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Morphological and molecular differentiation of the *Anagrus epos* species complex (Hymenoptera: Mymaridae), egg parasitoids of leafhoppers (Hemiptera: Cicadellidae) in North America

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Abstract

The *Anagrus epos* Girault species complex of the fairyfly wasp genus *Anagrus* Haliday (Hymenoptera: Mymaridae), egg parasitoids of *Erasmoneura* spp., *Erythroneura* spp., and other leafhoppers, is reviewed using both morphological and molecular methods. A new species, *A. vulneratus* Triapitsyn **sp. n.**, is described and illustrated from specimens reared from eggs of the leafhopper *Erasmoneura vulnerata* (Fitch) (Hemiptera: Cicadellidae) on grapevines from Colorado, USA. Discussed and corrected are the earlier published host and distribution records of *A. epos*, which is rediagnosed, and also of *A. daanei* Triapitsyn. Nuclear ribosomal DNA sequence data provides a genetic signature for *A. epos* and within the remainder of the species complex identifies *A. tretiakovae* Triapitsyn as being the most divergent member, confirms *A. vulneratus* as a separate entity, and reveals the closer similarity of specimens from Sonora, Mexico, to *A. vulneratus* rather than *A. epos*. Sequences from individuals identified as *A. daanei* were somewhat heterogeneous and revealed the existence of two distinct rDNA families — one represented by *A. daanei* from the Pacific Northwest and one by specimens from Colorado. Both gene families were represented by specimens from California, USA, and this finding is discussed in relation to recent use of "*A. epos*" from Colorado as a biological control agent in California.

Key words: Chalcidoidea, taxonomy, applied biological control, molecular identification, cryptic species, *Homalodisca vitripennis*

Introduction

Anagrus epos Girault (Hymenoptera: Mymaridae), first described from a collection in Illinois, USA (Girault 1911), is a common and seemingly widespread egg parasitoid of leafhoppers (Hemiptera: Cicadellidae) in North America. Location records for this species also include Colorado, Kentucky, New Mexico, and New York in the USA as well as Baja California and Sonora in Mexico (Triapitsyn 1998). Like many minute parasitoids, identification of members of the genus *Anagrus* Haliday to species is difficult because of their size and a paucity of diagnostic morphological characters. Traditionally, species identifications require skilled preparation of slide-mounted specimens and expert knowledge of the genus. Initially it was believed that eggs of all grape-feeding leafhoppers in North America were attacked by a single species, *A. epos*. However, Pickett *et al.* (1987) first suggested that *A. epos* may be more than one species and later a taxonomic revision, employing high resolution light microscopy (Triapitsyn 1998), confirmed that it was misidentified as several different species, among them at least *A. erythroneurae* Trjapitzin & Chiappini from the *atomus* species group, and also *A. epos*, *A. daanei* Triapitsyn, and *A. tretiakovae* Triapitsyn from the *incarnatus* species group of *Anagrus*. The morphological characters that are used for differentiating the latter three species, which we group in the *A. epos* species complex, can vary to some extent; thus, species limits may be difficult to assess without supporting data from their biology and from DNA sequences.

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