Annotated Checklist of California Encyrtidae (Hymenoptera)

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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
often take encyrtids. Worse, specimens of many species shrivel up when air-dried, making them difficult or impossible to identify, even to the generic level. Fortunately, the use of critical point drying (Gordh & Hall 1979) and hexamethyldisilazane (HMDS) (Brown 1993) treatments for point-mounted specimens, and the use of good media for slide-mounted specimens, now provide workers with more reliable methods for preserving minute specimens in excellent condition. Within the state, the best collections of parasitic Hymenoptera are museums at the three campuses of the University of California with Entomology or Biological Control programs: Essig Museum (Berkeley), Bohart Museum (Davis) and the Entomological Research Collection (Riverside). Nevertheless, large areas of the state have never been properly sampled for the encyrtids, and many undescribed species and genera remain to be named.

Therefore, a definitive treatment of the California Encyrtidae is years (if not decades) away, so it may be argued that a checklist of the group is premature. Indeed, it would be a serious mistake to expect this paper to reflect the full diversity of the state’s encyrtids—instead it should be regarded only as a foundation upon which later workers can build. However, I believe the publication of such a checklist now is worthy, based on the fragility of the state’s ecosystem. The California Floristic Province has been identified as one of the world’s biological hotspots (defined by Myers et al. 2000 as an exceptional concentration of endemic species experiencing an exceptional loss of habitat). For example, many encyrtids are parasitoids of scales (Hemiptera: Coccoidea), and native California scales appear to be in a decline (R. Gill, pers. comm.), suggesting their endemic parasitoids may be threatened as well.

Methods

As my basic framework, I used Noyes’ interactive catalog of world Chalcidoidea (2001), selecting both native and introduced species recorded from California. Other references I relied upon heavily were Peck’s (1963) and Gordh’s (1979) treatments of the Nearctic fauna, the host/parasitoid listing presented in Noyes & Hayat (1994), and Clausen’s (1978a) review of introduced natural enemies. I supplemented this initial listing with subsequent literature searches, always attempting to check distribution and host records against original sources. These searches included a Web of Science alert program, consulting the Universal Chalcidoidea Database (Noyes 2015) as well as examinations of hard-copy references, mostly from the collections of the Biosciences Library and Essig Museum (both University of California, Berkeley), the Research Library of the California Academy of Sciences (San Francisco), and my personal library. Additional distribution records for some Copidosoma species were obtained from Dr. Greg Zolnerowich’s unpublished revision of the Nearctic fauna of that genus.

I examined specimens from the following institutions (see below for key to codons): CAS, CSCA, EMEC, EMUS, LACM, RLZC, SBMN, SJSC, UCDC, UCFC, UCMC, UCR, USNM, and WSU. In general, I accepted the specific determinations previously assigned to these specimens, as well as the hosts noted on collecting labels, and identified a number of undetermined specimens to either genus or species.

Since 2001, I began devoting my personal collecting efforts towards the encyrtids of California. This activity encompassed the entire state, although the bulk of my efforts have been within a two-hour drive of the San Francisco Bay area. Most specimens were collected by sweeping vegetation, with a smaller number taken via malaise traps, although a surprisingly varied number of species were skimmed from a Marin County swimming pool. Collection records of these specimens are maintained in a Microsoft Access file.

I have organized my results into four parts: the checklist itself and three appendices. The checklist is presented as an alphabetical listing (by subfamily, genus and species) of the Encyrtidae. Subfamilial headings are not further notated, but generic headings include the author and date of publication, and if not been previously reported from California, the notation [New state record] is appended. Additionally, if the genus has described species from California with reliably known hosts, the order and family of those hosts are listed as well, in order to facilitate matching parasitoids with hosts in Appendix I (NB: the order and family of hosts of extralimital species, if different, are not included). Authors of Encyrtidae taxa are included in the checklist proper, while authors of host taxa are included in Appendix I.

Within a genus, described species are listed alphabetically. Undescribed or questionable taxa are typically treated under the epithet “spp.”, and placed after the described species (e.g. the order of taxa listed for Tetracnemoidea is brevicornis, peregrina, sydneyensis, spp.).

Specimens belonging to species for which I was unable to assign a genus are included at the end under “Undetermined Genera”.

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Each described species entry may have up to the following five sections:

1. **Original publication data.** The species epithet is followed by the author, date of publication, the starting page number of its description, and the name of the original genus (in parentheses) if different from the present combination. If a described species has not been reported from California before, the notation [**New state record**] is appended, along with the institutional codon (see below) where the specimens are deposited.

2. **Type.** The institution where primary types are deposited is listed as a codon, mostly based on those from the Bishop Museum website: http://hbs.bishopmuseum.org/codens/. The key to these codons is as follows:

- ANIC  Australian National Insect Collection, CSIRO, Canberra, ACT, Australia
- BMNH  The Natural History Museum [=British Museum of Natural History], London, United Kingdom
- BPBM  Bernice P. Bishop Museum, Honolulu, Hawaii
- CAS    California Academy of Sciences, San Francisco, California
- CNC    Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada
- CSCA   California State Collection of Arthropods, Sacramento, California
- CUMZ   Zoological Museum, Cambridge University, Cambridge, United Kingdom
- DEZA   Dipartimento di Entomologia e Zoologia Agraria, Università di Napoli, Portici, Italy
- EMEC   Essig Museum of Entomology, University of California, Berkeley, California (=California Insect Survey)
- EMUS   Utah State University Insect Collection, Utah State University, Logan, Utah.
- EUMJ   Ehime University, Matsuyama, Japan
- HMHN   Hungarian Natural History Museum, Budapest, Hungary
- IAEC   Institute of Agricultural Entomology, University of Catania, Italy
- INBio  Instituto Nacional de Biodiversidad, Santa Domingo de Heredia, Costa Rica
- INPC   National Pusa Collections, Indian Agriculture Research Institute, New Delhi, Haryana, India
- ITLJ   National Institute of Agro-Environmental Sciences, Tsukuba, Ibaraki, Japan
- LACM   Los Angeles County Museum of Natural History, Los Angeles, California
- MACN   Museo Argentina de Ciencias Naturales, Buenos Aires, Argentina
- MNHN   Muséum National d’Histoire Naturelle, Paris, France
- MNMS   Museo Nacional de Ciencias Naturales, Madrid, Spain
- MLPA   Museo de la Plata, Universidad Nacional de La Plata, La Plata, Argentina
- NHRS   Naturhistoriska riksmuseet, Stockholm, Sweden
- NMW    Naturhistorisches Museum Wien, Vienna, Austria
- NZAC   New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand
- OSU    Museum of Biological Diversity, Ohio State University, Columbus, Ohio
- OUNH   Museum of Natural History, Oxford University, Oxford, United Kingdom
- PPRI   Plant Protection Research Institute, Pretoria, Gauteng, South Africa
- QM     Queensland Museum, South Brisbane, Queensland, Australia
- RLZC   Personal collection of author (ultimately to be deposited in the EMEC)
- ROM    Royal Ontario Museum, Toronto, Ontario, Canada.
- SANC   South African National Collection of Insects, Pretoria, South Africa
- SBMN   Santa Barbara Museum of Natural History, Santa Barbara, California
- SEMC   Snow Entomological Museum, University of Kansas, Lawrence, Kansas
- SJSC   J. Gordon Edwards Museum of Entomology, San Jose State University, San Jose, California
- UCDC   Bohart Museum of Entomology, University of California, Davis, California
- UCFC   Stuart M. Fullerton Collection of Arthropods, University of Central Florida, Orlando, Florida
- UCMC   University of Colorado Museum of Natural History, University of Colorado, Boulder, Colorado
- UCRC   Entomology Research Museum, University of California, Riverside, California
- USNM   National Museum of Natural History (=United States National Museum), Washington, D.C.
- WSU    Maurice T. James Entomological Collection, Washington State University, Pullman, Washington
- ZDAMU  Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India
- ZIN    Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
- ZMUM   Moscow State University, Moscow, Russia
3. **Distribution.** Each entry has two parts: a letter code indicating the species distribution on a worldwide basis, followed (in parentheses) by the county (in normal font) and/or region (in italic font) where the taxon has been recorded within California. In the few cases where I have been unable to determine the California locality, I noted it with a question mark (?). Key to letter code:

- **C** Endemic to California
- **N** Endemic to the Nearctic Region, including California
- **W** Naturally occurring in California and at least one other biogeographic area
- **E** Established in California (in a biological control program)
- **A** Accidentally introduced into California
- **U** Unknown

4. **Host/habitat.** Only those hosts whose association I consider either proven or highly likely are listed (questionable or mistaken host records are discussed under next section), and are cross-indexed in Appendix I. Hosts are listed alphabetically (regardless of higher classification) and include those recorded worldwide, not just those from California. Previously reported hosts are listed first, followed by any new records (preceded by the notation **NEW**) and include the codon of the collection from which these records were taken. For taxonomic information of scales and mealybugs, I relied upon ScaleNet (http://www.sel.barc.usda.gov/scalenet/scalenet.htm).

If the hosts are unknown, I endeavored to include the plant or habitat from which the species has been collected. Unless specifically noted, all species are presumed to be primary parasitoids. For known hyperparasitoids, the primary hosts are listed first, followed by the primary parasitoids; if there are multiple primary hosts and/or parasitoids listed, I did not endeavor to determine whether any specific primary parasitoid attacked any specific primary host. Recorded hosts from laboratory studies are included, but not instances of parasitoids that accepted hosts for oviposition but failed to produce progeny.

5. **Remarks.** Miscellaneous notes and clarifications for described species are recorded (this is also the only section I presented for undetermined species). Noyes & Hayat (1994) included a summary of all encyrtid species used in biological control programs, but they did not indicate those programs that failed because the target species turned out to be not a true host of the parasitoid. Unfortunately, the associations between these unsuitable target species and the imported parasitoid were then carried forward into Noyes (2001), where the unsuitable target species were listed under “Hosts” of the encyrtids, thus giving the misimpression that a true host/parasitoid relationship existed. I have endeavored to point out this discrepancy in the Remarks section for each encyrtid species so involved, with the statement “not a proven host (see Methods)”.

One of the inherent weaknesses in preparing secondary works such as this one is the heavy dependence placed upon previously published sources, which can lead to the perpetuation of initial errors of misidentification and distribution (Noyes 1994). A complementary danger is adding more errors to the literature, thus increasingly widening the circle of misinformation. With this in mind, I tried to heed the physician’s maxim to “First do no harm”, and adopted the approach that I deemed the most conservative. In general I recognize four major sources of possible errors in this paper.

1. Misidentifications of parasitoids or their hosts in previously published works. To minimize the mistakes introduced by secondary sources, whenever possible I consulted the original papers describing the parasitoids’ distribution and host records. With the exception of *Psyllaephagus trioziphagus* (in Cazier 1964), I accepted as valid all identifications found in original research papers. Published records that I considered erroneous or questionable are discussed in the Remarks section.

2. Genera with variable species. There are several genera (e.g. *Anagyrus*) present in California which include both undescribed as well as morphologically variable described species, making it difficult (in the absence of a review of the genus) to determine if any given specimen represented a new species or not. I usually treated these taxa as undetermined species.

3. Incomplete label data. During the course of various biocontrol programs in California, quarantine and insectary facilities were established in the counties of Alameda (Albany), Los Angeles (Downey, Pasadena and Whittier), Riverside (Riverside) and Ventura (Fillmore). Regrettably, some museum specimens are simply labelled by these localities, and it is not clear if they represent locally collected populations, or imported taxa reared in these facilities. In the absence of further data, I chose to exclude the distributional data from these specimens (although I did include their host records).
4. Misidentifications of extant museum material. The identification of encyrtid specimens in the collections I examined spanned over 100 years and dozen of workers. Thus, a certain variation in the reliability of these determinations is to be expected. In a small percentage of cases, I corrected some misidentifications, but in general I accepted these pre-existing determinations. It is possible that I missed some erroneous determinations, or made mistakes in my own identifications.

Three appendices are included. Appendix I is a host-parasitoid listing (presented systematically by host order, then alphabetically by host family, genus and species). Encyrtid hyperparasitoids appear twice in this listing: under the name of the primary parasitoid, and again under the name of the herbivore, where it is designated with an (H). New host associations are followed by NEW: (collection codon). Appendix II is an alphabetical list of encyrtid taxa previously reported from California under currently invalid names. The names listed are those under which the taxa were known by when they were reported from California (not necessarily the original name). Appendix III is an alphabetical list of introduced species that did not become permanently established, and other species that have mistakenly been reported from the state.

Results and discussion

Encyrtinae

* Acerophagus E. Smith 1880 *

**Hosts.** Hemiptera: Coccidae, Dactylopiidae, Diaspididae, Pseudococcidae

*abstrusus* (Gahan 1946: 316) (*Pseudaphycus*)

**Type.** USNM

**Distribution.** W (Imperial)

**Host/habitat.** Pseudococcus comstocki, *P*. sp., Spilococcus pressus

*angelicus* (Howard 1898a: 245) (*Aphycus*)

**Type.** USNM

**Distribution.** N (Alameda, Fresno, Imperial, Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Santa Clara, Santa Cruz, Stanislaus, Tulare, Ventura)


**Remarks.** The natural range of this species is restricted to the western United States, but there are two incongruous records, from Quebec, Canada (Gordh 1979: 927) and Bermuda (de Santis 1989: 41). The record from Quebec traces back to the citation in Peck (1963: 398) that refers to its importation from California in a biocontrol program against *P*. maritinmus in greenhouses (Burnett 1947). Similarly, the citation by de Santis presumably traces back to its use in a biocontrol program against *P*. longispinus in Bermuda in 1951, although it failed to establish there (Bennett & Hughes 1959), and Hilburn *et al.* (1990) did not list it in their list of Bermuda Hymenoptera. A series of specimens was reportedly reared from *Saissetia oleae* (EMEC), but I suspect this is an error in identification. Another specimen (EMEC), determined as near *angelicus*, was reared from *Spilococcus mamillariae* in Alameda County.

*antennalis* Rosen 1969: 50

**Type.** USNM

**Distribution.** C (Los Angeles)

**Host/habitat.** Dysmicoccus ryani

*californicus* Rosen 1969: 68

**Type.** UCRC
Distribution. C (Imperial)
Host/habitat. Spilococcus pressus
Remarks. A specimen determined possibly as *A. californicus* was collected from Riverside County (UCRC). Two other specimens were collected together from *Adenostoma fasciculatum* (Rosaceae) in Marin County (RLZC): a macropterous female resembling *A. californicus*, and a brachypterous female.

citrinus (Howard 1898a: 235) (*Rhopoideus*)
Type. USNM
Distribution. N (Nevada)
Host/habitat. Unknown
Remarks. Howard (1898a) reported *Diaspidiotus pernicious* (repeated in Quaintance 1915) and *Tortrix* sp. as hosts. The latter is clearly a mistake, while Timberlake (1916) opined that the former was likely to be in error as well, based on the host records of related species. *Aulacaspis rosae* was also reported as a host in Peck (1951, 1963), who mistakenly attributed this to Ashmead (1900: 408)—Ashmead instead listed only *D. perniciosus*.

coccois E. Smith 1880: 84
Type. USNM
Distribution. N (Los Angeles, Riverside, Tulare)
Host/habitat. *Oracella acuta*, *Phenacoccus acericola*, *P. aceris*, *P. gossypii*, *P. herreni*, *P. maderiensis*, *P. manihoti*; NEW: *Pseudococcus comstocki* (UCRC)
Remarks. Timberlake (1916) reported the locations of the types are not known, but Rosen (1969) redescribed the species from a cotype. The host record of *Pulvinaria vitis* (Linnaeus) attributed by Peck (1963: 401) to Howard (1895b) is incorrect.

fasciipennis Timberlake 1918: 348
Type. USNM
Distribution. C (Los Angeles, San Bernardino, Ventura)
Host/habitat. *Anisococcus crawii*; NEW: *Dysmicoccus ryanii* (UCRC)

flavidulus (Brèthes 1916: 424) (*Psilomirinus*)
Type. MACN
Distribution. E (San Luis Obispo)
Host/habitat. *Pseudococcus viburni*, *Pseudococcus* sp.
Remarks. This is a South American species, and material from Chile was used to begin an insectary colony in that country. Material from that colony was released from 1997–1999 in a biocontrol program against *Pseudococcus viburni* in San Luis Obispo and Santa Barbara counties, and the species was recovered in the former county almost ten years later, albeit at low rates (Daane *et al.* 2008). In the original description, this species was reportedly reared from the diaspidid, *Diaspis (=Pseudaulacaspis) pentagona*, but Noyes (2001) considers this an error.

maculipennis (Mercet 1923: 140) (*Pseudaphycus*)
Type. MNMS
Distribution. E (San Luis Obispo)
Host/habitat. *Pseudococcus maritimus*, *P. viburni*
Remarks. This is a Palearctic species that has been used successfully in New Zealand to control *P. viburni* (Daane *et al.* 2008). In 2006, material from New Zealand was brought into California quarantine, but has not yet been released (Daane, pers. comm.). Nevertheless, this species was reared from *P. viburni* in San Luis Obispo County in 2007.

malinus (Gahan 1946: 317) (*Pseudaphycus*)
Type. USNM
Distribution. E (Kern, Stanislaus, Tulare)
Host/habitat. Coccura siwakoensis, Pseudococcus comstocki, P. cryptus; NEW: Pseudococcus longispinus (UCRC)

Remarks. This species was established after being introduced from Japan in a biological control program against Pseudococcus comstocki in the 1970s (Meyerdirk & Newell 1979). Dysmicoccus brevipes has been cited as a host (Noyes 2001), based on the use of P. malinus in a biocontrol program against that species (Bartlett 1978c), but there are no records of the parasitoid attacking the mealybug. Pulvinaria vitis has been cited as a host of this species in the USSR (Shutova & Kukhtina 1955), but I suspect this is a misidentification of the host.

notativentris (Girault 1917b: 10) (Pseudaphycus)

Type. USNM

Distribution. N (Fresno, Kern, Los Angeles, Santa Clara, Solano, Stanislaus, Tulare)

Host/habitat. Dysmicoccus ryani, Eurycoccus blancharidii, Ferrisia virgata, Formicococcus njalensis, Pseudococcus comstocki, Pseudococcus maritimus, Pseudococcus viburni, Pseudococcus sp.

pallidus Timberlake 1918: 350

Type. USNM

Distribution. C (Kern, Ventura)

Host/habitat. Ferrisia virgata, Formicococcus njalensis, Phenacoccus gossypii, P. madeirensis, P. solani, Pseudococcus maritimus, Spilococcus atriplicis, S. eriogoni

texanus (Howard 1898a: 245) (Aphycus)

Type. USNM

Distribution. E (Imperial)

Host/habitat. Ferrisia virgata

Remarks. This species was imported from Mexico and released from 1966–1967 (DeBach & Warner 1969)

spp.

Remarks. Specimens determined as Acerophagus “meracus or near” were collected from Tulare county (UCRC). There are undetermined specimens of this genus from Alameda, Calaveras, Contra Costa, Lassen, Modoc, San Bernardino, San Joaquin, San Mateo, Santa Barbara, Santa Clara, Stanislaus, Tulare, Tuolumne and Ventura counties (CSCA, EMEC, RLZC, SJSC, UCFC), including a series (EMEC) recorded from Spilococcus sequoiae.

Adelencyrtus Ashmead 1900

Hosts. Hemiptera: Coccidae, Diaspididae

aulacaspidis (Brèthes 1914: 29) (Prionomitus)

Type. MACN

Distribution. W (Alameda, Contra Costa, Los Angeles, Marin, Ventura)

Host/habitat. Aulacaspis difficilis, A. rosae, Chionaspis salicis, Diaspidiotus macroporanus, Lepidosaphes cupressi, Pseudaulacaspis pentagona, Rhizopulvinaria nevesi

odonaspidis (Fullaway 1913: 27) [New State record] (RLZC)

Type. USNM

Distribution. A (Marin, Stanislaus)

Host/habitat. Duplachionaspis sansevieriae, Odonaspis ruthae, O. saccharicaulis, O. sp.

Remarks. Burks (1958b) reported a questionable host record of Antonia graminis, but I suspect this was due to a misreading of the host “Odonaspis graminis“ as reported in the original description. While O. graminis Bremner remains a valid species, the host of A. odonaspidis in Hawaii is actually O. ruthae (Ben-Dov 2006c). The host record of “Odonaspis sp.” (Noyes 2015) is probably referable to a misspelling of Odonaspis. Although
originally described in Hawaii, Timberlake (1919a) reported that its true place of origin was unlikely, but opined it may be from the warmer areas of Europe or Asia. The species has also been recorded from South Africa, Japan, Mexico, Brazil and the southeastern USA (Noyes 2001), and was introduced into Bermuda in a biocontrol program against *O. ruthae* (but failed to establish). I consider its presence in California as an adventitious introduction.

*Agarwalencyrtus* Hayat 1981 [New State record] (UCRC)

spp.

**Remarks.** An undescribed species (near *A. euroxes* Noyes 2010) was collected in a pan trap under *Adenostoma* sp. in Riverside County (UCRC).

*Ageniaspis* Dahlbom 1857

**Hosts.** Lepidoptera: Gracillariidae, Nepticulidae

*bicoloripes* (Girault 1915e: 172) (*Paraleurocerus*)

**Type.** USNM

**Distribution.** N

**Host/habitat.** *Caloptilia* sp., *Cameraria caryaefoliella*, *C. cincinnatiella*, *C. diabloensis*, *C. gaultheriella*, *C. ulmella*, *C. sp. probably wilsizeniella*, *C. sp.*, *Marmara fraxinicola, Phyllonorycter sp.*, *Stigmella inconspicuella*, *S. sp.*

**NEW:** *Cameraria hamameliiella, C. quercivorella, Phyllonorycter rileyella* (EMEC)

**Remarks.** This species was recorded from California by Gates *et al.* (2002), without detailed locality data. Gordh (1979: 920–921) regarded *Gibberella scutellata* Miller, 1961 as a junior synonym of *A. bicoloripes*, and included the host record of *Phyllonorycter lucetiella* (Clemens) (as *Lithocolletis lucetiella*) as originally noted by Miller (1961). Noyes (2001) treated them as separate species, but mistakenly transferred the host record of *P. lucetiella* to *A. bicoloripes*.

spp.

**Remarks.** Specimens (including some reared from *Argyresthia cupressella, Phyllonorycter inusitatella* and *Cameraria* sp.) that appear to represent three species of this genus were collected from Alameda, Calaveras, Contra Costa, Humboldt, Los Angeles, Mendocino, Monterey, Orange, Riverside, San Bernardino, San Diego, San Francisco, San Mateo, Santa Cruz, Siskiyou, Solano, Tehama and Ventura counties (CSCA, EMEC, RLZC, UCDC, USNM).

*Agromyzaphagus* Gahan 1912

**Hosts.** Diptera: Chamaemyiidae

detrimentosus* Gahan 1912: 7

**Type.** USNM

**Distribution.** W (Alameda, Contra Costa, El Dorado, Fresno, Inyo, Los Angeles, Modoc, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Clara, Shasta, Solano, Ventura, Yolo)

**Host/habitat.** *Leucopis glyphinivora, L. ?minor*

**Remarks.** Host records (dating to the 1930s) from EMEC and UCRC include “*Leucopis griseola*”. This is a Palearctic species, and is probably a misidentification of the Holarctic *L. annulipes* Zetterstedt (S. Gaimari, pers. comm.).
Ammonoencyrtus De Santis 1964

Hosts. Hyperparasitoid of Hemiptera: Coccidae via Hymenoptera: Encyrtidae

californicus (Compere 1925: 304) (Eusemion)

Type. USNM

Distribution. C (Alameda, Contra Costa, Los Angeles, Marin, Orange, Riverside, San Diego, Santa Barbara, Ventura, southern San Joaquin Valley)

Host/habitat. Hyperparasitoid of Ceroplastes cirripediformis, Coccus hesperidum, Saissetia oleae via Metaphycus lounsburyi, Microterys nietneri; NEW: Eulecanium kunoense (EMEC), Parthenolecanium corni, P. quercifex, Pulvinariella mesembryanthemi (UCRC)

Remarks. This species was first referred to by Timberlake (1913) as “Eusemion n. sp.”. A specimen from Contra Costa County (EMEC), reported from E. kunoense, is placed here, although it lacks the characteristic dark color of A. californicus (possibly from being stored in alcohol for several years). Bernal et al. (2001) reported this species on citrus (Rutaceae) from the southern San Joaquin Valley (Fresno, Kern and Tulare counties) without specifying exactly which county this species occurred in. They also reared this species from a batch of Coccus pseudomagnoliarum, noting that the exact host still needs to be confirmed.

Anicetus Howard [in Howard & Ashmead] 1896

Hosts. Hemiptera: Coccidae

annulatus Timberlake 1919b: 227

Type. USNM

Distribution. E (Alameda, Sacramento, San Francisco, Santa Clara)


Remarks. Timberlake (1913) noted this species in California in 1912 (as Anicetus sp.), although this record may represent specimens escaped from the State Insectary Laboratory in Sacramento. In 1922–23, a handful of individuals were released in Los Angeles County (Smith 1923), while large-scale releases started only in 1931, with material imported from Australia & Taiwan during several biocontrol programs (Bartlett 1978a). Trjapitzin & Ruiz Cancino (2009) reported two locations that are misreadings of the collection data. The first was reported as “ex Coccus sp. on Aralia, on Yenyo Marin Beach (San Francisco, Cal.) in 1922.” In actuality, the label reads “Taiyo Maru boat”—these specimens originated from a plant used as an ornamental on a Japanese steamer, which had docked in San Francisco (Compere 1924). The second was reported as “1 mile south of Centerville near Niliss, Calif., Dec. 1, 1940 (Flanders & Finney)”, but the label reads “Niles” (not Niliss), and notes that the specimen was reared from a scale on an orange tree. There are about ten “Centervilles” in the State of California, but this site is probably the one in Alameda County that is now part of the Niles district of Fremont. Timberlake (1913) initially reported this species as a hyperparasitoid, but in the formal description (taken from a Hawaiian population) he confirmed it is a primary (1919b).

Aphycaspis Hoffer 1954 [New state record]

Hosts. Neuroptera: Coniopterygidae [New host record]

spp.

Remarks. An undescribed species of this genus has been collected in Alameda, Calaveras, Contra Costa, El Dorado, Imperial, Inyo, Kern, Lake, Lassen, Los Angeles, Marin, Orange, Riverside, San Benito, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Stanislaus, Tuolumne and Ventura counties (CSCA, RLZC, UCDC, UCFC, UCRC). One specimen from San Diego is noted as “ex Black scale sample twigs”, while a specimen from
Orange County was reared from the larva of a coniopterygid (both UCRC). *Aphycaspis* is closely related to *Homalotylus* and *Isodromus*, both of which are also known as parasitoids of predators, so this new host record is not surprising. A single specimen collected in October from Stanislaus County (RLZC), represents a second new species.

*Aphycoïdes* Mercet 1921 [New state record]

**Hosts.** Hemiptera: Coccidae

*clavellatus* (Dalman 1820: 355) (*Encyrtus*) [New state record] (CSCA)

- **Type.** NHRS
- **Distribution.** W (Amador)
- **Host/habitat.** *Nemolecanium graniforme, Physokermes fasciatus, P. hemicryphus, P. jezoensis, P. piceae, P. sugonjaevi*
- **Remarks.** A single specimen that appears to be near this genus was collected in Mendocino (UCDC).

*Aphycus* Mayr 1876 [New state record]

sp.

- **Remarks.** *Aphycus immaculatus* Howard, the only described species previously reported from California (Noyes 2001), is now treated in the genus *Metaphycus*. However, specimens that appear to represent an undescribed species have been collected from Imperial (CSCA, UCDC), Riverside (UCRC) and Stanislaus (RLZC) counties.

*Arrenophagus* Aurivillius 1888 [New state record] (UCRC)

**Host.** Hemiptera: Diaspididae

*chionaspidis* Aurivillius 1888: 146 [New state record] (UCRC).

- **Type.** NHRS
- **Distribution.** W (Los Angeles)
- **Host/habitat.** *Aulacaspis rosae, A. tegalensis, Chionaspis ramakrishnai, C. salicis, Chrysomphalus dictyospermi, Contigaspis sp., Diaspidiotus forbesi, D. perniciosus, Diaspis boisduvalii, D. sp., Dynaspidiotus britanicus, D. tsugae, Fiorinia externa, F. saprosmae, Furchadaspis zamiae, Lepidosaphes japonica, Lopholeucaspis japonica, Parlatoria ziziphi, Pinnaspis aspidistrae, P. dysoxyli, P. strachani, Pseudaulacaspis cockerelli, P. pentegona, Unaspis citri*
- **Remarks.** Gowdey (1925) reported this species from the coccid *Parasaissetia nigra*, in Jamaica, but this is probably a misidentification.

*Blastothrix* Mayr 1876

**Hosts.** Hemiptera: Coccidae, Eriococcidae, Kermesidae

*americana* Sugonjaev 1983: 603

- **Type.** USNM
- **Distribution.** N (Alameda, Butte, Contra Costa, Marin, Monterey, Napa, San Francisco, San Joaquin, San Mateo)
Host/habitat. *Eulecanium cerasorum, Eulecanium* sp.; NEW: *E. excrescens* (EMEC)

Remarks. As Sugonjaev (1983:146) noted, discriminating species of *Blastothrix* is difficult, especially when dealing with limited numbers of specimens, so the identification of all the California specimens should be regarded as tentative.

sp. nr. *britannica* Girault 1917d: 8

Type. USNM


Host/habitat. *Parthenolecanium corni*

Remarks. *Blastothrix britannica* is a Palearctic species. A species imported from Europe and released and established in British Colombia in 1928–29 in a biocontrol program directed against *Eulecanium tiliae* was initially identified as *B. sericea*, later misidentified as *B. longipennis* Howard, and ultimately confirmed as *B. britannica* (Sugonjaev 1983). Reports of *B. sericea* in northern California, previously ascribed to the southward spread of this species (Barlett 1978a: 63), may be referable to *B. britannica* or *B. americana*. Sugonjaev (1983) reported specimens from Berkeley as “*B. sp. aff. britannica*”, but he noted the material was too scanty and differed from the Type. Specimens near to *B. britannica* collected from counties along virtually the entire coast of California (CAS, CSCA, RLZC, UCDC, UCRC) may be this same taxon.

*hedqvisti* Sugonjaev 1964: 386

Type. ZIN

Distribution. W (Alameda, Nevada, Ventura)

Host/habitat. *Eulecanium pubescens, Eulecanium* sp., *Parthenolecanium corni, P. fletcheri, P. pruinosum, P. quercifex*

Remarks. Sugonjaev (1983) recorded this species from California, undoubtedly based on specimens in the USNM. However, in this paper is a discrepancy in the relative lengths of the postmarginal and stigmal veins—the key states the former is shorter than the latter, but this appears not to be the case in his figure 3, nor in the original description (Sugonjaev 1964), so there may be some question if this species is truly present in the state. A specimen identified as “near *hedqvisti*” by Sugonjaev was reared from *Parthenolecanium corni* in Los Angeles County (UCRC).

*longipennis* Howard 1881: 366

Type. USNM

Distribution. W (Alameda, Calaveras, Contra Costa, Los Angeles, Mendocino, Monterey, Nevada, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Santa Clara, Santa Cruz, Sierra, Siskiyou, Solano, Sonoma, Ventura, Yolo, *Sierra Nevada*)

Host/habitat. *Eriococcus spurius, Eulecanium cerasorum, Nanokermes pubescens Parthenolecanium corni, P. fletcheri, P. pomeranicum, P. pruinosum, P. quercifex, P. rufulum*

Remarks. This species was initially identified by Compere as the parasitoid attacking *E. cerasorum* in Linden (San Joaquin County) (Michelbacher & Hitchcock 1957), but Sugonjaev (1983) has since described that parasitoid as *B. americana*. This suggests that any other pre-1983 report of *B. longipennis* from California (e.g. Timberlake’s (1924:251) record from Berkeley (Alameda County) and Struble & Bedard’s (1958) record from the Sierras) may also refer to *B. americana*. The latter paper also reports *Coleotechnites milleri* (Busck) (Lepidoptera: Gelechiidae) as a possible host, based on parasitoids emerging from foliage infested by the leaf miner, but it is far more likely that they instead issued from undetected scales. Another mistaken host record is *Eulecanium tiliae*, which was the result of a misidentification, and is properly attributable to *Blastothrix britannica* (Sugonjaev 1983: 142).

spp.

Remarks. There appears to be an undescribed species near *B. longipennis* from Alameda, Amador, Calaveras, Contra Costa, and Marin counties (CSCA, RLZC), and a second species from San Bernardino County (UCRC).
Bothriothorax Ratzeburg 1844

Hosts. Diptera: Syrphidae

californicus Howard 1895a: 609

Type. USNM
Distribution. C (Alameda, Alpine, Contra Costa, Fresno, Humboldt, Lassen, Marin, Mendocino, Merced, Mono/Tuolumne border, Monterey, Nevada, Riverside, Sacramento, San Francisco, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Sierra, Solano, Sonoma, Tehama, Trinity, Yolo, coastal southern California)

Host/habitat. Eupeodes nitens, Scaeva pyrastri, Syrphus opinator

Remarks. Howard described B. californicus from three specimens, noting the “types” were in the U.S. National Museum, but I found only two specimens there. The Nearctic Bothriothorax species are badly in need of revision—the only generic treatment was by Howard (1895a) and there are discrepancies between the specimens and the descriptions therein. This species may prove to be a senior synonym of B. faridi and B. rotundiformis (q.v.).

faridi Kamal 1926: 283

Type. USNM
Distribution. C (Santa Clara)

Host/habitat. Syrphus opinator

Remarks. In the original description, Kamal did not provide a diagnosis for this species. It is very close to B. californicus, and the only difference I could discern between the types of the two species is a pair of medial longitudinal carina on the propodeum of B. faridi (missing in B. californicus). However, this is not a reliable defining characteristic, as an examination of a series of specimens from Merced County show it is present in some specimens and absent from others, so I suspect B. faridi will prove to be a junior synonym of B. californicus.

nigripes Howard 1895a: 610

Type. USNM

Host/habitat. Eupeodes lapponicus, E. volucris

Remarks. In the original description, Howard erroneously reported the first funicle segment was as long as the pedicel. There is a series of specimens of this species from Los Angeles County that were apparently reared from the pupa of a Lycaenidae (Lepidoptera) (EMEC). Interestingly, this is not the first record of a Bothriothorax associated with Lepidoptera—B. altensteinii Ratzeburg 1844 has been reported as a hyperparasitoid of Lymantria dispar (Linnaeus) (Lepidoptera: Lymantriidae) via Exorista larvarum (Linnaeus)(Diptera: Tachinidae) (Erdös 1957), and B. paradoxicus (Dalman 1820) has been reported from L. dispar, as well as Phalera bucephala (Linnaeus) (Notodontidae), and as a hyperparasitoid of Gastropacha quercifolia (Linnaeus) (Lasiocampidae), via the tachinids Compsilura concinnata (Meigen), E. larvarum and Sturmia scutellata (Robineau-Desvoidy) (Gyorfi 1942). Although Noyes (2001) considers the Ph. bucephala record erroneous based on the discontinuity in the generic host range (predatory syrphids vs. parasitic tachinids), a similar dichotomy is present in the genus Syrphophagus, which are known as primary parasitoids of syrphids and hyperparasitoids of aphids.

rotundiformis Howard 1895a: 610

Type. USNM
Distribution. N (Placer)

Host/habitat. Unknown

Remarks. This species is known from only the single type specimen, which is very close to B. californicus. I am treating it as a good species, but further research may prove these two species to be synonymous.

spp.

Remarks. Specimens that appear to represent three additional species were collected in Alameda, Marin, Nevada, San Mateo and Santa Clara, Santa Cruz and Sonoma counties (CAS, EMEC, LACM, RLZC).
Brethesiella Porter 1920

**Hosts.** Hemiptera: Margarodidae

*mojave* V. Trjapitzin & S. Triapitsyn 2006: 7

- **Type.** UCRC
- **Distribution.** C (Los Angeles)
- **Host/habitat.** *Steatococcus tabernicolus*

Caenohomalopoda Tachikawa 1979 [New state record]

**Hosts.** Hemiptera: Diaspididae

*shikokuensis* (Tachikawa 1956: 90) (*Pseudhomalopoda*) [New state record] (USNM)

- **Type.** EUMJ
- **Distribution.** A (Orange) (USNM)
- **Host/habitat.** *Froghatitella penicillata*

**Remarks.** Trjapitzin (1989) reported *Odonaaspis secreta* as a host of this species in Korea, but it is unclear whether that host record is more properly ascribed to *C. koreana* Tachikawa, Paik & Paik 1981. This species is presumably native to eastern Asia, but has spread worldwide (it has been previously reported from Africa, the Caribbean and Florida) with the introduction of bamboo.

Cerapterocerus Westwood 1833 [New state record]

**spp.**

**Remarks.** One described species (*C. phragmitis* Gordh & Trjapitzin 1981) and three undescribed species of this genus have been reported from the Nearctic region (Noyes *et al.* 1997). There are fully winged and brachypterous specimens, representing what appear to be two undescribed species, from Alpine, Inyo, Lassen, Mono, Modoc, Santa Clara, Stanislaus and Tuolumne counties (CSCA, RLZC, UCDC, UCFC, UCRC).

Cerapteroceroideus Girault 1916 [New state record]

**Hosts.** Hemiptera: Diaspididae

*cinctipes* Girault 1916: 48 [New state record] (RLZC)

- **Type.** USNM
- **Distribution.** N (Marin)
- **Host/habitat.** *Rhizaspidiotus dearnessi*

**Remarks.** The specimens from Marin are brachypterous, but the color pattern clearly matches that of the original description.

**spp.**

**Remarks.** There appear to be two undescribed species from Alpine, Imperial, Inyo, Kern, Lassen, Marin, Riverside, San Bernardino, San Luis Obispo and Santa Cruz counties (CSCA, OSU, RLZC, UCDC, UCRC).

Cerchysiella Girault 1914

**Hosts.** Coleoptera: Nitidulidae
scutellata (Howard 1897: 156) (Aratus)

- **Type.** BMNH
- **Distribution.** U (Riverside)
- **Host/habitat.** Carphophilus hemipterus, Stelidota geminata
- **Remarks.** Except for a single record from Riverside (LaSalle & Gordh 1985), this species is known only from the West Indies and Brazil. As LaSalle & Gordh pointed out, it remains to be seen if the California record represents part of a broad distribution of the species, or the result of an adventitious introduction.

spp.
- **Remarks.** Specimens undetermined to species were collected in Alameda, Marin, Orange, Sonoma and Stanislaus counties (CSCA, RLZC, UCFC).

*Cerchysius* Westwood 1832 [New state record]

- **Hosts.** Diptera: Chamaemyiidae, Drosophilidae, Leucospidae

*marilandicus* Girault 1917e: 119 [New state record] (CAS, LACM, RLZC, UCDC)

- **Type.** USNM
- **Distribution.** N (Contra Costa, El Dorado, Lassen, Marin, Napa, Nevada, Plumas, Santa Clara, Sierra, Siskiyou, Solano, Stanislaus, Sutter, Tehama, Yolo)
- **Host/habitat.** Unknown
- **Remarks.** The name of the paper in which *C. marilandicus* was described was mistakenly recorded by Noyes (2001) as “Descriptions of miscellaneous Chalcid-Flies from California”, but in fact the last two words are not present in the title. Of the 12 described species in this genus, only three (*laticeps* Kerrich, *subplanus* (Dalman) and *ugandensis* Kerrich, all Palearctic taxa) have recorded hosts, all Diptera. However, there are two records in the literature of undescribed *Cerchysius* from Hemiptera: a *Cerchysius* species near *laticeps* was reared from a scale (“Coccid on wild plant”) in India (Shafee *et al.* 1975) (and not *C. laticeps* itself on a Pseudococcidae, as reported in Noyes & Hayat 1994 and Noyes 2001), and an undescribed species was reported as a hyperparasitoid on *Coccus hesperidum* via *Microterys nietneri* (as *M. flavus*) in California, and associated with *Saissetia oleae* (Timberlake 1913). There is also a record of a *Cerchysius* sp. as a hyperparasitoid on *Coelomera lanio* Dalman, via *Lydellothelaira collaris* Townsend (Diptera: Tachinidae) (Parker *et al.* 1953).

spp.
- **Remarks.** An apparently undescribed species is represented by a series of three specimens from Stanislaus County (UCFC).

*Cheiloneurus* Westwood 1833

- **Hosts.** Hyperparasitoids of Coleoptera: Coccinellidae; Diptera: Cecidomyiidae, Syrphidae; Hemiptera: Aclerdidae, Cicadellidae, Coccidae, Delphacidae, Eriococcidae, Kermesidae, Pseudococcidae; Neuroptera: Chrysopidae; via Hymenoptera: Dryinidae, Encyrtidae, Ichneumonidae, Perilampidae, Platygastridae

*albinotatus* De Santis 1964: 351 [New state record] (RLZC)

- **Type.** MLPA
- **Distribution.** W (San Benito, Santa Barbara)
- **Host/habitat.** Host unknown, but one specimen was swept from sedge (Cyperaceae), and a series of three specimens were swept from a grassy field.
- **Remarks.** Previously this species has only been recorded from Argentina, but in addition to those from California, specimens have been collected in Arizona and North Carolina (both UCRC).

*banksi* (Howard 1898a: 247) (*Chrysopophagus*)
Type. USNM

Distribution. N (Alameda, Calaveras, Contra Costa, Imperial, Inyo, Kern, Kings, Lassen, Los Angeles, Madera, Marin, Modoc, Napa, Nevada, Plumas, Riverside, San Benito, San Bernardino, San Diego, Santa Barbara, Santa Clara, Shasta, Sierra, Solano, Sonoma, Stanislaus, Tehama, Tulare)

Host/habitat. Hyperparasitoid of Antonina graminis, Eriococcus sp. via Pseudococcobius sp.; NEW: Phenacoccus sp. (UCRC), Dysmicoccus timberlakei, hyperparasitoid of Hyperaspis pleuralis via Homalotylus affinis (EMEC)

Remarks. The specimen (EMEC) reared from D. timberlakei is probably a hyperparasitoid of an undescribed species of Pseudleptomastix, which was reared from the same host. This appears to be a species with a high variation in body color—ranging from coppery fuscous with yellow patches to almost totally dark, with the scutellum always at least partly yellow. A Cheiloneurus species near banksi was collected from Inyo County (UCDC), and there is another long series from Los Angeles and Riverside counties (UCRC).

compressicornis (Ashmead 1894: 246) (Chrysophophagus)

Type. USNM

Distribution. N (Los Angeles, Nevada, Orange, Riverside, San Bernardino, San Diego)

Host/habitat. Hyperparasitoid of undetermined Syrphidae, Ceraeochrysa cubana, C. sanchezi, C. valida, Chrysopea nigricornis, Chrysoperla plorabunda, C. rufilabris, via Isodromus iceryae, I. niger, Gelis tenellus, Perilampus chrysopae; NEW: Chrysopa oculata, undetermined Hemerobiidae (both UCRC).

Remarks. Two Cheiloneurus species near compressicornis were collected in Nevada & Sierra Counties (UCDC), another from Imperial County (UCRC), and two more specimens from Riverside County, which were reared from a whitefly on Encelia sp. (Asteraceae). Chrysoperla carnea (Stephens) has been recorded as a host in North America, but some authorities consider this species is restricted to the Palearctic, and would attribute such Nearctic host records to the C. plorabunda complex. The host record of a syrphid fly stems from a single observation by McGregor (1914)—it remains to be seen if this represents a misidentification, or if the secondary host range of C. compressicornis does indeed extend beyond the Neuroptera (there are no records of I. iceryae, I. niger, G. tenellus or P. chrysopae attacking any Diptera).

elegans (Dalman 1820: 151) [New state record](RLZC)

Type. NHRS

Distribution. W (Contra Costa, Marin, Stanislaus)

Host/habitat. Hyperparasitoid of undetermined Cicadellidae, Aclerda subterranea (via Platygaster zosinae), Acleida subterranea (via Paraphaenodiscus subterraneus), Eulecanium francoicium, Phenacoccus hordei, Physokermes piceae, Pulvinaria vitis, Trionymus abberans

Remarks. In South America and the Old World, this species is recorded as a hyperparasitoid of Acleridae, Pseudococcidae and Coccidae, whereas in North America it is only known as a hyperparasitoid of Diptera, which suggests records of this species represents a complex of species or two biological races of one species (Ferriere 1952). Neunenschwander et al. (1987) reported Cheiloneurus ?elegans as a hyperparasitoid of Phenacoccus manihoti via Anagyrus lopeti in Africa, but this identification has apparently never been confirmed. Eupelmus elegans Dalman 1820, is a junior of C. elegans (Noyes 2001), which led Noyes (2001) to mistakenly record Rhyacionia buoliana as a host of this species, based on the report of Millan de De Santis & De Santis (1960). However, the host record in that paper referred to Eupelmus elegans Blanchard 1942.

flaccus (Walker 1847: 21) (Encyrtus)

Type. BMNH

Distribution. N (Alpine, Contra Costa, Inyo, Marin, Monterey, Sacramento, Sonoma, Stanislaus)

Host/habitat. Hyperparasitoid of undetermined Cicadellidae; Megamelus proserrina via Echthrodelphax fairchildii, Haplogonatopus vitiensis, Pseudogonatopus hospes

Remarks. This species was described from material collected in Ohio, and has become established in Hawaii.
*inimicus* Compere 1925: 297

**Type.** USNM

**Distribution.** W (Alameda, Amador, Butte, Calaveras, Contra Costa, El Dorado, Los Angeles, Riverside, San Benito, San Bernardino, San Luis Obispo, Santa Barbara, Santa Clara, Stanislaus, Solano, Tulare, Ventura)

**Host/habitat.** Hyperparasitoid of *Ceroplastes* sp., *Physokermes insignicola*, *Saissetia oleae* via *Metaphycus lounsburyi*, *M. physokermis*; **NEW:** *Amonostherium lichtensioides*, *Lecanodiaspis rufescens*, *Pulvinaria mesembryanthemi* via *Diversinervus elegans*, *Microterys nietneri* (all UCRC)

**Remarks.** Specimens of a *Cheiloneurus* species near *inimicus* were collected from Fresno and Tehama counties (EMEC), Marin County (RLZC) and San Bernardino County, the latter having emerged from a gall on a *Quercus* sp. (Fagaceae) (UCRC). McCoy & Selhime (1970) reported this species as a primary parasitoid of *S. oleae* based on the lack of host remains, but Rosen (1981) corrected this, pointing out that hyperparasitoids can consume their entire host.

*lineascapus* Gahan 1910: 207

**Type.** USNM

**Distribution.** N (Los Angeles, Napa, San Bernardino, San Diego, Ventura)

**Host/habitat.** Hyperparasitoid of *Kermes nigropunctatus*, *Saissetia oleae* via *Metaphycus lounsburyi*; **NEW:** *Radiococcus kelloggii* (EMEC)

**Remarks.** The host record of a *Kermes* sp. on lilac (Oleaceae) given in the original description is probably a misidentification, since as far as is known, *Kermes* spp. are restricted to *Quercus* spp.

*noxius* Compere 1925: 302

**Type.** USNM

**Distribution.** C (Contra Costa, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Stanislaus)

**Host/habitat.** Hyperparasitoid of *Coccus hesperidum*, *Saissetia coffeae*, *S. oleae* via *Diversinervus elegans*, *Metaphycus lounsburyi*, *M. luteolus*, *M. stanleyi*, *Microterys nietneri*

**Remarks.** This species was accidentally established in Hawaii (Beardsley 1976). In nature, this species is probably restricted to *S. oleae/M. lounsburyi*—all other host records are from laboratory rearings. Weseloh (1969) reported this species appears to be able to discriminate between encyrtid and aphelinid primary parasitoids in the scale host.

**spp.**

**Remarks.** In addition to the species listed above, I have seen specimens that appear to represent an additional 10 morphospecies present in the state

*Cirrhencyrtus* Timberlake 1918

**Hosts** (Hemiptera: Pseudococcidae)

*ehrhorni* (Timberlake 1916: 564) (*Pseudococcobius*)

**Type.** USNM

**Distribution.** C (Alameda, Contra Costa, Los Angeles, Monterey, San Francisco, San Mateo, Santa Clara, Stanislaus, Ventura)

**Host/habitat.** *Dysmicoccus ryani*, *Spilococcus implicatus*, *S. sequoiae*

**spp.**

**Remarks.** Specimens that appear to represent an undescribed species were collected in Contra Costa County (RLZC).
**Coccidencyrtus Ashmead 1900**

**Hosts.** Hemiptera: Diaspididae

*infuscatus* Compere & Annecke 1961: 61

- **Type.** USNM
- **Distribution.** C (Riverside, Tulare)
- **Host/habitat.** *Diaspidiotus juglandisregiae*

*ochraceipes* Gahan 1927: 18

- **Type.** USNM
- **Distribution.** W (Alameda, Los Angeles, San Diego)
- **Host/habitat.** *Diaspis boisduvalii, Diaspis bromeliae, Diaspis sp.*

**Coccidoctonus Crawford 1912**

**Hosts.** Hyperparasitoid of Hemiptera: Asterolecaniidae, Coccidae via Hymenoptera: Aphelinidae, Encyrtidae, Pteromalidae

*dubius* (Girault 1915a: 102) (*Rhopalencyrtoidea*)

- **Type.** QM
- **Distribution.** E (Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, Santa Clara, Stanislaus, Ventura)
- **Host/habitat.** Hyperparasitoid of *Coccus hesperidum, C. viridis, Parasaissetia nigra, Russeliaspis pustulans, Saissetia coffeae, S. oleae* via *Anicetus beneficus, Coccophagus ceroplastae, C. merceti, Encyrtus infelix, Metaphycus lounsburyi, M. varius, Microterys nietneri, Moranila californica, Scutellista caerulea*

**Remarks.** This species, referred to in the literature as *Quaylea whittieri* (Girault 1918), was imported from Australia in 1901 under the mistaken belief it was a primary parasitoid of *S. oleae*. One synonym (and *nomen nudum*) of *C. dubius* is *Hemencyrtus crawii* Craw. Girault has been mistakenly attributed as the author of this name, but it was Ashmead who devised the name (without description), which was first published in Craw’s (1902) report. Essig (1926) considered this species to be the chief factor in reducing the efficiency of *S. caerulea* and *M. lounsburyi* attacking *S. oleae* in southern California. Bernal et al. (2001) reported this species on citrus from the southern San Joaquin Valley (Fresno, Kern and Tulare counties) without specifying exactly which county this species occurred in. They also reared this species from a batch of *Coccus pseudomagnoliarum*, noting that the exact host still needs to be confirmed.

**Coelopencyrtus Timberlake 1919b**

**Hosts.** Hymenoptera: Apidae, Colletidae

*hylaeoleter* Burks 1958a: 24

- **Type.** USNM
- **Distribution.** N (Alameda, Los Angeles, Santa Clara, Yolo)
- **Host/habitat.** *Ceratina acantha, C. punctigena, C. sp., Hylaeus ellipticus, Hylaeus sp.*

**Remarks.** Daly et al. (1967) reported that the undetermined *Ceratina* species was either *C. acantha* or *C. nanula* Cockerell, but no adult bees were available for the specific identification.

spp. **Remarks.** Specimens that may represent undescribed species were collected from Contra Costa (EMEC, RLZC), Los Angeles (LACM), Marin (RLZC), San Diego (CSA), and Mono and Siskiyou (USNM) counties.
Comperia Gomes 1942

Hosts. Blattodea: Blattellidae

merceti (Compere 1938: 317) (Dicarnosis)

Type. BMNH

Distribution. E (Alameda, Contra Costa, Riverside, Sacramento, San Diego, Stanislaus, Yolo)

Host/habitat. Supella longipalpa, Supella supellectilium

Remarks. This appears to be a tropical species that has become adventitiously established around the world. This species was imported into California using Hawaiian stock in a biocontrol programs against cockroaches in the late 1970s and was reported established (Slater et al. 1981). However, there is a single specimen from Contra Costa County (EMEC) collected in 1957, indicating the species was probably already present in the state. Gomes (1942) reported Blattella germanica as a host, but Roth and Willis (1960) noted that this was not based on rearing records. Lawson (1954) reported that C. merceti was unable to attack Blatta orientalis and Periplaneta americana ootheca, but a single specimen (UCRC) was reportedly reared from a Periplaneta sp.

Comperiella Howard 1906

Hosts. Hemiptera: Diaspididae

bifasciata Howard 1906

Type. USNM

Distribution. E (Butte, Glenn, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Tulare, Ventura)


Remarks. This is an Oriental species imported into many countries during various biological control programs. It was released in California from 1906 through 1952 (primarily for control of Aonidiella aurantii); the earliest importations failed, but the species finally became established in California in the mid-1920s (Rosen & DeBach 1978). This species was also introduced into Hawaii for control of several species, including Saissetia coffeae, even though it has never been demonstrated that this species is acceptable host (Funasaki et al. 1988).

Copidosoma Ratzeburg 1844

Hosts. Lepidoptera: Argyresthiidae, Blastobasidae, Coleophoridae, Gelechiidae, Geometridae, Hepialidae, Noctuidae, Notodontidae, Oecophoridae, Pyralidae, Tortricidae, Yponomeutidae

albipes (Westwood 1837b: 440) [New state record]

Type. OUNH

Distribution. W

Host/habitat. Anacampsis innocuella, A. niveopulvella, A. populella, Choristoneura conflictana, Coleophora viburniella, Epinotia solandria, Gelechia turpella, Holcocera modestella, Pseudosciaphila duplex

Remarks. Zolnerowich (in litt.) reported specimens of C. innocuellae Barron from California, but did not note the exact locations. In 2005, Guerrieri & Noyes synonymized C. innocuellae under C. albipes, thus extending the latter’s distribution range from Europe to the Holarctic.

bakeri (Howard 1898a: 238) (Berecyntus) [New state record] (UCRC)

Type. USNM

Distribution. W (El Dorado, Los Angeles, Orange, Sacramento, San Bernardino, Siskiyou, Sutter)

Remarks. Specimens identified as “C. bakeri?” have been collected from Mono County (CSCA), and Kern and Riverside Counties, with Agrotis ipsilon noted as a host (UCRC). Peck (1963) reported Pissodes strobi (Coleoptera: Curculionidae) as a host, citing MacAloney in Taylor (1929) as the authority. However, MacAloney did not positively associate C. bakeri with P. strobi, he merely reported that the parasitoid was reared from pine leaders which were infested with the weevil—undoubtedly C. bakeri had emerged from an unseen lepidopteran which was also in the plant material.

bucculatricis (Howard 1892: 366) (Pentacnemus) [New state record] (USNM, UCDC)

Type. USNM

Distribution. N (San Diego, Trinity)

Host/habitat. Argyresthia aureoargentella, A. freyella, A. libocedrella, A. thuella, Coleophora ulmifoliella, Coleotechnites thujaella

Remarks. Noyes (2001), citing Peck (1963), noted “Diptera (leaf miner)” as a host, but the original report upon which this record is based is in fact Proctor (1938), in which C. bucculatricis is reported from a leaf miner on arbor vitae (Cupressaceae), without any indication as to the taxon of the leaf miner.

capsicum Burks 1967: 54 [New state record] (EMEC, RLZC)

Type. USNM

Distribution. W (Alameda, Contra Costa, Marin, Santa Barbara, Sonoma)

Host/habitat. Gnorimoschema gudmanella, Phthorimaea operculella, Symmetrischema capsica, Diatraea sp, Lineodes sp.

celaenae Howard 1885: 11 [New state record] (EMEC, LACM, USNM, UCDC, UCRC)

Type. USNM


Host/habitat. Agrotis orthogonia, Eupsilia spp., Euxoa declarata, E. messoria, E. ochrogaster, E. perpolita, E. scoticola, E. tristicula, Feltia jaculifera, Lacinipolia renigera, Peridroma saucia, Polia purpurissata, Protolompra rufipunctata, Rhynchagrotis cupida, Xestia mustelina; NEW: Agrotis ipsilon (EMEC), Agrotis sp. (UCRC)

cervius (Walker 1846: 177) [New state record] (BMNH, CAS, ROM, UCDC, UCRC)

Type. BMNH

Distribution. W (Fresno, Kern, Marin, Orange, Placer, Riverside, San Bernardino, Solano, Sonoma, Tulare)


Remarks. Guerrieri & Noyes (2005) note that host records of Chloroclystis v-ata (Lepidoptera: Geometridae) and Cydia strobilella (Lepidoptera: Tortricidae) require confirmation.

deceptor Miller 1958: 58

Type. CNC

Distribution. N (Calaveras, Mariposa, Riverside, San Bernardino, Tulare, Tuolumne)


Remarks. Craighead (1950) reported Recurvaria nanella Denis & Schiffermüller (a Palearctic species) as a host of C. deceptor, but this undoubtedly was based on European records of C. nanellae Silvestri, the name by
which the American species was known until Miller (1958) separated the two taxa.

*floridanum* (Ashmead 1900: 365) (*Berecyntus*)

**Type.** USNM

**Distribution.** W (Alameda, Calaveras, Contra Costa, Fresno, Imperial, Kern, Lake, Lassen, Los Angeles, Marin, Merced, Nevada, Orange, Riverside, Sacramento, San Diego, San Joaquin, Santa Clara, Sierra, Solano, Stanislaus, Tulare)

**Host/habitat.** *Agrapha agnata*, *A. tarassota*, *Argyrogramma signatum*, *Autographa gamma*, *Chrysodeixis acuta*, *C. argentifera*, *C. chalcites*, *C. eriosoma*, *C. sp.*, *Mamestra brassicae*, *Nebrarctia obliqua*, *Plusia sp.*, *Polychrysia moneta*, *Pseudoplusia includens*, *Rachiplusia nu*, *Thysanoplusia orichalcea*, *T. intermixta*, *Trichoplusia ni*; **NEW:** *Autoplusia egena* (CSCA), *A. oliveacea* (LACM)

**Remarks.** This is a cosmopolitan species, very similar to *C. truncatellum*, and pre-1988 records of either species should not be taken at face value. Noyes (1988a) and Guerrieri & Noyes (2005) noted the characteristics useful for separating the two, and suggest that *C. floridanum* is probably host-specific on noctuids from the subfamily Plusiinae, and that records from non-plusiines may be attributable to *C. truncatellum*. Conversely, they note that the following host records of *C. truncatellum* are probably instead attributable to *C. floridanum*:

- *Autographa californica*, *A. egena*, *A. gamma*, *A. sp.*, *Euchalcia modestoides*, *Lamprotes c-aureum*, *Plusia festucae*, *Rachiplusia ou*, *Syngrapha epigaea*. De Santis & Monetti (2008) reported *Peridroma saucia* as a host, but this is probably a misidentification. A short series (LACM) was labelled "D. menippe" (=*Danaus plexippus* Linnaeus, *Nymphalidae*), but this also may be a misidentification.

gelechiae Howard 1885: 10 [New state record] (RLZC)

**Type.** USNM

**Distribution.** N (Calaveras, Lassen, Marin, Modoc, San Mateo)

**Host/habitat.** *Coleotechnites atrupictella*, *Gnorimoschema gallerasterella*, *G. gallaesolidaginis*, *G. gibsoniella*, *G. salinaris*, *G. sp.*, *Epiblema scudderiana*

**Remarks.** De Santis (1979) reported this species from Peru, attacking *Tuta (=Gnorimoschema) absoluta* (Meyrick). Since all other records of this species are from North America, I believe this single South American record represents a different species.

**howardi** Zolnerowich & Zuparko 2011 (*Parapsilophrys*)

**Type.** USNM

**Distribution.** N (Lake, Lassen, Nevada, Placer, Sacramento, Stanislaus)

**Host/habitat.** *Acleris sp.*, *Anacampsis niveopulvella*, *Apotomis sp.*, *Archips sp.*, *Gelechia lynceella*, *G. sp.*, *Pandemis canadana*, *Recurvia sp.*

**Remarks.** This is a replacement name for *C. gelechiae* Howard 1898a, a junior homonym of *C. gelechiae* Howard 1885. Özdikmen (2011) subsequently proposed the replacement name *C. americanum* for this same species.

koehleri Blanchard 1940: 107

**Type.** MLPA

**Distribution.** E (Southern California)

**Host/habitat.** *Ptithorimae operculella*, *Scrobipalpa absoluta*, *Symmetrischema tangolias*

**Remarks.** The initial importations of *Copidosoma* stock from South America released in California for control of *P. operculella* were originally credited to this species. However, as Annecke & Mynhardt (1974) pointed out, these importations were actually of *C. desantisi* (which failed to establish). But in the 1960s, *C. koehleri* was imported from Argentina and did establish (Oatman 1978). *Cydia molesta* (*Lepidoptera: Tortricidae*) has been recorded as a host, but this is doubtful.

pyralidis (Ashmead 1888: 15) (*Encyrtus*)

**Type.** USNM

**Distribution.** E (San Bernardino, Sutter, Yolo, Yuba)

**Host/habitat.** *Anarsia lineatella*, *Dichomeris flavocostella*, *D. setosella*
Remarks. This species was described from Florida, and has been reported from throughout the eastern USA, as far west as Utah, as well from Europe (Peck 1963), although Guerrieri & Noyes (2005) suggest the European records refer to *C. varicorne* (*q.v.*). In 1932, specimens from the eastern USA were released in Yuba County, and subsequently recovered (Clausen 1956a). Specimens labelled as this species collected from San Bernardino County (UCRC) may in fact be descendants of the material imported from France, and therefore represent *C. varicorne*, which may prove to be the senior synonym of *C. pyralidis*.

*truncatellum* (Dalman 1820: 168)

**Type.** NHRS

**Distribution.** W (Fresno, Lassen, Monterey, Nevada, Orange, Santa Clara, Sierra, Solano)


**Remarks.** This species has been commonly confused with *C. floridanum* (*q.v.*), and similarly has been erroneously associated with numerous hosts (see Guerrieri & Noyes 2005). Noyes (2001) listed this species as a “Biocontrol introduction” in California. However, the species was never purposely imported into the state although an attempt was made to propagate field-collected *C. truncatellum* and then release it back in the field (Clancy 1969).

*vagum* Howard 1885: 11 [New state record] [BMNH, CSCA, CNC, LACM, USNM]

**Type.** USNM

**Distribution.** N (Riverside, Shasta, Sonoma, Tulare)

**Host/habitat.** Argyrotaenia quercifoliana, *Aroga trialbaculamella*, Filatima pseudacaciella, *Gelechia sp.*, Hofmannophila pseudospretella; **NEW** Chionodes kubai (CSCA)

*varicorne* (Nees 1834: 214) [New state record] (EMEC)

**Type.** OUNH

**Distribution.** E (Colusa, Orange, San Bernardino)

**Host/habitat.** *Acleris hippophacana*, *Anarsia eleagnella*, *A. ephippias*, *A. lineatella*, *A. sagmatica*, *A. spartiella*, *A. sp.*, Compsolechia anisogramma, *Cydia funebrana*, *C. molesta*, *C. pomonella*, Cydia *sp.*, Dichromeris eridantis, Eucosma *sp.*, Gypsosoma minutana, Lobesia inculata, *Tortrix viridana*

**Remarks.** In 1931 a biocontrol program was initiated against *Anarsia lineatella* using *Copidosoma pyralidis*, an important parasitoid of this species known from the eastern USA, and thought to occur in Europe as well. European specimens were easier to obtain, and so specimens from France were imported into the USA, released near Yuba City (Sutter County) and Chino (San Bernardino County), and subsequently recovered (Oatman 1978). However, Guerrieri & Noyes (2005) opined that the French populations were actually *C. varicorne*, and recovered specimens (EMEC) certainly key out to that species. In 1932, additional releases of domestically obtained *C. pyralidis* were made in Yuba County (and subsequently recovered as well), and so “true” *C. pyralidis* is present in California, although *C. pyralidis* may prove to be a junior synonym of *C. varicorne*.

*spp.*

**Remarks.** *Copidosoma filicorne* (Dalman 1820) is an Old World species that became established in eastern North America—a single specimen (UCDC) from Fresno County closely resembles this species, although it varies in several details. Additionally, at least 5 other undescribed species occur in California (Zolnerowich, in litt.).

*Copidosomopsis* Girault 1915a

**Hosts.** Lepidoptera: Pyralidae, Tortricidae

*plethorica* (Caltagirone 1966: 146) (Pentalitomastix)

**Type.** CAS

**Distribution.** E (Alameda, Butte, Fresno, Kern, Madera, Santa Clara)
Host/habitat. *Amyelois transitella*, *Apomyelois ceratoniae*, *Cydia caryana*

Remarks. This species was introduced into the San Joaquin Valley from the 1960s through the 1970s from Mexico (Meals & Caltagirone 1995). Although the initial importations probably failed (Clausen 1978c, as *Pentalitomastix* sp.), by 1979 this species had established in both the Sacramento and San Joaquin Valleys (Legner 1983).

tanytmemus Caltagirone 1985: 705

Type. CAS

Distribution. C (El Dorado, Los Angeles, Stanislaus)

Host/habitat. *Ephestia kuehniella*

Remarks. The holotype was originally deposited with the Division of Biological Control, University of California, Berkeley, but was transferred to the California Academy of Sciences in 1993 (Zuparko & Hamai 1994).

spp.

Remarks. Specimens that represent an undescribed species were collected in Marin and Modoc counties (RLZC).

Deilio Noyes & Woolley 1994

Hosts. Hemiptera: Margarodidae

xilococculi (Beardsley & Gordh 1988: 161) (*Parechthrodryinus*)

Type. USNM

Distribution. C (El Dorado, Mariposa, Napa, Placer, Riverside)

Host/habitat. *Xilococcus macrocarpa*

Discodes Förster 1856

Hosts. Hemiptera: Asterolecaniidae, Coccidae, Diaspididae, Eriococcidae, Pseudococcidae

arizonensis (Howard 1898a 248) (*Phaenodiscus*) [New state record](UCRC)

Type. USNM

Distribution. N (Imperial)

Host/habitat. Unknown

spp.

Remarks. Gordh (1979) reported an undescribed species of this genus from California and Washington that feeds on *Planchonia arabidis* Signoret. I have seen specimens that appear to represent seven morphospecies from Alpine, Butte, Contra Costa, Lake, Los Angeles, Marin, Riverside, Santa Clara, Solano, Sonoma, Stanislaus, Tehama, Tuolumne and Yolo counties (CSCA, EMEC, RLZC, UCDC, UCFC, UCRC, USNM).

Diversinervus Silvestri 1915

Hosts. Hemiptera: Coccidae

elegans Silvestri 1915: 304

Type. DEZA

Distribution. E (Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura)

Host/habitat. *Ceroplastes brevicauda*, *C. destructor*, *C. floridensis*, *C. rusti*, C. sp., *Coccus hesperidium*, *C. pseudomagnoliarum*, *Drepanococcus chiton*, *Eulecanium kunoense*, *Gascardia* sp., *Inglisia* sp., *Marsipococcus*
Remarks. The first effort to import this species (in a \textit{Saissetia oleae} biocontrol program) into California was in 1931, but the stock perished in transit (Compere 1931). Successive importations (from Eritrea in 1953 and Lebanon in the mid-1960s) proved more successful, and it was released throughout the state (Lampson & Morse 1992). Initially, this species was recovered wherever \textit{S. oleae} occurred in southern California (Bartlett & Medved 1966), but later studies found it only established in the coastal region of southern California (Kennett 1986; Lampson & Morse 1992), possibly as a result of being outcompeted by other imported natural enemies. Lampson and Morse (1992) suggested that \textit{D. elegans} can act as a hyperparasitoid, but the detailed studies of Bartlett & Medved (1966) found no evidence of such (although second instar larvae will engage in combat to reduce the number of supernumeraries). Specimens from UCRC are recorded from \textit{Aonidiella aurantii}, but I suspect these are misidentified.

\textit{Echthroplexiella} Mercet 1921

spp.

Remarks. Until recently, this genus was known only from the Palearctic region, but Trjapitzin (2006) described a new species from Mexico, and reported another undescribed species from Pt. Reyes, Marin County (EMEC) (the collecting labels read “North Beach Turnoff, ungrazed plot”, not “North Beach Tarnhoff, ungrazed plot” as reported by Trjapitzin). Additional specimens of this species were collected in Lassen, Marin, Nevada, Santa Barbara (RLZC) and San Bernardino (UCRC) counties. Specimens which appear to represent a second species were collected in Inyo County (UCRC).

\textit{Echthroplexis} Förster 1856

Hosts. Neuroptera: Hemerobiidae

\textit{planiformis} (Howard 1895a: 611) (\textit{Bothriothorax})

Type. USNM


Host/habitat. \textit{Hemerobius pacificus}

Remarks. There is a host record of a ?\textit{Sympherobius} species (UCRC).

\textit{Encyrtus} Latreille 1809

Hosts. Hemiptera: Coccidae, Diaspididae, Eriococcidae, Pseudococcidae

\textit{aurantii} (Geoffroy 1785: 386) (\textit{Cynips})

Type. Probably lost, but possibly in MNHN (J. Noyes, pers. comm.)

Distribution. W (Contra Costa, Los Angeles, Tulare, \textit{southern San Joaquin Valley, southern California})


Remarks. In two recent studies, this species was reported (as \textit{E. lecaniorum}) on citrus from the southern San Joaquin Valley (including Fresno, Kern & Tulare counties) and from a region further south (Riverside, San Bernardino and San Diego counties), but the exact counties it occurred in were not specified (Bernal et al. 2001; Kapranas et al. 2007). The former paper mistakenly claimed the host record of \textit{Coccus pseudomagnoliarum} as new, but this association had been earlier reported by Trjapitzin (1957).
fuscus (Howard 1881: 363) (Comys)

**Type.** USNM

**Distribution.** N (Alameda, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Los Angeles, Marin, Mariposa, Modoc, Monterey, Napa, Nevada, Orange, Plumas, Riverside, San Benito, San Bernardino, San Luis Obispo, Santa Barbara, Santa Clara, Shasta, Sierra, Solano, Sonoma, Stanislaus, Tehama, Ventura, Yolo)

**Host/habitat.** Eulecanium cerasorum, E. tiliae, Eulecanium sp., Mesolecanium nigrofasciatum, Parthenolecanium cerasifex, Parthenolecanium corni, Parthenolecanium persicae, P. pruinorum, P. quercifex, Pulvinaria vitis, Saissetia coffeae, S. sp.

**Remarks.** Specimens in the CSCA were reared from a “Lecanium” species.

infelix (Embleton 1902: 223) (Comys)

**Type.** CUMZ

**Distribution.** E (Alameda, Colusa, Orange, San Diego, Tulare, Tuolumne, Ventura, Yolo)

**Host/habitat.** Ceroplastes madagascariensis, Coccus hesperidum, Parasaissetia nigra, Protopulvinaria pyriformis, Pulvinaria urbicola, Saissetia coffeae, S. oleae

**Remarks.** Imported from Hawaii in 1921 in an S. oleae biocontrol program, this species was reported established in California (Bartlett 1978a). It was not recovered in later surveys of S. oleae parasitoids (Kennett 1986; Daane et al. 1991; Lampson & Morse 1992), but was collected once in northern California in 1994 (RLZC).

saliens Prinsloo & Annecke 1978: 329

**Type.** PPR1

**Distribution.** E (?)

**Host/habitat.** Pulvinaria delottoi, Pulvinariella mesembryanthemi, P. sp.

**Remarks.** Introduced into California from South Africa in the early 1980s in a biocontrol program against P. mesembryanthemi and P. delottoi, this species, along with Metaphycus funicularis and M. stramineus, established immediately and are credited with the successful control of those species (Tassan & Hagen 1995), although I have been unable to determine the exact collection localities.

*Epitetracnemus* Girault 1915a [New state record]

**Hosts.** Hemiptera: Asterolecaniidae, Coccidae, Diaspididae

**intersectus** (Fonscolombe 1832: 305) (Encyrtus) [New state record] (EMEC, RLZC)

**Type.** Lost

**Distribution.** W (Alameda, Contra Costa, Yuba)


**Remarks.** De Santis (1989) reported Carulaspis minima (Signoret) as a host from Bermuda, while Noyes (2001) reported both C. minima and Lepidoasphes newsteadi (Šulc) as hosts. These records appear to be erroneous, traceable to the biocontrol program directed against these two pests in Bermuda (Bennett & Hughes 1959). Although *E. intersectus* was exported from Italy as part of this program, I could find no primary records indicating that this species was successfully reared from either host.

*Eusemion* Dahlbom 1857

**Hosts.** Hyperparasitoids of Hemiptera: Coccidae via Hymenoptera: Encyrtidae
longipenne (Ashmead 1888: 17) (Mira)

Type. USNM

Distribution. N (Contra Costa, Marin, San Mateo, Santa Barbara, Sonoma, Tehama)

Host/habitat. Hyperparasitoid of Coccus hesperidum, Eulecanium sp. via Metaphycus flavus and Microterys nietneri; NEW: Saissetia coffeae (UCRC)

Remarks. Gordh (1979) listed this species as E. longipennis. It is a Nearctic taxon, although Peck (1963) opined it might be a synonym of E. cornigerum (Walker 1838) (a Palearctic species), thus resulting in a Holarctic distribution for the species. Annecke (1967) accepted this synonymy (without formalizing it), but other authors have not, and treat them as two separate species. A series of specimens (UCRC) is recorded from “Aphycus sp. in Coccus hesperidum”, but the host is undoubtedly a Metaphycus species.

Exoristobia Ashmead 1904

spp.

Remarks. An undetermined species, recorded from “Xylococcus” has been collected from Riverside County, as well as a second specimen questionably from this genus (UCRC). Gordh (1979) reported an undescribed species (with a Girault manuscript name) of this genus from California under Parasyrpophagus.

Forcipestricis Burks 1968 [New state record] (CSCA, RLZC)

Hosts. Diptera: Ceratopogonidae

spp.

Remarks. Specimens that appear to represent an undescribed species near to gazeaui Burks, 1968 were collected in Contra Costa (RLZC) and Lake (CSCA) counties.

Formicencyrtus Girault 1916

Hosts. Hemiptera: Dactylopiidae, Pseudococcidae

neomexicanus (Ashmead 1900: 355) (Anusia)

Type. USNM

Distribution. N (Riverside)

Host/habitat. Amonosterium lichtensioides

Remarks. A specimen from Riverside (UCRC) is recorded as “on Erium n. sp.”, a monotypic genus that is restricted to Australia, so this host record probably refers to an undetermined pseudococcid.

thoreauini Girault 1916: 45 [New state record] (UCDC)

Type. USNM

Distribution. N (Inyo)

Host/habitat. Dactylopius confusus

Remarks. Both of the named species of this genus were described from brachypterous specimens. Fully winged specimens were collected in Imperial County (UCDC) and Los Angeles and San Bernardino counties (UCRC), but it is not clear if they represent new species.

Gahaniella Timberlake 1926

Hosts. Primary or hyperparasitoid of Hemiptera: Asterolecaniidae, Coccidae, Ortheziidae, Pseudococcidae
**californica** Timberlake 1926: 26

**Type.** USNM

**Distribution.** W (Contra Costa, Los Angeles, Riverside, San Benito, San Diego, Stanislaus)

**Host/habitat.** Ailicthensia argentina, Coccus hesperidum, Eulecanium perinflatum, Parthenolecanium corni, Saissetia coffeae, possibly as a hyperparasitoid

**Remarks.** Although Timberlake (1926) reared this species from *P. corni*, no definitive biological studies of this species have been conducted. One congener, *G. tertia*, is a hyperparasitoid of *Planococcus citri* via *Leptomastix dactylopii* (Kerrich 1953), and a second, *G. saissetiae* Timberlake, 1926, has been recorded from several families of scales (Noyes 2001) and is suspected of being hyperparasitic on *Saissetia oleae* (Compere 1939c), although Trjpitzin (2010) considered the entire genus was hyperparasitic. De Santis (1989) reported the host of *G. californica* as “Cochinilla blanda”: Noyes (2001) treated this host as a pseudococcid, but it is a common name for *C. hesperidum* (see De Santis & Monetti 2008: 97).

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**Ginsiana Erdös & Novicky 1955**

**Hosts.** Hemiptera: Aphalaridae

**arbuticola** (Gahan & Waterston 1926: 373) (*Psyllaephagus*)

**Type.** USNM

**Distribution.** C (Alameda, Amador, Marin, Napa, San Mateo, Santa Clara, Solano)

**Host/habitat.** Neophyllura arbuti

spp.

**Remarks.** Specimens that appear to represent three undescribed species of this genus have been collected in Alpine, El Dorado, Fresno, Inyo, Lake, Lassen, Los Angeles, Modoc, Mono, Napa, Nevada, Riverside, San Bernardino, Santa Barbara, Shasta, Sierra, Sonoma, Stanislaus and Tuolumne counties (CAS, CSCA, EMEC, RLZC, UCDC, UCFC, UCRC).

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**Habrolepis Förster 1856**

**Hosts.** Hemiptera: Diaspididae

**rouxi** Compere 1936a: 495

**Type.** BMNH

**Distribution.** E (San Diego)

**Host/habitat.** Aonidiella aurantii, A. citrina, A. orientalis, A. sp., Aspidiotus nerii, A. sp., Chrysomphalus aonidum, C. sp., Hemiberlesia rapax, Parlatoria oleae, Selenaspidus articulatus

**Remarks.** First imported from South Africa and released against *Aonidiella aurantii* in southern California and Fresno in the late 1930s, this species proved to be ineffective, as the report of its establishment in California is based on the 1943 recovery from a single orchard in San Diego (Flanders 1944). This species was reimported from South Africa against *Parlatoria oleae* and released in Fresno County from 1940–42; although it reproduced on this species, it failed to establish in the field (Huffaker et al. 1962). In the 1970s it was imported from Saudi Arabia and cultured in quarantine (DeBach 1977), but I found no record of subsequent releases. Thus, it is quite possible that this species is no longer extant in the state. DeSantis (1979) reported *Carulaspis minima* (Signoret) as a host, but it is not clear what this is based on—Bennett & Hughes (1959) had previously reported that *H. rouxi* had been moved from California to Bermuda in a biocontrol program directed against that species, but there was no evidence actually citing *C. minima* as a suitable host. Blumberg & DeBach (1979) noted that *H. rouxi* would attack *Aspidiotus nerii* in the lab, but it wasn’t a completely suitable host. Noyes (2001), citing Flanders (1944), recorded *Neoselenaspidus silvaticus* (Lindinger) as a host, but the earlier paper only noted that this scale species was heavily parasitized without identifying the parasitoid.
Remarks. What appears to be an undescribed species has been collected from a pit scale on a *Quercus* sp. in Marin (EMEC), as well as on *Adenostoma fasciculatum*, *Cercocarpus betuloides* (Rosaceae), *Pinus sabiniana* (Pinaceae), *Quercus agrifolia*, *Q. douglasii*, *Salix ?lasiolepis* (Salicaceae), and *Umbellularia californica* (Lauraceae) in Alameda, Contra Costa, Humboldt, Stanislaus, Sutter and Tuolumne counties (CAS, RLZC, UCDC, UCFC).

**Helegonatopus Perkins 1906 [New state record]**

**Hosts.** Hyperparasitoid of Hemiptera: Cicadellidae, Delphacidae via Hymenoptera: Dryinidae spp.

Remarks. Two male specimens that appear referrable to this genus were collected in Placer (UCRC) and Stanislaus (UCFC) counties.

**Hexacnemus Timberlake 1926**

**Hosts.** Neuroptera: Hemerobiidae

*armitagei* Timberlake 1926: 15

**Type.** USNM

**Distribution.** N (Lake, Ventura)

**Host/habitat.** Sympherobius californicus, *S*. sp.

Remarks. Gordh (1979) noted that *H. armitagei* has also been reported to parasitize mealybugs on citrus, probably based on a specimen from Florida (USNM) that has “Mealybug, citrus” on the collecting label. *Sympherobius* is predacious on mealybugs, and I suspect this is a mistaken host record, and the true host was an unrecognized hemerobiid. Noyes (2001) reported that a record of the genus from South America (where it putatively attacked *Aleurothrixus floccosus* and *Planococcus citri*) was in error. In fact, Parker *et al.* (1953) reported an Argentinean *Hexacnemus* sp. “ex material” of these two species, noting that the parasites were reared “in grosso modo” from lots of material, and that the precise role of the parasite is not available. I have seen a male specimen (USNM) of this parasitoid from Argentina, and it is definitely a *Hexacnemus* species, although I am unable to determine if it is conspecific with *H. armitagei*. Additionally, the USNM has a female and male *Hexacnemus* sp., reared in association with nymphs of *Phenacoccus gossypii*, apparently from Columbia (CIAT-Palmira), that appear to represent an undescribed species of this genus.

**Homalotyloidea Mercet 1921 [New state record]**

**Hosts.** Hyperparasitoids of Coleoptera: Coccinellidae, Discolomatidae via Hymenoptera: Encyrtidae spp.

Remarks. A single specimen of an undetermined species was collected in Riverside County (UCRC).

**Homalotylus Mayr 1876**

**Hosts.** Coleoptera: Coccinellidae

*affinis* Timberlake 1919c: 165

**Type.** USNM
Distribution. C (Kings, San Bernardino)
Host/habitat. Hyperaspis osculans; NEW: Hyperaspis pleuralis (EMEC)

*hyperaspidis* Timberlake 1919c: 167

**Type.** USNM

**Distribution.** N (Alameda, Los Angeles, Marin)

**Host/habitat.** Hyperaspis undulata, *H.* sp.

*similis* Ashmead 1887: 190

**Type.** USNM

**Distribution.** N (Alameda, Riverside, San Mateo)

**Host/habitat.** Hyperaspis bigeminata, *Scymnus americanus, S. cervicalis, S. iowensis, S. lacustris, S. sp.*

*terminalis* (Say 1828: 80) (Serlion)

**Type.** USNM

**Distribution.** W (Alameda, Kern, Los Angeles, Marin, Orange, Riverside, San Bernardino, San Diego, San Mateo, Santa Clara)


**Remarks.** Host records of the aphids *Hysteroneura setariae* (Thomas) and *Sipha flava* (Forbes) appearing in Noyes (2001) are incorrect—in the original papers, these species are noted as prey of the coccinellids attacked by *H. terminalis*.

*Isodromus* Howard 1887

**Hosts.** Neuroptera: Chrysopidae, Hemerobiidae

*iceryae* Howard 1887: 488

**Type.** USNM

**Distribution.** W (Alameda, Contra Costa, Los Angeles, Marin, Napa, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Clara, Sonoma, Ventura)

**Host/habitat.** Ceraeochrysa cubana, *C. lateralis, C. sanchezi, C. valida, Chrysoperla ploribunda, C. rufilabris, Leucochrysa floridana, Sympherobius angustus, Sympherobius californicus; NEW: Chrysopa nigricornis* (EMEC)

**Remarks.** *Icerya purchasi* and *Saissetia oleae* were erroneously reported as hosts by several authors—these reports are attributable to parasitized *Chrysopa* larvae, which pupated within the hollow shell of a dead scale (Clancy 1946a). Similarly, I consider the host report of *Coccus hesperidum* (De Santis & Monetti 2008) to be in error. Clancy (1946a) also questioned the validity of hemerobiid host records, but noted that *I. iceryae* would reproduce on *Eremochrysa punctinervis* in the lab. A series of specimens was reared from galls of *Heteroecus dasyacalyti* (Ashmead) (Hymenoptera: Cynipidae) in San Bernardino County (UCRC). *Harrisina brillans* (Lepidoptera: Zygaenidae) is noted as the host for one specimen (UCRC), but this is undoubtedly erroneous.

*niger* Ashmead 1900: 379

**Type.** USNM

**Distribution.** W (Alameda, Los Angeles, Santa Clara, Solano, Ventura)

**Host/habitat.** Chrysopa nigricornis, *C. oculata, C. pallens, C. sp., Chrysoperla carnea, Sympherobius angustus*, Hemerobiidae sp.

**Remarks.** Clancy (1946a) considered the only valid host records for this species were for the two closely related species, *Chrysopa nigricornis* (= *C. majuscula*) and *C. oculata*. Host records for *Chilocorus similis* and
Lymantria dispar (Linnaeus) are clearly erroneous, while records for “Chrysopa” may equally refer to Chrysoperla.

**puncticeps** (Howard 1885: 14) (*Encyrtus*)

- **Type.** USNM
- **Distribution.** W (Stanislaus, Yolo)
- **Host/habitat.** Chrysopa sp.

spp.

**Remarks.** A specimen determined as “sp. nr. axillaris” (Timberlake 1919c), was recorded from *Chrysopa nigricornis* in Contra Costa County (EMEC), and what appear to be undescribed species near *atriventris* (Ashmead 1900) were collected on aphid-infested *Pinus sabiniana* in Calaveras County and *Liriodendron tulipifera* (Magnoliaceae) in Stanislaus County (both RLZC).

**Ixodiphagus** Howard 1907

**Hosts.** Acari: Ixodidae

**hookeri** (Howard 1908: 241) (*Hunterellus*)

- **Type.** USNM
- **Distribution.** W (Los Angeles, Marin, Stanislaus)

**Remarks.** The host record of “*Ixodes hucinus*” in Noyes 2001 is a misprint for *I. ricinus*.

**Lamennaisia** Girault 1922

**Hosts.** Coleoptera: Chrysomelidae, Lathridiidae, Orthoperidae; Lepidoptera: Notodontidae

**ambigua** (Nees 1834: 239) (*Encyrtus*)

- **Type.** Probably destroyed (Noyes 1988b)
- **Host/habitat.** Bruchus brachialis, *Melanophthalma sp.; NEW: Orthoperidae (UCDC), Phryganidia californica (CAS)

**Remarks.** Lamennaisia ambigua is a cosmopolitan species. This is the encyrtid I have most commonly collected in the state; it is especially abundant in grassy areas, but I have also collected it on trees, woody shrubs and *Equisetum* (Equisetaceae) species. It is also one of the few encyrtid species that is active throughout the year in California. Besides the hosts recorded above, *L. ambigua* has also been reared from *Medicago sativa* (Fabaceae) infested with *Bruchophagus roodzi* Gussakovskij (Hymenoptera: Eurytomidae) (Noyes 1988b). Such a wide range in host taxa is unusual for an encyrtid, and suggests this species may be hyperparasitic. This species was recorded (as *Encyrtus dubius*) as a parasitoid of *Icerya purchasi* based on a single specimen that issued from “…a box which contained only adult females of the scale.” (Howard 1889). This record should be regarded as unproven, since alternative hosts might have been present as well.
spp.  
Remarks. Specimens from an undescribed species were collected in Imperial, Orange and Riverside counties (UCDC, UCRC).

**Mahencyrtus** Masi 1917 [New state record]

spp.  
Remarks. Undetermined specimens of this genus were collected in Marin (RLZC), Riverside (UCRC), and Sacramento (EMEC) counties.

**Mayridia** Mercet, 1921 [New state record]

spp.  
Remarks. Specimens of this genus that appear to represent three undescribed species were collected in Alameda, Contra Costa, Inyo, Lassen, Marin, Nevada, Riverside, San Bernardino, San Diego, Santa Barbara, Sierra, Solano, Sonoma, Tehama and Tuolumne counties (EMEC, RLZC, SBMN, UCDC, UCRC).

**Merlen** Noyes & Woolley 1994 [New state record]

spp.  
Remarks. A short series of an undetermined species was collected in Stanislaus County, as well as a single male in Modoc county (RLZC).

**Meromyzobia** Ashmead 1900

deserticola** Gordh 1987: 24

Type. USNM  
Distribution. C (El Centro)  
Host/habitat. Collected on Pleuraphis rigida (Thurber) (Poaceae)

Remarks. Gordh (1987) notes that species from this genus have an ecological preference for grasses. According to Noyes (2001), confirmed Meromyzobia host records (all extralimital) include Orthoptera eggs, Diptera (Chloropidae and Drosophilidae) and hyperparasitic on Aclerdidae via Chamaemyiidae; one species has also been associated with Pseudococcidae.

spp.  
Remarks. Specimens that appear to represent 4 undescribed species have been collected from Imperial, Inyo, Lassen, Solano and Stanislaus counties (CSCA, RLZC, UCDC, UCRC).

**Metablastothrix** Sugonjaev 1964

Hosts. Hemiptera: Coccidae

claripennis** (Compere 1928: 216) (Microterys)

Type. USNM  

Host/habitat. Eulecanium tiliae, Parthenolecanium corni, P. fletcheri, P. quercifex
Remarks. This species has a Nearctic distribution, and is only reliably recorded from Coccidae (Noyes 2001). There is a single record of it from Brazil (de Santis 1980: 195), which appears to be based on an earlier Brazilian catalog by Araújo e Silva et al. (1968). However, in the earlier work M. claripennis was _not_ recorded from Brazil—under Encyrtidae (pp. 599–600) they list only 5 described species, three of which are now placed under Tanaostigmatae. Instead this species is simply cited (page 100, as _Microterys claripennis_) as a parasitoid of _Aetalion reticulatum_ (Linnaeus) (Hemiptera: Aetalionidae). In my opinion, this is a dubious host record (no other encyrtids have been recorded parasitizing this family, and only _Prionomastix_ has been recorded as attacking the closely related Membracidae). Sugonjaev & Trjapitzin (1988) opine that _M. claripennis_ is actually a secondary parasitoid via _Encyrtus fuscus_, based on two lines of thought. The first is the incidence of hyperparasitism in closely related species, including the congeneric _M. truncatipennis_ (Ferrière); however, the latter species has since been placed in the genus _Blastothrix_. The second is Compere’s unpublished notes from 1911–1912, although they note that Compere (1928) later stated nothing was known of the status (i.e.: a primary or secondary parasitoid) of _M. claripennis_. Thus its status remains unknown. Undetermined specimens of this genus have also been collected from Lassen, Marin and Yolo counties (CSCA, EMEC).

**Metanotalia Mercet 1921**

**Hosts.** Hemiptera: Pseudococcidae

_maderensis_ (Walker 1872: 116) (*Ectroma*)

_Type._ BMNH

**Distribution.** A (Alameda, Amador, Contra Costa, Glenn, Marin, Mendocino, Modoc, Napa, Orange, Riverside, San Diego, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare)

**Host/habitat.** _Antonina purpurea, Phenacoccus madeirensis_

**Remarks.** Despite its small size, this is an easily recognized species, and since the mid 1990s, I have often swept it from grass in many areas throughout the state. However, the first published record of this species from California wasn’t until 1988 (Noyes 1988b), and the earliest record I found from the state was from Orange County (UCRC) in 1983, suggesting it is a relatively recent introduction. The species is probably Palearctic in origin, and now occurs in New Zealand as well as throughout the Holarctic region (Noyes 2001). It may have been unintentionally introduced into southern California in a shipment of parasitized mealybugs from Taiwan in 1951 (Zuparko 1995a).

**Metaphycus Mercet 1917**

**Hosts.** Hemiptera: Coccidae, Diaspididae, Eriococcidae, Kermesidae, Pseudococcidae, Triozidae

_alberti_ (Howard 1898a: 247) (* Aphycus*)

_Type._ USNM

**Distribution.** W (Los Angeles, Riverside, San Diego, Santa Barbara)

**Host/habitat.** _Ceroplastes sp., Coccus hesperidum, Parthenolecanium persicae_

**Remarks.** Originally described from Australia, this species has also been recorded from Hawaii and South Africa. Stauffer & Rose (1997) reported this species from Riverside county on _C. hesperidum_, while Bernal et al. (2001) reported it on citrus from the southern San Joaquin Valley (Fresno, Kern and Tulare counties) without specifying exactly which county it occurred in. They also reared this species from a batch of _Coccus pseudomagnoliarum_, noting that the exact host still needs to be confirmed. Kapranas et al. (2007) failed to find this species in their survey of _Coccus hesperidum_ in southern California citrus. A single specimen from Solano County (UCDC) may belong to this species as well.

_angustifrons_ Compere 1957: 227

_Type._ USNM
**Distribution.** E (Riverside, San Bernardino, San Diego)

**Host/habitat.** *Coccus hesperidium*

**Remarks.** In the 1950s, this species was repeatedly imported into California from the Orient against *Coccus hesperidium* and *Saissetia oleae,* but it was never considered established here (Bartlett 1978a; Lampson & Morse 1992) until Kapranas et al. (2007) found it 50 years later in a survey of *C. hesperidium* parasitoids. Three scale species (*Coccus pseudomagnoliarum,* *Pulvinaria psidii* and *S. oleae*) have been reported as hosts of *M. angustipennis* (Noyes & Hayat 1994; Noyes 2001), based upon citations from Bartlett (1978a) and Cock (1985) but I consider these records dubious, at best. For *C. pseudomagnoliarum,* Bartlett (page 61) noted that *M. angustipennis* (among other species) reportedly “showed some interest in this scale in the laboratory”, and for *S. oleae,* Bartlett (page 69) simply reported that the parasitoid was imported in a biocontrol program, without any evidence that the scale was actually an acceptable host. The record of *P. psidii* is traceable to its importation into Bermuda in the 1950s, when Bennett & Hughes (1959) reported that many parasites from California of “unknown value” against the scale were imported, and among these was *M. angustifrons,* which did not become permanently established there. This species is very close to *M. stanleyi,* and Rugman-Jones et al. (2011), suggest that records of the former may be applicable to the latter.

**annecki** Guerrieri & Noyes 2000

**Type.** PPR

**Distribution.** E (Alameda, Los Angeles, Riverside, San Diego, Santa Clara, Ventura, San Francisco Bay area, Central Valley)

**Host/habitat.** *Coccus hesperidium,* *Saissetia miranda,* *S. oleae,* *Waxiella mimosae; NEW: Parasaissetia nigra* (UCRC)

**Remarks.** Early in the 20th century, the South African species *Metaphycus lounsburyi* was exported to several countries (including Australia) in biocontrol programs directed against *Saissetia oleae.* However, Guerrieri & Noyes (2000) realized that two parasitoid species were involved, and described the second one as *M. annecki,* noting that much of the literature about *M. lounsburyi* may refer to *M. annecki.* In 1916, “*M. lounsburyi*” was imported from Australia and became established in southern California (Smith & Compere 1928), but Noyes (in litt.) thinks this was likely *M. annecki.* Bartlett (1978a) reported that *M. lounsburyi* (presumably *M. annecki*) may be the second most effective parasitoid of the black scale in the State, while Kennett (1986) and Lampson & Morse (1992) found it to be much less important. Specimens labelled as this species are recorded from “Lecanium viridis” (= *Coccus viridis* Green) and *Parthenolecanium corni* (both UCRC), but I suspect these are misidentifications.

**argyrocomus** (Compere 1947: 10) (*Erythraphycus*)

**Type.** USNM

**Distribution.** C (Lassen, Marin, Monterey, Riverside)

**Host/habitat.** *Eriococcus* sp.

**armitagei** (Compere 1926a: 30) (*Aenasioidea*)

**Type.** USNM

**Distribution.** C (Los Angeles, Marin)

**Host/habitat.** The original description was based on a specimen collected on a *Quercus* sp. in Los Angeles, which led Compere to opine that the host was likely to be a *Kermes* sp., but such an association has never been established. A single specimen (RLZC) was collected on *Quercus agrifolia* in Marin County, indicating that the species extends throughout California’s central coast area.

**californicus** (Howard 1898a: 245) (*Aphycus*)

**Type.** USNM

**Distribution.** N (Butte, Calaveras, Contra Costa, El Dorado, Lassen, Los Angeles, Madera, Marin, Monterey, Nevada, Plumas, Riverside, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Sonoma, Stanislaus, Tulare, Yolo)

**Host/habitat.** *Eulecanium* sp., *Mesolecanium nigrofasciatum,* *Parthenolecanium corni,* *P. pruinosum*

**Remarks.** Timberlake (1916) thought that *M. oregonensis* (Howard 1898a) was probably the male of *M.
californicus, and later suggested that *M. pulvinariae* (Howard 1881) might be synonymous as well (Compere & Annecke 1961). This same paper noted that *M. californicus* was indistinguishable from the imported Palearctic *M. insidiosus* (Mercet 1921), although there is no evidence that the latter ever established in California. They also reported that *M. californicus* is likely to be confused with *M. stanleyi* Compere morphologically, although these two species can be separated based on host species. Two specimens from Santa Barbara County (USNM) that seems to be referable to this species were reared from *Physokermis insignicola*.

calvus (Compere 1947: 11) (*Erythraphycus*)

**Type.** USNM  
**Distribution.** C (Contra Costa, Marin, Riverside, San Benito, San Bernardino, Santa Clara, Solano, Stanislaus)  
**Host/habitat.** Collected on an *Eriogonum* sp. (Polygonaceae)  
**Remarks.** Compere described this species with only the first two funicular segments darkened, but here I include a series of specimens which have the 3rd and 4th segments darkened as well.

clauseni (Timberlake 1918: 358) (*Pseudococcobius*)

**Type.** USNM  
**Distribution.** C (Alameda, Calaveras, Contra Costa, Imperial, Kern, Los Angeles, Marin, Napa, Riverside, San Benito, San Bernardino, San Diego, Santa Clara, Sonoma, Stanislaus)  
**Host/habitat.** *Amonostherium lichtensioides, Eriococcus adenostomae, E. palustris, E. sp.; NEW: Eriococcus coccineus* (UCRC)  
**Remarks.** Timberlake (1918) recorded this species from an “Erium sp.” on cactus, which Peck (1951) considered possibly an *Amonostherium* species. Essig (1926) reported the association with *E. palustris* on *Spartina foliosa* (Poaceae), which is limited to the high tide zone in the San Francisco Bay area. I have collected specimens over a range of ecological habitats, including the Sierra foothills, inland chaparral, and the coastal plain.

coquilleti (Howard 1898a: 244) (*Aphycus*)

**Type.** USNM  
**Distribution.** N (Los Angeles)  
**Host/habitat.** *Pulvinaria bigeloviae*

eriococi (Timberlake 1916: 631) (*Aphycus*)

**Type.** USNM  
**Distribution.** N (Contra Costa)  
**Host/habitat.** *Coccus hesperidum, Eriococcus quercus*  
**Remarks.** Originally described from Utah, Essig (1926) reported this species from California, without providing a more specific location. I’ve found only one specimen from California, from Mt. Diablo State Park.

eruptor (Howard 1881: 364) [New state record] (CSCA, RLZC)

**Type.** USNM  
**Distribution.** W (Marin, San Diego)  
**Host/habitat.** *Ceroplastes cirridpediformis, C. floridensis, C. sp., “Lecanium sp.”*

flammeus Compere 1947:13

**Type.** USNM  
**Distribution.** C (Alameda, Calaveras, Contra Costa, Kern, Los Angeles, Marin, Mendocino, Plumas, Santa Clara, Sierra, Solano, Tehama)  
**Host/habitat.** *Parthenolecanium quercitroneus*

fumipennis (Timberlake 1918: 356) (*Pseudococcobius*)

**Type.** USNM  
**Distribution.** N (Riverside, San Bernardino)  
**Host/habitat.** *Eriococcus sp., Phenacoccus solani*
Remarks. Timberlake (1918) reported this species was reared from *Pseudococcus solani* (Cockerell) in southern California (San Bernardino County). However, it is likely that Timberlake’s identification of the host was based on Essig’s (1909 or 1914) characterization, which was a misidentification of *Phenacoccus solani* (Ben-Dov 2006b). Certainly, in a later work Essig (1926: 833) reported the parasitoid (as *Pseudococcobius fumipennis*) “Reared from *Phenacoccus solani* Ferris in southern California” and did not include any mention of *Pseudococcus solani*, suggesting that he recognized the initial record of this species to be a mistake. Further, while *Phenacoccus solani* is known from throughout California (McKenzie 1967), *Pseudococcus solani* is known only from New Mexico (Ben-Dov 2006b).

*funicularis* Annecke 1965: 227

**Type.** SANC

**Distribution.** E (Alameda, Marin, Monterey, Santa Cruz, Yolo)

**Host/habitat.** Pulvinaria delottoi, Pulvinariella mesembryanthemi, P. sp.

**Remarks.** This species was introduced from South Africa with *M. stramineus* in a biocontrol program against *P. delottoi* and *P. mesembryanthemi* from 1978–1983, and along with *Encyrtus saliens*, is credited with successfully controlling both scale species (Tassan & Hagen 1995). The record of *M. funicularis* being used in a biocontrol program against *Saissetia oleae* (Lampson & Morse 1992) appears to be in error.

*fuscipennis* (Howard 1898a: 241) (*Aphycus*)

**Type.** USNM

**Distribution.** C (Alameda, Amador, Calaveras, Contra Costa, El Dorado, Kern, Marin, Monterey, San Benito, San Bernardino, Santa Barbara, Santa Clara, Sonoma, Stanislaus)

**Host/habitat.** Eulecanium sp. on Arctostaphylos pungens (Ericaceae)

**Remarks.** Both Howard (1898a) and Compere (1947) reported this species from undetermined “Lecanini” species, but this generic name has since been suppressed under *Eulecanium* Cockerell. Essig (1926) ascribed the original host record from Arctostaphylos in Sonoma County to *Parthenolecanium corni*, but this conclusion is questionable since *P. corni* has not otherwise been associated with any *Arctostaphylos* species.

*hageni* Daane & Caltagirone 1999: 14

**Type.** EMEC

**Distribution.** E (Tehama)

**Host/habitat.** Saissetia oleae

**Remarks.** This is a European species, imported from Spain in 1985 during a biocontrol program against *Saissetia oleae* (Daane & Caltagirone 1999) and has been confused with both *M. aneckei* and *M. lounsburyi* (Guerrieri & Noyes 2000).

*helvolus* (Compere 1926a:25) (*Aphycus*)

**Type.** USNM


**Host/habitat.** Cerooplatus destructor, C. helichrysi, C. sp., Coccus hesperidum, C. pseudomagnoliarum, Coccus viridis, Eucalyumnatus tessellatus, Marsipococcus proteae, Parasaissetia litorea, P. nigra, P. sp., Parthenolecanium corni, P. persicae, Protopulvinaria pyriformis, Pulvinaria aethiopica, P. psidi, P. urbicola, Pulvinariella mesembryanthemi, Saissetia coffeea, S. nigrella, S. oleae, S. somereni, S. sp.; **NEW:** Coccus africanus, Parlatoria pergandii (both UCRC)

**Remarks.** This is a south African species which was established in California in 1937 in a biocontrol program for *Saissetia oleae*, and is one of its most effective imported natural enemies (Bartlett 1978a; Kennett 1986; Daane et al. 1991; Lampson & Morse 1992). Noyes (2001) listed *M. helvolus* as a biocontrol agent of *Aonidiella aurantii*, but this is misleading—the paper he cited (Bellows & Morse 1988) merely noted the effect of pesticides (applied for *A. aurantii* control) on parasitoids of other species. Guerrieri & Noyes (2000) note that *Aspidiotus* sp. (Homoptera: Diaspididae) and *Rastrococcus mangiferae* (Green) (Homoptera: Pseudococcidae), have been reported as hosts, but they consider these records questionable.
howardi (Cockerell 1898: 276) (Aphycus)
Type. USNM
Distribution. N (Lassen, Riverside)
Host/habitat. Eriococcus tinsleyi, E. sp.
Remarks. Two specimens (UCDC) from Imperial County may belong to this species as well.

immaculatus (Howard 1894: 235) (Aphycus) [New combination]
Type. USNM
Distribution. C (Los Angeles)
Host/habitat. Aonidiella aurantii
Remarks. The species was described in Aphycus, based on a single male. Timberlake (1916) was unable to locate the type, and opined that if it was a true Aphycus, then the host record of A. aurantii was “undoubtedly erroneous”. The holotype is slide type #1474 at the USNM, and belongs in Metaphycus, which means the original host record may be correct.

inviscus Compere 1940a: 20
Type. BMNH
Distribution. E (Contra Costa, Fresno, Marin, Santa Cruz, Sonoma, Tulare)
Host/habitat. Saissetia oleae, S. sp.
Remarks. Native to South Africa, this species was imported into California at least twice. A specimen mentioned in the original description was reared from the Riverside Insectary in 1924—probably imported in one of the shipments of parasitoids made by E.W. Rust in the 1920s (Compere 1940b)—but there is no record of this species being released then. A second importation was made in 1979, and the species was recovered soon thereafter in the Central Valley (Kennett 1986). Bartlett (1978a) reported a third importation of this species in 1958, which apparently failed to establish. However, Annecke & Mynhardt (1972) considered this effort involved a species that is distinct from M. inviscus and described it as M. bartletti (now a junior synonym of M. lounsburyi).

kermicola (Timberlake 1916: 583) (Aenasioidea)
Type. USNM
Distribution. N (Los Angeles)
Host/habitat. Allokermes essigi, A. galliformis
Remarks. The host record of Allokermes (= Kermes nigropunctatus) (Ehrhorn & Cockerell) cited in Essig (1926) is a misidentification of A. essigi (Miller & Gimpel).

lecanii (Howard 1898a: 242) (Aphycus)
Type. USNM
Distribution. C (Alameda, Los Angeles, Santa Barbara)
Host/habitat. Eulecanium pubescens, E. sp., Parthenolecanium corni, P. quercifex, Physokermes insignicola

lounsburyi (Howard 1898a: 244) (Aphycus)
Type. USNM
Distribution. E (Alameda, Marin, Riverside, San Diego, San Mateo, Santa Barbara, Santa Clara, Solano, Tulare, Ventura, Yolo)
Host/habitat. Ceroiplastes floridensis, Coccus capparidis, C. hesperidum, C. pseudomagnoliarum, Lichtensia viburni, Parthenolecanium corni, Saissetia coffeae, S. oleae
Remarks. This species is native to South Africa, and has been exported as a parasitoid of Saissetia oleae to several countries. However, Guerrieri and Noyes (2000) discovered that material identified as M. lounsburyi included a second species, which they described as M. annekei, noting that previous literature references to M. lounsburyi may be referable to M. annekei. One such reference includes Smith and Compere’s (1928) report of material imported from Australia into California in 1916, which Noyes (in litt.) thinks was likely M. annekei. In 1958, a species identified as M. invisus was imported from South Africa into California (Bartlett 1978a), but Annecke & Mynhardt (1972) considered this material represented a new species, which they described as...
Metaphycus bartletti. Based on a comparison of types, Guerrieri & Noyes (2000) synonymized *M. bartletti* under *M. lounsburyi*. This makes *M. lounsburyi* represents one of the most widespread and important natural enemies of *S. oleae* in California (Smith & Compere 1928; Bartlett 1978a; Kennett 1986, Daane et al. 1991; Lampson & Morse 1992). In his report on the parasitoids of *S. oleae* in central and northern California, Kennett (1986) reported distinct biological differences between the taxa he identified as *M. lounsburyi* and *M. bartletti*: the latter was one of the most common species found (in both the interior valley as well as the coastal and subcoastal areas), while the former appeared to be largely limited to the more temperate coastal area. Noyes (in litt.) suspects Kennett’s *M. lounsburyi* was really *M. annekei*, and his *M. bartletti* was *M. lounsburyi*. Two specimens that appear close to *M. lounsburyi* were taken in Contra Costa and Kern counties (RLZC).

*luteolus* (Timberlake 1916: 636) (*Aphycus*)

**Type.** USNM

**Distribution.** W (Butte, Fresno, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Tulare, Ventura, Yolo, Yuba)

**Host/habitat.** *Coccus hesperidum, C. pseudomagn liarum, Parthenolecanium corni, Pulvinaria psidii, Pulvinariella mesembryanthemi, Saissetia coffeae, S. oleae*

**Remarks.** This species may prove to be a junior synonym of *M. flavus* (Howard) (Guerrieri & Noyes 2000). These authors also note that the host record of *Saissetia coffeae* was incorrect, based upon an error in Herting (1972). However, *S. coffeae* is now considered the senior synonym of *S. hemisphaerica* (Ben-Dov 2006a), and there are several records of that species serving as a host for *M. luteolus*. *Coccus viridis* has been noted as host of *M. luteolus* (Noyes & Hayat 1994: 398), based on its use in biocontrol programs against the scale in Bermuda and Hawaii. However, *M. luteolus* failed to establish in both cases, and there is no record of it successfully attacking this host (Bennett & Hughes 1959; Bartlett 1978a). Specimens (UCRC) have been reportedly reared from *Aonidiella aurantii* and *Parlatoria pergandii* (both Hemiptera: Diaspididae), but these records need to be confirmed.

*matteolus* (Compere 1947: 11) (*Erythraphycus*)

**Type.** USNM

**Distribution.** C (Contra Costa, Imperial, Kern, Los Angeles, Marin, Merced, Napa, Riverside, San Bernardino, Solano, Stanislaus)

**Host/habitat.** Host unknown, but this species is common in chaparral, collected off *Adenostoma fasciculatum, Chilopsis linearis arcuta* (Bignoniaceae), *Juniperus californica* (Cupressaceae) and *Larrea tridentata* (Zygophyllaceae).

**Remarks.** This species was described based on a single male specimen (Compere, 1947). There are a series of females (EMEC, RLZC) that match the original description exactly, except for the color of the fore- and hind tibiae. Given the propensity for sexual dimorphism in the Encyrtidae, I have no hesitation in considering these females conspecific with *M. matteolus*. The specimen from Merced County (EMEC) was labeled “ex *Desmia* on wild grape”, but I think it likely this simply indicates the specimen was collected on grape (Vitaceae) infested with a *Desmia* species, and does not reflect an actual rearing record.

*physokermis* (Timberlake 1916: 606) (*Aphycus*)

**Type.** USNM

**Distribution.** C (Alameda, Contra Costa, Humboldt, Plumas, Santa Barbara)

**Host/habitat.** *Physokermis insignicola*

*psyllidis* Compere 1943: 72

**Type.** USNM

**Distribution.** C (Los Angeles, Orange, Santa Barbara, Santa Clara, Ventura)

**Host/habitat.** *Bactericera cockerelli*

**Remarks.** This is one of only three species in the genus recorded as psyllid parasitoids (Guerrieri & Noyes 2000).
*stanleyi* Compere 1940a: 20

**Type.** Lost

**Distribution.** E (Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Tulare, Ventura)

**Host/habitat.** *Ceroplastes brevicauda*, *C. sp.*, *Coccus alpinus*, *C. celatus*, *C. hesperidum*, *C. pseudomagnoliarum*, *C. viridis*, *Eucalyptus tessellatus*, *Lichensia chilianthi*, *Parasaissetia nigra*, *F. sp.*, *Protopulvinaria pyriformis*, *Pulvinariella mesembryanthemi*, *Pulvinaria psidi*, *Saissetia coffeae*, *S. nigrella*, *S. oleae*, *Saissetia somereni*, *S. sp.; NEW: Pulvinarisca jacksoni* (UCRC)

**Remarks.** Although the name is properly ascribable to Compere 1940a, the full description is found in Compere 1940b. Native to Africa, this species was imported into California in 1937 in a biocontrol program against *Saissetia oleae*, and immediately became established (Compere 1940a, 1940b; Bartlett 1978a). This species was recovered in southern California over 55 years later at very low levels (Lampson & Morse 1992), but was not found in central or northern California (Kennett 1986; Daane et al. 1991). Bernal et al. (2001) reported this species on citrus from the southern San Joaquin Valley (Fresno, Kern and Tulare counties) without specifying exactly in which county this species occurred. This species is very similar to *M. californicus*, separable only by differences in hosts (Compere & Annecke 1961). A host record of *Coccus subhemisphaericus* (Newstead) is doubtfully referred to *M. stanleyi* (Compere 1940a).

*stramineus* Compere 1940a: 28

**Type.** BMNH

**Distribution.** E (Alameda, Monterey, San Mateo)

**Host/habitat.** *Pulvinaria delottoi*, *Pulvinariella mesembryanthemi*

**Remarks.** Imported from South Africa from 1978–1983 in a biocontrol program against *Saissetia oleae*, and immediately established (Tassan & Hagen 1995). Along with *Encyrtus saliens* and *Metaphycus funicularis*, this species was credited with the successful control of those species (Tassan & Hagen 1995).

*trimblei* (Dozier 1936: 183) (*Aenasioidea*)

**Type.** USNM

**Distribution.** N (San Bernardino)

**Host/habitat.** *Parthenolecanium quercifex*

**Remarks.** The only primary literature record of this species is the original description, based on specimens from Caledonia, Pennsylvania. Noyes (2001) noted the type was from California, but I suspect this was a misreading of “Caledonia”. However, there is a single specimen of this species collected from San Bernardino County (UCRC).

*zzebratus* (Mercet 1917: 138) (*Aphycus*)

**Type.** MNMS

**Distribution.** E

**Host/habitat.** *Ceroplastes floridensis*, *Drepanococcus cajani*, *Eriopeltis festucae*, *E. lichtensteini*, *Lecanopsis formicarum*, *Luzulaspis luzulae*, *Parthenolecanium corni*, *P. persicae*, *P. pomeranicum*, *P. rufulum*, *Pulvinaria vitis*, *Saissetia oleae*

**Remarks.** This is a Palearctic species, imported into California in 1986 in a biocontrol program against *Saissetia oleae*. The species was released in northern and central California (Alameda, Contra Costa, Fresno, Glenn, Madera & Tehama counties), recovered and considered established, although the exact localities were not specified (Lampson & Morse 1992). Questionable host records for this species include *Aonidiella orientalis*, *Planchonia arabidis*, *Nipaecoccus sp.*, *Phenacoccus aceris* and *Trionymus perrisi*.

**spp.**

**Remarks.** In addition to the described species listed above, I have seen specimens that appear to represent up to 31 undescribed morphospecies from the state (LACM, RLZC, SBMN, UCDC, UCFC, UCRC).
Microterys Thomson 1876

Hosts. Hemiptera: Coccidae, Eriococcidae, Kermesidae

mazzinini Girault 1917a: 12

Type. USNM
Distribution. C (Inyo, San Bernardino, Santa Barbara, Tulare)
Host/habitat. Physokermes insignicola

nieteri (Motschulsky 1859: 170) (Encyrtus)

Type. ZMUM
Remarks. Microterys nietneri is a widespread (perhaps even cosmopolitan) species, but it is not clear if it occurs naturally in California. Howard (1881) described Encyrtus flavus from Los Angeles County, but Timberlake (1913) and Bartlett & Lagace (1961) noted that this species was also known from Asia and opined it had been accidentally established here. In the 1950s a “black scale race” of this species was introduced from India and Pakistan in a series of (apparently unsuccessful) biocontrol introductions (Clausen 1959; Bartlett 1978a). In 1989, Triapitzin synonymized E. flavus under M. nietneri. Bartlett & Lagace (1961) and Rosen & Kfir (1980) noted that several geographical strains of this species exist, and they differ in their host preferences. Noyes (2001) includes a host record of “Coccus piperus”, referred to Hayat’s (1986) catalog of Indian Encyrtidae, but in that work the host is properly spelled as “Coccus piperis” (now placed in the genus Maacoccus). There are specimens reportedly reared from Aonidiella aurantii (UCRC), but this identification is questionable.

physokermis Compere 1926b: 43

Type. USNM
Distribution. C (Alameda, Calaveras, Contra Costa, Madera, Monterey, Napa, San Francisco, Santa Clara)
Host/habitat. Physokermis insignicola

sylvius (Dalman 1820: 154) (Encyrtus)

Type. NHRS
Distribution. W (Calaveras, El Dorado, Inyo, Lassen, Los Angeles, Merced, Modoc, Napa, Plumas, Riverside, San Bernardino, San Diego, Yosemite National Park)
Host/habitat. Didesmococcus unifasciatus, Eulecanium ficiphilum (nec ficifilum), E. nocivum, E. sericeum, E. tiliae, E. sp., Parthenolecanium corni, P. persicae, P. rufulum, Physokermes jezoensis, Rhodococcus perornatus, R. spiraeae, R. turanicus, Sphaerolecanium prunastri, Stotzia maxima
Remarks. This is a Holarctic species that was originally recorded from California under the junior synonym M. titiani Girault (1917a).

xanthopsis Compere 1926b: 41

Type. USNM
Host/habitat. Parthenolecanium corni, P. persicae
**yolanda Compere 1926b: 39**

**Type.** USNM

**Distribution.** C (Alameda, Contra Costa, Riverside, San Benito, Solano, Tulare, Yolo)

**Host/habitat.** *Kermes cockerelli*

**Remarks.** Noyes (2001) mistakenly recorded this species from Japan.

spp.

**Remarks.** I have seen specimens that appear to represent an additional seven morphospecies present in the state (EMEC, LACM, RLZC, SBMN, UCFC, UCRC). One of these species had previously (Dreistadt & Hagen, 1994) been reported as a parasitoid of *Eriococcus spurius*, and it is not clear if it is a native species or if it had been introduced into the state.

**Mucrencyrtus Noyes 1980**

**variabilis** Sharkov 1996: 366

**Type.** CNC

**Distribution.** N (Marin, San Luis Obispo, Stanislaus, Tuolumne)

**Host/habitat.** Unknown

**Remarks.** Several extralimital species of this genus are known to attack Aclerdidae (Hemiptera).

**Neococcidencyrtus Compere 1928**

**Hosts.** Hemiptera: Diaspididae

**poutiersi** (Mercet 1922: 399) (*Coccidencyrtus*)

**Type.** MNMS

**Distribution.** W (Los Angeles)

**Host/habitat.** *Furcudaspis zamiae*

**Remarks.** This is a Holarctic species, recorded from California in the original description of a junior synonym, *N. alula* Compere 1928.

**Oesol Noyes & Woolley 1994**

**Hosts.** Hemiptera: Kermesidae

**anubis** Noyes & Woolley 1994: 1334

**Type.** USNM

**Distribution.** N (San Benito)

**Host/habitat.** *Kermes cockerelli*

**Oobius Trjapitzin 1963**

**Hosts.** Coleoptera: Buprestidae, Cerambycidae; Diptera: Asilidae

**buprestidis** Gordh & Trjapitzin 1981: 7 (*Avetianella*) [**New state record**](EMEC, RLZC, UCF)

**Type.** USNM

**Distribution.** N (Contra Costa, El Dorado, Lassen, Los Angeles, Tuolumne)

**Host/habitat.** *Buprestus aurulentus*

**Remarks.** This species was previously known from only one site in Oregon (Gordh & Trjapitsin 1981).
dahlsteni (Trjapitzin 1971): 507 (Avetianella)

Type. CAS
Distribution. C (El Dorado, Madera, Siskiyou)
Host/habitat. The host is unknown, but specimens were collected in bark beetle traps on Pinus lambertina.

longoi (Siscaro 1992): 206 (Avetianella)

Type. IAEC
Distribution. E (Riverside, San Diego)
Host/habitat. Coptocercus aberrans, Epithora dorsalis, Phoracantha semipunctata
Remarks. Imported from Australia in a biocontrol program directed against P. semipunctata. This species was released from 1993–1995 in San Diego, Riverside, Orange, Los Angeles, San Bernardino, Santa Barbara, Fresno & Santa Clara counties; it established immediately at several sites, and became an effective natural enemy of the beetle (Hanks et al. 1996).

nearctica (Trjapitzin 1977): 160 (Szelenyiola)

Type. EMEC
Distribution. C (El Dorado)
Host/habitat. Unknown
Remarks. According to the original description, the holotype was to be deposited at EMEC, but instead it was placed at the USNM. In 2010 the specimen was indeed placed in the EMEC.

spp.
Remarks. Gordh (1979) reported two undetermined species from California (one under the genus Avetianella). Specimens that may represent six undescribed species were collected in Alpine, Contra Costa, Imperial, Marin, Nevada, Riverside, San Bernardino, Santa Clara, Shasta, Solano, Tuolumne and Ventura counties (EMEC, LACM, RLZC, UCFC, UCDC, UCRC).

Ooencyrtus Ashmead 1900

Hosts. Coleoptera: Coccinellidae; Hemiptera: Coreidae, Pentatomidae, Reduviidae; Hymenoptera: Braconidae; Diptera: Chloropidae; Neuroptera: Chrysopidae; Lepidoptera: Arctiidae, Lasiocampidae, Lymantriidae, Nymphalidae, Saturniidae, Sesiidae

californicus Girault 1917a: 22

Type. USNM
Distribution. N (Inyo, Riverside, Sacramento, Tulare)
Host/habitat. Anasa tristis, Pennisetia marginata
Remarks. Peck (1963: 428) questioned the host record of Pennisetia marginata reported by Johansen (1957), but I’m including it since other Ooencyrtus species have been reported as parasitoids of Lepidoptera. A species near to O. californicus has been collected from Alameda, Calaveras, Riverside, San Bernardino, Santa Barbara, Solano, Stanislaus and Trinity counties (RLZC). The holotype female is mounted on a slide (USNM) and has been crushed into dozens of pieces. The antenna and one forewing are easily visible, but otherwise the rest of the specimen offers little opportunity to distinguish this species.

kuvanae (Howard 1910: 3) (Schedius) [New state record] (CSCA)

Type. USNM
Distribution. W (Contra Costa, Riverside)
Remarks. Dowden (1962) reported that *O. kuvanae* will reproduce on *Orgyia leucostigma* in the lab, but the parasitoid was never recovered from that host in the field. Peck (1963: 431) noted *O. leucostigma* as a host of *O. kuvanae*, but failed to cite any reference for that record. Specimens identified as near *O. kuvanae* were collected in Napa, Santa Clara and Sonoma counties (EMEC).

*submetallicus* (Howard 1897: 151) *(Encyrtus)* **[New state record]** (CSCA)

**Type.** BMNH

**Distribution.** W (Imperial)

**Host/habitat.** *Anasa scorbutica*, *Caligo memnon*, *Coleotichus blackburniae*, *Edessa meditabunda*, *E. sp.*, *Erinnyis ello*, *Euschistus heros*, *Heliconius sp.*, *Liohippelates pusio*, *Hypercompe albicornis*, *Leptoglossus gonagra*, *Mormidea angustata*, *Nezara viridula*, *Oebalus ypsilongriseus*, *Opsiphanes cassina*, *O. tamarindi*, *Piezodorus guildinii*

**Remarks.** The California record is based upon a single damaged specimen, determined by Burks. The antennae, legs and forewings are all missing, but the remaining body agrees with the redescription provided by Noyes (1979). The specimen was one of several parasitoid species associated with *Ferrisia virgata* on *Tecoma capensis* (Bignoniaceae).

*spp.*

**Remarks.** In addition to the species listed above, I have seen specimens that appear to represent an additional 17 morphospecies present in the state, one of which was reared from *Malacosoma californicum* and *M. sp.* (Langston 1957) (EMEC, RLZC).

*Parablastothrix Mercet 1917*

**Hosts.** Lepidoptera: Gracillariidae, Heliozelidae, Lyonetiidae, Nepticulidae

*nearctica* Miller 1965: 751

**Type.** CNC

**Distribution.** N (Alameda, Contra Costa, Marin, Monterey, Sacramento, San Mateo, Santa Barbara, Santa Clara, Solano, Sonoma)

**Host/habitat.** *Bucculatrix albertiella*, *Coptodisca powellella*, *C. sp.*, *Obrussa sp.*, *Phyllonorycter sandraella*, *Stigmella variella*; **NEW:** *Cameraria* sp., *Nepticula rhaddonica*, *N. sp.*, *Stigmella* sp. (all EMEC)

**Remarks.** This species is a solitary parasitoid, which suggests it is monoembryonic, an unusual condition for a representative of the Copidosomatini, where this genus is placed (Zuparko 1995b).

*spp.*

**Remarks.** A single female, representing a species distinct from *P. nearctica*, was collected from a *Salix* sp. in Lassen County (RLZC). A male specimen undetermined to species was collected in Inyo County (UCDC).

*Paratetracnemoidea Girault 1915a [New state record]*

*americana* Gordh 1985: 588 **[New state record]** (UCDC, UCFC)

**Type.** UCRC

**Distribution.** N (Inyo, Nevada, Tuolumne)

**Host/habitat.** Unknown

**Remarks.** Specimens that appear near to *P. americana* have been collected in Riverside County (UCRC).

*Pentelicus Howard 1895a [New state record]*

**Hosts.** Coleoptera: Sphinididae
Remarks. A series of specimens of this genus were collected in Yuba County from a slime mold on a log populated with Lathridiidae (Coleoptera), and another single specimen was collected in San Mateo County (RLZC).

**Perpolia Noyes & Woolley 1994 [New state record]**

spp.

Remarks. Undetermined specimens from this genus were collected off Chrysothamnus (Asteraceae), Pinus "jeffreyi" and from chapparal habitats in Inyo, Los Angeles, Placer, Riverside, San Benito, San Diego, Santa Barbara, Santa Clara and Stanislaus counties (RLZC, UCRC). Another specimen that may be referable to this genus was collected in Solano County (UCDC).

**Plagiomerus Crawford 1910**

**Hosts.** Hemiptera: Diaspididae

diaspidis Crawford 1910: 90

Type. USNM

Distribution. W (Alameda, Butte, Inyo, Lassen, Los Angeles, Marin, Mendocino, Orange, Riverside, San Bernardino, Santa Barbara, Santa Clara, Stanislaus, Tuolumne, Yuba)

Host/habitat. Clavaspis sp., Diaspis echinocacti, Hemiberlesia lataniae; NEW: Chionaspis ortholabis (EMEC), Lepidosaphes sp. (UCRC)

Remarks. De Santis (1979) lists "Clovastis sp." as a host—presumably a misspelling of "Clavaspis sp." Two species of Plagiomerus (P. daispidis and P. cyaneus Ashmead, 1888) reported from the Nearctic Region, and a third (P. hospes Timberlake, 1920) from the Neotropical Region, are mostly distinguished from each other based on the color and relative dimensions of the funicle segments. Specimens from California (some from the same localities) generally resemble P. daispidis, but reflect this range of antennal variation, suggesting a high degree of variation in this species, and that these characteristics are therefore of questionable use in distinguishing species.

**Prionomastix Mayr 1876 [New state record]**

biformis (Ashmead 1900: 370)(Chestomorpha) [New state record](EMEC, UCDC, UCRC)

Type. USNM

Distribution. N (Inyo)

Host/habitat. Specimens were collected on Larrea divaricata.

spp.

Remarks. Male specimens from San Diego and Sierra counties (UCDC, UCRC) may represent an undescribed species.

**Prionomitus Mayr 1876**

**Hosts.** Hemiptera: Psyllidae, Triozidae

mitratus (Dalman 1820: 352) (Encyrtus)

Type. NHRS

Distribution. W (Alameda, Butte, Contra Costa, El Dorado, Fresno, Inyo, Kern, Lassen, Los Angeles, Marin,
Modoc, Mono, Monterey, Napa, Nevada, Placer, Plumas, Riverside, San Bernardino, San Diego, Santa Barbara, Sierra, Solano, Sonoma, Stanislaus, Tuolumne, Ventura, Yolo, Sequoia National Park)

**Host/habitat.** Cacopsylla americana, C. bidens, C. crataegi, C. mali, C. sp. nr. media, C. melanoneura, C. peregrina, C. pyri, C. pyricola, C. ribesiae, Ceanothia essigi, C. insolita, Euglyptoneura fuscipennis, E. minuta, E. robusta, Livilla retamae, Pexopsylla cercocarpi, Psylla pyrisuga, Trioza beameri; **NEW:** Arytaina sp. (EMEC), Psylla alni (UCRC), Psylla floccosa, P. sp. (EMEC).

**Remarks.** This is a Holarctic species, reported from several psyllid species in the western United States (Jensen 1957). Nevertheless, this species was imported from Switzerland into California in the 1960s in a biocontrol program against Cacopsylla pyricola (Clausen 1978b).

tiliaris (Dalman 1820: 171) ([Encyrtus] [**New state record**] (CAS, EMEC, LACM, RLZC, SBMN, UCDC, UCRC)

**Type.** NHRS


**Host/habitat.** Cacopsylla mali, C. melanoneura, C. peregrina, C. pyri, C. ulmi; **NEW:** Cacopsylla tenuata (RLZC), Psylla sp. (EMEC)

**Remarks.** This species has previously been reported only from the Palearctic Region. Peck (1963) noted it questionably occurred in the Nearctic Region, but this record appears to trace to Howard’s report of its presence in St. Vincent (Riley et al. 1894), which apparently was based on a misidentification of *Psyllaephagus rotundiformis* (Howard) (Noyes 1980). This species has been present in the state since at least 1930, when two specimens were collected in Alameda County (UCRC).

**Prochiloneurus Silvestri 1915**

**Hosts.** Hyperparasitoid of Hemiptera: Pseudococcidae via Hymenoptera: Encyrtidae

dactylopii (Howard 1885: 17) ([Chiloneurus] [**new state record**] (RLZC, UCRC)

**Type.** USNM

**Distribution.** W (Alameda, Contra Costa, Glenn, Imperial, Marin, Orange, Santa Clara, Stanislaus, Tulare, Ventura)

**Host/habitat.** Hyperparasitoid of Ferrisia virgata, Phenacoccus manihoti, P. solenopsis, P. sp., Planococcus citri, Pseudococcus comstockii, P. sp., Puto barberi via Anagyrus diversicornis, A. lopezi, Leptomastix dactylopii and Zarhopalus putophilus.

**Remarks.** De Santis (1980) reported Coccus viridis and Chrysopa sp. as hosts for this species, evidently based on Parker et al. (1953), but the latter paper simply reported that *P. dactylopii* was reared from a lot containing (principally) *Coccus viridis* and some *Chrysopa* cocoons—there is no conclusive evidence it emerged from either of these taxa. However, De Santis & Fidalgo (1994) reported a single female of this species had emerged from the pupa of a Sympherobius sp. (Neuroptera: Hemerobiidae) collected in Chile—a record which, in my opinion, needs to be confirmed. A specimen from Orange County (UCRC) was labeled as “working on *C. citrophilus*” (probably =*Pseudococcus calceolariae*). Several specimens from Alameda, Contra Costa, Glenn, Imperial, Santa Barbara and Santa Clara counties appear to be intermediate between *P. dactylopii* and *P. modestus* (RLZC, UCDC).

modestus (Timberlake 1924: 240) ([Achrysocephagus])

**Type.** USNM

**Distribution.** C (Fresno, Orange, Riverside, Tulare, Yuba)

**Host/habitat.** Hyperparasitoid of Pseudococcus maritimus via Anagyrus yuccae and Zarhopalus corvinus; **NEW:** P. comstockii (UCRC)

**Remarks.** Specimens that appear to represent three undescribed species have been collected from Alameda, Marin, San Bernardino and Santa Barbara counties (EMEC, RLZC, SBMN, UCRC).
**Pseudencyrtoides Gordh & Trjapitzin 1975**

**Hosts.** Diptera: Cecidomyiidae

cupressi Gordh & Trjapitzin 1975: 872

  **Type.** USNM

  **Distribution.** C (Marin, San Luis Obispo, Sonoma)

  **Host/habitat.** Walshomyia cupressi

  **Remarks.** Specimens determined as *Pseudencyrtoides* or near *Pseudencyrtoides* were collected from San Bernardino and San Diego counties (UCRC).

**Pseudencyrtus Ashmead 1900 [New state record]**

**Hosts.** Diptera: Cecidomyiidae

spp.

  **Remarks.** Specimens that appear to represent 11 morphospecies of this genus have been collected from Alameda, Calaveras, Contra Costa, Fresno, Kern, Marin, Modoc, Mono, Monterey, Nevada, Riverside, Sacramento, San Benito, San Bernardino, San Joaquin, Solano, Sonoma, Stanislaus, Sutter, Tuolumne and Yolo counties (CSCA, EMEC, RLZC, UCDC, UCFC, UCRC). Two host records (UCRC) are from Syrphidae: Allograpta sp., and a larva attacking *Aphis gossypii*.

**Pseudhomalopoda Girault 1915e [New state record]**

**Hosts.** Hemiptera: Diaspididae

spp.

  **Remarks.** A single specimen (CSCA) was collected on an aphid-infested pecan tree (*Carya* sp., Juglandaceae) in Orange County, and identified as *Pseudhomalopoda* nr. *guamensis* by Burks in 1959. The specimen is now badly damaged, and all that remains is the mesosoma (with a pin running through the scutellum), two legs, one forewing and one hind wing. The fore wing venation nearly matches that of *Pseudhomalopoda prima* Girault 1915e, so it appears that the determination by Burks is correct. Besides armored scales, hosts recorded in the literature include Aleyrodidae and Coccidae.

**Psilophryoidea Compere 1928**

**Hosts.** Hemiptera: Kermesidae

comesor Compere 1928: 215

  **Type.** USNM

  **Distribution.** C (Yolo)

  **Host/habitat.** Kermes cockerelli

**Psyllaephagus Ashmead 1900**

**Hosts.** Hemiptera: Aphalaridae, Psyllidae, Triozidae

bliteus Riek 1962: 722
Type. ANIC
Distribution. E (Central Valley, San Francisco Bay Area, Central Coastal area, southern California coastal and inland areas)

Host/habitat. Creiis costatus, Glycaspis brimblecombei, G. sp.
Remarks. This species was imported from Australia and released in California in a biocontrol program against Glycaspis brimblecombei on Eucalyptus camaldulensis (Myrtaceae) in 2000 and immediately established (Dahlsten et al. 2003; Daane et al. 2005). Further releases resulted in establishment throughout the Central Valley and coastal areas of central and southern California, with pest suppression more effective in the cooler, coastal areas (Dahlsten et al. 2008). It appears to be a very vagile species, as I have collected it in two sites that appear to have no Eucalyptus species in the immediate vicinity.

brachiatus Riek 1962: 726 [new state record](RLZC)
Type. ANIC
Distribution. E (Alameda, Contra Costa)
Host/habitat. Cardiaspina fiscella, Glycaspis sp.
Remarks. I collected a single male that appeared referable to this species, from low roadside vegetation near a Eucalyptus camaldulensis heavily infested with Glycaspis brimblecombei in Oakland in June 2015. A month later, I found a number of males on several tree species at the peak of Mt. Diablo, about 27 kilometers east of the Oakland site. This species was never intentionally imported into California and presumably was accidentally introduced along with the tree and the psyllid, which, if proved, would be a new host record. This species is known only from males, but I collected a series of undetermined females from the E. camaldulensis that I suspect are conspecific.

pachypsyllae (Howard 1885: 15) (Encyrtus)
Type. USNM
Distribution. N (Imperial, San Bernardino)
Host/habitat. Pachypsylla celtidisgemma, P. celtidisvesicula, P. venusta, Trioza beameri

parvus Riek 1962: 749
Type. ANIC
Distribution. E (Orange, Riverside, San Bernardino, San Diego)
Host/habitat. Eucalyptolyma maidenii, Spondyliaspis sp.
Remarks. This species had been imported from Australia in a biocontrol project against E. maidenii, but before it was released it was found to have already been adventitiously established (Jones et al. 2011).

perplexus Riek 1962: 750
Type. ANIC
Distribution. E (Orange, Riverside, San Bernardino, San Diego)
Host/habitat. Cryptoneossa triangula, Eucalyptolyma sp.
Remarks. Jones et al. (2011) reported this species (mistakenly as Psyllaephagus perplexans Cockerell) has established in California adventitiously.

pilosus Noyes 1988b: 105
Type. NZAC
Host/habitat. Ctenarytaina eucalypti; NEW: C. spatulata (UCDC)
Remarks. Imported from New Zealand and Australia in a biocontrol program against Ctenarytaina eucalypti, this species was released in several sites in California in 1993, and immediately established (Dahlsten et al. 1998).

spp.
Remarks. In addition those species listed above, I have seen specimens that appear to represent an additional 15 morphospecies present in the state (CSCA, EMEC, RLZC, UCDC, UCFC, UCRC).
**Rhytidothorax Ashmead 1900 [New state record]**

spp.

**Remarks.** A specimen that appears to represent an undescribed species of this genus was collected on *Adenostoma fasciculatum* in Solano County (UCDC).

**Saera Noyes & Woolley 1994 [New state record]**

*leuce* Noyes & Woolley 1994: 1365 [New state record] (UCRC)

  **Type.** BMNH
  **Distribution.** N (Inyo, Riverside, San Bernardino)
  **Host/habitat.** Unknown

spp.

**Remarks.** Specimens that appear to represent two undescribed species were collected in Imperial, Solano and Stanislaus counties (RLZC, UCDC, UCRC).

**Sectiliclava Hoffer 1957 [New state record]**

**Hosts.** Hemiptera: Psyllidae

sp.

**Remarks.** This genus has an interesting disjunct distribution: one species (*S. cleone*) from the Palearctic, and two others (*S. isis* Noyes & Hanson 1996 and *S. pulchriceps* Noyes & Hanson, 1996) from the Neotropics (Noyes 2001). Noyes et al. (1997) reported an unidentified species, probably *S. cleone*, from the Nearctic, representing the first record of the genus from this region. Specimens that are close to *S. cleone* have been collected from psyllid-infested *Cercocarpus betuloides* and *Salix ?lasirolepis* in Contra Costa, El Dorado, Kern, Marin, Mono, Napa, Nevada, Stanislaus and Tuolumne counties (EMEC, RLZC, UCDC), as well as Arizona (RLZC) and Canada (CAS). One specimen from Alberta was collected in 1928, indicating the presence of the genus in North America is not the result of a recent introduction.

**Stemmatosteres Timberlake 1918**

**Hosts.** Hemiptera: Pseudococcidae

*apterus* Timberlake 1918: 354

  **Type.** USNM
  **Distribution.** W (Alameda, Contra Costa, Fresno, Inyo, San Bernardino, San Mateo)
  **Host/habitat.** *Dysmicoccus timberlakei*, *Phenacoccus* sp.

**Syrphophagus Ashmead 1900**

**Hosts.** Diptera: Chamaemyiidae, Syrphidae; Hyperparasitoids on Hemiptera: Aphalaridae, Aphididae, Psyllidae via Hymenoptera: Aphelinidae, Braconidae, Encyrtidae, Figitidae

*aphidivorus* (Mayr 1876: 712–713, 724) (*Encyrtus*)

  **Type.** NMW
  **Distribution.** W (Alameda, Alpine, Butte, Contra Costa, El Dorado, Fresno, Imperial, Inyo, Kern, Kings,
Hemiptera: Kerriidae


Remarks. The original description is founded on keys to females (page 712) and males (page 713) and a summary paragraph (page 724). This species had been placed in the genus Aphidencyrtus in many early papers, and typically acts as a hyperparasitoid of aphids (and rarely, psyllids) but it has also been reported as a primary parasitoid of aphidophagous Diptera. Unlike other aphid hyperparasitoids, S. aphidivorus has a “dual” ovipositing behavior, ovipositing into both living and dead aphids (Kanuck & Sullivan 1992). In California, this species has shown a preference for attacking aphids parasitized by Aphelinus species rather than those attacked by Aphidiinae (Zuparko & Dahlsten 1995). Hoffer & Starly (1970) reported it as primary parasitoid of aphids, based on its apparent ability to reproduce over several generations in the absence of another primary parasitoid, but this view is not now commonly accepted. Silvestri (1909) reported that S. aphidivorus oviposited into dead aphids parasitized by Aphidius brassicae which in turn were parasitized by Alloxysta victrix (= Allotria vittrix var. infuscata), and thus the encyrtid might prove to be a tertiary parasitoid, but no such evidence has since been published. The host record of Trialeurodes vaporariorum (Hemiptera: Aleyrodidae) cited in Gahan et al. (1928) is probably erroneous.

smitti Kamal 1926: 284

Type. USNM

Distribution. N (Alameda, Contra Costa, Los Angeles, Marin, Mendocino, Monterey, Napa, Orange, Riverside, San Diego, San Mateo, Santa Barbara, Sierra)

Host/habitat. Epistrophe emarginata, Eupeodes nitens, Neocnemodon rita, Syrphus opinator; NEW: Xanthogramma sp. (UCRC)

Remarks. Mitchell (1962) categorized this as a “superparasite” of the pupal stage of N. rita, presumably meaning a hyperparasitoid. However, it is more likely that, like other Syrphophagus species, it is a primary parasitoid of Syrphidae. Originally described from California, specimens of this species have been collected from Alaska and Canada as well (CAS).

spp.

Remarks. Specimens that appear to represent an additional ten morphospecies have been collected in Alameda, Contra Costa, El Dorado, Imperial, Los Angeles, Marin, Modoc, Napa, Nevada, Placer, Riverside, San Benito, San Bernardino, Solano, Sonoma, Stanislaus and Tuolumne counties (CSCA, CAS, EMEC, RLZC, SBMN, UCDC, UCFC, UCRC).

Tachardiobius Timberlake 1926

Hosts. Hemiptera: Kerriidae

nigricans Timberlake 1926: 22

Type. USNM
**Tachinaephagus Ashmead 1904**

**Hosts.** Diptera: Calliphoridae, Fanniidae, Muscidae, Sarcophagidae, Stratiomyiidae, Ulidiidae

**zealandicus** Ashmead 1904: 304

**Type.** USNM

**Distribution.** E (Alameda, Contra Costa, El Dorado, Los Angeles, Marin, Orange, Placer, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, Santa Barbara, Santa Clara, Santa Cruz)

**Host/habitat.** Bercaea cruentata, Calliphora augur, Calliphora quadrimaculata, Calliphora stygia, Calliphora vicina, Chrysomya chloropyga, Chrysomya megacephala, Chrysomya ruficollis, Chrysomya varipes, Chrysomya sp., Fannia canicularis, Haematobia exigua, Oxysarcodexia varia, Phaenicia sericata, Lucilia cuprina, Lucilia sp., Microchrysa sp., Musca domestica, Musca sorbens, Musca sp., Muscina stabulans, Muscina sp., Protocalliphora sp., Sarcophaga aurifrons, Sarcophaga impatiens, Sarcophaga sp., Stomoxys calcitrans, Tritoxa flexa

**Remarks.** This species was imported from Australia in a biological control program against several species, including Phaenicia sericata, Musca domestica, Stomoxys calcitrans and Fannia canicularis in the 1960s (Legner 1978). Bercaea haemorroidalis, noted as a host in Noyes (2001), is a junior synonym of B. cruentata.

**Tineophoctonus Ashmead 1900**

**Hosts.** Coleoptera: Anobiidae

**hubbardii** (Ashmead 1900: 380) (Cerchysius)

**Type.** USNM

**Distribution.** N (Imperial)

**Host/habitat.** Vrilletta hubbardi [nomen nudum]

**Trechnites Thomson 1876**

**Hosts.** Hemiptera: Psyllidae

**insidiosus** (Crawford 1910: 89) (Psylleodontus)

**Type.** USNM

**Distribution.** W (Alameda, Butte, Contra Costa, Inyo, Los Angeles, Marin, Mendocino, Mono, Napa, Orange, Placer, Riverside, San Bernardino, San Diego, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Stanislaus, Tulare, Ventura)

**Host/habitat.** Cacopsylla pyri, C. pyricola, C. vasiljevi, Psylla pyrisuga, P. sp.

**Remarks.** Trechnites insidiosus was described in 1910 in New York, and at the time its only known host was Cacopsylla pyricola, an Old World species first found in the New World in 1832, and on the west coast in 1939 (Clausen 1978b). The parasitoid was first recorded on the West Coast in 1962. During a biocontrol program against C. pyricola that ran from the 1960s to the 1980s, T. pyllae (Ruschka) was imported into California from...
Switzerland and southeastern Europe (Unruh et al. 1995). Recently Guerrieri & Noyes (2009) synonymized *T. psyllae* under *T. insidiosus* (thereby increasing the host records of the latter). However it is not clear if the presence of *T. insidiosus* in California reflects the natural endemic range of a Holarctic species, if it is a Palearctic species that was introduced accidentally when *C. pyricola* expanded its range (as suggested by Unruh et al. 1995), or if it became established in California during the biocontrol program starting in the 1960s.

**Trichomasthus Thomson 1876**

**Hosts.** Hemiptera: Eriococcidae

*Trichomasthus coeruleus* Mercet 1923: 49

**Type.** MNMS

**Distribution.** E (Alameda, San Joaquin)

**Host/habitat.** Eriococcus spurius

**Remarks.** In 1939 and 1949–50 a species then identified as *T. cyanifrons* was imported from Europe and released in southern California in a biocontrol program against *E. spurius*, but failed to establish (Flanders 1952; Bartlett 1978b, cited by Noyes 2010). However, subsequent importations of a species initially identified as *T. cyanifrons* in 1952–1954 in central and northern California did result in establishment—this imported agent was later determined to be *T. coeruleus* (Dreistadt & Hagen 1994). Noyes (2001) lists two hosts for this species—both of which are invalid names for *E. spurius*.

**Trjapitzinellus Viggiani 1967**

**Hosts.** Neuroptera: Coniopterygidae

*Trjapitzinellus microrphanos* Gordh 1973: 51

**Type.** SEMC

**Distribution.** C (Alameda, Calaveras, Lassen, Marin, Orange, Plumas, Riverside, San Bernardino, San Diego, San Mateo, Santa Barbara, Solano, Stanislaus, Tuolumne, Ventura, Yolo)

**Host/habitat.** Conwentzia sp., Parasemidalis sp.; NEW: *Conwentzia barretti* (EMEC)

**Remarks.** In southern California, the hosts of this species are likely to be *Conwentzia nigrans* Carpenter and *Parasemidalis flaviceps* Banks, which were the most abundant coniopterygids found in association with *T. microrphanos* (Gordh 1973). In northern California, there are two instances (EMEC) where a *T. microrphanos* adult was reared from the same host (*C. barretti*) specimen as a *Dendrocerus* sp. (Hymenoptera: Megaspilidae), representing the extremely rare phenomenon of multiple parasitism. An undetermined species of this genus has been collected from Lassen and Santa Barbara counties (UCRC).

**Tyndarichus Howard 1910**

**Hosts.** Hyperparasitoids of Lepidoptera: Noctuidae via Hymenoptera: Encyrtidae

*Tyndarichus americanus* Gordh & Trjapitzin 1981: 45 [New state record]

**Type.** USNM

**Distribution.** N (Alameda, Alpine, Contra Costa, El Dorado, Fresno, Lassen, Los Angeles, Modoc, Nevada, Orange, Plumas, San Bernardino, Tuolumne)
**Host/habitat.** NEW: Hyperparasitoid of *Agrotis ipsilon* via *Copidosoma celaenae* (EMEC)

**Remarks.** Gordh (1979: 937) reported “an undetermined species” that ranged from Wisconsin to Montana, south to Nebraska, and in Florida and California. But in the original description of *T. americanus*, Gordh & Trjapitzin (1981) noted that the type series was based on only six specimens from Wisconsin and Utah, which leaves in doubt the identity of most of the other specimens Gordh mentioned in the earlier work. At the time of the original description males were unknown, but several male specimens from Los Angeles, Nevada and Plumas counties (UCDC, UCRC) have the same collecting data as female *T. americanus*, and are presumably conspecific.

**Remarks.** Specimens representing an undescribed species were collected from Alameda, Contra Costa, Humboldt, Lassen, Los Angeles, Nevada, Orange and Tulare counties (CAS, CSCA, LACM, RLZC, UCDC).

**Zaomma Ashmead 1900**

**Hosts.** Hyperparasitoid of Hemiptera: Asterolecaniidae, Conchaspididae, Diaspididae, Eriococcidae via Hymenoptera: Aphelinidae, Encyrtidae

lambinus (Walker 1838: 422) (*Encyrtus*)

**Type.** BMNH

**Distribution.** W (Alameda, Alpine, Calaveras, Contra Costa, Lassen, Marin, San Bernardino, San Diego, Santa Clara, Stanislaus, Trinity, Yuba)


**Remarks.** Although Graham (1969) synonymized *Chiloneurus microphagus* Mayr, 1876 with *Z. lambinus* (under *Apterencyrtus*), Gordh (1979) continued to use the former name in the interest of stability.

**Remarks.** A single specimen that represents another species was swept from *Baccharis pilularis* (Asteraceae) in San Mateo County (RLZC).

**Tetracneminae**

**Aenasius Walker 1846**

**Hosts.** Hemiptera: Pseudococcidae

arizonensis (Girault 1915b: 280) (*Chalcaspis*)

**Type.** USNM

**Distribution.** N (Imperial, Los Angeles, Riverside, San Bernardino, Santa Clara, Tulare)

**Host/habitat.** *Phenacoccus solenopsis*

flandersi Kerrich 1967: 204

**Type.** USNM

**Distribution.** W (San Diego)

**Host/habitat.** *Ferrisia virgata*, *Phenacoccus gossypii*, *P. herreni*, *P. madeirensis*
maplei Compere 1937: 397
Type. USNM
Distribution. W (Ventura)
Host/habitat. *Puto yuccae*
Remarks. Noyes (2001) cites Compere (1937) in reporting *A. maplei* from Brazil, when in fact, Compere (pp. 390, 397–398) records this species only from California. The erroneous mention of Brazil for *A. maplei* probably stems from the next species treated by Compere, *A. brasiliensis* (Mercet) (pg. 398).

*phenacocci* (Ashmead 1902: 301) (*Blepyrus*)
Type. USNM
Distribution. N (Colusa, Imperial, Los Angeles, Riverside, San Bernardino, San Joaquin, Ventura)
Host/habitat. *Phenacoccus solani*, *P. solenopsis*
Remarks. *Formicococcus njalensis* is not a proven host (see Methods). A series of specimens from Riverside County identified as *A. sp. nr. phenacocci* was reared from *Heliococcus atriplicis* (UCRC).

spp.
Remarks. Specimens which may represent one or more undescribed species have been collected from Alameda, Calaveras, Contra Costa, Inyo, Lake, Lassen, Los Angeles, Marin, Mendocino, Mono, Monterey, Orange, Placer, Riverside, San Benito, San Bernardino, San Diego, San Mateo, San Francisco, Santa Barbara, Santa Clara, Stanislaus, Siskiyou, Tehama, Tulare and Ventura counties (CSCA, EMEC, LACM, RLZC, SBMN, UCFC, USNM).

*Anagyrus* Howard [in Howard & Ashmead] 1896
Hosts. Hemiptera: Pseudococcidae

californicus* (Compere 1947: 19) (*Apoanagyrus*)
Type. USNM

clauseni Timberlake 1924: 226
Type. UCRC
Distribution. W (Fresno, San Joaquin, Santa Clara)
Host/habitat. *Pseudococcus maritimus*
Remarks. This species was described on the basis of a single specimen, that was in good condition except for the absence of one flagellum; in the original description, Timberlake (1924: 223) noted his intention of depositing the type in the USNM. However, there is no record of the type at the USNM (M. Gates, in litt.), but, as reported by Noyes (2000: 123), a slide mounted antenna and forewing from the holotype are deposited at UCRC. According to the literature, this species has a disjunct distribution, reported only from California (Compere 1947) and Chile (De Santis 1989). Noyes (2000) noted that this species might be synonymous with *A. putonophilus*, which also has a disjunct New World distribution (California and Costa Rica).

dzanokmenae Trjapitzin, Myartseva & Ruiz 2001: 413
Type. USNM
Distribution. N (Contra Costa, Kern, Los Angeles, Riverside, San Diego, San Luis Obispo)

Host/habitat. Unknown

Remarks. A small series of specimens from Inyo County (UCDC) appear to be near to this species.

**kamali** Moursi 1948: 1

Type. USNM

Distribution. E (Imperial)

Host/habitat. *Ferrisia virgata, F.* sp., *Macnellicoccus hirsutus, Nipaecoccus viridis, N.* sp., *Pseudococcus* sp., *Trabutina serpentinus*

Remarks. Along with *Gyranusoidea indica*, this species was imported in a biocontrol program against *M. hirsutus* (Roltsch et al. 2006). Releases took place in Imperial County from 1999 through 2002, and included material originating from China, Hawaii and Egypt, and it established as the dominant parasitoid against the mealybug. Shafee et al. (1975) reported *Formicococcus (=Planococcus) robustus* as a host for *A. flavus* Agarwal 1965 (later amended to *A. flavidus* after Agarwal recognized his original name was a junior homonym of *A. flavus* Ishii, 1928), which is a junior synonym of *A. kamali*. However, Noyes & Hayat (1994) noted that specimens of that species in the USNM determined by Shafee et al. are actually *A. chrysos* Noyes & Hayat, 1994, thus bringing that host record into question.

**nigritus** (Howard 1898a: 243) (*Aphycus*)

Type. USNM

Distribution. C (Los Angeles)

Host/habitat. Undetermined pseudococcid on *Artemisia* sp.

Remarks. In the original description, this species was reported from a “*Dactylopius* sp.” At that time, many mealybugs were placed in *Dactylopius*, but that genus is now restricted to cochineal scales, placed in the family Dactylopiidae.

**paralia** Noyes & Menezes, in Noyes 2000:39 [New state record] CSCA, UCRC

Type. INBio

Distribution. W (Imperial, Los Angeles, Riverside, San Diego)

Host/habitat. Unknown

Remarks. This species was previously known only from Arizona, Texas, Mexico and Costa Rica.

**sp. nr. pseudococci** (Girault 1915c) (*Epidinocarsis*).

Remarks. The confusion surrounding the identity of this species rivals that of *Copidosoma floridanum/C. truncatellum. Anagyrus pseudococci* was described from specimens collected in Sicily, and a species identified as such was introduced into California from Brazil in biocontrol programs against *Planococcus citri* in 1934 (Bartlett & Lloyd 1958), and *Pseudococcus longispinus* in 1953 (Bartlett 1978c). In 1955, a species identified as *A. sp. nr. pseudococci* was imported from Italy against a suite of citrus mealybugs (Bartlett & Lloyd 1958). Evidently the 1934 attempt failed, but the species established after the later efforts. However, recent research indicated that at least two genetically and reproductively distinct taxa are involved: the “true” *A. pseudococci* (native to the Mediterranean area and probably accidentally established in South America), and another taxon referred to as *Anagyrus* sp. nr. *pseudococci*, which is native to the Palearctic region, but has been introduced across the globe (as *A. pseudococci*) in a series of biological control programs (Triapitsyn et al. 2007). It is this second taxon that has become established in California, reported from Fresno, Orange, Riverside and Ventura Counties on *Planococcus citri* and *P. ficus* (Triapitsyn et al. 2007), and from San Luis Obispo County on *Pseudococcus longispinus* and *P. viburni* (Daane et al. 2008). Triapitzin (1989: 136) synonymized *A. kivuensis* Compere 1939 under *A. pseudococci*, a taxon that Triapitsyn et al. (2007: 18) treated as *A. sp. nr. pseudococci*.

**putonophilus** Compere 1947: 22

Type. UCRC

Distribution. W (Marin, Ventura)

Host/habitat. *Puto ambiguum, P. yuccae*
**Remarks.** See remarks under *A. clauseni*. Compere (1947) reported his intention to deposit new types described in that paper in the US National Museum, but he evidently failed to do so. Compere’s syntype series is at U.C. Riverside, and Noyes (2000) designated a lectotype from that material.

**smithi** Doutt 1952: 401
- **Type.** CAS
- **Distribution.** C (Alameda, Contra Costa, Fresno)
- **Host/habitat.** *Spilococcus implicatus*
- **Remarks.** I designated a female specimen as lectotype (Zuparko 2009).

**yuccae** (Coquillet 1890: 44) (*Blastothrix*)
- **Type.** USNM
- **Distribution.** C (Fresno, Los Angeles, San Bernardino, San Diego)
- **Host/habitat.** *Anisococcus crawii, Pseudococcus maritimus, Puto yuccae; NEW: Amonostherium lichtensioides, Puto simmondsiae* (both UCRC)
- **Remarks.** Compere (1947) synonymized *Anagyrus ferrisi* Compere 1926 under *Anagyrus* (*=Epidinocarsus*) *subalbicornis* (Girault 1916), and noted that the latter was very near to *A. yuccae*, but maintained them as different species. However Gahan (1949) later synonymized *A. subalbicornis* under *A. yuccae*. The record of *Achrysopophagus* (*=Prochiloneurus*) *modestus* as a host in Peck (1951: 476) probably stems from a misreading of Clausen (1924), who records that species as a hyperparasitoid of *P. maritimus* via *A. subalbicornis*.

**spp.**
- **Remarks.** In addition to the species listed above, I have seen specimens that appear to represent an additional 35 morphospecies present in the state (CSCA, EMEC, RLZC, SBMN, UCDC, UCFC).

**Anusioptera** Brues 1910 [New state record]

**Hosts.** Hemiptera: Pseudococcidae

**koebeli** Trjapitzin 1997: 668 [New state record](UCDC)
- **Type.** BMNH
- **Distribution.** W (Imperial)
- **Host/habitat.** Unknown
- **Remarks.** The single specimen from California varies slightly from the original description in regard to the dimensions of the syntergite and color, but Trjapitzin (1997) noted a fair degree of variation between specimens from southern Mexico and the USA, and so I feel confident assigning this specimen to the species. The only other species in the genus, *A. aureocincta* Brues, 1910, was imported into California (as “undescribed genus near *Leptomastix*”) for control of *Ferrisia virgata*, but died out in culture (DeBach & Warner 1969). However, I have seen a single specimen of that species from Baja California (UCRC), and it seems likely that it will eventually be found in California as well.

**Avernes** Noyes & Woolley 1994 [New state record]

**gela** Noyes & Woolley 1994: 1379 [New state record](CAS)
- **Type.** CNC
- **Distribution.** W (San Diego)
- **Host/habitat.** Unknown
**Blepyrus** Howard 1898a

**Hosts.** Hemiptera: Pseudococcidae

*tenuiscapus* (Kerrich 1967: 239) (*Euryrhopalus*)

Type. USNM  
Distribution. C (Ventura)  
Host/habitat. *Phenacoccus* sp.  
Remarks. There is a short series of specimens from Kern, San Benito, San Bernardino, Santa Barbara and Solano counties (RLZC, UCDC, UCRC) that, except for their funicular segments, match *B. tenuiscapus*.

**Charitopus** Förster 1856

spp.  
Remarks. An undescribed species was collected in Los Angeles County (UCRC). A second species that may be referrable to this genus was collected in Kern County (RLZC).

**Chrysoplatycerus** Ashmead 1889

**Hosts.** Hemiptera: Pseudococcidae

*ferrisi* Timberlake 1922: 6  
Type. USNM  
Distribution. C (Calaveras, Los Angeles, Riverside, San Diego, Santa Clara)  
Host/habitat. *Anisococcus adenostomae, Phenacoccus gossypii*  
Remarks. Hitherto known only from southern California, specimens from Calaveras and Santa Clara counties (RLZC) shows this species reaches well into northern California.

*splendens* (Howard 1888: 194) (*Rileya*)  
Type. USNM  
Distribution. W (Alameda, Contra Costa, Los Angeles, Marin, Orange, Riverside, San Bernardino, San Diego, San Mateo, Santa Barbara, Santa Clara, Ventura, Yolo, Yuba)  
Host/habitat. *Dysmicoccus brevipes, D. ryani, Ferrisia virgata, Planococcus citri, P. ficus, Pseudococcus calceolariae, P. comstockii, P. longispinus, P. maritimus, P. viburni*  
Remarks. Although this species was described from specimens collected in Los Angeles County in 1888, Essig (1911) stated that it “appears to be the same as one of the three introduced [into California] from the Philippine Islands by Compere.” Presumably, based on this observation Clausen (1915) reported that *C. splendens* had been “placed” in San Diego County following its introduction. However, Noyes (2000: 215) thought it probable that Essig misapplied this name to a species from the genus *Taftia*, which occurs in the Philippines and closely resemble the genus *Chrysoplatycerus*. *Formicococcus njalensis* is not a proven host (see Methods).

**Coccidoxenoides** Girault 1915a

**Hosts.** Hemiptera: Pseudococcidae

*perminutus* Girault 1915a: 173  
Type. QM  
Distribution. E (Los Angeles, Riverside, San Luis Obispo, Ventura)  
Host/habitat. *Delottococcus quaeusius, Ferrisia virgata, ’Phenacoccus maderiensis, Planococcus citri, P. ficus, P. kenyae, P. lilacinus, P. sp. nr. ficus, P. vovae, Pseudococcus bingervillensis, P. longispinus, P. njalensis, P. maritimus, Spilococcus sp.; NEW: Pseudococcus cryptus* [UCRC]
Remarks. Initially imported from Hawaii in an unsuccessful biocontrol program against *P. citri* (as *Pauridia peregrina* Timberlake 1919b), this species later established from material imported from China in 1950 (Bartlett 1978c). Another strain was recently imported from South Africa and released in the central coastal area (Daane et al. 2008). The host record of *Planococcus krauhniae* in reports from the early 20th century represents a misidentification of *P. citri* (Bartlett 1978c). Two specimens (UCRC) are recorded from *Aonidiella aurantii* on Valencia oranges from Riverside County, but this record needs to be confirmed.

**Dicarnosis Mercet 1921**

**Hosts.** Hemiptera: Pseudococcidae

*ripariensis* Kerrich 1978: 117

**Type.** USNM

**Distribution.** N (Alameda, Fresno, Monterey, Riverside)

**Host/habitat.** *Phenacoccus gossypii* spp.

**Remarks.** I collected a series of specimens representing an undetermined species in Kern County (RLZC).

**Ectromatopsis Compere 1947**

**Hosts.** Hemiptera: Pseudococcidae

*americana* (Howard 1898a: 248) (*Ectroma*)

**Type.** USNM

**Distribution.** N (Imperial, Inyo, Kern, Riverside, San Bernardino, San Diego, Santa Barbara)

**Host/habitat.** *Phenacoccus solani*

**Ericydnus Haliday [in Curtis] 1832**

**Hosts.** Hemiptera: Pseudococcidae

*lamasi* (Domenichini 1951: 171) (*Grandoriella*)

**Type.** BMNH

**Distribution.** W (Riverside, San Bernardino, Santa Barbara)

**Host/habitat.** *Phenacoccus gossypii, Phenacoccus sp., Planococcus citri, P. maritimus, P. neomaritimus*

**Remarks.** This species was originally reported from the USA by Kerrich’s (1967) reference to specimens from “California, Fillmore”. However, these were laboratory reared from the insectary of the Fillmore Protection District, and it is unknown if they had been collected locally or imported. This species is known to occur from Peru north to at least Mexico (Noyes 2015), and specimens referable to *lamasi* (CAS, EMEC, SBMN, UCRC) have been widely collected in southern California, so it appears likely that the species occurs here naturally. Noyes & Hayat (1994) reported *Pseudococcus elisae* Borchensius as a host, citing De Santis (1983), but in fact the latter paper does not link these two species.

*sipylus* (Walker 1837: 445)

**Type.** BMNH

**Distribution.** A (Los Angeles, San Bernardino)

**Host/habitat.** *Brevennia pulveraria*

**Remarks.** Kerrich (1967) reported a specimen of this species reared from “*Heterococcus pulverarius*
“Zuparko”, which is now placed in the genus *Brevennia*. However, Miller (1975) noted that some mealybugs identified as *H. pulverarius* were actually *H. nudus* (Green), so the exact host still needs to be confirmed. Except for the California records reported in Kerrich (1967), this species appears to be restricted to the western Palaearctic, so I’m treating this species as an accidental introduction into the state.

Remarks. Specimens that appear to represent two undescribed species (both with macropterous and brachypterous forms) have been collected from Alameda, Contra Costa, Lassen, Los Angeles, Modoc, Napa, Riverside, San Bernardino, Shasta, Sierra, Solano, Stanislaus and Tuolumne counties (CAS, EMEC, RLZC, SBMN, UCFC, UCRC).

**Gyranusoidea Compere 1947**

**Hosts.** Hemiptera: Pseudococcidae

*advena* Beardsley 1969: 303 [New state record] (RLZC)

Type. BPBM

Distribution. A (Alameda)

Host/habitat. *Pseudococcus antricolens, P. longispinus, P. pipturicolus*, *P. sp.*; in California, it was collected on *Syzygium paniculatum* (Myrtaceae).

Remarks. Noyes (1988b) opined that this species might have been accidentally introduced into New Zealand from Hawaii (whence it had been described), while Beardsley (1969) noted this species did not appear to be closely allied to the Hawaiian anagyrine complex, and suggested that it was adventive there. Noyes (in litt.) notes that this species is also found in southern Africa and the Mediterranean region, suggesting it may be native to one of those areas.

*claripennis* (Timberlake 1918: 365) (*Tanaomastix*)

Type. USNM

Distribution. C (Los Angeles)

Host/habitat. *Dysmicoccus ryani*

*indica* Shafee, Alam & Agarwal 1975: 22

Type. ZDAMU

Distribution. E (Imperial)

Host/habitat. *Maconellicoccus hirsutus, Nipaecoccus viridis, N. sp.*

Remarks. Along with *Anagyrus kamali*, this species was imported in a biocontrol program directed against *M. hirsutus* (Roltsch et al. 2006). Releases of specimens originating from Egypt, Pakistan and Australia began in 1999. Although it has established in California, it appears to be outcompeted by *A. kamali*.

**spp.**

Remarks. In addition to the species listed above, I have seen specimens that appear to represent an additional five morphospecies collected in Alameda, Contra Costa, Imperial, Los Angeles, San Bernardino, San Luis Obispo, Stanislaus, Tulare and Tuolumne counties (RLZC, UCDC, UCFC, UCRC).

**Holcencyrtus** Ashmead 1900

**Hosts.** Hemiptera: Pseudococcidae

*myrmicoides* (Compere & Zinna 1955: 98) (*Acroaspidia*)

Type. BMNH
**Distribution.** E (San Bernardino)

**Host/habitat.** *Ferrisia virgata, Formicococcus njalensis, Phenacoccus madeirensis, Planococcus citri, P. calceolariae, P. longispinus, P. maritimus*

**Remarks.** This was one of a series of natural enemies imported into California from 1948–56 in biocontrol programs directed against economic mealybugs. This species was imported from Trinidad in 1954 and released in Ventura County the next year (Clausen 1956b), but it was considered to have failed to establish (Bartlett 1978c). However, it was collected in San Bernardino County in 1995 and 2006 (UCRC).

**Remarks.** At least two additional species are present in the state, one found in Inyo, Lassen, Los Angeles, Marin, Riverside and San Luis Obispo counties (CSCA, RLZC, UCRC), and the other in Lassen and Los Angeles counties (RLZC, UCRC).

**Leptomastidea Mercet 1916**

**Hosts.** Hemiptera: Pseudococcidae

*abnormis* (Girault 1915c: 184) (*Paraleptomastix*)

**Type.** USNM

**Distribution.** E (Fresno, Los Angeles, Riverside, San Diego, San Luis Obispo, Santa Barbara, Ventura, Yuba)

**Host/habitat.** *Dysmicoccus brevipes, D. ryani, Ferrisia virgata, Formicococcus njalensis, Phenacoccus gossypi, P. sp., Planococcus citri, P. ficus, P. kenya, P. kraunhiae, P. sp. nr. ficus, P. vovae, Pseudococcus calceolariae, P. comstocki, P. cryptus, P. longispinus, P. maritimus, P. viburni, P. sp. Saccharicoccus sacchari*

**Remarks.** This species was established in 1914, when it was imported from Sicily in a biocontrol program against *P. citri* (Bartlett 1978c). It is now reared in commercial insectaries and continues to be used against several mealybug species. In the 1990s, additional stock was imported from the Middle East and released in Riverside County (González 1998), while further releases have been made in Fresno County.

**Leptomastix Förster 1856**

**Hosts.** Hemiptera: Pseudococcidae

*dactylopii* Howard 1885: 23

**Type.** USNM

**Distribution.** E (San Luis Obispo, Ventura)


**Remarks.** This species was imported from Brazil and released in a biocontrol program against *P. citri* in southern California in 1935, but apparently established only in the central coastal area of California (Bartlett 1978c), where it was found 80 years later (Daane et al. 2008).

**Mira Schellenberg 1803 [New state record]**

*mucora* Schellenberg, 1803: 68 [New state record](CSCA, EMEC, RLZC, UCDC, UCRC)

**Type.** Boucek (1977) thought the type might be lost.

**Distribution.** A (Alameda, Amador, Contra Costa, Marin, Orange, Placer, Riverside, San Benito, San Diego, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tehama, Yolo)
Host/habitat. Collected from a variety of grasses and shrubs.

Remarks. This appears to be primarily a Palearctic species, but there is also a single previous record from Idaho (Gordh 1979) so it may have a natural holarctic Distribution. However, even though the species is quite distinctive and large enough to be noticed and taken by general collectors, I found no California records of this species prior to 1999. It now occurs in the coastal belt from San Diego north to Sonoma, and can be quite numerous locally, and is winter active as well. Therefore I treat the species as a relatively recent arrival in California, and I suspect it will continue to increase its range through western North America.

*Neocharitopus* Hayat, Alam & Agarwal 1975 [New state record]

**Hosts.** Hemiptera: Pseudococcidae

**spp.**

**Remarks.** An undetermined specimen of this genus was collected in San Bernardino County, while four additional specimens, questionably ascribed to this genus, were collected from San Diego County (UCRC).

*Neodusmetia* Kerrich 1964

**Hosts.** Hemiptera: Pseudococcidae

*sangwani* (Subba Rao 1957) (*Dusmetia*).

**Type.** INPC

**Distribution.** E (Orange)

**Host/habitat.** *Antonina graminis*

**Remarks.** This species was originally imported from India in 1959 and established in Texas in a biological control program against *Antonina graminis*, and specimens from that program were released in Imperial County (Bartlett 1978c). Noyes (2000), referring to Bartlett (1978c), stated this species was also successfully used in California; however Bartlett (1978c: 139) reported only that a small number of the species had been released in California in 1968, and its success had not yet been assessed. However, there is a specimen (UCRC) collected from Orange County in 1992, indicating that the species is at least established here.

*Pseudleptomastix* Girault 1915d

**Hosts.** Hemiptera: Pseudococcidae

*squammulata* Girault 1915d: 272

**Type.** USNM

**Distribution.** W (Alameda, Butte, Calaveras, Contra Costa, Fresno, Glenn, Imperial, Inyo, Kern, Lassen, Los Angeles, Riverside, San Bernardino, San Joaquin, Santa Barbara, Ventura)

**Host/habitat.** *Amonostherium lichtensioides, Pseudococcus maritimus; NEW: Spilococcus pressus*

**Remarks.** This species has also been reported from California under its junior synonyms *Paraleptomastix notatus* Girault 1917c and *Pseudleptomastix flatulescens* Compere 1926a. One of the distinguishing characters of this species is the all yellow fore coxae, but in a short series of specimens from Kern County (RLZC), the color varies from almost all yellow to almost all black.

**spp.**

**Remarks.** Two species of the genus (*P. squammulata* and *P. tertia* Kerrich 1982, the latter known only from the eastern seaboard) have been recorded from the United States, but I have seen specimens that appear to represent an additional five morphospecies present in the state from Kern, Imperial, Marin, Lassen, Los Angeles, Riverside,
Santa Barbara and Stanislaus counties (RLZC, UCDC, UCFC, UCRC). A single specimen (UCRC) was reared from an *Asphondylia* sp. stem gall on *Larrea tridentata*, and a series of specimens from Marin County (RLZC) appear to be associated with *Calycadenia multiglandulosa* (Asteraceae). There is another series of specimens that appear to be near to *Pseudleptomastix*, reared in association with male *Rhopus* from *Dysmicoccus timberlakei* in Alameda County (EMEC).

**Rhopus Förster 1856 [New state record]**

_spp._

**Remarks.** To date, only two described species, *R. americanus* (Girault 1915e) and *R. nigroclavatus* (Ashmead 1902) have been reported from North America, although neither has yet been found in California (Noyes 2001). However, three morphospecies have been collected from *Distichlis* sp. (Poaceae) and terrestrial grasses from Alameda, Contra Costa, El Dorado, Imperial, Lassen, Marin, Placer, Santa Barbara and Solano counties (EMEC, RLZC, UCDC, UCRC), while some males have been reared from *Dysmicoccus timberlakei* in Alameda County (EMEC) (NEW), in association with specimens that appear to be near *Pseudleptomastix*.

**Tetracnemoidea Howard 1898a**

**Hosts.** Hemiptera: Pseudococcidae

*brevicornis* (Girault 1915e: 174) (*Arhopoideus*)

_Type._ QM

**Distribution.** E (Alameda, Los Angeles, Orange, Riverside, San Diego)

**Host/habitat.** *Pseudococcus calceolariae*, *P. longispinus*, *P. maritimus*, *P. viburni*

**Remarks.** Imported from Australia in 1928 in a biological control program against *Pseudococcus calceolariae*, this species was released at several sites in Southern California, and immediately established (Bartlett 1978c, as *Hungariella pretiosa*). *Pseudococcus comstocki* is not a proven host (see Methods). In California, I have found the three described species of the genus can occur sympatrically on urban shade trees.

*peregrina* (Compere 1939b: 59) (*Tetracnemus*)

_Type._ USNM

**Distribution.** E (Alameda, Los Angeles, Orange, Riverside, San Diego, San Luis Obispo)

**Host/habitat.** *Ferrisia virgata*, *Pseudococcus calceolariae*, *P. longispinus*, *P. maritimus*, *P. viburni*, *P. sp.*

**Remarks.** Imported from Brazil in 1934 and released in a biocontrol program against *Pseudococcus longispinus*, this species became established in southern California (Bartlett 1978c). *Dysmicoccus brevipes*, *Pseudococcus comstocki*, and *P. njalensis* are not proven hosts (see Methods). Additionally, Onillon (1988: 484) reports the use of *T. peregrina* in a partially successful biocontrol program against *Pseudococcus citriculus* in Israel, citing DeBach (1964); however DeBach (1964: 681) reported that parasitoid only in programs against *P. longispinus* in California and Bermuda. Noyes (2001), citing Wysoki et al (1989), reported *Pseudococcus sp.* as a host; however Wysoki _et al._ (1989) were referring to *P. longispinus*.

*sydneyensis* (Timberlake 1929: 18) (*Anarhopus*)

_Type._ USNM

**Distribution.** E (Alameda, Los Angeles, Marin, Orange, Placer, San Diego, San Mateo, Santa Barbara, Santa Clara, Ventura)

**Host/habitat.** *Pseudococcus calceolariae*, *P. longispinus*

**Remarks.** Imported from Australia in 1933 in a biocontrol program against *P. longispinus*, this species was released and established in southern California, and in conjunction with *T. peregrina* provided excellent control of the mealybug (Bartlett 1978c). *Pseudococcus comstocki* and *P. njalensis* are not proven hosts (see Methods). One specimen was reportedly reared from a *Protopulvinaria* species in Los Angeles County (UCRC), but this is probably a misidentification of the host.
Remarks. Specimens from Alameda, Fresno, Santa Barbara and Stanislaus counties (EMEC, RLZC, SBMN) represent an undescribed species, and single specimens from San Diego (UCRC) and Marin (RLZC) represent two additional species.

*Tetracnemus* Westwood 1837a

**Hosts.** Hemiptera: Pseudococcidae

*tertius* (Girault 1917a: 7) (*Paracalocerinus*)

**Type.** USNM

**Distribution.** N (Inyo, Los Angeles)

**Host/habitat.** Eriococcus sp.

Remarks. Eleven nominal species of this genus have been recorded from the United States, but given the absence of a recent generic revision, and the fact that several species were described from only one sex, it is likely that some of these names will prove to be synonymous.

spp.

Remarks. An additional five species (three fully winged and two brachypterous) have been collected from Contra Costa, Inyo, Lassen, Marin, San Benito, San Bernardino, Sonoma, Stanislaus and Yuba counties (CSCA, EMEC, RLZC, UCR).

*Zarhopalus* Ashmead 1900

**Hosts.** Hemiptera: Pseudococcidae

*corvinus* (Girault 1915e: 169) (*Anagyrella*)

**Type.** USNM

**Distribution.** C (Alameda, Fresno, Kern, Merced, Riverside, San Francisco, San Joaquin, Santa Cruz, Stanislaus, Tulare, Tuolumne, Ventura)

**Host/habitat.** Pseudococcus comstocki, *P. maritimus*, *P. sp.*; NEW: Anisococcus crawii (UCRC)

**Remarks.** Gordh (1979: 958) recorded this species from Quebec, which suggests it has a trans-Nearctic

**Distribution.** However, this species was introduced into Quebec (and elsewhere in Canada) from California in a biocontrol program against *P. maritimus* in greenhouses (Burnett 1947). Burnett (1947) reported it provided good control, and thus it may have successfully established there, but I have seen no confirmed reports of this.

*inquisitor* (Howard 1881) (*Encyrtus*) [New state record] (RLZC)

**Type.** Lost

**Distribution.** W (Contra Costa, Glenn, San Benito, Santa Clara, Solano, Stanislaus)

**Host/habitat.** Ferrisia virgata, Planococcus citri

**Remarks.** Gahan (1927) synonymized *Aphidencyrtus schizoneurae* (Ashmead 1885), *A. aphidiphagus* (Ashmead 1887), *A. megourae* (Ashmead 1887), and *A. websteri* (Howard 1890) under *A. inquisitor*. In a later paper Gahan (1930) correctly placed these under *A.* (now *Syrphophagus*) *aphidivorus* (Mayr). Ashmead (1887) reported this species from a “Lecanium (=Eulecanium) sp. on pine”, which was probably a misidentification of a mealybug.

*sheldoni* Ashmead 1900: 406

**Type.** USNM (lost)

**Distribution.** N (Imperial, Riverside, San Diego, Ventura)

**Remarks.** There are series of undetermined specimens from Alameda, Butte, Imperial, Inyo, Los Angeles, Marin, Merced, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Santa Clara, Stanislaus, Tulare and Tuolumne counties, swept from *Adenostoma fasciculatum*, *Arctostaphylos* sp. and *Juniperus californicus* (CSCA, RLZC, UCDC, UCFC, UCRC).

**Undetermined Genera**

There are a number of specimens that I have been unable to place to genus. I have sorted them into 21 morphospecies that appear to represent 20 genera. In my collection there is a long series of specimens (35 or more) for four of these species, but the majority are represented by only 1 or 2 specimens each.

My results total 484 morphospecies present in the state. There are 208 described species (with a further 214 undetermined morphospecies) from 90 genera. There are 41 morphospecies representing an additional 21 described genera. Additionally, there are another 21 morphospecies, belonging to 20 genera that I am unable to recognize. Of the 276 undetermined morphospecies, some are undoubtedly undescribed, while others probably represent described species that haven’t been previously reported from California. However, due to the paucity of keys to species for most Nearctic genera, I am currently unable to determine how many belong to each category.

Of the 111 described genera reported in this paper, 31 (28%) are new state records. Of the 208 described species, 36 (17%) are new state records. For these taxa, there are 68 new host records for the described species, and two new host records for the genera *Aphycaspis* and *Rhopus*. There is also one new host record reported for *Metaphycus maculipennis* (Timberlake), which is not present in California (see Appendix III).

Of the described species, 157 appear to be native, 43 were established in biological control programs, seven appear to have been introduced accidentally, while the origin of one is undetermined. Three described species found in California have curiously disjunct distributions, being known from only California and the Neotropics: *Cercyshiella scutellata*, *Anagyrus clauseni* and *A. putonophilus*. Since they were originally described from California specimens, the two *Anagyrus* species are presumed native here, and it remains to be seen if their occurrence in the Neotropics reflects a natural widespread distribution, or accidental introductions. The matter of *C. scutellata* is more questionable, so I’m treating its natural distribution as unknown.

Of the undescribed species, 273 are presumably native, two were introduced, and the origin of one is undetermined.

During my personal collecting, I found grassy areas to be the most productive habitat for encyrtids (the single most productive site was a grassy strip perhaps 400m long bordering Del Puerto Creek in Stanislaus County, where I collected hundreds of specimens representing 13 species in 11 genera over the course of two weeks). Hard chapparal was the second most productive habitat, particularly the woody shrubs—chamise (*Adenostoma fasciculatum*) was best source of encyrtids, while gray pine (*Pinus sabiniama*), manzanita (*Arctostaphylos* sp.) and coyote brush (*Baccharis pilularis*) yielded fewer specimens. Willow (*Salix* species) often supported a varied encyrtid fauna, but otherwise, riparian zones (and herbaceous plants and vines in general) were not particularly productive. Imported shade trees planted in urban zones, such as *Liriodendron tulipifera*, *Tilia* spp., and *Syzygium paniculatum*, occasionally had high populations of introduced Homopteran species, and proved to be good sites to rear parasitoids of aphids, psyllids and scales, particularly *Bothriothorax*, *Homalotylus*, *Isodromus*, *Metaphycus* and *Syrphophagus* species. Meadows and coastalprairie zones had a fair diversity of encyrtid species, while wetter, cooler areas were the least productive. Some plant species (*Alnus* spp., *Heteromeles arbutifolia*, *Juglans* spp., *Ulmus* spp.) were particularly depauperate of encyrtids, while California’s state tree, coast redwood (*Sequoia sempervirens*) was the most disappointing—despite many attempts, I failed to collect a single encyrtid from this species. I chose to avoid sampling poison oak (*Toxicodendron diversilobum*), perhaps the most common woody shrub in California.

The vast bulk of specimens were collected during the warmer months of the year, especially from June through September. However, I collected the following 17 taxa from the period of 1 December through 28 February:

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APPENDIX I. Host-parasitoid index for encyrtid species known to be in California

Order BLATTODEA
Blattellidae
Supella longipalpa (Fabricius)
Comperia merceti
Supella supellectilium (Serville)
Comperia merceti

Order COLEOPTERA
Anobiidae
Vrilletta hubbardi Schwarz [nomen nudum]
Tineophoctonus hubbardi

Buprestidae
Buprestis aurulenta Linnaeus
Oobius buprestidis

Cerambycidae
Coptocercus aberrans (Newman)
Avetianella longoi
Epithora dorsalis (Macleay)
Avetianella longoi
Phoracantha semipunctata (Fabricius)
Avetianella longoi
Chrysomelidae
Bruchus brachialis Fahreus
Lamennaisia ambiguа

Coccinellidae
Adalia bipunctata (Linnaeus)
Homalotylus terminalis
Anatis labiculata (Say)
Homalotylus terminalis
Cheilomenes sexmaculatus (Fabricius)
Homalotylus terminalis
Chilocorus similis (Rossi)
Homalotylus terminalis
Coccinella californica Mannerheim
Homalotylus terminalis
Coccinella novemnotata Herbst
Homalotylus terminalis
Coccinella quinquentata Kirby
Homalotylus terminalis
Coccinella quinquenotata Kirby
Homalotylus terminalis
Coccinella transversoguttata Faldeman
Homalotylus terminalis
Coleomegilla innotata (Mulsant)
Homalotylus terminalis
Coleomegilla maculata (DeGeer)
Homalotylus terminalis
Coleomegilla sp.
Homalotylus terminalis
Cycloneda sanguinea (Linnaeus)
Homalotylus terminalis
Cycloneda sp.
Homalotylus terminalis
Disonycha sp.
Homalotylus terminalis
Hippodamia convergens Guerin-Meneville
Homalotylus terminalis
Hyperaspis pleuralis Casey
Cheiloneurus banksi (H) NEW (EMEC)
Homalotylus affinis
Hyperaspis undulata (Say)
Homalotylus hyperaspidis
Hyperaspis osculans LeConte
Homalotylus affinis
Hyperaspis bigeminata (Randall)
Homalotylus similis
Myzia pullata (Say)
Homalotylus terminalis
Psyllobora vigintimaculata (Say)
Homalotylus terminalis
Scymnus americanus Mulsant
Homalotylus similis
Scymnus cervicatilis Mulsant
Homalotylus similis
Scymnus iowensis Casey
   Homalotylus similis
Scymnus lacustris (LeConte)
   Homalotylus similis
Scymnus sp.
   Homalotylus terminalis

Lathridiidae
Melanophthalma sp.
   Lamennaisia ambigu

Nitidulidae
Carpophilus hemipterus (Linnaeus)
   Cerchysiella scutellata
Stelidota geminata (Say)
   Cerchysiella scutellata

Orthoperidae
Undetermined genus
   Lamennaisia ambigu NEW (UCDC)

Order DIPTERA
Cecidomyiidae
Mayetiola destructor (Say)
   Cheiloneurus elegans (H)
Walshomyia cupressi Gagne
   Pseudencyrtoides cupressi

Chamaemyiidae
Leucopis glyphinivora Tanasijtschuk
   Agromyzaphagus detrimentosus
Leucopis ?minor Malloch
   Agromyzaphagus detrimentosus
Leucopis obscura Haliday
   Syrphophagus aphidivorus

Calliphoridae
Calliphora augur Fabricius
   Tachinaephagus zealandicus
Calliphora quadrimaculata (Swederus)
   Tachinaephagus zealandicus
Calliphora stygia (Fabricius)
   Tachinaephagus zealandicus
Calliphora vicina Robineau-Desvoidy
   Tachinaephagus zealandicus
Chrysomya chloropyga (Wiedemann)
   Tachinaephagus zealandicus
Chrysomya megacephala (Fabricius)
   Tachinaephagus zealandicus
Chrysomya rufifacies (Macquart)
   Tachinaephagus zealandicus
Chrysomya varipes (Macquart)
   Tachinaephagus zealandicus
Chrysomya sp.
  Tachinaephagus zealandicus
Lucilia cuprina (Wiedemann)
  Tachinaephagus zealandicus
Lucilia sp.
  Tachinaephagus zealandicus
Phaenicia sericata (Meigen)
  Tachinaephagus zealandicus
Protocalliphora sp.
  Tachinaephagus zealandicus

Ceratopogonidae
Forcipomyia hirtula (Zetterstedt)
  Forcipestricis gazeaudi

Chloropidae
Liohippelates pusio (Loew)
  Ooencyrtus submetallicus

Fanniidae
Fannia canicularis (Linnaeus)
  Tachinaephagus zealandicus

Muscidae
Haematobia exigua Meijere
  Tachinaephagus zealandicus
Musca domestica Linnaeus
  Tachinaephagus zealandicus
Musca sorbens (Wiedemann)
  Tachinaephagus zealandicus
Musca sp
  Tachinaephagus zealandicus
Musca stabulans (Fallen)
  Tachinaephagus zealandicus
Musca sp.
  Tachinaephagus zealandicus

Sarcophagidae
Bercaea cruentata (Meigen)
  Tachinaephagus zealandicus
Oxysarcodexia varia (Walker)
  Tachinaephagus zealandicus
Sarcophaga aurifrons (Macquart)
  Tachinaephagus zealandicus
Sarcophaga impatiens Walker
  Tachinaephagus zealandicus
Sarcophaga sp.
  Tachinaephagus zealandicus
Stomoxyx calcitrans (Linnaeus)
  Tachinaephagus zealandicus

Stratiomyiidae
Microchrysa sp.
  Tachinaephagus zealandicus
Syrphidae
Epistrophe emarginata (Say)
Syrphophagus smithi
Eupeodes lapponicus (Zetterstedt)
Bothriothorax nigripes
Eupeodes nitens (Zetterstedt)
Bothriothorax californicus
Syrphophagus smithi
Eupeodes volucris Osten Sacken
Bothriothorax nigripes
Neocnemodon rita (Curran)
Syrphophagus smithi
Scaeva pyrastris (Linnaeus)
Bothriothorax californicus
Sphaerophoria javana Wiedemann
Syrphophagus aphidivorus
Syrophus opinator Osten Sacken
Bothriothorax californicus
Bothriothorax faridi
Syrphophagus smithi
Xanthogramma sp.
Syrphophagus smithi NEW (UCRC)
Undetermined
Cheiloneurus compressicornis (H)

Ulidiidae
Tritoxa flexa (Wiedemann)
Tachinaephagus zealandicus

Order HEMIPTERA
Acleridae
Aclerda subterranea Signoret
Cheiloneurus elegans (H)

Aphalaridae
Agonoscena pistaciae Burckhardt & Lauterer
Syrphophagus aphidivorus (H)
Neophyllura arbuti Schwarz
Ginsiana arbuticola
Cardiaspina fiscella Taylor
Psyllaephagus brachiatius

Aphididae
Acyrthosiphon gossypii Mordvilko
Syrphophagus aphidivorus (H)
Acyrthosiphon malvae (Mosley)
Syrphophagus aphidivorus (H)
Acyrthosiphon pisum (Harris)
Syrphophagus aphidivorus (H)
Aphis craccivora Koch
Syrphophagus aphidivorus (H)
Aphis cytisorum Hartig
Syrphophagus aphidivorus (H)
| Aphis fabae Scopoli                      | Syrphophagus aphidivorus (H) |
| Aphis gossypii Glover                   | Syrphophagus aphidivorus (H) |
| Aphis medicaginis Koch                  | Syrphophagus aphidivorus (H) |
| Aphis pomi DeGeer                       | Syrphophagus aphidivorus (H) |
| Aulacorthum solani (Kaltenbach)         | Syrphophagus aphidivorus (H) |
| Brachycaudus persicae (Passerini)       | Syrphophagus aphidivorus (H) |
| Brevicoryne brassicae (Linnaeus)        | Syrphophagus aphidivorus (H) |
| Cavariella aquatica (Gillette & Bragg)  | Syrphophagus aphidivorus (H) |
| Diuraphis frequens (Walker)             | Syrphophagus aphidivorus (H) |
| Diuraphis noxia (Kurdjumov)             | Syrphophagus aphidivorus (H) |
| Eucallipterus tiliae (Linnaeus)         | Syrphophagus aphidivorus (H) |
| Hysteroneura setariae (Thomas)          | Syrphophagus aphidivorus (H) |
| Illinoia liriodendri (Monell)           | Syrphophagus aphidivorus (H) |
| Myzocallis coryli (Goeze)               | Syrphophagus aphidivorus (H) |
| Myzus cerasi (Fabricius)                | Syrphophagus aphidivorus (H) |
| Myzus persicae (Sulzer)                 | Syrphophagus aphidivorus (H) |
| Nearctaphis bakeri (Cowen)              | Syrphophagus aphidivorus (H) |
| Periphyllus aceris (Linnaeus)           | Syrphophagus aphidivorus (H) |
| Pterochlorides persicae (Cholodkovsky)  | Syrphophagus aphidivorus (H) |
| Rhopalosiphoninus solani (Thomas)       | Syrphophagus aphidivorus (H) |
| Rhopalosiphum maidis (Fitch)            | Syrphophagus aphidivorus (H) |
| Rhopalosiphum padi (Linnaeus)           | Syrphophagus aphidivorus (H) |
| Sanbornia juniperi Pergande             | Syrphophagus aphidivorus (H) |
| Schizaphis gramimum (Rondani)           | Syrphophagus aphidivorus (H) |
| Sitobion avenae (Fabricius)             | Syrphophagus aphidivorus (H) |
| Therioaphis trifolii (Monell)           | Syrphophagus aphidivorus (H) |
| Toxoptera aurantii (Boyer de Fonscolombe)| Syrphophagus aphidivorus (H) |
Uroleucon compositae (Theobald)
  Syrphophagus aphidivorus (H)

**Asterolecaniidae**

* Asterodiaspis mina (Russell)  
  Epitetracnemus intersectus  
* Asterodiaspis quercicola (Bouché)  
  Epitetracnemus intersectus  
* Asterodiaspis variolosa (Ratzeburg)  
  Zaomma lambinus (H)

**Asterolecanium** sp.  
  Epitetracnemus intersectus  
  Zaomma lambinus (H)

* Russelaspis pustulans (Cockerell)  
  Coccidoctonus dubius (H)

**Cicadellidae**

Undetermined sp.  
  Cheiloneurus flaccus (H)

**Coccidae**

* Alichtensia argentina (Leonardi)  
  Gahaniella californica (H?)  
* Ceronema koebeli Green  
  Metaphycus lichteniae  
* Ceroplastes brevicauda Hall  
  Diversinervus elegans  
  Metaphycus stanleyi  
* Ceroplastes ceriferus (Fabricius)  
  Anicetus annulatus  
* Ceroplastes cirripediformis Comstock  
  Ammonoencyrtus cirripediformis (H)  
  Metaphycus eruptor  
  Microterys nietneri  
* Ceroplastes destructor Newstead  
  Metaphycus helvolus  
  Diversinervus elegans  
  Microterys nietneri  
* Ceroplastes floridensis Comstock  
  Diversinervus elegans  
  Metaphycus eruptor  
  Metaphycus lounsburyi  
  Metaphycus zebratus  
  Microterys nietneri  
* Ceroplastes helichrysi Hall  
  Metaphycus helvolus  
* Ceroplastes japonicus (Green)  
  Microterys nietneri  
* Ceroplastes madagascariensis (Targioni Tozzetti)  
  Encyrtus infelix  
* Ceroplastes rubens Maskell  
  Epitetracnemus intersectus  
  Microterys nietneri
Ceroplastes rusci (Linnaeus)
   Diversinervus elegans
Ceroplastes sp.
   Cheiloneurus inimicus (H)
   Diversinervus elegans
   Metaphycus alberti
   Metaphycus eruptor
   Metaphycus helvolus
   Metaphycus stanleyi
Coccus africanaus (Newstead)
   Metaphycus helvolus NEW (UCRC)
Coccus alpinus De Lotto
   Metaphycus stanleyi
Coccus capparidis (Green)
   Metaphycus lounsburyi
Coccus celatus De Lotto
   Metaphycus stanleyi
Coccus hesperidum Linnaeus
   Ammonoencyrtus cirrippediformis (H)
   Anicetus annulatus
   Cheiloneurus noxius (H)
   Cocciidoctonus dubius (H)
   Diversinervus elegans
   Encyrtus aurantii
   Encyrtus infelix
   Eusemion longipenne (H)
   Gahaniella californica
   Metaphycus alberti
   Metaphycus angustifrons
   Metaphycus annekei
   Metaphycus eriococci
   Metaphycus helvolus
   Metaphycus lounsburyi
   Metaphycus luteolus
   Metaphycus stanleyi
   Microterys nietneri
Coccus pseudomagnoliarum (Kuwana)
   Anicetus annulatus
   Diversinervus elegans
   Encyrtus aurantii
   Metaphycus helvolus
   Metaphycus lounsburyi
   Metaphycus luteolus
   Metaphycus stanleyi
   Microterys nietneri
Coccus viridis (Green)
   Anicetus annulatus
   Cocciidoctonus dubius (H)
   Encyrtus aurantii
   Metaphycus helvolus
   Metaphycus stanleyi
   Microterys nietneri
   Prochiloneurus dactylopii (H)
Didesmococcus unifasciatus (Archangelskaya)
  Microterys sylvius
Drepanococcus cajani (Maskell)
  Metaphycus zebratus
Drepanococcus chiton (Green)
  Diversinervus elegans
Eriopeltis festucae (Boyer de Fonscolombe)
  Metaphycus zebratus
Eriopeltis lichtensteini Signoret
  Metaphycus zebratus
Eucalymnatus tessellatus (Signoret)
  Anicetus annulatus
  Encyrtus aurantii
  Metaphycus helvolus
  Metaphycus stanleyi
  Microterys nietneri
Eulecanium cerasorum (Cockerell)
  Blastothrix americana
  Blastothrix longipennis
  Encyrtus fuscus
Eulecanium ex crescens (Ferris)
  Blastothrix americana NEW (EMEC)
Eulecanium ficiphilum Borchsenius
  Microterys sylvius
Eulecanium franconicum Lindinger
  Cheiloneurus elegans (H)
Eulecanium kunoense (Kuwana)
  Ammonoencyrtus californicus NEW (EMEC)
  Diversinervus elegans
Eulecanium noci num Borchsenius
  Microterys sylvius
Eulecanium perinflatum (Cockerell)
  Gahaniella californica
Eulecanium pubescens (Ehrhorn)
  Blastothrix hedqvisti
  Metaphycus lecanii
Eulecanium sericeum (Lindinger)
  Microterys sylvius
Eulecanium tiliae (Linnaeus)
  Encyrtus aurantii
  Encyrtus fuscus
  Metablastothrix claripennis
  Microterys sylvius
Eulecanium sp.
  Anicetus annulatus
  Blastothrix americana
  Blastothrix hedqvisti
  Encyrtus aurantii
  Encyrtus fuscus
  Eusemion longipenne (H)
  Metaphycus californicus
  Metaphycus fuscipennis
  Microterys nietneri
  Microterys sylvius
Gascardia sp.
  Diversinervus elegans
  Microterys nietneri
Inglisia sp.
  Diversinervus elegans
Lecanopsis formicarum Newstead
  Metaphycus zebratus
Lichtensia chilanthi (Brain)
  Metaphycus stanleyi
Lichtensia viburni (Signoret)
  Metaphycus lounsburyi
Luzulaspis lazulae (Dufour)
  Metaphycus zebratus
Maacoccus piperis (Green)
  Microterys nietneri
Marsipococcus proteae (Brain)
  Diversinervus elegans
  Metaphycus helvolus
Mesolecanium nigrofasciatum (Pergande)
  Encyrtus fuscus
Metaphycus californicus
  Zaomma lambinus (H)
Milviscutulus mangiferarum (Green)
  Microterys nietneri
Nemolecanium graniforme (Wunn)
  Aphycoidee clavellatus
Parasaissetia litorea De Lotto
  Metaphycus helvolus
Parasaissetia nigra (Nietner)
  Cocidoctonus dubius (H)
  Diversinervus elegans
  Encyrtus aurantii
  Encyrtus infelix
  Metaphycus annekei NEW (UCRC)
  Metaphycus helvolus
  Metaphycus stanleyi
  Microterys nietneri
Parasaissetia sp.
  Metaphycus helvolus
  Metaphycus stanleyi
Parthenolecanium cerasifex (Fitch)
  Encyrtus fuscus
  Microterys nietneri
Parthenolecanium corni (Bouché)
Ammonoencyrtus californicus NEW (UCRC)
  Blastothrix sp. nr. britannica
  Blastothrix hedqvistii
  Blastothrix longipennis
  Diversinervus elegans
  Encyrtus aurantii
  Encyrtus fuscus
  Gahaniella californica (H?)
  Metablastothrix claripennis
  Metaphycus californicus
Metaphycus helvolus
Metaphycus lounsburyi
Metaphycus luteolus
Metaphycus lecanii
Metaphycus zebratus
Microterys nietneri
Microterys sylvius
Parthenolecanium fletcheri (Cockerell)
Blastothrix hedqvisti
Blastothrix longipennis
Encyrtus aurantii
Metablastothrix claripennis
Microterys nietneri
Parthenolecanium persicae (Fabricius)
Encyrtus fuscus
Metaphycus alberti
Metaphycus helvolus
Metaphycus trimblei
Metaphycus zebratus
Microterys nietneri
Microterys sylvius
Parthenolecanium pomeranicum (Kawecki)
Blastothrix longipennis
Metaphycus zebratus
Parthenolecanium pruinorum (Coquillett)
Blastothrix hedqvisti
Blastothrix longipennis
Encyrtus fuscus
Metaphycus californicus
Parthenolecanium quercifex (Fitch,)
Ammonoencyrtus californicus NEW (UCRC)
Blastothrix hedqvisti
Blastothrix longipennis
Encyrtus fuscus
Metablastothrix claripennis
Metaphycus lecanii
Parthenolecanium querquilifer (Fitch)
Metaphycus flammeus
Parthenolecanium rufulum (Cockerell)
Blastothrix longipennis
Epitetracnemus intersectus
Metaphycus zebratus
Microterys sylvius
Phyllostoma myrtilli (Kaltenbach)
Zaomma lambinus (H)
Physokermes fasicatus Borchsenius
Aphycoideis clavellatus
Physokermes hemicryphus (Dalman)
Aphycoideis clavellatus
Physokermes insignicola (Craw)
Cheiloneurus inimicus (H)
Metaphycus lecanii
Metaphycus physokermis
Microterys mazzinini
Microterys physokermis
Physokermes jezoensis Siraiwa
Aphycoides clavellatus
Microterys sylvius
Physokermes piceae (Schrank)
Aphycoides clavellatus
Cheiloneurus elegans (H)
Physokermes sugonjaevi Danzig
Aphycoides clavellatus

Protopulvinaria pyriformis (Cockerell)
Encyrtus infelix
Metaphycus helvolus
Metaphycus stanleyi
Microterys nietneri

Pulvinaria aethiopica
Metaphycus helvolus

Pulvinaria aurantii Cockerell
Anicetus annulatus

Pulvinaria bigeloviae Cockerell
Metaphycus coquillettii

Pulvinaria delottoi Gill
Encyrtus saliens
Metaphycus funicularis
Metaphycus stramineus

Pulvinaria floccifera (Westwood)
Diversinervus elegans
Encyrtus aurantii

Pulvinaria kowacola Kuwana
Anicetus annulatus

Pulvinaria mammeeae Maskell
Microterys nietneri

Pulvinaria peregrina (Borchsenius)
Microterys nietneri

Pulvinaria polygonata Cockerell
Anicetus annulatus

Pulvinaria psidii Maskell
Anicetus annulatus
Diversinervus elegans
Encyrtus aurantii
Metaphycus angustifrons
Metaphycus helvolus
Metaphycus luteolus
Metaphycus stanleyi
Microterys nietneri

Pulvinaria urbicola Cockerell
Diversinervus elegans
Encyrtus infelix
Metaphycus helvolus

Pulvinaria vitis (Linnaeus)
Cheiloneurus elegans (H)
Encyrtus fuscus
Metaphycus zebrazus
Microterys nietneri
**Pulvinaria sp.**
- Encyrtus aurantii
- Microterys nietneri

**Pulvinariella mesembryanthemi** (Vallot)
- Ammonoencyrtus californicus **NEW** (UCRC)
- Encyrtus saliens
- Metaphycus funicularis
- Metaphycus helvolus
- Metaphycus luteolus
- Metaphycus stanleyi
- Metaphycus stramineus
- Microterys nietneri

**Pulvinariella sp.**
- Encyrtus saliens
- Metaphycus funicularis

**Pulvinarisca jacksoni** (Newstead)
- Metaphycus stanleyi **NEW** (UCRC)

**Rhizopulvinaria nevesi** (Gómez-Menor Ortega)
- Adelencyrtus aulacaspisidis

**Rhodococcus perornatus** (Cockerell & Parrott)
- Metaphycus zebratus
- Microterys sylvius

**Rhodococcus spiraeae** Borchsenius
- Microterys sylvius

**Rhodococcus turanicus** (Archangelskaya)
- Microterys sylvius

**Saissetia coffeae** (Walker)
- Anicetus annulatus
- Cheiloneurus noxius (H)
- Coccidoctonus dubius (H)
- Diversinervus elegans
- Encyrtus aurantii
- Encyrtus fuscus
- Encyrtus infelix
- Eusemion longipenne (H) **NEW** (UCRC)
- Gahaniella californica (H?)
- Metaphycus helvolus
- Metaphycus lounsburyi
- Metaphycus luteolus
- Metaphycus stanleyi
- Microterys nietneri

**Saissetia miranda** (Cockerell & Parrott)
- Metaphycus annecke
- Microterys nietneri

**Saissetia nigrella** King
- Metaphycus helvolus
- Metaphycus stanleyi

**Saissetia oleae** (Olivier)
- Ammonoencyrtus cirripediformis (H)
- Anicetus annulatus
- Cheiloneurus inimicus (H)
- Cheiloneurus lineascapus (H)
- Cheiloneurus noxius (H)
- Coccidoctonus dubius (H)
Diversinervus elegans
Encyrtus aurantii
Encyrtus infelix
Metaphycus angustifrons
Metaphycus anneckeii
Metaphycus hageni
Metaphycus helvolus
Metaphycus inviscus
Metaphycus lounsburyi
Metaphycus luteolus
Metaphycus stanleyi
Metaphycus zebra tus
Microterys nietneri
Saissetia persimilis (Newstead)
Diversinervus elegans
Saissetia privigna De Lotto
Encyrtus aurantii
Saissetia somereni (Newstead)
Metaphycus helvolus
Metaphycus stanleyi
Saissetia sp.
Diversinervus elegans
Metaphycus helvolus
Metaphycus inviscus
Metaphycus stanleyi
Microterys nietneri
Sphaerolecanium prunastri (Boyer de Fonscolombe)
Encyrtus aurantii
Epitetracnemus intersectus
Microterys sylvius
Stotzia maxima Borchsenius
Microterys sylvius
Waxiella mimosae (Signoret)
Metaphycus anneckeii

Coreidae
Anasa scorbutica (Fabricius)
Ooencyrtus submetallicus
Anasa tristis (De Geer)
Ooencyrtus californicus
Anoplocnemis curvipes (Fabricius)
Ooencyrtus kavanae
Clavigralla tomentosicollis Stål
Ooencyrtus kavanae
Leptoglossus gonagra (Fabricius)
Ooencyrtus submetallicus

Dactylopiidae
Dactylopius confusus (Cockerell)
Formicencyrtus thoreauini

Delphacidae
Tarophagus proserpina (Kirkaldy)
Cheiloneurus flaccus (H)
Diaspididae

Acutaspis paulista (Hempel)
  Zaomma lambinus (H)
Aonidiella aurantii (Maskell)
  Aphycus immaculatus
  Comperiella bifasciata
  Habrolepis rouxi
Aonidiella citrina (Coquillett)
  Comperiella bifasciata
  Habrolepis rouxi
Aonidiella eremocitri McKenzie
  Comperiella bifasciata
Aonidiella inornata McKenzie
  Comperiella bifasciata
Aonidiella orientalis (Newstead)
  Comperiella bifasciata
  Habrolepis rouxi
Aonidiella taxus (Leonardi)
  Comperiella bifasciata
Aonidiella sp.
  Habrolepis rouxi
Aspidiotus cryptomeriae Kuwana
  Comperiella bifasciata
Aspidiotus destructor Signoret
  Comperiella bifasciata
  Zaomma lambinus (H)
Aspidiotus nerii Bouché
  Comperiella bifasciata
  Habrolepis rouxi
  Zaomma lambinus (H)
Aspidiotus sp.
  Habrolepis rouxi
Aulacaspis difficileis (Cockerell)
  Adelencyrtus aulacaspidis
  Zaomma lambinus (H)
Aulacaspis rosae (Bouché)
  Adelencyrtus aulacaspidis
  Arrenophagus chionaspidis
  Zaomma lambinus (H)
Aulacaspis tegalensis (Zehntner)
  Arrenophagus chionaspidis
Chionaspis alnus Kuwana
  Zaomma lambinus (H)
Chionaspis ortholabis Comstock
  Plagiomerus diaspidis NEW (EMEC)
Chionaspis ramakrishnai Rao
  Arrenophagus chionaspidis
Chionaspis salcis (Linnaeus)
  Adelencyrtus aulacaspidis
  Arrenophagus chionaspidis
  Zaomma lambinus (H)
Chrysomphalus aonidum (Linnaeus)
  Comperiella bifasciata
  Habrolepis rouxi
Zaomma lambinus (H)
Chrysomphalus bifasciculatus Ferris
Comperiella bifasciata
Chrysomphalus dictyospermi (Morgan)
Arrenophagus chionaspidis
Comperiella bifasciata
Chrysomphalus sp.
Comperiella bifasciata
Habrolepis rouxi
Zaomma lambinus (H)
Clavaspis sp.
Plagiomerus diaspidis
Contigaspis sp.
Arrenophagus chionaspidis
Diaspidiotus bavaricus (Lindinger)
Epitetracnemus intersectus
Diaspidiotus forbesi (Johnson,)
Arrenophagus chionaspidis
Diaspidiotus gigas (Thiem & Gerneck)
Comperiella bifasciata
Epitetracnemus intersectus
Diaspidiotus juglandsregiae (Comstock)
Coccidencyrtus ensifer
Coccidencyrtus infuscatus
Zaomma lambinus (H)
Diaspidiotus macroporanus (Takagi)
Adelencyrtus aulacaspidis
Epitetracnemus intersectus
Diaspidiotus marani (Zahradnik)
Zaomma lambinus (H)
Diaspidiotus ostreaeformis (Curtis)
Epitetracnemus intersectus
Zaomma lambinus (H)
Diaspidiotus perniciosus (Comstock)
Arrenophagus chionaspidis
Coccidencyrtus ensifer
Comperiella bifasciata
Epitetracnemus intersectus
Zaomma lambinus (H)
Diaspidiotus prunorum (Laing)
Epitetracnemus intersectus
Zaomma lambinus (H)
Diaspidiotus pyri (Lichtenstein)
Epitetracnemus intersectus
Zaomma lambinus (H)
Diaspidiotus zonatus (Frauenfeld)
Zaomma lambinus (H)
Diaspis boisdouvallii Signoret
Arrenophagus chionaspidis
Coccidencyrtus ochraceipes
Encytus auroantii
Diaspis bromeliae (Kerner)
Coccidencyrtus ochraceipes
Diaspis echinocacti (Bouché)
Comperiella bifasciata
Plagiomerus diaspidis
Diaspis sp.
  Arrenophagus chionaspisidis
  Coccidencyrtus ochraceipes
Duplachionaspis sansevieriae Williams
  Adelenyctrus odonaspidis
Dynaspidotus abietis (Schrank)
  Comperiella bifasciata
  Zaomma lambinus (H)
Dynaspidotus britannicus (Newstead)
  Arrenophagus chionaspisidis
Dynaspidotus tsugae (Marlatt)
  Arrenophagus chionaspisidis
Fiorinia externa Ferris
  Arrenophagus chionaspisidis
Fiorinia saprosmae Green
  Arrenophagus chionaspisidis
Froggattiella penicillata (Green)
  Caenohomalopoda shikokuensis
Furchadaspis zamiæ (Morgan)
  Arrenophagus chionaspisidis
  Neococcidencyrtus poutiersi
Hemiberlesia lataniae (Signoret)
  Plagiomerus diaspidis
Hemiberlesia rapax (Comstock)
  Comperiella bifasciata
  Habrolepis rouxi
Lepidosaphes conchiformis (Gmelin)
  Zaomma lambinus (H)
Lepidosaphes cupressi Borchsenius
  Adelenyctrus aulacaspidis
Lepidosaphes japonica (Kuwana)
  Arrenophagus chionaspisidis
Lepidosaphes malicola Borchsenius
  Zaomma lambinus (H)
Lepidosaphes tubulorum Ferris
  Epitetracnemus intersectus
  Zaomma lambinus (H)
Lepidosaphes ulmi (Linnaeus)
  Epitetracnemus intersectus
  Zaomma lambinus (H)
Lepidosaphes sp.
  Plagiomerus diaspidis NEW (UCRC)
Lopholeucaspis japonica (Cockerell)
  Arrenophagus chionaspisidis
Morganella longispona (Morgan)
  Comperiella bifasciata
Odonaspis ruthae Kotinsky
  Adelenyctrus odonaspidis
Odonaspis saccharicaulis (Zehntner)
  Adelenyctrus odonaspidis
Odonaspis sp.
Adelencyrtus odonaspidis
Parlatoria oleae (Colvée)
Habrolepis rouxi
Parlatoria pergandii Comstock
Metaphycus helvolus NEW (UCRC)
Parlatoria ziziphi (Lucas)
Arrenophagus chionaspidis
Pinnaspis aspidistrae (Signoret)
Arrhenophagus chionaspidis
Pinnaspis dysoxyli (Maskell)
Arrenophagus chionaspidis
Pinnaspis strachani (Cooley)
Arrenophagus chionaspidis
Pseudoaulacaspis cockerelli (Cooley)
Arrenophagus chionaspidis
Pseudaonidia duplex (Cockerell)
Epitetracnemus intersectus
Pseudaonidia paecaniae (Cockerell)
Epitetracnemus intersectus
Pseudoaulacaspis pentagona (Targioni Tozzetti)
Adelencyrtus aulacaspidis
Arrenophagus chionaspidis
Comperiella bifasciata
Epitetracnemus intersectus
Zaomma lambinus (H)
Rhizaspidiotus dearnessi (Cockerell)
Ceraptroceroideus cinctipes
Selenaspidus articulatus (Morgan)
Habrolepis rouxi
Unaspis citri (Comstock)
Arrenophagus chionaspidis
Unknown, AKA “Aspidiotus corticalis” Riley, MSS
Coccencyrtus ensifer

Eriococcidae
Eriococcus adenostomae Ehrhorn
Metaphycus clauseni
Eriococcus buxi (Boyer de Fonscolombe)
Encyrtus aurantii
Eriococcus coccineus Cockerell
Metaphycus clauseni NEW (UCRC)
Eriococcus palustris Dodds
Metaphycus clauseni
Eriococcus quercus (Comstock)
Metaphycus eriococci
Eriococcus spurius (Modeer)
Blastothrix longipennis
Microterys sp.
Trichomanthus coerules
Zaomma lambinus (H)
Eriococcus tinsleyi Cockerell
Metaphycus howardi
Eriococcus sp.
  Cheiloneurus banksi (H)
  Metaphycus argyrocomus
  Metaphycus clauseni
  Metaphycus fumipennis
  Metaphycus howardi

Kermesidae
Allokermes essigi (King)
  Metaphycus kermicola
Allokermes galliformis (Riley)
  Metaphycus kermicola
Kermes cockerelli Ehrhorn
  Microterys yolanda
  Oesol anubis
  Psilophyroidea comesor
Kermes nigropunctatus Ehrhorn & Cockerell
  Cheiloneurus lineascapatus (H)
Kermes sp.
  Cheiloneurus elegans (H)
  Nanokermes pubescens (Bogue)
  Blastothrix longipennis

Kerriidae
Tachardiella larreae (Comstock)
  Tachardiobius nigricans

Lecanodiaspidae
Lecanodiaspis rufescens (Cockerell)
  Cheiloneurus inimicus (H) NEW (UCRC)

Margarodidae
Steatococcus tabernicolus Ferris
  Brethesiella mojave
Xylococcus macrocarpae (Coleman)
  Deilio xylococculi

Pentatomidae
Dichelops furcatus (Fabricius)
  Ooencyrtus submetallicus
Edessa meditabunda (Fabricius)
  Ooencyrtus submetallicus
Edessa sp.
  Ooencyrtus submetallicus
Euschistus heros (Fabricius)
  Ooencyrtus submetallicus
Mormidea angustata Stål
  Ooencyrtus submetallicus
Nezara viridula (Linnaeus)
  Ooencyrtus submetallicus
Oebalus psliongriseus (DeGeer)
  Ooencyrtus submetallicus
Piezodorus guildinii (Westwood)
  Ooencyrtus submetallicus
**Pseudococcidae**

- *Amonostherium lichtensioides* (Cockerell)
- *Anagyrus yucae* NEW (UCRC)
- *Cheiloneurus inimicus* (H) NEW (UCRC)
- *Formicencyrtus neomexicanus*
- *Metaphycus clauseni*
- *Pseudoleptomastix squammulata*
- *Anisococcus adenostomae* (Ferris)
- *Chrysopterygion ferrarisi*
- *Anisococcus crawii* (Coquillett)
- *Acerophagus fasciipennis*
- *Anagyrus yucae*
- *Zarhopalus corvinus* NEW (UCRC)
- *Zarhopalus sheldoni* NEW (UCRC)
- *Antonina graminis* (Maskell)
- *Cheiloneurus banksi* (H)
- *Neodusmetia sangwani*
- *Antonina purpurea* Signoret
- *Metanotalia madeirensis*
- *Brevennia pulveraria* (Newstead)
- *Erycymus sipylus*
- *Coccus suwakoensis* (Kuwana & Toyoda)
- *Acerophagus malinus*
- *Delottococcus quaesitus* (Brain)
- *Leptomastix dactylopii*
- *Delottococcus proteae* (Hall)
- *Leptomastix dactylopii*
- *Dysmicoccus brevipes* (Cockerell)
- *Acerophagus angelicus*
- *Chrysopterygion splendens*
- *Leptomastidea abnormis*
- *Leptomastix dactylopii*
- *Dysmicoccus ryanii* (Coquillett)
- *Acerophagus angelicus*
- *Acerophagus antennalis*
- *Acerophagus fasciipennis* NEW (UCRC)
- *Acerophagus notativentris*
- *Chrysopterygion splendens*
- *Cirrhencyrtus ehrhorni*
- *Gyranusoidea claripennis*
- *Leptomastidea abnormis*
- *Leptomastix dactylopii* NEW (UCRC)
- *Dysmicoccus timberlakei* (Cockerell)
- *Cheiloneurus banksi* NEW (EMEC)
- *Rhopus sp.* NEW (EMEC)
- *Stemmatosteres apterus*
- *Eurycoccus blancharidii* (King & Cockerell)
- *Acerophagus notativentris*
- *Ferrisia virgata* (Cockerell)
- *Acerophagus angelicus*
- *Acerophagus notativentris*
- *Acerophagus pallidus*
- *Acerophagus texanus*
- *Aenasius flandersi*
Anagyrus californicus NEW (UCRC)
Chrysoplatycerus splendens
Cocciadoxenoides permunitus
Holocercyrtus myrmicoideus
Leptomastidea abnormis
Leptomastix dactylopii
Prochiloneurus dactylopii (H)
Tetracnemoidea peregrina
Zarhopalus sheldoni NEW (CSCA)

Formicococcus njalensis (Laing)
   Acerophagus angelicus
   Acerophagus notativentris
   Acerophagus pallidus
   Holocercyrtus myrmicoideus
   Leptomastidea abnormis
   Leptomastix dactylopii

Heliococcus atriplicis McKenzie
   Aenasius sp. nr. phenacocci NEW (UCRC)

Maconellicoccus hirsutus (Green)
   Anagyrus kamali
   Gyranusoidea indica

Nipaecoccus viridis (Newstead)
   Anagyrus kamali
   Gyranusoidea indica
   Leptomastix dactylopii

Nipaecoccus sp.
   Gyranusoidea indica

Oracella acuta (Lobdell)
   Acerophagus coccois

Phenacoccus acericola King
   Acerophagus coccois

Phenacoccus aceris (Signoret)
   Acerophagus coccois

Phenacoccus colemani Ehrhorn
   Acerophagus angelicus NEW (UCRC)

Phenacoccus gossypii Townsend & Cockerell
   Acerophagus angelicus
   Acerophagus coccois
   Acerophagus pallidus
   Aenasius flandersi
   Anagyrus californicus NEW (UCRC)
   Chrysoplatycteris ferrisi
   Dicarnosis ripariensis
   Ericydnus lamasi
   Leptomastidea abnormis
   Leptomastix dactylopii

Phenacoccus hargreavesi (Laing)
   Leptomastix dactylopii

Phenacoccus herreni Cox & Williams
   Acerophagus coccois
   Aenasius flandersi

Phenacoccus hordei (Lindeman)
   Cheiloneurus elegans (H)
Phenacoccus maderiensis Green
   Acerophagus coccoid
   Aenasius flandersi
   Acerophagus pallidus
   Holcencyrtus myrmicoides
   Leptomastix dactylopii
   Metanotalia madeirensis

?Phenacoccus maderiensis Green
   Acerophagus angelicus
   Coccidoxonoides perminutus

Phenacoccus manihoti Matile-Ferrero
   Acerophagus coccoid
   Prochiloneurus dactylopii (H)

Phenacoccus pergandei Cockerell
   Acerophagus angelicus NEW (UCRC)

Phenacoccus saccharifolii (Green)
   Leptomastix dactylopii

Phenacoccus solani Ferris
   Acerophagus angelicus NEW (UCRC)
   Acerophagus pallidus
   Aenasius phenacocci
   Anagyrus Californicus
   Ectromatopsis americana
   Leptomastix dactylopii
   Metaphycus fumipennis

Phenacoccus solenopsis Tinsley
   Aenasius arizonensis
   Aenasius phenacocci
   Prochiloneurus dactylopii (H)

Phenacoccus sp.
   Aenasius paulistus
   Anagyrus californicus
   Blepyrus tenuiscapus
   Cheiloneurus banksi (H) NEW (UCRC)
   Ericydus lamasi
   Leptomastidea abnormis
   Stemmatosteres apterus
   Zarhopolus sheldoni

Planococcus aemulor De Lotto
   Leptomastix dactylopii

Planococcus citri (Risso)
   Acerophagus angelicus
   Chrysoplatycerus splendens
   Coccidoxonoides perminutus
   Encyrtus aurantii
   Ericydus lamasi
   Holcencyrtus myrmicoides
   Leptomastidea abnormis
   Leptomastix dactylopii
   Prochiloneurus dactylopii (H)

Planococcus ficus (Signoret)
   Chrysoplatycerus splendens
   Leptomastidea abnormis
   Leptomastix dactylopii
Planococcus kenyae (Le Pelley)
   Coccidoxenoides perminutus
   Leptomastidea abnormis
   Leptomastix dactyloprii
Planococcus kraunhiae (Kuwana)
   Leptomastidea abnormis
   Leptomastix dactyloprii
Planococcus lilacinus (Cockerell)
   Leptomastix dactyloprii
Planococcus minor (Maskell)
   Leptomastix dactyloprii
Planococcus vovae (Nasonov)
   Coccidoxenoides perminutus
   Leptomastidea abnormis
   Leptomastix dactyloprii
Planococcus sp. nr. ficus
   Coccidoxenoides perminutus
   Leptomastidea abnormis
Planococcus sp.
   Leptomastix dactyloprii
Pseudococcus antricolens Ferris
   Gyranusoidea advena
Pseudococcus calceolariae (Maskell)
   Acerophagus angelicus
   Aenasius paulistus
   Chrysoplatycerus splendens
   Leptomastidea abnormis
   Leptomastix dactyloprii
   Tetracnemoidea brevicornis
   Tetracnemoidea pergrina
   Tetracnemoidea sydneyensis
Pseudococcus comstocki (Kuwana)
   Acerophagus abstrusus
   Acerophagus coccois NEW (UCRC)
   Acerophagus malinus
   Acerophagus notativentris
   Chrysoplatycerus splendens
   Leptomastidea abnormis
   Leptomastix dactyloprii
   Prochiloneurus dactyloprii (H)
   Prochiloneurus modestus (H) NEW (UCRC)
   Zarhopalus corvinus
   Zarhopalus sheldoni
Pseudococcus concavocerarii James
   Leptomastix dactyloprii
Pseudococcus cryptus Hempel
   Coccidoxenoides perminutus NEW (UCRC)
   Leptomastidea abnormis
Pseudococcus longispinus (Targioni Tozzetti)
   Acerophagus angelicus
   Acerophagus malinus NEW (UCRC)
   Aenasius paulistus
   Chrysoplatycerus splendens
   Coccidoxenoides perminutus
Encyrtus aurantii
Gyranusoidea advena
Holencyrtus myrmicoides
Leptomastidea abnormis
Leptomastix dactylopii
Tetracnemoidea brevicornis
Tetracnemoidea peregrina
Tetracnemoidea sydneyensis
Zarhopalus sheldoni

Pseudococcus maritimus (Ehrhorn)
Acerophagus angelicus
Acerophagus maculipennis
Acerophagus notativentris
Acerophagus pallidus
Aenasius paulistus
Anagyrus clauseni
Anagyrus yuccae
Chrysoplatycerus splendens
Coccidoxenoides perminutus
Ericydus lamasi
Leptomastidea abnormis
Leptomastix dactylopii
Pseudoleptomastix squammulata
Tetracnemoidea brevicornis
Tetracnemoidea peregrina
Zarhopalus corvinus
Zarhopalus sheldoni

Pseudococcus neomaritimus Beardsley
Ericydus lamasi

Pseudococcus occiduus De Lotto
Leptomastix dactylopii

Pseudococcus pipturicolus Beardsley
Gyranusoidea advena

Pseudococcus sociabilis Hambleton
Aenasius paulistus

Pseudococcus viburni (Signoret)
Acerophagus flavidulus
Acerophagus maculipennis
Acerophagus notativentris
Chrysoplatycerus splendens
Leptomastidea abnormis
Leptomastix dactylopii
Tetracnemoidea brevicornis
Tetracnemoidea peregrina
Zarhopalus sheldoni NEW (UCRC)

Pseudococcus sp.
Acerophagus abstrusus
Acerophagus angelicus
Acerophagus notativentris
Aenasius paulistus
Chrysoplatycerus splendens
Gyranusoidea advena
Leptomastidea abnormis
Leptomastix dactylopii
Tetracnemoidea peregrina
Zarhopalus corvinus
Puto ambiguous (Fullaway)
Anagyrus putonophilus
Puto barberi (Cockerell,)
Prochiloneurus dactylopii (H)
Puto simmondsiae McKenzie
Anagyrus yuccae NEW (UCRC)
Puto yuccae (Coquillett)
Aenasius maplei
Anagyrus putonophilus
Anagyrus yuccae
Radiococcus kelloggii (Carnes,)
Cheiloneurus lineascapus (H) NEW (EMEC)
Saccharicoccus sacchari (Cockerell)
Leptomastidea abnormis
Spilococcus atriplicis (Cockerell,)
Acerophagus pallidus
Spilococcus eriogoni (Ehrhorn)
Acerophagus pallidus
Spilococcus implicatus Ferris
Acerophagus angelicus
Anagyrus smithi
Cirrhencyrtus ehrhorni
Spilococcus pressus Ferris
Acerophagus abstrusus
Acerophagus californicus
Pseudleptomastix squammulata NEW (UCRC)
Spilococcus sequoiae (Coleman)
Cirrhencyrtus ehrhorni
Trabutina serpentinus (Green)
Anagyrus kamali
Trionymus aberrans Goux
Cheiloneurus elegans (H)

Psyllidae
Arytaina sp.

Prionomitus mitratus NEW (EMEC)
Cacopsylla americana (Crawford)
Prionomitus mitratus
Cacopsylla bidens (Šulc)
Trechnites insidiosus
Cacopsylla crataegi (Schrank)
Prionomitus mitratus
Cacopsylla sp. nr. media (Tuthill)
Prionomitus mitratus
Cacopsylla mali (Schmidberger)
Prionomitus mitratus
Prionomitus tiliaris
Cacopsylla melanoneura (Foerster)
Prionomitus mitratus
Prionomitus tiliaris
Cacopsylla peregrina (Foerster)
Prionomitus mitratus
Prionomitus tiliaris
Cacopsylla pyri (Linnaeus)
Prionomitus mitratus
Prionomitus tiliaris
Trechnites insidiosus
Cacopsylla pyricola (Foerster)
Prionomitus mitratus
Syrphophagus aphidivorus NEW (EMEC)
Trechnites insidiosus
Cacopsylla ribesiae (Crawford)
Prionomitus mitratus
Cacopsylla ulmi (Foerster)
Prionomitus tiliaris
Ceanothia essigi (Jensen)
Prionomitus mitratus
Ceanothia insolita (Tuthill)
Prionomitus mitratus
Creis costatus (Froggatt)
Psyllaephagus bliteus
Cryptoneossa triangula Taylor
Psyllaephagus perplexus
Ctenarytaina eucalypti (Maskell)
Psyllaephagus pilosus
Ctenarytaina spatulata Taylor
Psyllaephagus pilosus NEW (UCDC)
Eucalyptolyma maidenii Froggatt
Psyllaephagus parvus
Euglyptoneura fuscipennis (Crawford)
Prionomitus mitratus
Euglyptoneura minuta (Crawford)
Prionomitus mitratus
Euglyptoneura robusta (Crawford)
Prionomitus mitratus
Glycaspis brimblecombei Moore
Psyllaephagus bliteus
Glycaspis sp.
Psyllaephagus brachiatius
Psyllaephagus bliteus
Heteropsylla cubana Crawford
Syrphophagus aphidivorus (H)
Livilla retamae (Puten)
Prionomitus mitratus
Pachypsyslla celtidisgemma Riley
Psyllaephagus pachypysyllae
Pachypsyslla celtidisvesicula Riley
Psyllaephagus pachypysyllae
Pachypsyslla venusta (Osten Sacken,)
Psyllaephagus pachypysyllae
Pexopsylla cercocarpi Jensen
Prionomitus mitratus
Psylla alni (Linnaeus,
        Prionomitus mitratus NEW (UCRCC)
Psylla floccosa Patch
        Prionomitus mitratus NEW (EMEC)
Psylla pyrisuga Foerster
        Prionomitus mitratus
        Trechnites insidiosus
Psylla sp.
        Prionomitus mitratus NEW (EMEC)
        Prionomitus tiliaris NEW (EMEC)
        Trechnites insidiosus
Spondylaspis sp.
        Psyllaephagus parvus

Scutelleridae
Coleotichus blackburniae White
        Ooencyrtus submetallicus

Triozidae
Bactericera cockerelli (Sulc)
        Metaphycus psyllidis
Trioza beameri Tuthill
        Prionomitus mitratus
        Psyllaephagus pachypsyllae

Order HYMENOPTERA
Aphelinidae
Aphelinus asychis Walker
        Syrphophagus aphidivorus
Aphelinus jacundus Gahan
        Syrphophagus aphidivorus
Aphelinus maidis Timberlake
        Syrphophagus aphidivorus
Aphelinus mali (Haldeman)
        Syrphophagus aphidivorus
Aphelinus sanborniae Gahan
        Syrphophagus aphidivorus
Aphelinus semiflavus Howard
        Syrphophagus aphidivorus
Aphelinus varipes (Foerster)
        Syrphophagus aphidivorus
Aphelinus sp.
        Syrphophagus aphidivorus
Aphytis mytilaspidis (LeBaron)
        Zaomma lambinus
Coccophagus ceroplastae (Howard)
        Coccidoctonus dubius
Coccophagus merceti Hayat
        Coccidoctonus dubius
Encarsia berlesei (Howard)
        Zaomma lambinus
Apidae
Ceratina acantha Provancher
Coelopencyrtus hylaeoleter
Ceratina punctigena Cockerell
Coelopencyrtus hylaeoleter
Ceratina sp.
Coelopencyrtus hylaeoleter

Braconidae
Aphidius avenae Haliday
Syrphophagus aphidivoros
Aphidius ervi Haliday
Syrphophagus aphidivoros
Aphidius smithi Sharma & Subba Rao
Syrphophagus aphidivoros
Aphidius sonchi Marshall
Syrphophagus aphidivoros
Aphidius sp
Syrphophagus aphidivoros
Binodoxys communis (Gahan)
Syrphophagus aphidivoros
Binodoxys indica (Subba Rao & Sharma)
Syrphophagus aphidivoros
Cotesia melanoscela (Ratzeburg)
Ooencyrtus kavanae
Diaeretiella rapae (M’Intosh)
Syrphophagus aphidivoros
Ephedrus lacertosus (Haliday)
Syrphophagus aphidivoros
Ephedrus persicae Froggatt
Syrphophagus aphidivoros
Lysiphlebus dissolatus (Nees)
Syrphophagus aphidivoros
Lysiphlebus fabarum (Marshall)
Syrphophagus aphidivoros
Lysiphlebus testaceipes (Cresson)
Syrphophagus aphidivoros
Monoctonus caricis (Haliday)
Syrphophagus aphidivoros
Praon exsoletum (Nees)
Syrphophagus aphidivoros
Praon volucre (Haliday)
Syrphophagus aphidivoros
Praon sp.
Syrphophagus aphidivoros
Trioxys complanatus Quilis
Syrphophagus aphidivoros
Trioxys curvicaudus Mackauer
Syrphophagus aphidivoros
Trioxys pallidus (Haliday)
Syrphophagus aphidivoros
Colletidae
Hylaeus ellipticus (Kirby)
   Coelopencyrtus hylaeoleter
Hylaeus sp.
   Coelopencyrtus hylaeoleter

Dryinidae
Echthrodelphax fairchildii Perkins
   Cheiloneurus flaccus
Haplogonatopus vitiensis Perkins
   Cheiloneurus flaccus
Pseudogonatopus hospes Perkins
   Cheiloneurus flaccus

Encyrtidae
Anagyrus diversicornis (Howard)
   Prochiloneurus dactylopii
Anagyrus lopezi (DeSantis)
   Prochiloneurus dactylopii
Anagyrus yuccae
   Prochiloneurus modestus
Anicetus beneficus Ishii & Yasumatsu
   Coccidoctonus dubius
Diversinervus elegans Silvestri
   Cheiloneurus inimicus NEW (UCRC)
   Cheiloneurus noxius
Encyrtus infelix (Embleton)
   Coccidoctonus dubius
Homalotylus affinis Timberlake
   Cheiloneurus banksi NEW (EMEC)
Isodromus iceriae Howard
   Cheiloneurus compressicornis
Isodromus niger Ashmead
   Cheiloneurus compressicornis
Metaphycus flavus (Howard)
   Eusemion longipenne
Metaphycus lounsburyi (Howard)
   Ammonoencyrtus californicus
   Cheiloneurus inimicus
   Cheiloneurus lineascapus
   Cheiloneurus noxius
   Coccidoctonus dubius
Metaphycus luteolus (Timberlake)
   Cheiloneurus noxius
Metaphycus physokermis (Timberlake)
   Cheiloneurus inimicus
Metaphycus stanleyi Compere
   Cheiloneurus noxius
Metaphycus varius (Girault)
   Coccidoctonus dubius
Microterys nietneri (Motschulsky)
   Ammonoencyrtus californicus
   Cheiloneurus inimicus NEW (UCRC)
   Cheiloneurus noxius
Coccidoctonus dubius
Eusemion longipenne
Paraphaenodiscus subterraneus Ferrière
Cheiloneurus elegans
Pseudhomalopoda prima Girault
Zaomma lambinus
Pseudococcobius sp.
Cheiloneurus banksi
Psyllaephagus pistaciae Ferriere
Syrphophagus aphidivorus
Psyllaephagus yaseeni Noyes
Syrphophagus aphidivorus
Thomsonica amathus (Walker)
Zaomma lambinus
Zarhopalus corvinus (Girault)
Prochiloneurus modestus

Eupelmidae
Anastatus japonicus Ashmead
Ooencyrtus kuvanae

Ichneumonidae
Gelis tenellus (Say)
Cheiloneurus compressicornis

Perilampidae
Perilampus chrysopae Crawford
Cheiloneurus compressicornis

Platygastridae
Platygaster zoisine Walker
Cheiloneurus elegans

Pteromalidae
Moranila californica (Howard)
Coccidoctonus dubius
Sentellista caerulea (Fonscolombe)
Coccidoctonus dubius

Order LEPIDOPTERA
Arctiidae
Hypercompe albicornis (Grote)
Ooencyrtus submetallicus

Argyrethriidae
Argyrethria aureoargentella Brower
Copidosoma deceptor

Blastobasidae
Holcocera modestella Clemens
Copidosoma albipes

Coleophoridae
Coleophora ulmifoliella McDunnough
Copidosoma bucculaticis

Gelechiidae

Anacampsis innocuella (Zeller)
  Copidosoma albipes

Anacampsis niveopulvella (Chambers)
  Copidosoma albipes
  Copidosoma howardi

Anacampsis populella (Clerck)
  Copidosoma albipes

Anarsia eleagnella Kusnezov
  Copidosoma varicorne

Anarsia ephippias (Meyrick)
  Copidosoma varicorne

Anarsia lineatella Zeller
  Copidosoma pyralidis
  Copidosoma varicorne

Anarsia sagmatica Meyrick
  Copidosoma varicorne

Anarsia spartiella (Schrank)
  Copidosoma varicorne

Anarsia sp.
  Copidosoma varicorne

Aroga eleagnella (Chambers)
  Copidosoma vagum

Battaristis vittella (Busck)
  Copidosoma deceptor

Chionodes kubai Hodges
  Copidosoma vagum NEW (CSCA)

Coleotechnites apicitripunctella (Clemons)
  Copidosoma deceptor

Coleotechnites atrupictella (Dietz)
  Copidosoma gelechiae

Coleotechnites canusella (Freeman)
  Copidosoma deceptor

Coleotechnites huntella (Keiffer)
  Copidosoma deceptor

Coleotechnites milleri (Busck)
  Copidosoma deceptor

Coleotechnites moreonella Heinrich
  Copidosoma deceptor

Coleotechnites piceaella Kearfott
  Copidosoma deceptor

Coleotechnites starki Freeman
  Copidosoma deceptor

Coleotechnites thujaella (Kearfott)
  Copidosoma bucculaticis
  Copidosoma deceptor

Coleotechnites spp.
  Copidosoma deceptor

Compsolechia anisogramma (Meyrick)
  Copidosoma varicorne
Dichromeris eridantis (Meyrick)
    Copidosoma varicorne
Dichromeris flavocostella (Clemons)
    Copidosoma pyralidis
Dichromeris setosella (Clemons)
    Copidosoma pyralidis
Exoteleia dodecella (Linnaeus)
    Copidosoma deceptor
    Copidosoma filicorne
Exoteleia nepheos Freeman
    Copidosoma deceptor
    Copidosoma filicorne
Exoteleia pinifoliella (Chambers)
    Copidosoma deceptor
    Copidosoma vagum
Filatima pseudacaciella (Chambers)
    Copidosoma vagum
Gelechia lyncella Zeller
    Copidosoma howardi
Gelechia turpella (Denis & Schiffermüller)
    Copidosoma albipes
Gelechia sp.
    Copidosoma howardi
    Copidosoma vagum
Gnorimoschema gallaeasterella (Kellicott)
    Copidosoma gelechiae
Gnorimoschema gallaesolidaginis (Riley)
    Copidosoma gelechiae
Gnorimoschema gibsoniella Busck
    Copidosoma gelechiae
Gnorimoschema salinaris Busck
    Copidosoma gelechiae
Gnorimoschema gudmanella (Walsingham)
    Copidosoma capsicum
Gnorimoschema sp.
    Copidosoma gelechiae
Phthorimaea operculella (Zeller)
    Copidosoma capsicum
    Copidosoma koehleri
Recurvaria sp.
    Copidosoma deceptor
Scrobipalpa absoluta (Meyrick)
    Copidosoma koehleri
Symmetrischema capsica (Bradley & Polovný)
    Copidosoma capsicum
Symmetrischema tangolias (Geyen)
    Copidosoma koehleri

Geometridae
Cosmorhoe ocellata (Linnaeus)
    Copidosoma cervius
Eupithecia abietaria (Goeze)
    Copidosoma cervius
Eupithecia analoga Diakonoff
    Copidosoma cervius
Eupithecia assimilata Doubleday
Copidosoma cervius

Eupithecia centaureata (Denis & Schiffermüller)
Copidosoma cervius

Eupithecia expallidata Doubleday
Copidosoma cervius

Eupithecia gueneata Millière
Copidosoma cervius

Eupithecia haworthiata (Doubleday)
Copidosoma cervius

Eupithecia innotata (Hufnagel)
Copidosoma cervius

Eupithecia laricata (Freyer)
Copidosoma cervius

Eupithecia linariata (Denis & Schiffermüller)
Copidosoma cervius

Eupithecia pimpinellata (Hübner)
Copidosoma cervius

Eupithecia pusillata (Denis & Schiffermüller)
Copidosoma cervius

Eupithecia rosmarinata Millière
Copidosoma cervius

Eupithecia simpliciata (Haworth)
Copidosoma cervius

Eupithecia succenturiata (Linnaeus)
Copidosoma cervius

Eupithecia tripunctaria Herrich-Schäffer
Copidosoma cervius

Eupithecia ?trisignaria Herrich-Schäffer
Copidosoma cervius

Eupithecia unedonata (Mabille)
Copidosoma cervius

Eupithecia vulgata (Haworth)
Copidosoma cervius

Eupithecia spp.
Copidosoma cervius

Perizoma affinitata (Stephens)
Copidosoma cervius

Perizoma bifasciatum (Haworth)
Copidosoma cervius

Gracillariidae
Caloptilia sp.
Ageniaspis bicoloripes

Cameraria caryaefoliella (Clemens)
Ageniaspis bicoloripes

Cameraria cincinnatiella (Chambers)
Ageniaspis bicoloripes

Cameraria diabloensis Opler & Davis
Ageniaspis bicoloripes

Cameraria gaultheriella (Walsingham)
Ageniaspis bicoloripes

Cameraria hamameliiella (Busck)
Ageniaspis bicoloripes NEW (EMEC)
Cameraria quercivorella (Chambers)  
Ageniaspis bicoloripes **NEW** (EMEC)

Cameraria ulmella Chambers  
Ageniaspis bicoloripes

Cameraria sp. prob. wislizeniella Opler  
Ageniaspis bicoloripes

Cameraria sp.  
Ageniaspis bicoloripes  
Parablastothrix nearctica **NEW** (EMEC)

Marmara fraxinicola Braun  
Ageniaspis bicoloripes

Phyllonorycter inasiatella (Braun)  
Ageniaspis sp. nr. bicoloripes **NEW** (EMEC)

Phyllonorycter rileyella (Chambers)  
Ageniaspis bicoloripes **NEW** (EMEC)

Phyllonorycter sandraella (Opler)  
Parablastothrix nearctica

Phyllonorycter sp.  
Ageniaspis bicoloripes

Heliozelidae  
Coptodisca powellella Opler  
Parablastothrix nearctica

Coptodisca sp.  
Parablastothrix nearctica

Hepialidae  
Hepialus humuli (Linnaeus)  
Copidosoma truncatellum

Lasiocampidae  
Dendrolimus spectabilis (Butler)  
Ooencyrtus kuvanae

Malacosoma californicum (Packard)  
Ooencyrtus sp.

Malacosoma neustria (Linnaeus)  
Ooencyrtus kuvanae

Malacosoma sp.  
Ooencyrtus sp.

Lymantriidae  
Dasychira pinicola (Dyar)  
Ooencyrtus kuvanae

Euproctis chrysorrhoea (Linnaeus)  
Ooencyrtus kuvanae

Leucoma salicis (Linnaeus)  
Ooencyrtus kuvanae

Lymantria fumida Butler  
Ooencyrtus kuvanae

Lymantria monacha (Linnaeus)  
Ooencyrtus kuvanae

Lymantria xylina Swinhoe  
Ooencyrtus kuvanae

Orgyia antiqua (Linnaeus)
Ooencyrtus kuvanae
Orgyia leucostigma (Smith)
Ooencyrtus kuvanae
Orgyia sp.
Ooencyrtus kuvanae
Porthertria dispar (Linnaeus)
Ooencyrtus kuvanae

Lyonetiidae
Bucculatrix albertiella Busck
  Parablastothrix nearctica

Nepticulidae
Nepticula rhamnicola (Braun)
  Parablastothrix nearctica NEW (EMEC)
Nepticula sp.
  Parablastothrix nearctica NEW (EMEC)
Obrussa sp.
  Parablastothrix nearctica
Stigmella variella (Braun)
  Parablastothrix nearctica
Stigmella inconspicuesta
  Ageniaspis bicoloripes
Stigmella sp.
  Ageniaspis bicoloripes
  Parablastothrix nearctica NEW (EMEC)

Noctuidae
Actinotia polyodon (Clerck)
  Copidosoma truncatellum
Agrapha agnata (Staudinger)
  Copidosoma floridanum
Agrapha tarassota (Hampson)
  Copidosoma floridanum
Agrotis ipsilon (Hufnagel)
  Copidosoma celaenae NEW (EMEC)
  Tyndarichus americanus (H) NEW (EMEC)
Agrotis malefida Guenée
  Copidosoma truncatellum
Agrotis orthogonia Morrison
  Copidosoma bakeri
  Copidosoma celaenae
Agrotis venerabilis Walker
  Copidosoma bakeri
Agrotis sp.
  Copidosoma celaenae NEW (UCRC)
  Copidosoma truncatellum
Anomis erosa Hübner
  Copidosoma truncatellum
Apamea devastator (Brace)
  Copidosoma bakeri
Apamea monoglypha (Hufnagel)
  Copidosoma truncatellum
Apamea sublustris (Esper)
Copidosoma truncatellum
Argyrogramma signatum (Fabricius)
Copidosoma floridanum
Autographa californica (Speyer)
Copidosoma floridanum
Autographa gamma (Linnaeus)
Copidosoma floridanum
Autographa sp.
Copidosoma floridanum
Autoplusia egena (Guenée)
Copidosoma floridanum NEW (CSCA)
Autoplusia olivacea (Skinner)
Copidosoma floridanum NEW (LACM)
Catocala electa (Vieweg)
Copidosoma truncatellum
Chrysodeixis acuta (Walker)
Copidosoma floridanum
Chrysodeixis argentifera (Guenée)
Copidosoma floridanum
Chrysodeixis chalcites (Esper)
Copidosoma floridanum
Chrysodeixis eriosoma (Doubleday)
Copidosoma floridanum
Chrysodeixis sp.
Copidosoma floridanum
Euchalcia modestoides Poole
Copidosoma floridanum
Eupsilia sp.
Copidosoma celaenae
Euxoa auxiliaris (Grote)
Copidosoma bakeri
Euxoa declarata (Walker)
Copidosoma celaenae
Euxoa detera (Walker)
Copidosoma bakeri
Euxoa flavicollis (Smith)
Copidosoma bakeri
Euxoa intrita (Morrison)
Copidosoma bakeri
Euxoa lidia (Stoll)
Copidosoma bakeri
Copidosoma truncatellum
Euxoa messoria (Harris)
Copidosoma bakeri
Copidosoma celaenae
Euxoa obelisca (Denis & Schiffermüller)
Copidosoma truncatellum
Euxoa ochrogaster (Guenée)
Copidosoma bakeri
Copidosoma celaenae
Euxoa perpolita (Morrison)
Copidosoma celaenae
Euxoa scandens (Riley)
Copidosoma bakeri
Euxoa scolastica McDunnough
  Copidosoma celaena
  Copidosoma celaena

Euxoa temera (Hübner)
  Copidosoma truncatellum

Euxoa tristicula (Morrison)
  Copidosoma bakeri
  Copidosoma celaena

Euxoa sp.
  Copidosoma bakeri
  Copidosoma truncatellum

Feltia jaculifera (Gueneé)
  Copidosoma bakeri
  Copidosoma celaena

Feltia subgothica (Haworth)
  Copidosoma bakeri

Feltia sp.
  Copidosoma bakeri

Hadena luteago (Denis & Schiffermüller)
  Copidosoma truncatellum

Lacinipolia renigera (Stephens)
  Copidosoma bakeri
  Copidosoma celaena

Lamprotes c-aureum (Knoch)
  Copidosoma floridanum

Mamestra brassicae (Linnaeus)
  Copidosoma floridanum
  Copidosoma truncatellum

Mocis latipes Gueneé
  Copidosoma truncatellum

Nebractia obliqua (Walker)
  Copidosoma floridanum

Peridroma saucia (Hübner)
  Copidosoma bakeri
  Copidosoma celaena

Plusia festucae (Linnaeus)
  Copidosoma floridanum

Plusia sp.
  Copidosoma floridanum

Polia purpurissata
  Copidosoma celaena

Polychrysa moneta (Fabricius)
  Copidosoma floridanum

Protolampra rufipectus (Morrison)
  Copidosoma celaena

Pseudoplusia includens (Walker)
  Copidosoma floridanum

Rachiplusia mu (Gueneé)
  Copidosoma bakeri
  Copidosoma floridanum

Rachiplusia ou (Gueneé)
  Copidosoma floridanum

Rhynchagrotis cupida (Grote)
  Copidosoma celaena
Spodoptera ornithogalli (Guenée)
  Copidosoma truncatellum
Spodoptera sp.
  Copidosoma truncatellum
Syngrapha epigaea (Grote)
  Copidosoma floridanum
Thysanoplusia orichalcea (Fabricius)
  Copidosoma floridanum
Thysanoplusia intermixta (Warren)
  Copidosoma floridanum
Trichoplusia ni (Hübner)
  Copidosoma floridanum
  Copidosoma bakeri
Xestia diatrapezium (Denis & Schiffermüller)
  Copidosoma truncatellum
Xestia mustelina (Smith)
  Copidosoma celaenae
Xestia smithii (Snellen)
  Copidosoma bakeri

Notodontidae
Notodonta ziczac (Linnaeus)
  Copidosoma truncatellum
Phryganidia californica Packard
  Lamennaisia ambiguа NEW (CAS)

Nymphalidae
Caligo memnon (Felder & Felder)
  Ooencyrtus submetallicus
Heliconius sp.
  Ooencyrtus submetallicus
Opsiphanes cassina Felder & Felder
  Ooencyrtus submetallicus
Opsiphanes tamarindi (Felder & Felder)
  Ooencyrtus submetallicus

Oecophoridae
Hofmannophila pseudospretella (Stainton)
  Copidosoma vagum

Pyralidae
Amyelois transitella (Walker)
  Copidosomopsis plethorica
Apomyelois ceratoniae (Zeller)
  Copidosomopsis plethorica
Diatraea sp.
  Copidosoma capsicum
Ephesia kuehniella Zeller
  Copidosomopsis tanytnemus
Lineodes sp.
  Copidosoma capsicum

Saturniidae
Eriogyna pyretorum (Westwood)
Ooencyrtus kuvanae
Hemileuca oliviae Cockerell
Ooencyrtus kuvanae

Sesiidae
Pennisetia marginata (Harris)
Ooencyrtus californicus

Sphingidae
Erinnyis ello (Linnaeus)
Ooencyrtus submetallicus

Tortricidae
Acleris hippophaeana (Heyden)
Copidosoma varicorne
Acleris variana (Fernald)
Copidosoma deceptor
Acleris sp.
    Copidosoma howardi
Apotomis sp.
    Copidosoma howardi
Archips fumiferana (Clemons)
    Copidosoma filicorne
Archips sp.
    Copidosoma howardi
Argyrotaenia quercifolia Fitch
    Copidosoma vagum
Choristoneura conflictana (Walker)
    Copidosoma albipes
Cydia caryana (Fitch)
    Copidosomopsis plethorica
Cydia funebrana Treitschke
    Copidosoma varicorne
Cydia molesta (Busck)
    Copidosoma varicorne
Cydia pomonella (Linnaeus)
    Copidosoma varicorne
Cydia sp.
    Copidosoma varicorne
Epiblema scudderiana (Clemens)
    Copidosoma gelechiae
Epinotia nanana (Treitschke)
    Copidosoma deceptor
Epinotia solandriana (Linnaeus)
    Copidosoma albipes
Eucosma sp.
    Copidosoma varicorne
Gypsonoma minutana (Hübner)
    Copidosoma varicorne
Lobesia incultana (Walker)
    Copidosoma varicorne
Pandemis canadana Kearfott
    Copidosoma howardi
Pseudosciaphila duplex (Walsingham)
Copidosoma albipes
*Rhyacionia buoliana* (Denis & Schiffermüller)
Copidosoma filicorne
*Rhyacionia frustrana* (Comstock)
Copidosoma filicorne
*Tortrix viridana* (Linnaeus)
Copidosoma varicorne

**Yponomeutidae**
*Argyresthia aureaargentella* Brower
Copidosoma bucculatricis
*Argyresthia freyella* Walsingham
Copidosoma bucculatricis
*Argyresthia libocedrella* Busck
Copidosoma bucculatricis
*Argyresthia thuiella* (Packard)
Copidosoma bucculatricis

**Order NEUROPTERA**

**Chrysopidae**
*Ceraeochrysa cubana* (Hagen)
Cheiloneurus compressicornis (H)
Isodromus iceryae
*Ceraeochrysa lateralis* (Guérin-Méneville)
Isodromus iceryae
*Ceraeochrysa sanchezi* (Navás)
Cheiloneurus compressicornis (H)
Isodromus iceryae
*Ceraeochrysa valida* (Banks)
Cheiloneurus compressicornis (H)
Isodromus iceryae
*Chrysopa nigricornis* Burmeister
Cheiloneurus compressicornis (H)
Isodromus iceryae
Isodromus niger
*Chrysopa oculata* Say
Cheiloneurus compressicornis (H)
Isodromus niger
*Chrysopa pallens* (Rambur)
Isodromus niger
*Chrysopa sp.*
Isodromus puncticeps
*Chrysoperla carnea* (Stephens)
Isodromus niger
Ooencyrtus kavanae
*Chrysoperla plorabunda* (Fitch)
Cheiloneurus compressicornis (H)
Isodromus iceryae
*Chrysoperla rufilabris* (Burmeister)
Cheiloneurus compressicornis (H)
Isodromus iceryae
*Eremochrysa punctinervis* (McLachlan)
Isodromus iceryae
*Leucochrysa floridana* Banks
Isodromus iceryae
Suarius fedtschenkoi (McLachlan)
Ooencyrtus kuvanae

Coniopterygidae
Conwentzia barretti (Banks)
Trjapitzinellus microrphanos NEW (EMEC)
Conwentzia sp.
Trjapitzinellus microrphanos
Parasemidalis sp.
Trjapitzinellus microrphanos
Undetermined
Aphycaspis sp. NEW (UCRC)

Hemerobiidae
Hemerobius pacificus Banks
Echthroplexis planiformis
Sympherobius angustus (Banks)
Isodromus iceryae
Isodromus niger
Sympherobius californicus Banks
Hexacnemus armitagei
Isodromus iceryae
Sympherobius sp.
Hexacnemus armitagei

Order ACARI
Ixodidae
Amblyomma tholloni Neumann
Ixodiphagus hookeri
Amblyomma variegatum (Fabricius)
Ixodiphagus hookeri
Dermacentor andersoni Stiles
Ixodiphagus hookeri
Dermacentor nitens Neumann
Ixodiphagus hookeri
Dermacentor parumapertus Neumann
Ixodiphagus hookeri
Dermacentor variabilis (Say)
Ixodiphagus hookeri
Dermacentor sp.
Ixodiphagus hookeri
Haemaphysalis bispinosa Neumann
Ixodiphagus hookeri
Haemaphysalis concinna Koch
Ixodiphagus hookeri
Haemaphysalis inermis Birula
Ixodiphagus hookeri
Haemaphysalis japonica Warburton
Ixodiphagus hookeri
Haemaphysalis leachei (Audouin)
Ixodiphagus hookeri
Haemaphysalis lepoispalustris (Packard)
Ixodiphagus hookeri
Hyalomma aegyptium (Linnaeus)
    Ixodiphagus hookeri
Hyalomma anatolicum Koch
    Ixodiphagus hookeri
Hyalomma asiaticum Schulze & Schlottke
    Ixodiphagus hookeri
Hyalomma sp.
    Ixodiphagus hookeri
Ixodes crenulatus Koch
    Ixodiphagus hookeri
Ixodes dentatus Marx
    Ixodiphagus hookeri
Ixodes hexagonus Leach
    Ixodiphagus hookeri
Ixodes marmotae Cooley & Kohls
    Ixodiphagus hookeri
Ixodes muris Bishopp & Smith
    Ixodiphagus hookeri
Ixodes persulcatus Schulze
    Ixodiphagus hookeri
Ixodes ricinus (Linnaeus)
    Ixodiphagus hookeri
Ixodes scapularis Say
    Ixodiphagus hookeri
Ixodes texanus Banks
    Ixodiphagus hookeri
Ixodes sp.
    Ixodiphagus hookeri
Rhipicephalus appendiculatus Neumann
    Ixodiphagus hookeri
Rhipicephalus evertsi Neumann
    Ixodiphagus hookeri
Rhipicephalus oculatus Neumann
    Ixodiphagus hookeri
Rhipicephalus sanguineus (Latreille)
    Ixodiphagus hookeri
Rhipicephalus sp.
    Ixodiphagus hookeri

APPENDIX II. Taxa previously reported from California under invalid names.

Aenasioidea armitagei Compere 1926a
    Now placed in Metaphycus
Aenasioidea kermicola Timberlake 1916
    Now placed in Metaphycus
Anarhopus sydneyensis Timberlake 1929
    Now placed in Tetracnemoidea
Anisotylus similis utahensis Timberlake 1919c
    Now placed in Homalotylus
Anusia neomexicana Ashmead 1900
    Now placed in Formicencyrtus
Apoanagyrus californicus Compere 1947
    Now placed in Anagyrus
Apterencyrtus microphagus (Mayr 1876)
   Junior synonym of Zaomma lambinus
Arhopoideus peregrinus (Compere 1939b)
   Now placed in Tetracnemoidea
Arhopoideus pretiosus (Timberlake 1929)
   Junior synonym of Tetracnemoidea brevicornis
Caenocercus planiformis (Howard 1895a)
   Now placed in Echthroplexis
Chalcaspis arizonensis Girault 1915b
   Now placed in Aenasius
Chalcaspis phenacocci (Ashmead 1902)
   Now placed in Aenasius
Cerchysius hubbardii Ashmead 1900
   Now placed in Timeophoctonus
Chrysopophagus amplicornis (Gahan 1914)
   Synonymized under Cheiloneurus banksi by Trjapitzin & Zuparko (2005)
Chrysopophagus compressicornis Ashmead 1894
   Now placed in Cheiloneurus
Encyrtus albicoxa (Ashmead 1885)
   Junior synonym of Encyrtus aurantii
Encyrtus barbatus Timberlake 1919b
   Junior synonym of Encyrtus aurantii
Encyrtus bicolor (Howard 1881)
   Junior synonym of Encyrtus aurantii
Encyrtus californicus (Girault 1917d)
   Junior synonym of Encyrtus fuscus
Erythraphycus argyrocomus Compere 1947
   Now placed in Metaphycus
Erythraphycus calvus Compere 1947
   Now placed in Metaphycus
Erythraphycus matteolus Compere 1947
   Now placed in Metaphycus
Hunterellus hookeri Howard 1908
   Now placed in Ixodiphagus
Leptomastidea claripennis (Timberlake 1918)
   Now placed in Gyranusoidea
Melanaphycus clauseni (Timberlake 1918)
   Now placed in Metaphycus
Melanaphycus famipennis (Timberlake 1918)
   Now placed in Metaphycus
Melanaphycus fuscipennis (Howard 1898a)
   Now placed in Metaphycus
Microterys claripennis Compere 1928
   Now placed in Metablastothrix
Microterys dubiosus (Dalla Torre 1898)
   Junior synonym of Lamennaisia ambigu
Microterys flavus (Howard 1881)
   Junior synonym of Microterys nietneri
Microterys titiani Girault 1917a
   Junior synonym of Microterys sylvius
Paralitomastix pyralidis (Ashmead 1888)
   Now placed in Copidosoma
Paramusia sp.
An unidentified species was recorded from California in Gordh (1979); the genus was synonymized with *Anagyrus* by Noyes (1980), although Kerrich (1982) maintained them separately.

*Parasyrphophagus* sp.
- Junior synonym of *Exoristobia*
- *Pauridia peregrina* Timberlake 1919b
- Junior synonym of *Coccidoxenoides perminutus*
- *Pentalitomastix plethoricus* Caltagirone 1966
- Now placed in *Copidosomopsis*
- *Psyllaephagus arbuticola* Gahan & Waterston 1926
- Now placed in *Ginsiana*
- *Quaylea whittieri* (Girault 1918)
  - Junior synonym of *Coccidoctonus dubius*
- *Trechnites psyllae* (Ruschka 1923)
  - Junior synonym of *Trechnites insidiosus*

**APPENDIX III.**

Taxis either mistakenly reported from California, or introduced into the state without evidence of long-term establishment.

*Anagyrus fujikona* Tachikawa, 1963. The type deposition is unknown, but is probably at either Kyushu University (Fukuoka, Japan) or Ehime University (Matsuyama, Japan). It was imported from Japan in a biocontrol program against *Pseudococcus comstocki* and released in Tulare County in 1974, but apparently failed to establish (Meyerdirk & Newell 1979).

*Anagyrus fusciventris* (Girault 1915a) (*Epidinocarsis*). This species was imported from Hawaii (presumably previously established there from Australia) in 1936 in a biocontrol program against *Pseudococcus longispinus*, but it has not been recovered since 1939 (Flanders 1940b; Bartlett 1978b).

*Anagyrus kivuensis* Compere 1939a. This species was imported in a biocontrol program against *Pseudococcus maritimus* from Kenya in 1949, and again in 1953, but it failed to establish (Bartlett 1978b), although it did have some success in greenhouses (Doutt 1951). Trjapitzin (1989) considered this species a junior synonym of his concept of *A. pseudococci* Girault, a taxon that Triapitsyn et al. (2014) treated as *A. sp. nr. pseudococci*, and became established in California in 1955.

*Anagyrus subalbipes* Ishii 1928. This species was imported from Japan in 1973 in a biocontrol program against *Pseudococcus comstocki* and released in Tulare County, but it failed to establish (Meyerdirk & Newell 1979).

*Anthemus inconspicuus* Doutt 1966. This species was imported from Pakistan and released in a biocontrol program against *Parlatoria oleae* in 1957, and initially established in several locations (Contra Costa, Fresno and Tulare counties). However, it apparently was outcompeted by *Coccophagoides utilis* Doutt 1966, and had disappeared by 1961 (Rosen & DeBach 1978).
Blastothrix sericea (Dalman 1820) (Encyrtus). See remarks under B. sp. nr. britannica. This is a Palearctic species, which was reported established in British Columbia in the late 1920s, but Sugonjaev (1983) reports that this was a misidentification of B. britannica. Subsequent reports of B. sericea from the Pacific Northwest and northern California are probably referable to B. britannica or B. americana. In 1939, a species then identified as B. sericea was released in California in a biocontrol effort against Parthenolecanium corni (Bouché), but that species evidently never established (Bartlett 1978a: 62–63). Due to previous misidentifications, Sugonjaev (1983: 147) considers B. sericea may be monophagous on E. tiliae, although more recent references list many hosts for this species (Noyes 2001). Ashmead (1900: 390) reported B. sericea from North America, but he may have been referring to B. longipennis, which he placed as a junior synonym. Slosson (1906: 323), Simanton (1916: 66) and Viereck (1916: 502) reported B. sericea from the northeastern United States early in the 20th century: these records may represent an adventive New World establishment of B. sericea, but I suspect they were misidentifications. Interestingly, Viereck’s host record (“Reared from Phenacoccus acericolor parasitized by Baccha fascipennis”) led to later catalogs recording the latter (a syrphid fly) as a (albeit questionable) host.

Blepyrus insularis (Cameron 1886) (Encyrtus). This species was imported from Mexico in 1966–67 in biocontrol program against FERRISIA virgata and released in Imperial County, but failed to establish (DeBach & Warner 1969).

Blepyrus saccharicola Gahan 1942. This species was imported from the southern USA in 1952 in a biocontrol program against PSEUDOCoccus LONGISPINUS, but failed to establish (Bartlett 1978b).

Bothriocraera bicolor Compere & Zima 1955. This species was imported from Trinidad, reared on FERRISIA virgata and released in California during a series of biocontrol programs from 1952–1954 against Planococcus citri, Pseudococcus longispinus and P. maritimus, with no record of successful establishment (Bartlett 1978b).

Choreia inepta (Dalman 1820) (Encyrtus). This is a Palearctic species, mistakenly listed from the USA (Virginia & California) in Noyes (2001), through confusion of a junior synonym (CHOREIA nigroaenea Westwood) with Spalangia nigroaenea Curtis (Hymenoptera: Pteromalidae). This carried over into the host listing, and all the Diptera (Musciidae & Fanniidae) in Noyes’ listing is properly attributable to S. nigroaenea.

Chrysoplatyceus flavicollis (De Santis 1972) (Encyrtolophus). This species was imported from Paraguay, presumably in the early 1970s, and reared in an insectary in Tulare county (as Paraplatyceus citriculus Hall) as part of a biocontrol program against Pseudococcus comstocki (Hall 1974). There is no record in the literature that it was ever released.

Clausenia purpurea Ishii 1923. This species was released in Tulare County in a biocontrol program against Pseudococcus comstocki in 1967, where it was initially recovered, but apparently failed to establish (Meyerdirk & Newell 1979).

Coeccidencyrtus ensifer (Howard 1885) (Encyrtus). This species was originally recorded from “Aspidiotus corticalis” (a Riley MSS name) on peach—the true identity of this scale is unknown. Coecidencyrtus ensifer occurs throughout the eastern United States (Noyes 2001), and its reported presence in California appears to be based on a single record by Essig (1915). However, Essig did not specifically state that C. ensifer occurs in California—he simply noted that Diaspidiotus juglansegregiae is common throughout the southern portion of the state, and that C. ensifer (among several other species) has been reared from the scale. I have not found any other original record of this species from California, and therefore conclude that it is not present in the state, and that Essig’s statement was referring to host records from the eastern part of the country.

Comperiella unifasciata Ishii 1925. Trjapitzin (1989: 296) and Noyes & Hayat (1994: 407) report that this species was introduced into California as a biological control agent. However, although Compere (1926b: 49) redescribed this species from specimens in the Citrus Experiment Station (now the University of California, Riverside) sent there from Japan, there is no record that any releases were attempted.

Copidosoma desantisi Annecke & Mynhardt 1974. This species was originally introduced (as C. koehleri) into California in the 1940s from Chilean stock in a biocontrol program against Phthorimaea operculella (Zeller), but failed to establish (Oatman 1978). The species has been reported from California (Noyes 2001), but this was based on insectary records (Annecke & Mynhardt 1974: “Albany” refers to the University of California’s, Berkeley, Biological Control facility), not field-collected specimens.

Discodes aeneus (Dalman 1820) (Encyrtus). This was one of a suite of species imported from Europe for control of Parthenolecanium corni, but there is no record that it ever became established (Bartlett 1978a).

Diversinervus smithi Compere 1940b. This species was imported from South Africa in 1937 for control of Saissetia oleae, and was released in southern California but failed to establish (Bartlett 1978a).

Ectroma n. sp. nr. annulicorne Trjapitzin 1972. Trjapitzin & Trjapitsyn (2007) reported a single female specimen (CAS) “near Francis Lake in Sierra Nevada, California” (the complete collecting label actually reads “CAL Inyo Co.,
Tecopa, alkaline N. Francis (or Grimshaw) Lake 24 III 1964 H.B. Leech”). I have examined this specimen, and it belongs to an undescribed genus (as determined by J. Noyes), close to Discodes, which occurs from southern California north to Stanislaus County.

_Enyctrus fuliginosus_ Compere 1940b. This species was imported from South Africa in 1937 and released in southern California for the biocontrol of _Saissetia oleae_, but it failed to establish (Bartlett 1978a).

_Enyctrus infidus_ (Rossi 1790) (Chrysida). In 1953, a species tentatively identified as _E. infidus_ was introduced from Japan in a biocontrol program against _Eulecanium kunoense_ and released in Contra Costa County (Clausen 1955). A single individual collected in Contra Costa County in June 1953 (EMEC) represents the only specimen recovered.

_Gyranusoidea pseudococci_ (Bréthes 1924) (Leptomastidae). This species was imported from Mexico in 1966–67 in a biocontrol program against _Ferrisia virgata_ in Imperial County, but it failed to establish (DeBach & Warner 1969).

_Habrolepis aspidi_ (Risbec 1951) (Anabrolepis). This species was imported (as _Habrolepis aspidi_ from Eritrea in 1953 in a biocontrol program against _Diaspidiotus perniciosus_ (Compere & Annecke 1961). Although it propagated on this host in the lab, it failed to establish when released in southern California (Rosen & DeBach 1978).

_Habrolepis oppugnati_ Silvestri 1915. This species was imported from Eritrea and released in 1953 in Riverside and San Diego counties against _Diaspidiotus perniciosus_ (Clausen 1955) but there is no record it established.

_Hambletonia pseudococcina_ Compere 1936b. Peck (1963) reported this species was introduced and recovered in California, citing Clausen (1956a), but the latter reference reported that this species had been imported into Florida, not California.

_Leptomastix epona_ (Walker 1844) (_Enyctrus_). This is a Palearctic species that has been cultured for biocontrol programs. Stock from England was used to begin a colony in Chile, and material from that colony was released in the late 1990s in San Luis Obispo and Santa Barbara counties in a biocontrol program against _Pseudococcus viburni_, but it failed to establish (Daane et al. 2008).

_Leptomastix flava_ Mercet 1921. This species was imported from Israel in the 1970s in a biocontrol program against _Pseudococcus comstocki_, and was released in Tulare county (Meyerdirk & Newell 1979), but it was not recovered subsequently (Meyerdirk et al. 1981).

_Metaphycus alami_ Tachikawa 1968. This is a Palearctic species originally described as _M. eriococi_ Alam, 1957. Tachikawa (1968) recognized this name was a junior homonym of _M. eriococi_ (Timberlake 1916), and proposed _M. alami_ as a replacement name. Unfortunately, probably due to a confusion between _M. eriococi_ (Timberlake) and _M. eriococi_ Alam, the latter was listed from North America (as _M. alami_) in Noyes (2001).

_Metaphycus chemris_ (Fonscolomb 1832) (_Cynips_). This is a Palearctic species imported into California in 1939 in a biocontrol program against _Parthenolecanium corni_ as _M. mayri_ (Timberlake 1916), but it failed to establish (Bartlett 1978a).

_Metaphycus citrimum_ Compere 1957. This species was imported from Eritrea in a 1953 biocontrol program against _Saissetia oleae_ but failed to establish (Bartlett 1978a). It evidently also showed interest in _Coccus pseudomagnoliarum_ in the lab and was released against that species as well, but with no report of success (Bartlett 1978a).

_Metaphycus dispar_ (Mercet 1925). This species was imported into California (as _M. tamakatakai_ Tachikawa) from Japan for control of _Eulecanium kunoense_ (Kuwana) in the 1980s, but apparently failed to establish (Kennett 1988).

_Metaphycus flavus_ (Howard 1881) (_Aphycus_). This is a Holarctic species that was introduced into California several times beginning in 1947 (Compere 1957). In the 1950s it was imported from Morocco and Spain in a biocontrol project against _Saissetia oleae_ (Bartlett 1978a). van den Bosch et al. (1955) noted it appeared to be permanently established, but later reports (Bartlett 1978a; Kennett 1986; Daane et al. 1991; Lampson & Morse 1992) found no sign of this species. In 1996, a species initially identified as _M. flavus_, but later referred to as _Metaphycus_ sp. nr. _flavus_, was imported from Turkey and released in Riverside and Tulare counties—it was shown to be a useful augmentative agent against _Coccus pseudomagnoliarum_, but there was no evidence that it became established (Bernal et al. 1999; Schweizer et al. 2002). This species may prove to be synonymous with _M. luteolus_ (Guerrieri & Noyes 2000).

_Metaphycus gilvus_ Compere 1957. This species was introduced into southern California from Eritrea in 1953 under the name _M. praevidens_ (Silvestri) for control of _Saissetia oleae_ (van den Bosch et al. 1955), but there is no record that it ever became established (Bartlett 1978a; Daane et al. 1991; Lampson & Morse 1992).

_Metaphycus insidiosus_ (Mercet 1921). This species was imported from France in 1939 and again in 1955, for control of a lecanium scale (Compere & Annecke 1961). This may have been one of the suite of imported agents that Bartlett (1978a: 62) reported released in small numbers in San Jose, none of which established. However, this species
Psyllaephagus trioziphagus (Howard [in Howard & Ashmead] 1896) (Aphycus). This is a widespread species, imported from Pakistan in 1957 in a biocontrol program against Saissetia oleae, but failed to establish (Bartlett 1978a) (not from South Africa in 1958, as reported in Daane et al. 1991).

Metaphycus maculipennis (Timberlake 1916) (Aphycus). This is a widespread species (Noyes 2001), which was introduced into California from Europe in 1939 in a biocontrol program against Parthenolecanium corni, but it apparently failed to establish (Bartlett 1978a). I presume that the record of this species from Sacramento, California in Guerrieri & Noyes (2000), refers to insectary material. Specimens collected in France (UCRC) were reared from Sphaerolecanium prunastri (Boyer de Fonscolombe) (New host record).

Metaphycus melanostomatus (Timberlake 1916) (Aphycus). This is a Palearctic species that was imported into California in 1939 in a biocontrol program against Parthenolecanium corni, but it failed to establish (Bartlett 1978a).

Metaphycus orientalis (Compere 1924) (Aphycus). This is an Oriental species imported into California in the early 1950s, and again in 1985, in a biocontrol program against Coccus pseudomagnoliarum, but it never established (Bartlett 1978a; Kennett 1988).

Microterys lunatus (Dalman 1820) (Encyrtus). This is a Palearctic species imported into California 1939 in a biocontrol program against Parthenolecanium corni, but it failed to establish (Bartlett 1978a).

Microterys okitsuenis Compere 1926b. This species was imported from China and Japan in a series of biocontrol programs against Coccus pseudomagnoliarum and Saissetia oleae from 1922 through the 1980s, but it failed to establish (Bartlett 1978a; Kennett 1988).

Microterys tricoloricornis (De Stefani 1886) (Encyrtus). This species was imported from Mexico in a biocontrol program against Saissetia oleae as M. consobrina (Mercet 1921), but it failed to establish (Bartlett 1978a).

Ooencyrtus johnsoni (Howard 1898). This species was described from Texas, and has since been reported along the eastern seaboard of the USA (Noyes 2001). In California, it was initially reported from Orange County (Essig 1922) and later from Imperial County (Clancy 1946b) and Riverside and Santa Barbara counties (Vol & Goeden 1973). Maple (1937) considered specimens he collected from Orange County as “undoubtedly the same as described by Howard and recalled by Essig.” However, the original description reported that the species had “all legs uniformly honey-yellow”. I have not seen the holotype, but I have examined the allotype, and its legs are indeed completely yellow, while southern California specimens collected by E.O. Essig and identified as O. johnsoni (EMEC) have the femora darkened, as does the specimen appearing in Figure 1 in Maple (1937). Further, the sculpture of the head of the allotype appears more finely reticulate than any of the other California specimens previously identified as O. johnsoni. Therefore, in the absence of a definitive revision of Nearctic Ooencyrtus species, I consider that O. johnsoni is restricted to the east of the Rocky Mountains, and California records of that species are more properly ascribed to an undescribed morphospecies.

Psyllaephagus trioziphagus (Howard 1885) (Encyrtus). This is a widespread species in the New World, ranging from Canada to Brazil, but (in the USA) with no confirmed records west of Texas (Noyes 1996). Gordh (1979) listed this species from California, but I have been unable to find any specimens or published papers confirming this distribution. Cazier (1964) reported this species from Arizona as a parasitoid of Kuwayama medicaginis, but I have inspected voucher specimens, and in my opinion they are not conspecific with P. trioziphagus.

Trichomasthus cyanifrons (Dalman 1820) (Encyrtus). This species was supposedly introduced from Europe into southern California in 1939 and 1948–1950 in a biocontrol program against Eriococcus spurius. After the second attempt it reproduced for one generation in the field, but then died out (Flanders 1952). Additional releases (again with a species identified as T. cyanifrons) were made from 1952–54 in northern and Central California—this effort resulted in establishment, but Dreistadt & Hagen (1994) reported the species was actually T. coeruleus.

Tropidophrynne melvillei Compere 1939a. This species was imported from Kenya in 1948, apparently in the hopes of using it against “Pseudococcus species” (Smith & Flanders 1949). Known to attack Planococcus citri, this species was released in a biocontrol program against that pest, but it failed to establish (Bartlett & Lloyd 1958). It was also released at or about the same time against Pseudococcus maritimus (Bartlett 1978b), although it was not clear if that species was an acceptable host. The parasitoid was recovered afterwards (Bartlett 1978b), but I could find no record of it becoming permanently established.