

Revealing the biotechnological potential of marine extremophilic bacteria for the production of novel biosurfactants and other bioactive compounds

S-02.6-2

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Due to a wide range of household, biotechnological and pharmaceutical applications, surfactants are extremely important from an industrial perspective. In this scenario, biosurfactants (surfactants from natural sources) have raised significant attention, as being less toxic, active at lower concentrations, and more resistant to extreme conditions as compared to the synthetic ones. Moreover, biosurfactants are endowed with several pharmacological properties, such as antimicrobial, antitumoral, antiviral and anti-inflammatory activities. So far, marine extremophilic bacteria have been acknowledged as a prolific factory of bioactive natural products, including biosurfactants, which feature unusual chemical structures with no counterpart in the terrestrial environment. In the framework of the EU funded project SECRETED (H2020), about 300 extremophilic bacteria from the SZN microbial collection were subjected to primary and secondary screening selecting promising strains for biosurfactants production. A bottom-up (bioactivity-guided) and a top-down approach (based on genome mining) allowed the selection of two marine bacteria belonging to *Bacillus* and *Rhodococcus* genera capable to produce different biosurfactants (along with other bioactive compounds) displaying several biological activities. More specifically, scale-up and fractionation, HPLC-MS/MS-based metabolomics combined with automated and manual annotation approaches (molecular networking and in silico dereplication), allowed the identification of novel lipopeptide biosurfactants. Both approaches confirmed the high potential of marine bacteria as source of novel molecules with relevant biotechnological applications.