



## Review of the native Hawaiian leafhopper genus *Nesophrosyne* (Hemiptera: Cicadellidae: Deltocephalinae) with description of eight new species associated with *Broussaisia arguta* (Hydrangeaceae)

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### Abstract

A review of the native Hawaiian leafhopper genus *Nesophrosyne* (Hemiptera: Cicadellidae: Deltocephalinae) is presented. Specimens were examined from across the entire Hawaiian Archipelago, *Nesophrosyne* is redescribed, and the subgenus *Nesoreias* is synonymized with *Nesophrosyne*. Eight new species associated with the widespread host plant species *Broussaisia arguta* are described: *N. heopoko* **sp. n.** from Kaua'i; *N. makaihe* **sp. n.** from O'ahu; *N. magnaccai* **sp. n.** from Moloka'i; *N. broussaisiai* **sp. n.**, *N. ogradyi* **sp. n.**, and *N. kaupoi* **sp. n.** from Maui; and, *N. aakokohaikea* **sp. n.** and *N. kanawao* **sp. n.** from Hawai'i Island. Morphological and molecular characters were employed to delineate new species. Populations associated with *B. arguta* on different islands, individual volcanic mountains, and discrete geographic areas represent reciprocally monophyletic species. A monophyletic complex of five sibling species, morphologically cryptic on individual islands, were identified from Maui and Hawai'i Island. The *kanawao* species group is erected for these species and is further subdivided into two species subgroups based on monophyly, island endemism, and morphology: *broussaisiai* species subgroup containing *N. broussaisiai*, *N. ogradyi*, and *N. kaupoi* on Maui; and, *aakokohaikea* species subgroup containing *N. aakokohaikea* and *N. kanawao* on Hawai'i Island.

**Key words:** Hawaiian Islands, Sibling Species, Biogeography, Taxonomy, Phylogeny, Endemism

### Introduction

The native Hawaiian leafhopper genus *Nesophrosyne* Kirkaldy (1907) (Cicadellidae: Deltocephalinae: Opsini) is a diverse and ubiquitous, yet understudied, element of the Hawaiian entomofauna. The native group currently comprises sixty-two described species (Kirkaldy 1907, 1910; Osborn 1935; Zimmerman 1948), distributed across the high islands of the archipelago (e.g., Kaua'i – Hawai'i). The Hawaiian species are single island endemics, occurring in almost all habitat types from coastal scrub to sub-alpine regions (2500–3100 meters above sea level). Nearly all species are host plant specific, utilizing approximately 25% of the native Hawaiian plant genera, and 75% of the most species rich and ecologically dominant genera (e.g., genera of the lobeloid group, *Myrsine*, *Hedyotis*, *Coprosma*; Kirkaldy 1907, 1910; Osborn 1935; Zimmerman 1948; Wagner *et al.* 1999).

Kirkaldy (1907) first described *Nesophrosyne* based on the presence of a large median anteapical cell and a small outer anteapical cell on the forewing. He later expanded the description to include more detail on forewing cell number and size, venation, and the relative size of the pronotum, which resulted in splitting the genus into two subgenera, *Nesophrosyne* and *Nesoreias* (Kirkaldy 1910). The latter subgenus being separated by the complete absence of the outer anteapical cell (Fig. 1). The shape of the outer anteapical cell is extremely plastic in size and presence, negating the subgeneric taxonomic classification. Unfortunately, Kirkaldy's treatments further complicated taxonomy within *Nesophrosyne* by issuing cursory descriptions of forty-one species. These descriptions, sometimes limited to only a few sentences, highlighted color and other variable traits and are inconsistently based on either males or females, which can show dramatic sexual dimorphism. Kirkaldy (1910) also neglected to provide illustrations and a key to these species.