Screening of a Greek actinobacterial collection for producers of antiaging compounds

HELLENIC REPUBLIC
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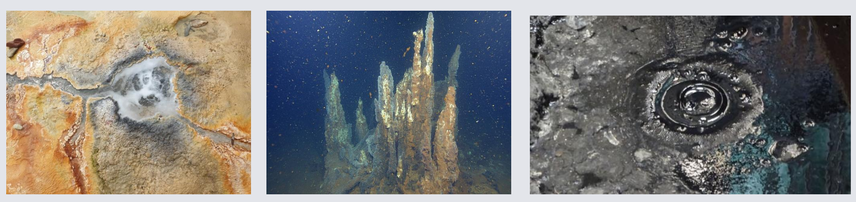
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Introduction

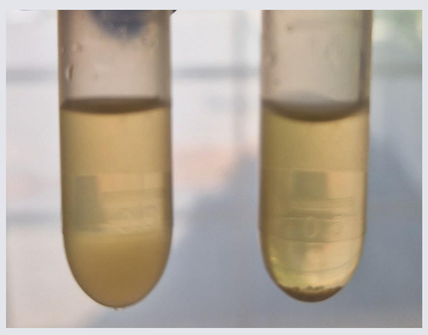
- Greece possesses a high microbial diversity that produces a large number of secondary metabolites.
- Locations of research interest include rhizosphere soils, hot springs, deep sea sediments, and volcanic environments.

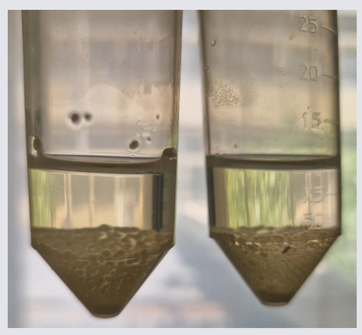


- These diverse secondary metabolites have many potential uses, including the development of products with antiaging activity.
- The Athens University Bacterial & Archaea Culture Collection (ATHUBA) contains numerous actinobacterial isolates from Greek environments with potential industrial utility.
- 1000 strains of the collection were screened for antiaging activity, more specifically for actinobacteria producing secondary metabolites capable of inhibiting:
  - **elastase** (which breaks down skin collagen and can cause wrinkles)
  - **tyrosinase** (which produces melanin and can cause liver spots).

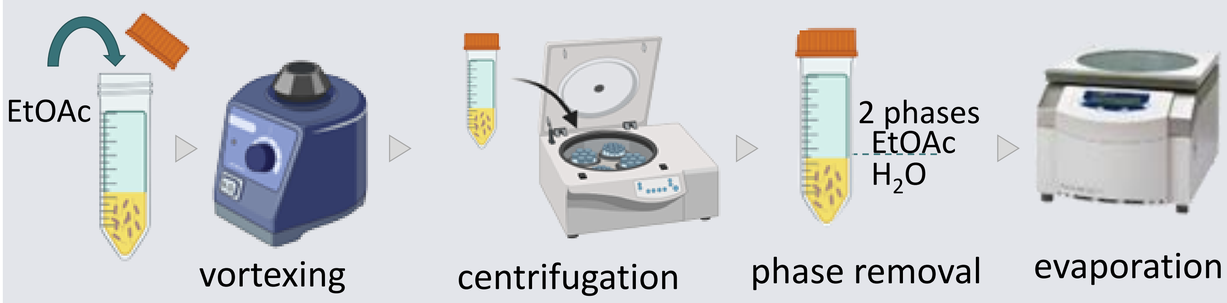
Methods

- Strains were precultured for 3 days in TSB (Tryptone Soy Broth) followed by culturing for 7 days in ISP4 (Inorganic Salt Starch Broth).





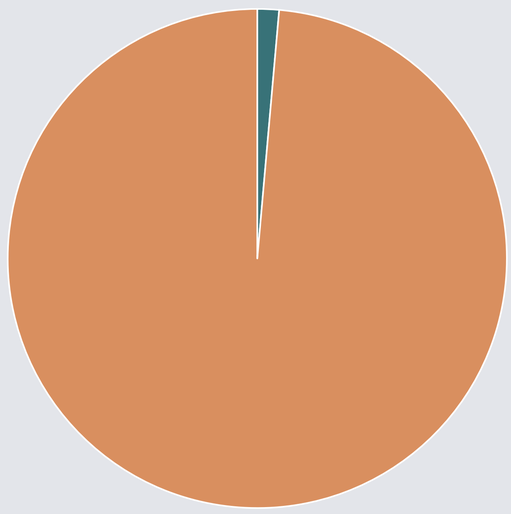
- Cultures had acetone added to lyse the cells and then underwent extraction twice, first with ethyl acetate and then with methanol.



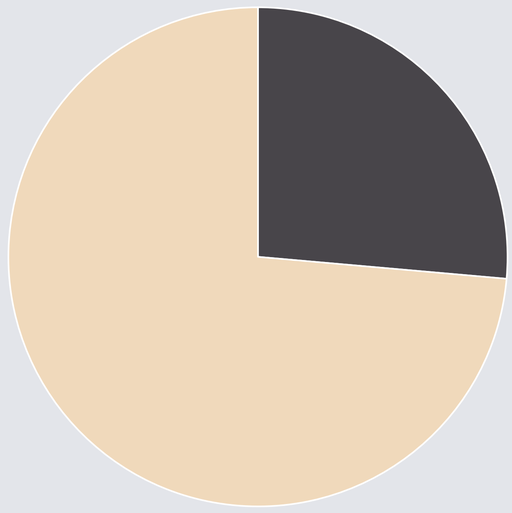
- Extracts were tested for inhibition of elastase and tyrosinase using *in vitro* enzymatic assays.
- Active extracts, were tested for cytotoxicity on two human cell lines.
- Non-cytotoxic extracts were tested for tyrosinase or elastase inhibition on human cell lines.
- Successful strains were tested on 4 media to select optimal one and large-scale culturing was performed.

Results

- 1.4% of strains produced elastase inhibitors (14 out of 1000 strains).
- 26.4% of strains produced tyrosinase inhibitors (264 out of 1000 strains).

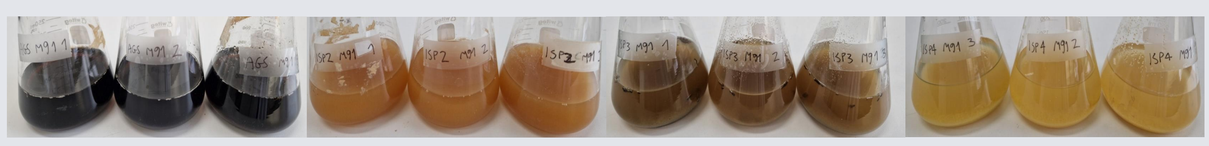


Strains with elastase inhibition



Strains with tyrosinase inhibition

- 37% of extracts tested on cell lines were not cytotoxic (37 out of 100 extracts).
- 1 extract showed elastase inhibition on cell lines.
- 3 extracts showed tyrosinase inhibition on cell lines.



Strain grown in variety of media

- The ISP4 medium produced the largest amount of active metabolites for all 4 strains and was used for large-scale cultures.

Conclusions and Further Work

- This project succeeded in identifying strains that produce antiaging compounds that are effective on human cell lines and are non-cytotoxic.
- The extracts are undergoing fractionation to identify these compounds.
- A commercial partner will incorporate these extracts into a skin cream that will be subjected to patch tests.
- If successful, this skin cream could potentially be released as a commercial product.

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