

TAXONOMY AND IDENTIFICATION OF THE EGG PARASITES  
(HYMENOPTERA: PLATYGASTRIDAE, TRICHOGRAMMATIDAE,  
MYMARIDAE, AND EULOPHIDAE) OF CITRUS  
WEEVILS (COLEOPTERA: CURCULIONIDAE)

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*Abstract.*—The egg parasitoids of citrus weevils are reviewed, and an illustrated key is presented. Nine species of Hymenoptera in two superfamilies (Chalcidoidea: Eulophidae, Mymaridae, and Trichogrammatidae and Proctotrupeoidea: Platygastriidae) are now known to be primary or secondary parasites in these weevil egg masses. Two new species, *Horismenus bennetti* and *Tetrastichus fennahi*, both eulophids, are described and figured. Additional data on the known hosts and distributions of the parasitoids are given.

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Weevils in the genera *Pachneus*, *Exopthalmus*, *Artipus*, and *Diaprepes* (Curculionidae) feed on a variety of plants. Adults are leaf feeders and larvae feed on and bore into the roots of the host plants. When these weevils attack citrus trees, they are collectively called citrus weevils and are capable of causing substantial economic damage. Larvae can even kill citrus by girdling the roots.

Since 1964, when specimens of *Diaprepes abbreviatus* (L.) were discovered in citrus groves in the vicinity of Apopka, Florida (Woodruff, 1964), several attempts to establish effective biological control programs have been made (e.g. Sutton et al., 1972; Beavers and Selhime, 1975). Unfortunately, these efforts have met with limited success.

The weevil is native to Puerto Rico and the West Indies (Woodruff, 1968), but the exact route by which it became introduced into continental United States is unknown. In Puerto Rico, where *D. abbreviatus* has been a pest of sugarcane (commonly known as the sugar-cane root-stalk borer weevil), it has been effectively suppressed by an egg

parasite, *Tetrastichus haitiensis* Gahan (Wolcott, 1948). This parasite has been the subject of most of the efforts to establish a biological control agent in the U.S. However, several other parasites have been reared from the eggs of citrus weevils and the inability to identify and correctly assign specific names to these species has hampered efforts at control (R. Woodruff, pers. comm.). In addition, it is now apparent that some of these species are undescribed.

I take this opportunity to clarify the taxonomy of these species and provide a key to enable field workers to identify them. Much information about the biology and interrelationships of these species remains to be discovered and a sounder taxonomy should enable that work to proceed. Listed hosts for the parasites refer only to known species of citrus weevils and, in the case of hyperparasites, to hosts associated with citrus weevils.

The majority of specimens used in this study were collected by R. Woodruff, E. E. Grissell and F. D. Bennett. They and the types are deposited in either the Florida State

Collection of Arthropods at Gainesville (FSCA), the British Museum of Natural History (BMNH) or the U.S. National Museum, Washington, D.C. (USNM).

Morphological terminology follows that of Graham (1959), except that I use the term metasoma to refer to that part of the abdomen past the propodeum (often called the gaster) and metanotum rather than meta-scutellum. Terms for sculpturing follow Harris (1979).

KEY TO THE PARASITES OF CITRUS  
WEEVIL EGGS

- 1. Forewings nearly parallel sided (Fig. 5) and with marginal cilia longer than width of wing; female antennae with 6 funicle articles and club entire (Fig. 14); male antennae with 13 articles ..... *Cleruchus* sp.
- Forewings not parallel sided (Figs. 1-4) and with marginal cilia much shorter than wing width; female antennae with fewer than 6 funicle articles and club when present with 2 or 3 articles (Figs. 6-11); male antennae with fewer than 13 articles ..... 2
- 2. Tarsi 5-segmented; forewing with only submarginal vein (Fig. 1); antenna with 4 small funicular articles (Fig. 6) and a 3-segmented club; scutellum without paired setae (Fig. 15) ..... *Platystasius citri* Nixon
- Tarsi 3 or 4-segmented; forewing with submarginal, marginal and stigmal veins (Figs. 2-4); antennae with fewer than 4 funicular articles or club not 3-segmented (Figs. 7-11); scutellum with 1 or two pairs of setae (Figs. 16, 20) ..... 3
- 3. Tarsi 3-segmented; forewings with obvious setal tracts radiating from stigmal vein and other wing veins as in Fig. 2; female antenna as in Fig. 10; body length about 0.8 mm ..... *Brachyufens osborni* (Dozier)
- Tarsi 4-segmented; forewings without setal tracts, wing veins as in Figs. 3, 4; antennae as in Figs. 7-9, 11; body length greater than 0.9 mm ..... 4
- 4. Scutellum with 2 longitudinal submedian grooves and 2 pairs of setae (Figs. 16, 17); axillae advanced forward of anterior edge of scutellum; clypeus bilobed (Fig. 24); propodeum narrowed medially, only about as wide as metanotum, with a simple median carina which may be incomplete (Fig. 23); metasoma broadly joined to propodeum, petiole not apparent ..... 7
- Scutellum without grooves or with only a single

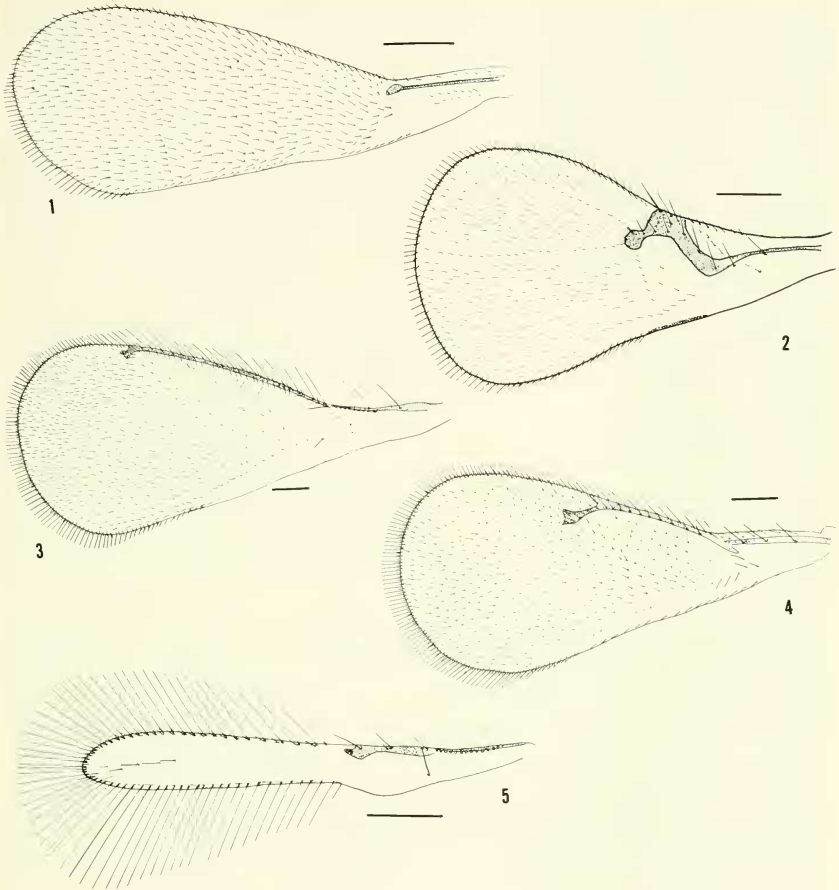
- median groove (Figs. 18-20), with only a single pair of setae; axillae not advanced past anterior edge of scutellum, clypeal margin straight; propodeum wider than metanotum; metasoma petiolate ..... 5
- 5. Scutellum with median longitudinal groove (Figs. 18, 19); propodeum with median raised area flanked by submedian carinae (Fig. 22) ... 6
- Scutellum without median groove (Fig. 20), propodeum with a pair of parallel submedian carinae (Fig. 21) ... *Pediobius irregularis* Kerrich
- 6. Notaulices complete, well defined (Fig. 18); first metasomal tergum with narrow reticulate band of sculpture posteriorly (Fig. 12); body metallic green; male femora and scape yellow ..... *Horismenus cupreus* (Ashmead)
- Notaulices faint, incomplete (Fig. 19); first metasomal tergum nearly smooth or with faint open crack-like sculpture on posterior half (Fig. 13); body black; male femora and scape brown to black ..... *Horismenus bennetti* sp. nov.
- 7. Most of head and metasoma yellow, rest of body often with extensive areas of yellow, may be nearly entirely yellow; male flagellar articles with long whorled setae (Fig. 11) ..... *Tetrastichus gala* (Walker)
- Body dark brown or blackish (except legs yellow); male flagellar articles without long whorled setae (Fig. 8) ..... 8
- 8. Submarginal vein with a single seta (rarely 2); mesoscutum midlobe with single row of setae (Fig. 17); body without metallic greenish lustre; base of metasoma yellow; propodeum smooth and without carinae arising from nucha ..... *Tetrastichus haitiensis* Gahan
- Submarginal vein with 3 or 4 setae (Fig. 4); mesoscutum with an irregular second row of setae (Fig. 16); body with metallic greenish lustre; propodeum sculptured and with carinae arising from nucha (Fig. 21) ..... *Tetrastichus fennahi* sp. nov.

TRICHOGRAMMATIDAE

*Brachyufens osborni* (Dozier)  
Figs. 2, 10

*Ufens osborni* Dozier, 1932: 36.

Notes.—This species was described from specimens reared from *Diaprepes abbreviatus* eggs in Puerto Rico. In his original description, Dozier noted that *osborni* was somewhat different than other species of *Ufens*, but decided that it still fell within the limits of that genus. Dout and Viggiani (1968) noted several differences between the

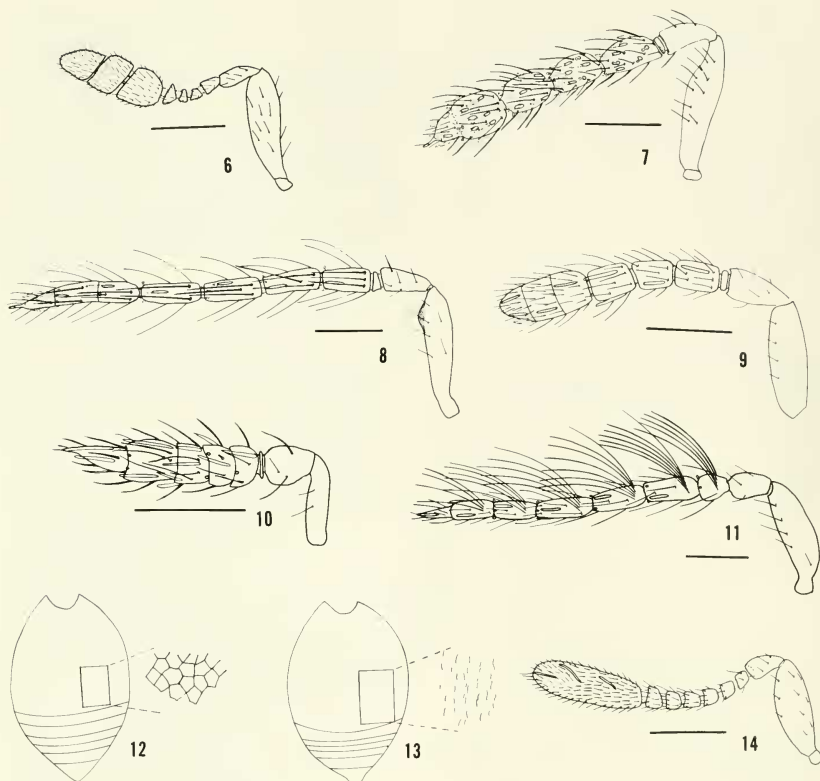


Figs. 1-5. Forewings. 1, *Platystasius citri*. 2, *Brachyufens osborni*. 3, *Horismenus bennetti*. 4, *Tetrastichus fennahi*. 5, *Cleruchus* sp. Scale line equals 0.1 mm.

other species of *Ufens* and *osborni* and transferred it to their new genus *Brachyufens* as the type species. *B. osborni* has been reared from *Pachnaeus litus* eggs as well as species of *Diaprepes*. It has been reported to be quite common at times and has parasitized as many as 81% of the eggs of *P. litus* (Baranowski, 1960). In view of the known biology of other trichogrammatids, it is

doubtful that reports of this species as a possible secondary parasite (Burks, 1979) are correct.

**Diagnosis.**—As the only trichogrammatid reared from citrus weevil eggs, this species is quite easily separated from the other parasites by the following characters: tarsi 3-segmented (4 or 5 segmented in others), forewings with distinct setal tracts (no



Figs. 6-14. 6-11, Antennae. 6, *Platystasius citri*, female. 7, *Horismenus bennetti*, female. 8, *Tetrastichus haitiensis*, male. 9, *Tetrastichus fennahi*, female. 10, *Brachyufens osborni*, female. 11, *Tetrastichus gala*, male. 12, 13, Metasomas. 12, *Horismenus cupreus*. 13, *Horismenus bennetti*. 14, *Cleruchus* sp., female antenna. Scale line equals 0.1 mm.

tracts in other species) and venation as in Fig. 2, length about 0.8 mm and female antennae as in Fig. 10 (other antennae as in Figs. 6-9).

Hosts.—*Pachneus litus* (Germar), *P. opalus* (Olivier), *Diaprepes abbreviatus* (L.).

Specimens examined.—Dominican Republic: San Cristobal Prov., San Cristobal. Puerto Rico: Mayaguez, University Campus; Maricao. Andros Island, San Andros. Montserrat, Plymouth. United States. Florida: Dade Co., Homestead; Palm Beach Co., West Palm Beach; Indian River Co., Vero

Beach; St. Lucie Co.; Ft. Pierce, Hardee Co., Ft. Green. Collection dates range from 14 June through 3 October.

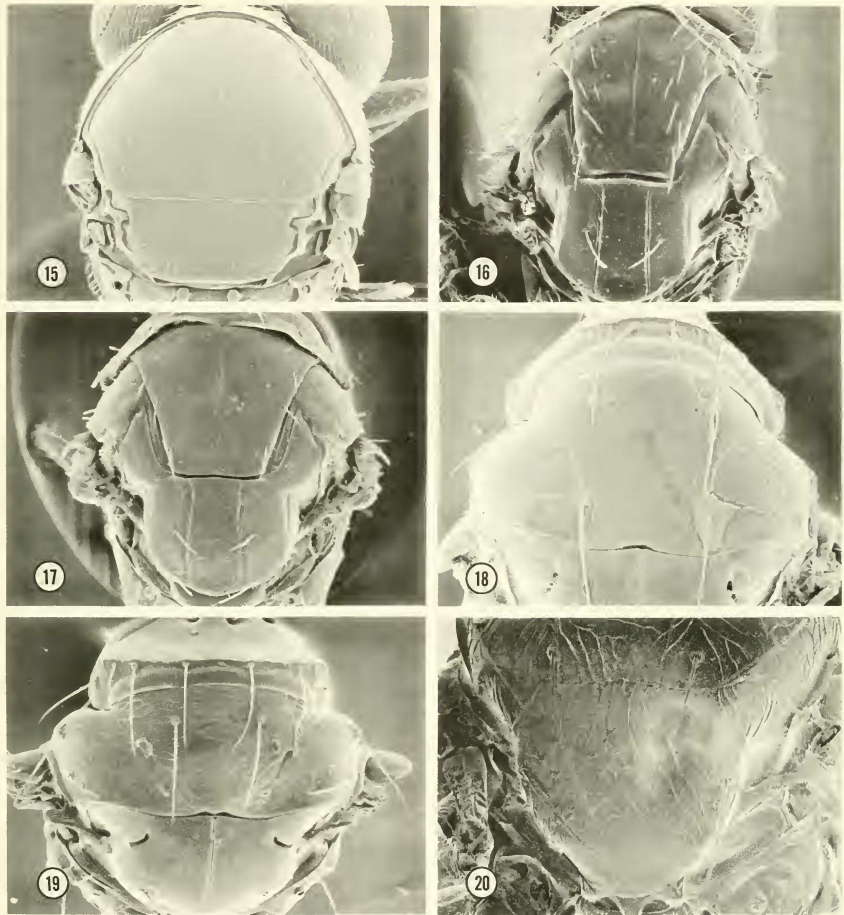
#### EULOPHIDAE

#### *Tetrastichus haitiensis* Gahan

Figs. 8, 17

*Tetrastichus haitiensis* Gahan, 1929: 17.

Notes.—This species was described from a series of specimens reared from *Exopthalmus quadrivittatus* eggs at Port-au-Prince, Haiti. It is a primary parasite of the



Figs. 15–20. SEMs. Thorax, dorsal view. 15, *Platystasius citri*. 16, *Tetrastichus fennahi*. 17, *Tetrastichus haitiensis*. 18, *Horismenus cupreus*. 19, *Horismenus bennetti*. 20, *Pediobius irregularis*.

eggs and has also been reared from *Diaprepes abbreviatus* and *Pachnaeus litus*. It is apparently the commonest parasite of citrus weevil eggs in this area and at times may kill up to 100% of the eggs and egg masses (Van Whervin, 1968). As a result, it has received the most attention from biological control workers and has been imported and released into Florida from the West Indies

on several occasions (Sutton et al., 1972; Beavers and Selheime, 1975). A few specimens have recently been recovered from citrus weevil eggs in Central Florida (C. Tarrant, pers. comm.).

Diagnosis.—This species is most easily confused with *Tetrastichus gala* or *T. fennahi*. It differs in the following: the body is generally dark brown without a greenish



tinge and with the legs and base of the metasoma yellow (body extensively yellow in *gala* and body with greenish tinge and base of metasoma not yellow in *fennahi*); submarginal vein usually with only 1 seta (submarginal with 3 or more in others); setae on male funicles about  $2\times$  as long as width of segment (Fig. 8) (shorter in *fennahi* and much longer and whorled in *gala*, Fig. 11); propodeum smooth and without paraspiracular carinae (propodeum sculptured in others and with paraspiracular carinae in *fennahi*); mid lobe of scutum with only a single row of setae laterally (Fig. 17) (*T. fennahi* with partial second row, Fig. 16).

Variability.—Females may occasionally have some yellow or very light brown areas around the scrobes, ocelli, and notauli. There may also be some light brown on the femora. A few males have been observed with much shorter setae on the funicular articles than is typical for this species and the expanded ridge on the anterior surface of the scape is present although not as noticeable as in males with elongated funicular setae.

Hosts.—*Diaprepes abbreviatus* (L.), *Exophthalmus quadrivittatus* (Olivier), *Pach-nelus litus* (Germar), and *P. opalus* (Olivier).

Specimens examined.—Dominican Republic: La Romana Prov., Cacata; San Cristobal Prov., San Cristobal; Republic Prov., Monte Cristi, 4 Km. N. Villa Vasquez. Puerto Rico: Isabela; Mayaguez, University Campus; Ponce, Fortuna Fruit Experiment Station. Andros Island, San Andros. Jamaica: St. Catherine Parish, Charlton nr. Ewarton; Red Hill. Cuba, Santiago, D. I. Vegas. Haiti, Port-au-Prince. United States. Florida, Hardee Co., Ft. Green. Collection dates range from March through October.

### *Tetrastichus gala* (Walker)

Figs. 11, 24

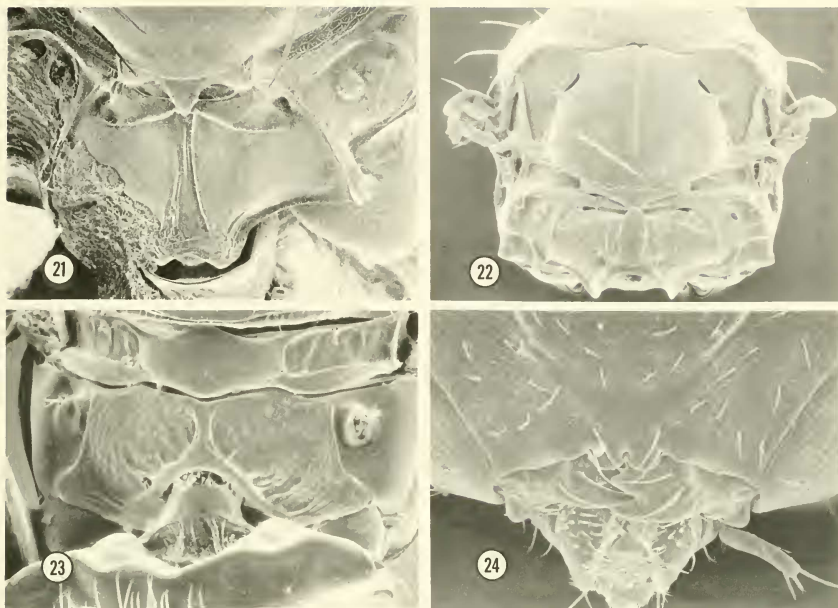
*Tetrastichus gala* Walker, 1847: 28.

Notes.—This species has been misidentified as *T. marylandensis* Girault (1916) (Z.

Bouceck, pers. comm.) and the exact relationship of these two species remains in doubt. I can find little difference between specimens of the two species, but the host ranges indicate that two species may indeed be involved. *T. marylandensis* is recorded as a parasite of lepidopterous larvae, aphids, and midges as well as from the eggs of citrus weevils. When associated with citrus weevils, *T. gala* (cited as *marylandensis*) has been cited as an "egg predator" feeding externally in the weevil egg masses (Van Whervin, 1968). I have studied specimens identified as both *marylandensis* and *gala* reared from various hosts, but many are in such poor condition that definitive identification to species is not possible. Since this paper is not revisionary in scope, I am reluctant to propose the synonymy of *marylandensis* with *gala*. Until further specimens from the various hosts can be obtained or a comprehensive revision is undertaken, I believe it better to leave the two names as they are.

Diagnosis.—This species is most easily confused with *Tetrastichus fennahi* and *T. haitiensis*. It can be separated by the following: submarginal vein with 3–5 setae (submarginal with only one seta or rarely 2 in *T. haitiensis*); body with at least some yellow markings on the face, venter of thorax, and metasoma and often nearly entirely yellow (body entirely dark brown or blackish except for the legs or base of the metasoma in other *Tetrastichus* species); male funicular articles with greatly lengthened, whorled setae (Fig. 11) (funicular setae much shorter in other *Tetrastichus* as in Fig. 8).

Variability.—This species shows marked variation in coloration. Some specimens are almost entirely yellow with only a little brown on the edges of the metasomal terga, posterior margin of the propodeum, anterior edge of the pronotum, and around the foramen of the head. At the other extreme a series of specimens from Jamaica has almost the entire dorsum of the thorax dark brown, and has large brown areas on the



Figs. 21–24. SEMs. 21–23, Propodeums. 21, *Pediobius irregularis*. 22, *Horismenus bennetti*. 23, *Tetrastichus fennahi*. 24, Face of *Tetrastichus gala*.

metasoma, side of the thorax, and head. Variation in color ranges almost the whole spectrum between these two extremes. The face and frons are apparently always light colored, as is the venter of the thorax.

Hosts.—*Diaprepes abbreviatus* (L.), *D. famelicus* (Olivier).

Specimens examined.—Jamaica, St. Catherine Parish, Charlton nr. Ewarton. Montserrat, Plymouth. Guadeloupe, Domain Duclos. Puerto Rico, Isabela, Mayaguez. Dominica. Collection dates range from December through June.

***Tetrastichus fennahi* Schauff. NEW SPECIES**  
Figs. 4, 9, 16, 23

Holotype female.—Length 1.2 mm. Color as follows: body dark brown with metallic green reflections; basal half of hind coxae light brown; rest of legs, tegulae, and

antennae yellow. Head slightly wider than thorax, about as high as wide; face, frons, occiput with scattered silvery setae; frons with scattered small setigerous punctures near eye margins; occiput lightly imbricate; POL 2.5 × OOL; malar space ½ eye height; malar suture complete, curved; antenna inserted on line with ventral margin of eye; scape not quite reaching level of tip of eye; antenna as in Fig. 9; scutum (Fig. 16) imbricate, median longitudinal groove complete; midlobe with 2 irregular lines of setae; slightly longer than scutellum (18:15); scutellum as long as wide, propodeum (Fig. 23) imbricate, with several irregular small carinae projecting anteriorly from nucha, medially only about as wide as metanotum, paraspiracular carinae complete, with only a single seta laterad of spiracle; metasoma slightly longer than thorax; first tergum

smooth medially, becoming imbricate laterally, other terga imbricate; ovipositor sheaths cylindrical, barely protruding past tip of metasoma; forewing slightly more than  $2\times$  as long as wide (43:20) (Fig. 4); submarginal vein with 3 setae; ratio submarginal: marginal: stigmal 15:25:7; tip of hindwing rounded, marginal fringe  $\frac{1}{3}$  width of hindwing at hamulus.

Male.—The only available male specimen is very badly shriveled and no obvious differences from the female (except for the genitalia) can be discerned.

Diagnosis.—This species is most easily confused with *T. haitiensis* and *gala*. It can be differentiated from them and from other *Tetrastichus* species by the following: body dark brown with greenish tinge (at least face and venter of thorax yellow in *T. gala*, no greenish tinge in *T. haitiensis* or base of metasoma yellowish); mid lobe of scutum with partial second row of setae (Fig. 16) (mid lobe with only a single row of setae in other species (as in Fig. 17); submarginal vein with 3–5 setae (submarginal with only 1 or rarely 2 setae in *T. haitiensis*); propodeum imbricate and with carinae arising from nucha (Fig. 23), paraspiracular carina present (other species with propodeum mostly smooth, without carinae, paraspiracular carina absent); male flagellum with setae only about as long as width of segment (male flagellar setae about  $2\times$  as long as width of segment in *haitiensis* (Fig. 8), much longer and whorled in *T. gala* (Fig. 11).

Variability.—Very little variation was observed in the specimens available for study. The body length ranges from 1.0–1.3 mm. Eye color varies from bright red to silver or grayish. In a few specimens, the hind coxae are nearly entirely yellow. The majority of the specimens are badly shriveled and the propodeum is collapsed making it difficult to see if the paraspiracular carinae are as evident as in the type female and in a specimen that was photographed with the scanning electron microscope. In some of these poor specimens it appears

that the carina is absent and caution should be used when assessing this character.

Types.—Holotype ♀ on point with data: St. Lucia, B.W.I., 1937, R. G. Fennah, Ex. *Diaprepes abbreviatus* eggs. Forewing and antenna slide mounted. Deposited in U.S. National Museum of Natural History. Paratypes: 17 ♀, 1 ♂ same data as holotype; 1 ♀ Barbados, W. I., ex. eggs of *Diaprepes abbreviatus* on citrus; 5 ♀ Machourie, Dominica, B.W.I., June, 1954, Coll. F. D. Bennett, ex. ova *Diaprepes* on legume; 1 ♀ same data as above except collected at Grand Savannah [Grande Savanne], July, 1954; 2 ♀ Jamaica, St. Catherine Parish, Charlton nr. Ewarton, 19-VI-1975, em. 29-VI-1975. E. E. Grissell, R. E. Woodruff. ex. *Exophthalmus* or *Pachneus* eggs. Paratypes deposited in the USNM except for 2 ♀ each deposited in British Museum, Canadian National Collection, and Florida State collection of Arthropods.

Hosts.—*Diaprepes abbreviatus* (L.).

Eymology.—This species is named in honor of the collector of the holotype, R. G. Fennah.

### *Pediobius irregularis* Kerrich

Figs. 20, 21

*Pediobius irregularis* Kerrich, 1973: 190.

Notes.—This species was described from specimens reared from the egg mass of *Exophthalmus viticollis* Champion on citrus by L. W. Van Whervin taken in Belize (British Honduras). Little else is known of this species and it apparently has not been collected in the West Indies where most of the collecting by biological control workers has taken place. Kerrich listed this species as a primary parasite of the weevil eggs.

Diagnosis.—This species is most easily confused with the two species of *Horismenus*. It can be separated by the following: scutellum without median groove (Fig. 20) (groove present in *Horismenus*, Fig. 19); propodeum with a pair of parallel submedian carinae (Fig. 21) (propodeum medially



with a shiny raised area in *Horismenus*, Fig. 22).

Hosts.—*Exopthalmus vitticollis* Champion.

Specimens examined.—Paratypes of *P. irregularis* and an additional short series of specimens collected a year earlier by the same collector (L. W. Van Whervin) who collected the types series (from the same locality). This species is known only from the type locality (Belize).

***Horismenus cupreus* (Ashmead)**

Figs. 12, 18

*Holcopelte cupreus* Ashmead, 1894: 171.

Notes.—The types of this species were collected on St. Vincent from unknown host (specimens deposited in BMNH). There are additional specimens in the USNM labelled as reared from eggs of *Diaprepes famelicus esuriens* on Montserrat. Whether it is a primary or secondary parasite of the eggs is unknown.

Diagnosis.—This species is most easily confused with *H. bennetti* or *Pediobius irregularis*. It is easily separated from *Pediobius* by the presence of a longitudinal groove on the scutellum and the raised smooth median area of the propodeum (as in Figs. 19, 22) (scutellar groove absent in *Pediobius* and median propodeum with paired carinae, Figs. 20, 21). *H. cupreus* differs from *bennetti* by having complete and well defined notauli (Fig. 18), the first metasomal tergum with a narrow sculptured band (Fig. 12), the body is black, and the male scape and femora are yellow (in *bennetti*, the notauli are not well defined (Fig. 19), the first tergum usually has only minute cracklike sculpture (Fig. 13), the body is black, and the male femora and scape are brown or black).

Hosts.—*Diaprepes famelicus esuriens* (Gyllenhal).

Specimens examined.—Type of *H. cupreus* and other specimens from St. Vincent, and Montserrat.

***Horismenus bennetti* Schauff, NEW SPECIES**  
Figs. 3, 7, 13, 19, 22

Holotype female.—Length 1.6 mm. Color black except the following: scape, legs past coxae yellow; last tarsomere brownish apically. Antennae as in Fig. 7; apex of scape even with arms of frontal forks at margin of eye; face below toruli lightly imbricate; area laterad of scrobes and below frontal grooves more strongly sculptured, nearly alveolate; between scrobes smooth; frons medially above frontal forks very lightly imbricate, nearly smooth; vertex imbricate; genae smooth to very faintly strigate, occiput alveolate; POL 3× OOL; pronotum imbricate except smooth along posterior margin; scutum and scutellum imbricate as in Fig. 19; notaulices fading anteriorly; median scutellar groove nearly reaching posterior margin of scutellum; with row of small alveolae extending posteriorly from scutellar setae and curving inwards near margin; metanotum smooth; propodeum (Fig. 22) smooth except at posterior edge and laterad of nucha; petiole in dorsal view slightly longer than wide (13:10), rugulose; prepectus imbricate, mesopleuron smooth; metasoma equal in length to thorax, nearly 2× as long as wide (60:35); first tergum covering  $\frac{2}{3}$  length, smooth except for small postero-medial patch of very fine crack-like aciculations (Fig. 13); forewing as in Fig. 3.

Male.—Similar to female except the following: length about 1.1 mm; scape and femora brown to black; basal half of tibiae occasionally light brown; scape 3× as long as wide, funicular articles covered by numerous white setae; petiole 2× as long as wide; metasoma ovate, only about as wide as long.

Diagnosis.—This species is most easily confused with *Pediobius irregularis* and *H. cupreus*. It can be separated from *Pediobius* by the presence of a longitudinal groove on the scutellum and the raised smooth median area of the propodeum (as in Figs. 19, 22) (scutellar groove absent in *Pediobius* and

median propodeum with paired carinae, Figs. 20, 21). It differs from *H. cupreus* by: the black body color (*cupreus* and many other species are metallic green); the notaules are faint and incomplete (Fig. 19) (notaules well defined in *cupreus*, Fig. 18); the first metasomal tergum nearly smooth, with only faint crack-like sculpture (Fig. 13) (narrow reticulate band in *cupreus*, Fig. 12); male femora and scape brown to black (male scape and femora of *cupreus* yellow). Additional characters which help to separate this species from other *Horismenus* are: propodeum mostly smooth and without reticulation near nucha (many other species have some reticulate sculpture on the propodeum); legs of the female yellow past coxae (several species have the femora and/or tibiae dark colored); small row of alveolae adjacent to scutellar setae and scutellar surface nearly completely smooth (alveolae lacking and scutellar surface sculptured in some other species).

Variability.—There is some variation in the appearance of the sculptured area on the first metasomal tergum. In one specimen, it appears as more of a reticulated pattern somewhat similar in appearance to that in *cupreus*. However, in this specimen, the band of sculpture was quite wide (about half as wide as long), while in *cupreus* the band is very narrow (only about a sixth as wide as long).

Types.—Holotype ♀ on point with data: Jamaica, Red Hill, May 1956. Curculionid eggs on citrus. Coll. by F. D. Bennett. Deposited in the U.S. National Museum of Natural History. Paratypes: 3 ♀; Puerto Rico, Isabela, VI-16-1932, G. N. Wollcott, ex. eggs *Diaprepes abbreviatus*; 1 ♀, 1 ♂, Jamaica, B.W.I., July 1954, Ova *Prepodes*, coll. by Simmonds; 1 ♀, Jamaica, Mona, Dec. 1, 1967, ex. eggs of *Tetrastichus* parasite on citrus weevil eggs, coll. by Van Whervin; 5 ♂ and 4 ♀, Dominican Republic, San Cristobal, 23-VI-1976, on citrus, emerged 24-VI-1976; 8 ♀ and 3 ♂, Jamaica, Parish of St. Catherine, Charlton. Exp. Sta., 19-VI-1975.

Grissell & Woodruff. Ex. *Exophthalmus* eggs on citrus, em. 25-VI-1975. One ♂ and 1 ♀ paratype deposited in BMNH and FSCA, rest in USNM.

Hosts.—The species is apparently a hyperparasite. Its most likely host is *Tetrastichus haitiensis*, although it may also parasitize other *Tetrastichus*.

Etyymology.—This species is named in honor of F. D. Bennett who collected many of the specimens used in this study.

#### PLATYGASTRIDAE

##### *Platystasius citri* Nixon

Figs. 1, 6, 15

*Platystasius citri* Nixon, 1969: 447.

Notes.—This species is a primary endoparasite (Van Whervin, 1968) of citrus weevil eggs (*Exophthalmus* or *Pachneus* sp. according to label data). It is known from Jamaica, although it is possible that it occurs on other islands in the West Indies. Although originally described in the genus *Platystasius*, this species is now considered better placed in *Fidiobia* (L. Masner, pers. comm.). A formal change in generic placement is being proposed in a manuscript on platygastriid taxonomy that is currently in preparation but has not yet been published. Therefore, I have used the currently published combination.

Diagnosis.—This species is the only proctotrupoid that has been associated with citrus weevil eggs. It can be identified by the following: tarsi 5-segmented (3 or 4 segmented in other species); forewing with only a submarginal vein (Fig. 1) (obvious submarginal and marginal and stigmal veins in other species, except *Cleruchus* sp. (see Figs. 2-4); antenna with four small funicles and large 3-segmented club (Fig. 6) (antennae of other species as in Figs. 7-11, 14); scutellum without obvious paired setae (Fig. 15) (scutellum with one or two pairs of large setae in others, Figs. 16, 17, 20, 22).

Hosts.—*Pachneus* or *Exophthalmus* sp.

Specimens examined.—Jamaica, St.

Catherine Parish, Worth Park and Charlton nr. Ewarton; Manchester. Mona Island. Collected in June, August, and September.

#### MYMARIDAE

##### *Cleruchus* sp.

Notes.—This species was recently reared from eggs of *Artipus floridanus* Horn in the vicinity of Wabasso, Florida (Indian River Co.). Unfortunately, only 4 specimens have been collected, and these are in poor condition. I would place them in the genus *Cleruchus* (sensu Schauff, 1984). They are very similar to *C. brevipennis* Ogloblin (1940). This species is almost certainly undescribed, but without additional specimens I am reluctant to name it at this time.

Diagnosis.—This species is the only member of the family Mymaridae yet recorded from citrus weevil eggs. It can be identified by the following characters: tarsi 4-segmented; forewings nearly parallel-sided and with marginal cilia much longer than wing width (Fig. 5) (other species with forewings much broader and not parallel-sided and marginal cilia much shorter than wing width); female antenna with 6 funicular articles and a single segmented club (Fig. 14); male antennae with 13 segments (other species with male antennae with fewer than 13 segments).

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#### LITERATURE CITED

- Ashmead, W. H. 1894. Report upon the Parasitic Hymenoptera of the Island of St. Vincent. *J. Linnean Soc.* 25: 56–254.
- Baranowski, R. M. 1960. Notes on a parasite of the citrus root weevil *Pachnaeus litus* (Germ.). *Fla. Entomol.* 43: 197.
- Beavers, J. B. and A. G. Selhime. 1975. Further attempts to establish the weevil egg parasite *Te-trastichus haiteinsis* in Florida. *Fla. Entomol.* 58: 29–31.
- Burks, B. D. 1979. Family Trichogrammatidae, pp. 1033–1043. In Krombein, K. V. et al., eds., Catalog of Hymenoptera in America north of Mexico, Vol. 1. Symphyta and Apocrita (parasitica). Smithsonian Institution Press, Washington, D.C., 1198 pp.
- Dozier, H. L. 1932. Descriptions of new trichogrammatid (Hymenoptera) egg parasites from the West Indies. *Proc. Entomol. Soc. Wash.* 34: 29–37.
- Doutt, R. L. and G. Viggiani. 1968. The classification of the Trichogrammatidae (Hymenoptera: Chalcidoidea). *Proc. Calif. Acad. Sci.* (4th ser.) 35: 477–586.
- Gahan, A. B. 1929. Description of an egg-parasite of *Exophthalmus quadrivittatus* (Olivier). *Proc. Entomol. Soc. Wash.* 31: 17–18.
- Girault, A. A. 1916. New miscellaneous chalcidoid Hymenoptera with notes on described species. *Ann. Entomol. Soc. Am.* 9: 291–308.
- Graham, M. W. R. DeV. 1959. Keys to the British genera and species of Elachertinae, Eulophinae, Entedontinae, and Euderinae (Hym., Chalcidoidea). *Trans. Soc. British Entomol.* 13: 169–204.
- Harris, R. A. 1979. A glossary of surface sculpturing. Occasional papers of laboratory services/ Entomology no. 28. California Department of Food and Agriculture, Sacramento, California, 31 pp.
- Kerrich, G. J. 1973. A revision of the tropical and subtropical species of the eulophid genus *Pediobius* Walker (Hymenoptera: Chalcidoidea). *Bull. Br. Mus. (Nat. Hist.)* 29: 115–199.
- Nixon, G. E. J. 1969. Two new species of *Platystasius* Nixon with a note on the generic relationship be-

- tween *Platystasius* and *Fidiobia* Ashmead. Proc. Entomol. Soc. Wash. 71: 445-449.
- Ogloblin, A. A. 1940. Dos Mymaridae nuevos de Misiones (Hym.). Rev. de Entomol. Rio de Janeiro 11: 597-603.
- Schauff, M. E. 1984. The Holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). Mem. Entomol. Soc. Wash. 12: 67 pp.
- Sutton, R. A., A. G. Selhime, and W. McCloud. 1972. Colonization and release of *Tetrastichus haitiensis* as a biological control agent for citrus root weevils. J. Econ. Entomol. 65: 184-185.
- Van Whervin, L. W. 1968. The citrus weevils of Jamaica and some of their parasites. Univ. West Indies, St. Augustine, Trinidad Tech. Bull. 1: i-ii, 1-23.
- Walker, F. 1847. Characters of undescribed Chalcidites collected in North America by E. Doubleday, and now in the British Museum. Ann. Mag. Nat. Hist. 20: 19-29.
- Wolcott, G. N. 1948. The insects of Puerto Rico; Coleoptera. J. Agr. Univ. Puerto Rico. 32: 225-416.
- Woodruff, R. 1964. A Puerto Rican weevil new to the United States. Fla. Dept. Agr., Div. Plant Ind. Ent. Circ. 30: 1-2.
- . 1968. The present status of a West Indian weevil (*Diaprepes abbreviata* (L.)) in Florida (Coleoptera: Curculionidae). Fla. Dept. Agr., Div. Plant. Ind. Ent. Circ. 77: 1-4.