

# IRGF Final Report

## Acedo - #103267

### Characterization of a Novel Antimicrobial from *Streptococcus mitis*

#### 1.1 Project Summary

This project involved the characterization of the bioactivity and stability of miticin, a novel antimicrobial peptide discovered by our research group. Establishing the bioactivity profile and optimal conditions necessary for miticin's activity will provide foundational knowledge that will enable the use of miticin as an antimicrobial agent, and pave the way for further investigation of its structure, activity, and practical applications.

#### 1.2 Project Outcomes and Impacts

Through our bioinformatics studies, we previously identified miticin as a putative novel antimicrobial peptide. Miticin was then obtained through chemical synthesis and its minimum inhibitory concentration (i.e., MIC; the lowest peptide concentration that inhibits the growth of an indicator organism) against a suite of indicator organisms was determined. Furthermore, miticin's pH, temperature, and protease stability were investigated. Miticin was found to be a pH-tolerant, thermostable molecule that is active against a wide range of Gram-positive bacteria. This study validated our bioinformatics (i.e., genome mining) results by presenting the discovery of miticin, a promising new molecule that may be used in various antimicrobial applications. The genome mining strategy employed in this work allows for the target-specific isolation of novel antimicrobial peptides, in contrast to trial-and-error surveying of bacterial isolates. The findings of this project provide the foundational data on miticin's activity necessary for its further characterization and development as an antimicrobial agent.

#### 2.1 Use of Awards Funds

The award funds were used to purchase miticin and pay the salary of three research assistants.

#### 2.2 Additional Outcomes/Research Issues

N/A

#### 2.3 Dissemination of Project

\* denotes MRU students: - Alkassab D\*, Sampang J\*, Budhwani Z\*, Buragina J\*, Lussier L\*, Acedo JZ. 2024. Discovery of leaderless bacteriocins through genome mining. *Can J Chem* (Accepted for publication; In press) - Alkassab D\*, Sampang J\*, Acedo JZ. Production and characterization of a novel bacteriocin from *Streptococcus mitis*. 106th Canadian Chemistry Conference and Exhibition. Jun 4-8, 2023. Vancouver, Canada (Poster Presentation at a National Conference) - Sampang J\*, Alkassab D\*, Acedo JZ. Characterization of a novel antimicrobial peptide, miticin. 9th Annual Undergraduate Research in Science Conference of Alberta. Apr 28-29, 2023. Calgary, Canada. Awarded Best Presentation Runner-up (Oral Presentation at a Provincial Conference)

#### 2.4 Future Research Plans

Future research plans include investigating the mode of action of miticin (i.e., how does it kill its target), structural studies (i.e., what structural features are important for activity), and application-focused studies.