“Anti-Aging”: Exploitation of Greek microbial diversity for the development of innovative cosmeceuticals and food supplements

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Greek ecosystems are a fertile yet under-explored ground for the study of Actinobacteria-known producers of bioactive compounds. By exploring this under-investigated biodiversity and chemodiversity of Greek actinobacterial strains (mostly of the genus *Streptomyces*), the “AntiAging” project aims to uncover potentially novel natural compounds with anti-aging activity that can be formulated as cosmeceutical and nutraceutical products. In total, 3000 isolates belonging to the Athens University Bacterial & Archaea Culture Collection (ATHUBA)-some originating from unique environments (caverns, volcanoes, thermal springs, etc.)-were studied. A customized *in-house* library of 2000 extracts was generated, all of which were investigated for potential anti-aging properties. This biological evaluation was performed though elastase (anti-aging activity) and tyrosinase (whitening activity) inhibition *in vitro* assays. Fractions (~400) of the most promising, highly active compounds are chosen for the same biological evaluation and assessment of their possible cell toxicity (~400). Next, metabolites (~30) of the most nontoxic extracts and fractions, are biologically evaluated for their anti-aging properties, whitening activities, antioxidant potential, proteasome and autophagy-lysosome system activation capability. Last, the most promising metabolites are tested in a *Drosophila melanogaster in vivo* model, where we evaluate their ability to induce antioxidant mechanism through activation of the Nrf2/cncC transcriptional factor. A small yet significant number of extracts demonstrated >50% elastase inhibitory activity, whereas a considerably larger number exhibited >50% tyrosinase inhibitory action. Interestingly, in some cases, the bioactivity exceeded 80% in *in vitro* assays. The latter results show a hidden yet powerful potential of harnessing Greek microbial wealth in the context of the science of anti-aging.

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