

Corrections and Additions to Metcalf's "The Fulgorina of Barro Colorado and Other Parts of Panama" (Homoptera: Fulgoroidea)

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ABSTRACT Of 68 species Metcalf (1938 Bull. Mus. Comp. Zool. 82: 277-423) illustrated and identified as previously described, 15 were correctly named, 17 were incorrect, and status of the others has not been checked by comparison with types. Eight species that Metcalf misidentified are here described as new: *Pintalia metcalfi* and *Pintalia mettacta* (Cixiidae), *Herpis metcalfi* (Derbidae), *Lappida metchroma* and *Hyalodictyon metcalfi* (Dictyopharidae), *Anormenis metdiscus*, *Atracis metcalfi*, and *Flataloides metobliqua* (Flatidae). Status of the others is listed. Four lectotypes are designated. Because the value of Metcalf (1938) is diminished as an introduction and key to Latin American planthoppers, a table with other keys to genera and species is provided.

KEY WORDS Fulgoroidea, Cixiidae, Derbidae, Dictyopharidae, Flatidae, Issidae

BECAUSE METCALF'S "The Fulgorina of Barro Colorado and other parts of Panama" (1938) provided many keys, it seems a better introduction to Central American Fulgoroidea than the *Biologia Centrali-Americana* (Distant 1883-1905, Fowler 1900-1909), which generally lacked keys. However, after examining types in the British Museum I found that several of Metcalf's identifications were incorrect or misleading. Metcalf's identifications of 40 species described by Fowler, Walker, Distant, and Muir include 12 correct, 15 incorrect, 6 in which the illustration could apply to several species (see below), and 7 for which only the genitalia were illustrated. Not all of the latter were examined because of the lack of time and because the quality of Metcalf's illustrations of genitalia varies: some are of opaque external genitalia only and some are of specimens cleared in potassium hydroxide. Unfortunately, I have been unable to examine types from other museums of the 28 other species he identified and illustrated, but I have seen types of 5, of which 3 are correct and 2 are not (see Table 2).

I am not aware of any use of these names in the sense of Metcalf in ecological or economic papers, but they may exist.

Because the value of Metcalf (1938) as an introduction to Latin American Fulgoroidea is, thus, diminished, one seeks a substitute. Only two families, the Achilixiidae and the Achilidae, have a modern key to genera for all New World tribes. However, Table 1 lists the Neotropical families, the number of Neotropical genera and species in 1981, the most complete keys to genera, and some revisions of genera that include Latin American species. To use the keys to genera one needs a reference collection. Fennah, who has done most

of the generic keys, emphasized the relationship of tribes and genera on a worldwide basis rather than identification of New World species. In contrast, most of the revisions of genera are so complete that a reference collection is not necessary. They have keys, all known species are included, and the illustrations are excellent. However, in two revisions, that of *Phrictus* by Caldwell (1945) and *Taosa* by Synave (1969), the authors did not see all types and they misjudged some characters, so not all species are correctly keyed. A key to families of Fulgoroidea may be found in Fennah (1950b) and O'Brien & Wilson (1985).

In this paper I point out the misidentifications in Metcalf, suggest other references for identification in the family, provide new names for eight of the species Metcalf illustrated, and warn of the probability of misidentifications when one uses papers or identifications of his period. Metcalf's work is generally excellent, but in the 1930's few researchers traveled to Europe to examine types, and types were not lent. Metcalf had to rely on descriptions without illustrations or with inadequate illustrations.

Eight species that Metcalf illustrated but misidentified are renamed, types of these are designated, male genitalia are illustrated, each new species is compared with the one Metcalf thought it to be, and illustrations of the types of the Walker and Fowler species are provided without further description. In general, I have refigured that part of the insect illustrated by Metcalf and the male genitalia when a male was available.

Only eight of the misidentified species are renamed; six of the others are represented by females only. The specimen identified by Metcalf as *Dictyopharoides tenuirostris* Fowler is lost in the U.S.

Table 1. References to keys to Latin American genera and species

Family	Keys to genera	Keys to species
1. Cixiidae (27 genera, 183 species)		<i>Myndus</i> : Kramer (1979), <i>Cixius</i> (Mexico): Kramer (1981); Bennini: Penny (1980) <i>Stobaera</i> : Kramer (1973)
2. Delphacidae (52 genera, 255 species)	Muir (1926)	<i>Cedusa</i> : Flynn & Kramer (1983), Kramer (1986); Mysidiini: Broomfield (1985), <i>Neodawnaria</i> : Penny & Arias (1984)
3. Derbidae (36 genera, 414 species)	Fennah (1952), O'Brien (1982), Mysidiini: Broomfield (1985)	Fennah (1946); O'Brien & Penny (1987)
4. Achilixiidae (2 [1] genera, 8 [20] species) ^a	Fennah (1946)	Kinnarinae: Fennah (1980); Puerto Rico: Ramos (1957)
5. Kinnaridae (12 genera, 59 species)	Fennah (1942)	<i>Taosa</i> : Synave (1969)
6. Dictyopharidae (29 genera, 126 species)	Fennah (1944, 1947)	<i>Cyrpoptus</i> : Kramer (1978), <i>Phrictus</i> : Caldwell (1945)
7. Fulgoridae (63 genera, 241 species)	Stål (1870)	
8. Achilidae (42 genera, 100 species)	Fennah (1950a)	
9. Tropiduchidae (35 genera, 92 species)	Fennah (1945, 1949, 1982)	
10. Nogodinidae (8 genera, 45 species)	Melichar (1923), Fennah (1984)	<i>Bladina</i> : Kramer (1976)
11. Flatidae (73 genera, 299 species)	Melichar (1902)	
12. Acanaloniidae (5 genera, 61 species)	Fennah (1954)	
13. Issidae (49 genera, 173 species)	Melichar (1906)	
14. Ricaniidae (4 genera, 8 species)		
15. Lophopidae (4 [3] genera, 6 [7] species) ^a	O'Brien et al. (1987)	O'Brien et al. (1987)

The numbers of genera and species were estimated combining sources some of which used biogeographical and others political boundaries. Until a new checklist is done, counts will reflect this inaccuracy. The families Tettigometridae and Eurybrachidae are omitted; the specimens described from the New World are thought to be mislabeled. The paper by Caldwell & Martorell (1952) on Puerto Rico, although not listed above because of the relatively depauperate fauna covered, has excellent keys and illustrations; combined with Ramos' (1957) work, it provides a complete monograph of the Fulgoroidea of Puerto Rico, the only area so well treated in America.

^a Numbers in brackets are corrections of the number of genera and species; papers are in preparation (L.O.B., unpublished data).

National Museum of Natural History and, thus, unavailable for description as a new species. The other species not renamed, *Hyalodictyon brachyrhina* Walker sensu Metcalf, was not treated because it had no striking feature that would allow it to be distinguished from its congeners. It will be treated later in a revision of the genus.

In those categories where the illustrations could be any of several species or where genitalia only were figured, I thought it best to defer to future revisions. The fulgorids *Enchophora sanguinea* Distant and *Enchophora longirostris* Distant fall here. The type of the first is a female and that of the second is a male. The specimens in the British Museum seem to form a continuum between the two types, but I am not prepared to synonymize them until I can analyze the similarities and differences. Finally, *Dictyophara nigronotata* Stål has been synonymized by Synave (1969) into *Taosa herbida* (Walker). The few other generic changes made since 1938 will be included in the treatment that follows the list.

Illustrations of types of six species in the British Museum that Metcalf misidentified are included even though Metcalf's specimens were not renamed.

A list is provided of species of other authors illustrated by Metcalf (Table 2). The specimens with types at the British Museum are divided into five categories: correct; misidentified, renamed; misidentified, not renamed; illustrated, might be any of several species; and illustrated genitalia only, not verified at the British Museum.

The types not found at the British Museum are divided into correct, incorrect, and incertae sedis

categories. Metcalf also listed 19 other species by other authors, but because these were not illustrated, they are less likely to cause errors and are not listed here.

Descriptions and Comparisons of New and Previously Described Species

The types of all species were examined except those listed as incertae sedis. Male genitalia were cleared in potassium hydroxide. All illustrations were made with a camera lucida.

The new species are numbered for ease in locating them; each is followed by the species Metcalf thought it to be. The museums in which types and paratypes are deposited are cited by acronyms listed in the *Acknowledgment*. The sequence and style of month and date in the list of paratypes follow that given on the label.

Cixiidae

1. *Pintalia metcalfi* O'Brien, n. sp. (Fig. 15)

Pintalia germana (Fowler 1904b: 87) sensu Metcalf 1938: 291. See Metcalf plate 1 (habitus, lateral view), plate 4 (head and thorax), plate 17 (ventral view genitalia).

Salient Features. Length of males, 6.2–6.5 mm; females, 6.5–7.2 mm. Ground color straw, 1 pair of pale brown spots at posterior lateral angles of vertex and 3 pairs on genae, one next to spot on vertex, one small and pale under ocelli, and one between these two; forewings straw with pale brown

Table 2. Status of species of other authors illustrated by Metcalf (1938) (numbers after species refer to Metcalf's plates)

1. Type at British Museum	
Achilidae	
<i>Amblycratus fuscolineatus</i>	Fowler 10, 15, 22, identified correctly
<i>Apateson albomaculatum</i>	Fowler 9, 15, identified correctly
<i>Catonia sobrina</i>	Fowler 2, illustration not specific
<i>Messesia asper</i>	Fowler 7, 16, 22, identified correctly
Cixiidae	
<i>Mutrolonia metallicus</i>	Fowler 1, 4, 17, identified correctly
<i>Oecleus concinnus</i>	Fowler 4, illustration not specific
<i>Oltarus concinnulus</i>	Fowler 4, illustration not specific
<i>O. excelsus</i>	Fowler 4, misidentified, not renamed
<i>Pintalia germana</i>	Fowler 1, 4, 17: to <i>P. metcalfi</i> , misidentified, renamed
<i>P. tacta</i>	Fowler 1, 4: to <i>P. metcalfi</i> , misidentified, renamed
Derbidae	
<i>Anotia invalida</i>	Fowler 19, not verified, genitalia only illustrated
<i>Anotia rubescens</i>	Fowler 19, not verified, genitalia only illustrated
<i>Cedusa funesta</i>	Fowler 5, illustration not specific
<i>Derbe westwoodi</i>	Fowler 18, not verified, genitalia only illustrated
<i>Persis fuscineris</i>	Muir 1, 5, 18, 19, identified correctly
<i>Syntames delicatus</i>	Fowler 1, 19, 20: to <i>H. metcalfi</i> , misidentified, renamed
Dictyopharidae	
<i>Dictyophara brachyrhina</i>	Walker 7, now <i>Hyalodictyon</i> , misidentified, not renamed
<i>D. herbida</i>	Walker 7, now <i>Taosa</i> , misidentified, not renamed
<i>D. obtusifrons</i>	Walker 7, 21: to <i>D. metcalfi</i> , misidentified, renamed
<i>Dictyopharoides tenuirostris</i>	Fowler 7, 15, misidentified, not renamed
<i>Lappida chlorochroma</i>	Walker 6: to <i>L. metchroma</i> , misidentified, renamed
<i>L. ferocula</i>	Distant 6, identified correctly
<i>Taosa herbida</i>	(Walker) 6, 20, identified correctly = <i>Dictyophara nigronotata</i> (Stål) Synave (1969)
Flatidae	
<i>Anormenis discus</i>	Walker 3, 12: to <i>A. metdiscus</i> , misidentified, renamed
<i>Atractis humeralis</i>	Walker 12, 23: to <i>A. metcalfi</i> , misidentified, renamed
? <i>Atractis pollutus</i>	Fowler 23, not verified, genitalia only illustrated
<i>Flataloides obliqua</i>	Walker 23: to <i>F. metobliqua</i> , misidentified, renamed
<i>Flatoidinus occidentalis</i> [sic]	Walker 12, 23, misidentified, not renamed
<i>Flatormenis griseoalba</i>	Fowler 23, not verified, genitalia only illustrated
<i>F. albescens</i>	Fowler 23, not verified, genitalia only illustrated
Fulgoridae	
<i>Copidocephala ornanda</i>	Distant 7, 21, identified correctly
<i>Enchophora longirostris</i>	Distant 8, 21, illustration not specific
<i>E. rosacea</i>	Distant 8, 20, identified correctly
<i>E. sanguinea</i>	Distant 8, 21, illustration not specific
<i>Phrictus quinquepartitus</i>	Distant 20, 21, not verified, genitalia only illustrated
<i>Scaralis neotropicalis</i>	Distant 9, 21, identified correctly
Nogodinidae	
<i>Biolleyana costalis</i>	Fowler 2, 11, 22, identified correctly
<i>Bladina magnifrons</i>	Walker 11, 22, identified correctly
Issidae	
<i>Picumna subrotundata</i>	Fowler 3, 14, misidentified, not renamed
<i>Thionia brevior</i>	Fowler 3, 13, misidentified, not renamed

Table 2. Continued

2. Type not at British Museum	
Achilidae	
<i>Elidiptera callosa</i>	Spinola 2, 10, 16, misidentified
<i>Myconus conspersinervis</i>	Stål 16, 21, misidentified
<i>Plectoderes collaris</i>	F. 10, 16, incertae sedis
Cixiidae	
<i>Bothriocera bicornis</i>	F. 15, 17, incertae sedis
<i>B. tinealis</i>	Burmeister 17, incertae sedis
<i>B. westwoodi</i>	Stål 12, incertae sedis
<i>Mnemnosyne planticeps</i>	F. 15, 17, incertae sedis
Delphacidae	
<i>Eucanyna stigmata</i>	Crawford 1, 4, 17, incertae sedis
Derbidae	
<i>Amalopota ficht</i>	Van Duzee 1, 19, incertae sedis
<i>Mysidia costata</i>	F. 1, 4, 17, 18, identified correctly
<i>M. punctum</i>	F. 18, incertae sedis
<i>M. nebulosa</i>	Germar 17, 18 incertae sedis
<i>Syntames fulvus</i>	Van Duzee 5, 20, incertae sedis
<i>S. brunneus</i>	McAtee 20, incertae sedis
Flatidae	
<i>Anormenis media</i>	Melichar 16, 23, incertae sedis
<i>Flatormenis panamensis</i>	Schmidt 3, 12, 23, incertae sedis
<i>Ormenis roscida</i>	Germar 23, incertae sedis
<i>Poekilloptera phalaenoides</i>	L. 22, incertae sedis
Fulgoridae	
<i>Calyptoproctus elegans</i>	Olivier 8, 21, incertae sedis
<i>Diareusa conspersa</i>	Schmidt 9, 21, incertae sedis
<i>Enchophora prasina</i>	Gerstaecker 9, 21, identified correctly
<i>Odontoptera carrenot</i>	Signoret 7, 21, identified correctly
<i>Phrictus diadema</i>	L. 21, incertae sedis
Issidae	
<i>Coloptera marginalis</i>	Burmeister 3, 12, 20, incertae sedis
<i>Thionia carinata</i>	Melichar 13, incertae sedis
<i>T. coriacea</i>	F. 12, incertae sedis
<i>T. transversalis</i>	Melichar 12, 13, incertae sedis
Nogodinidae	
<i>Nogodina reticulata</i>	F. 11, 22, incertae sedis

markings as follows: two brown transverse lines and an apical area in costal cell before stigma, stigmal cell, and narrow irregular areas across forewing at level of junction of claval veins; posterior veins sometimes partially darkened.

Male Genitalia. Genital capsule in ventral view with median lobe of pygofer triangularly produced, styles broadened medially, aedeagus with three spines on right, one on left of shaft; genital capsule in left lateral view (Fig. 15) with posterior margin of pygofer produced, with dorsal margin indented, style enlarged distally, tipped with many fine hairs half as long as width of style, distal half of anal tube at an angle to basal portion, apex of distal portion enlarged, aedeagus with ventral margin of shaft irregular, 2 spines on left near middle, one on each side near apex, flagellum about as long as shaft, broadest medially.

Type Material. Holotype male: CANAL ZONE, Barro Colorado Island VIII-8-1967, L. & C. W. O'Brien (LOB). Allotype female: same except 13-VIII-1924, N. Banks (MCZ). Paratypes (14): all Barro Colorado Island, VIII-8-1967, 2 ♀♀, VIII-7-1967,

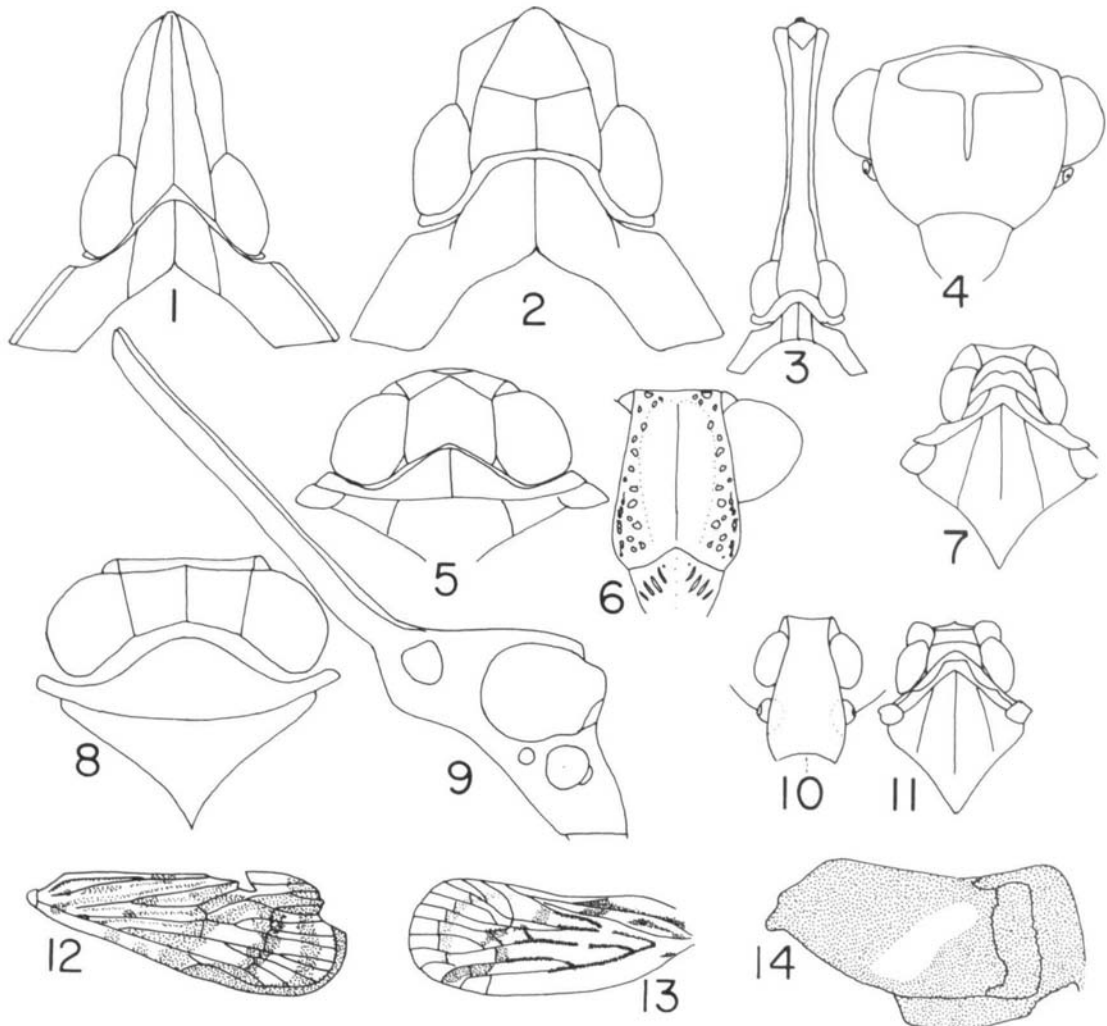


Fig. 1-14. Illustrations of types in the British Museum: (1) *Hyalodictyon brachyrhinum*, head and pronotum; (2) *Hyalodictyon obtusifrons*, head and pronotum; (3) *Lappida chlorochroma*, head and pronotum; (4) *Anormenis discus*, frons; (5 and 6) *Picumna subrotundata*, head and thorax, frons; (7) *Pintalia tacta*, head and thorax; (8) *Thionia brevior*, head and thorax; (9) *Dictyopharoides tenuirostris*, lateral view head; (10 and 11) *Pintalia germana*, frons, head and thorax; (12) *Pintalia tacta*, forewing; (13) *Herpis delicata*, forewing; (14) *Anormenis discus*, color pattern of forewing.

1 ♀*¹ (LOB); SMIII (light trap), VII-26-73, 2 ♂♂, 4 ♀♀, 18-VII-1973, 1 ♀, 30-VII-1973, 1 ♂, 1 ♀, 18-VII-1973, 1 ♂, lights, 24-VII-1974, 1 ♀, all H. Wolda (6 HW, 1 BMNH, 1 NCS, 3 LOB).

Notes. The species may be identified by its pale color and three pale brown areas on the gena. Metcalf's illustration of the color pattern on the forewing may represent a specimen I have not seen. All I have seen have the longitudinal band on the corium reduced to a series of subcircular spots. Metcalf said four specimens were in the MCZ collection, but I was sent one female. A similar pale species (not described) with more brown areas on

the forewing has only the two outside areas on the gena and different genitalia. *P. metcalfi* can be separated from *P. germana* by the color pattern of the wing, which is evenly mottled in *P. germana*. The shape of the vertex is similar in the two species.

***Pintalia germana* (Fowler)**
(Fig. 10, 11, and 22)

Metabrixia germana Fowler 1904b: 87, table IX, fig. 25, 25a (dorsal habitus, lateral view head).

Notes. This species is fairly evenly mottled pale brown and milky. Fowler included six specimens, but I would place the two from Costa Rica in another species. The frons has an oval translucent area in

¹ An asterisk signifies collected by C. W. or L. B. O'Brien, or both, sometimes with associate G. B. Marshall.

front of the antennae (Fig. 10) as in *Cyclopoliarus* that *P. metcalfi* lacks.

Type Material. Lectotype male and allolectotype female (BMNH) here designated mounted on the same card with labels: "Type" (red paper) and "Metabrixia/germana/Fowler type" (hand printed) and "Teapa/Tabasco/HHS" and "BCA Homopt. I./Metabrixia germana/Fowler" (slashes indicate the end of a line on the label).

2. *Pintalia mettacta* O'Brien, n. sp.
(Fig. 16)

Pintalia tacta (Fowler 1904b: 88) sensu Metcalf 1938: 292. See Metcalf plate 1 (habitus, lateral view), plate 4 (head and thorax).

Salient Features. Length of males, 5.2–5.5 mm; females, 6–6.5 mm. Ground color of head and hind wings medium brown, thorax and abdomen medium to dark brown, forewings clear with a brown pattern of thickened margins of wing and 1 oblique and 4 transverse bands as follows (see Metcalf 1938, plate 1): oblique band from side of prothorax to anterior 1/3 of clavus; first transverse band broken, thin, composed of 4 crescents near level of junction of claval veins, second and darkest transverse band before stigmal cell to apex of clavus, this widened and marked with pale veins near clavus, third band from apex of stigmal cell turning toward apex at M_{3+4} , fourth band broadest at costal margin, extending across 2/3 of wing, preceded by or fused to a smaller dark patch.

Male Genitalia. Genital capsule in ventral view with median lobe of pygofer triangular, styles narrow at base, toothed along midline at basal 1/3, broadened into apical lobe, apical lobe sparsely covered with short hairs, aedeagus with 1 spine on each side and 1 long median ventral spine; genital capsule in left lateral view (Fig. 16) with posterior margin produced midlaterally, concave above, slightly convex below, style narrow at base, toothed at basal 1/3, apical lobe broadest at base, sparsely pubescent, anal tube asymmetrical, distal portion at angle to short basal portion, broadly flared apically, aedeagus in left lateral view with 2 short spines and 1 long ventral spine, latter with setae, flagellum as long as shaft, broadened medially, with dorsal spine with setae.

Type Material. Holotype male: CANAL ZONE, Barro Colorado Island, VIII-8-1967* (LOB); allo-type female: 13-VII-1924, N. Banks (MCZ). Paratypes (3): 19-VII-1924, N. Banks, 1 ♀ (MCZ). PANAMA, Cerro Campana, VII-5-1974, at night*, 2 ♀♀ (LOB).

Notes. This species should be determined initially by the male genitalia; additional specimens may be identified by color pattern. I have seen an undescribed, closely related species from Panama with a very similar pattern except that it has three dark spots in the apical cells in addition to the pattern of *P. mettacta*. The only male, the holotype, has the left wing frayed and the right wing

broken. *P. mettacta* has fewer markings in the forewings than *P. tacta*, which has dark markings along each vein in the anterior 1/3 of the forewing as well as the posterior pattern (see Fig. 12).

Pintalia tacta (Fowler)
(Fig. 7 and 12)

Metabrixia tacta Fowler 1904b: 88, table X, fig. 1, 1a (dorsal habitus, lateral view head).

Notes. I have illustrated the forewing and vertex of the unique male holotype. The frons is cracked through the base and 1 eye, and the tips of the tegmina are frayed, with 1 broken.

Derbidae

3. *Herpis metcalfi* O'Brien, n. sp.
(Fig. 17)

Syntames delicatus (Fowler 1905: 139) sensu Metcalf 1938: 328. See Metcalf plate 1 (habitus, lateral view), plate 19 (ventral view female pygofer), plate 20 (lateral view male genitalia).

Salient Features. Length of males, 6.5–7 mm; females, 6.8–7.5 mm. Ground color stramineous, sometimes with white waxy bloom, marked with brown in broken oblique band and 2 spots on forewing, carinae of frons and vertex very narrowly darkened. Oblique line on forewing running between claval veins, sometimes evanescent medially, continuing (after a break) from claval suture to outer apical cell, spots near base of costal cell and at apex of Cu_2 (see Metcalf plate 1).

Male Genitalia. Genital capsule in ventral view with median lobe of pygofer triangular, style with 2 teeth, 1 broad dorsal and 1 ventral at basal 1/3, broadest at apical 1/3, thence concavely narrowed to apical recurved point; aedeagus bilaterally symmetrical with 5 pairs of needlelike spines, 3 pairs of broader spines. Genital capsule in left lateral view (Fig. 17) with posterior margin emarginate dorsally, style broadest medially with dorsal tooth and ventral tooth, narrowed to acute recurved apex, anal tube broadest subapically, narrowed to acute apex (emarginate medially in dorsal view), aedeagus in left lateral view with vertical needlelike and broad spines on shaft, flagellum as long as shaft, with 3 needlelike and 2 broad spines projecting anteriorly.

Type Material. Holotype male: CANAL ZONE, Barro Colorado Island, 22-VII-1924, N. Banks (MCZ). Allotype female: same except 27-VI-1924. Paratypes (27): 2 ♂♂ and 9 ♀♀ paratypes (and 1 damaged specimen) same except between VI-24 and VII-27-1924 (MCZ). 1 ♀, VII-24-1963, D. Q. Cavagnaro & M. E. Irwin (CAS). 6 ♂♂, 5 ♀♀ paratypes (and 1 specimen) VIII-8-1967*; 1 ♂, at light, VIII-7-1967 (7 LOB, 2 BMNH, 2 NCS, 1 HW). 1 ♀, 7 mi. SW. Gatun Locks, May 22, 1978*. PANAMA, 7 mi. SW. El Valle, 2300', 2 ♀♀, VII-6-1974* (LOB).

Additional Material Examined. Canal Zone, Pipe Line Road, 2 ♀♀, VI-30-1974* (LOB).

Notes. *Herpis delicata* (Fowler) differs from *H. metcalfi* in having fuscous markings on both sides of each vein except subcosta anterad of the first crossvein, and one transverse band posteriorly (see Fig. 13).

Herpis delicata (Fowler)

(Fig. 13 and 23)

Syntames delicatus Fowler 1905: 139, table 13, fig. 21, 21a, 21b (dorsal habitus, lateral view head, apex female venter).

Herpis delicata (Fowler), Caldwell 1944: 99.

Notes. Fowler's dorsal view of this insect is a bit difficult to interpret. I have drawn the forewing and a lateral view of the male genitalia. A specimen in the original species represented now by the anterior of the forewing seems to match Metcalf's illustration, but this is not what Fowler illustrated.

Type Material. I designate as lectotype a male (BMNH) with the labels "Type" and "David,/Chiriqui,/Champion." and "B. C. A. Homopt. I./Syntames delicatus/Fowl." and, handwritten, "Syntames/delicatus/Fowler. TYPE." There are also three females with the same data as the lectotype.

Dictyopharidae

4. *Lappida metchroma* O'Brien, n. sp.

(Fig. 18)

Lappida chlorochroma (Walker 1851a: 311) sensu Metcalf 1938: 339. See Metcalf plate 6 (head and thorax).

Salient Features. Length of males, 14.5–15.5 mm; females, 16.5–17 mm. Ground color green, often tinged with red, head projection with red band laterally, in some specimens dorsally; black or brown carinae as follows: basal ½ of carina on frons and apical ½ on vertex, callosity behind eye, ventrolateral carinae of pronotum, and reflexed costal margin of forewing. Head slightly shorter than pro- and mesothorax combined (5:6) (see Metcalf plate 6).

Male Genitalia. Genital capsule in ventral view without median lobe, aedeagus bilaterally symmetrical with a dorsal and a ventral median inflatable projection. Genital capsule in left lateral view (Fig. 18) with dorsal projection; style triangular, broadest near middle, lateral spine at basal ½; anal tube triangular, widest near apex. Aedeagus in left lateral view with apical inflatable extension that bends upward and forward in glycerine, ventral expandable projection ca. ½ width of aedeagus.

Type Material. Holotype male: CANAL ZONE, Pipe Line Road, VI-30-1974, C. W. & L. O'Brien & G. B. Marshall (LOB). Allotype female: Fort Davis, 5-VII-1924, N. Banks (MCZ). Paratypes (16): (1 each locality unless otherwise noted): Barro Colorado Island, VI-13-1974, H. Wolda (HW); VII-8-

1961, J. M. Campbell; VIII-8-1967* (NCS). Escobal Road, 18-VII-1982, D. Engleman. Fort Davis, 20-IV-1982, D. Engleman. Fort Kobbe, July 6, 1976, E. G. Riley (BMNH). Fort Gulick, at light, VII-1979, on weeds, Aug. 1979, 2 ♂♂. 7 km. SW. Gatun Lock, V-22-1978*, 1 ♂ (NR). Pipe Line Road, VI-14-1975, D. Engleman; VI-30-1974*. La Pita Signal Station Road, June 29, 1976, E. G. Riley, 1 ♂. Madden Forest, July 25, 1976, E. G. Riley; VII-3-1974*. PANAMA, Las Cumbres, VII-14-1962, M. T. James, G. B. Fairchild, 1 ♂. (LOB, unless otherwise noted.)

Notes. The shape of the aedeagus may be a difficult character to use in Dictyopharidae and Fulgoridae because it is not easy to get the inflatable processes of the aedeagus to expand to the same degree in different preparations. In one of duplicate dissections, the ventral extension did not inflate at all, and in another the apical extension was at right angles when placed in water from KOH and curved forward as I watched when placed in glycerin. Fortunately, the species of *Lappida* may be distinguished by the shape and color pattern of the head. This species differs from *L. chlorochroma* in the length of the head projection (Fig. 3), and in the absence of a black callus on the apex of the head projection, which is present in *L. chlorochroma*.

Lappida chlorochroma (Walker)

(Fig. 3)

Dictyophora (sic) chlorochroma Walker 1851a: 311. *Lappida chlorochroma* (Walker), Melichar 1912: 83.

Notes. I have illustrated a dorsal view of the head and thorax. This species has a shiny black callosity both on the dorsum and venter of the apex of the projection not mentioned by Walker (1851). The mediolateral carinae of the frons are green. The carinae of the head projection anterad of the eyes, a short lateral carina anterad of the eye, the projection behind the eye, and the ventrolateral carinae of the pronotum are black. The head is almost twice as long as the pro- and mesonotum combined.

5. *Hyalodictyon metcalfi* O'Brien, n. sp.

(Fig. 19)

Dictyophara obtusifrons (Walker 1851: 318) sensu Metcalf 1938: 341. See Metcalf plate 7 (dorsal view head and thorax), plate 21 (lateral view of male genitalia [probably of *H. centraliamericum* Fennah]).

Salient Features. Length of males, 15–16 mm; females, 17.5–19.5 mm. Ground color green, often faded to tan in collections. Vertex narrowed anteriorly, apex ca. ½ width of base, sides of head in dorsal view parallel, head (excluding eyes) ca. 1.5-fold as long as wide. Frons parallel sided, with lateral margins slightly sinuate, ca. 3-fold as long

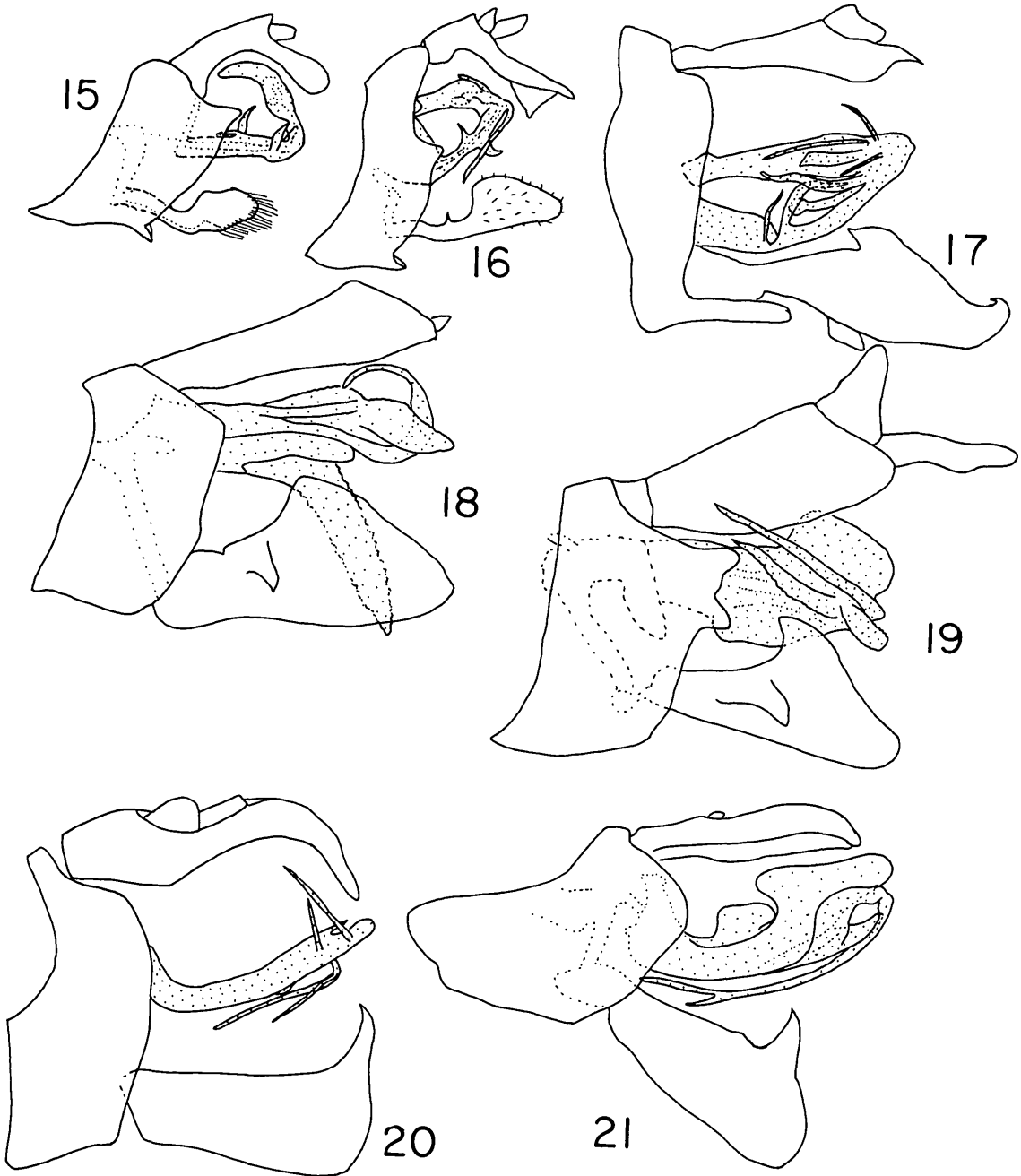


Fig. 15-21. Male genitalia of new species, left lateral view: (15) *Pintalia metcalfi*, (16) *Pintalia mettacta*, (17) *Herpis metcalfi*, (18) *Lappida metchroma*, (19) *Hyalodictyon metcalfi*, (20) *Anormenis metdiscus*, (21) *Atracis metcalfi*.

as broad (see Metcalf plate 7). Stigmal spot usually 4-celled.

Male Genitalia. Genital capsule in left lateral view (Fig. 19) with dorsolateral trilobate projection; style subtriangular; anal tube subquadrangular in lateral view, concave ventrally; aedeagus in left lateral view with dorsal apical and ventral

inflatable lobes; 2 pairs of spines directed anteriorly.

Female pregenital sternite with apical margin without emargination or depression.

Type Material. Holotype male: CANAL ZONE, Barro Colorado Island, VIII-8-1967, L. B. & C. W. O'Brien (LOB). Allotype female: 11-13-X, M. Bates,

with yellow label "Dictyophara obtusifrons Walker Det. Z.P.M." Paratypes (80): Barro Colorado Island, Nov. 1930, H. F. Schwartz, 1 ♀, with yellow label like allotype (MCZ); 10 Oct. 1966, H. Wolda, 4 ♀♀ (HW); VI-4 to VII-15-1973, 1 ♂ (HW); July 3, 1961, J. M. Campbell, 2 ♀♀ (CNC); July 24, 1963, D. C. Cavagnaro & M. E. Irwin, 1 ♂, 4 ♀♀ (CAS); 1941, K. W. Cooper, 1 ♀ (FMNH); Jan. 14-30, 1959, H. S. Dybas (some at light), 5 ♂♂, 14 ♀♀ (14 FMNH, 5 LOB); 8-8-1967*, 1 ♀ (LOB), March 2, 1967, R. D. Akre, 1 ♀ (LOB). CANAL ZONE, Gatun Lake, Tres Rios Plantation, T. O. Zschokko 1930, 1 ♀ (CAS); 1931, 7 ♂♂, 32 ♀♀ (29 CAS, 6 LOB, 1 NCS, 1 BMNH, 1 AMNH, 1 NR); 7 mi. SW. Gatun Lock, 5-22-1978*, 1 ♀ (LOB); Pipe Line Road, 14-VI-1975, D. Engleman, 1 ♀ (LOB). PANAMA, Chiriqui Province, Fortuna, 8°44'N, 82°15'W, 10 Dec. 1977, R. W. Flowers, at light, 2 ♀♀ (LOB); Alto Lino near Boquete, May 15, 1978*, 1 ♀ (LOB).

Notes. This species may be identified with the male genitalia without dissection by viewing the projection on the lateral caudal margin of the pygofer. Females have the ventral margin of the pregenital segment straight, which in combination with the shape of the vertex identifies them. As Fennah (1947) noted, identification of species of *Hyalodictyon* is a problem with existing literature. Previous authors apparently have considered species to be plastic in the shape of vertex and frons and have had difficulty interpreting existing species. Fennah renamed *H. obtusifrons* (Walker) sensu Distant as *H. bugabae* Fennah, *H. brachyrhinum* (Walker) sensu Distant as *H. centraliamericanum* Fennah, and *H. nodivenum* (Walker) sensu Distant as *H. teapanum* Fennah. Metcalf included at least two species in his series labeled *H. obtusifrons* and illustrated the genitalia of one and the head of the other; he did the same with *H. brachyrhinum*. Because *Hyalodictyon* requires a major revision, I am not renaming the species Metcalf illustrated as *D. brachyrhinum* Walker at this time.

Hyalodictyon obtusifrons Walker

(Fig. 2)

Dictyophora (sic) *obtusifrons* Walker 1851: 318.
Hyalodictyon obtusifrons (Walker), Fennah 1944: 87.

Notes. I have drawn the vertex of the holotype male.

Flatidae

6. *Anormenis metdiscus* O'Brien, n. sp. (Fig. 20)

Anormenis discus (Walker 1851a: 409) sensu Metcalf 1938: 397. See Metcalf plate 3 (habitus, lateral view), plate 12 (ventral view head).

Salient Features. Length of males, 8.1-8.2 mm; females 9.2-10 mm. Ground color of head and thorax golden brown (sometimes brown areas lat-

erally), triangular apex of mesonotum dark brown, forewing dark brown with white patch on costal margin at apex of costal vein (see Metcalf plate 3) and less distinct pale oval area of similar size behind basal cell, rest of costal area dark.

Male Genitalia. Genital capsule in ventral view without median lobe, aedeagus bilaterally symmetrical, with four pairs of spines. Genital capsule in left lateral view (Fig. 20) with dorsal apical margin concave under anal segment, basal margin excavate dorsally; style subquadrate with large apical spine, anal flap broadest at basal 1/4, narrowing and curving apically; aedeagus in left lateral view with 2 dorsal upright spines and 2 ventral reflexed spines arising from apical 1/4, median ventral swelling in apical 1/2.

Type Material. Holotype male: PANAMA, Gatun Lake, IX-8-1931, Tres Rios Plantation, T. O. Zschokko coll., E. P. Van Duzee Collection (CAS). Allotype female: CANAL ZONE, Barro Colorado Island, 20-VII-1924, N. Banks (MCZ). Paratypes (6): Canal Zone, Barro Colorado Island, VIII-7-1968*, 1 ♀, VIII-8-1968*, 1 ♀ (LOB); lights, Weir III, 17-IX-1974, H. Wolda, 1 ♀, light SM III, 30-IV-1974, 1 ♀, H. Wolda (HW); Fort Kobbe, 28 Aug. 1971, 1 ♂, N. J. Lee (LOB). PANAMA, Las Cumbres, lights, 13-V-1979, 1 ♀, H. Wolda (HW).

Notes. This species differs from *Anormenis discus* Walker in the shape and placement of the pale spot in the wing, which is about twice as long as broad in *A. discus* and does not seem to reach the wing margin (the type has the wing margin missing). In *A. metdiscus*, the pale area is nearly circular, with an extension to the wing margin. The shape of the frons also differs, with *A. discus* having a broad elevated T-shaped area dorsad (Fig. 4).

Anormenis discus (Walker)

(Fig. 4 and 14)

Flatoides discus Walker 1851: 409.

Flatoides latistriga Walker 1858: 48; Melichar 1898: 338.

Anormenis discus (Walker), Melichar 1923: 69.

Notes. I have illustrated the frons and the pronotum and the position of the pale disc in the forewing.

Type Material. The type (BMNH) is a male labeled with a green-edged label "Type," and "Para"; on the reverse is "50; 2," which is the registration number for material collected up the Amazon by A. R. Wallace and H. E. Bates and later purchased by W. W. Saunders; the last label, cut from a copy of Walker's 1951 catalog, is "11. FLATOIDES DISCUS." A second specimen, a female with no label, is thought to be from the type series also, as Walker mentioned two specimens. There is also a female labeled "type *latistriga* Walker." There is a pale area along the claval suture and at the base of the forewing along the suture in the type of *F. latistriga* that is less marked in the second female specimen.

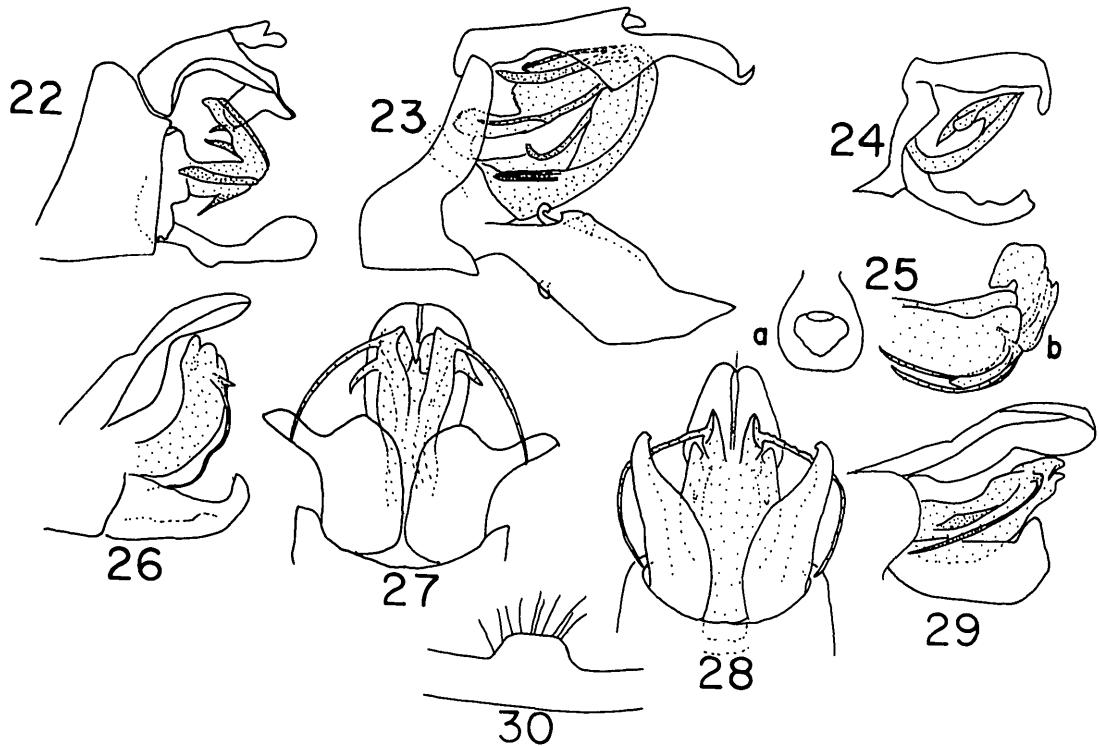


Fig. 22-30. (22-29) Male genitalia of types in the British Museum, left lateral view except Fig. 25, 27, and 29: (22) *Pintalia germana*; (23) *Herpis delicata*; (24) *Anotia invalida*; (25) *Thtonia brevior*, anal flap, lateral view aedeagus; (26) *Flataloides obliqua*; (27) *Flatoidinus occidentis*, ventral view; (28 and 29) *Atracis humeralis*, ventral view, lateral view. (30) Ventral view of last pregenital sternite of female type of *Picumna subrotundata*, drawn by P.S. Broomfield.

7. *Atracis metcalfi* O'Brien, n. sp.
(Fig. 21)

Atracis humeralis (Walker 1858b: 70) sensu Metcalf 1938: 402. See Metcalf plate 12 (ventral view head, dorsal view head and thorax), plate 23 (lateral view male genitalia).

Salient Features. Length of males, 12 mm. Ground color pale yellowish brown with a few darker markings.

Male Genitalia. Genital capsule in left lateral view (Fig. 21) expanded anterad ventrally; style subrectangular, ca. 2.5-fold as long as broad, slightly emarginate before dorsal tooth; anal tube elongate oval, emarginate at apex in dorsal view, convex dorsally, concave ventrally, aedeagus in left lateral view with 2 dorsal paired lobes, smaller anterad, larger somewhat mushroom-shaped, flattened dorsad, lateral recurved spines as long as aedeagus, spurred twice before apex, single median ventral projection reaching level of apex of spines in recurved position.

Type Material. Holotype male: COSTA RICA, No. Siquirrea, June 1924; yellow label "*Atracis humeralis* Walker, det. Z.P.M.," and "Property of Entomology Dept. North Carolina State University" (NMNH, on indefinite loan from NCSU).

Notes. Metcalf's illustration of the male genitalia must have been made of another specimen, as the type had not been dissected nor the genitalia cleared, and the illustration in Metcalf does not match this specimen. I believe genitalia are necessary to identify specimens of *Atracis*.

Atracis humeralis (Walker)
(Fig. 28 and 29)

Elidiptera humeralis Walker 1858: 70.
Flatoides humeralis (Walker), Dornh 1859: 65.
Atracis humeralis (Walker), Melichar 1902: 187.

Notes. I have illustrated the genitalia of the male holotype (BMNH). A *humeralis* differs from *A. metcalfi* in the shape of the spines of the aedeagus and in the presence of a median ventral keel on the anal segment.

8. *Flataloides metabliqua* O'Brien, n. sp.
(See Metcalf plate 23)

Flataloides obliqua (Walker 1858a: 70) sensu Metcalf 1938: 403. See Metcalf plate 23 (lateral and ventral views of male genitalia).

Salient Features. Length of male, 14 mm; female, 15 mm. Ground color pale with few faint irregular darker markings.

Male Genitalia. Genital capsule in left lateral view subquadrate, style ovoid, anal tube narrowed, elongate, slightly concave ventrally; aedeagus with pair of subapical U-shaped spines (see Metcalf plate 23).

Type Material. Holotype male: PANAMA, Barro Colorado Island, June 29, 1933, Hood, Hood, & Hook. Allotype female: same except VII-6-1923, R. C. Shannon (both NMNH).

Notes. Metcalf's illustrations of the genitalia are excellent. The species may be identified by the male genitalia.

***Flataloides obliqua* (Walker)**
(Fig. 26)

Elidiptera obliqua Walker 1858: 70.

Flatoides obliquus (Walker), Fowler 1900: 64.

Notes. I have illustrated the genitalia of the male holotype. *F. obliqua* differs from *F. metcalfi* by the presence of a small spine at the base of the long spine of the aedeagus. The anal segment also has a median ventral keel. The head is missing on the type.

Fowler's and Walker's Types Illustrated
(Metcalf's Species Not Described)

In these species, either a male specimen corresponding to Metcalf's analysis cannot be found, or the specimens Metcalf examined cannot be found, so that new species are not described. Nonetheless, that character of Fowler's and Walker's species purportedly illustrated by Metcalf has been illustrated from the types. Lectotypes are designated where appropriate.

Dictyopharidae

***Hyalodictyon brachyrhinum* (Walker)**
teste Fennah 1944: 87
(Fig. 1)

***Dictyopharoides tenuirostris* Fowler**
(Fig. 9)

I have illustrated the vertex of the holotype (BMNH) of the former (the abdomen is missing) and the lateral view of the head of the holotype female (BMNH) of the latter.

Flatidae

***Flatoidinus occidentis* (Walker)**
(Fig. 27)

Metcalf discussed this species as *Flatoidinus occidentalis* Walker, a typographical error he corrected in his catalog. I have illustrated the genitalia of the male holotype (BMNH), which was collected on the "West Coast of North America." Metcalf's

illustration of the genitalia differs from the holotype, but his figure of the head fits the species.

Issidae

***Thionia brevior* Fowler**
(Fig. 8 and 25)

I have illustrated the vertex and the male genitalia of the lectotype (BMNH) of *T. brevior*, here designated. The 4 labels are a circular "Type" with a red margin and "Bugaba/Panama,/Champion" and "B. C. A. Homopt. I./Thionia/brevior,/Fowl." and a handwritten label "Thionia/brevior/Fowler. TYPE." The genitalia are in a cover glass attached to the specimen.

***Picumna subrotundata* (Fowler)**
(Fig. 5, 6, and 30)

I have illustrated the frons and vertex and last pregenital sternite of *P. subrotundata*. The tegmen is very like Metcalf's drawing but lacks 2 spots in the white median band, has white humeral patches, and the apical ¼ has dark veins. Caldwell illustrated the male genitalia. Not having seen his specimens, I cannot determine if they are conspecific with Fowler's types.

Derbidae

***Anotia invalida* Fowler**
(Fig. 24)

This species may not have been misidentified. I have not seen Metcalf's specimens, and his illustration gives little detail. But the specimens in the British Museum include a male with the aedeagus partially exposed, granting an opportunity to clarify this species with an illustration of the genitalia. I designate as lectotype a male (BMNH) with 4 labels "Type" and "Bugaba/Panama/Champion" and "B. C. A. Homopt. I./Anotia/invalida/Fowl." and "Anotia/invalida/Fowler. Type"; the last label is handwritten.

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(LOB). I am grateful to S. W. Wilson for reviewing the manuscript.

References Cited

- Broomfield, P. S.** 1985. Taxonomy of Neotropical Derbidae in the new tribe Mysidiini (Homoptera). *Bull. Br. Mus. (Nat. Hist.) Entomol.* 50: 1-152.
- Caldwell, J. S.** 1944. The tribe Cenchreini with special references to the *Cenchrea* complex (Homoptera, Derbidae). *Bull. Brooklyn Entomol. Soc.* 39: 99-110.
1945. Neotropical lanternflies of the genus *Phrictus* in the United States National Museum, with descriptions of four new species. *Proc. U.S. Natl. Mus.* 96: 177-184.
- Caldwell, J. S. & L. F. Martorell.** 1952. Review of the Auchenorrhynchous Homoptera of Puerto Rico. Part II. The Fulgoroidea except Kinnaridae. *J. Agric. Univ. P.R.* 34: 133-269.
- Distant, W. L.** 1883-1905. *Biologia Centrali-Americana. Insecta. Rhynchota. Hemiptera-Homoptera.* I: 17-24, 25-40, 41-43, 140-146.
- Fennah, R. G.** 1942. New or little known West Indian Kinnaridae (Homoptera: Fulgoroidea). *Proc. Entomol. Soc. Wash.* 44: 99-110. [key: New World genera]
1944. New Dictyopharidae from the New World. (Homoptera: Fulgoroidea). *Proc. Biol. Soc. Wash.* 57: 77-94. [key: New World genera]
1945. The Tropiduchidae of the Lesser Antilles (Homoptera: Fulgoroidea). *Proc. Entomol. Soc. Wash.* 47: 137-167. [key: most New World genera]
1946. A synopsis of the Achilixiidae of the New World (Homoptera: Fulgoroidea). *Ann. Mag. Nat. Hist. Ser.* 11. 13: 183-191.
1947. Notes on Neotropical Dictyopharidae and synonymy in two other groups. *Smithson. Misc. Coll.* 107: 1-15 [publ. no. 3904]. [addition to generic key]
1949. On a small collection of Fulgoroidea (Homoptera) from the Virgin Islands. *Psyche* 56: 51-65. [emendations to tropiduchid generic key]
- 1950a. A generic revision of the Achilidae (Homoptera: Fulgoroidea) with descriptions of new species. *Bull. Br. Mus. (Nat. Hist.) Entomol.* 1: 1-170.
- 1950b. Fulgoroidea of Fiji. *Bull. B. P. Bishop Mus.* 202: 1-122.
1952. On the generic classification of Derbidae (Homoptera: Fulgoroidea) with descriptions of new neotropical species. *Trans. R. Entomol. Soc. London* 103: 109-170.
1954. The higher classification of the family Issidae (Homoptera: Fulgoroidea) with descriptions of new species. *Trans. R. Entomol. Soc. London* 105: 455-474. [key: genera of Acanaloniidae, treated as subfamily of Issidae]
1980. New and little-known Neotropical Kinnaridae (Homoptera: Fulgoroidea). *Proc. Biol. Soc. Wash.* 93: 674-696. [key: Kinnarinae]
1984. Revisionary notes on the classification of the Nogodinidae (Homoptera, Fulgoroidea), with descriptions of a new genus and a new species. *Entomol. Mon. Mag.* 120: 81-86.
- Flynn, J. E. & J. P. Kramer.** 1983. Taxonomic study of the planthopper genus *Cedusa* in the Americas (Homoptera: Fulgoroidea). *Entomography* 2: 121-260.
- Fowler, W.** 1900-1905. Order Rhynchota. Suborder Hemiptera-Homoptera. *Biologia Centrali-Americana.* I: 44-76, 109-124, 125-139, 146-147.
- Kramer, J. P.** 1973. Revision of the American plant-hoppers of the genus *Stobaera* (Homoptera: Delphacidae) with new distributional data and host plant records. *Proc. Entomol. Soc. Wash.* 75: 379-402.
1976. Revision of the neotropical planthoppers of the genus *Bladina* (Homoptera: Fulgoroidea: Nogodinidae). *Trans. Am. Entomol. Soc. (Philadelphia)* 102: 1-40.
1978. Taxonomic study of the American planthopper genus *Cyrpoptus* (Homoptera: Fulgoroidea: Fulgoridae). *Proc. Biol. Soc. Wash.* 91: 303-335.
1979. Taxonomic study of the planthopper genus *Myndus* in the Americas (Homoptera: Fulgoroidea: Cixiidae). *Trans. Am. Entomol. Soc. (Philadelphia)* 105: 301-389.
1981. Taxonomic study of the planthopper genus *Cixius* in the United States and Mexico (Homoptera: Fulgoroidea: Cixiidae). *Trans. Am. Entomol. Soc. (Philadelphia)* 107: 1-68.
1986. Supplement to a taxonomic study of the planthopper genus *Cedusa* in the Americas (Homoptera: Fulgoroidea: Derbidae). *Entomography* 4: 254-314.
- Melichar, L.** 1898. *Monographie der Ricaniden* (Homoptera). *Ann. Nat. Hofmus. Wien* 13: 197-359.
1902. *Monographie der Acanaloniiden und Flatiden* (Homoptera) (Fortsetzung.). *Ann. Nat. Hofmus. Wien* 17: 1-123.
1906. *Monographie der Issiden* (Homoptera). *Abh. Zool. Bot. Ges. Wien* 3: 1-327.
1923. Homoptera, fam. Acanaloniidae, Flatidae et Ricanidae. *Gen. Insect.* 182: 1-185.
- Metcalfe, Z. P.** 1938. The Fulgorina of Barro Colorado and other parts of Panama. *Bull. Mus. Comp. Zool.* 82: 277-423, 23 plates.
- Muir, F.** 1926. Contributions to our knowledge of South American Fulgoroidea (Homoptera). Part I. The family Delphacidae. *Bull. Hawaii. Sugar Plant. Assoc. Entomol. Ser.* 18: 2-50.
- O'Brien, L. B.** 1982. Two neotropical derbid genera with observations on wing rolling (Fulgoroidea, Homoptera). *Fla. Entomol.* 65: 306-321. [partial key to Cenchreini, checklist of Cenchreini, keys to *Neodawnaria* and *Dawnarioides*]
- O'Brien, L. B. & N. D. Penny.** 1987. Achilixiidae of the Amazon Basin (Homoptera: Fulgoroidea). *Acta Amazonica* (in press).
- O'Brien, L. B. & S. W. Wilson.** 1985. Planthopper systematics and external morphology, pp. 61-102. *In* L. R. Nault & J. G. Rodriguez [eds.], *The leafhoppers and planthoppers*. Wiley, New York.
- O'Brien, L. B., N. D. Penny & J. R. Arias.** 1987. Lophopidae of the Amazon Basin with keys to New World genera and to species of *Hesticus* (Homoptera: Fulgoroidea). *Acta Amazonica* (in press).
- Penny, N. D.** 1980. A revision of American Bennini (Hemiptera: Fulgoroidea: Cixiidae). *Acta Amazonica* 10: 207-212.
- Penny, N. D. & J. R. Arias.** 1984. Four new species of wing rolling *Neodawnaria* (Homoptera: Derbidae) from the Amazon Basin. *Acta Amazonica* 14: 459-471.
- Ramos, J.** 1957. A review of the Auchenorrhynchous Homoptera of Puerto Rico. The Kinnaridae. *J. Agric. Univ. P.R.* 41: 38-117.
- Stål, C.** 1870. Die amerikanischen Fulgoriden-Gattungen, synoptisch beschrieben. *Stett. Entomol. Ztg.* 31: 255-258, 282-294.
- Synave, H.** 1969. Note sur le genre *Taosa* Distant (Dictyopharidae) et sur *Harmosa bivulneratum* Fen-

nah (Eurybrachidae) (Homoptera-Fulgoroidea). Bull. Inst. R. Sci. Nat. Belg. 45: 1-17.

Walker, F. 1851. List of the specimens of Homopterous insects in the collection of the British Museum. 2: 261-636.

1852. Supplement. List of the specimens of Homopterous insects in the collection of the British Museum. 4: 1119-1168.

1858. Supplement. List of the specimens of Homopterous insects in the collection of the British Museum. 1858: 1-307.

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