A Synopsis of the Encyrtidae of the Hawaiian Islands with Keys to General and Species (Hymenoptera: Chalcidoidae), [1,2,3]

JOHN W. BEARDSLEY, JR.
UNIVERSITY OF HAWAII
HONOLULU, HAWAII

This paper is an attempt to update and summarize taxonomic and other biological data on Hawaiian Encyrtidae and to provide keys for their identification.

The Hymenoptera Parasitica section of the *Fauna Hawaiiensis* (Ashmead, 1901) listed only four species of Encyrtidae (*s. str.*). The Supplement to Hymenoptera (Perkins, 1913) added ten more. Most of what is known about Hawaiian encyrtids resulted from the careful studies of P.H. Timberlake (1919a, 1919b, 1920, 1922, 1924a, 1924b). Excepting a review of the non-endemic species of the subtribe Anagyrina (Beardsley, 1969), more recent published information on Hawaiian encyrtids is found largely in scattered notes which record the identity and hosts of newly discovered adventive species.

The Hawaiian encyrtid fauna contains both endemic and recently adventive elements. Of the 106 species in 60 genera which are treated here, 26 species are almost certainly endemic, two additional species possibly so, and the remaining 78 species are recent adventives. The endemic Encyrtidae comprise poorly known species complexes in the genera *Anagyrus* Howard, *Coelopencyrtus* Timberlake, *Hypergonatopus* Timberlake and *Rhopus* Foerster. *Hypergonatopus* and the closely related, monotypic *Aulonops* Timberlake are considered to be endemic genera, and the endemic species of *Anagyrus* have been placed in an endemic subgenus, *Nesoanagyrus* (Beardsley, 1969). In addition there are two monotypic genera, *Euchalcerinys* Timberlake and *Xesmatia* Timberlake, which are unknown outside Hawaii and may be endemic.

Numerous species of Encyrtidae have been introduced purposely into Hawaii for biological control of insect pests, particularly against scale insects and mealybugs. Many others, not only beneficial primary parasites of pests, but also undesirable hyperparasites and parasites of beneficial species, have been imported unintentionally. I have endeavored to treat all of the named species of Encyrtidae for which there is evidence indicating that they are now present in the Hawaiian Islands. No attempt has been made to include the

[1]Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Journal Series No. 1845.

[2]Research supported in part by a grant from the National Science Foundation, GB3725.

[3]For the purposes of this paper I have accepted the relatively strict definition of the family Encyrtidae adopted in the 1963 Peck Catalogue of Nearctic Chalcidoidea (Peck, 1963). This concept of the family excludes the Eupelmidae and Signiphoridae which have been included in the Encyrtidae by some workers.

many others which have been introduced here but which apparently failed to become established. A few undescribed or incompletely identified adventive species are listed, but I have not attempted to treat the many undescribed endemics which are represented in local collections.

The synopsis is intended to provide essential information concerning the genera and species present here. The abbreviated synonomies listed for each entry are limited essentially to citations of original descriptions and to other names which have appeared in Hawaiian entomological literature. The first published record for each species in Hawaii is cited and, for adventives, whether purposely or accidentally introduced. Distribution records within Hawaii (by island) include both published, and unpublished records derived from specimen labels. Host citations are limited to those recorded for Hawaii. Selected references to important taxonomic revisions and biological studies have also been included.

Inasmuch as the subfamily and tribal classification of the Encyrtidae is still subject to considerable differences of opinion, I have selected to treat the genera in alphabetical order, without regard to phylogenetic relationships. However, a key to the commonly recognized subfamilies and tribes is given, and the Hawaiian genera in each of these taxa are listed in Table 1. The morphological structures referred to in the keys are illustrated in figures 1 and 2.

The keys to genera and species are largely "artificial" in that no attempt has been made to reflect phylogeny. Their usefulness, therefore, will not extend beyond the Hawaiian fauna. Only the females are treated and separate keys for males are needed. However, as males of many species are unrepresented in the material available, these have not been attempted. The main key deals primarily with genera, but as a majority of these contain but a single Hawaiian representative, it will usually run to species. Supplemental keys to species in genera containing more than one Hawaiian species have been added at appropriate places in the checklist, or previously published keys are cited. Much use has been made of characters which are relatively easy to observe, such as color, sculpture and relative proportions of salient body parts. This was done in the hope that dissection and preparation of slide mounts will not be necessary for most identifications. At times less readily visible features, such as mandible structure and palpal segmentation, are utilized as secondary characters, and when dealing with the smaller species it may not always be possible to avoid slide mounting at least the antennae and mouthparts. Host data have been used in the keys whenever they seem useful.

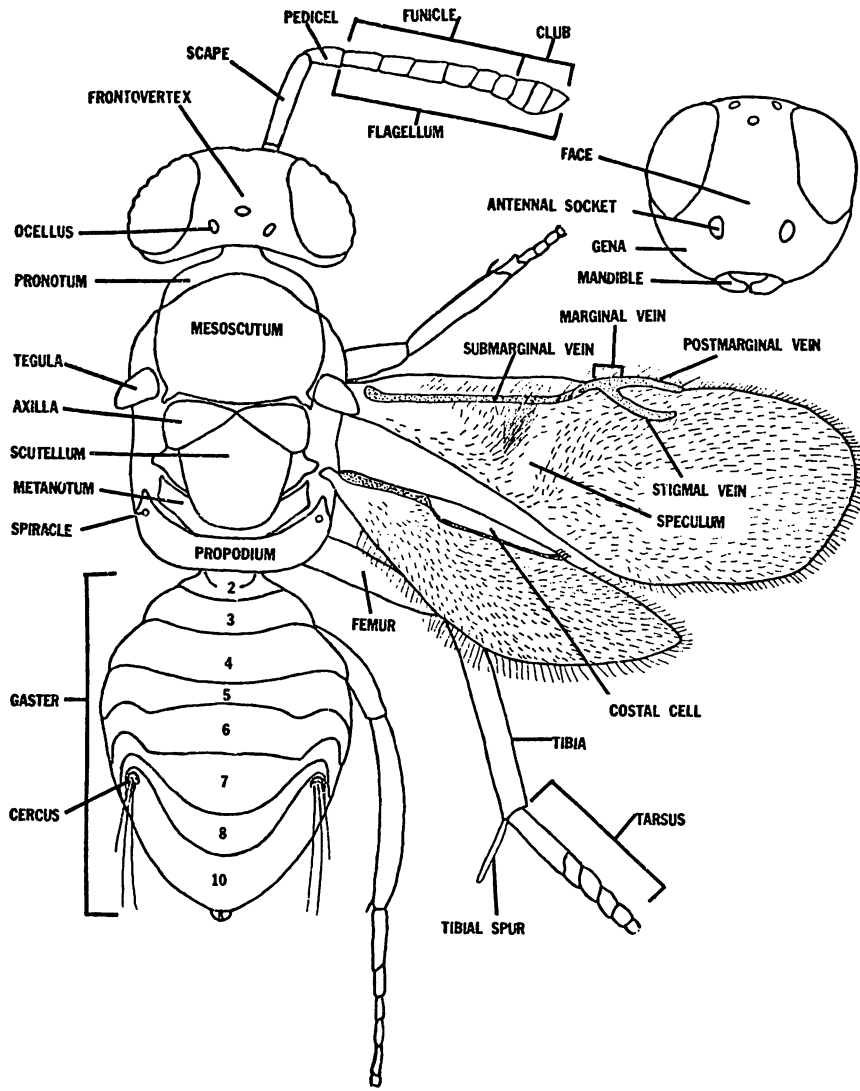
Species determinations were made mostly by comparison with types and other identified specimens housed in collections at the Bernice P. Bishop Museum, the Hawaii State Department of Agriculture and the University of Hawaii, all in Honolulu. Much of the named material used was determined originally by P.H. Timberlake. A few determinations were made by me through comparison with types or authoritatively determined specimens at the U.S. National Museum. B.D. Burks of the U.S. Department of Agriculture and Harold Compere and P.H. Timberlake, at the University of California, Riverside, each provided determinations at my request and I am indebted to these gentlemen for their help. A few determinations were based solely on published descriptions. If any misidentifications have been perpetrated they are my responsibility.

TABLE 1. *Subfamily and Tribal Placement of Hawaiian Encyrtid Genera*

Subfamily	*Tribe*	*Hawaiian Genera*
Arrhenophaginae		*Arrhenophagus*
Encyrtinae	Encyrtini	*Encyrtus*
	Anagyrini	*Acerophagus, Aenasius, Anagyrus, Anarhopus, Aphycus, Apoanagyrus, Blepyrus, Chrysoplatycerus, Clausenia, Coelaspidia, Euryrhopalus, Gyranusa, Gyranusoidea, Hambletonia, Leptomastidea, Leptomastix, Neodusmetia, Pauridia, Pseudaphycus, Rhopus, Xanthoencyrtus.*
	Bothriothoracini	*Achrysopophagus, Adelencyrtus, Anabrolepsis, Anicetus, Aphidencyrtus, Aphycomorpha, Apterencyrtus, Aulonops, Ceraptocerus, Cheiloneuromyia, Cheiloneurus, Chrysopophagus, Coccidencyrtus, Coccidoxenus, Coelopencyrtus, Comperia, Comperiella, Copidosoma, Diversinervus, Euchalcerinys, Exoristobia, Gahaniella, Helegonatopus, Homalopoda, Homalotylus, Hunterellus, Hypergonatopus, Isodromus, Metaphycus, Microterys, Ooencyrtus, Plagiomerus, Pseudhomalopoda, Quaylea, Tachinaephagus, Xesmatia, Zeteticontus*

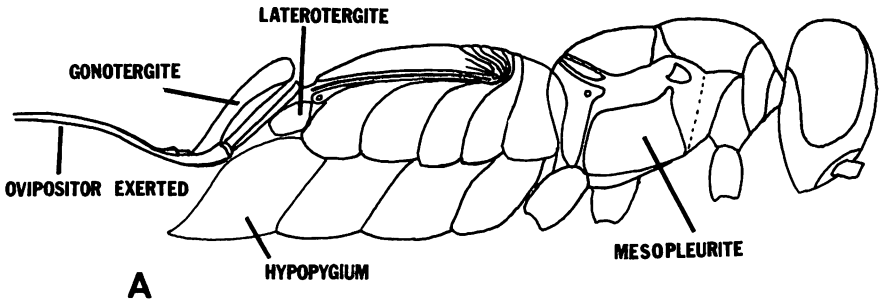
KEY TO SUBFAMILIES AND TRIBES OF ENCYRTIDAE
(Modified from Kerrich, 1967)

1. Tarsi 4-segmented; marginal, postmarginal and stigmal veins of forewing indistinct and fused; minute parasites of diaspidid scale insects .... Subfamily Arrhenophaginae
   Tarsi 5-segmented; forewing when present with marginal postmarginal and stigmal veins relatively well developed; host various .... Subfamily Encyrtinae—2
2. Gonostyli and paratergites absent; mandibles apically truncate; costal cell of hind wing relatively broad; primary parasites of the family Coccidae (*s. str.*) .... Tribe Encyrtini
   Gonostyli or paratergites or both present; mandibles apically dentate; costal cell of hind wing usually very narrow or obsolete; hosts various . . . 3
3. Paratergites almost always present; gonostyli often absent; mandibles slender, generally bidentate, sometimes tridentate with 3 sharp teeth, but never with two sharp teeth and a truncation; female hypopygium usually boat-shaped, and usually enclosing ovipositor to tip of abdomen; primary parasites of Pseudococcidae .... Tribe Anagyrini (= Ectromini)
   Paratergites absent; gonostyli always present and distinct; mandibles generally tridentate, often with two sharp teeth and a truncation, rarely quadridentate; female hypopygium rarely boat-shaped, rarely enclosing ovipositor; hosts various, but rarely primary parasites of pseudococcids . . Tribe Bothriothoracini (= Mirini)



Encyrtus sp.; diagramatic

FIG. 1. *Encyrtus* sp., diagrammatic (after Anneke, 1964).



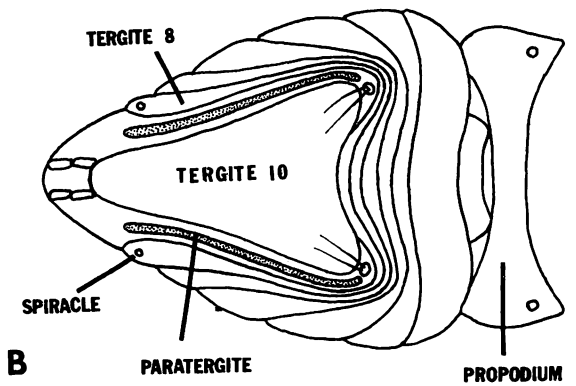


FIG. 2. *Anagyrus* sp. (diagrammatic). A, lateral aspect; B, dorsal aspect of abdomen (after Compere, 1947).

TABLE 2. *Known Hosts of Hawaiian Encyrtidae*

Host Taxa	*Encyrtid Parasites*
ACARINA - IXODIDAE	
Rhipicephalus sanguineus (nymphs)	*Hunterellus hookeri*
BLATTARIA	
Supella longipalpa (oothecae)	*Comperia merceti*
COLEOPTERA - COCCINELLIDAE	
Coelophora pupillata (larva)	*Homalotylus* sp. -2
Lindorus lophanthae (larvae)	*Homalotylus* sp. -1
Telsimia nitida (larvae)	*Homalotylus* sp. -1
DIPTERA - SYRPHIDAE	
Allograpta exotica (puparia)	*Ooencyrtus guamensis*
- MUSCIDAE	
Musca sorbens (puparia)	*Tachinaephagus zealandicus*
	Exoristobia philippiensis
- SARCOPHAGIDAE	
Parasarcophaga misera (puparia)	*Exoristobia philippiensis*
- TACHINIDAE	
Achaetoneura archippivora (puparia)	*Exoristobia philippiensis*
Trichopoda pilipes (puparia)	*Exoristobia philippiensis*
HETEROPTERA - PENTATOMIDAE	
Murgantia histrionica (eggs)	*Ooencyrtus johnsoni*
HOMOPTERA - ASTEROLECANIIDAE	
Asterolecanium pustulans	*Metaphycus portoricensis*
- COCCIDAE	
Ceroplastes cirripediformis	*Coccidoxenus mexicanus*
	Metaphycus mexicanus
Coccus acuminatus	*Cheiloneuromyia javensis*
	Metaphycus sp. nr. *claviger*
Coccus elongatus	*Metaphycus alberti*
	Metaphycus flavus
	Metaphycus stanleyi
	Microterys flavus
Coccus hesperidum	*Anicetus annulatus*
	Encyrtus lecaniorum
	Metaphycus stanleyi
	Microterys flavus
Coccus viridis	*Metaphycus stanleyi*
	Microterys flavus
Eucalymnatus tesselatus	*Anicetus annulatus*
Pulvinaria mammeae	*Microterys flavus*
Pulvinaria psidii	*Microterys flavus*
Pulvinaria urbicola	*Metaphycus flavus*
Saissetiae coffeae	*Anicetus annulatus*
	Diversinervus elegans
	Encyrtus infelix
	Encyrtus lecaniorum
	Metaphycus stanleyi
	Microterys flavus
Saissetia miranda	*Metaphycus lounsburyi*
Saissetia nigra	*Diversinervus elegans*
	Encyrtus infelix
	Encyrtus lecaniorum
	Microterys flavus
Saissetia oleae	*Metaphycus lounsburyi*

TABLE 2. *Known Hosts of Hawaiian Encyrtidae* (Continued)

Host Taxa	*Encyrtid Parasites*
- DIASPIDIDAE	
Chrysomphalus ficus	*Comperiella bifasciata*
	Habrolepsis rouxi
Diaspis boisduvali	*Plagiomerus diaspidis*
Diaspis echinocacti	*Plagiomerus diaspidis*
Duplaspidiotus claviger	*Anabrolepsis bifasciata*
	Homalopoda cristata
Hemiberlesia lataniae	*Plagiomerus* sp.
Morganiella longispina	*Comperiella bifasciata*
Odonaspis greeni	*Pseudhomalopoda guamensis*
Odonaspis ruthae	*Adelencyrtus odonaspidis*
Phenacaspis cockerelli	*Arrhenophagus albipes*
- ERIOCOCCIDAE	
Eriococcus araucariae	*Aphycomorpha araucariae*
-PSEUDOCOCCIDAE	
Antonina crawi	*Anagyrus antoninae*
Antonina graminis	*Anagyrus antoninae*
	Neodusmetia sangwani
Chorizococcus rostellum	*Anagyrus swezeyi*
	Pseudaphycus sp.
Dysmicoccus boninsis	*Aphycus terryi*
	Coelaspidia osborni
	Xanthoencyrtus fullawayi
Dysmicoccus brevipes	*Anagyrus ananatis*
	Euryrhopalus propinquus
	Hambletonia pseudococcina
Dysmicoccus neobrevipes	*Euryrhopalus propinquus*
Ferrisia virgata	*Acerophagus texanus*
	Aenasius advena
	Blepyrus insularis
Nipaecoccus nipae	*Pseudaphycus utilis*
Nipaecoccus vastator	*Anagyrus dactylopii*
Pedronia acanthocauda	*Anagyrus laeviceps*
Pedronia cibotii	*Anagyrus nigricans*
Pedronia hawaiiensis	*Anagyrus nigricans*
Phenacoccus gossypii	*Acerophagus coccois*
	Gyranusa advena
Phenacoccus solani[1]	*Apoanagyrus califonicus*
Planococcus citri	*Leptomastidea abnormis*
	Leptomastix dactylopii
	Pauridia peregrina
Pseudococcus antricolens	*Gyranusoidea advena*
Pseudococcus citriculus	*Clausenia pupurea*
Pseudococcus longispinus	*Anagyrus fusciventris*
	Anarhopus sydneyensis
	Chrysoplatycerus splendens
Pseudococcus pipturicolus	*Gyranusoidea advena*
Saccharicoccus sacchari	*Anagyrus saccharicola*
Trionymus insularis	*Rhopus apterus*
	Rhopus bridwelli
	Rhopus semiflavus
	Rhopus semiluteus

[1]Presumed host, not yet reared in Hawaii.

TABLE 2. *Known Hosts of Hawaiian Encyrtidae* (Continued)

Host Taxa	*Encyrtid Parasites*
HYMENOPTERA - DRYINIDAE (pupae)	
(?) *Echthrodelphax fairchildii*	*Hypergonatopus hawaiiensis*
Haplogonatopus vitiensis	*Chrysopophagus americanus*
	Helegonatopus pseudophanes
Pseudogonatopus hospes	*Chrysopophagus americanus*
	Helegonatopus pseudophanes
Pseudogonatopus perkinsi	*Hypergonatopus brunneipes*
	Hypergonatopus flavipes
Pseudogonatopus perkinsi (Cont'd)	*Hypergonatopus hawaiiensis*
	Hypergonatopus vulcanus
-HYLAEIDAE (larvae)	
Nesoprosopis caeruleipennis	*Coelopencyrtus kaalae*
Nesoprosopis fuscipennis	*Coelopencyrtus kaalae*
Nesoprosopis sp., prob. koae	*Coelopencyrtus kaalae*
Nesoprosopis pubescens	*Coelopencyrtus kaalae*
-VESPIDAE (larvae)	
Odynerus erythrognathus	*Coelopencyrtus orbi*
Odynerus nigripennis	*Coelopencyrtus mauiensis*
	Coelopencyrtus odyneri
	Coelopencyrtus swezeyi
Odynerus orbus	*Coelopencyrtus orbi*
LEPIDOPTERA - HESPERIIDAE	
Erionota thrax (eggs)	*Ooencyrtus erionotae*
- NOCTUIDAE	
Chrysodeixis Chalcites (larvae)	*Copidosoma truncatellum*
NEUROPTERA - CHRYSOPIDAE	
Chrysopa basalis (pupae)	*Isodromus axillaris*
HYPERPARASITES	
of aphid primaries	*Aphidencyrtus aphidivorus*
of coccid primaries	*Cheiloneurus noxius*
	Gahaniella saissetiae
	Quaylea whittieri
of diaspidid primaries	*Apterencyrtus microphagus*
of pseudococcid primaries	*Achrysopophagus rex*
	Cheiloneurus sp. no. 1

KEY TO HAWAIIAN ENCYRTIDAE
(Females only)

1. Wings fully developed 6
   Wings vestigeal or absent 2
2. Apex of scutellum with a small tuft of fine setae 3
   Apex of scutellum without a tuft of setae 4
3. Scape foliaceous, strongly expanded beneath; funicle segments all much broader than long; parasite of *Dysmicoccus boninsis*. *Coelaspidia osborni*
   Scape not appreciably expanded beneath; funicle segments as long as broad or longer; presumed hyperparasite of mealybugs ..... *Cheiloneurus* sp. #1
4. Color largely black, dark metallic green or blue; parasites of dyrinid pupae ..... *Hypergonatopus* (part)
   Color light brown, reddish or yellowish 5
5. Gaster about twice as long as wide; antennae with dark funicle and white club; parasite of *Antonina graminis* ..... *Neodusmetia sangwani*

Gaster about 3 times as long as wide; antennae variously colored, but without combination of dark funicle and white club; parasites of endemic *Trionymus* ..... *Rhopus*

6. Tarsi 4-segmented; antennae appearing 3-segmented (actually 5-segmented, with 2 minute funicle segments), club large and unsegmented; minute parasite of *Phenacaspis* scales ..... *Arrhenophagus albitibiae*
Tarsi 5-segmented; antennae with 4 to 6 funicle segments; club usually distinctly 3-segmented 7
7. Antennae with 4-segmented funicle 8
Antennae with 5 or 6-segmented funicle 10
8. Forewings hyaline or nearly so ..... *Plagiomerus*
Forewings with distinctive dark markings 9
9. Apex of scutellum with tuft of fine setae; antennae entirely dark, elongate, funicle segments all longer than broad; parasite of *Duplaspidiotus claviger* ..... *Homolopoda cristata*
Apex of scutellum with a pair of large squamiform setae; antennae with last funicle segment and last 2 club segments white, moderately short, the funicle segments all as broad as long or broader; parasite of *Odonaspis* scales on bamboo ..... *Pseudhomalopoda guamensis*
10. Forewing with a conspicuous transverse patch of elongate setae basad of the speculum (fig. 1); mandibles without distinct teeth; parasites of Coccidae ..... *Encyrtus*
Forewing without such a patch of long setae, mandibles with 2 to 4 distinct teeth 11
11. Scutellum with an apical or subapical group of several long erect setae, usually forming a compact tuft, or with a pair of large squamiform setae; forewings partly or mostly infuscate 12
Scutellum without such an apical tuft of long setae (there may be a group of several long setae near the middle of the scutellum but these do not form a conspicuous tuft), or a pair of large squamiform setae; or if with a weakly developed scutellar tuft, then with wings hyaline 17
12. Scape foliaceous, very strongly expanded beneath; anterior margin of frontovertex marked by a sharp, forward projecting transverse ridge; body entirely dark metallic bluish or greenish; forewings, except basal third, strongly infuscate; parasite of *Pseudococcus longispinus* ..... *Chrysoplatycerus splendens*
Scape not strongly expanded; other characters not in above combination 13
13. Apex of scutellum with a pair of large squamiform setae; mesoscutum without appressed silvery setae; head and body strongly flattened; small metallic green species with maculate wings; parasite of *Chrysomphalus* ..... *Habrolepis rouxi*
Apex of scutellum with a group or tuft of long slender setae; head and body not strongly flattened 14
14. Scutum with a tuft of long erect setae near anterior margin, and a bright metallic blue stripe across posterior margin; head in lateral aspect angulate, face strongly reflexed beneath; antennae short, flagellum only slightly longer than head; parasite of *Saissetia* spp. *Diversinervus elegans*
Scutum without such a tuft of long setae; head not strongly angulate; antennae more elongate 15

15. Ovipositor elongate, exerted length of gonostyli equal to more than one-half of length of gaster; apical one-fifth of forewing hyaline; hyperparasitic in mealybugs ..... *Achrysopophagus rex*
Ovipositor short, length of gonostyli much less than one-half length of gaster; forewings infuscate to apex, or nearly so 16
16. Antennae relatively elongate, first segment of funicle as long as or longer than pedicel ..... *Chrysopophagus*

Antennae shorter, first segment of funicle distinctly shorter than pedcel ..... *Cheiloneurus*
17. Dorsum of thorax entirely or partly yellow or orange to light brown or gray 18
Dorsum of thorax black, dark piceous, dark metallic green or blue ... 33
18. Forewing with 2 or 3 transverse infuscate bands, or with apical two-fifths infuscate plus a weak incomplete band behind marginal vein 19
Forewings hyaline or partly infuscate, but not as above 21
19. Antennae elongate, all funicle segments distinctly longer than broad; funicle and club concolorous, brownish; frontovertex as wide as compound eye; parasite of *Planococcus citri* ..... *Leptomastidea abnormis*
Antennae shorter, outer funicle segments about as broad as long; club black, funicle distinctly paler; frontovertex much narrower than width of eye; parasites of Coccidae 20
20. Lower margin of face with a dark transverse stripe; antennae with funicle segments concolorous or nearly so ..... *Cheiloneuromyia javensis*
Lower margin of face without such a dark stripe; antennae with 3 apical segments of funicle white, basal 3 flavotestaceous ..... *Microterys flavus*
21. Head distinctly triangular in lateral aspect, frontovertex broad and flat, face strongly reflexed beneath; antennae short, scape expanded beneath, funicle segments all very short, outer ones becoming very broad and flat; color light reddish brown 22
Head not as above 23
22. Width of frontovertex between eyes distinctly greater than width of an eye; basal width of ocellar triangle greater than length; parasite of *Dysmicoccus brevipes* ..... *Hambletonia pseudococcivora*
Width of frontovertex less than width of an eye; ocelli forming a relatively narrow, acute triangle; parasite of *Coccus* spp .... *Anicetus annulatus*
23. Funicle 5-segmented; small parasites of Pseudococcidae 24
Funicle 6-segmented 25
24. Antennal club white, distinctly paler than general body color; frontovertex relatively narrow, width at anterior ocellus about as wide as compound eye ..... *Pseudaphycus*
Antennal club yellowish or orange, not distinctly paler than body; width of frontovertex at anterior ocellus greater than eye ..... *Acerophagus*
25. Dorsum of abdomen formed mostly by a single large sclerite (the 10th tergite); abdomen usually rather elongate, apically acute, with hypopygium keel-shaped; gonostyli absent 26
Tenth tergite forming not more than one-half dorsal surface of abdomen; abdomen relatively short, apex often rounded, usually not keel-shaped below; gonostyli present 30
26. Scape linear, the upper and lower margins approximately parallel, more than 5 times as long as maximum width; parasite of *Planococcus citri* ...

. . . . . *Leptomastix dactylopii*
Scape moderately to strongly expanded beneath, the upper and lower margins obviously not parallel, maximum width equal to one-third or more of length 27

27. Costal cell of forewing very narrow, nearly supressed apically; abdomen relatively short, length in dried specimens less than thorax; parasite of *Phenacoccus gossypii* . . . . . *Gyranusa phenacocci*
Costal cell normal; abdomen sometimes longer than thorax 28

28 Antennae relatively short, funicle segments 3 to 6 wider than long; club 2-segmented; scape only slightly expanded; length about 1.5 mm; parasite of *Dysmicoccus boninsis* . . . . . *Xanthoencyrtus fullawayi*
Antennae longer, all funicle segments longer than wide; club 3-segmented; length usually greater than 1.5 mm; parasites of other Pseudococcidae 29

29. Scape marked with black and white, usually strongly expanded beneath, maximum width usually equal to more than one-third of length; maxillary palpi 4-segmented; labial palpi 3-segmented . . . . . *Anagyrus*
Scape without areas of sharply contrasting color, only slightly expanded, maximum width equal to one-third or less of length; maxillary palpi 3-segmented; labial palpi 2-segmented . . *Anagyrus* subgenus *Nesoanagyrus*

30. Antennal club diagonally truncate at apex; legs elongate, the middle tarsi approximately as long as the gaster; thorax yellow with axillae, metanotum and propodium dark brown or black; parasite of *Chrysopa* pupae . . . . . *Isodromus axillaris*
Antennal club not diagonally truncate; legs less elongate, the middle tarsi definitely shorter than gaster; thorax without such conspicuous dark markings, axillae at least pale 31

31 Antennal club white; seventh abdominal sternite apically acute, enclosing ovipositor to apex of abdomen; apical part of gonostyli reflexed upward; parasite of *Dysmicoccus boninsis* . . . . . *Aphycus terryi*
Antennal club at least partly dark; seventh sternite more rounded apically, not enclosing ovipositor to end of abdomen; apical part of gonostyli not noticeable reflexed upward 32

32. Compound eyes and dorsum of thorax with conspicuous dark setae; forewing with a small weakly infuscate patch behind stigmal vein; mandible with an acute ventral tooth and a broad dorsal truncation; parasite of *Eriococcus araucariae* . . . . . *Aphycomorpha araucariae*
Compound eyes bare or with inconspicuous pale setae; dorsal thoracic setae pale; forewing without such an infuscate patch; mandibles with 3 distinct teeth; parasites of Coccidae and Asterolecaniidae . . . *Metaphycus*

33. Face metallic green, sculptured with large, smooth, shallow depressions; antennae very short, length of pedicel plus flagellum less than height of eye; scape strongly expanded beneath; forewings infuscate except apically; parasite of *Ferrisia virgata* . . . . . *Aenasius advena*
Without above combination of characters 34

34. Forewings marked with distinct patterns of dark and light areas 35
Forewings hyaline or nearly so, without distinct light and dark patterns 43

35. Scape strongly expanded beneath, foliaceous, apex extending beyond articulation of pedicel; pedicel and funicle segments all very flat and

several times as broad as long; dorsum of head and thorax metallic green; wings marked with a broad longitudinal infuscate streak plus diagonal infuscate rays; presumed hyperparasite of Coccidae ..... *Ceraptocerus mirabilis*
Antennae not so formed 36

36. Apical half of forewing with a pair of diverging longitudinal stripes; head flattened; antennae moderately short; scape expanded, foliaceous, funicle segments very short and broad; head and thorax metalic blue, dorsum of head with a longitudinal pale stripe along inner margin of each eye, extending onto pronotum; parasite of *Chrysomphalus ficus* ..... *Comperiella bifasciata*
Without the above combination of characters 37
37. Scutellum with very dense, fine reticulopunctation; scutum lightly reticulate, more shining than scutellum, body somewhat flattened, head distinctly angulate in lateral aspect, face strongly reflexed; metallic blue-green parasites of diaspidid scales 38
Without above combination of characters, if scutellum reticulopunctate then body not flattened or head strongly angulate with reflexed face .. 39
38. Antenna, except club, largely pale; forewing with a median transverse pale area, base and apex lightly infuscate; parasite of *Odonaspis ruthae* ..... *Adelencyrtus odonaspidis*
Antennae, except for last funicle segment, black; forewing with a median longitudinal infuscate strip connected to margins by 2 or more transverse infuscate bands ..... *Anabrolepis*
39. Scape strongly expanded, foliaceous; apex of pedicel and funicle segments 3-6 white, remainder of antenna dark; dorsum of thorax dull, dark brown to blackish, with conspicuous pale setae; forewing infuscate except for subapical crecentic hyaline stripe and narrowly at apex; parasite in eggs of cockroach, *Supella longipalpa* ..... *Comperia merceti*
Scape not so noticeably expanded, forewings not so marked 40
40. Forewing with a single large dark transverse band or spot near the middle, both base and apex distinctly pale; dorsum of thorax, particularly scutellum, dull, with extremely dense, fine reticulopunctation... 41
Forewing with two infuscate areas, usually two transverse bands or spots joined together by a connecting infuscate area; dorsum of thorax relatively smooth and shining, very weakly reticulate with a few scattered setigerous punctures 42
41. Frontovertex broad, equal to width of an eye; flagellum segments becoming distinctly broader toward apex, antenna dark except inner surface of scape; abdomen flattened laterally, keel-shaped; parasite of *Pseudococcus longispinus* ..... *Anarhopus sydneyensis*
Frontovertex distinctly narrower than width of an eye; flagellum segments not noticeably broader toward apex; outer flagellam segments and club pale; abdomen not laterally flattened; parasites of coccinellid larvae ..... *Homalotylus*
42. Head in lateral aspect distinctly triangular, face concave; forewing with a broad sub-basal and a narrower submedian transverse infuscate bands; host unknown ..... *Aulonops bifasciata*
Head in lateral aspect smoothly rounded; forewing with median and

apical infuscate bands joined near middle by a short longitudinal infuscate area; parasites of endemic dryinid larvae . . . *Hypergonatopus* (part)

43. Ovipositor elongate, gonostyli nearly as long as gaster; hyperparasite on Cocidae . . . . . *Quaylea whittierri*
Ovipositor short, gonostyli protruding slightly or not at all beyond apex of gaster 44

44. Antennae with strongly contrasting dark and pale areas 45
Antennae of relatively uniform coloration, without contrasting dark and pale areas or if club is somewhat paler than remainder, then scape not expanded, and second and third funicle segments not white 46

45. Scape moderately expanded beneath, the maximum width greater than one-third length; gonostyli absent; hypopygium keel-shaped; parasite of *Phenacoccus solani* . . . . . *Apoanagyrus californicus*
Scape only very slightly expanded, maximum width less than one-fourth length; gonostyli present; hypopygium not keel-shaped; presumed hyperparasite of diaspidid scales . . . . . *Apterencyrtus microphagus*

46. Submarginal vein of forewing with a well developed subtriangular thickening located about three-fourths of distance between base and apex; a small (about 1.25 mm long) parasite of *Planococcus citri* . . . . . *Pauridia peregrina*
Submarginal vein without such a thickening 47

47. Size very small, length 1.5 mm or less; antennae and legs entirely pale, dorsum of head and thorax metallic purple, dorsum of abdomen largely straw-colored; parasite of *Diaspis boisduvali* . . . . . *Coccidencyrtus ochraeceipes*
Larger species; abdomen not conspicuously paler than thorax 48

48. Head in dorsal aspect very short and broad, lenticular in outline; frontovertex sculptured with moderately large shallow depressions and finely shagreened; antennae very short, length of pedicel plus flagellum less than height of eye; parasite of *Ferrisia virgata* . . . . . *Blepyrus insularis*
Head longer; other characters not in above combination 49

49. Legs entirely pale (white to orange), without dark markings 50
Legs partly or wholly dark, or largely pale with dark markings 53

50. Scutellum mostly dull, more coarsely sculptured than scutum, sometimes with apical third smooth and shining 51
Scutellum entirely smooth and shining, at most very faintly, finely shagreened 52

51. Frontovertex relatively narrow, distinctly less than one-half as wide as compound eye; antennae entirely pale; parasite in eggs of *Erionota thrax* . . . . . *Ooencyrtus erionotae*
Frontovertex wider, about one-half as wide as eye at narrowest point; antennae darker, scape distinctly brownish; parasite of dryinid pupae . . . . . *Helegonatopus pseudophanes*

52. Frontovertex wider than width of compound eye; antennal scape and mesopleurites orange; club and flagellum concolorous, dark; parasite of muscoid Diptera puparia . . . . . *Tachinaephagus zealandicus*
Frontovertex narrower than width of compound eye; scape and mesopleurites dark; club usually paler than flagellum; host unknown . . . . . *Euchalcerinys apicicornis*

53. Scutellum dull, with a fine granulate sculpture; scutum nearly smooth, shining, with numerous white setae; abdomen shorter than thorax, usually broader than long; parasite of syrphid puparia ..... *Ooencyrtus guamensis*
Scutellum usually moderately shining, not conspicuously duller than scutum 54
54. Scape short, only 1.3 to 1.5 times as long as pedicel, moderately expanded beneath; compound eyes small; head angulate, frontovertex flat, face reflexed beneath, small (ca 1.25 mm long), uniformly brown; parasite of brown dog tick ..... *Hunterellus hookeri*
Scape more elongate, twice as long as pedicel or more 55
55. Scutum and scutellum sculptured with fine scale-like reticulation, scutum more aeneous and somewhat more shining; apex of antennal club diagonally truncate, appearing pointed; polyembryonic parasite of *Chrysodeixis* larvae ..... *Copidosoma truncatellum*
Without above combination of characters 56

56. Scutum finely reticulate, moderately shining to dull; scutellum smoother and more shining than scutum, very faintly reticulate or without clearly discernible sculpture 57
Scutellum not noticeably smoother and more shining than scutum, with clearly discernible sculpture 59
57. Abdomen moderately long, distinctly longer than wide 58
Abdomen very short, as wide as or slightly wider than long ..... *Xesmatia flavipes*
58. Scutellum black; scape entirely black; middle femora and tibiae mostly dark; host unknown ..... *Zeteticontus perkinsi*
Scutellum metallic blue; scape except upper margin, middle femora and tibiae pale; parasite of *Pseudococcus citriculus* ..... *Clausenia purpurea*
59. Antennae relatively short, length of antennae exclusive of scape subequal to or less than length of head (measured from vertex to mouth parts) .. 60
Antennae longer, length exclusive of scape definitely greater than length of head 62
60. Marginal vein of forewing relatively elongate, definitely longer than wide; antennae with funicle and club black, scape flavo-testaceous; parasite of muscoid Diptera puparia ..... *Exoristobia philippinensis*
Marginal vein short; not longer than wide; antennae concolorous 61
61. Funicle and club subequal in length, segments of flagellum gradually increasing in width from base to apex, club not abruptly wider than funicle; parasite of *Dysmicoccus brevipes* and *D. neobrevipes* ..... *Euryrhopalus propinquus*
Funicle relatively more elongate, about 1.5 times as long as club; club abruptly wider than funicle; polyembryonic parasites of endemic *Odynerus* and *Nesoprosopis* larvae ..... *Coelopencyrtus*
62. Legs mostly pale except for partly brown femora; antennae pale except partly brown scape; axillae separated mesally by a small lobe of mesoscutum; parasite in eggs of *Murgantia histrionica* .. *Ooencyrtus johnsoni*
Legs entirely dark or with more extensive dark markings; antennae dark; axillae usually meeting mesally 63

63. Antennae inserted well above oral margin at level of lower margin of compound eye; scape short, length equal to about one-half height of eye; hyperparasite in *Saissetia* spp. ..... *Gahaniella saissetiae*
Antennae inserted closer to oral margin, below level of lower margin of eye; length of scape slightly less than, equal to or greater than height of eye 64

64. Scape slightly expanded beneath; abdomen moderately elongate (1.5 times as long as wide), hypopygium keel-shaped; gonostyli absent, legs entirely dark; parasites of endemic mealybugs ..... *Anagyrus* subgenus *Nesoanagyrus* (part)
Scape cylindrical or nearly so; abodomen as broad or nearly as broad as long, hypopygium not keel-shaped; gonostyli present; legs with dark and light markings 65

65. Scutellum appearing silky due to close fine longitudinal striations; legs with femora mostly dark, tibiae and tarsi flavotestaceous 67
Scutellum without such fine, silky sculpture; legs mostly dark except for tarsi and sometimes apices of tibiae 66

66. Largely balck species; width of frontovertex approximately equal to width of compound eye; hyperparasite in aphids ..... *Aphidencyrtus aphidvorus*
Mostly dark metallic blue; frontovertex less than one-half as wide as compound eye; parasite of *Ceroplastes cirripediformis* ..... *Coccidoxenus mexicanus*

67. Scutellum about as long as scutum; antennae with apex of club not diagonally truncate; scape entirely flavotestaceous ..... unidentified genus and species from Kokee, Kauai
Scutellum shorter than scutum; apex of antennal club diagonally truncate; scape dark ... unidentified genus and species from Ewa, Oahu