

## SYNOPSIS OF HAWAIIAN EULOPHIDAE INCLUDING APHELININAE (Hym.: Chalcidoidea)

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*Abstract:* The Hawaiian Chalcidoidea comprises 10 families. Studies on the family Eulophidae are presented here. On the basis of morphological characters, Aphelininae is treated as one of 6 subfamilies. A total of 33 genera and 71 species are enumerated. Keys to all categories are included with descriptions of a new genus and 4 new species, synonymy, distribution and host records.

In the Hawaiian Chalcidoidea, the family Eulophidae (including the subfamily Aphelininae) comprises one of the important economic groups of parasitic Hymenoptera. Except for a small number in this family, all have been introduced to the Islands. They are principally parasitic on Aphididae, Aleyrodidae, Diaspididae, Pseudococcidae, Coccidae, Tephritidae, Agromyzidae, Gracilariidae and Noctuidae. In general, the Chalcidoidea of continental faunae represent a large number of genera, with complex speciation within a single genus. But in Hawaii, the introduced genera are largely represented by one or two species each. There are not many species involved in the few endemic genera.

The Hawaiian Sugar Planters' Association has for many years been interested in controlling sugar cane pests and pests of other economic plants in Hawaii. Many prominent entomologists contributed biological and systematic information on the parasitic Hymenoptera. Likewise, the Hawaii State Department of Agriculture has contributed interesting work on parasitic Hymenoptera.

Knowledge of Eulophidae from the Hawaiian Islands is based on papers by Ashmead (1901), Timberlake (1922, 1924, etc.), Fullaway (1920, 1932, etc.), Swezey (1929, 1946, 1950, etc.) and other investigators. I am including species of eulophids studied by the aforementioned investigators, excluding those species that were released in the field for biological control but have not become established over the span of years.

The purpose of this study is to provide a suitable key to the families of Chalcidoidea, and to the genera and species of Eulophidae. Included are bibliography, synonymy, host records for all the known local species, distribution records, and description of new species.

A total of 33 genera and 71 species of Hawaiian Eulophidae are listed in Table 1. This list includes the subfamily Eulophinae with 5 genera, 13 species; Tetrastichinae with 5 genera, 13 species; Elachertinae with 4 genera, 6 species; Entedontinae with 7 genera, 12 species; Euderinae with a single genus and a species; and Aphelininae with 11 genera and 27 species.

The following papers on Eulophidae were very useful in this study. W. H. Ashmead

Table 1. Distribution of species of Hawaiian Eulophidae.

	Hawaiian Islands										Others
	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Niihau	Nihoa	Laysan	Midway	
										Kure	
<b>EULOPHINAE</b>											
1. <i>Diglyphus begini</i>	×	×									U.S.
2. <i>Pnigalio externa</i>	×	×									
3. <i>Sympiesis konae</i>	×										
4. <i>S. sparsus</i> , n. sp.	×	×									
5. <i>S. hawaiiensis</i> , n. comb.	×	×									
6. <i>S. vagans</i> , n. comb.	×	×									
7. <i>S. mauiensis</i> , n. comb.	×	×									
*8. <i>Hemiptarsenus semialbiclavus</i>	×										Australia, Philippines, Saipan, Caroline Atolls, Marshall Is.
9. <i>Pauahiana swezeyi</i> , n. sp.	×	×	×								
10. <i>P. maculatipennis</i> , n. comb.	×	×									
11. <i>P. lineata</i> , n. sp.	×										
12. <i>P. metallica</i> , n. sp.	×		×								
<b>TETRASTICHINAE</b>											
13. <i>Tetrastichus beardsleyi</i>											
14. <i>T. giffardianus</i>		×	×								S. Nigeria, Fiji, California
*15. <i>T. hagenowii</i>	×	×	×								U.S., Worldwide, Guam, Palau, Yap, Caroline Atolls
16. <i>T. dacicida</i>		×									Yangambi, Nairobi, Africa
17. <i>T. nr bruchophagi</i>											Africa
18. <i>T. nr skolowskii</i>											Nairobi, Africa
19. <i>T. sp.</i>											
*20. <i>Ootetrastichus beatus</i>											Queensland, Australia, Fiji, Guam, Saipan, Palau
21. <i>O. formosanus</i>			×								Taiwan, Guam, Palau, Caroline Atolls, Truk, Ponape
*22. <i>Aceratoneuromyia indicum</i>											India, Guam, Fiji
23. <i>Melittobia peles</i>											
*24. <i>M. hawaiiensis</i>	×	×	×								Guam, Ponape, Wake, Truk, S. Africa, West Indies
*25. <i>Melittobiopsis ereunetiphila</i>											Guam, Indonesia
<b>ELACHERTINAE</b>											
26. <i>Euplectrus platypenae</i>	×	×	×								Continental U.S., Mexico
*27. <i>Elachertus advena</i>	×	×									West Indies, Philippines, Fiji
28. <i>E. giffardi</i>											Guam, Palau, Caroline Atolls, Ponape, Kusaie, Gilbert

\* Data taken from Yoshimoto &amp; Ishii, 1965, Insects of Micronesia, B. P. Bishop Museum 19(4).

	Hawaiian Islands										Others
	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Niihau	Nihoa	Laysan	Midway	
29. E. sp.											
30. Cirrospilus sp.		X	X	X		X	X				
31. Zagrammosoma flavolineatum					X	X					
*32. Euderus metallicus	X	X	X		X	X		X			
ENTEDONTINAE											
*33. Burksia viridimaculata	X					X					Colorado, California
34. Chrysocharis parksi						X	X				Guam, Palau, Yap, Caroline Atolls
35. C. majoriana						X					
*36. Derostenus fullawayi	X	X				X	X				Palau, Florida
37. D. sp.											Continental U.S.
38. Horismenus depressus						X					Sao Paulo, Brazil
39. H. sp.							X				U.S., Canada, Palau
40. Pediobus wilderi	X		X			X					California
41. P. detrimentosus	X	X	X			X	X				Canada, New York, S. Carolina, California
42. P. sp.											
43. Ceranisus brui	X	X				X	X				
44. Closterocerus sp.	X					X					
APHELININAE											
45. Eretmocerus corni						X					Continental U.S., Argentina, Paraguay, Chile
46. E. haldemani						X	X				Florida, Mississippi, California
47. Archenomus perkinsi						X	X				
48. A. imitatrix						X	X				
49. Centrodora xiphidii		X				X	X				
50. Marietta carnesi						X	X				
51. M. graminicola						X	X				
52. Aphytis chrysomphali	X	X	X			X	X				
53. A. proclia						X					
54. A. lingnanensis						X					
55. Aphelinus gossypii						X					
56. A. mali						X					
57. Aphelinus maidis	X					X					
58. A. semiflavus						X					
59. Prospaltella bicolor						X					
60. P. koebelei		X				X					
61. P. transvena		X				X					
62. Encarsia formosa						X					
63. E. pergandiella						X					Worldwide

	Hawaiian Islands									Others	
	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Niihau	Nihoa	Laysan		
64. <i>Aspidiotiphagus citrinus agilior</i>					X						Worldwide
65. <i>A. citrinus citrinus</i>	X	X			X						Worldwide
66. <i>Aneristus ceroplastae</i>	X	X	X		X	X					Worldwide
67. <i>Coccophagus hawaiiensis</i>					X						
68. <i>C. lycimnia</i>	X	X			X	X	X				Worldwide
69. <i>C. viridis</i>											Worldwide
70. <i>C. ochraceus</i>	X				X						Continental U.S., S. Africa, Eritrea
71. <i>C. sp.</i>					X						

(1904), J. Erdos (1951), M.N. Nikolskaja (1952), O. Peck (1963), and O. Peck, Z. Bouček & A. Hoffer (1964).

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A deserving thanks to Mrs Barbara Downs for her well executed drawings.

The following key to the families of Chalcidoidea is included in the text primarily to separate the Hawaiian Chalcidoidea as well as families not yet known here. The key may be useful for neighboring Polynesia and other areas in the Pacific.

#### KEY TO FAMILIES OF CHALCIDOIDEA (after B.D. Burks)

1. Head with an anterior cavity ; soft-bodied, small dark species with pale colored, wingless ♂♂ ; developing only in figs ..... **Agaonidae**
- Head without an anterior cavity ..... 2
- 2 (1). Tarsi with 3 segments ; minute egg parasites ; wings often with bristles arranged in longitudinal rows ..... **Trichogrammatidae**
- Tarsi with 4 or 5 segments ..... 3
- 3 (2). Hind wing pedunculate ; small to minute egg parasites ; tarsi with 4 or 5 seg-

ments .....	<b>Mymaridae</b>
Hind wing not pedunculate.....	4
4 (3). Hind tarsus with 4 segments .....	5
Hind tarsus with 5 segments .....	6
5 (4). Hind coxa not large and flat; small to moderate-sized specimens with antennal segments reduced in number, often only 2 or 3 funicle segments present .....	<b>Eulophidae, except some Aphelininae</b>
Hind coxa large and flat; body slender and wings elongate; small to minute species .....	<b>Elasmidae</b>
6 (4). Hind coxa large and long .....	7
Hind coxa not large and long .....	8
7 (6). Hind coxa round in cross-section; hind femur enlarged and toothed ventrally; cercus biscuit-like and located well anterior to posterior margin of 7th gastral tergum .....	<b>Chalcididae</b>
Hind coxa approximately triangular in cross-section, ridged dorsally; hind femur usually not enlarged and toothed ventrally; cercus exserted and articulated at bases, located at posterior margin of 7th tergum.....	<b>Torymidae</b>
8 (6). Mid tibial spur large, for jumping; mesopleuron without a femoral furrow; tarsi always with an elongate 1st segment .....	
..... <b>Encyrtidae (including Thysaninae, Eupelminae, Tanaostigmatinae)</b>	
Mid tibial spur relatively weak.....	9
9 (8). Mandible sickle-shaped, thorax gibbous .....	<b>Eucharitidae</b>
Mandible not sickle-shaped .....	10
10 (9). Abdomen short, subtriangular; thorax elevated and grossly punctate..	<b>Perilampidae</b>
Abdomen elongate .....	11
11 (10). Pronotum semiquadrata, thorax usually unbilicate-punctate dorsally ...	<b>Eurytomidae</b>
Pronotum transverse.....	12
12 (11). Stigmal vein minute, sessile; all species minute... <b>Eulophidae (most of Aphelininae)</b>	
Stigmal vein elongate, never sessile; species moderate to large in size .....	
..... <b>Pteromalidae</b>	

### Family EULOPHIDAE

#### KEY TO HAWAIIAN SUBFAMILIES OF EULOPHIDAE

- Submarginal vein of fore wing broken proximal to marginal vein, usually shorter than marginal, radial vein rarely long, postmarginal vein nearly always absent or slightly developed, rarely equal or longer than radial..... 2  
Submarginal vein of fore wing not broken before uniting to marginal vein, usually equal or longer in length than marginal, radial rarely short, postmarginal vein always present, usually equal to or longer than radial..... 4
- Parapsidal furrows incomplete; abdomen often petiolate; axilla rounded at anterior margin, rarely produced..... **Entedontinae**  
Parapsidal furrows complete; axilla angulate and produced into scapula ..... 3
- Scutellum with 2 longitudinal grooved lines .....
- Scutellum without grooved lines .....
- Parapsidal furrows wanting, incomplete or slightly visible on posterior 1/3 ... **Eulophinae**

- Parapsidal furrows complete, entire, distinct.....5
5. Postmarginal vein distinctly developed; small to medium-sized wasps over 1 mm long, body usually long, weakly sclerotized; tarsi 4-segmented.....*Elachertinae*
- Postmarginal vein wanting; small wasps of usually less than 1 mm long; body usually stout and not metallic in color; tarsi 5-segmented (except *Eretmocerus* and *Archenomus* 4-segmented).....*Aphelininae*

#### Subfamily EULOPHINAE

##### KEY TO HAWAIIAN GENERA OF EULOPHINAE

1. ♀ with 2 funicle segments; ♂ with 2 or 3 unbranched funicle segments; scutellum with 2 dorsal grooved lines ..... *Diglyphus*  
♀ with 3 or 4 funicle segments; ♂ with 4 or 5 branches; scutellum without dorsal grooved line ..... 2
2. Antenna inserted near middle of face; costal cell of fore wing narrow...*Hemiptarsenus*  
Antenna inserted below middle of face; costal cell of fore wing broad.....3
3. Propodeum with transverse costula..... *Pnigalio*  
Propodeum without transverse costula ..... 4
4. Propodeum micro-reticulate, with distinct median carina; ♀ funicle 4-segmented;  
♂ with 4 or 5-segmented funicles and with or without branches..... *Sympiesis*  
Propodeum generally smooth and polished, without carina, or if present, a short, thin, indistinct carina extending 1/2 its length; ♀ funicle 3-segmented; ♂ funicle 3-segmented and unbranched ..... *Pauahiana*

#### Genus *Diglyphus* Walker

*Diglyphus* Wlk. 1844, Ann. Mag. Nat. Hist. **14**: 409 (type: *Cirrospilus chabrias* Wlk.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 102-4.—Peck, Bouček, & Hoffer, 1964, Canad. Ent., Mem. **34**: 92.

*Solenotus* Foerster, 1856, Hym. Stud. **2**: 74, 76.

*Diaulinus* Schulz, 1906, Spolia Hym., p. 143.

#### *Diglyphus begini* (Ashmead)

*Diaulus begini* Ashm., 1904, Mem. Carnegie Mus. **1**: 356, 372.

*Diaulinus* sp., Timb., 1924, Proc. Haw. Ent. Soc. **5**: 444.—Looch, 1951, *Ibid.* **14**: 205.

DISTRIBUTION: Hawaiian Is. (Oahu, Maui).

HOSTS: Lepidoptera, Gracillariidae: *Parectopa marginestrigata* (Walsm.) (reared by Swezey). Diptera, Agromyzidae: *Liriomyza pusilla* (Meigen). (See Peck 1963 for additional host records).

#### Genus *Pnigalio* Schrank

*Pnigalio* Schr., 1802, Fauna Boica **2**(2): 315 (type: *Ichneumon pectinicornis* Linnaeus; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 86-90.

#### *Pnigalio externa* (Timberlake) Fig. 1a.

*Notanisomorphomyia externa* Timb., 1927, Proc. Haw. Ent. Soc. **6**: 522.

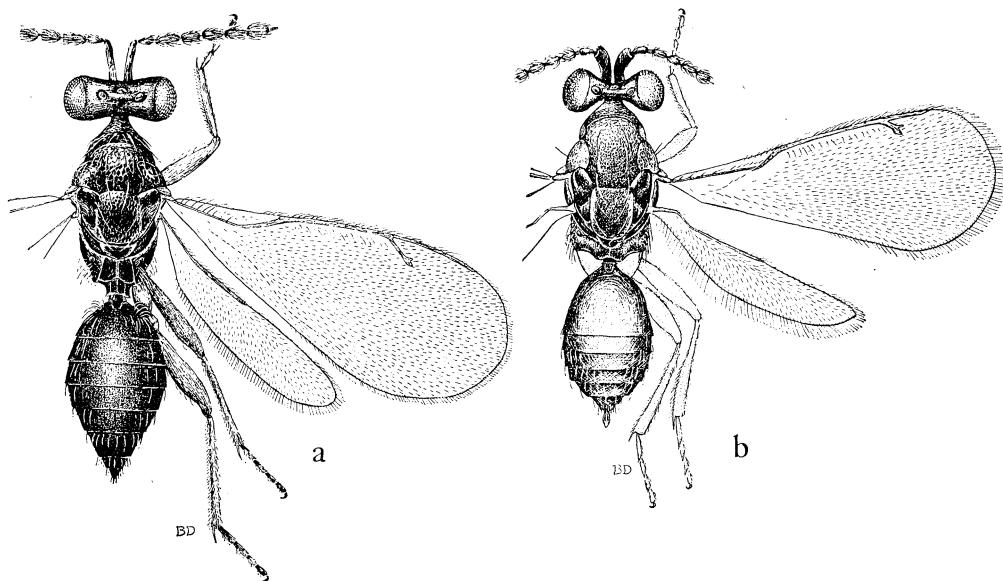


Fig. 1. a, *Pnigalio externa* Timberlake, ♀; b, *Sympiesis sparsus* n. sp., ♂.

DISTRIBUTION: Hawaiian Is. (Oahu, Maui, Hawaii, Kauai).

HOSTS: Lepidoptera, Gracilariidae: *Bedellia orchilella* Walsm.; *Cremastobombycia lantanaella* Busck, *Parectopa marginestrigata* (Walsm.), *P. neraudicola* (Swezey), *P. hibiscella* (Sw.), *P. epibathra* (Walsm.), *P. hauicola* (Sw.); Lyonetiidae: *Euhyposmocoma trivitella* Sw.; Hypomonoeutidae: *Philodoria picturicola* Sw.; Gelechiidae: *Aristotelia* sp. Diptera, Agromyzidae: *Agromyza* sp. in *Coccus*.

#### Genus *Sympiesis* Foerster

*Sympiesis* Foers., 1856, Hym. Stud. 2: 74, 76 (type: *Eulophus sericeicornis* Nees; orig. design.).—Peck, 1963, Canad. Ent., Suppl. 30: 90–99.

#### KEY TO HAWAIIAN SPECIES OF SYMPIESIS

1. Body metallic greenish blue ..... 2  
Body brownish to fuscous with some metallic tinge ..... 3
2. Mesonotum and scutellum small, with deep reticulation; tergites 2–5 with broad, longitudinal yellow streak along both lateral margins ..... *vagans*  
Mesonotum and scutellum polished, with shallow, or impression of, reticulation; tergites either brownish or fuscous ..... *hawaiensis*
3. Anterodorsal corner of prepectus, a small area immediately behind tegula, tibiae and tarsi yellowish ..... *sparsus*  
Body entirely brownish to fuscous; legs brownish yellow or partly fuscous ..... 4
4. Body length of ♀ 3.0–3.4 mm long; abdomen elongate, fusiformly pointed; coxae brownish or fuscous, ♂, 2.0 mm long; legs except tarsi fuscous or metallic black ..... *mauiensis*

Body length of ♀ 2.0-2.5 mm long; abdomen short and ovate; fore and mid coxae yellowish brown, ♂ 1.5 mm long; legs entirely brownish yellow except coxae dark brown ..... *konae*

**Sympiesis konae** Ashmead

*Sympiesis konae* Ashm., 1901, Fauna Hawaiensis 1: 331.

DISTRIBUTION: Hawaiian Is. (Hawaii)

**Sympiesis hawaiensis** (Ashmead), n. comb.

*Hemiptarsenus hawaiensis* Ashm., 1901, Fauna Hawaiensis 1: 330.

DISTRIBUTION: Hawaiian Is. (Hawaii).

Z. Bouček and G. J. Kerrich have examined the type specimen of ♀ *Hemiptarsenus hawaiensis* Ashm. No. 1297, British Museum (Nat. Hist.). Both verified that *Hemiptarsenus* of Ashmead is not congeneric but closely related to *Sympiesis* Foerster. I am tentatively placing this species under this genus.

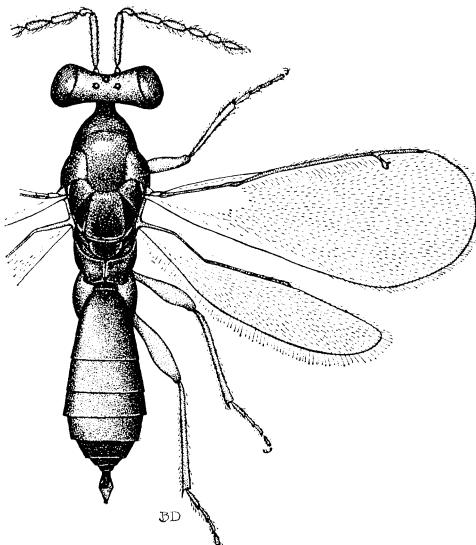


Fig. 2. *Sympiesis mauiensis* (Ashmead), ♂.

**Sympiesis mauiensis** (Ashmead). n. comb.  
Fig. 2.

*Ophelinus mauiensis* Ashm., 1901, Fauna Hawaiensis 1: 329.—Swezey, 1931, Proc. Haw. Ent. Soc. 7: 502.

DISTRIBUTION: Hawaiian Is. (Hawaii, Maui, Oahu, Kauai).

HOST: Lepidoptera, Hyponomeutidae: *Hyposmocoma chilonella* Wlsm.

**Sympiesis vagans** (Timberlake), n. comb.  
Fig. 3.

*Pseudopheliminus* sp., Timb., 1924, Proc. Haw. Ent. Soc. 5: 352, 354, 445.—Editor, 1924, *Ibid.* 5: 485.

*Pseudopheliminus vagans* Timb., 1926, Bull. B. P. Bishop Mus. 31: 27, 41.—Krauss, 1944, Proc. Haw. Ent. Soc. 12: 92.—Look, 1951, *Ibid.* 14: 205.—Swezey, 1951, *Ibid.* 14: 205.

DISTRIBUTION: Hawaiian Is. (Nihoa, Maui, Oahu, Kauai).

HOSTS: Lepidoptera, Gracilariidae: *Parectopa hibiscella* (Swezey), *P. marginestrigata* (Walsm.), *P. hauicola* (Swezey). Diptera, Agromyzidae: *Liriomyza pusilla* (Meigen) reared by C. Garcia.

**Sympiesis sparsus** Yoshimoto, n. sp. Fig. 1b.

*Sympiesis* sp. Swezey & Bryan, 1929, Proc. Haw. Ent. Soc. 7: 296.

♀. Body length 2.0-2.5 mm; fore wing 1.5-2.0 mm long.

Body generally fuscous to aeneous black or sometimes reddish brown. Parts of scape

and occasionally apex of club pale yellow. Mouthparts including mentum area orange yellow. Legs entirely yellow except for mid and hind coxae which are concolorous with body; sometimes anterior 1/2 of fore coxa yellowish. Anterior dorsal corner of prepectus and a small area behind tegula pale yellow. Fore wing hyaline and sparsely ciliate.

Head as wide as thorax; front of face longitudinally convex without scrobes; fronto-vertex and clypeal area broad. Ocelli in obtuse-angled triangle, posterior pair separated from inner eye margin by 1/2 the distance between posterior ocelli. Eyes hemispherical and surface with sparse, short hairs.

Antenna inserted below middle of face; scape elongate, touching anterior ocellus; funicle and club segments with dense, thick long hairs; ratio of antennal segments 4.0 : 1.5 : 2.5 : 2.0 : 1.5 : 2.75\* (\*club = 1.5 : 1.0 : 0.10). Pronotum short, acute anteriorly; mesoscutum with indistinct parapsidal furrows; mesoscutum with shallow, large reticulation and scutellum more or less rectangular, sloping at edge, surface slightly convex in center, with predominantly minute reticulation, and 2 pairs of bristles at lateral periphery.

Abdomen shorter than head and thorax combined, flattened dorsally and ovate. Ovipositor sheath exserted about 1/2 distance of length of last tergite. Surface of hind coxa rugose. Dense, long white hairs on metapleura. Propodeum rugulose with a median carina.

Fore wing cilia short on anterior and posterior margin except in basal portion and lateral margin longer; submarginal, marginal, radial and postmarginal approximately in ratio of 5.5 : 12.0 : 1.5 : 3.0; submarginal vein with 10-12 bristles.

♂. Length of body 1.0-2.0 mm; fore wing 0.8-1.5 mm long. Similar to ♀ in general except as follows: in general, antennal funicle and club segments shorter than ♀; scape elliptical, somewhat flattened on outer side.

Holotype ♀ (BISHOP 6120), Upper Hamakua Ditch Trail, Hawaii, 30.VII.1921, O.H. Swezey. Allotopotype ♂, same data as holotype.

Paratypes. OAHU: 2♀♀, Kaluanui, 22.II.1931, ex *Hibiscus*, Swezey; ♀, Kaluanui, 26.III.1933, ex *Broussaisia*, Swezey; ♀, Puu Kaua, 3.V.1925, Swezey; ♀, Kawaihoa, 18.VII.1932, ex *Perrottetia*, Swezey; ♀, Konahuanui, 26.II.1914, Swezey; ♀, Mt Kaala, 22.II.1929, Swezey; ♀, Mt Kaala, 4.VII.1916, Zimmerman; ♀, Mt Kaala, 22.I.1938, Swezey; ♀, Mt Kaala, 6.III.1929, Swezey; ♀, Kahana, 27.II.1928, ex *Pholidoria picturiella*, Swezey; ♀, ♂, Opaeula, 30.II.1913, Swezey; ♀, Castle Trail, 27.IX.1938, ex *Hibiscus arnottianus*, Bryan, Jr.; 3♂♂, Mt Tantalus, 4.VII.1956, Beardsley; ♂, Mt Tantalus, 27.I.1927, Swezey; ♂, Mt Olympus, 3.I.1915, Swezey; ♂, Palolo, 3.I.1915, Swezey; ♂, Kaumuohona, 12.XII.1907, Swezey. HAWAII: 3♀♀, ?♂♂, Upper Hamakua Ditch Trail, 30.VII.1921, Swezey; ♀, Kilauea, 13.X.1929, ex ferns, Swezey; ♂, Kilauea, 4.VIII.1946, Zimmerman; ♂, Kipuka Ki, Kilauea, 7.VI.1947, on *Pipturus*, Swezey; ♂, Upolu, 9.VI.1922, Swezey; 2♀♀, Nauhi Gulch, 1500-1800 m, 30.IX.1931, Swezey & Williams. MAUI: 3♂♂, Iao Valley, 28.II.1926, on "Ohia lehua", Swezey; ♂, Waikapu, 23.III.1924, Swezey; ♂, Kula Pipe Line, 1350 m, 20.III.1922, Swezey; ♂, Olinda, 13.V.1926, on *Cheirodendron*, Swezey. KAUAI: 4♂♂, Kalalau Lookout, 1200 m, VIII.1953, Hardy; ♂, Kalalau, 20.VIII.1921, on *Osmanthus*, Swezey; 3♂♂, Kokee, 21.VIII.19??, Swezey; ♂, Kumuwelia, 27.VI.1932, ex *Cheirodendron*, Swezey; 2♂♂, Nualolo, 26.VI.1932, ex *Pipturus* & *Bidens cosmoides*, Swezey.

Not in type series: 10♀♀, Ukulele, Maui, 13.VII.1919, on *Rubus*, Timberlake; ♀, Kula Pipe Line, Maui, 3.IV.1932, Bryant; ♀, Haelelaau, Maui, 19.XII.1928, on *Broussaisia*, Swe-

zey; ♀, Kalalau, Kauai, 20.VIII.1921, on *Osmanthus*, Swezey; ♀, Lanai, 900 m, II.1894, Perkins.

Genus **Hemiptarsenus** Westwood

*Hemiptarsenus* Wstw., 1833, Mag. Nat. Hist. **6**: 122 (type: *H. fulvicollis* Wstw.; design. Wstw., 1840).—Peck, 1963, Canad. Ent., Suppl. **30**: 101.

**Hemiptarsenus semialbiclavus** (Girault)

*Hemiptarsenoideus semialbiclava* Gir., 1916, Mem. Queensland Mus. **5**: 220.

*Hemiptarsenus semialbiclavus* Gir., 1924, Homo Perniciosus and New Hymenoptera p. 4.—Van Zwaluwenburg, 1947, Proc. Haw. Ent. Soc. **12**: 30.—Look, 1948, *Ibid.* **13**: 219.

DISTRIBUTION: Hawaiian Is. (Oahu, Hawaii).

HOST: Diptera, Agromyzidae: *Pseudonapomyza spicata* Malloch.

Genus **Pauahiana** Yoshimoto, n. gen.

♀. Antenna 8-segmented with a ring segment; antennal segments gradually thickened apically with an ovate club; ♂ antenna similar to ♀ except antennal scape large, ovate,  $1.3 \times$  as long as broad, flattened, and convex to elongate-ovate,  $3 \times$  as long as broad and slightly flattened. Antennal scape nearly reaching anterior ocellus; funicle 3-segmented, segment 1 longest. Head and frontovertex narrow and clypeal area broad. Hind tibia with 2 spurs. Marginal vein  $2 \times$  longer than submarginal vein; postmarginal vein  $2.3\text{--}2.5 \times$  longer than radial. Propodeum short and without a definite median carina. Parapsidal furrows incomplete or faintly indicated on posterior 1/3. Fore and hind marginal cilia of fore wing short, apical margin slightly longer.

Type Species: *Pauahiana swezeyi* Yoshimoto, n. sp. (present designation).

This new genus is closely related to the genera *Necremnus* Thomson and *Diaulomorpha* Ashmead but differs from the former in having a longer postmarginal vein, the scape not extending beyond the anterior ocellus and the ♂ antennal scape enlarged. It differs from the latter by not having 2 grooved lines on the scutellum and funicle segments 2 and 3 subequal in length.

The ♀ type specimen of *Necremnus maculatipennis* Ashm. No. 1298 at British Museum (Nat. Hist.) and allotype ♂ No. 6483 at USNM are not *Necremnus* but closely related. *Diaulomorpha australiensis* Ashmead No. 4902 of USNM is also a near relative of this genus.

Because *Pauahiana swezeyi* n. sp. exhibits essential characteristics of this group and is commonly found in large numbers throughout the Hawaiian Islands, I am designating this species as type rather than selecting Ashmead's. Furthermore, based on the external morphology and color pattern of the named species of this group, it seems that the ancestral stock may have evolved from a group similar to this species.

This genus is named in honor of the late Princess Bernice Pauahi Bishop, direct descendant of the Hawaiian Monarchy and in whose memory Bishop Museum was established.

KEY TO SPECIES OF PAUAHIANA N. GEN.

1. Mesonotum and scutellum metallic bluish green; meso- and metapleura brown and

- polished ..... 2
- Mesonotum and scutellum brown to black with some metallic tinge; pleura concolorous with body ..... 3
- 2. Fore coxa and tibiae yellowish; ratio of antenna (5.0 : 1.5 : 2.0 : 1.5 : 1.5 : 3.0); ♂ lower 1/2 of face yellowish ..... *swezeyi*
- Coxae and tibiae fuscous; ratio of antenna (4.0 : 1.5 : 2.0 : 1.0 : 1.0 : 2.0); funicle segment 2 and apex of club orange yellow; face entirely brown or frontovertex with yellow spots ..... *metallica*
- 3. Fore coxa brownish to fuscous ..... 4
- Fore coxa yellowish; ♂ lower 1/2 of face including mouthparts and gena pale yellow ..... *swezeyi*
- 4. Antennal funicle segments 1 and 2, and tip of club distinctly yellow to yellow-orange; legs pale yellowish except coxae and hind femur brown or fuscous ..... *maculatipennis*
- Antenna brown except tip of club whitish; legs pale yellow except tarsi and tibiae brownish ..... *lineata*

**Pauahiana swezeyi** Yoshimoto, n. sp. Fig. 3b.

♀. Body length 1.7 mm; fore wing 1.5 mm long.

Thorax metallic bluish green: sometimes meso- and metacoxae shiny brown to fuscous; head pale brown to dark brown with a single large yellow spot covering area of ocelli; abdomen shiny black to dark brown. Antenna brown to dark brown mixed with irregular yellowish spots. Fore wing hyaline except for a small pale brown spot extending vertically from radial area. Legs, mouthparts including mentum area yellowish.

Head as wide as thorax; face convex without scrobes and with few short scattered hairs; frontovertex narrow, clypeal area broader; ocelli in a very obtuse angled triangle, posterior pair separated from inner eye margin by slightly more than distance between posterior ocelli.

Antenna inserted somewhat below middle of face; scape elongate, nearly touching anterior ocellus; funicle segment 1 longest, cylindrical, 3× as long as broad; funicle segment 2 shorter and slightly broader than 1, 3× as long as broad; segment 3 broader than 2, as long as broad and shorter than 2; club 2× as long as broad, broader than last funicle segment; scape and pedicel with scattered thin hairs, funicle and club segments with thick hairs; antennal ratio 5.0 : 1.5 : 2.0 : 1.5 : 1.5 : 3.0. Pronotum short, acute anteriorly; mesoscutum with indistinct parapsidal furrows; mesoscutum and scutellum with regularly spaced hairs; surface of mesoscutum and scutellum with minute reticulation, scutellum broad and flattened, 2 pairs of bristles at lateral periphery.

Abdomen shorter than head and thorax combined (4 : 6), flattened dorsally and ovate, 7-segmented; tergite 1, 2× as long as 2, other tergites subequal in length. Ovipositor sheaths exserted about length of last tergite. All coxae smooth and polished.

Fore wing cilia short on anterior and posterior margin except on basal portion and apical cilia longer; submarginal, marginal, radial and postmarginal approximately in ratio of 5.0 : 9.5 : 1.0 : 2.5; submarginal vein with 15 bristles.

♂. Length of body 1.5 mm; fore wing 1.3 mm. Similar to ♀ in general except as follows: Antennal funicles and club segment much more slender than those of ♀; scape

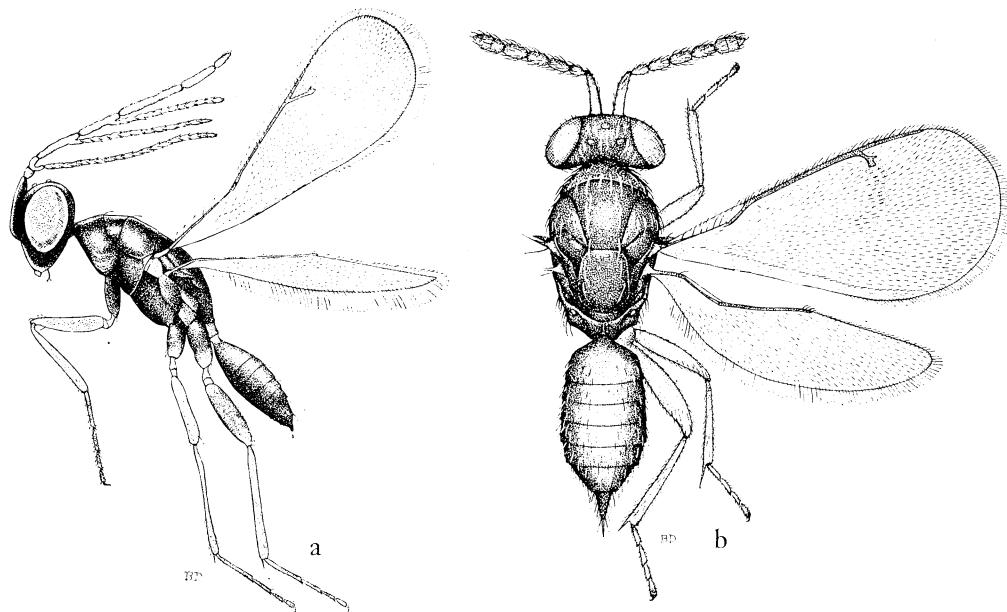


Fig. 3. a, *Sympiesis vagans* (Timberlake), ♂; b, *Pauahiana swezeyi* n. sp., ♀.

expanded into a large, broad, ovate shape, 1.3× as long as broad, flattened at outer side and convex at inner side; pedicel and funicle segments with fewer brownish spots, club brown. Lower 1/2 of face largely yellowish.

Holotype ♀ (BISHOP 6121), Mt Tantalus, Oahu, 27.VIII.1933, O.H. Swezey, ex *Metrosideros*. Allotopotype ♂, 4.VII.1956, J.W. Beardsley. Paratypes: paratotypes ♂, 29.III.1918, ♀, 23.II.1925, Swezey, ♀, VI.1955, Beardsley, 7♀♀, 8♂♂, VII.1956, Beardsley; 3♀♀, Pupukea Trail, Oahu, 27.II.1957, Beardsley, ♀, Mt Olympus, Oahu, 31.III.1935, Swezey; ♀, Palolo, Oahu, 3.I.1915, Swezey; ♂, Palolo, Oahu, 14.IV.1936, ex *Metrosideros*, Swezey; 3♂♂, Kalihi, Oahu, 22.IV.1923, Swezey; ♂, Pauoa Flats, Oahu, 27.IV.1934, *Metrosideros*, Swezey; 2♀♀, 2♂♂, Kawaiola Rdg., Oahu, 20.XI.1934, ex *Metrosideros*, Swezey; 2♀♀, Kilauea, Hawaii, 19.VI.1934, ex *Metrosideros*, Swezey; ♀, Kilauea, Hawaii, 12.VII.1934, ex *Dodonaea*, Swezey; 3♀♀, Kilauea, Hawaii, 1200 m, 25.I.1915, Gifford; 2♀♀, Kilauea, Hawaii, 4.VII.1946, Zimmerman; ♂, Kilauea, Hawaii, 14.VI.1947, ex *Trioza* gall on *Metrosideros*, Swezey; 6♀♀, Kilauea, Hawaii, 14.X.1929, ex "Ohia lehua", Swezey; 2♂♂, Upololu, Hawaii, 9.VI.1922, ex "Ohia lehua," Swezey; 4♂♂ Kilauea, Hawaii, 22.VI.1917, ex "Ohia lehua," Swezey; 3♂♂, 6♀♀, Niulii, Hawaii, 1.V.1917, ex psyllid on "Ohia", Swezey; ♂, Upper Hamakua, Hawaii, 14.X.1929, Swezey.

Not in type series: OAHU: ♀, Tantalus, 8.VIII.1909, ex *Pipturus* leaf miner, Swezey; ♂, Tantalus, 19.III.1918, ex psyllid in galls on leaves *Metrosideros tremuloides*, Swezey; ♂, Tantalus, 29.III.1918, Swezey; ♂, Kalihi, 450 m, Osborn; ♂, Waimano, 5.I.1913, Swezey; 2♂♂, Manini Gulch, 25.IX.1934, ex *Metrosideros*, Swezey; ♂, Wailupe, 23.I.1915, Swezey; ♂, Palolo, 26.XII.1914, Swezey; ♂, Pacific Hts., 29.III.1918; 2♂♂, ♀, Mt. Kaala, 11.VIII.1912, Swezey; 16♀♀, 23♂♂, Hauula, 11.V.1916, ex *Trioza* on *Metrosideros*, Swezey; ♀, 5♂♂,

Wahiawa, 3.VI.1921, ex "Ohia lehua", Swezey; 2♀♀, 3♂♂, Kalihi, 17.V.1914, Swezey; ♀, Palikea, 30.VI.1935, ex *Pelea*, Swezey; ♀, Waiahole, 13.VIII.1933, ex *Parectopa hibiscella*, Swezey. HAWAII: 3♀♀, Kilauea, 1200 m, 15.I.1915, Swezey; 3♀♀, Kilauea, VIII.1920, ex *Cheirodendron*, Swezey; 4♀♀, 2♂♂, Kilauea, 15.V.1911, 27.VI.1917, ex "Ohia lehua", Swezey; 6♂♂, Kilauea, 14.VI.1947, 12.VII.1934, ex psyllid on "lehua", ex *Trioza gall*, Swezey; 8♀♀ 20♂♂, Niulii, 9.V.1917, Swezey; 11♀♀, Kohala Mt, 24.V.1917, Swezey; 3♀♀, Upololu, 9.VI.1922, ex "Ohia lehua", Swezey; ♀, Honokaa, 760 m, 28.V.1922, Swezey. MOLOKAI: 8♀♀, 9♂♂, Kainalu, 180-450 m, 540-660 m, 21.VII.1927, Bryan Jr. MAUI: ♂, Iao Vall., 28.II.1926, ex "Ohia lehua", Swezey; ♂, Iao Vall., 29.VII.1906, Swezey?

**Pauahiana maculatipennis** (Ashmead), n. comb.

*Necremnus maculatipennis* Ashm., 1901, Fauna Hawaiensis 1 (3) : 331.

♀. Body length 2.1-1.2 mm; fore wing 1.5-1.2 mm long.

Mesonotum and scutellum ferruginous to fuscous, leathery, pleura brownish. Lower portion of head pale brown. Antenna dark to pale brown, except funicle segments 1 and 2 plus part of segment 3 and apex of club yellowish. Mouthparts including mentum area brown. Fore wing with infuscate to dark brown maculate spots on radial vein area. Legs yellowish except coxae, hind tibia and femur concolorous with body.

Dense hairs around ocelli. Ocelli in obtuse-angled triangle, posterior pair separated from inner eye margin by about 2× their own diameter and very near to occipital margin.

Antennal club and funicles with dense thick hairs; antennal ratio 4.0 : 1.5 : 2.0 : 1.5 : 1.0 : 2.0. Posterior margin of pronotum with 4 distinctly separated long hairs. Propodeum reticulate. Hind coxa predominantly smooth with a little irregular rugosity. Fore wing with pale brown spots on radial and at apex of submarginal vein. Metapleuron with sparse thin hairs.

Posterior margin of tergites 2-5 with a row of evenly spaced long hairs. Fore wing of submarginal, marginal, radial and postmarginal approximately in a ratio of 4.0 : 8.0 : 0.5 : 4.0.

♂. Length of body 1.2 mm; fore wing 1 mm. Similar to ♀ in general except as follows: Antenna flattened, scape ellipsoidal, 2× as long as broad; pedicel, funicles, gradually becoming thicker in size, club larger in length and width than *swezeyi*.

Specimens examined: OAHU: 4♀♀, 5♂♂, Mt Olympus, III.1935, I.1936, VI.1935, Swezey, ex *Parectopa* in *Dubautia*; 2♀♀, ♂, Mt Tantalus, VIII.1933, Swezey, ex *Hibiscus*; ♀, Mt Tantalus, VI.1956, VII.1956, Beardsley, reared ex *Pipturus*; ♀, Mt Tantalus, III.1935, Swezey, ex *Hibiscus*; 2♀♀, 4♂♂, Mt Tantalus, III.1915, Swezey, ex *Parectopa ureralla*; ♀, Tantalus, I.1929, II.1906, Swezey; 2♂♂, Tantalus, XII.1906, Swezey, ex leafminer *Pipturus*; ♀, Kahana, IX.1924, Swezey, *Dubautia*; ♀, ♂, Hauula, I.1934, Swezey, ex leafminer in *Dubautia*; 2♀♀, ♂, Kaluanui, II.1931, Swezey, *Hibiscus*; 2♀♀, Waiahole, VII.1933, Swezey, ex *Parectopa hibiscella*; 3♀♀, ♂, Cook Trail, III.1916, Swezey, on *Pipturus albidus*; 2♂♂, Kawaihoa Rdg., IV.1933, XI.1934, Swezey, ex *Metrosideros*, ex *Usera*; 2♂♂, Kaumuohona, XII.1907, Swezey; ♂, Pupukea XII.1933, Swezey, ex leafminer in *Mespero mania*; ♂, Castle Trail, 600 m, XI.1937, Zimmerman. KAUAI: 2♀♀, Milolii, VIII.1925, Swezey, ex *Beddellia* in *Dianella*; ♀, Puu Ka Pele, VII.1932, Swezey, *Acacia koa*; ♀, Kumuwia, VI.1932, Swezey, ex *Pipturus*. HAWAII: ♀, Kohala Mts, V.1917, Swezey, "Ohia lehua"; ♀, ♂,

Upololu, VI.1922, Swezey. MAUI: ♀, Haleakala, 1200 m, IV.1894, Perkins.

**Pauahiana lineata** Yoshimoto, n. sp.

♀. Body length 1.7 mm; fore wing 1.3 mm long.

Mesonotum and scutellum brownish, with 2 yellowish brown lines running vertically from mesonotum to scutellum on lateral margin. Antenna generally brownish with tip of club whitish, scape sometimes yellowish at base. Fore wing with dark brown maculate spot around radial vein area. Legs brownish except tarsi and between articulation of femora and coxae.

Head, frontovertex, ocelli angle and its distances from eye margin similar to *swezeyi*. Antennal ratio 4.0 : 1.5 : 2.0 : 1.5 : 1.5 : 4.0. Pronotum similar to *swezeyi*. Mesonotum and scutellum shiny and micro-reticulate.

Abdomen similar to *swezeyi* except for a definite row of spaced long hairs on posterior margins of each tergite. Ovipositor sheaths slightly exserted. Coxae smooth and polished. Propodeum with median carina and surface rugulose. Long dense whitish hairs on metapleuron.

♂. Body length 1.3-1.4 mm; fore wing 1.0-0.8 mm long. Similar to ♀ in general except for antenna. Antennal club slightly broader than funicles; scape ellipsoidal, 3× as long as broad, slightly flattened at its sides; segment 1 elongate, and cylindrical; 2 subcylindrical, shorter and slightly broader than 1; 3 subequal with 2; club 4× as long as broad, slightly broader than funicle segment 3.

**DISTRIBUTION:** Hawaiian Is. (Oahu, Hawaii).

Holotype ♀ (BISHOP 6122), Mt Tantalus, Oahu, 10.III.1935, Swezey, ex *Opostega maculata*. Allotopotype, ♂ same data as holotype. Paratypes: paratotypes, 2♀♀, 1.X.1911, 29. VIII.1909, Swezey, ex *Pelea* leaf miner; 4♀♀, 1♀, 16.XII.1906, Swezey, ex spiral leaf miner of *Pelea* leaf miner; 2♀♀, Kaumuohona, Oahu, 23.I.1909, Swezey, ex miner in *Pelea* leaf; 4♀♀, Pacific Hts., Oahu, 17.XI.1918, Swezey, ex *Opostega* B; 3♀♀, ♂, Palolo, Oahu, 5.IX. 1915, Swezey, ex *Opostega* A; 2♀♀, Palolo, Oahu, 22.II.1922, Swezey, ex *Opostega maculata*; ♂ Kaulauea, Hawaii, Kipuka Puaula, 12.X.1927, Swezey; ♀ Kumuweia, 4.VII.1932, Swezey, ex *Opostega*, mine in *Pelea*.

**Pauahiana metallica** Yoshimoto, n. sp.

♀. Body length 1.5 mm; fore wing 1.5 mm long.

Mesonotum, scutellum, vertex and occipital region of head metallic bluish green. Pleura, coxae, femora, hind tibia, and abdomen polished brown. Antenna fuscous except funicle segment 2 and sometimes part of scape orange yellow. Mandibles and anterior mentum area orange yellow. Fore wing with brown maculate spots below radial vein and infuscate area at end of submarginal vein.

Head as wide as thorax; frontovertex, ocelli similar to *swezeyi*. Antenna similar to *swezeyi* except smaller in size; antennal ratio 4.0 : 1.5 : 2.0 : 1.5 : 1.5 : 4.0. Mesoscutum and scutellum similar to *swezeyi*. Hind coxa rugulose. Dense, thick, hairs on metapleuron. Propodeum microreticulate. Fore wing of submarginal, radial and postmarginal in ratio of 5.0 : 9.0 : 1.5 : 3.0.

♂. Length of body 1.2 mm; fore wing 1.0 mm long. Similar to ♀ in general except

as follows: Antenna elongate; scape ovate, 1.5× as long as broad; funicles and club segments flattened, subequal in width.

DISTRIBUTION: Hawaiian Is. (Hawaii, Molokai, Oahu, Kauai).

Holotype ♀ (BISHOP 6123), Malamalama, Oahu, 8.II.1925, Swezey, ex *Euphorbia*. Allotopotype ♂, same data as holotype. Paratypes: paratotypes 6♀♂, 3♂♂, 8.II.1925, Swezey, ex *Euphorbia*; 3♀♀, Palolo, 14.IV.1935, Swezey, *Metrosideros*; ♀, Palolo, Oahu, 3.IX.1906, Swezey?; ♀, Palolo, 25.VI.1921, Swezey: 3♀♀, Waikane, 14.XII.1924, Swezey, ex *Philolaria splendida*; ♀, Mt Tantalus, 4.VII.1956, Beardsley; ♀, Mt Kaala, Oahu, 22.I.1929, Swezey; Pauoa Flats, 23.IV.1934, Swezey, *Metrosideros*; ♀, Manoa, Oahu, 15.III.1929, Swezey; ♂, Kahauiki, 28.II.1926, Swezey; ♂, Kumuweia, Kauai, 27.VI.1932, Swezey, *Acacia koa*; ♀, Upper Hamakua Ditch Trail, 4.X.1921, Swezey, ex "Ohia lehua."

Not in type series: OAHU: ♀, ♂, Waikane, 14.XII.1924, Swezey, ex *Philodoria splendidae*. MOLOKAI: ♀, Kawela, 23.XII.1925, ferns, Bryan Jr. KAUAI: 2♂♂, Kokee, 14.VI.1932, Swezey; ♀, Mohihi Rdg., 15.VII.1937, Zimmerman; ♀, Kokee, 21.VIII.1937, at light, Zimmerman. HAWAII: ♀, Upper Hamakua Ditch Trail, 1.X.1929, Swezey, *Sadleria* ferns; ♂, Waimea, 20.X.1912, Swezey?, ex leg miner in "Ohia"; ♂, Kohala Mt, 24.IX.1919, Swezey, ex *Philodoria buscipes*.

#### Subfamily TETRASTICHINAE

##### KEY TO HAWAIIAN GENERA OF TETRASTICHINAE

1. Mesonotum with median grooved line..... *Tetrastichus*  
Mesonotum without median grooved line ..... 2
2. Antennal funicle 2-segmented..... *Melittobiopsis*  
Antennal funicle 3-segmented..... 3
3. ♀ Antenna with 4 ring segments..... *Ootetrastichus*  
♀ Antenna with 1 or 2 ring segments ..... 4
4. Prontum transverse, subquadrate or rounded anteriorly..... 5  
Pronotum long, conical ..... *Melittobia*
5. Scutellum with 2 distinct longitudinal grooved lines ..... *Tetrastichus*  
Scutellum with 4 distinct longitudinal grooved lines..... *Aceratoneuromyia*

##### Genus *Tetrastichus* Haliday

*Tetrastichus* Hal., 1843, Trans. Ent. Soc. Lond. 3: 297.—Peck, 1963, Canad. Ent. Suppl. 30: 120–156.

##### KEY TO HAWAIIAN SPECIES OF TETRASTICHUS

1. Body 0.75–1.0 mm long; yellowish brown species..... *beardsleyi*  
Body 1.5–2.2 mm long; brown, fuscous to jet-black species..... 2
2. Mesonotum with irregular pattern of hairs; propodeum smooth, shiny..... *hagenowii*  
Mesonotum with 1 or 2 definite rows of hairs on lateral margins; propodeum punctate or micro-reticulate ..... 3
3. Two rows of short hairs (5 in each row); each hair set in a minute depressed area; frontal eye margins and anterolateral corner of mesonotum with yellow markings; trunk of fore wing yellow..... sp.

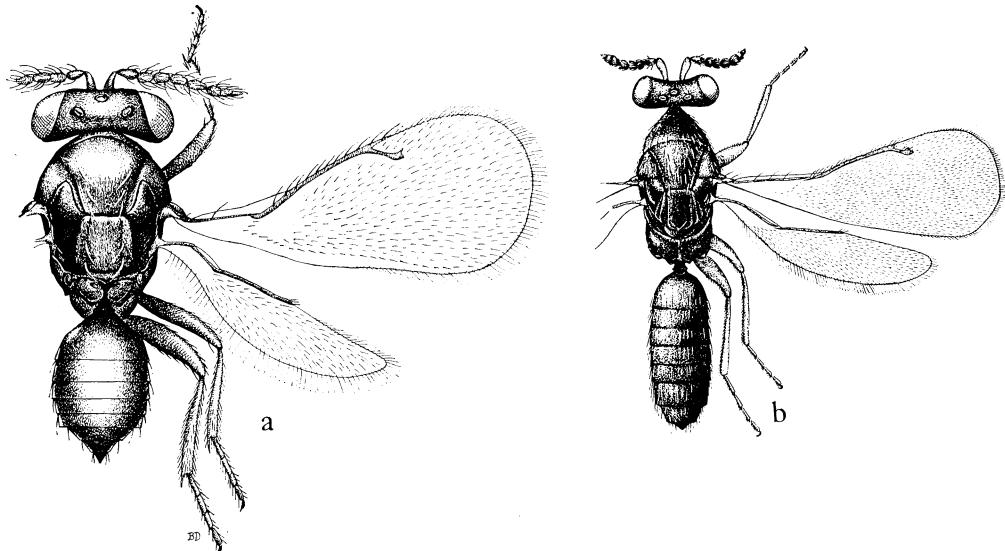


Fig. 4. a, *Tetrastichus giffardianus* Silv., ♀; b, *Melittobia hawaiiensis* Perkins, ♂.

- A single row of 3 to 4 hairs along lateral margin of mesonotum.....4
4. Compound eyes reddish with few scattered minute hairs or without visible hairs ..... 5  
Compound eyes dull brownish red with distinctly longer hairs ..... 6
5. Hind coxa smooth; trochanter of leg and antennal scape brown; radial vein with 7 cilia.....nr *bruchophagi*  
Hind coxa reticulate; trochanter of leg and antennal scape yellowish; radial vein with 10-12 cilia.....nr *sokolowskii*
6. Propodeum not polished, reticulation and carinae distinct; tarsi yellow except tar-  
sal pad; marginal cilia short; radial vein with 3-4 cilia ..... *dacicida*  
Propodeum polished, reticulation and carinae not distinct; antennal scape yellowish  
brown; terminal tarsal segment and pad brownish; radial vein with 4-6 cilia ...  
..... *giffardianus*

#### *Tetrastichus beardsleyi* Fullaway

*Tetrastichus (Epitetrastichus) beardsleyi* Full., 1956, Proc. Haw. Ent. Soc. 16: 43.

DISTRIBUTION: Hawaiian Is. (Oahu).

#### *Tetrastichus giffardianus* Silvestri Fig. 4a.

*Tetrastichus giffardianus* Silv., 1915, Bol. Lab. Zool. Portici 9: 372-75.—Swezey, 1923, Proc. Haw. Ent. Soc. 5: 302.—Timberlake, 1924, *Ibid.* 5: 442.—Willard, 1927, *Ibid.* 6: 510, 513-15.—Krauss, 1944, *Ibid.* 12: 92.—Pemberton, 1949, *Ibid.* 13: 338.—Pemberton & Willard, 1918, J. Agric. Res., Wash., D.C. 12(2): 103.—Bess, Van den Bosch & Hamamoto, 1961, Proc. Haw. Ent. Soc. 17: 368, 372.—Peck, 1963, Canad. Ent., Suppl. 30: 134.

DISTRIBUTION: S. Nigeria, Fiji, California, Hawaiian Is. (Oahu, Maui, Molokai).

HOSTS: Diptera, Trypetidae: *Rhagoletis completa* (Cresson), *Dacus dorsalis* Hendel.

**Tetrastichus hagenowii** (Ratzeburg)

*Entedon Hagenowii* Ratz., 1852, Ichneumonen der Forstinsecten 3: 211.—Ashmead, 1901, Fauna Hawaiiensis 1: 329.

*Tetrastichus hagenowii*: Fullaway, 1913, Proc. Haw. Ent. Soc. 2: 287.—Perkins, 1913, Fauna Hawaiiensis, Intro. pp. 107, 214.—Terry, 1910, Proc. Haw. Ent. Soc. 2: 91.—Timberlake, 1924, *Ibid.* 5: 442.—Pemberton, 1941, *Ibid.* 11: 19.—Peck, 1963, Canad. Ent., Suppl. 30: 134.

DISTRIBUTION: Continental U.S., Europe, Fiji, Palestine, Hawaiian Is. (probably all islands).

HOSTS: Blattaria: *Blatta orientalis* L., *Blatella germanica* L., *Eurycotis floridana* Walker, *Periplaneta americana* (L.), *P. australasiae* Fabricius, *P. fuliginosa* Serville. Hymenoptera, Evaniidae: *Evania appendigaster* (L.) (after Peck 1963).

**Tetrastichus dacicida** Silvestri

*Tetrastichus dacicida* Silv., 1915, Bol. Lab. Zool. Portici 9: 375.—Weber, 1951, Proc. Haw. Ent. Soc. 14: 330.—Chong, 1953, *Ibid.* 15: 8, 19.—Fullaway, 1954, *Ibid.* 15: 264.—Bess, Van den Bosch, Haramoto, 1961, *Ibid.* 17: 368, 371.

DISTRIBUTION: S. Nigeria, Africa, California, Hawaiian Is. (Oahu).

HOST: Diptera, Trypetidae: *Dacus dorsalis* Hendel.

The introduction of this species to the Hawaiian Islands from February to May, 1950 was probably unsuccessful. To this date, no mention of establishment of this species has been found in the literature. Not represented in the HSPA or Bishop Museum collections.

**Tetrastichus nr sokolowskii** Kurdjumov

*Tetrastichus sokolowskii* Kurd., 1912, Rev. Russe Ent. (Ent. Obozr.) 12: 238.—Chong, 1954, Proc. Haw. Ent. Soc. 15: 282.—Weber, 1955, *Ibid.* 15: 636.—Peck, 1963, Canad. Ent., Suppl. 30: 150.

DISTRIBUTION: Nairobi, E. Africa, Hawaiian Is. (Oahu, Kauai, Maui).

HOST: Lepidoptera, Plutellidae: *Plutella maculipennis* Curtis.

This parasitic wasp was introduced in May 1953 from Nairobi, E. Africa to control the diamond-back cabbage moth.

**Tetrastichus sp.**

*Tetrastichus* sp., Giffard, 1919, Proc. Haw. Ent. Soc. 4: 233.—Timberlake, 1924, *Ibid.* 5: 443.—Editor, 1924, *Ibid.* 5: 486.—Krauss, 1944, *Ibid.* 12: 92.—Suehiro, 1960, *Ibid.* 17: 297.

DISTRIBUTION: Hawaiian Is. (Oahu).

**Tetrastichus nr bruchophagi** Gahan

*Tetrastichus bruchophagi* Gahan, 1913, Proc. U.S. Natl. Mus. 46: 439.—Swezey, 1931, Proc. Haw. Ent. Soc. 7(3): 383, 390; 1934, *Ibid.* 8(3): 381.

DISTRIBUTION: N. America, Europe, New Zealand, Argentina, Hawaiian Is. (Oahu).

HOST: Hymenoptera, Eurytomidae: *Systole geniculata* Foerster (see Peck 1963, for additional host records).

Genus **Ootetrastichus** Perkins

*Ootetrastichus* Perk., 1906, Haw. Sugar Planters' Assoc. Expt. Sta., Ent. Bull. **1**: 236 (type: *O. beatus* Perkins; monobasic).

## KEY TO HAWAIIAN SPECIES OF OOTETRASTICHUS

- Body yellowish except for a large marking on mesonotum; tiny spots on dorsolateral margin of abdomen and apical 1/2 of tarsi slightly brownish ..... **beatus**  
 Body brownish with metallic tinge; antennae brownish, apical 1/2 of abdomen dark brown ..... **formosanus**

**Ootetrastichus beatus** Perkins

*Ootetrastichus beatus* Perk., 1906, Haw. Sugar Planters' Assoc. Expt. Sta., Ent. Bull. **1**: 263-64.—Timberlake, 1924, Proc. Haw. Ent. Soc. **5**: 442.

DISTRIBUTION: Australia, Fiji, Guam, Saipan, Palau, Hawaiian Is. (Oahu; introduced from Fiji, 1905).

HOST: Leafhopper eggs.

**Ootetrastichus formosanus** Timberlake

*Ootetrastichus formosanus* Timb., 1921, Proc. Haw. Ent. Soc. **4**: 558-64; 1924, *Ibid.* **5**: 442.

DISTRIBUTION: Taiwan, Hawaiian Is. (Oahu, Molokai, Hawaii; introduced from Formosa in 1916).

HOST: Homoptera, Delphacidae: *Perkinsiella saccharicida* Kirkaldy.

Genus **Aceratoneuromyia** Girault

*Aceratoneuromyia* Gir., 1917, Ins. Inscit. Menst. **5**: 151 (type: *A. australia* Gir.; monobasic, orig. design.).

**Aceratoneuromyia indicum** (Silvestri)

*Syntomosphyrum indicum* Silv., 1909, Bol. Lab. Zool. Gen. Agraria Portici **4**: 232.—Fullaway, 1948, Proc. Haw. Ent. Soc. **13**: 216.—Chong, 1953, *Ibid.* **15**: 8; 1962, *Ibid.* **18**: 63.—Weber, 1951, *Ibid.* **14**: 330; 1953, *Ibid.* **15**: 127.—Bess, Van den Bosch, & Haramoto, 1961, *Ibid.* **17**: 368, 371, 375.

*Aceratoneuromyia indicum* (Silv.), Gradwell, 1959, Ent. Month. Mag. **94**: 277.

DISTRIBUTION: India, Guam, Fiji.

HOST: Diptera, Trypetidae: *Dacus dorsalis* Hendel, *Dacus cucurbitae* Coquillett.

**Aceratoneuromyia** sp.

*Aceratoneuromyia* sp., Fullaway, 1961, Proc. Haw. Ent. Soc. **17**: 320.

DISTRIBUTION: Hawaiian Is. (Oahu).

Genus **Melittobia** Westwood

*Melittobia* Wstw., 1847, Trans. Ent. Soc. Lond. **5** (Proc.): XVII, LXV (type: *M. audouinii* Wstw.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 161-63.

**Melittobia peles** Perkins

*Melittobia peles* Perk., 1924, Proc. Haw. Ent. Soc. **5**: 441.

DISTRIBUTION: Hawaiian Is. (Oahu, Hawaii).

**Melittobia hawaiiensis** Perkins Fig. 4b.

*Melittobia hawaiiensis* Perk., 1907, Proc. Haw. Ent. Soc. **1**: 124; 1925, *Ibid.* **6**: 216; 1910, Fauna Hawaiiensis **2**: 658.—Swezey, 1907, Proc. Haw. Ent. Soc. **1**: 121; 1908, *Ibid.* **1**: 174; 1909, *Ibid.* **2**: 17; 1909, Haw. Sugar Planter's Assoc. Expt. Sta. Bull. **6**: 28; 1913, Proc. Haw. Ent. Soc. **2**: 194; 1915, *Ibid.* **3**: 103; 1926, *Ibid.* **6**: 250; 1931, *Ibid.* **7**: 390.—Giffard, 1913, *Ibid.* **2**: 200.—Timberlake, 1924, *Ibid.* **5**: 441.—Williams, 1927, *Ibid.* **6**: 433, 435, 437, 460.—Swezey & Bryan, 1929, *Ibid.* **7**: 296.—Weber, 1948, *Ibid.* **13**: 206.—Mitchell, 1952, *Ibid.* **14**: 369.—Beardsley, 1960, *Ibid.* **17**: 168.

DISTRIBUTION: Guam, Wake, Truk, West Indies, South Africa, and Hawaiian Is. (Hawaii, Maui, Molokai, Oahu).

HOSTS: Hymenoptera, Vespidae: *Pachodynerus simplicornis*; Sphecidae: *Pison argentatum*. Diptera, Sarcophagidae: *Amobia* sp.

Genus **Melittobiopsis** Timberlake

*Melittobiopsis* Timb., 1926, Proc. Haw. Ent. Soc. **6**: 317 (type: *Melittobiopsis ereunetiphila* Timb.; monobasic).

**Melittobiopsis ereunetiphila** Timberlake

*Melittobiopsis ereunetiphila* Timb., 1926, Proc. Haw. Ent. Soc. **6**: 319.—Swezey, 1941, *Ibid.* **10**: 457.

DISTRIBUTION: Indonesia, Guam, Hawaiian Is. (Oahu, Kauai).

HOST: Lepidoptera, Tineidae: *Ereunetis flavistriata* Walsm.

## Subfamiy ELACHERTINAE

## KEY TO GENERA OF HAWAIIAN ELACHERTINAE

1. Hind tibia with very short spurs ..... 2  
Hind tibia with very long spurs..... *Euplectrus*
2. Antennal funicles 2-segmented..... 3  
Antennal funicles 3-segmented..... *Elachertus*
3. Wings with 2 dark areas; in dorsal view head longer than wide..... *Zagrammosoma*  
Wings hyaline; in dorsal view head wider than long..... *Cirrospilus*

Genus **Euplectrus** Westwood

*Euplectrus* Wstw., 1832, Phil. Mag. (3) **1**: 128 (type: *E. maculiventris* Wstw.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 164–69.

**Euplectrus platypenae** Howard Fig. 5a.

*Euplectrus platypenae* How., 1885, Bull. U.S. Dept. Agr., Div. Ent. **5**: 26–27.—Fullaway, 1923, Proc. Haw. Ent. Soc. **5**: 354; 1924, *Ibid.* **6**: 22.—Swezey, 1927, *Ibid.* **6**: 355, 360,

503; 1928, *Ibid.* 7: 9; 1924, Haw. Planters' Record 28(3) : 318.—Hadden 1927, Proc. Haw. Ent. Soc. 6: 386.—Swezey & Bryan, 1927, *Ibid.* 6: 414.—Muir & Swezey, 1924, Rept. Comm. Exp. Sta. Haw. Sugar Planters' Assoc. p. 12.—Bianchi, 1946, Proc. Haw. Ent. Soc. 13: 345.—Weber, 1952, *Ibid.* 14: 348.—Davis, 1955, *Ibid.* 15: 403.—Peck, 1963, Canad. Ent., Suppl. 30: 169.

**DISTRIBUTION:** Continental U.S., Mexico, West Indies, Philippines, Fiji, Hawaiian Is. (Oahu, Hawaii, Molokai, Maui).

**HOSTS:** Lepidoptera, Noctuidae: *Laphygma exempta* (Walker), *Peridroma margaritosa* (Haworth), *Agrotis ypsilon* Rottenburg, *Pseudaletia unipuncta* (Haworth). (See Peck, 1963 for additional host records).

#### Genus **Elachertus** Spinola

*Elachertus* Spinola, 1811, Ann. Mus. Hist. Nat., Paris 17: 151, (type: *Diplolepis lateralis* Spin.; design. by Gahan & Fagan, 1923).—Peck, 1963, Canad. Ent., Suppl. 30: 173.

##### **Elachertus advena** Timberlake

*Elachertus advena* Timb., 1924, Proc. Haw. Ent. Soc. 5: 443; 1926, Bishop Mus. Bull. 31: 33.—Sakimura & Linford, 1940, Proc. Haw. Ent. Soc. 10: 454.—Suehiro, 1960, *Ibid.* 17: 297.

**DISTRIBUTION:** Guam, Midway, Hawaiian Is. (probably all islands).

**HOST:** Coleoptera, Scolytidae: *Hypothenemus* sp.

##### **Elachertus giffardi** Timberlake

*Elachertus giffardi* Timb., 1927, Proc. Haw. Ent. Soc. 6: 519.—Editor, 1927, *Ibid.* 6: 558.

**DISTRIBUTION:** Hawaiian Is. (Oahu).

##### **Elachertus** sp.

*Elachertus* sp., Timb., 1924, Proc. Haw. Ent. Soc. 5: 444.—Editor, 1924, *Ibid.* 5: 486.

**DISTRIBUTION:** Hawaiian Is. (Oahu).

#### Genus **Cirrospilus** Westwood

*Cirrospilus* Wstw., 1832, Phil. Mag. (3) 1: 128 (type *C. elegantissimus* Wstw.; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 182-88.

##### **Cirrospilus** sp.

*Cirrospilus* sp., Timb., 1922, Proc. Haw. Ent. Soc. 5: 15; 1924, *Ibid.* 5: 444.

**DISTRIBUTION:** Hawaiian Is. (Oahu, Kauai, Maui).

**HOSTS:** Lepidoptera, Gracillariidae: *Cremastobombycia lantenella* Busk, *Parectopa marginistrigata* (Walsm.).

#### Genus **Zagrammosoma** Ashmead

*Zagrammosoma* Ashm., 1904, Mem. Carnegie Mus. 1: 354, 393 (type: *Hippocephalus multilineatus* Ashm.; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 188-91.

**Zagrammosoma flavolineatum** Crawford Fig. 5b.

**Zagrammosoma flavolineata** Craw., 1913, Proc. U.S. Nat. Mus. **45**: 255.—Fullaway, 1950, Proc. Haw. Ent. Soc. **14**: 15.—Beardsley, 1961, *Ibid.* **17**: 314.

**Zagrammosoma flavolineatum**: Peck, 1961, *In Muesebeck et al, Agr. Monog. U.S. Dept. Agr.* **2**: 459; 1963, *Canad. Ent., Suppl.* **30**: 188.

DISTRIBUTION: Colorado, California, Hawaiian Is. (Oahu).

HOSTS: Lepidoptera, Gracillaridae: *Parectopa marginestrigata* (Walsm.); Elachistidae:

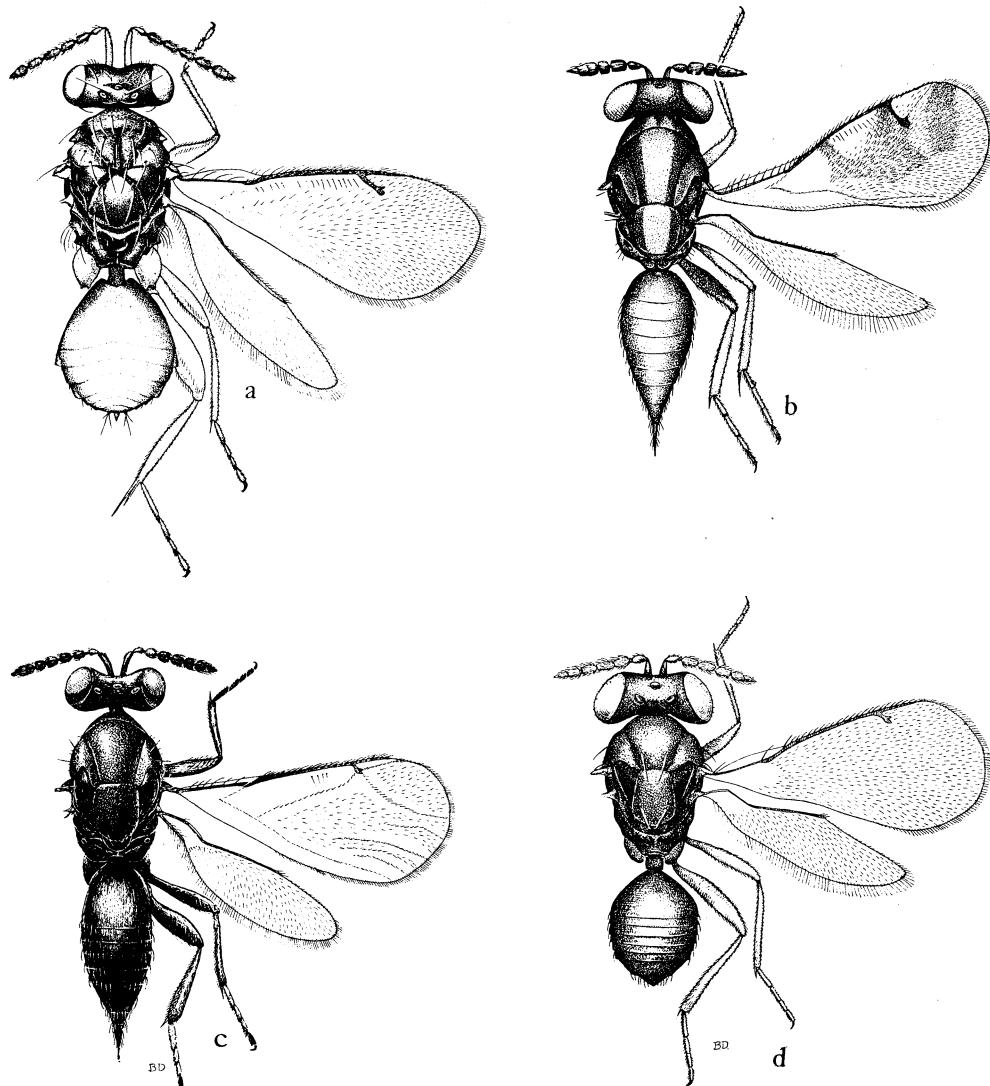


Fig. 5. a, *Euplectrus platypenae* Howard, ♀; b, *Zagrammosoma flavolineatum* Crawford, ♀; c, *Euderus metallicus* (Ashmead), ♀; d, *Chrysocharis parksi* Crawford, ♀.

*Swezeyula lonicerae* Zimmerman & Bradley.

Subfamily EUDERINAE

Genus **Euderus** Haliday

*Euderus* Hal., 1843, Trans. Ent. Soc. Lond. 3: 298 (type: *Entendon amphis* Walker: monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 197-201.

**Euderus metallicus** (Ashmead) Fig. 5c.

*Omphale metallicus* Ashm., 1901, Fauna Hawaiensis 1: 327.—Swezey, 1912, Proc. Haw. Ent. Soc. 2: 160, 162; 1915, *Ibid.* 3: 103.—Bridwell, 1919, *Ibid.* 4: 42.—Perkins, 1913, Fauna Hawaiensis, Introd., p. 170.

*Secodella metallica*: Timb., 1924, Proc. Haw. Ent. Soc. 5: 440; 1926, Bishop Mus. Bull. 31: 33.—Swezey, 1926, Proc. Haw. Ent. Soc. 6: 233; 1935, *Ibid.* 9: 94.—Swezey & Bryan, 1927, *Ibid.* 6: 413; 1929, *Ibid.* 7: 296, 310.—Swezey & Williams, 1932, *Ibid.* 8: 183.

*Euderus metallicus*: Krauss, 1944, Proc. Haw. Ent. Soc. 12: 92.

DISTRIBUTION: Guam, Hawaiian Is. (probably all islands).

HOSTS: Lepidoptera, Tineidae: *Bedellia orchilella* Walsm.; Gracilaridae: *Parectopa ure-rana* (Swezey), *epibathra* (Walsm.), *haunicola* (Swezey), *ureraella* (Swezey), *Philodoria basalis* Walsm., *P. pipturicola* Swezey, *P. auromagnifica* Walsm.; Alucitidae: *Orneodes objurgatella* Walsm.; Carposinidae: *Heterocrossa inscripta* Walsm.; Hyponomeutidae: *Hyposmocoma liturata* Walsm., *H. empedota* Meyr., *alliterata* Walsm.; Gelechiidae: *Aristotelia* sp.; Pyralidae: *Scoparis* sp. Diptera, Agromyzidae: *Agromyza* sp.; trypetid fly. Coleoptera, Curculionidae, *Heteramphus swezeyi* Perkins.

Subfamily ENTEDONTINAE

KEY TO HAWAIIAN GENERA OF ENTEDONTINAE

1. Body weakly sclerotized and sculptured; abdomen usually sessile..... 2  
Body strongly sclerotized and sculptered, abdomen often petiolate..... 5
2. ♀ antennae with 2-segmented funicle; ♂ rarely without 3-segmented funicle ..... 3  
♀ antennae with 3-segmented funicle; postmarginal vein 1.5 × as long as radius, usually longer..... **Chrysocaris**
3. Thorax smooth; antennal club broader than funicle ..... **Ceranisus**  
Thorax minutely reticulate; antennal club not so ..... 4
4. Wing with a single fuscous streak at stigma; flagellar segments not transverse ..... **Derostenus**  
Wing with 2 or 3 transverse bands, outer one at apical margin; flagellar segments tranverse ..... **Closterocerus**
5. Scutellum without median grooved line ..... 6  
Scutellum with median grooved line..... **Horismenus**
6. Body shiny metallic bluish black; thorax and abdomen stout, propodeum with 2 submedian carinae ..... **Pediobius**  
Body yellow with patches of brown; thorax and abdomen elongate; propodeum

with a median carina.....**Burksia**

**Genus Burksia Fullaway**

*Burksia* Full., 1955, Proc. Haw. Ent. Soc. **15**: 409 (type: *Burksia viridimaculata* Fullaway)

**Burksia viridimaculata** Fullaway Fig. 6.

*Burksia viridimaculata* Full., 1955, Proc. Haw. Ent. Soc. **15**: 410.

DISTRIBUTION: Florida, Palau, Hawaiian Is. (Oahu).

**Genus Chrysocharis Foerster**

*Chrysocharis* Foerst., 1856, Hym. Stud. pp. 79, 82 (type *C. femoralis* Foers.; design. by Ashmead, 1904).—Peck, 1963, Canad. Ent., Suppl. **30**: 201-5.

**Chrysocharis parksi** Crawford Fig. 5d.

*Chrysocharis parksi* Craw., 1912, Proc. U.S. Nat. Mus. **43**: 173-74.—Timberlake, Proc. Haw. Ent. Soc. **5**: 440.—Krauss, 1936, *Ibid.* **9**: 16.—Peck, 1963, Canad. Ent., Suppl. **30**: 203.

DISTRIBUTION: Continental U.S., Hawaiian Is. (Oahu).

HOSTS: Diptera, Agromyzidae: *Agromyza parvicornis* Loew, *Cerodontha femoralis* Meigen, *Liriomyza langei* Frick, *L. pictella* Thomson, *L. pusilla* (Meigen), *Ophomyia texana* Malloch, *Phytomyza aquilegiae* Hardy, *P. atricornis* Meigen, *P. obscurella* Fallen (After Peck 1963).

**Chrysocharis majoriana** (Girault)

*Chrysocharodes majoriana* Gir., 1917, Descr. Hym. Chalc. Var. cum Observ. p. 10.

**Chrysocharis majoriana**: Davis & Krauss, 1962, Proc. Haw. Ent. Soc. **18**: 129.—Krauss, 1962, *Ibid.* **18**: 131.

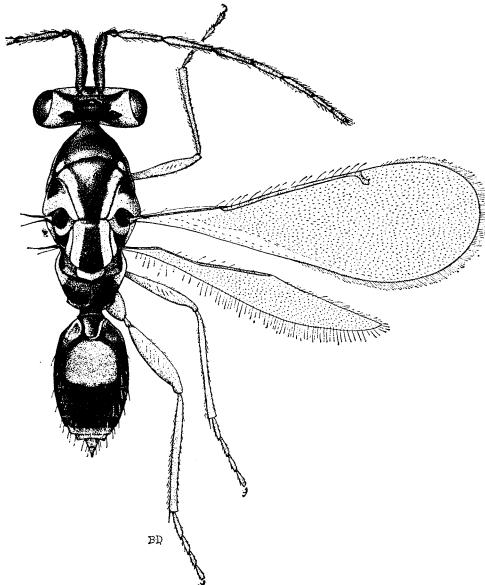
DISTRIBUTION: Sao Paulo, Brazil, Hawaiian Is. (Oahu).

HOSTS: Diptera, Agromyzidae: *Phytobia maculosa* (Malloch).

This species was introduced from Brazil on 18 September 1961, for control of *Phytobia maculosa* but was probably not established here.

**Genus Derostenus Westwood**

*Derostenus* Wstw., 1833, Mag. Nat. Hist. **6**: 495 (type *D. gemmeus* Wstw.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 213-16.



**Derostenus fullawayi** Crawford

*Derostenus fullawayi* Crawford, 1913, Proc. U.S. Nat. Mus. **46**: 348.—Peck, 1963, Canad. Ent., Suppl. **30**: 214-5.

*Achrysocharis fullawayi*: Timb., 1924, Proc. Haw. Ent. Soc. **5**: 440.—Van Zwaluwenburg, 1947, *Ibid.* **13**: 10.—Look, 1948, *Ibid.* **13**: 219; 1951, *Ibid.* **14**: 205.

*Derostenus fullawayi*: Peck, 1951, *In Muesebeck et al, Agr. Monogr. U.S. Dept. Agr.* **2**: 466.  
DISTRIBUTION: Palau, Hawaiian Is. (Oahu, Hawaii, Maui, Kauai).

HOSTS: Lepidoptera, Gracilaridae: *Cremastobombycia lantanella* Busck, *Parecpopa hiscicella* (Swezey). Diptera, Agromyzidae: *Liriomyza pusilla* (Meigen), *Pseudonapomyza spicata* Malloch.

**Derostenus** sp.

*Achrysocharis* sp., Timb., 1924, Proc. Haw. Ent. Soc. **5**: 440.—Davis & Krauss, 1962, *Ibid.* **18**: 129.

DISTRIBUTION: Hawaiian Is. (Oahu, Kauai).

Genus **Horismenus** Walker

*Horismenus* Walk., 1843, Ann. Mag. Nat. Hist. **11**: 117 (type: *H. cleodora* Walk.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 217-23.

**Horismenus depressus** Gahan Fig. 7a.

*Horismenus depressus* Gahan, 1930, Proc. U. S. Nat. Mus. **77**(8): 8.—Peck, 1963, Canad. Ent., Suppl. **30**: 217.

DISTRIBUTION: California, Hawaiian Is. (Oahu).

SPECIMENS EXAMINED: ♀, Honolulu, Hawaii, 24.VI.1941, ex *Pithecolobium dulce* pods (USNM); 11 ♀♀, 2 ♂♂, Honolulu, Hawaii, 24.VI.1941, ex *Acanthoscelides limbatus* Horn (USNM); 2 ♂♂, Barbers Point, Oahu, III.1960, E. J. Ford, Jr. (USNM); ♂, Honolulu, Hawaii, 18.V.1945, Weber, ex *Acacia koa* pod (USNM); ♀, Kaena Point, Oahu, 15.X.1927, Swezey; 4 ♂♂, Kalaua, Oahu, 16.XI.1932, Swezey, ex *Acacia confusa*.

**Horismenus** sp.

*Horismenus* sp., Swezey, 1923, Proc. Haw. Ent. Soc. **5**: 302.—Willard, 1924, *Ibid.* **5**: 356.—Timberlake, 1924, *Ibid.* **5**: 441.—Swezey, 1939, *Ibid.* **10**: 189.—Beardsley & Tuthill, 1959, *Ibid.* **17**: 60.—Hinckley, 1960, *Ibid.* **17**: 265.

DISTRIBUTION: Hawaiian Is. (Oahu, Niihau).

HOSTS: Coleoptera, Bruchidae: *Mimosestes sallaei* (Sharp). Hymenoptera, Braconidae: larva parasite.

This species was introduced as a parasite of bruchids in Hawaii by Bridwell and Willard from Brownsville, Texas in 1921 (Timberlake 1924).

SPECIMENS EXAMINED: 4 ♂♂, 9 ♀♀, Waianae, Oahu, 3.VII.1938, Swezey ex *B. sallaei* in *A. farnesiana* (USNM), 3 ♂♂, 13 ♀♀, Honolulu, Hawaii, 15.VII.1941 (No. 675), ex *Acanthoscelides sallaei*.

*Horismenus* sp. differs from *H. depressus* by the unpolished coxae, surface of scutellum

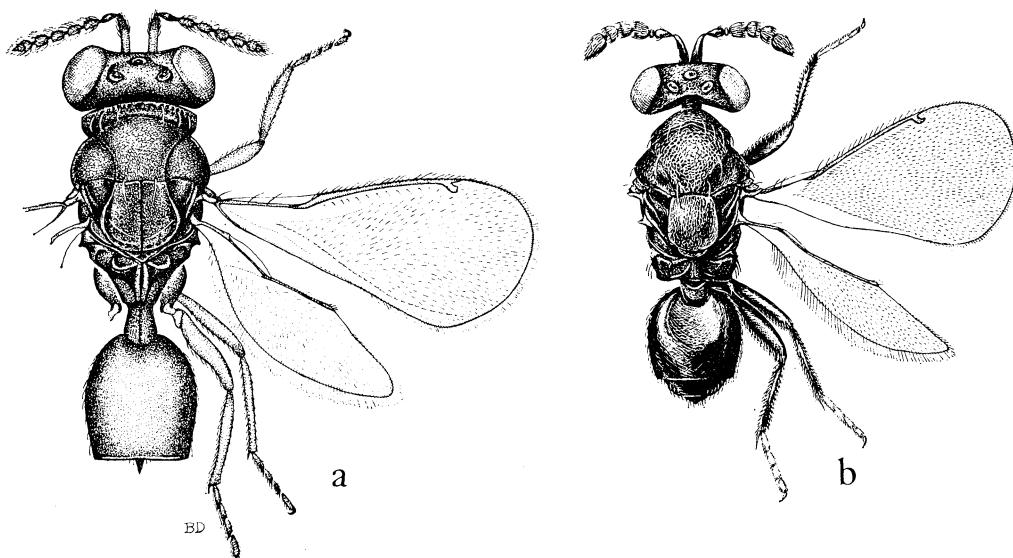


Fig. 7. a, *Horismenus depressus* Gahan, ♀; b, *Pediobius wilderi* (Howard), ♀.

not flattened but raised at base, reticulate and propodeum stouter.

#### Genus **Pediobius** Walker

*Pediobius* Walk., 1846, Ann. Mag. Nat. Hist. **17**: 184 (type: *Entedon (P.) imbreus* Walk.; design. by Ashmead, 1900).—Peck, 1963, Canad. Ent., Suppl. **30**: 223.

##### **Pediobius wilderi** (Howard) Fig. 7b.

*Mestocharis wilderi* How., 1892, Proc. Ent. Soc. Wash. **2**: 298.

*Pleurotropis wilderi*: Crawford, 1912, Proc. U. S. Nat. Mus. **43**: 179.—Bianchi, 1945, Proc. Haw. Ent. Soc. **12**: 246.—Look, 1946, *Ibid.* **12**: 474.—Bess, 1951, *Ibid.* **14**: 214.

*Pediobius wilderi*: Burks, 1958, In Krombein, Agr. Monog. U.S. Dept. Agr. **2**: Suppl. **1**: 28.—Peck, 1963, Canad. Ent., Suppl. **30**: 234.

DISTRIBUTION: Canada, New York, District of Columbia, South Carolina, California, Hawaiian Is. (Oahu, Hawaii).

HOSTS: Hymenoptera, Ichneumonidae: *Tromatobia rufopectus* (Cresson). Araneida, Argiopidae: *Aranea solitaria* (Emerton), *Argiope aurantia* Lucas. (After Peck 1963).

##### **Pediobius detrimentosus** (Gahan)

*Pleurotropis detrimentosus* Gah., 1931, Proc. U.S. Nat. Mus. **77(8)**: 9.—Beardsley, 1956, Proc. Haw. Ent. Soc. **16**: 8.

DISTRIBUTION: Hawaiian Is. (Hawaii, Oahu).

HOST: Hymenoptera, Braconidae: *Bracon omiodivorum*, reared from cocoon.

**Pediobius** sp.

*Pleurotropis* sp., Timb., 1924, Proc. Haw. Ent. Soc. **5**: 441.—Editor, 1924, *Ibid.* **5**: 486.—Sakimura & Linford, 1940, *Ibid.* **10**: 454.

DISTRIBUTION: Hawaiian Is. (Oahu).

Genus **Ceranisus** Walker

*Ceranisus* Walk., 1842, Entomologist **1**: vi, plate N. 2 (type: *Cirrospilus pacuvius* Walker; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 117–18.

**Ceranisus brui** Vuillet

*Thripoctenus brui* Vuill., 1914, Memoir Soc. Biol. France 66, p. 553.—Swezey, 1950, Proc. Haw. Ent. Soc. **14**: 10.

DISTRIBUTION: Hawaiian Is. (Hawaii, Maui, Oahu, Kauai).

HOST: Thysanoptera: probably *Isoneurothrips fullawayi* (Moulton).

Genus **Closterocerus** Westwood

*Closterocerus* Westw., 1833, Mag. Nat. Hist. **6**: 419 (type: *C. trifasciatus* Westw.; monobasic).—Crawford, 1912, Proc. U.S. Nat. Mus. **43**: 175.—Peck, 1963, Canad. Ent., Suppl. **30**: 192–96.

**Closterocerus** sp.

*Closterocerus* sp., Look, 1948, Proc. Haw. Ent. Soc. **13**: 219.

DISTRIBUTION: Hawaiian Is. (Hawaii, Oahu).

HOST: Diptera, Agromyzidae: *Pseudonapomyza spicata* Malloch.

*Astichus cyaneus* Ashmead in the Fauna Hawaiiensis [1901, Vol. **1** (3): 326] was misidentified and placed in the Eulophidae. The type specimen ♀, No. 1308 at British Museum (Nat. Hist.) was also examined by Z. Bouček and G. J. Kerrich and they both verified that it belongs to the family Pteromalidae. Later at the USNM, Washington D. C., Dr B. D. Burks, examined my specimen that had been compared with the type and agreed, further indicating that it belongs to the subfamily Tridyminae, tribe Tridymini using A. B. Gahan, 1951, unpublished key to the subfamilies and tribes of the family Pteromalidae. Comprehensive study of the family Pteromalidae will be taken up after this present study.

## Subfamily APHELININAE

## KEY TO HAWAIIAN GENERA OF APHELININAE

1. Antenna with more than 5 segments, club small, segmented ..... 2  
Antenna with 5 segments, club large, undivided ..... **Eretmocerus**
2. Tarsi 5-segmented ..... 3  
Tarsi 4-segmented ..... **Archenomus**
3. Wing normal ..... 4  
Wingless or dwarfed form ..... **Aphelinus**
4. Fore wing with an oblique hairless line from region of stigmal vein (speculum); antennae 6-segmented ..... 5

- Fore wing without oblique hairless lines; antennae 7 or 8-segmented ..... 8
5. Fore wing without maculate spots ..... 6
- Fore wing whitish with rounded fuscous spots ..... Marietta
6. Body robust; ovipositor not prominent ..... 7
- Body slim; ovipositor distinctly exserted ..... Centrodora
7. Marginal vein equal to or longer than submarginal vein; body generally yellow...  
..... Aphytis
- Marginal vein shorter than submarginal vein; body dark colored..... Aphelinus
8. Fore wing not amygdaliform; stigmal vein present; cilia on marginal fore wing  
  short; 3 funicle segments in unequal length ..... 9
- Fore wing amygdaliform; stigmal vein absent; cilia on marginal fore wing long;  
  3 funicle segments subequal in length ..... Aspidiotiphagus
9. Lateral margin of fore wing with long ciliae, usually longer than 1/4 of wing width  
..... Prospaltella
- Lateral margin of fore wing with shorter ciliae ..... 10
10. Hind tibia flattened ..... Aneristus
- Hind tibia normal ..... 11
11. ♀ club 3-segmented, shorter than funicle; ♂ with 8 antennal segments ...Coccophagus
- ♀ club 2-segmented, as long as funicle; ♂ with 7 antennal segments..... Encarsia

#### Genus *Eretmocerus* Haldeman

*Eretmocerus* Hald., 1850, Am. J. Sci. Arts (2)9: 111 (type: *E. corni* Hald.; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 239-41.

##### *Eretmocerus corni* Haldeman

*Eretmocerus corni* Hald., 1850, Am. J. Sci. Arts. (2)9: 110.—Kotinsky, 1907, Proc. Haw. Ent. Soc. 1: 127.—Timberlake, 1924, *Ibid.* 5: 438.—Fullaway, 1913, *Ibid.* 2: 216; 1932, *Ibid.* 8: 113, 119.—Weber, 1953. *Ibid.* 15: 129.—Peck, 1963, Canad. Ent., Suppl. 30: 240.

DISTRIBUTION: Continental U.S., Argentina, Paraguay, Chile, Hawaiian Is. (Oahu).

HOST: Homoptera, Aleyrodidae: *Pealius hibisci* (Kotinsky).

##### *Eretmocerus haldemani* Howard

*Eretmocerus haldemani* How., 1908, Proc. Ent. Soc. Wash. 10: 65.—Weber, 1953, Proc. Haw. Ent. Soc. 15: 129.—Peck, 1963, Canad. Ent., Suppl. 30: 240.

DISTRIBUTION: Florida, Mississippi, California, Hawaiian Is. (Oahu).

HOSTS: Homoptera, Aleyrodidae: *Aleuroplatus coronatus* (Quaintance); *Aleurothrix floccosus* (Maskell); *Trialeurodes vaporariorum* (Westwood).

*E. haldemani* was released on Oahu 19 August 1952 for control of aleyrodids.

#### Genus *Archenomus* Howard

*Archenomus* How., 1898, Proc. Ent. Soc. Wash. 4: 136 (type: *A. bicolor* How.; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 241.

*Pteroptrichoides* Full., 1913, Ann. Rpt. Haw. Agr. Expt. Sta. (1912): 27.

*Pseudopteroptrix* Full., 1918, Proc. Haw. Ent. Soc. **3**: 464.

KEY TO SPECIES OF HAWAIIAN ARCHENOMUS

- Antennal funicle segment 2 transverse, 1/2 length of segment 1 and 3 ..... *perkinsi*  
 Antennal funicle segments subequal in length ..... *imitatrix*

**Archenomus perkinsi** (Fullaway)

*Pterotrichoides perkinsi* Full., 1918, Proc. Haw. Ent. Soc. **3**: 463; 1920, *Ibid.* **4**: 239, 245;  
 1932, *Ibid.* **8**: 113.—Timberlake, 1924, *Ibid.* 438.—Swezey, 1950, *Ibid.* **14**: 3.

DISTRIBUTION: Hawaiian Is. (Oahu).

HOST: Homoptera, Diaspididae: *Morganella longispina* (Morgan); *Leucaspis indica* Fullaway.

**Archenomus imitatrix** (Fullaway)

*Pseudopteroptrix imitatrix* Full., 1918, Proc. Haw. Ent. Soc. **3**: 464; 1920, *Ibid.* **4**: 239, 234;  
 1932, *Ibid.* **8**: 119.—Timberlake, 1924, *Ibid.* **5**: 439.

DISTRIBUTION: Hawaiian Is. (Oahu).

HOST: Homoptera, Diaspididae: *Howardia biclavis* (Comstock).

Genus **Centrodora** Foerster

*Centrodora* Foerst., 1878, Verh. Naturh. Ver. Preuss. Rheinl. u. Westfalens **35**: 66 (type: *C. amoena* Foerster; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 242-43.

*Paraphelinus* Perkins, 1906, Bull. Haw. Sugar Planters' Assoc. Expt. Sta., Div. Ent. **1**: 264.

**Centrodora xiphidii** (Perkins)

*Paraphelinus xiphidii* Perk., 1906, Bull. Haw. Sugar Planter's Assoc. Expt. Sta., Div. Ent. **1**: 264; 1910, Fauna Hawaianensis **2**: 658; 1913, *Ibid.* Introduction, 107, 215; 1908, Proc. Haw. Ent. Soc. **2**: 21.—Timberlake, 1924, *Ibid.* **5**: 434.—Swezey, 1929, *Ibid.* **7**: 286.

*Centrodora xiphidii*: Bianchi, 1941, Proc. Haw. Ent. Soc. **11**: 14.

DISTRIBUTION: Hawaiian Is. (Oahu, Maui, Kauai).

HOSTS: Diptera, Agromyzidae: *Melanagromyza simplex* (Loew), *Xiphidium varipenne* Swezey.

Genus **Marietta** Motschulsky

*Marietta* Mots., 1863, Bull. Soc. Imp. Nat. Moscou **36** (2): 51 (type: *Marietta leopardina* Mots.; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 243-245.

KEY TO HAWAIIAN SPECIES OF MARIETTA

- Antennal scape slender, subequal in width to pedicel ..... *carnesi*  
 Antennal scape broad, 2× width of pedicel ..... *graminicola*

**Marietta carnesi** (Howard)

*Perissopterus carnesi* How., 1910, Ent. News **21**: 162-163.—Timberlake, 1925, Proc. Haw.

Ent. Soc. 6: 10.—Fullaway, 1932, *Ibid.* 8: 117.

*Perissopterus chinensis* Fullaway, 1920, *Ibid.* 4: 244.

*Marietta carnesi*: Timberlake, 1924, *Ibid.* 5: 438.—Swezey, 1936, *Ibid.* 9: 110.—Peck, 1963, Canad. Ent., Suppl. 30: 243.

DISTRIBUTION: Japan, Mauritius, Far East, Hawaiian Is. (Oahu).

HOSTS: Homoptera, Diaspididae: *Lepidosaphes* sp.; Coccidae: *Saissetia nigra* (Nietner), *S. oleae* (Bernard), (see Peck 1963 for additional host records).

Timberlake (1925) mentioned that this was probably the species Kotinsky reported as introduced from China in 1906.

#### ***Marietta graminicola* Timberlake**

*Marietta graminicola* Timb., 1925, Proc. Haw. Ent. Soc. 6: 180.—Swezey, 1932, *Ibid.* 8: 12, 273.—Fullaway, 1932, *Ibid.* 8: 11, 117.—Peck, 1963, Canad. Ent., Suppl. 30: 243.

DISTRIBUTION: Texas, Maryland, Hawaiian Is. (Oahu, Maui, Molokai).

HOSTS: Homoptera Pseudococcidae: *Trionymus insularis* Ehrhorn, *Antonina graminis* (Maskell).

This species was reported by Fullaway (1932) as a hyperparasite on *Anagyrus antonina* Timberlake, *A. swezeyi* Timberlake and *A. nigricornis* Timberlake (Hym., Encyrtidae).

#### ***Marietta* sp.**

*Perissopterus* sp., Fullaway, 1920, Proc. Haw. Ent. Soc. 4: 239, 240.

*Marietta* sp., Timberlake, 1924, Proc. Haw. Ent. Soc. 5: 438.

#### **Genus *Aphytis* Howard**

*Aphytis* How., 1900, Canad. Ent. 32: 168 (type: *Aphytis chilensis* How.; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 246–61.

#### **KEY TO HAWAIIAN SPECIES OF APHYTIS**

Body whitish to pale yellow; ovipositor sheath short (1.0); cilia of fore wing long...  
..... *chrysomphali*  
Body brownish yellow; ovipositor sheath long (1.5); cilia of fore wing short ..... *proclia*

#### ***Aphytis chrysomphali* (Mercet)**

*Aphelinus chrysomphali* Mercet, 1912, Trab. Mus. Nac. Cien. Nat., Madrid 10: 53, 67.

*Aphelinus limonus* Rust, 1915, Ent. News 26: 75.—Fullaway, 1920, Proc. Haw. Ent. Soc. 4: 239.—Timberlake, 1924, *Ibid.* 5: 412, 437.

*Aphytis chrysomphali*: Mercet, 1927, Eos 3: 489–90.—Timberlake, 1926, Proc. Haw. Ent. Soc. 6: 315.—Fullaway, 1932, *Ibid.* 8: 113, 117.—Swezey, 1936, *Ibid.* 9: 110; 1950, *Ibid.* 14: 3.—Hardy, 1950, *Ibid.* 14: 8.—Peck, 1963, Canad. Ent., Suppl. 30: 247–49.

DISTRIBUTION: Probably worldwide; Hawaiian Is. (Oahu, Hawaii).

HOSTS: Homoptera, Coccidae: *Saissetia nigra* (Nietner); Diaspididae: *Diaspis bromeliae* (Kerner), *Hemiberlesia cyanophylli* (Signoret), *H. rapax* (Comstock), *H. cydoniae*

Comstock, *Hemichionaspis minor* Maskell; *Chrysomphalus aonidum* (L.), *C. rossi* Maskell, *Lepidosaphes auriculata* Fullaway, *L. beckii* (Newman), *Pseudoparlatoria giffardi* Fullaway, *Morganella longispina* (Morgan), *Aonidiella inornata* McKenzie.

**Aphytis proclia** (Walker)

*Aphelinus proclia* Walk., 1839, Monog. Chalciditum 1, p. 9.

*Aphelinus diaspidis* Howard, 1881, Ann. Rpt. U.S. Dept. Agr. (1880): 355.—Fullaway, 1913, Proc. Haw. Ent. Soc. 2: 213, 216; 1920, *Ibid.* 4: 243–244; 1932, *Ibid.* 8: 113, 117.—Timberlake, 1924, *Ibid.* 5: 412, 437.—Muir, 1913, *Ibid.* 2: 228.

*Aphelinus fuscipennis* Howard, 1881, Ann. Rpt. Dept. Agr. (1880): 356.—Kotinsky, 1906, Proc. Haw. Ent. Soc. 1: 30.—Fullaway 1920, *Ibid.* 4: 239.

*Aphytis proclia*: Peck, 1951, *In Muesebeck et al*, Agr. Monog. U.S. Dept. Agr. 2: 434; 1963, Canad. Ent., Suppl. 30: 256–61.

DISTRIBUTION: Worldwide, Hawaiian Is. (Oahu).

HOSTS: Homoptera Diaspididae: *Diaspis bromeliae* Kerner, *D. echinocacti* Bouché, *Aulacaspis rosae* Bouché, *Hemichionaspis minor* Maskell, *Aspidiotus cydoniae* Comstock, *Pinnaspis buxi* Bouché (see Peck 1963 for additional host records).

**Aphytis lingnanensis** Compere

*Aphytis lingnanensis* Comp., 1955, Univ. Calif. Publ. Ent. 10: 272, 274, 281, 303, 307, 314.

*Aphytis holoxanthus* De Bach, 1960, Ann. Ent. Soc. Amer. 53: 701–5.—Davis & Krauss, 1964, Proc. Haw. Ent. Soc. 18: 394.

Because of poor specimens, I was not able to put this species in the key.

DISTRIBUTION: China, Taiwan, California, Texas, Hawaiian Is. (Oahu).

Genus **Aphelinus** Dalman

*Aphelinus* Dalman, 1820, Handl. K. Svensk. Vetensk Akad. 21: 181 (type: *Entedon abdominalis* Dalman; monobasic).—Peck, 1963, Canadian Ent., Suppl. 30: 261–69.

KEY TO HAWAIIAN SPECIES OF APHELINUS

1. Middle and hind tibia brownish ..... 2  
Legs except coxae and hind femur polished cream yellow; abdomen concolorous with legs except lateral margin brownish ..... *semiflavus*
2. Abdomen concolorous with thorax ..... 3  
Base of abdomen yellowish ..... *gossypii*
3. Body brownish ..... *maidis*  
Head jet black, body mostly black ..... *mali*

**Aphelinus gossypii** Timberlake Fig. 8.

*Aphelinus gossypii* Timb., 1924, Proc. Haw. Ent. Soc. 5: 408, 410, 437.—Swezey & Bryan, 1929, *Ibid.* 7: 295.—Fullaway, 1932, *Ibid.* 8: 118.

DISTRIBUTION: Hawaiian Is. (Oahu).

HOST: Homoptera, Aphididae: *Aphis gossypii* Glover, prob *A. medicaginis* Koch.

**Aphelinus mali** (Haldeman)

*Eriophilus mali* Hald., 1851, Pennsylvania, Farm J. 1: 130-31.

*Aphelinus mali*: Howard, 1881, Ann. Rpt.

U. S. Dept. Agr. (1880): 356-57.—  
Kirkaldy, 1907, Proc. Haw. Ent. Soc. 1: 100.—Fullaway, 1913, *Ibid.* 2: 216.—  
Timberlake, 1924, *Ibid.* 5: 410.—  
Peck, 1963, Canad. Ent., Suppl. 30: 263-66.

DISTRIBUTION: Worldwide, Hawaiian Is. (Oahu).

HOSTS: Homoptera: Aphididae; Diapsidae (see Peck, 1963 for additional host records).

**Aphelinus maidis** Timberlake

*Aphelinus maidis* Timb., 1924, Proc. Haw. Ent. Soc. 5: 405, 408, 411, 436.—  
Swezey, 1928, *Ibid.* 7: 181, 209.—  
Fullaway, 1932, *Ibid.* 8: 118.

DISTRIBUTION: Hawaiian Is. (Oahu, Hawaii).

HOST: Homoptera, Aphididae: *Aphis maidis* Fitch, *A. sacchari* Zehntner.

**\*Aphelinus semiflavus** Howard

*Aphelinus semiflavus* How., 1908, Ent. News 19: 366.—Timberlake, 1924, Proc. Haw. Ent. Soc. 5: 409, 411, 437.—Fullaway, 1932, *Ibid.* 8: 118.—Peck, 1963, Canad. Ent., Suppl. 30: 268.

DISTRIBUTION: Continental U.S., Worldwide, Hawaiian Is. (Oahu).

HOSTS: Homoptera, Aphididae: *Toxoptera aurantii* (Fonscolombe), *Aulacorthum circumflexum* (Buckton); Aleyrodidae: *Aleyrodes shizuokensis* (reared by Beardsley, June 1957). (See Peck 1963, for additional host records).

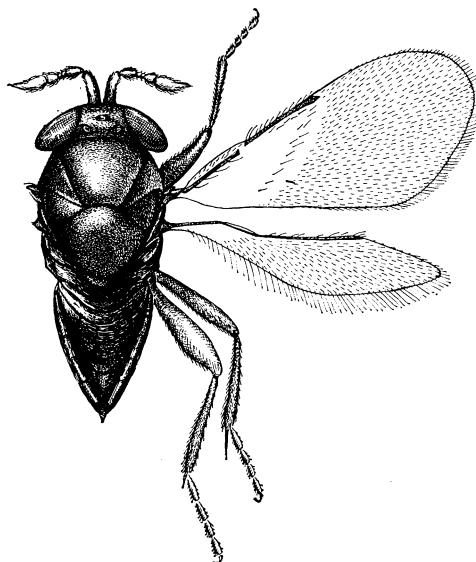


Fig. 8. *Aphelinus gossypii* Timberlake, ♀.

### Genus **Prospaltella** Ashmead

*Prospalta* How., 1894, Insect Life 7: 6 (preoccupied by *Prospalta* Walker, 1857).

*Prospaltella* Ashmead, 1904, Proc. Ent. Soc. Wash. 6: 126 (n. name).—Peck, 1963, Canad. Ent., Suppl. 30: 275-83.

### KEY TO HAWAIIAN SPECIES OF PROSPALTERRA

1. Body yellowish or parts of body with combination of brown and yellow color ..... 2  
Brownish to black species with pale yellow scutellum ..... **bicolor**

\* A junior synonym of *A. asychis* Walker (Ferrière, 1965, Hymen. Aphelin. d'Europe, p. 77).

2. Pale to orange yellow species.....*transvena*  
 Head, meso- and metanotum yellow; abdomen and pronotum brown.....*koebelei*

**Prospaltella bicolor** Timberlake

*Prospaltella bicolor* Timb., 1926, Proc. Haw. Ent. Soc. **6**: 310.—Fullaway, 1932, *Ibid.* **8**: 112.

DISTRIBUTION: Hawaiian Is. (Oahu).

HOST: Homoptera, Diaspididae: *Aspidiotus cydoniae* Comstock.

**Prospaltella koebelei** Fullaway

*Prospaltella koebelei* Full., 1920, Proc. Haw. Ent. Soc. **4**: 245; 1932, *Ibid.* **8**: 119.—Swezey, 1950, *Ibid.* **14**: 3.

DISTRIBUTION: Hawaiian Is. (Hawaii).

HOST: Homoptera, Diaspididae: *Morganella longispina* Morgan.

**Prospaltella transvena** Timberlake

*Prospaltella transvena* Timb., 1926, Proc. Haw. Ent. Soc. **6**: 312.—Fullaway, 1932, *Ibid.* **8**: 112, 119.

DISTRIBUTION: Hawaiian Is. (Oahu, Hawaii).

HOSTS: Homoptera, Aleyrodidae: *Trialeurodes vaporariorum* (Westwood), *Pealius hibisci* (Kotinsky), *Aleyrodes sonchi* (Kotinsky). *Aphis sacchari* Zehntner.

**Prospaltella** sp.

*Prospaltella* sp., Timberlake, 1924, Proc. Haw. Ent. Soc. **5**: 434-35.

Genus **Encarsia** Foerster

*Encarsia* Foerst., 1878, Verh. Naturh. Ver. Preuss. Rheinl. u. Westfalens **35**: 65 (type: *Encarsia tricolor* Foerster; monobasic).

KEY TO HAWAIIAN SPECIES OF ENCARSIA

- Base of the fore wing narrow; cilia on margin short; abdomen and legs pale yellowish. Thorax brownish.....*pergandiella*  
 Base of the fore wing broad; cilia on margin long; abdomen brownish, thorax yellowish .....*formosa*

**Encarsia formosa** Gahan

*Encarsia formosa* Gah., 1924, Proc. U.S. Nat. Mus. **65** (4): 14.—Swezey, 1949, Proc. Haw. Ent. Soc. **13**: 327; 1952, *Ibid.* **14**: 344.—Peck, 1963, Canad. Ent., Suppl. **30**: 283-85.

DISTRIBUTION: Worldwide, Hawaiian Is. (Oahu).

HOST: Homoptera, Aleyrodidae: *Trialeurodes vaporariorum* (Westwood), *Aleyrodes shizuokensis* (reared by Beardsley, 1957).

**Encarsia pergandiella** Howard

*Encarsia pergandiella* How., 1907, U. S. Dept. Agr., Bur. Ent., Tech. Ser. **12**: 78.—Peck, 1963, Canad. Ent., Suppl. **30**: 286.

*Encarsia versicolor* Girault, 1908, Psyche **15**: 53-57.—Timberlake, 1924, Proc. Haw. Ent. Soc. **5**: 435.—Fullaway, 1932, *Ibid.* **8**: 112.

DISTRIBUTION: Continental U. S., Hawaiian Is. (Oahu).

HOST: Homoptera, Aleyrodidae: *Aleyrodes sonchi* Kotinsky, *Trialeurodes vaporariorum* Westwood (see Peck 1963, for additional host records).

**Encarsia** sp.

*Encarsia* sp., Timberlake, 1924, Proc. Haw. Ent. Soc. **5**: 435.—Editor, 1924, *Ibid.* **5**: 486.—Fullaway, 1932, *Ibid.* **8**: 118.

**Genus Aspidiotiphagus Howard**

*Aspidiotiphagus* How., 1894, Insect Life **6**: 229-30, (type: *Coccophagus citrinus* Craw; monobasic).—Peck, 1963, Canad. Ent., Suppl. **30**: 288-93.

**KEY TO HAWAIIAN SUBSPECIES OF ASPIDIOTIPHAGUS**

Fore wing proportionately larger; antennae longer ..... *citrinus citrinus*  
Fore wing proportionately smaller; antennae smaller ..... *citrinus agilior*

**Aspidiotiphagus citrinus agilior** Berlese

*Aspidiotus citrinus* var. *agilior* Berl., 1916, Redia **12**: 5, 7-8, 10-12.

*Aspidiotus agilior*: Timberlake, 1924, Proc. Haw. Ent. Soc. **5**: 436.—Fullaway, 1932, *Ibid.* **8**: 118.

*Aspidiotiphagus agilior*: Swezey, 1939, Proc. Haw. Ent. Soc. **10**: 179.

*Aspidiotiphagus citrinus agilior*: Peck, 1951, *In Muesebeck et al, Agr. Monog. U. S. Dept. Agr.* **2**: 438.

DISTRIBUTION: Almost worldwide, Hawaiian Is. (Oahu).

HOSTS: Homoptera, Diaspididae: *Parlatoria zizyphus* (Lucas), *Fiorinia fioriniae* (Targioni-Tozzetti), *Diaspis echinocacti* Bouché.

Timberlake (1924) remarked that the "species of *Aspidiotiphagus* was introduced by Koebele about 1894 from China and Japan, but whether it was this or the preceding species or both, is unknown." The preceding species he refers to is *A. citrinus citrinus* (Craw).

**Aspidiotiphagus citrinus citrinus** (Craw)

*Coccophagus citrinus* Craw, 1891, Calif. State Bd. Hort., Div. Ent., Destructive Insects, pp. 25, 28.—Kotinsky, 1911, Proc. Haw. Ent. Soc. **2**: 25.

*Aspidiotiphagus citrinus*: 1894, Howard, Insect Life **6**: 228.—Fullaway, 1913, Proc. Haw. Ent. Soc. **2**: 213, 216; 1920, *Ibid.* **4**: 243-46; 1922, Hawaiian Forest. & Agric. **19** (1): 7; 1932, *Ibid.* **8**: 118.—Swezey, 1923, Proc. Haw. Ent. Soc. **5**: 300; 1952, *Ibid.* **14**: 379.—Timberlake, 1924, *Ibid.* **5**: 436.—Browne, 1939, *Ibid.* **10**: 187.

DISTRIBUTION: Worldwide.

HOSTS: Homoptera, Diaspididae: *Pinnaspis buxi* Bouche, *Phenacaspis cockerelli* (Cooley)=*P. sandwicensis* (Fullaway), (see Peck 1963, for additional host record).

Genus *Aneristus* Howard

*Aneristus* How., 1895, Canad. Ent. 27: 351 (type: *Aneristus ceroplastae* Howard; monobasic).—Peck, 1963, Canad. Ent., Suppl. 30: 293-94.

*Aneristus ceroplastae* Howard      Fig. 9a.

*Aneristus ceroplastae* How., 1895, Canad. Ent. 27: 351.—Timberlake, 1924, Proc. Haw. Ent. Soc. 5: 433.—Swezey, 1931, *Ibid.* 7: 486; 1932, *Ibid.* 8: 6; 1936, *Ibid.* 9: 110.—Fullaway, 1932, *Ibid.* 8: 112.—Ehrhorn, 1941, *Ibid.* 11: 16.—Beardsley, 1955, *Ibid.* 15: 386.—Peck, 1963, Canad. Ent., Suppl. 30: 293.

*Prococcophagus orientalis* Howard, 1896, In Howard & Ashmead, Proc. U.S. Nat. Mus. 18: 633.—Fullaway, 1913, Proc. Haw. Ent. Soc. 2: 216, 218, 287; 1920, *Ibid.* 4: 239, 241; 1932, *Ibid.* 8: 119.—Timberlake, 1915, *Ibid.* 3: 404.—Illingworth, 1929, *Ibid.* 7: 248.

DISTRIBUTION: Worldwide, Hawaiian Is. (Oahu, Hawaii, Kauai, Molokai, Maui).

HOSTS: Homoptera, Diaspididae: *Hemiberlesia rapax* (Comstock); Coccidae: *Ceroplastes rubens* Maskell, *Saissetia hemisphaerica* (Targioni-Tozzetti), *S. nigra* (Nietner), *S. oleae* (Bernard), *Coccus viridis* Green, *C. hesperidum* L., *Coccus longulus* Dougl.

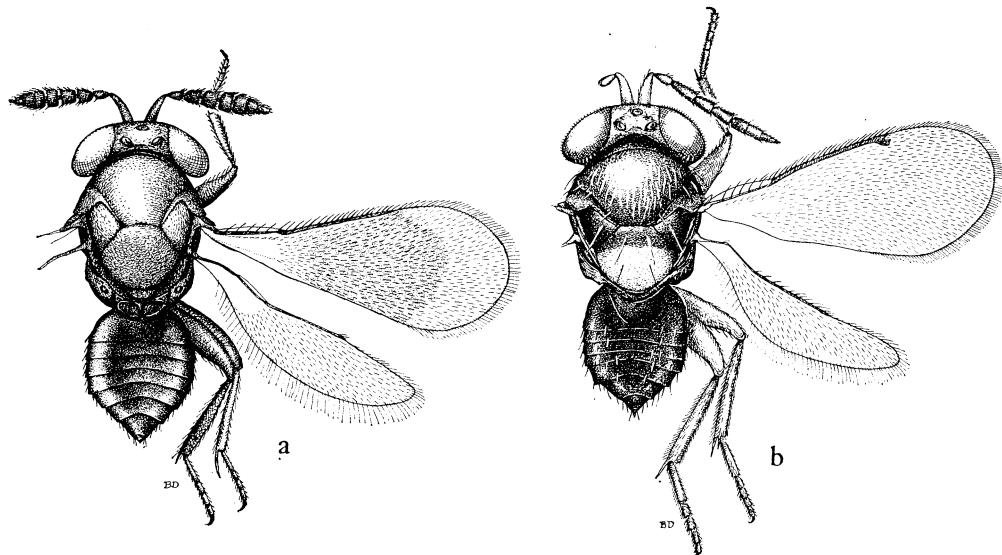


Fig. 9. a, *Aneristus ceroplastae* Howard ♀; b, *Coccophagus hawaiiensis* Timberlake, ♀.

## KEY TO HAWAIIAN SPECIES OF COCCOPHAGUS

1. Body black, except apical half of scutellum and sometimes posterior part of metanotum yellowish; antennae brownish to fuscous..... 2
- Body brownish yellow; antennae yellow except pedicel black..... *ochraceus*
2. Fore and mid tibiae yellowish..... *lycimnia*
- Fore, mid and hind tibiae brownish to fuscous..... *hawaiiensis*

Genus **Coccophagus** Westwood

*Coccophagus* Westw., 1833, Phil. Mag. (3) 3: 344 (type: *Entedon scutellaris* Dalman; designated by Westwood, 1840).—Peck, 1963, Canad. Ent., Suppl. 30: 295–318.

**Coccophagus hawaiiensis** Timberlake      Fig. 9b.

*Coccophagus hawaiiensis* Timb., 1926, Proc. Haw. Ent. Soc. 6: 315–17.—Fullaway, 1932, *Ibid.* 8: 112.—Swezey, 1936, *Ibid.* 9: 125.—Peck, 1963, Canad. Ent., Suppl. 30: 302.

DISTRIBUTION: Hawaiian Is. (Oahu).

HOST: Homoptera, Coccidae: *Saissetia nigra* (Nietner), *S. oleae* (Bernard), *Coccus viridis* Green.

**Coccophagus lycimnia** (Walker)

*Aphelinus lycimnia* Walk., 1839, Monog. Chalciditum 1: 11.

*Platygaster lecanii* Fitch, 1858 (1859), Trans. N. Y. State Agr. Soc. 18: 805–6.

*Coccophagus lecanii*: Smith, 1878, Amer. Nat. 12: 661.—Ashmead, 1901, Fauna Hawaiiensis 1: 328.—Fullaway, 1911, Proc. Haw. Ent. Soc. 2: 216; 1920, *Ibid.* 4: 239, 242; 1931, Agric. Ext. Ser. Ext. Bull. 9: 8.

*Coccophagus lycimnia*: Mercet, 1931, Eos 7: 400–2.—Peck, 1963, Canad. Ent., Suppl. 30: 305–12.

DISTRIBUTION: Worldwide, Hawaiian Is. (Hawaii, Maui, Oahu, Kauai).

HOST: Diaspididae, Pseudococcidae, Coccidae, *Coccus viridis* Green, Dactylopiidae, Margarodidae, Encyrtidae (after Peck 1963).

**Coccophagus ochraceus** Howard

*Coccophagus ochraceus* How., 1895, Tech. Ser. U.S. Dept. Agr., Div. Ent. 1: 38.—Ashmead, 1901, Fauna Hawaiiensis 1: 328.—Fullaway, 1920, Proc. Haw. Ent. Soc. 4: 242; 1932, *Ibid.* 8: 112.—Timberlake, 1924, *Ibid.* 5: 434.—Peck, 1963, Canad. Ent., Suppl. 30: 312–13.

DISTRIBUTION: Continental U.S., Africa, Eritrea, Hawaiian Is. (Hawaii, Oahu).

HOSTS: Homoptera, Coccidae: *Lecanium corni* Bouché, *Saissetia hemisphaerica* (Targioni-Tozzetti), *S. nigra* (Nietner), *S. oleae* (Bernard), after Peck 1963; *Coccus viridis* Green.

**Coccophagus** sp.

*Coccophagus* sp. Timberlake, 1924, Proc. Haw. Ent. Soc. 5: 433.

DISTRIBUTION: Hawaiian Is. (Kauai).