Zootaxa 4017 (1): 001–126
www.mapress.com/zootaxa/

Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.4017.1.1
http://zoobank.org/urn:lsid:zoobank.org:pub:BBFC3D93-6A7E-4862-84EF-021ADE2F4B3A

ZOOTAXA

4017

Annotated Checklist of California Encyrtidae (Hymenoptera)

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Magnolia Press
Auckland, New Zealand

Accepted by G. Gibson: 19 Aug. 2015; published: 11 Sept. 2015

ROBERT L. ZUPARKO
Annotated Checklist of California Encyrtidae (Hymenoptera)
(*Zootaxa* 4017)

126 pp.; 30 cm.

11 Sept. 2015

ISBN 978-1-77557-793-5 (paperback)

ISBN 978-1-77557-794-2 (Online edition)

FIRST PUBLISHED IN 2015 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

Based on examination of the literature and specimens, 208 described species in 90 genera of Encyrtidae are listed from California. Data on the original publication, deposition of types, geographic distribution and host records of these species are presented. Forty-three species were established in biocontrol programs, 157 are presumed native, 7 appear to be adventitious introductions, and the origin of one is undetermined. An additional 276 morphospecies are also listed as present

in the state within an additional 21 described genera and potentially up to 20 undescribed genera. Altogether, 31 new genera and 36 new species are recorded for the state, as well as 70 new parasitoid-host records.

Errors pertaining to California taxa in previously published papers are corrected. *Metaphycus immaculatus* (Howard) is reported as a **new combination** (from *Aphycus* Mayr).

Three appendices are included: a host/parasitoid listing for the described species present in the state, a listing of taxa previously reported from California under invalid names, and a list of taxa either erroneously reported from the state, or unsuccessful biocontrol introductions.

Key words: Biodiversity, new host records, new state records

Introduction

"Among the many thousands of minute Hymenopterous insects existing in the world and to which have been given the popular name Chalcid flies, there is probably no single family that is of more interest or of greater economic importance than the family Encyrtidae." Ashmead, 1900.

"From a distance, this is the most unlikable family in the chalcidoid series but close acquaintance reveals so many fascinating qualities that students, after some experience, will no doubt choose it as a favorite … the whole diverse and varied panorama is such that the most torpid of interests must finally become conscious of a spell." Girault, 1915.

A century has passed since W.H. Ashmead and A.A. Girault penned these statements as introductions to their respective treatments of the family Encyrtidae, but they certainly bear repeating today. Not only is this group one of the largest and most diverse families of the parasitic Hymenoptera, but many species have proven to be of immense economic benefit through their use in biological control programs of agricultural pests.

Over the past three decades, there have been major treatments of the family of the Neotropical (Noyes 1980, 2000, 2004, 2010), Palaearctic (Trjapitzin 1989; Guerrieri & Noyes 2000, 2005; Zhang & Huang 2004), Oriental (Noyes & Hayat 1994; Hayat 2006) and Australian (Noyes 1988b; Dahms & Gordh 1997) faunas. In contrast, the fauna of the United States has never been studied systematically, although keys to the Nearctic genera were produced by Trjapitzin & Gordh (1978a, b) and Noyes *et al.* (1997), and a checklist of the Mexican species was compiled by Trjapitzin & Ruiz-Cancino (1995).

Within the Nearctic region, there is greater ecological diversity in California than in any other area of comparable size, which predicts a rich endemic fauna in the state. Considering all taxa, California has both the highest total number of species as well as the highest number of endemic species of any state in the union (Salwasser 2003). Noyes (2001) recorded 118 apparently native species of encyrtids from California, comprising 25% of the 468 species then known from the United States. Another 10 species have been recorded from the state by other workers, for a total of 128 native species reported in the state prior to this study.

Five workers authored the majority of described Californian encyrtids: W.H. Ashmead, L.O. Howard, A.A. Girault, P.H. Timberlake and H. Compere. The works of the former three were notoriously short and typically unaccompanied by illustrations. In contrast, Timberlake and Compere, both of whom were involved in research and implementation of biological control programs, produced superior (and in Compere's case, well-illustrated) descriptions and systematic works that are still largely useful today. This reflects the case that the study of Californian encyrtids in the 20th century was largely that of agents introduced into the state in biological control programs, notably for those species attacking economically important pests in the Central and Imperial Valleys, or the coastal plain from San Diego north to San Francisco, while studies of native, non-economic species occupied an ancillary role. Thus, while the biologies of many imported species are well elucidated, much less is known about the endemic taxa.

In the mid 1970s an exchange program between the US National Academy of Sciences and the USSR Academy of Sciences led to collaboration between two prestigious specialists, Gordon Gordh and Vladimir A. Trjapitzin, which marked a reenergization in the study of endemic encyrtids from the Nearctic region. Although the native California fauna still remains largely unstudied, Trjapitzin has continued to author a long series of papers on the Mexican fauna (see references in Trjapitzin *et al.* 2008), which share a number of species with the California fauna.

Coincident with the paucity of published works on California Encyrtidae, the number and diversity of specimens found in museum collections are generally quite poor. Due to their small size, general collectors do not