Synergistic activity of co-secreted natural products from amoebae-associated bacteria.

Arp J, Götze S, Mukherji R, Mattern DJ, Garcia-Altares M, Klapper M, Brock DA, Brakhage AA, Strassmann JE, Queller DC, Bardl B, Willing K, Peschel G, Stallforth P (2018) Synergistic activity of co-secreted natural products from amoebae-associated bacteria. *Proc Natl Acad Sci USA* 115(15), 3758-3763.

Details



Abstract

Investigating microbial interactions from an ecological perspective is a particularly fruitful approach to unveil both new chemistry and bioactivity. Microbial predator-prey interactions in particular rely on natural products as signal or defense molecules. In this context, we identified a grazing-resistant Pseudomonas strain, isolated from the bacterivorous amoeba Dictyostelium discoideum. Genome analysis of this bacterium revealed the presence of two biosynthetic gene clusters that were found adjacent to each other on a contiguous stretch of the bacterial genome. Although one cluster codes for the polyketide synthase producing the known antibiotic mupirocin, the other cluster encodes a nonribosomal peptide synthetase leading to the unreported cyclic lipopeptide jessenipeptin. We describe its complete structure elucidation, as well as its synergistic activity against methicillin-resistant Staphylococcus aureus, when in combination with mupirocin. Both biosynthetic gene clusters are regulated by quorum-sensing systems, with 3-oxo-decanoyl

homoserine lactone (3-oxo-C10-AHL) and hexanoyl homoserine lactone (C6-AHL) being the respective signal molecules. This study highlights the regulation, richness, and complex interplay of bacterial natural products that emerge in the context of microbial competition.

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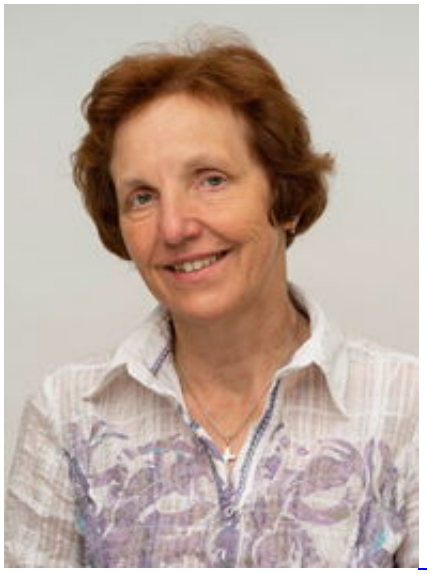
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