Ecological and Chemical Evaluation of South Dakotan *Achillea*

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The *Achillea millefolium* aggregate is a collection of approximately 15 plant species, of which most are found natively in Europe. Commonly known as yarrow, these plants host significant biomedical activity and have, in fact, been utilized by Native American communities for hundreds of years. More recently, extracts have been shown to act in anti-fungal, anti-oxidant, and anti-microbial assays. Of the few species native to North America, however, there have not been many studies examining basic ecological and chemical properties. Thus, the Ramsey lab has begun investigating a North American species of *A. millefolium* – *A. borealis* – especially focusing on the dominance of characteristics across varying environmental zones. A key component of this investigation is a chemical analysis of the substituent compounds contained within flowering bodies of yarrow plants. This evaluation was performed by first extracting chemical substituents of specimens collected from two environmentally-contrasting ecotypes using a sequential gradient procedure, and then quantitatively comparing the crude product yield of each extraction against the others. Following these preliminary findings, a bioassay was developed to test the effect of extracts – with concentration and original ecotype factors – on the growth of *Candida albicans* and *Candida krusei* cultures. Initial results from these chemical experiments, coupled with ecological data, suggest that significant variations in *A. borealis* exist within South Dakota and that they have measurable effects on chemical composition. Future research may include isolation of specific compounds contained within crude extracts, in-depth characterization of biomedical properties in the context of changing environmental conditions, and determination of activity in additional bioassays, including those against filamentous fungi and *Staphylococcus aureus*. Continued inquiry into the properties of North American yarrow will yield valuable information for the ecological, biomedical, and environmental fields.