



## Morphological and molecular diversification of slender salamanders (Caudata: Plethodontidae: *Batrachoseps*) in the southern Sierra Nevada of California with descriptions of two new species

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### Abstract

Slender salamanders of the genus *Batrachoseps* achieve relatively high diversity in the Kern Canyon region at the southern end of the Sierra Nevada of California through high turnover of species with small geographic ranges. The status of several populations of *Batrachoseps* in this region is enigmatic, and both morphological and molecular data have suggested that some populations do not belong to any of the currently recognized species. Identification of species in this region is complicated by the apparent extinction of *Batrachoseps relictus* in the vicinity of its type locality in the Lower Kern River Canyon. Here we analyze a comprehensive morphological dataset to evaluate diversity in the Kern River Canyon region. We conclude that populations from Breckenridge Mountain are conspecific with *B. relictus*, while populations from north of the Kern River previously treated as *B. relictus* belong to an undescribed species. The morphological data also show the distinctiveness of populations from the Upper Kern River Canyon. Thus, we describe two new species, *Batrachoseps bramei* **sp. nov.** for populations from the Upper Kern River Canyon and *Batrachoseps altasierrae* **sp. nov.** for populations from the southern Sierra Nevada previously referred to *B. relictus*. *B. bramei* **sp. nov.** and *B. relictus* are members of the *nigriventris* group; *B. altasierrae* **sp. nov.** belongs to the group formerly called the *relictus* group, which we rename the *diabolicus* group. We conclude by presenting allozyme and mitochondrial DNA sequence data that support the distinctiveness of these newly described species and provide a hypothesis of relationships within the *nigriventris* group.

**Key words:** *Batrachoseps altasierrae* **sp. nov.**, *Batrachoseps bramei* **sp. nov.**, *Batrachoseps relictus*, Kern River Canyon, morphometrics, allozymes, cytochrome *b*

### Introduction

Slender salamanders of the genus *Batrachoseps* (Caudata: Plethodontidae: Batrachosepini) are the most diverse clade of salamanders in western North America, with 19 currently recognized species (Stebbins & McGinnis in press). *Batrachoseps* is thought to be the sister taxon of the Neotropical salamander clade (Bolitoglossini, Vieites *et al.* 2011; Pyron & Wiens 2011) which contains about 45% of extant salamander diversity. *Batrachoseps* is widespread along the Pacific Coast of North America, with a nearly continuous range from the California/Oregon border south into Baja California, and some disjunct interior ranges from the Cascade Mountains of northern Oregon through the Sierra Nevada and Inyo mountain systems in California to the Sierra San Pedro Mártir near the southern end of its range in Baja California. This distribution is filled by five species groups (subgenus *Plethopsis* and the four species groups of the subgenus *Batrachoseps*: the *attenuatus* and *nigriventris* groups of Jockusch and Wake (2002), a group renamed herein but previously referred to as the *relictus* group (Jockusch & Wake 2002), and the *pacificus* group). Although sympatry is relatively limited, with at most two species reported from any site, high diversity is achieved in some regions through turnover of species over short geographic distances. The two areas