TECHNICAL ABSTRACT FOR EXPERT REVIEWERS:

In nature, organisms often face stressful temperatures. In many habitats, organisms even die from exposure to temperature extremes. Recent studies have documented that global climate change is altering the natural distribution of insect species, causing some species to go extinct in some habitats and allowing others to invade new regions. On the other hand, insects may adapt to changes in climate. Other studies have revealed that genetic changes allow insects to persist in native habitats after environmental change, yet few studies have been able to identify specific genes involved in this process. Even fewer studies have traced the process of adaptation from the gene through its effects on performance to effects on survival and reproduction, and finally to evolutionary change. This proposed research will contribute to our understanding of the relationship between genes and evolutionary change in populations of a native California insect. The leaf beetle *Chrysomela aeneicollis* inhabits high elevations in the eastern Sierra Nevada, which is at the southern end of this species' range. Populations show unusual differences in frequency of different forms of the temperature sensitive enzyme, phosphoglucose isomerase (PGI), which is coded by a single gene. These differences relate to local habitat temperature. We propose to compare PGI frequency differences to those at other genes to test the hypothesis that populations are locally adapted to their environment. We will also study variation at other genes that code for proteins that are induced in response to extreme temperatures: heat shock proteins. These studies will help us understand the role of PGI and other genes in allowing insects to adapt to rapidly changing climatic conditions.