Frey B., Brunner I., Senn-Irlet, B., Hörandl E., Gramlich S. & Suz L.M. (2020) "Plant-fungal interactions in hybrid zones: ectomycorrhizal communities of willows (*Salix* L.) in an alpine glacier forefield." Fungal Ecology, 45:100936, <https://doi.org/10.1016/j.funeco.2020.100936>

### SELECTED POSTER COMMUNICATIONS

- [7] Wright, F., Sanders, I.R, **Arraiano-Castilho, R.** (2023) "Unravelling the interactions between the soil microbiome and mycorrhizal fungi to improve plant productivity" - 1st European Healthy Soils Conference, Muttentz, Switzerland
- [6] **Arraiano-Castilho R.**, Tzivanopoulou M. & Sanders I. R. (2022) "The forgotten kingdom: Exploring the application of metatranscriptomic approaches for the study of soil fungal communities" - ISME18, Lausanne, Switzerland
- [5] **Arraiano-Castilho R.**, Bidartondo M.I., Niskanen T., Clarkson J.J., Brunner I., Zimmermann S., Senn-Irlet B., Frey B., Peintner U., Gramlich S., Mrak T. & Suz L.M. (2018) "Plant-Fungal interactions in alpine ecosystems"- State of the World's Fungi Symposium, Kew, United Kingdom
- [4] **Arraiano-Castilho R.**, Saglam I.K., O'Rourke S.M., Miller M.R., Beja-Pereira A. (2016) "Using RAD sequencing to detect cryptic speciation in *Amanita* (Basidiomycota, *Amanitaceae*)"- CONGENOMICS, Conference in conservation genomics, Vairão, Portugal
- [3] Viegas S., Hespanhol H.H., Marques J., **Arraiano-Castilho R.**, Pereira J.M., Ribeiro R., Portela P., Alves C., Oliveira C., Vieira C. (2015) "CryptoBlitz: Exploring the bryophytes, lichens and macrofungi of Serralves Park through a Bioblitz event with a citizen science framework and kits"- XX Cryptogamic Botany Symposium, Porto, Portugal

- [2] **Arraiano-Castilho R.**, Saglam I.K., Miller M.R., Beja-Pereira A. (2015) "Genome wide studies reveals cryptic speciation in *Amanita* Pers. in Iberian peninsula"- XVII Congress of European Mycologists, Funchal, Portugal
- [1] **Arraiano-Castilho R.**, Saglam I.K., Miller M.R., Beja-Pereira A. (2015) "Next-generation RAD sequencing: a tool for evaluation the phylogeographic patterns of *Amanita ponderosa* (Malençon & R. Heim) in Iberian Peninsula"- Annual Meeting of the Society for Molecular Biology and Evolution- SMBE, Vienna, Austria

## BOOK CONTRIBUTIONS

- [2] Scientific revision for macrofungal surveys: **Arraiano-Castilho R.** in Almeida J., Mexia de Almeida J., Braga F., Parada R.C. (2014) "The park in macro"- Fundação de Serralves, Porto, ISBN: 978-972-739-323-7
- [1] Scientific revision for macrofungal surveys: **Arraiano-Castilho R.** in Almeida J., Mexia de Almeida J., Alves E., Nogueira P., Ribeiro R., Viegas S. (2014) "There is life in the park!"- Fundação de Serralves, Porto, ISBN: 978-972-739-304-6

## SOFTWARE DEVELOPMENT

- [1] **Arraiano-Castilho R.**, Miller M.R., Beja-Pereira A. "SPLITTER: a pipeline for identification of divergent genomes from RADseq datasets"  
Source code: <https://radsplitter.github.io/SPLITTER/>

## ORAL COMMUNICATIONS

- [9] Vila-Viçosa C., **Arraiano-Castilho R.**, Hipp A., Vázquez F. M., Almeida R., García C., Beja-Pereira A., Azevedo H. (2024) "The Iberian Peninsula as a major hotspot for white oak conservation and analysis of species syngameons" XX International Botanical Congress, Madrid, Spain.
- [8] **Arraiano-Castilho R.**, Tzivanopoulou M. & Sanders I. R. (2022) "The forgotten kingdom: Exploring metatranscriptomic approaches for the study of mycorrhizal fungal communities." - International Conference on Mycorrhizae, ICOM 11, Beijing, China
- [7] **Arraiano-Castilho R.**, (2019) "Plant-Fungal interactions in alpine ecosystems"- Autumn Meeting, The British Mycological Society, Kew, United Kingdom
- [6] **Arraiano-Castilho R.**, Bidartondo M.I., Niskanen T., Clarkson J. J., Brunner I., Zimmermann S., Senn-Irlet B., Frey B., Peintner U., Mrak T. & Suz L.M. (2019) "Above the tree line: Drivers of ectomycorrhizal fungal communities in the European Alps"- International Conference on Mycorrhizae - ICOM 10, Mérida, Mexico
- [5] **Arraiano-Castilho R.**, (2018) "Plant-Fungal Interactions in Alpine Ecosystems"- North European Forest Mycologists meeting, Oulanka, Finland
- [4] **Arraiano-Castilho R.**, Saglam I.K., Miller M.R., Beja-Pereira A. (2016) "Phylogeography of *Amanita*"- Autumn Meeting - British Mycological Society, Kew, United Kingdom
- [3] **Arraiano-Castilho R.**, Saglam I.K., Miller M.R., Beja-Pereira A. (2015) "Next-generation RAD sequencing as a tool for evaluation the phylogeographic patterns of *Amanita ponderosa* (Malençon & R. Heim) in Iberian Peninsula"- XVII Congress of European Mycologists, Funchal, Portugal
- [2] **Arraiano-Castilho R.** (2015) "*Amanita ponderosa*, el gurumelo"- IX Jornadas Transfronterizas del gurumelo, Villanueva del Fresno, Spain
- [1] **Arraiano-Castilho R.** (2014) "Population genomics of a fleshy fungus delicacy (*Amanita ponderosa*)"- CIBIO-InBIO Seminar Series, Vairão, Portugal

PEER-REVIEW JOURNALS

Editor

2024 Guest editor for “Rhizosphere” special issue at Applied Microbiology International

Reviewer

Fungal Ecology, Molecular Ecology, Science of The Total Environment, Spectrum Microbiology, Scientific Reports, Molecular Biology and Evolution, Environmental Microbiology, New Phytologist, Frontiers in Fungal Biology, PLOS - Plant and Soil, Environmental Science: Processes & Impacts, European Journal of Soil Biology

OTHER ACTIVITIES

- 2019 - present Collaboration with CIBIO-BIOPOLIS in the phylogeographic inference of *Galliferae* (Spach) Guerke subsection (*Quercus* L.) in Western Mediterranean Basin, combining morphological data with molecular tools (RAD-seq) to solve taxonomic and phylogenetic relationships
- 2013 - present Collaboration with CIBIO-BIOPOLIS in Serralves 360° for Check List of Fungi in Serralves urban park
- 2019 - Sep Committee member of the First Meeting of the National Mycological Resources hosted by ICNF, INIAV & ADPM, Oeiras, Portugal
- 2010 - Sep Integrated the committee for the development of the “Manual for the mycological resources in Baixo Alentejo (Portugal)”- ADPM, IPBragança, INRB funded by EU-SUDOE
- 2010 - 2013 Collaboration with Terrestrial Ecosystems Lab (DPAO-University of Évora) in the field of Taxonomy and Mycological resources management
- 2010 - 2013 Collaboration with Department of Landscape, Environment and Planning, University of Évora (DPAO-UÉvora) in Mycology training courses
- 2008 - present Member of GUME (Grupo Universitário de Micologia de Évora). Mission: Outreach and training activities in the field of Mycology
- 2007 - 2008 Collaborator at the R&D project lead by Prof. Celeste Santos e Silva at the University of Évora about “Canopy cover influence on macrofungal richness and fruitbodies production in montado ecosystems”

ORGANIZATION OF CONFERENCES

[1] XIII National Meeting of Biology Students (ENEB), April 7-9, 2009, Évora, Portugal

Date

19/07/2024

Place

Cheseaux-sur-Lausanne,1033