DISCOVERY OF ANTIMICROBIAL PROPERTIES IN *ARTEMISIA LUDOVICIANA* AND *MONARDA FISTULOSA*

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ABSTRACT

*Artemisia ludoviciana* (sage) and *Monarda fistulosa* (bee balm) are plant species that have been used by American Indian tribes for medicinal purposes. Both species have been found in the Black Hills region. Initial screening for antimicrobial activity indicated that both plants had activity against *Staphylococcus aureus*. Identifying the compounds responsible would enable us to provide insight into their modes of action and lead to the discovery of more potent compounds with antimicrobial activity. Determining the structure of compounds isolated from *A. ludoviciana* and *M. fistulosa* is critical to this project, ultimately elucidating their inhibitory concentrations against *S. aureus*. The compound’s mode of action will be explored via *S. aureus* gene expression transcriptional profiling through microarrays and qRT-PCR or RNA-sequencing. Analysis of these data may reveal *S. aureus* genes affected by antimicrobial properties of a specific chemical compound. Extracts of *A. ludoviciana* and *M. fistulosa* have been separated and initially purified using silica-gel flash chromatography. The purity of the samples was evaluated through analytical HPLC (high performance liquid chromatography). Final purification will be completed via preparatory-HPLC. Microarrays or RNA-sequencing will be used to determine the mode of action of the antimicrobial compounds. Structure determination will be conducted through nuclear magnetic resonance (NMR), and infrared (IR) and mass spectrometry (MS). Through this research, we hope to discover novel compounds that are not currently being used in modern medicine to battle pathogenic microbes.