INTRODUCTION

Assistant Professor

MARTA FILIPA SIMÕES

SHORT BIO

Marta Filipa Simões is a microbiologist with a deep curiosity for the unseen world of microorganisms. Her research journey has taken her across continents and scientific disciplines, from studying mycobacteria and bacteriophages to exploring the biodiversity of filamentous fungi in extreme environments.

Currently based in Macau (China), Marta is an Assistant Professor of Astrobiology at the State Key Laboratory of Lunar and Planetary Sciences (SKLPlanets), part of the Macau University of Science and Technology (MUST). Her work focuses on fungal ecology and biodiversity in terrestrial analogues (environments that mimic some of the outer space conditions), with projects ranging from bioprospection of fungi, to fungal containment and their application in extraterrestrial settings.

Before joining MUST, Marta conducted research at **Edge Hill University** (**UK**), where she explored fungal biodiversity in unique ecosystems such as salt marshes, peatlands, and brine springs. She also investigated the potential of filamentous fungi to produce valuable secondary metabolites. Her postdoctoral work at **KAUST** (**Saudi Arabia**) centered on marine microbiology, further expanding her interdisciplinary expertise. Marta earned her **PhD in Chemical and Biological Engineering** from the **University of Minho** (**Portugal**), where she focused on identifying and characterizing filamentous fungi, including techniques such as electronic microscopy and molecular biology techniques. Her PhD was featured in the "PhD Highlights" section of the Portuguese Society of Microbiology magazine. Earlier in her career, Marta contributed to the **EU project EMbaRC**, managing microbial data for the **culture collection MUM** (UMinho, Portugal), and worked at the **University of Lisbon** on phage-based antimicrobial strategies against mycobacteria. She holds a **MSc in Clinical Microbiology** and a degree in **Biotechnological Engineering**, with early research focused on developing and testing prodrugs for tuberculosis treatment, work that led to four co-authored patents and several publications.

Marta is passionate about mentoring students and fostering curiosity-driven research. Her interdisciplinary approach and commitment to exploring life in extreme environments make her an inspiring guide for those interested in microbiology, astrobiology, and the future of life beyond Earth.

EDUCATION

- Postgraduate Certificate in Teaching in Higher Education (PGCTHE) – Edge Hill University (UK) (2019)
- Ph.D. in Chemical and Biological Engineering – Minho University (PT) (2013)
- Master in Clinical Microbiology – Faculty of Medicine, Lisbon University (PT) (2009)
- Bachelor (Licenciatura) in Biotechnological Engineering – ULHT (PT) (2006)

PROFESSIONAL EXPERIENCE

2021-Current: Assistant Professor - Macau University of Science and Technology, (MO).

2019-2021: Postdoctoral fellow - Macau University of Science and Technology, (MO).

2016-2019: Associate tutor and Junior Research Fellow - Edge Hill University, (UK).

2014-2015: Postdoctoral fellow - King Abdullah University of Science & Technology, Saudi Arabia.

2010-2013: Curator - Micoteca da Universidade do Minho (MUM), Minho University, (PT).

2009-2010: Researcher, EU project EMbaRC (www.embarc.eu/project.html) - Minho University, (PT).

2009-2010: Researcher, Centre for Molecular Pathogenesis, University of Lisbon, (PT).

2009-2010: Researcher, Faculty of Pharmacy, University of Lisbon, University of Lisbon, (PT).

ORCID: 0000-0002-8767-9487
Twitter: @Simoes_MF
BLUESKY: @mf-s.bsky.social

msimoes@must.edu.mo
marta.simoes.pt@gmail.com

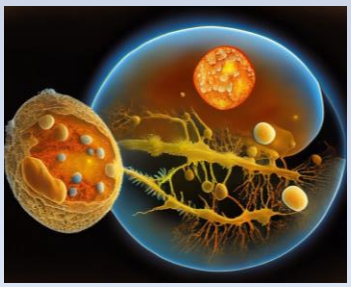
SCIENTIFIC QUESTIONS

RESEARCH QUESTIONS

- How can we exploit fungal species and their products for space exploration ?
- Can we standardize fungal processes for *in situ* resource utilization (ISRU)?
- Once exposed to outerspace conditions, do fungi present any alterations (morphology, phenotype, genotype, MNPs production, enzymatic profiles, or secondary metabolite profiles)?
- Which outerspace parameters affect fungi the most?
- Do fungal species develop increased pathogenic potential in space?
- What is fungal impact and potential within the context of planetary protection?

Astromycology is expected to provide major contributions to astrobiology, space biotechnology, Mars exploration, and space exploration, and *in situ* resource utilization.

Fungal Bioprocesses are essential for Space exploration and *in situ* resource utilization.



Fungal biodiversity in terrestrial analogues (AI generated image).

Fungal adaptations to extreme conditions (AI generated image).

OUTREACH

Marta is highly engaged with different organisations and societies to promote the dissemination of science, particularly microbiology, and astrobiology, as well as to develop answers to environmental concerns and space exploration.

- Member of the Editorial Board of Microbiology Today, the Microbiology Society's membership magazine (https://microbiologysociety.org/members-outreach-resources/microbiology-today.html, https://microbiologysociety.org) and champion of the society.
- Member of the Applied Microbiology International (AMI, https://appliedmicrobiology.org), former Society for Applied Microbiology (sfam), and part of the Climate Action Advisory Group (CAAG)
- Member of the Portuguese Language Office of Astronomy for Development (PLOAD, https://pload.org), developed by the Office of Astronomy for Development – International Astronomical Union (IAU)
- Member of the Macao Association for Scientific Cooperation between China and Portuguese Speaking Countries (ASCMAC; www.ascmac.org)
- Part of the Network of European Researchers in Biology and Medicine in China (NERBIMEC – https://euraxess.ec.europa.eu/worldwide/china/network-european-researchers-biology-and-medicine-china)
- Member of the Origins of Life Early-career Network (OoLEN, www.oolen.org)
- Part of the Astrobiology Society of Asia-Pacific (ASAP, https://astrobiology.asia)
- Member of the "Lusophone Network of Microbiology", Rede Lusófona de Microbiologia https://redelusofonamicrobiologia.wordpress.com, coordinator from Macau University of Science and Technology.
- Member of the Review College for the British Ecological Society (www.britishecologicalsociety.org)

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ACHIEVEMENTS AND PROGESS

SELECTED KEY PUBLICATIONS (latest)

He, Y., **Simões M.F.**, et al. (2025). *Fodinibius alkaliphilus* sp. nov., a moderately halophilic and alkalophilic bacterium isolated from an inland saltern in central Portugal and reclassification of "*Aliifodinibius salipaludis*" *as Fodinibius salipaludis* comb. nov.. Int J Syst Evol Microbiol, 75(7), 006840.

Trotta, C., A., ..., **Simões, M.F.**, & Ottoni, C.A. (2025). Marine mycosilver nanoparticles: Screening, evaluation of their antimicrobial properties and synthesis optimization. Sustainable Chemistry, 6(1), 10.

Wang, S.-Y., ..., **Simões, M.F.**, Shi, X.-C. & Laborda, P. (2025). Discovery of the dipicolinic acid synthase in the spoilage fungus *Paecilomyces* reveals its role in spore heat, salt, and alkaline pH resistance. Food Research International, 115994.

Zhang, J., **Simões, M.F.**, ... & Zhang, S. (2024). Co–upcycling hazardous solid wastes of MSWI fly ash and secondary aluminum ash into iron and glass ceramic foams. Resources, Conservation & Recycling, 215 (April 2025): 108082.

Aguiar, A.P., ..., **Simões, M.F.** & Barbieri, E. (2024). Mycogenic silver nanoparticles (from *Penicillium citrinum* IB-CLP11) – their antimicrobial activity and potential toxicity effects on freshwater organisms. Environmental Science: Nano, 11, 2229–2238.

Simões, M.F.*, et al. (2023). The relevance of fungi in astrobiology research – Astromycology. Mycosphere 14(1): 1190–1253.

Wu, J.-H., McGenity, T.J., Rettberg, P., **Simões, M.F.**, et al. (2022). The archaeal class Halobacteria and astrobiology: Knowledge gaps and research opportunities. Frontiers in Microbiology, 13:1023625.

Silva, C.A., ..., **Simões, M.F.**, et al. (2022) Effects of mycogenic silver nanoparticles on different trophic levels organisms. Chemosphere 308(3):136540.

Méndez, A., ..., **Simões, M.F.**, et al. (2021) Habitability Models for Planetary Sciences. Astrobiology, 21, 8.

Simões, M.F. & Antunes, A. (2021) Microbial pathogenicity in space. Pathogens, 10(4): 450

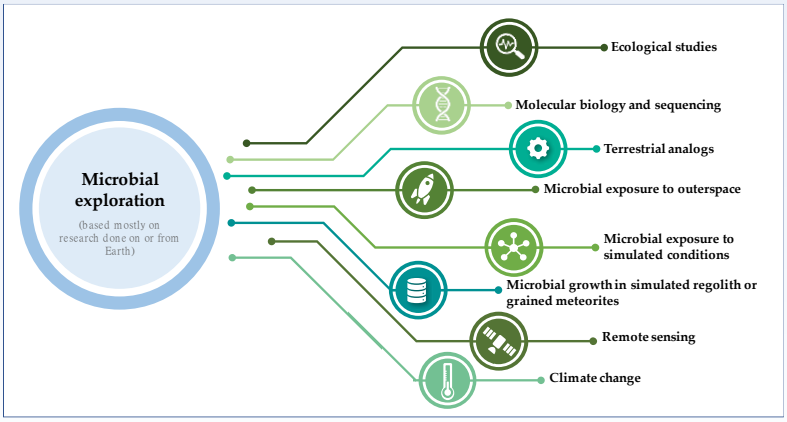
Simões, M.F.*, et al. (2020) Mycogenic metal nanoparticles for the treatment of mycobacteriosis. Antibiotics 9(9):569.

DasSarma, P., Antunes A., **Simões, M.F.**, et al.(2020) Earth's Stratosphere and Microbial Life. Current Issues in Molecular Biology, 38:197-244.

Simões, M. F.*, et al.(2020) Biogenic Metal Nanoparticles: A New Approach to Detect Life on Mars?. Life, 10(3), 28.

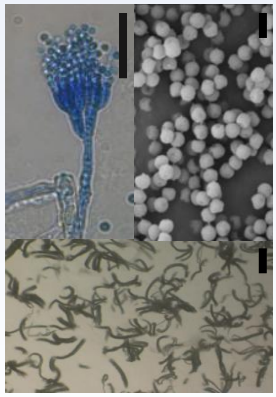
MORE DETAILS HERE:

- https://scholar.google.co.uk/citations?user=sm5g6nsAAAAJ&hl=en&oi=sra;
- www.researchgate.net/profile/Marta_Simes;
- www.linkedin.com/in/martafilipasimoes.



Field sampling at salterns in Cabo Verde.

Fungal morphological characterisation.



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Alumni and previous visiting researchers

GRANTS

- 2025-2029: **CEMAR** - National Institute for Identification, Quantification, Dispersion, Environmental Risks and Mitigation of Pollution by Emerging Contaminants in Marine and Coastal Environments. CNPq project (Brazil led, in collaboration with Portugal and Macau). Process No. 408782/2024-2. Role: Collaborator.
- 2024-2026: **MORSpaceEx** – Mitigating Outer-planetary Risks: Fungal Adaptation in Space exploration. FDCT project: Project code: 0033/2024/ITP1. Role: PI.
- 2022-2025: China-Portugal Belt and Road Joint Laboratory on Space & Sea Technology Advanced Research and new technologies for Space-Marine Interdisciplinary research. Funded by the National Key R&D Program of China led by Innovation Academy for Microsatellites of CAS (IAMCAS). Project No.: 2022YFE0204600. Role: PI (of Task 3).
- 2023: **HyperSpacEx** – Medical and Biotechnological potential of Fungi in Hypergravity for Space Exploration. Funding from HyperGES fellowship, a joint programme of United Nations Office for Outer Space Affairs (UNOOSA) and European Space Agency (ESA), (Netherlands). Role: PI.
- 2023-2024: Simulated microGravity effects on Fungal Genomics – GFG. Open Project, State Key Laboratory of Lunar and Planetary Sciences, Macau University of Science and Technology (Macau): Co-PI, collaboration with Giovanna Cristina Varese (Turin University, Italy).
- 2022-2023: **MBF_SpacEx** – Medical and Biotechnological potential of Fungi for Space Exploration, FRG-22-080-LPS. Faculty Research Grants (FRG), Macau University of Science and Technology (Macau): PI.
- 2021-2023: Development and validation of a low-cost, bio- and nano-based innovative technology for drinking water disinfection, project with collaborators from São Paulo State University (UNESP), MUST (Macau), and Aveiro University (Portugal). Funding from FAPESP (The São Paulo Research Foundation, Brazil): Collaborator .
- 2021-2024: **B3iS** – Biodiversity and Bioprospection of Biosurfactants In Saline environments; FCT (PT): Collaborator.

Current team

Alireza Armand

(Posdoc fellow)
. Astromycology
. MNPs

Ana Filipa Lenha

(Research Assistant)
. Astromycology
. Altered gravity

Online Research Interns

Gabriel de Barros

Sulekha Komeravelli

Alumni:

- Yang He, PhD student (2022-2025)
- Jiahui Wu, PhD student (2022-2025)
- Meiwen Zhou, MSc student (2022-2024)
- Allen Matt Drews, MSc student (2023-24)
- Catherine P. O. Pacheco, Research intern (2024)

Past Resident Visiting Researchers

- Cátia Pereira (2024)
- Sara Silvério (2024)
- Donatella Tesei (2023)

Past Undergraduate Interns

- Hamnah Amir (2025)
- Anthea, I Weng Lam (2021)
- Wan Ian Lou (Winka) (2021)

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