

Título: *PAENIBACILLUS* SP. CULTIVATED IN NUTRIENT BROTH PRODUCE A NEW ISOFORM OF PELGIPEPTIN WITH ANTIMICROBIAL ACTIVITY

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Resumo:

Bacteria of the *Paenibacillus* genus produce antimicrobial compounds with a broad spectrum of activity; some of these compounds are small cyclic lipopeptides produced by non-ribosomal synthesis belonging to the Pelgipeptin family. These molecules show good stability and low toxicity, desired characteristics for antibiotic development for human and animal use. A recently isolated *Paenibacillus* strain from the Brazilian Cerrado showed antimicrobial activity, however it was unclear whether these molecules were identical to the ones reported previously. The aim of this study was to identify these antimicrobial compounds and to evaluate their antimicrobial potential. Bacterial cells were cultured in nutrient broth medium at 37°C for 40 hours. The cells were removed and the supernatant was extracted with butanol. The organic fraction was dried and the remaining material was resuspended in deionized water. This extract was purified by HPLC and the chromatographic fractions were quantified and examined by MALDI-TOF-MS/MS. Their antimicrobial activity against *Escherichia coli* was evaluated using the agar diffusion method. The chromatographic profile of the extract showed the presence of the ions *m/z* 1087, 1101, and 1119. All of the purified peptides showed antimicrobial activity. The concentrations of these molecules in the supernatant were 1.09, 0.80, and 4.55 µg/mL respectively. The MALDI-TOF-MS/MS confirmed that the fractions 1087 and 1101 *m/z* are consistent with antimicrobial lipopeptides corresponding to pelgipeptin C and B respectively. However the mass 1119 correspond to a pelgipeptin B isoform, showing the same amino acid sequence and fatty acid, but with a linear structure. It is unclear which culture conditions caused the linearization of pelgipeptin B, however, the linearization did not affect its antimicrobial activity. This ion was observed in the culture supernatant, and it is not an artifact of the organic extraction. Although alkaline pH is known to break the lactone ring from cyclic peptides leading to linearization, it is unlikely that such drastic change occurred in nutrient broth, since it exhibits a weak buffering effect. The higher abundance of the molecule 1119 over its cyclic isoform is intriguing and further studies will reveal what is the correlation between its production and culture medium. However, we suggest that this molecule should be called Pelgipeptin E, since it is a product of the same non-ribosomal peptide synthetase.

Key-words: *Paenibacillus*, antimicrobial lipopeptides, pelgipeptin.

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