

Microbial life in snow is an enigmatic aspect of snowpack, in which visible snow algae blooms paint the spring and summer snow fields with their brilliant red hues. Here, we propose to initiate a collaboration with the Living Snow Project (LSP) to make a groundbreaking advance in the state of knowledge concerning the diversity and biogeography of Sierra Nevada snow algae. This data set will then form the basis of comparisons with the Cascade Mountain Range of the northwestern US – and together the results will be used to: (i) establish understanding of the scale of prevalence of snow algae that is key to understand with respect to changing climate in mountain ecosystems and (ii) develop the first cross-mountain range, western US data set of snow algae biodiversity that will lead to a better understanding of snow algae dispersal and evolution. This study will engage the help of citizen scientists – snow enthusiasts who will both mark observations and help sample the Sierra Nevada mountain snow fields. DRI's experience in citizen science programs led by the PI, Meghan Collins, provides the essential leadership, connections, and expertise to this project to ensure its success while project Col, Dr. Alison Murray brings a wealth of field and laboratory-based experience, and long-term interest in life in icy environments to the program. In addition to a widespread citizen-science experience incorporating lessons in snow biology, implications of changing snowpack albedo and life in extreme environments, student training is also a key element of this program, as at least two University of Nevada undergraduate students will participate in laboratory and data management aspects of the program. The proposed work will solidify a new collaboration between DRI and Western Washington University investigators that promises to be a fruitful partnership with many shared interests in building a next generation knowledgebase of living snow and sharing this knowledge with students and citizens alike. The data sets generated will be part of the LSP and made accessible to the international community through the Polar 'Omics Links to Antarctic, Arctic and Alpine Research database that Col Murray is a co-lead of. The data set will also provide a resource for future studies of the snow microbiome in the snowpack as the nucleic acids extracted will be archived and can be used for future DNA-based genomics studies. The proposed research builds capacity through establishing the first widespread Sierra Nevada snow algae data set collected. This will be used to build new relationships with NASA scientists studying snowpack albedo and changing climate across the western US and NASA researchers studying life in the cryosphere to inform our knowledge of biological adaptations required for survival in low temperature, high UV radiation conditions.