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Recent updates on exploiting the Greek microbial diversity for the discovery and development of novel antiaging molecules.

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Actinobacteria from Greek ecosystems are renowned for producing bioactive compounds. To this purpose, the "AntiAging" project sought to uncover new, promising natural compounds with anti-aging properties, which could be incorporated into cosmeceutical/nutraceutical formulations. Herein, 1000 isolates originating from the Greek natural environment and belonging to the ATHUBA collection (Athens University Bacterial & Archaea Culture Collection), were investigated. A unique library of ~2000 extracts (EtOAc and MeOH/H2O) was generated, and the tyrosinase and elastase inhibition activity was evaluated via enzymatic assays. Out of the top 100 extracts with the highest inhibitory activity, 28 were found to be non-cytotoxic, when tested on cell-based assays. Those extracts were then analyzed by HPLC-DAD-ELSD and UPLC-HRMS. The top 3 microbial strains, belonging to Amycolatopsis sp. and Streptomyces sp. families, combining a high production of secondary metabolites and bioactivity on both cell-free and cell-based assays, with inhibition rates ranging from 35-65% and 20-25%, respectively, were subsequently grown using four different cultivation media. The most promising cultures were subjected to a scale-up process (2L) and fractionation, and their bioactivity was further assessed. A customized bio-guided workflow was then applied, combining a high-throughput dereplication and molecular networking method (UPLC-HRMS), along with the bioactivity of each fraction. Our ultimate goal is the targeted identification and isolation of bioactive compounds, which can be integrated into cosmeceutical formulations. The plethora of identified molecules highlight the significant potential for exploiting Greek microbial diversity in the realm of anti-aging research.

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