

Simulium (Hearlea) Vargas, Martínez Palacios, & Díaz Nájera **(Diptera: Simuliidae): Taxonomic revision and cladistic analysis**

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Abstract

Simulium (Hearlea) Vargas, Martínez Palacios, & Díaz Nájera 1957 is comprised of 20 known species that are largely confined to the area between México and Guatemala. Herein, all currently recognized species within this subgenus are described, illustrated, keyed (except males), and subjected to phylogenetic analysis. Geographic distributions for each species are also updated. *Simulium deleoni* Vargas, 1945, is synonymized with *S. capricorne* De León, 1944. *Simulium paracarolinae* new species, from Guatemala, is described from the larva. A cladistic analysis of all *Hearlea* species and representatives from three outgroups was conducted using 39 morphological characters. Although different character weighting methods yielded different topologies, all trees agreed that *Hearlea* is monophyletic is comprised of two species groups, based mainly upon characters of the larva and pupa: the *Simulium juarezi* group—*S. ayrozai* Vargas, *S. burchi* Dalmat, *S. canadense* Hearle, *S. capricorne* De León, *S. chiriquiense* Field, *S. contrerense* Díaz Nájera & Vulcano, *S. dalmati* Vargas & Díaz Nájera, *S. delatorrei* Dalmat, *S. estevezi* Vargas, *S. ethelae* Dalmat, *S. juarezi* Vargas & Díaz Nájera, *S. microbranchium* Dalmat, and *S. nigricorne* Dalmat—and the *S. carolinae* group—*Simulium (Hearlea) carolinae* De León, *S. gorirossiae* Vargas & Díaz Nájera, *S. johnsoni* Vargas & Díaz Nájera, *S. larvispinosum* De León, *S. menchacai* Vargas & Díaz Nájera, *S. paracarolinae* n. sp., and *S. temascalense* Díaz Nájera & Vulcano.

Key words: *Simulium (Hearlea)*, Neotropical, black fly, taxonomy, phylogeny

Introduction

Simulium (Hearlea) Vargas, Martínez Palacios, & Díaz Nájera 1957 is comprised of 20 species largely confined to the Sierra Madre Mountains from México to Guatemala, although single species have respective ranges that extend north through western North America into British Columbia, Canada, and south into northern Panamá. The greatest diversity occurs in cold torrenticulous streams in upland areas between 1000–3000 m in the Sierra Occidental Mountains. The pupal respiratory organ and the larval anal sclerite with associated accessory sclerites provide the bulk of characters useful for species identification.

The objectives of this research were to revise taxonomically all known species of *Hearlea*, including clarification of geographic distributions, construction of dichotomous