



Conference Abstract

# Caves as a source of new antimicrobial agents: the case study of antibacterial activity from microorganisms inhabiting Cerâmica Cave, Portugal

André Grangeia Gouveia<sup>‡</sup>, Ana Sofia Reboleira<sup>§</sup>, Fernando J. M. Gonçalves<sup>‡</sup>, Sérgio M. Marques<sup>‡</sup>

<sup>‡</sup> Universidade de Aveiro, Aveiro, Portugal

<sup>§</sup> University of Copenhagen, Copenhagen, Denmark

Corresponding author: André Grangeia Gouveia ([aagg@ua.pt](mailto:aagg@ua.pt))

Received: 28 Sep 2018 | Published: 02 Oct 2018

Citation: Gouveia AG, Reboleira AS, Gonçalves FJM, Marques SM (2018) Caves as a source of new antimicrobial agents: the case study of antibacterial activity from microorganisms inhabiting Cerâmica Cave, Portugal. ARPHA Conference Abstracts 1: e30142. <https://doi.org/10.3897/aca.1.e30142>

## Abstract

Antibiotics have been developed for more than 80 years but presently there is an evident decline on their effectiveness due to the development of resistance by pathogens. The arising of multi drug resistant pathogens, has become a serious threat to public health. Microorganisms play a central role in nature as well as in drug discovery with a long track record as important sources of bioactive natural products revealing a wide array of molecules. Although many approaches have been applied to solve this crisis, in the last decades the focus on extreme habitats as gain attention due to peculiar features and due to the presence of unique microbial populations inhabiting these ecosystems. Caves are considered extreme environments, usually oligotrophic, being in general devoid of light, and presenting stable conditions (temperature, humidity) throughout the year.

We present the first analysis of antimicrobial activity of bacteria isolated from Cerâmica Cave, located in the Sicó karst massif, central Portugal. Microorganism acquisition was performed through a variety of physical and chemical treatments: dry-heat, wet-heat, dry-heat plus phenol (1,5%), phenol (1,5%), microwave irradiation, rehydration centrifugation, and no-treatment, along with three media: R2A agar, Actinomycetes isolation agar and Yeast-malt agar. A primary antimicrobial activity screening, through cross streak method,

was performed in 28 isolates, using two different incubation periods and different target agents (*Staphylococcus aureus*, *Bacillus cereus*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Aeromonas salmonicida*, *Salmonella typhimurium* and *Enterococcus faecalis*). A total of 7 isolates presented antagonistic activity against *B. cereus*, *P. aeruginosa*, *E. coli*, *A. salmonicida*, *S. typhimurium* and *S. aureus*. This study proves the ability of cave microorganisms to inhibit both Gram positive and Gram negative pathogenic strains, highlighting the potential of caves microbiome to be one of the answers to solve the current global crisis of multi drug resistant pathogens.

## Keywords

Cave, bacteria, cross streak method, antimicrobial metabolites

## Presenting author

André Alexandre Grangeia Gouveia

## Presented at

24<sup>th</sup> International Conference on Subterranean Biology

## Acknowledgements

Thanks are due for the financial support to CESAM (UID/AMB/50017 - POCI-01-0145-FEDER-007638), to FCT/MCTES through national funds (PIDDAC), and the co-funding by the FEDER, within the PT2020 Partnership Agreement and Compete 2020. Also Sérgio Marques is a recipient of an individual research grant by FCT (SFRH/BPD/112803/2015), ASR is supported by a research grant (15471) from the VILLUM FONDEN and André Gouveia has received financial support by Muxima Bio PT for developing his MSc. thesis. We also would like to thank Bernardo Barosa and Telma Veloso for sample collection and bacteria isolation which enable the realization of this study.

## Hosting institution

Aveiro University