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Metabolomic and Morphological Analysis of Micromonospora Strains Isolated from Marine Sediments

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Marine ecosystems are recognized as promising sources of microorganisms capable of producing bioactive secondary metabolites. In this context, two strains of *Micromonospora* sp. (BRB 607 and BRB 640), isolated from marine sediments, were cultivated in A1 broth (10g starch, 2g peptone, 4g yeast extract, 35.71g sea salt) at 28 °C, 120 rpm, followed by liquid–liquid extraction with ethyl acetate. The crude extracts were analyzed by liquid chromatography–mass spectrometry (LC-MS/MS), hydrogen nuclear magnetic resonance spectroscopy (^{1}H NMR), and scanning electron microscopy (SEM). SEM images revealed significant morphological changes between 6 and 22 days of cultivation, including filament formation and structures compatible with exopolysaccharides, suggesting biofilm development as an adaptive strategy to osmotic conditions. LC-MS/MS analysis, integrated with the GNPS platform, enabled the construction of molecular networks and the annotation of six compounds, with lumichrome ($C_{12}H_{10}N_4O_2$) identified as the major metabolite, previously reported for its antimicrobial activity. The ^{1}H NMR spectra of the extracts exhibited characteristic signals in the 6.5–8.0 ppm region, indicative of aromatic hydrogens, as well as signals between 3.0–4.0 ppm, associated with hydrogens bound to oxygenated carbons, and multiple signals within 0.8–2.0 ppm, typical of aliphatic chains. These findings reinforce the structural diversity of metabolites present in the crude extracts and corroborate the annotations obtained via GNPS. In addition, genomic DNA was extracted following a protocol adapted from Sachinandan et al. (2010), yielding A260/A280 ratios of 1.53 (BRB 607) and 2.14 (BRB 640), confirming adequate purity for downstream analyses. Altogether, the results obtained thus far highlight the metabolic diversity of marine *Micromonospora* strains and their potential as sources of bioactive compounds. Ongoing efforts involve metabolite isolation, structural characterization, and biological activity assays.

Keywords: *Micromonospora, marine sediment, antimicrobial activity*