Discovery of the Antifungal Volatile-producing Bacterium Brevibacterium sp. H4 Isolated from the Feces of Pill Bugs

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Invasive mold infection can cause damage to various creatures, including arthropods. My previous observation that mold does not grow in the rearing containers of pill bugs (Armadillidium vulgare) led to the isolation of a bacterial strain, Brevibacterium sp. H4, which is highly identical to Brevibacterium sediminis, from pill bug feces. H4 exhibited antifungal activity. In this study, the antifungal properties of H4 were elucidated. In addition, the general distribution of H4 in Japanese pill bug feces was examined. First, the antifungal activity of H4 was assessed by a culture test with several molds. Inoculation of H4 inhibited the growth of selected molds, even when the solid media of the mold and H4 were not in direct contact, indicating that H4 can produce volatile antifungal substances. H4 had an inhibitory effect on five species of molds, including an arthropod pathogen. Second, analysis using headspace GC/MS showed that the antifungal substances were the sulfur-containing compounds methanethiol, S-methyl thioacetate, and dimethyl disulfide. These compounds are insoluble in water . Finally, nested PCR using H4-specific primers successfully detected H4 in the feces of pill bugs from different areas of Japan. Thus, H4 is generally present in the feces of pill bugs in Japan. To my knowledge, this is the first study to report the presence of a bacterium that produces volatile antifungal substances in pill bug feces. H4 seems to have a symbiotic relationship with pill bugs since it suppressed the growth of arthropod pathogens, and thereby may benefit the survival of pill bugs. The volatile antifungal substances may also have useful applications, such as in the preservation of foods in which residues of antifungal agents should be avoided.

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