Behavioral Divergence in Populations of the Cave-Adapted Planthopper Species *Oliarus Polyphemus* on the Island of Hawaii (Homoptera Fulgoroidea Cixiidae)

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Abstract

With 80 described endemic species, the cixiid genus *Oliarus* is known to have undergone extensive adaptive radiation on the Hawaiian Islands. In *Oliarus*, however, adaptive radiation is not restricted to surface habitats. Several evolutionary lines have invaded caves on the islands of Molokai (one species), Maui (three species), and Hawaii Island (two species). They have acquired typical troglomorphies such as reduction of eyes, wings, and pigment. Populations of one of the cave invasions on Hawaii Island, the completely blind, flightless and pigmentless *Oliarus polyphemus* have been found in numerous lava tubes within all major volcanic systems. This apparently wide distribution of a species which is restricted to the cave environment was thought to be the result of underground dispersal through the mesocavernous rock system.

Recent investigations on the mating behavior, especially the analysis of the courtship signals of seven *O. polyphemus* populations, however, have revealed a high degree of divergence: the signals of all seven populations studied differ significantly even between populations from caves within the same volcanic system, and only a couple of miles apart. Since the communication signals serve mate recognition, they are sexually selected and species-specific, thus the seven *O. polyphemus* populations tested are regarded as reproductively isolated entities, i.e., separate biological species.

Hypotheses to explain this high degree of divergence among *O. polyphemus* populations are discussed. Future research will concentrate on the quantification of the observed divergence on the molecular level using mitochondrial DNA sequence data, and on the correlation of divergence events with evolutionary time.