

Genetic and phenotypic responses of small mammals to life at high altitudes. K.A. Hammond, G.A. Russell, C.A. Chmura, and S. Ortiz. U.C. Riverside, Riverside CA, 92521. khammond@ucr.edu

Because of their small size and high energy demands, small mammals living at high altitude face several important challenges. Energy demands are greater because of low ambient temperatures, but hypoxia limits aerobic metabolism so it is harder to fuel relatively higher demands. Because of harsh ambient conditions food availability is often low at high altitudes so there are fewer resources to fuel higher demands. Among small mammals, there are known genetic adaptations that allow a greater acquisition of oxygen such as several different α globin haplotypes as well as many other candidate genes that are correlated with altitude. In this talk we will discuss genetic adaptations to high altitude, and also report on phenotypic adjustments small mammals make to accommodate the challenges of life at high altitude within their life-time. Not only are these changes a function of changing abiotic conditions, but the types of adjustments made are also determined, in part by an individual's developmental habitat. Here we discuss the significance of increases in cardiovascular and pulmonary organ mass, exercising muscle mass, and muscle enzymatic capacity, on aerobic performance in deer mice both born at high altitude and acclimated to high altitude as adults. We will also discuss the role of hypometabolism in both *ad lib* fed and calorically restricted mice. In total we observe that captive small mammals living at high altitude are forced to adopt a "lower" metabolic output than captive mice at low altitudes. A very interesting point is that wild mice from high altitude habitats have a much higher metabolic outputs than captive mice. We will discuss the potential causes of this discrepancy.