Discovery of clostrubin, an exceptional polyphenolic polyketide antibiotic from a strictly anaerobic bacterium.

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Abstract

Genome mining of the strictly anaerobic bacterium Clostridium beijerinckii, an industrial producer of solvents, revealed the presence of several cryptic gene clusters for secondary metabolite biosynthesis. To unearth its metabolic potential, a C. beijerinckii strain was cultured under various conditions, which led to the discovery of a deep purple pigment. This novel metabolite, named clostrubin (1), was isolated and its structure was fully elucidated. The pentacyclic polyphenol features a benzo[a]tetraphene ring topology that is unprecedented for natural products. Stable-isotope labeling experiments showed that 1 is an aromatic polyketide that folds in a noncanonical manner to form the unusual perifused ring system. In addition to being the first reported polyketide from an anaerobic bacterium, 1 is a potent antibiotic with pronounced activity against various pathogenic bacteria, such as MRSA, VRE, and mycobacteria, with minimum inhibitory concentrations (MIC) of 0.12-0.97 μM.

Beteiligte Forschungseinheiten

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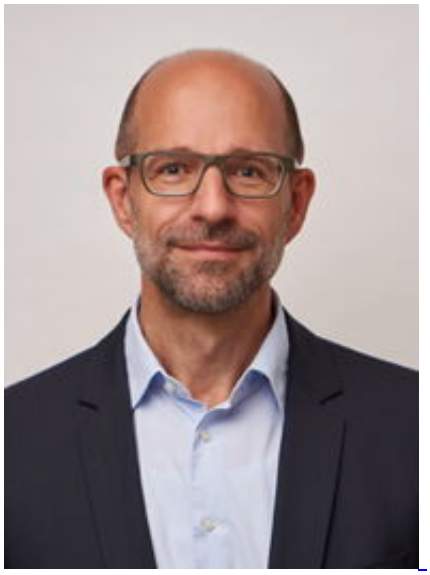
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