The Potential for the Marine Bacterium *Pseudovibrio denitrificans* to Produce Novel Antibiotics

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Antibiotics produced by microorganisms are an important defense against infectious pathogens, and the search for novel antibiotics is of increasing importance due to the emergence of antibiotic-resistant bacteria. Antibiotics are also natural compounds that play a key ecological role within an environment, often creating a unique 'chemical' signature that exerts selection pressure on community members. We have focused our studies on the chemical ecology associated with the diverse microbial community found in the coral surface mucopolysaccharide layer (SML) due to the recent unprecedented global degradation of coral reef ecosystems. In our studies, we characterized the chemical ecology of the microbial community in the gorgonian octocoral, *Pseudopterogorgia americana.* We isolated three unique Gram-negative bacteria with 99% 16S rRNA gene sequence similarity (1200 b.p.) to *Pseudovibrio denitrificans* capable of inhibiting Gram-positive and Gram-negative bacteria, as well as a known coral and human fungal pathogen. We hypothesize that the species *P. denitrificans* may play a role in protecting the coral against potential pathogens due to the production of antimicrobial compounds. To characterize the antibiotic compounds from one of the three *P. denitrificans* strains, the cell-free supernatant was extracted using dichloromethane, acetone, and methanol, and each resulting fraction was screened for its antimicrobial activity. The acetone extract inhibited Gram-positive *Kocuria rhizophila*, and the methanol extract inhibited Gram-positive *Bacillus subtilis* and Gram-negative *Vibrio harveyi* and *V. coralliilyticus*. A bioassay-guided fractionation of the MeOH extract using high-performance liquid chromatography (HPLC) suggests the presence of at least two antibiotics in this extract, one inhibiting the Gram-negative and one inhibiting the Gram-positive bacteria. Studies are on-going to isolate, purify, and structurally characterize the three chemically distinct antibiotics using HPLC, mass spectrometry, and nuclear magnetic resonance spectroscopy. *Pseudovibrio* species have only been recently isolated from marine environments and little is known regarding their production of antimicrobial compounds. These results highlight the potential role of *P. denitrificans* in protecting corals against invading pathogens, and as a source for novel bioactive natural compounds.

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