Oxygenated geosmins and plant-like eudesmanes from a bacterial mangrove endophyte.

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Abstract

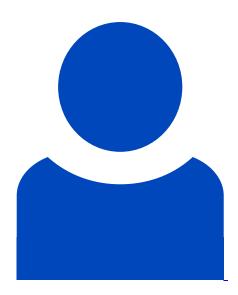
Geosmin (1) is a microbial terpene metabolite that is responsible for the typical smell of soil and causes an off-odor of food and water. Eudesmane sesquiterpenes are commonly found in plant essential oils. Here we describe the discovery of four geosmin-type metabolites, 7R-hydroxygeosmin (2), 3-oxogeosmin (3), 2R-hydroxy-7-oxogeosmin (4), 5-deoxy- 7β , 9β -dihydroxygeosmin (5), the plant-like eudesmanes 4β , 10α -eudesmane- 5β ,11-diol (6) and (1S,5S,6S,7S,10S)- 10α -eudesm-4(15)-ene- 1α , 6α -diol (7), and the known 1(10)E,5E-germacradiene-2,11-diol (8) from a bacterial endophyte (Streptomyces sp. JMRC:ST027706) of the mangrove plant Bruguiera gymnorrhiza. By means of NMR, MS, and ECD spectroscopy, all chemical structures as well as the absolute configurations for the new compounds were elucidated. Compounds 2-5 represent the first geosmin-related metabolites directly as bacterial natural products. The plant-derived eudesmane- 5β ,11-diol (6) and (1S,5S,6S,7S,10S)- 10α -eudesm-4(15)-ene- 1α , 6α -diol (7) are also now reported as bacterial products. The broad antimicrobial activities of 6 against a suite of fungal and bacterial pathogens including methicillin-

resistant Staphylococcus aureus suggest that this terpene could be an important active principle of the medicinal plant Cymbopogon distans. The discovery of geosmin metabolites from one actinomycete indicated that these bacteria could possess enzymes for modifying geosmin and offer a possibility for bioremediation.

Involved units

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