

Exploring Bioactive Compounds: Unveiling the Hidden Treasures of Bacterial Isolates from Algarve Coast Undersea Caves

Background

Microorganisms thriving in unique hypogenic environments, such as undersea caves, present a promising frontier for bioactive compounds discovery. These environments constitute ecosystems that provide an unparalleled canvas for the evolution of a wide range of microorganisms, resulting in unexplored biodiversity wealth. Within these cryptic realms, microorganisms have adapted to oligotrophic conditions by weaving complex metabolic networks, thus unlocking an untapped treasure trove of novel bioactive compounds. The quest for undiscovered microorganisms is driven by the significant potential to harness these biocompounds produced through their secondary metabolism, which can exhibit various biological functions, including antioxidant and antitumor activities [1]. Cancer remains among the top leading causes of death worldwide. Given this global challenge, there is an urgent need to discover innovative drugs that are more effective and have fewer side effects. Exploring the bioactive compounds produced by hypogean microorganisms may hold the key to developing groundbreaking pharmaceuticals.

This study aims to prospect for new bioactive compounds produced by bacterial cultures, isolated from undersea caves (Sagres, Algarve-Portugal) [3] with an emphasis on assessing their antioxidant and antitumor potential [2].

Culturing bacteria from these hypogenic environments is useful for prospect about new sustainable biotechnological solutions and also represents an opportunity to preserve and value these Natural, Genetics and Cultural Heritages.

Sampling & Bacterial Isolates



Cátia Salvador¹

Patrícia Gatinho^{1,2}

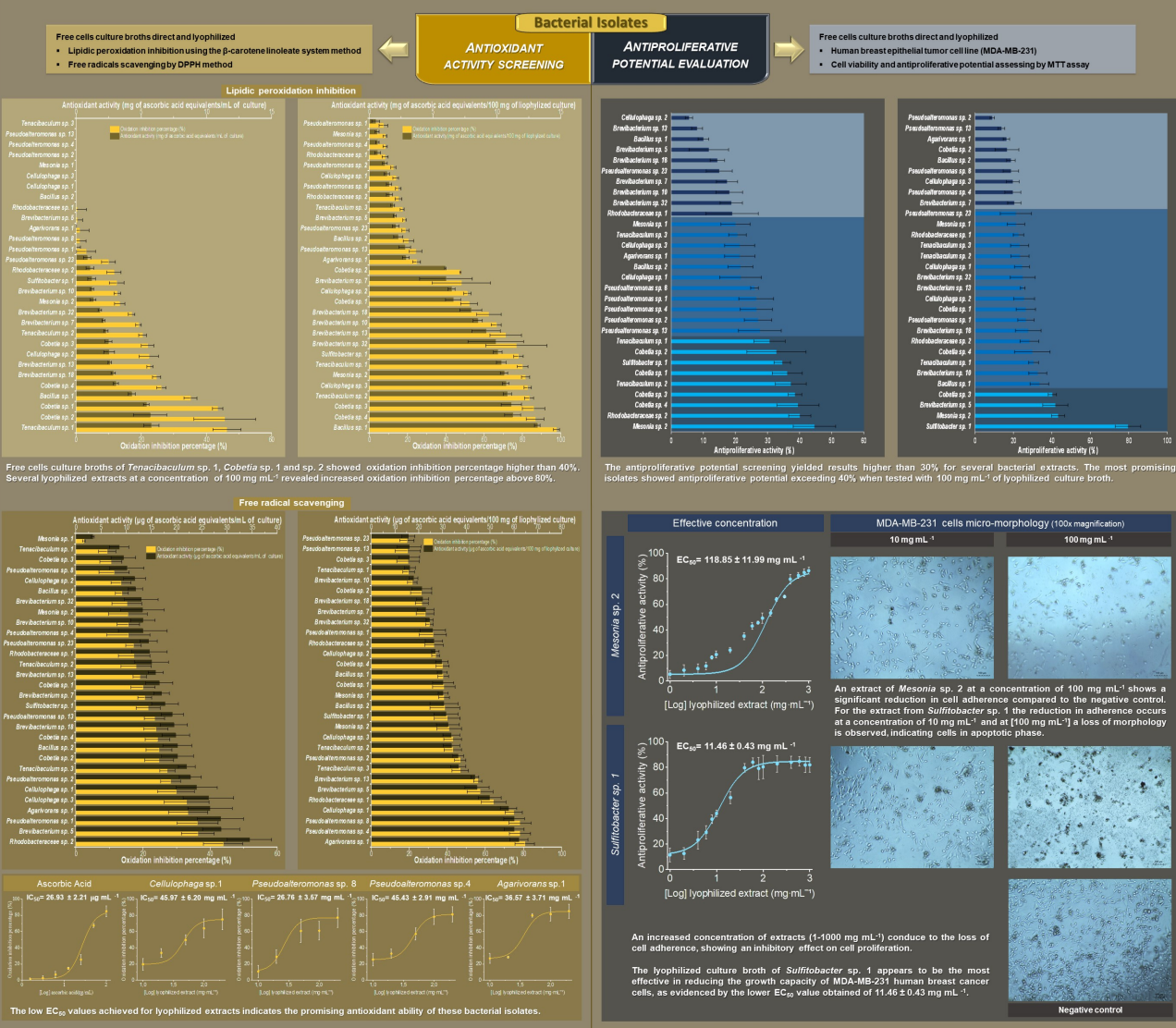
Silvia Arantes¹

M. Rosário Martins^{1,3}

A.Teresa Caldeira^{1,4}

- 1 HERCULES Laboratory – Cultural Heritage Studies and Safeguard, IN2PAST Associate Laboratory for Research and Innovation in Heritage, Arts, Sustainability and Territory, University of Évora, Évora, Portugal.
- 2 Department of Engineer, School of Science and Technology, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal.
- 3 Department of Medical and Health Sciences, School of Health and Human Development, University of Évora, Évora, Portugal.
- 4 Chemistry and Biochemistry Department, School of Sciences and Technology & City U. Macau Chair in Sustainable Heritage & Sino-Portugal Joint Laboratory of Cultural Heritage Conservation Science, University of Évora, Évora, Portugal.

Methodology and Results



Keywords

Marine Caves
Bacteria
Bioactive Compounds
Antioxidant Properties
Anti-tumoral Potential
Sustainable Products

References

- [1] Gatinho P., Salvador C., Silva A.M., Caldeira A.T. (2023). Prokaryotic Communities from Pristine Cave Environments: Biotechnological Potential with Sustainable Production. Sustainability, 15, 7474. <https://doi.org/10.3390/su15097474>
- [2] Arantes S.M., Piçarra A., Guerreiro M., Salvador C., Candéias F., Caldeira A.T., Martins M.R. (2019). Toxicological and pharmacological properties of essential oils of *Calamita nepeta*, *Origanum onites* and *Thymus mastichina* of Alentejo (Portugal). Food Chem Toxicol, 133, 110747. <https://doi.org/10.1016/j.fct.2019.110747>
- [3] Salvador C., Arantes S.M., Martins M.R., Candéias A., Salazar-Jimenez C., Caldeira A.T. (2023). Microbial communities of undersea caves from Algarve coast: Biological activities prospecting. TECHNART2023 Book of Abstracts, Nova School of Science and Technology of Lisbon, May 7-12, Lisbon, Portugal. ISBN: 978-969-9164-08-6

Contacts

Cátia Salvador: cscs@uevora.pt
Patrícia Gatinho: patricia.gatinho@uevora.pt
Silvia Arantes: sa@uevora.pt
M. Rosário Martins: mrm@uevora.pt
Ana Teresa Caldeira: atc@uevora.pt

Funding & Acknowledgments

The authors acknowledge the FCT Portuguese Foundation for Science and Technology - IP for funding within the scope of the projects: UIDB/04449/2020 (HERCULES Lab), IN2PAST (LAP/01522/2020), ARTTime (DOI:10.24469/2022-07303.PTDC), MICROCENO (PTDC/CTA-AMB/0608/2020), C. Salvador individual support (DLS/2016/CP1372/CT0019).

The authors are grateful for the bacterial isolates from undersea caves obtained within the scope of the European Union's Project 0483 PROBIOMA 5-E co-financed by the European Regional Development Fund within the framework of the INTERREG V-A Spain-Portugal program (PCTE) 2014-2020.



Remarks

- ✓ Cultures of bacterial isolates from undersea caves showed important antioxidant properties, revealing antioxidant activity by radical DPPH method and β -carotene linoleate system.
- ✓ Several supernatants from the bacterial cultures showed high anti-proliferative activity against MDA-MB-231 tumoral cell line highlighting the *Sulfitobacter* sp. 1 and *Mesonina* sp. 2.
- ✓ Our results are promising in the quest for new bioactive compounds from bacterial isolates found in undersea caves, creating potential for sustainable solutions with broader medicinal applications.