Analysis of the Antimicrobial Activities of Antarctic Bacteria from Antarctic Lake Sediments with Special Focus on Those from *Pedobacter* sp. BG5

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Antarctic bacteria live in an extreme environment, and mostly under limited nutrient condition. Hence, they have evolved to produce various antimicrobial compounds to give them the advantage to compete with other microbes in the same niche[1,2]. There are some works to analyze antimicrobial compounds produced by Antarctic bacteria with the hope of understanding the survival strategies of those bacteria, and at the same time discovering new antimicrobial compounds. In recent years, efforts are geared towards non-antibiotics antimicrobial compounds such as the antimicrobial peptides. The advantage of antimicrobial peptides is that it will not likely to extend the resistant capabilities of the superbugs. Hence, this project is set out: (i) to determine the population of terrestrial bacteria that produce antimicrobial compounds, (ii) to characterize the potential antimicrobial peptide-coding genes to inhibit the growth of bacteria. Total of 2582 bacteria from lake sediment from King George Island was isolated and screened[3]. Thirty-two isolates were found to inhibit the growth of foodborne pathogens. One of the thirty-two strains inhibited the most strains which were eight out of the 14 tester strains consisting of Gram-negative and positive food-borne pathogens. Strains BG5 was identified as *Pedobacter* sp. strain BG5, and its genome was sequenced and annotated. It is found that it harbored several potential antimicrobial peptide-coding genes, such as the *pemK* toxin gene of the toxin-antitoxin (TA) system, and the phage lysin in plasmid pMWHK1 and in the chromosome. *pemK* and phage lysin were cloned separately and expressed from the arabinose inducible promoter of pBAD plasmid. The *pemK* toxin gene expressed by *Escherichia coli* TOP10 showed moderate antimicrobial activity. In contrast, the phage lysin gene expressed by *E. coli* TOP10 has a significant amount of antimicrobial activity against the host. The host harboring the phase lysin gene showed slower growth in broth medium when induced as compared to the controls. This results indicated that, while the phage lysin did not harm its host, *Pedobacter* sp. BG5, it inhibited the growth of the recombinant *E.coli.* The results show the phage lysin from *Pedobacter* sp. BG5 probably target other pathogenic bacteria as well. The findings of this work support an earlier report that Antarctic bacteria is a good source for non-antibiotics antimicrobial compounds and probably new antibiotics too.

References

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