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Bioactive Secondary Metabolites from Culturable Unusual Actinomycetes from Solomon Islands Marine Sediments: Isolation and Characterisation of Bioactive Compounds

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Abstract : A total of 37 actinomycete strains were purified from 25 Solomon Islands marine sediments using four different types of isolation media. Among them, 54% of the strains had obligate requirement of seawater for growth. The ethyl acetate extract of 100 ml fermentation product of each strain was screened for antimicrobial activity against multidrug resistant human pathogens and cytotoxic activity against brine shrimps. A total of 67% of the ethyl acetate extracts showed antimicrobial and/or cytotoxic activities. A strain F-1915 was selected for isolation and evaluation of bioactive compound(s) based on its bioactive properties and chemical profile analysis using the LC-MS. The strain F-1915 was identified to have 96% sequence similarity to Streptomyces violaceusniger on the basis of 16S rDNA sequences using BLAST analysis. The 16S rDNA revealed that the strain F-1915 is a new member of MAR4 clade of actinomycetes. The MAR4 clade is an interesting clade of actinomycetes known for the production of pharmaceutically important hybrid isoprenoid compounds. The ethyl acetate extract of the fermentation product of this strain was purified by silica gel column chromatography and afforded the isolation of one bioactive pure compound. Based on the 1D and 2D NMR spectral data of compound 1 it was identified as a new mono-brominated phenazinone, Marinophenazimycin A, a structure which has already been studied by external collaborators at Scripps Institution of Oceanography but is yet to be published. Compound 1 displayed significant antimicrobial activity against drug resistant human pathogens. The minimum inhibitory concentration (MIC) of compound 1 was against Methicillin Resistant Staphylococcus aureus (MRSA) was about 1.9 µg/ml and MIC recorded against Amphotericin Resistant Candida albicans (ARCA) was about 0.24 µg/ml. The bioactivity of compound 1 against ARCA was found to be better than the standard antifungal agent amphotericin B. Compound 1 however did not show any cytotoxic activity against brine shrimps.

Keywords : actinomycetes, antimicrobial activity, brominated phenazine, MAR4 clade, marine natural products, multidrug resistent, 1D and 2D NMR
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