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"REVIEW OF THE AUCHENORYNCHOUS[1] HOMOPTERA OF PUERTO RICO"

PART II. THE FULGOROIDEA EXCEPT KINNARIDAE

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Section II is a continuation of the presentation of data obtained during our survey of the Homoptera in relation to bunchy-top disease of "papaya." In addition to the collections and material consulted for the cicadellids we have received four boxes of West Indian fulgoroids from the American Museum of Natural History. From this collection we have gathered additional data for Puerto Rico and have added records from various islands in the Virgin group which give us a much better idea of the distribution and relationship of many forms.

Since our work has almost doubled the number of forms known from this region and a check of old records has uncovered very many errors, we do not believe that a comparison of the Puerto Rican Homopterous fauna with that of the other Antilles and associated continental regions could be very accurate because it is not unreasonable to assume that records for these other regions, with few exceptions, are any more accurate or nearly complete than they were for Puerto Rico.

Furthermore we do not flatter ourselves by believing that our records "must represent fairly well the occurrence of all but the rarer forms", nor do we believe that our determinations approach perfection; however we do feel that we have made it a little easier for others to go on from here.

It is pertinent to repeat the information contained in Section I that authorship for new forms and group of Cicadellidae and Fulgoroidea excepting the Kinnaridae are to be credited to Caldwell, and new forms and

[1] The term Hemoptera will here-in-after apply to the Auchenorynchi in which the beak is free from the sternum.

[2] Dr. Caldwell is responsible for the systematic data in this paper.

[3] Dr. Martorell is responsible for the biologic data throughout the text.

groups of Cicadidae, Cercopidae, Membracidae, and Kinnaridae are to be credited to Prof. J. A. Ramos; L. F. Martorell is responsible for the biologic and ecologic data throughout the text. All primary types in Section II are retained by Caldwell except those from the Ramos and American Museum collections.

Superfamily FULGOROIDEA (excepting the KINNARIDAE)

The fulgoroids differ from other Homoptera by the location of the antennal base on the side of the head beneath the eye and by the absence of several characters peculiar to other groups such as a greatly developed pronotum, a double row of spines on the metatibia, or three ocelli on the vertex. The nomenclature is rather unstable with *Fulgora* apparently a synonym of *Laternaria* and with *Delphax* lacking logical priority over *Araeopus*. For the sake of constancy I use Fulgoroidea and Delphacidae until the International Commission on Zoological Nomenclature makes a definite decision for proper usage.

We record 141 forms from this region, 70 of these are new to science and 13 are new records. Approximately 28 previous records that were based on misidentifications or synonymy of one kind or another are deleted from the fauna, and as usual, many problems remain unsolved.

KEY TO FAMILIES OF FULGOROIDEA

(Adapted from Metcalf, 1938)

1. Metatibia with movable spur or calcar at apex ..... Delphacidae
   Metatibia without a movable spur at apex 2
2. Second metatarsus with a row of spines across apex 3
   Second metatarsus with one spine on either side at apex 6
3. Abdominal tergites 6–8 bearing wax-pores ..... Kinnaridae
   Abdominal tergites 6–8 without wax-pores 4
4. Very fragile forms; apical segment of labium about as broad as long ... Derbidae
   More robust forms; apical segment of labium longer than broad 5
5. Fore wing beyond clavus overlapping ..... Achilidae
   Fore wing beyond clavus not overlapping ..... Cixiidae
6. (2) Tip of mesonotum transversed by a groove or fine line ..... Tropiduchidae
   Tip of mesonotum not transversed by a groove or line 7
7. Costal area with cross veins; clavus granulate ..... Flatidae
   Costal area absent or obscure; clavus not granulate 8
8. Metatibia without spines before apex ..... Acanaloniidae
   Metatibia with one or more preapical spines ..... Issidae

Family CIXIIDAE

Antennae small, second segment globose. Median ocellus often present. Second tarsus of metatibia with a row of small spurs across apex. Fore wing usually vitreous; claval suture distinct with claval veins neither granulate

nor reaching to apex of clavus; nodal cell conspicuous (stigma). Tegulae present. Ovipositor complete or incomplete. Aedeagus and periandrium usually with many prominent processes. Immatures subterranean or under surface litter.

KEY TO GENERA OF CIXIIDAE

1. Antennae in front of eyes in ear-like cavities ..... **Bothriocera**
   Antennae below eyes, not in ear-like cavities 2
2. Mesonontum with five carinae; periandrium strongly attached to upper pygofer **Oliarus**
   Mesonotum tricarinate; periandrium strongly attached to anal segment 3
3. Head and body greatly depressed dorsoventrally ..... **Microledrida**
   Head and body compressed laterally 4
4. Vertex with a longitudinal median carina ..... **Cubana**
   Vertex without longitudinal median carina ..... **Pintalia**

BOTHRIOCERA Burmeister

1835. Handb. Entomologie **2:** 156.

Antennae in front of eyes in ear-like cavities. Ocelli prominent. Vertex with single transverse carina. Mesonotum tricarinate. Fore wing expanded apically; media arising from basal cell. Female pygofer robust. Aedeagus thin, usually with flagellate processes.

Bothriocera undata (Fabricius)

1803. *Issus undatus* Fabricius. Systema Rhygn. p. 101.
1936. *Bothriocera venosa* Wolcott. Jour. Dept. Agr. P. R. **20:** 93–94.
1936. *Bothriocera bicornus* Wolcott. Jour. Dept. Agr. P. R. **20:** 94.
1943. *Bothriocera undata* Caldwell. Lloydia **6:** 323.

Length 4–5.5 mm. Generally black to light brown. Face edged with brown. Clavus usually dark; a transverse band present from stigma to apex of clavus; apical cross veins often broadly darkened.

Male pygofers extended laterally to obtuse apices. Styles pipe shaped in lateral aspect. Periandrium with a lobe-like process on its apical left. Aedeagus with a pair of small flagellate processes. (See Plate 1.)

The marking and intensity of color are extremely variable but the male genitalia are constant. While I have never had any Puerto Rican material compared with the type of *venosa* Fowler I am positive that this form is not *venosa* because I have material from Central America that compares favorably with the figures in the Biologia. It is quite possible that the Fabrician type came from one of the other Caribbean islands; however this form is extremely abundant, well known and easily recognized, and the present determination may be presumed to be correct.

Very common from sea level to almost 3000 ft., in suitable localities in Puerto Rico. Also found on Saint Thomas and Saint Croix, V. I.

RECORDS:

Puerto Rico: Rio Piedras (In front of San José Central, along railroad line up to Cemetery), Aug. 17, 1947, by sweeping grasses; El Yunque Mts. (along Pinnacles and Mt. Britton's trail), altitude 1700–3000 ft., Aug. 22, 1947, by sweeping weeds, shrubs and grasses; Mayagüez (Inst. of Trop. Agric.), Aug. 29, 1947, on the underbrush of "papaya" plantation; Aguadilla Beach (Columbus Park), Aug. 29, 1947, by sweeping on "calabazas" (squash); Barranquitas, Barranquitas-Aibonito Road, Km. 8.4, Barrio Helechal, altitude 1900 ft., Sept. 11, 1947, from weeds and shrubs, (*Ipomoea, Rubus, Solanum* and *Casearia*); Orocovis-Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, from weeds and grasses; Ponce,

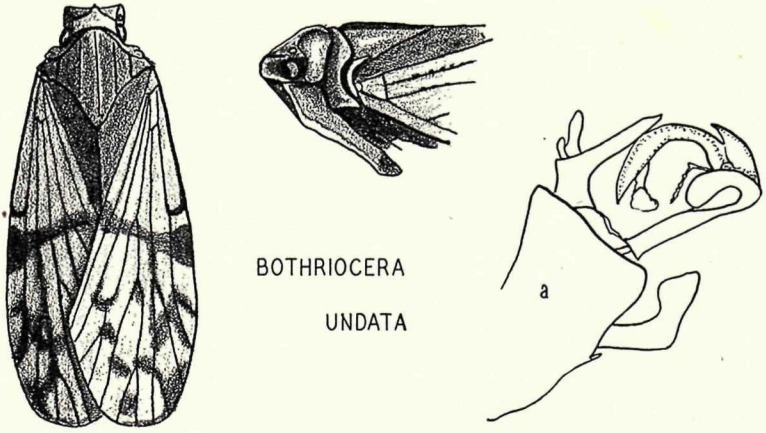


PLATE 1. a, genital capsule.

Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from shrubs and weeds along roadsides and from underbrush of coffee bushes; Ponce-Adjuntas Road, Km. 23.7, altitude 2100 ft., from weeds; Ponce-Adjuntas Road, Km. 27.9, altitude 1550 ft., from "higuillo", *Piper aduncum* forest; Cayey, Peñon del Collao, altitude 2000–2500 ft., Sept. 13, 1947, from weeds and bushes; Aguas Buenas, (E. Castro's farm) 1300 ft., altitude, Sept. 13, 1947, by sweeping the low forest, mostly melastomaceous shrubs; Ciales-Jayuya Road, Km. 30.6, altitude 1820 ft., Sept. 25, 1947, by sweeping from bushes and shrubs particularly "guaraguao", *Guarea trichilioides, Dendropanax arboreum* and *Inga vera;* Ciales-Jayuya Road, Km. 25.8, altitude 2010 ft., Sept. 25, 1947, from weeds; Jayuya-Ponce Road (Alto de la Bandera-La Carmelita), Sept. 25, 1947, from weeds and grasses; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Doña Juana, altitude 2600 ft., Oct. 9, 1947; Maricao Insular Forest, Oct. 10, 1947; Toro Negro Mts., (La Maravilla) altitude 2800–2950 ft. altitude,

Nov. 14, 1947, from trees and bushes; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping weeds, grasses and bushes; Aibonito, Dec. 30, 1947.

Vieques Island: East Beach, Oct. 23, 1947, among weeds, grasses and shrubs.

Bothriocera eborea Fennah

1943. *Bothriocera eborea* Fennah. Psyche **50:** 14:17.
1945. *Bothriocera eborea* Fennah. Proc. Biol. Soc. Wash. **58:** 142–143.
1945. *Bothriocera eborea* Fennah. Psyche **56:** 53.

Size, color, and markings similar to *undata* F. Periandrium with dorsal margin sinuate and terminating in a lobe-like process that is acute apically. Aedeagus with a curved spine one-third distance from base; apex with a curved spine and a spatulate process.

The form of the dorsoapical termination of the periandrium is probably the most easily observed character that will separate *eborea* from *undata*, being more erect and apically acute in the former, and strongly produced anteriorly and broadly rounded apically in the latter.

Fennah records this species from Jost Van Dyke and Tortola, B. V. I., on *Coccoloba uvifera*. We took no specimens but it must occur in the other Virgin Islands.

OLIARUS Stål

1862. Berliner Ent. Zeit. **6:** 306.

Vertex usually longer than broad, double carinae present apically forming apical fovae. Mesonotum with five carinae. Fore wing usually hyaline; media arising from basal cell. Ovipositor greatly flattened; female pygofer concave posteriorly, with many wax pores that produce a mass of wax filaments. Aedeagus and periandrium with many prominent processes; periandrium strongly attached to upper pygofer. Anal segment broad, hood-like.

KEY TO SPECIES OF OLIARUS

1. Species usually 6.5 or longer; aedeagus with many processes ..... *borinquensis*
   Species less than 5 mm. in length, usually much less; aedeagus with never more than five processes 2
2. Periandrium with one right and one left ventroapical process ..... *complectus*
   Periandrium with only a right ventroapical process ..... *viequensis*

Oliarus borinquensis n. sp.

Length of male 7 mm. General color black with all carinae and median tablet of mesonotum brownish; pronotum whitish. Fore wing milky-hyaline, often with a dark area from basal cell to claval veins; sutural

margin often darkened except at claval apex; veins dark brown, pustules scarcely visible.

Vertex a third longer than broad, trough-like; median carina present in basal three-fourth. Median facial carina little elevated; clypeus deeply inserted into frons. Intermediate mesonotal carinae scarcely elevated. Male pygofers produced on either lateroposterior margin, almost acute. Style enlarged apically, the inner apical thumb-like process varying in length. Periandrium short, transverse, with elongate processes. Aedeagus as illustrated. (See Plate 2.)

RECORDS:

Puerto Rico: Male holotype and paratype from Guánica Insular Forest, Sept. 26, 1947, on red mangrove or "mangle colorado" *Rhizophora mangle*. Paratypes from Cambalache Experimental Forest, Guánica Insular Forest and Ponce. (Caldwell and Martorell.)

Oliarus complectus Ball

1902. *Oliarus complectus* Ball. Canadian Ent. **34:** 152.
1917. *Oliarus franciscanus* Van Duzee. Proc. Calif. Acad. Sci. **7:** 309.
1921. *Oliarus cinereus* Wolcott. Jour. Dept. Agr. P. R. **5:** 18–19.
1929. *Oliarus franciscanus* Osborn. Jour. Dept. Agr. P. R. **13:** 106.
1934. *Oliarus complectus* Ball. Jour. Washington Acad. Sci. **24:** 273–274.
1945. *Oliarus* (*Melanolarius*) *campestris* Fennah. Proc. Biol. Soc. Washington **58:** 141–142.
1949. *Oliarus* (*Melanolarius*) *campestris* Fennah. Psyche **56:** 53.

Length 3–5 mm. Usually black with light carinae on face, vertex, and pronotum. Fore wing milky-hyaline; veins light to dark brown. An occasional female will have the median tablet of the mesonotum brownish.

Vertex about as long as broad but appearing longer than broad because of acute triangular shape; apical fovae elongate-triangular. Median facial carina highly elevated. Intermediate carinae of mesonotum arcuate. Anal segment of male with short apical tooth projected ventrad into genital cavity. Pygofers with either lateroposterior margin produced more basally than apically in lateral aspect; medioventral process acutely triangular. Styles somewhat recurved apically. Periandrium with three apical processes, the median process dorsal. Aedeagus with two apical processes; the more basal process strongly curved. (See Plate 2.)

This is the most common *Oliarus* in Puerto Rico and the Virgin Islands, occurring from sea level up to 2800 ft.

Complectus Ball was described in 1902 from a cotype series containing forms from Continental North America and Haiti. By 1917, Van Duzee, among others, suspected that the continental forms were the same as

franciscanus Stål. This synonomy became generally accepted, so in 1934 Ball made a subsequent type designation limiting the primary types to

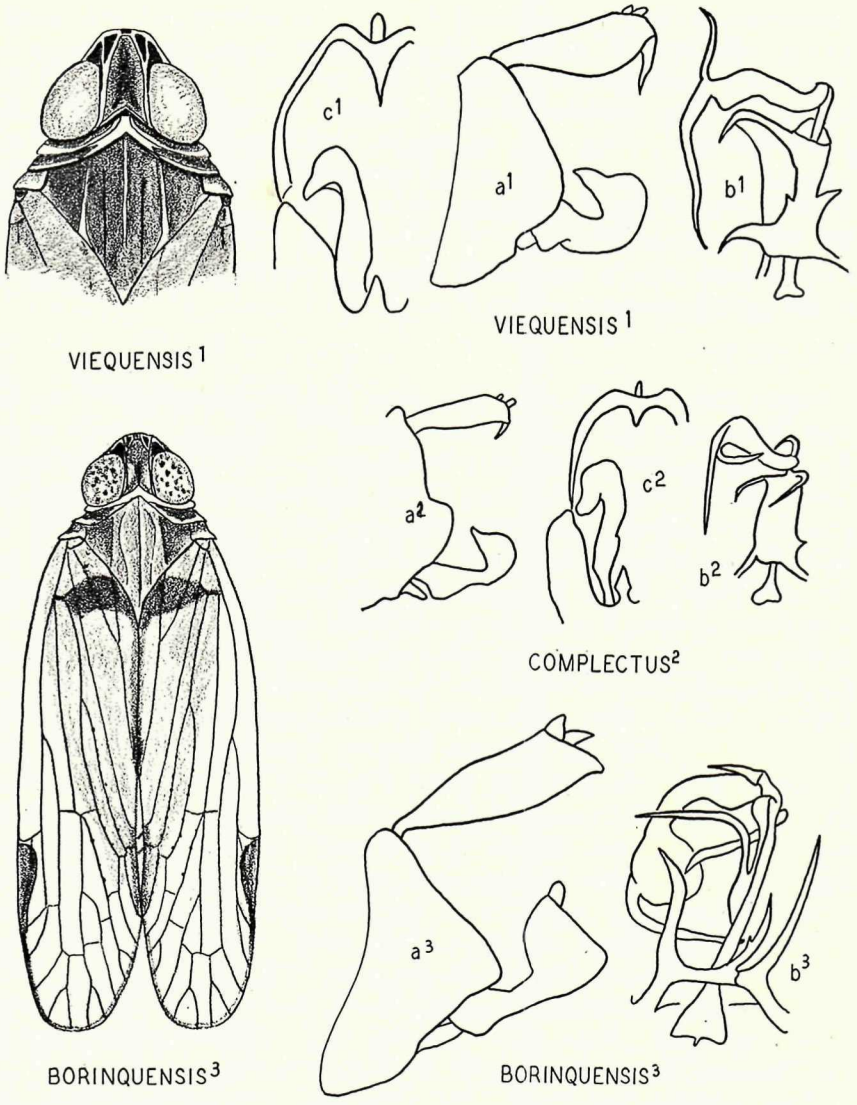


PLATE 2. *Oliarus*, a, genital capsule, b, aedeagus, ventral, c, genital capsule, ventral.

Haiti. In the meanwhile Wolcott in 1921 described *cinereus* from Puerto Rico with no mention of types and very little descriptive material; however

many species are accepted from much less and his name would be accepted if *cinereus* Wolcott was not the same species as *complectus* Ball from Haiti. Through the courtesy of Dr. Rene Malaise I have examined the type of *franciscanus* Stål and have found that it is evidently a very rare species known only from California and from the type. All the forms previously determined as *franciscanus* are not that species. I have described two species from the complex formerly identified as *franciscanus* and others await description (Ohio Jour. Sci. **47:** 76, 1947). Another form that could have been mixed in the *franciscanus-complectus* complex is *maidis* Fennah from Trinidad, which is closely related to *complectus* (Proc. U. S. Nat. Mus. **95:** 423, 1945). In final analysis, *complectus* or one of the closely related forms may prove to be *lunata* Fabricius which was described from the West Indies in 1803, (Systema Rhyng. p. 54).

RECORDS:

Puerto Rico: Rio Piedras (Solis farm on DDT Experiment) Aug. 17, 1947, from soybeans; Luquillo Beach, Aug. 22, 1947, by sweeping weeds along beach; Tallaboa (Giron's farm) Aug. 28, 1947, from egg-plants "berenjena", *Solanum melongena*; Rincon, Barrio Punta, Aug. 29, 1947, by sweeping on pigeon peas, *Cajanus indicus;* Santurce, Sept. 5, 1947, at light; Orocovis River bed, Sept. 11, 1947, among weeds and grasses; Orocovis-Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, from weeds and grasses; Ponce, Ponce-Guayanilla Road, in pasture near Ford House, Sept. 11, 1947, by sweeping on *Vachellia farnesiana* and "caro" *Cissus sicyoides;* Cayey, Peñón del Collao, altitude 2000–2500 ft., Sept. 13, 1947, sweeping weeds and bushes; Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 13, 1947, sweeping low forest mostly among melastomaceous shrubs; Ciales-Jayuya Road, Km. 23.2, altitude 1100 ft., Sept. 25, 1947, from *Castilla elastica* trees; Ciales-Jayuya Road, Km. 25.8, altitude 1200 ft., Sept. 25, 1947, from weeds; Cabo Rojo, Sept. 26, 1947, from grasses and weeds; Guánica, Sept. 26, 1947 ,from *Volkameria aculeata;* Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Juana Díaz-Losey Field Road, Km. 3.7, altitude 75 ft., Oct. 9, 1947, from weeds and grasses; Arecibo, Cambalache Experiment Forest, Nov. 6–7, 1947, beating weeds and shrubs; Maunabo Beach, Nov. 21, 1947, by sweeping grasses and weeds; Ponce, Nov. 21, 1947, from "papaya" foliage; Ponce-Las Cucharas Beach, Dec. 4, 1947, from *Batis maritima.*

Vieques Island: Oct. 22–23, 1947, from weeds and grasses; Puerto Negro, Oct. 10, 1947, beating *Volkameria aculeata;* Navy Base, Oct. 23, 1947, among weeds, grasses and bushes; Isabel II-La Esperanza Road, Oct. 23, 1947, at light (auto lights against white sheet from 8:00–10:00

P. M.); Navy Base Hill and east center hill, Oct. 24, 1947, from weeds, grasses and bushes; also collected form "papaya" foliage.

Caja de Muertos Island: Dec. 11, 1947.

St. Thomas, Virgin Islands: Nov. 25, 1947, from weeds, grasses and bushes.

Oliarus viequensis n. sp.

Length of male 4 mm., female 4.3 mm. Black with all carinae light except the intermediate carinae of the mesonotum. Fore wing milky-hyaline; veins light yellow darkening apically; stigma lightly infuscate.

Vertex narrower than in *complectus*, hence less triangular; apical fovae shorter. Intermediate mesonotal carinae almost straight. Anal segment of male with apical tooth elongate, acute, slightly deflexed at midlength in lateral aspect. Pygofer with lateroposterior margins broadly rounded; medioventral process elongate-triangular. Periandrium with one long apical process projected to the right; aedeagus with right apical process extremely long, left process half as long. (See Plate 2.)

RECORD:

Vieques Island: Male holotype and paratype from Vieques, Oct. 22, 1947. (Caldwell and Martorell.)

Female allotype and paratypes of both sexes from Cape Sable, Florida, Feb. 14, 1950, (Caldwell). Male paratypes from St. John, Antigua, B. W. I., June 5, 1911, (A.M.N.H.).

MICROLEDRIDA Fowler

1904. Biologia Cent.-Amer. **1:** 99.

Greatly flattened dorsoventrally, face horizontal and ventral. Vertex with median carina; double apical carinae present apically united at center forming lateral fovae. Frons extremely broad, with median carina. Pronotum with median carina. Mesonotum tricarinate. Fore wing deflexed at nodal line; subhyaline; venular pustules very prominent. Posttibia with one or two preapical spines. Ovipositor complete. Aedeagus relatively simple, usually with two processes.

Microledrida arida n. sp.

Length, male 3.5 mm.; female 3.8 mm. Face yellowish-white, brown apically. Vertex, pronotum, and median tablet of mesonotum sordid yellow lightly washed with fuscous. Mesonotum brownish laterally. Fore wing milky, brownish basally and across nodal line but color not reaching to

sutural margin; apex lightly washed with brown; veins not colored; granulations very dark, prominent.

Vertex with median length two-thirds that of greatest width; deeply and broadly concave caudally. Anal segment of male semicircularly emarginate apically forming an acute apex on either side. Style lobate apically, gently divergent. Aedeagus with one long and one short apical process. (See Plate 3.)

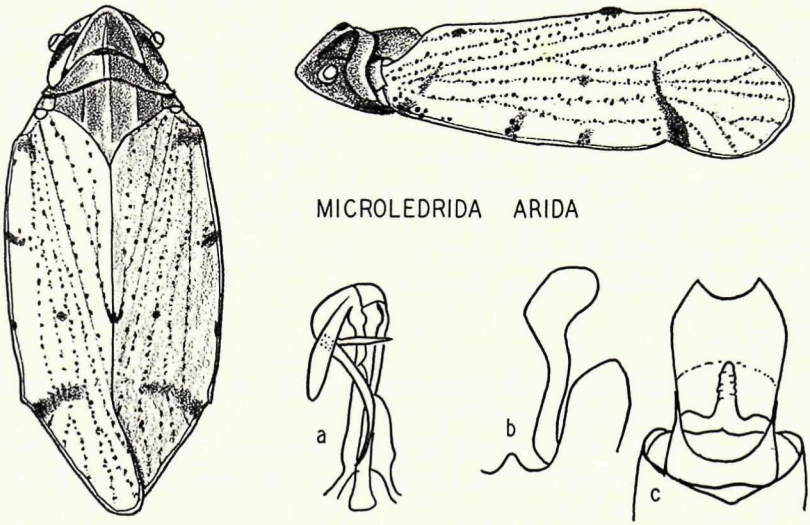


PLATE 3. a, Aedeagus, ventral, b, pygofer & right style, ventral, c, anal segment, dorsal.

RECORDS:

Caja de Muertos Island: Male holotype and female allotype from Caja de Muertos Island, Dec. 11, 1947. (Caldwell and Martorell.)

Puerto Rico: Paratypes from Cabo Rojo, Sept. 26, 1947, from "cereza", *Cordia nitida;* Guánica, Guánica Insular Forest, Sept. 25, 1947,; also from Juana Diaz, El Pastillo.

PINTALIA Stål

1862. Svensk. Vet. Akad. Handl. **3**(6): 4.

Laterally compressed; face anterior, almost vertical. Vertex transverse, double apical carinae present not touching or connected, hence no apical fovae present. Ovipositor complete, elongate. Anal segment of male elongate, slender, apex often variously modified. Styles narrow, elongate. Periandrium usually with more and longer processes than aedeagus.

KEY TO SPECIES OF PINTALIA

1. Fore wing with round dark spot near apex between fork of media; small species, 5.2 mm. or less 2
   Fore wing without a round dark apical spot; species usually 6 mm. or larger ... 3
2. Periandrium with one long curved basal process and three apical processes on left ..... *supralta*
   Periandrium with one pair short basal processes, apex with one process on left and two on the right ..... *alta*
3. Fore wing grayish without definite markings ..... *martorelli*
   Fore wing whitish with definite brown marks 4
4. Fore wing with numerous brownish dashes in addition to large dark areas *nemaculata*
   Fore wing with only a few large darks spots 5
5. Anal angle of male pygofer angularly produced posteriorly ..... *insularis*
   Anal angle of male pygofer rounded posteriorly ..... *osborni*

Pintalia martorelli n. n.

1935. *Pintalia infuscata* Osborn. N. Y. Acad. Sci. **14:** 199 (Nec *infuscata* Muir).
1935. *Pintalia decorata* Osborn. N. Y. Acad. Sci. **14:** 202.

Length 6.5–8 mm. Head, pronotum and mesonotum dark brown. Fore wing smoky-hyaline, infuscata apically, brownish-yellow dash present at apex of clavus and another more apical, often a yellow area present anterior to stigma; veins fuscous with brown punctuations.

Face narrow but not trough-like. Vertex with concave posterior margin bearing a sharp median notch; apical portion over half as long as basal portion. Male anal segment curved inward, scoop-like apically. Style straight on inner margin in apical portion, outer margin rounded to acute apex, either style forming half an ellipse in ventral aspect. Aedeagus with acute apex hooked to the left.

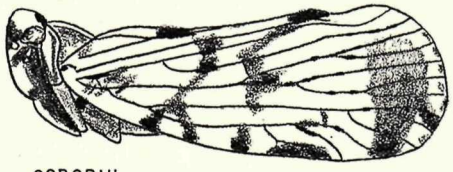
Muir applied the name *infuscata* to a Brazilian form (Trans. Royal Soc. London **82:** 430, 1934) so I propose the name *martorelli* for this outstanding species in honor of my friend and colleague Dr. Luis F. Martorell. *Decorata* Uhler from St. Vincent, B. W. I. has to my knowledge never been taken in Puerto Rico. The specimen determined as *decorata* by Osborn in the Cornell University collection is a small specimen of *martorelli*. (See Plates 4 & 5.)

RECORDS:

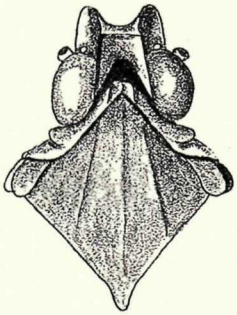
Puerto Rico: Taken sparingly from El Yunque Mts. and Maricao Insular Forest, over 1500 ft. altitude in both localities. It probably occurs the length of Puerto Rico in suitable habitats.

Pintalia osborni Caldwell

1935. *Pintalia maculata* Osborn. N. Y. Acad. Sci. **14:** 199–200.
1944. *Pintalia osborni* Caldwell. Pan-Pacific Ent. **20:** 156. (N. n. for *maculata* Osborn nec *maculata* Fowler.)



OSBORNI



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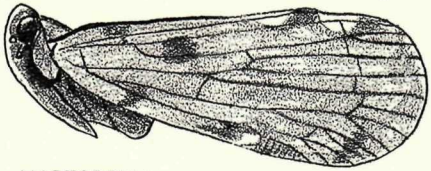
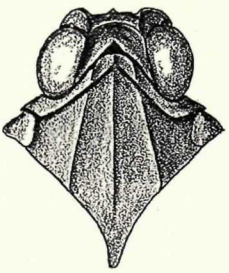
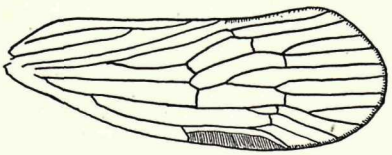


MARTORELLI

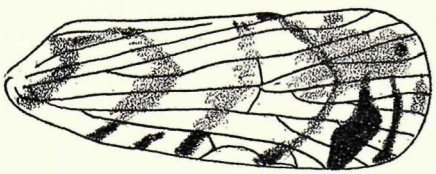
NEMACULATA



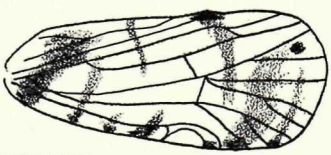
MARTORELLI



INSULARIS



ALTA



SUPRALTA

PLATE 4. *Pintalia.*

Length 7.5–8.5 mm. General color brown marked with black. Fore-wing yellowish with five black costal spots counting the stigma; black spot present on sutural margin at center of clavus and another at claval apex, these spots are often brokenly projected across the wing to the costal spots anterior to the stigma; outer apex usually brokenly but heavily infuscate.

Vertex with anterior portion about a fourth as long as posterior; posterior margin deeply, roundly concave. Lateral margins of face foliaceous making the face narrow and trough-like; median carina present. Stigma of fore wing narrow, elongate-triangular. Male style elongate, narrow, apex acute, flexed inward; inner margins sinuate apically. Periandrium with two long apical processes; aedeagus with long, stylate apical process. (See Plates 4 & 5.)

This form is more abundant than *martorelli* and has the same range. It is possible that *variegata* Fabricius may be this species.

RECORDS:

Puerto Rico: El Yunque Mts., along the Pinnacles and Mt. Britton's trail, altitude 1700–3000 ft., Aug. 22, 1947, by sweeping on weeds, shrubs and grasses; Maricao Insular Forest, Oct. 10, 1947; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping on bushes and grasses.

Pintalia nemaculata n. sp.

Length of female 6 mm. General color light maculate with black. Face yellowish mottled with brown. Vertex dark yellow, posterior portion with a black spot present either side of median line. Mesonotum with median tablet brown, lateral compartments black with a brown median spot; posterior ends of carinae yellow. Fore wing whitish-hyaline; costal margin with four black spots before the golden stigma; prestigmal spot diagonally connected to claval apex by an irregular fuscous band; three poststigmal spots present on costa connected to an inner apical spot by narrow black bands; area anterior to stigmal band maculate across veins with black dashes which are heavily concentrated in the center of the claval area.

Vertex with anterior portion half as long as posterior; posterior margin deeply triangularly notched. Pronotum almost bisected medianly by a deep posterior notch. Fore wing elongate, narrow, scarcely widened apically; stigma broadly elliptical. Hind tibia with three small preapical spurs. (See Plate 4.)

RECORD:

Puerto Rico: Female holotype from El Yunque Mts., over 1500 ft. high, Dec. 12, 1947, by sweeping on grasses and shrubs. (Caldwell and Martorell.)

Differentiated from *osborni* by the very prominent yellow stigma narrow fore wing, and broader, flatter face.

Pintalia insularis Osborn

1935. *Pintalia insularis* Osborn. N. Y. Acad. Sci. **14:** 200.

"Rather slender; head narrower than prothorax; vertex longer than broad, deeply depressed, lateral carinae elevated and extended over to the expanded lateral carinae of the front; vertex and front separated by a distinct but not much elevated carina, median carina of the front prominent, separated from median carina of clypeus by the ocellar pit; antennae, the second joint scarcely as long as wide, bristle short. Pronotum very short, mesonotal disc narrow, carinae prominent, lateral carinae converging to tip; elytra with veins punctate, veins of inner sector strongly curved toward tip of clavus. Male, last ventral segment elongate, hind border with a median tooth; plates elongate, slender, extending to tip of anal plate. (See Plates 4 & 5.)

Brown, carinae unicolorous; elytra hyaline, the veins inconspicuous, costa with three fuscous patches, noticeable spot at tip of clavus, cloud at the outer apical cells infuscate, the apical areoles smoky, apical veinlets whitish. Length, 6.5 mm."

"Described from one specimen received from the National Museum (type No. 50584) labeled "St. Thomas, W. I., 2–8, Aug. Busk Collector," with sub-label indicating locality as probably wrong."

I have never seen this specimen nor any specimen conspecific with it. The sketches presented herein were made by Dr. Oman from the type.

Pintalia alta Osborn

1935. *Pintalia alta* Osborn. N. Y. Acad. Sci. **14:** 200–201.

Length 5–6 mm. Brownish with light carinae. Mesonotum with lateral compartments dark brown. Fore wing whitish-hyaline; costa with four diagonal black spots before yellow stigma; three poststigmal spots present, intermediate spot extended into center of wing forming a fuscous cloud, apical spot extended as a narrow line near the apex; a black spot present near the apex between inner forks of media. In darker specimens the prestigmal spots, except the third, are projected across the wing roughly forming triangles with apices posterior; the first poststigmal spot is connected to the claval apex by a narrow black band almost paralleling the apex of the wing; the black spot at the fork of the media is broadly infuscate.

Vertex with anterior portion little shorter than posterior, both portions relatively short; posterior margin deeply triangularly notched. Fore wing relatively long, narrow, little widened apically. Stigma ovate. Male anal

segment gently curved ventrally in lateral aspect. Style abruptly turned dorsad in apical portion, apex rounded. Periandrium with three apical

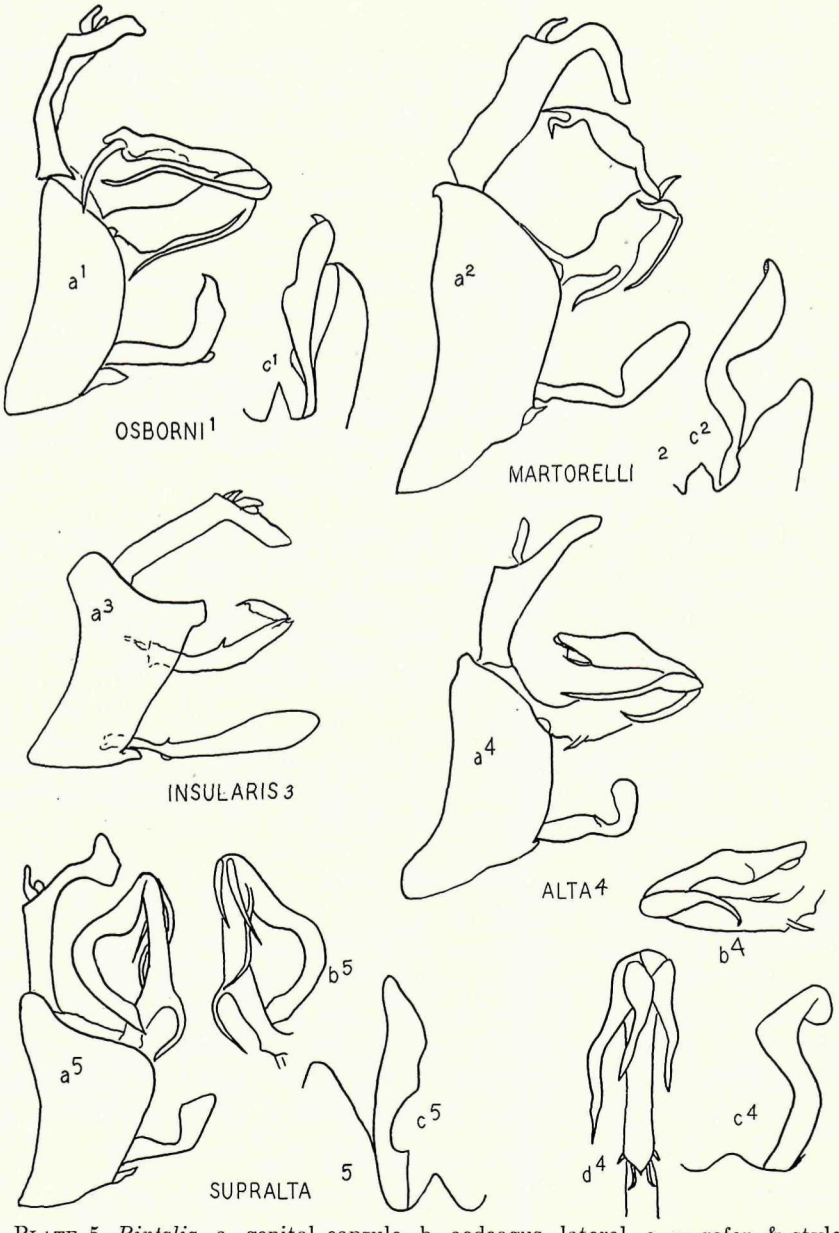


PLATE 5. *Pintalia*, a, genital capsule, b, aedeagus, lateral, c, pygofer & style, ventral, d, aedeagus, ventral.

processes, two left and one right; two pair short basal processes present. (See Plates 4 & 5.)

RECORDS:

Puerto Rico: El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping weeds, grasses and bushes; Aibonito, Dec. 30, 1947.

Common on the Island from sea level to about 2600 ft. and over. (Caldwell and Martorell).

St. Thomas, Virgin Islands: Also found at St. Thomas. (Caldwell.)

Pintalia supralta n. sp.

Length of male 4.5 mm. General color brownish-yellow with fuscous markings, carinae always light. Fore wing yellowish-hyaline; costal margin with four black prestigmal spots, the more basal spot extended into claval area, apex of stigma darkened followed by a preapical cloud that extends to the black spot between the forks of the media; extreme apex darkened; sutural margin with a fuscous line extended from its center toward the fourth costal spot, apex of clavus black. The markings are heavier on the paratypes than on the type.

Vertex short, anterior portion half as long as posterior; posterior margin deeply triangularly incised. Face narrow. Posttibia with two very minute preapical spines. Male anal segment produced and enlarged apically in lateral aspect. Styles slender, elongate. Periandrium with three apical processes on right; prebasal process forked apically. (See Plates 4 & 5.)

RECORDS:

Puerto Rico: Male holotype and paratypes from El Yunque Mts., Dec. 12, 1947, around 3000 ft., (Caldwell and Martorell). Paratype from Maricao Insular Forest, Aug. 31, 1946. (Ramos.)

CUBANA Uhler

1895. Proc. Zool. Soc. London. p. 62.

This genus is doubtfully distinct from *Pintalia*. The one concrete difference is the presence of a median carina on the vertex. This carina is represented in *Pintalia alta* and *sulpralta* by a light stripe. All species of *Cubana* that I have seen have a typical color pattern, especially along the costa. If some structure could be found that accompanies this color pattern then several species of Puerto Rican *Pintalia* would transfer into *Cubana*.

Cubana tortriciformis Muir

1924. *Cubana tortriciformis* Muir. Proc. Hawaii. Ent. Soc. **5:** 461.

Length of female 8.7 mm. Brown with light carinae. Fore wing yellowish-

hyaline, with the usual four prestigmal dashes, three postapical dashes, and the round darkened apical spot between M^3 and M^4. The first and second prestigmal dashes are broadly joined apically and extended posteriorly. The first and third postigmal dashes are extended well into the wing as narrow fuscous lines. The second poststigmal dash is a fuscous cloud in the outer apical area of the wing. (See Plate 6.)

Vertex with apical portion about a third as long as basal portion; pos-

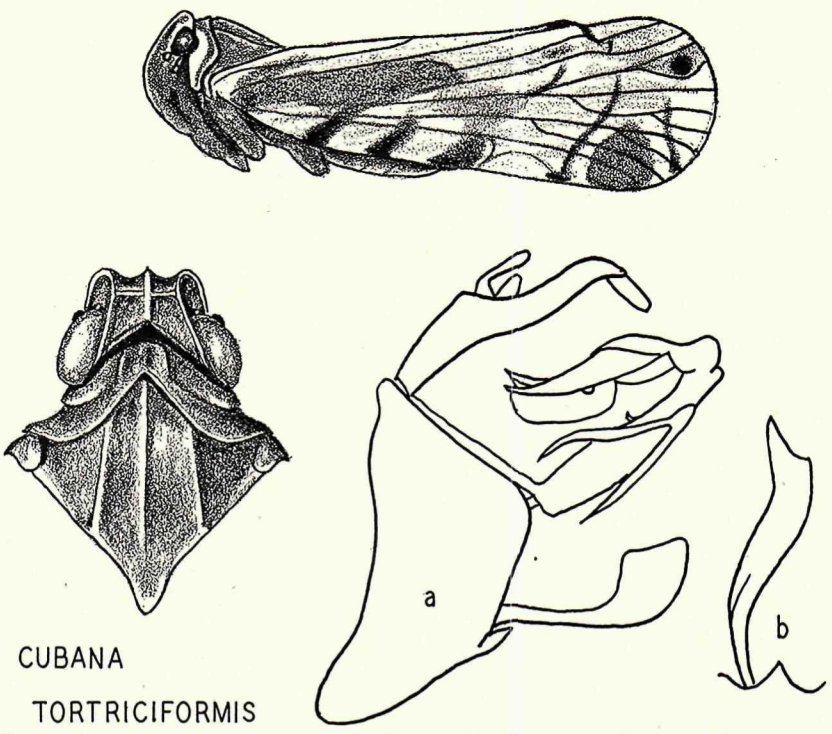


PLATE 6. a, genital capsule, b, pygofer & right style, ventral.

terior margin deeply triangularly incised. Fore wing with M^3 distinctly curved around the dark spot, this spot appears to be calloused. (See Plate 6.)

RECORD:

Puerto Rico: One female at light from El Yunque Mts., Nov. 27, 1943. (Maldonado.)

Family DELPHACIDAE

The Delphacidae resemble and are closely related to the Cixiidae, but the presence of a movable spur or calcar at the apex of the metatibia sets

them apart from all other fulgoroids. The location of the antennae, set well into the ventral margin of the eye, is also a unique character. For the most part generic concepts have been based upon chrotic characters such as shape of calcar, head and cranial topography which is often variable within the same species, is often obscure, and is limited in possibilities. In the smaller forms (Delphacini) this procedure has resulted in considerable generic confusion. Muir and Giffard (1924, p. 19) have stated that the trick is not to separate species but to recognize the relationships among them. They also suggested that a study of the phallic characters would eventually give us a better understanding. While all true systematists agree that specific identity rests entirely upon phallic characters not one has attempted generic revision by consultation of these characters. Following Muir and Giffard, Dr. Beamer (1945–46) and his students have made a start in this direction and have illustrated that congeneric species have similar phallic characters.

A limited fauna is a poor place to attempt any revision, especially in this group because many forms are distributed over the semi-tropic and tropical regions of the world and some forms are entirely cosmopolitan. The present classification into genera is so confused that it is frequently necessary to identify a species before it can be placed in its accepted genus. Metcalf's statement (1938, p. 280) that there are 120 genera in synonymy in this family, gives an indication of the magnitude of the task facing those who work with the delphacids. In the present work I have attempted to associate related species even though there remains considerable uncertainty as to the correct name for some of the groups so formed.

We list 52 forms from Puerto Rico and believe that many more will be taken. The forms are so numerous that I have departed from the usual procedure and have resorted to use of tribe and subfamily to break them down into more wieldy groups.

KEY TO SUBFAMILIES, TRIBES, AND GENERA OF DELPHACIDAE

1. Calcar ovate or angular in cross section, not concave beneath 2
   Calcar crescent-shaped in cross section ..... Delphacinae, Delphacini
2. Calcar broad, convex on both sides, with posterior teeth
   Delphacinae, genus *Stobaera* in the Alohini
   Calcar subulate or spine-like ..... Asiracinae

KEY TO GENERA OF ASIRACINAE

1. Antennal segments very long, broad, and foliaceous ..... **Copicerus**
   Antennal segments circular or ovate in cross section 2
2. Median facial carinae almost contiguous; head narrow, elongate ..... **Ugyops**
   Face with single median carina or with two widely separated 3
3. Face with one obscure median carina or with none ..... **Punana**
   Face with two median carinae forming a broad oval ..... **Pentagrama**

COPICERUS Schwarz

1802. Kong. Vet. Akad. Nya. Handl. **23:** 180.

Elongate forms with the first two segments of the antennae dark, conspicuously elongate, flattened and foliaceous. Head narrower than pronotum. Vertex longer than broad. Face with median carina. Mesonotum tricarinate. Fore wing narrow, elongate. Legs conspicuously elongate; calcar spiniform. Male anal segment short, hood-like. Aedeagus unsegmented, strongly attached to anal segment, short, with many processes.

Copicerus irroratus Schwarz

1802. *Copicerus irroratus* Schwarz. Kong. Vet. Akad. Nya. Handl. **23:** 181.
1923. *Copicerus irroratus* Osborn. Jour. Dept. Agr. P. R. **13:** 110.

Length 4.5–6.2 mm. General color brownish-gray punctate with black. Face with a light band at apex of frons extended laterally onto thorax. Fore wing with dark, diagonal apical vitta. (See Plate 7.)

From hundreds of thousands of specimens of Homoptera that have been collected in Puerto Rico the only specimen representing this genus was taken by Prof. Osborn at Añasco. Several species are present in the genus and several names are available so the recording of this form as *irroratus* can only be tentative. My sketch was made from Mexican material.

PENTAGRAMA Van Duzee

1897. Bull. Buffalo Soc. Nat. Hist. **5:** 260.

Head as broad as pronotum. Vertex longer than broad, triangular. Frons elongate-ovate; with a pair of intermediate carinae. Antennae with second segment much longer than first. Mesonotum with five carinae. Fore wing elongate; Cu forking at cross veins. Calcar spiniform. Male anal segment greatly enlarged apically. Style horizontal. Aedeagus segmented; with processes suggestive of *Punana*.

Pentagrama bivittata Crawford

1914. *Pentagrama bivittata* Crawford. Proc. U. S. Nat. Mus. **46:** 560.

Length of male 5.2 mm. General color smoky-yellow. Face orange tinged, with white, arcuate, transverse band at level of antennae and another straight band at clypeal suture. Base of clypeus with a narrow black band. Antenna with one full length black stripe and a second stripe on second segment. Anterior coxa with large black apical spot; femora with four longitudinal black stripes; tibia with preapical black band.

Vertex about one-fifth longer than broad. Frons with intermediate carinae farther from each other than from lateral margins. Aedeagus with a pair of apical processes and a large preapical process apparently arising from periandrium. (See Plate 7.)

RECORD:

Puerto Rico: One specimen taken by J. Maldonado Capriles in the Cartagena Lagoon near Lajas, P. R. is placed here. The genitalia of any of the *Pentagrama* have never been illustrated so determinations can not be positive without authentic material for direct comparison.

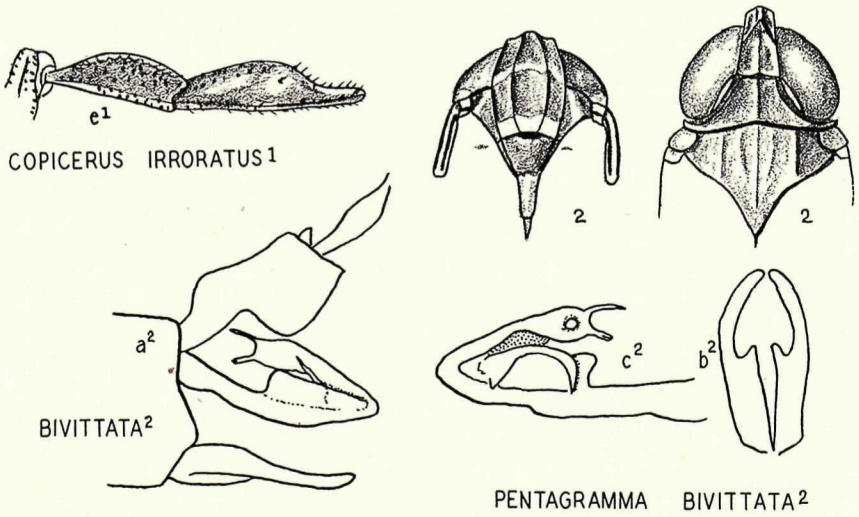


PLATE 7. a, genital capsule, b, styles, ventral, c, aedeagus, lateral, e, antenna, frontal.

UGYOPS Guerin-Meneville

1834. Zool. Ins. p. 477.

Large robust forms. Face very elongate, narrow; with two approximate median carinae carried basad, diverging and forming lateral margins of vertex. Mesonotum with five carinae. Fore wing without large stigma. Calcar spiniform. Ovipositor greatly extended beyond pygofer. Male style enlarged in basal portion; apical portion lunate with apices approximate. Aedeagus curved in a horizontal plane; apparently segmented; with few or no processes.

Eucanyra Crawford is doubtfully distinct from this genus, the degree of development of the stigma separates the two.

KEY TO SPECIES OF UGYOPS

1. Male anal segment symmetrical, hood-like.....2
   Male anal segment asymmetrical, flattened apically.....*osborni*
2. Aedeagus without processes; periandrium lobate ventroapically.....*occidentalis*
   Aedeagus with processes; periandrium with dorsoapical process.....*isolata*

Ugyops occidentalis Muir

1918. *Ugyops occidentalis* Muir. Proc. Hawaiian Ent. Soc. **3:** 425.

Length 6.8–7 mm. General color yellowish-white with brownish transverse stripe across base of clypeus and several apically on frons. Eyes, spot behind eyes on pronotum, and lateral compartments of mesonotum blackish; black prebasal spot along claval suture extended across clavus at junction of claval veins and then extended along commisural margin terminating before apex of clavus. Veins alternate light and dark in long strips; cross veins at nodal line usually infuscate between R and Cu; several fuscous clouds present apically.

Head in profile not greatly arched above eyes. Fore wing much broadened apically. Male anal segment deeply hood-like. Lateroposterior margin of pygofer produced at center. Style narrowed in apical half from inner margin. Periandrium with a prominent ventroapical lobe. Aedeagus without processes. (See Plate 8.)

RECORDS:

Puerto Rico: Taken in heavy shade at low and middle altitudes, Aibonito, Dec. 30, 1947; Cambalache Experimental Forest at Arecibo, Nov. 9, 1947; and at El Yunque Mts., Dec. 12, 1947.

Ugyops isolata n. sp.

Length of male 5.9 mm. Form and coloration similar to *occidentalis*.

Male pygofer with a small, ventral projecting spur at center of either lateroposterior margin. Style tapered from base to apex, strongly concave at midlength on inner margin. Aedeagus with one flagellate preapical process; periandrium with one very prominent dorsoapical process and a minute ventroapical spur. (See Plate 8.)

The aedeagus is suggestive of *E. flagellata* Fennah from Trinidad.

RECORD:

Vieques Island: Male holotype from Vieques, Oct. 24, 1947. (Caldwell and Martorell). Taken on a well wooded hill in the eastern section of the island between the Caribbean Sea and Vieques Sound.

Ugyops osborni Metcalf

1935. *Ugyops granulata* Osborn. N. Y. Acad. Sci. **14:** 236–237.

1943. *Ugyops osborni* Metcalf. Gen. Cat. Hemipt. Fulgoroidea, Part 3. p. 45. (N. n. for *granulata* osborn nec *granulata* Melichar.)

Length 7–8 mm. General color greenish-testaceous marked with fuscous. Face either unmarked or with brownish spots along median carinae. Pronotum fuscous behind eyes. Mesonotum entirely brown or with median

and lateral carinae broadly embrowned. Fore wing yellowish-hyaline; nodal line pink, yellow, or green. Area behind line and between M and Cu heavily infuscate; venation as in *occidentalis*. Some individuals have a tendency to be pink, especially on head and thorax.

Head strongly arched above eyes in profile. Fore wing elongate, narrow; veins conspicuously granulate. Male anal segment flattened apically, narrowed from the left. Pygofer produced ventrally on lateroposterior margin. Style almost bulbose in central third in ventral aspect. Aedeagus with one preapical process. (See Plate 8.)

RECORD:

Puerto Rico: Female allotype and paratypes from El Yunque Mts., over 3000 ft. high, Dec. 12, 1947. (Caldwell and Martorell.) Evidently confined to the upper range of the Luquillo Mts. We took immatures and adults from tree and sierra palm (*Euterpe globosa*) trunks, covered with moss and lichens.

PUNANA Muir

1913. Proc. Hawaiian Ent. Soc. **2:** 249.

Flattened forms. Vertex at least twice as broad as long, with small apical fovae; very broadly truncate on posterior margin between center of eyes. Face very broad, with obscure median carina and usually more obscure intermediate carinae. Second segment of antenna longer than first. Mesonotum with five carinae. Fore wing strongly granulate; Cu forking at apical third before nodal line. Calcar spiniform. All species with a broad dark band across base of frons between eyes. Aedeagus with apical processes; functional orifice between or basal to processes.

KEY TO SPECIES OF PUNANA

1. Aedeagus with medioapical process four times as long as either lateral; right process very sinuate ..... *puertoricensis*
   Aedeagus with apical and lateral processes of equal length or with two apical processes 2
2. Aedeagus with either lateroapical process as long as apical ..... *vulgaris*
   Aedeagus with one pair apical processes in addition to others 3
3. Aedeagus with a lateral process on either side in addition to a pair of apical processes ..... *robusta*
   Aedeagus with only three processes; lateral one much reduced 4
4. Aedeagus with right apical process longer than left, strongly curved; small lateral process present on left ..... *caribbensis*
   Aedeagus with apical process subequal in length; small lateral process present on right ..... *alapa*

Punana puertoricensis Muir

1918. *Punana puertoricensis* Muir. Proc. Hawaiian Ent. Soc. **3:** 425.

Length 4.5–5.3 mm. General color gray to light testaceous, often marked

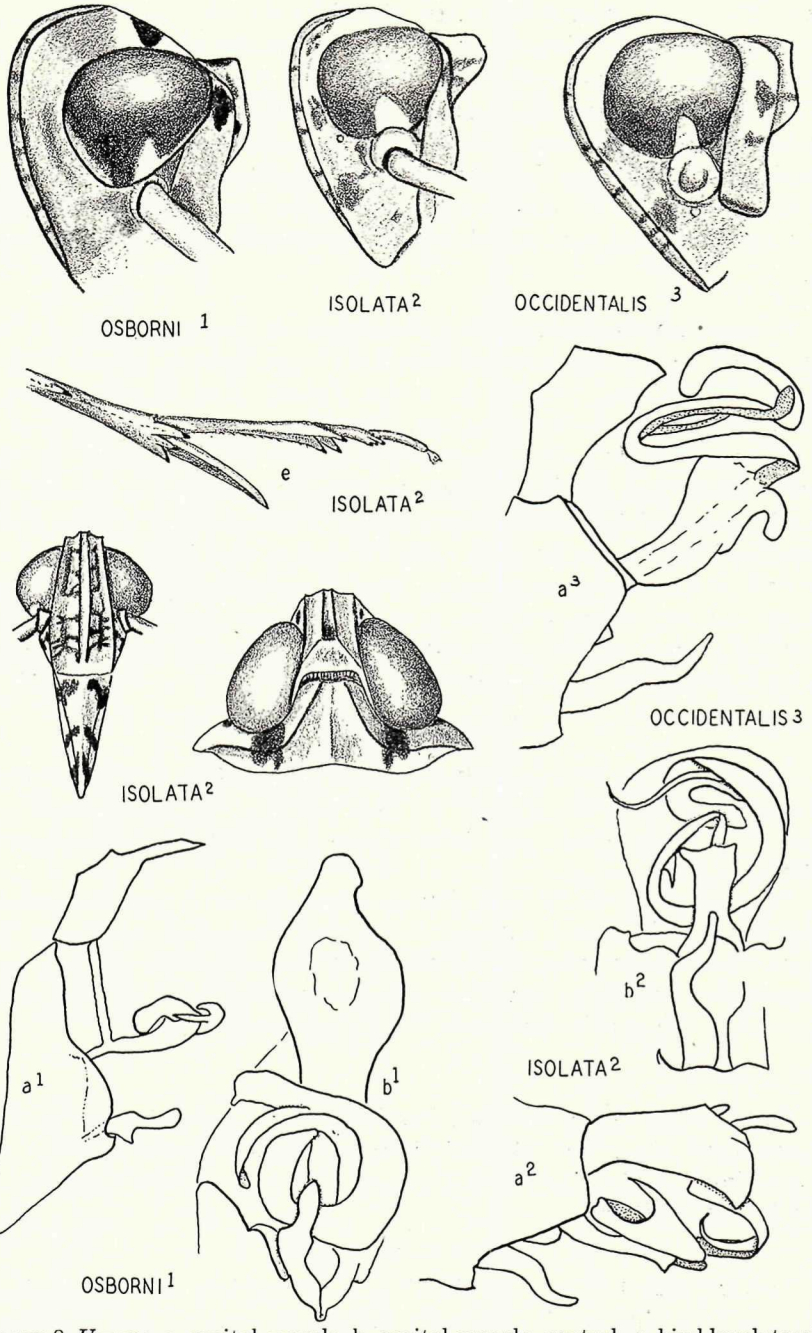


PLATE 8. *Ugyops*, a, genital capsule, b, genital capsule, ventral, e, hind leg, lateral apex.

with fuscous. Lighter forms often pinkish. Fore wing and venation concolorus, clear; with fuscous granules; often smoky basally and apically. (No two individuals marked alike.)

Vertex almost three times as broad as median length. Frons almost circular in outline. Anal segment of male angled with half its length projected posteriorly. Style greatly narrowed from inner margin in apical three-fifths. Aedeagus with very elongate medioapical process. Left apical process slender, short; right apical process extremely minute. (See Plate 9.)

RECORDS:

Puerto Rico: Maricao-Sabana Grande Road, Km. 15.6, Sept. 12, 1947, from weeds and grasses; Aguas Buenas (E. Castro's farm) altitude 1300 ft., Sept. 14, 1947, by sweeping in the low forest mostly among melastomaceous shrubs; Ciales-Jayuya Road, Km. 23.2 altitude 1100 ft., Sept. 25, 1947, from *Castilla elastica* trees; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Cambalache Experimental Forest, Nov. 6, 1947.

Also taken at Aibonito, Coamo Springs, Mayagüez and Utuado. Species ranging from the low forest to middle elevations and higher.

Prof. Ramos took one specimen from Maricao that has the dorsum jet black and the medioapical process of the aedeagus extremely long. One of our black specimens has irregular longitudinal fuscous stripes on the fore wing. I believe these to be variations.

Punana vulgaris n. sp.

Length, male 4.5 mm.; female 5.3 mm. Generally grayish-testaceous over laid with light fuscous. Fore wing yellowish with smoky areas basally and apically. One specimen has a fuscous band across the fore wing anterior to the nodal line.

Vertex approximately three times as broad as long in the male, longer in the female. Male anal segment not greatly produced posteriorly. Style narrowed from inner margin in apical half. Aedeagus with an apical and a lateroapical process on either side of equal length; a small preapical process present on left side is variable in length. (See Plate 9.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from the Toro Negro Mts., Nov. 14, 1947, 3700 ft. (Caldwell and Martorell); paratypes from Carite Mts., Toro Negro Mts., Maricao, and Luquillo Mts., all at high altitudes.

Punana alapa n. sp.

Length, male 4.2 mm.; female 4.7 mm. Resembling *vulgaris* but darker. Base of fore wing usually markedly fuscous; fuscous patches present over entire wing.

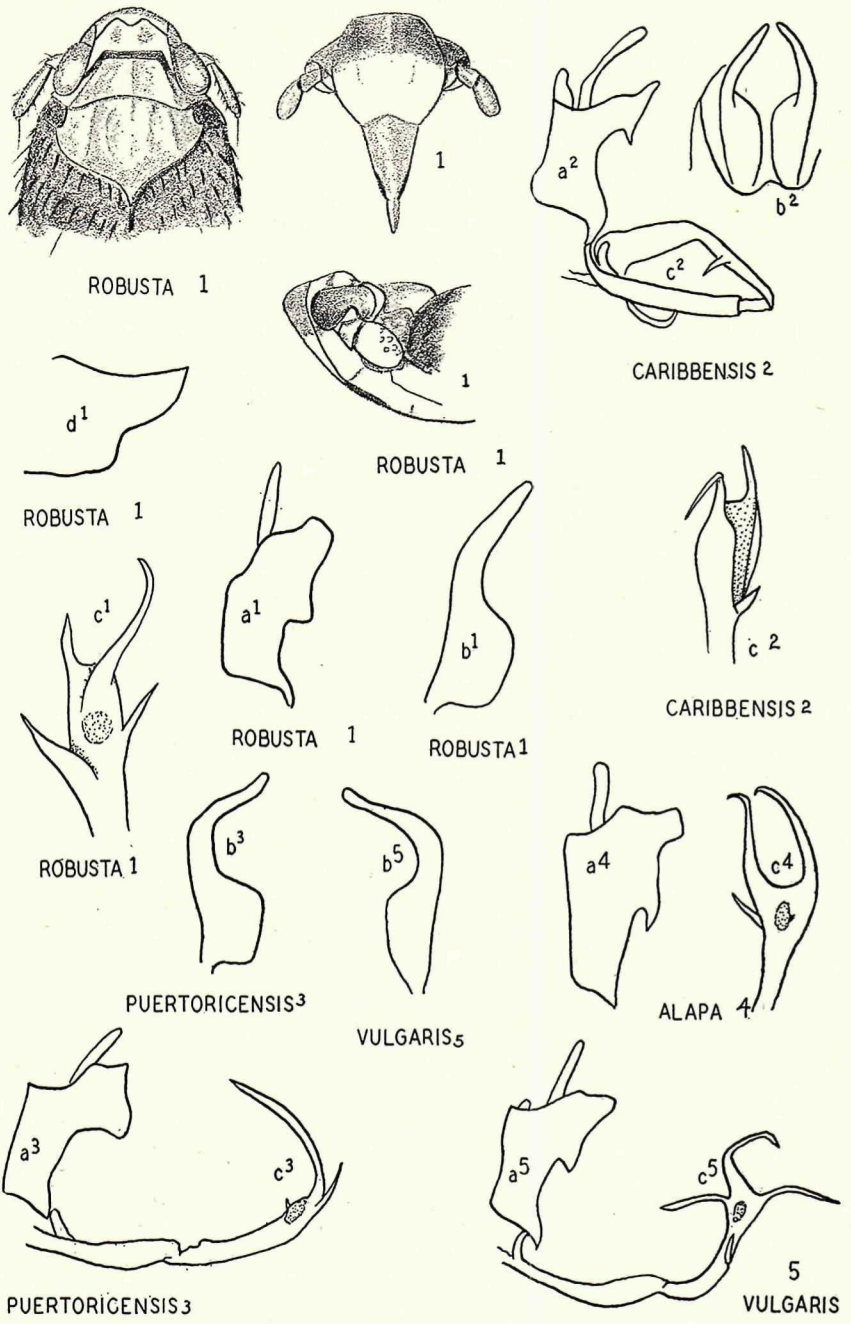


PLATE 9. *Punana*, a, anal segment, lateral, b, style or styles, ventral, c, aedeagus, apex, d, pygofer, lateral.

Vertex almost three times as broad as long. Male anal segment with extreme apex produced posteriorly; narrowed basally at midlength. Style gradually narrowed at midlength. Aedeagus with one pair elongate apical processes equally developed; a small preapical process present on right side. (See Plate 9.)

RECORD:

Puerto Rico: Male holotype, female allotype, and two paratypes from Maricao Insular Forest, at middle elevations, Nov. 13, 1947. (Caldwell and Martorell.)

Punana caribbensis n. sp.

Length, male 4 mm.; female 4.8 mm. General color yellowish-gray to testaceous. Venular granulations brownish. Fore wing clear-whitish, often slightly smoky apically.

Vertex little over twice as broad as long. Frons definitely narrowed between eyes. Male anal segment produced posteriorly. Lateroposterior margins of pygofer slightly produced, angulate. Style gradually narrowed apically from inner margin. Aedeagus with two apical processes; right process longer than left and abruptly curved toward axis of aedeagus; left process straight, short; a small stout preapical process present on left often well removed from apex. (See Plate 9.)

RECORDS:

St. Thomas, Virgin Islands: Male holotype, female allotype and paratype from St. Thomas. (E. Z. and J. S. Caldwell.)

Puerto Rico and Vieques Island: Paratypes from Guánica Insular Forest and Vieques.

Punana robusta n. sp.

Length, male 4.9 mm.; female 6.2 mm. Male with basal band on frons light brown, broad. Vertex, pro- and mesonotum yellow. Fore wing strongly enfumed; venation concolorus; granulations small, fuscous, bearing very prominent black setae. Female with basal band of frons narrow, black. Vertex, pro- and mesonotum black. Median carina of vertex, spots on pronotum, and posterior angle of mesonotum yellowish. (See Plate 9.)

Robust in form. Vertex over three times as broad as long; anterior angles rounded; median carina obscure. Male anal segment robust. Pygofer with dorsoposterior angle strongly, acutely produced. Style narrowed from inner margin in apical three-fifths. Aedeagus with two apical and two preapical processes; left apical the longest, curved; right apical short, stout; right

preapical second longest and farthest removed from apex; left preapical short, slender. (See Plate 9.)

RECORDS:

Puerto Rico: Male holotype from El Yunque Mts., Dec. 12, 1947, (Caldwell and Martorell). Female holotype from Luquillo Nat. Forest, Nov. 18, 1925. (A. M. N. H.). Although the allotype is much larger and darker than the holotype I nevertheless believe the association is correct.

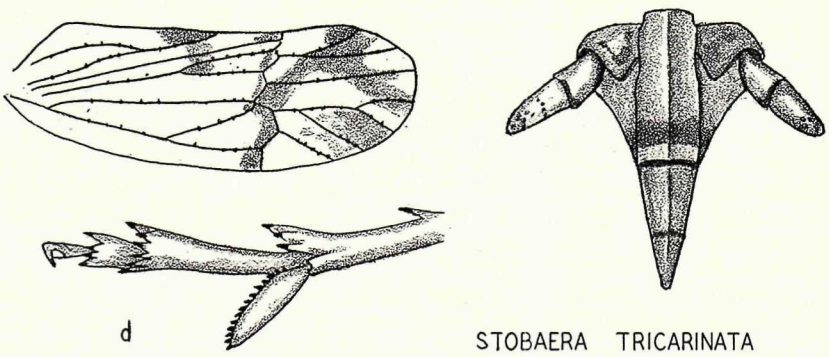


PLATE 10. d, Hind leg, lateral apex.

Delphacinae tribe Alohini

STOBAERA Stål

1859. Berl. Ent. Zeit. **3:** 327.

Vertex short, broad. Face narrow. Antenna with first segment flattened, triangular. Fore wing usually banded. Calcar convex on either side, sometimes slightly flattened beneath; posterior spines always present.

Stobaera tricarinata (Say)

1825. *Delphax tricarinata* Say. Jour. Acad. Nat. Sci. Phila. **4:** 237.
1938. *Stobaera tricarinata* Osborn. N. Y. Acad. Sci. **14:** 239.

Length 4.5–5 mm. General color brownish-yellow. Frons with a brown band apically near clypeal suture. Legs with longitudinal brown stripes. Fore wing with oblique fuscous band near middle and another preapically. (See Plate 10.)

Reported from Aguirre, Puerto Rico by Osborn. I have been unable to locate this specimen in his collection at Ohio State University. It is possible that Osborn had a specimen of *Abbrosoga errata* which he mistook for *tricarinata* since they both have ornate fore wings.

Tribe Delphacini

KEY TO THE GENERA OF DELPHACINI

1. Large species, at least 6 mm. in length ..... **Chloriona**
   Smaller forms, at most 5 mm., usually much less 2
2. Basal metatarsus with one or more preapical spines ..... **Nilaparvata**
   Basal metatarsus without preapical spines 3
3. Head acute apically; Y carina absent ..... **Megamelanus**
   Head truncate or rounded apically, or Y carina present 4
4. Aedeagus lightly sclerotized coiled within pygofer 5
   Aedeagus heavily sclerotized, external 6
5. Antenna reaching to apex of clypeus; segments of equal length ..... **Neomalaxa**
   Antenna short, reaching to clypeal suture; segment II longer than I **Saccharosydne**
6. Pygofer folded ventrolaterally ..... **Megamelus**
   Pygofer various but not folded laterally 7
7. Aedeagus very long, slender, spine-like 8
   Aedeagus short, tubular, or laterally compressed 9
8. Antennal segments I and II subequal in length ..... **Peregrinus**
   Antennal segment II twice as long as I ..... **Pissonotus**
9. Pygofer with a medioventral process 10
   Pygofer without a medioventral process 11
10. Pygofer with a simple medioventral process in addition to a lateral process on either side; anal segment usually with a single apical spine ..... **Pygospina**
    Pygofer with medioventral process greatly developed and bifid apically **Phrictopyga**
11. Aedeagus with an elongate basal process ..... **Abbrosoga**
    Aedeagus without a basal process 12
12. Relatively slender forms; lateral pronotal carinae almost or usually reaching the posterior margin ..... **Sogata**
    Relatively robust forms; lateral pronotal carinae closely curved around behind eyes, not reaching posterior margin 13
13. Basal metatarsus elongate, much longer than other two together ..... **Euidella**
    Basal metatarsus short, seldom as long as other two together ..... **Delphacodes**

CHLORIONA Fieber

1866. Verh. Zool. Bot. Ges. Wien. **16:** 519.

Large elongate forms. Head little produced before eyes. Vertex short, broad. Facial carinae forking at apex of head. Face much longer than broad. Lateral carinae of pronotum not reaching posterior margin but curved behind eyes. Fore wing elongate, broadly rounded apically. Calcar elongate-triangular, concave beneath, without apparent teeth.

Chloriona slossonae (Ball)

1903. *Liburnia Slossoni* Ball. Canadian Ent. **35:** 231.

Length of female 6 mm. General color brownish-testaceous with a pair of brown stripes beginning in the vertex and extended across the pro-

and mesonotum inside of the lateral carinae. Area between stripes almost white. Face dark brown to fuscous, with brownish carinae. Fore wing lightly infuscate or smoky longitudinally in inner half along sutural margin. All tibia and femorae with longitudinal brown stripes. (See Plate 11.)

RECORDS:

Puerto Rico: Without the male the determination can not be positive but the female from Puerto Rico resembles this species from Florida. One specimen from Río Piedras, Agricultural Experiment Station. Mr. Roque's Office, at light; one more specimen from Ponce. (Maldonado.)

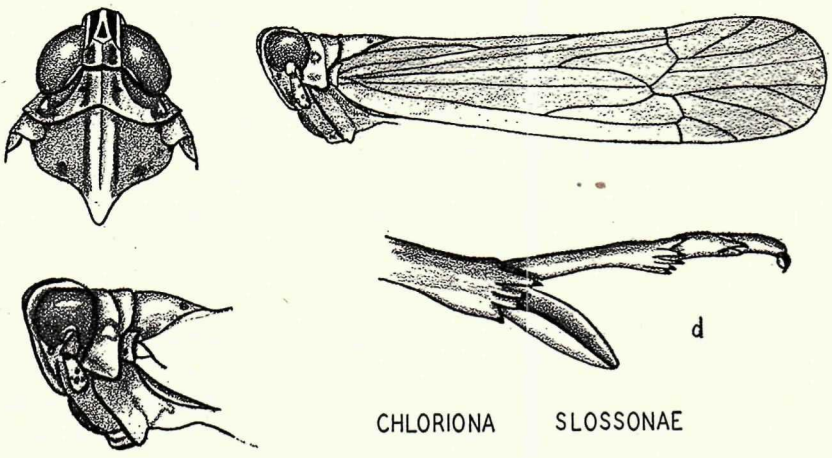


PLATE 11. d, Hind leg, lateral apex.

SACCHAROSYDNE Kirkaldy

1907. Hawaii. Sugar Plts. Exp. Sta. Bull. **3:** 139.

Slender, elongate forms. Head much narrower than pronotum. Vertex much extended before eyes. Median carina of face not forked before vertex. Pronotum with lateral carinae reaching posterior margin. Anal segment of male without posterior projections. Aedeagus small; penis long, coiled within pygofer.

Saccharosydne saccharivora (Westwood)

1833. *Delphax saccharivora* Westwood. Mag. Nat. Hist. **6:** 413.

Length 4.5–5 mm. General color green to yellowish with a black longitudinal stripe on antenna. Eyes usually reddish, often smoky beneath.

Lateral margins of vertex gently sinuate. Fore wing over three times as long as broad. Male pygofer slightly roundedly produced on dorsoposterior angle. Style narrow at base, broadened and projected outward thence nar-

rowed to thumb-like apex from outer margin. Aedeagus with basal spur much longer than its basal width. (See Plate 12.)

RECORDS:

Puerto Rico: Maricao-Sabana Grande Road, Km. 15.6, Sept. 12, 1947, from weeds and grasses *Andropogon bicornis*; Maricao Insular Forest, (near block stone Observation Tower), altitude 2600 ft., Sept. 12, 1947, among weeds, bushes and shrubs; Ciales-Jayuya Road, Km. 25.8, altitude 2000 ft. Sept. 25, 1947, from weeds; Carite Insular Forest, Oct. 2, 1947, from trees and weeds; Doña Juana, altitude 2600 ft., Oct. 9, 1947, from *Andropogon* Cambalache Experimental Forest, Nov. 6–7, 1947, beating on weeds and bushes; Toro Negro Mts., La Maravilla, altitude 2800 ft., Nov. 14, 1947, from *Andropogon bicornis*; Toro Negro Mts., La Maravilla, altitude 2950 ft., Nov. 14, 1947, from bushes, weeds and grasses.

Vieques Island: near Navy Base, Oct. 23, 1947, on sugar-cane.

This species is considered a sugar cane pest, however we believe that the natural host plant of this insect is the grass *Andropogon bicornis*. The insect ranges from sea level up to high elevations. (0-3500 ft.)

NEOMALAXA Muir

1918. Proc. Hawaii. Ent. Soc. **3:** 426.

Slender and delicate in form. Head much narrower than pronotum. Antenna elongate. Face narrow; median carina forming a minute fovae before vertex. Vertex quadrate. Pronotum with lateral carinae reaching posterior margin. Anal segment of male without posterior projections. Aedeagus small; penis long, slender, within pygofer.

Neomalaxa flava Muir

1918. *Neomalaxa flava* Muir. Proc. Hawaii. Ent. Soc. **3:** 426.

Length 4–4.5 mm. General color whitish-yellow with the mesonotum deeper orange. First antennal segment with a longitudinal black stripe. Fore wing milky-white; veins distad of cross veins embrowned.

Carinae indistinct at apex of head. Fore wing as in *Saccharosydne saccharivora*. Male pygofer with dorsoposterior angle produced into an acute posterior tooth. Style broad, gently sinuate, narrowed to an acute apex from the outer margin. Aedeagus with posterior spur about as long as its basal width. (See Plate 12.)

Common in cool moist habitats usually above 1000 ft.

RECORDS:

Puerto Rico: Lares-Yauco Road, Km. 33.1, altitude 1700 ft., Sept. 12, 1947, on weeds and grasses under coffee plants; Ponce-Adjuntas Road,

(Mr. H. Giron's house), Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (daylight type); Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 13, 1947, by sweeping in the low forest mostly among melastomaceous shrubs; Ciales-Jayuya Road, Km. 30.6, altitude 1820 ft., Sept. 25,

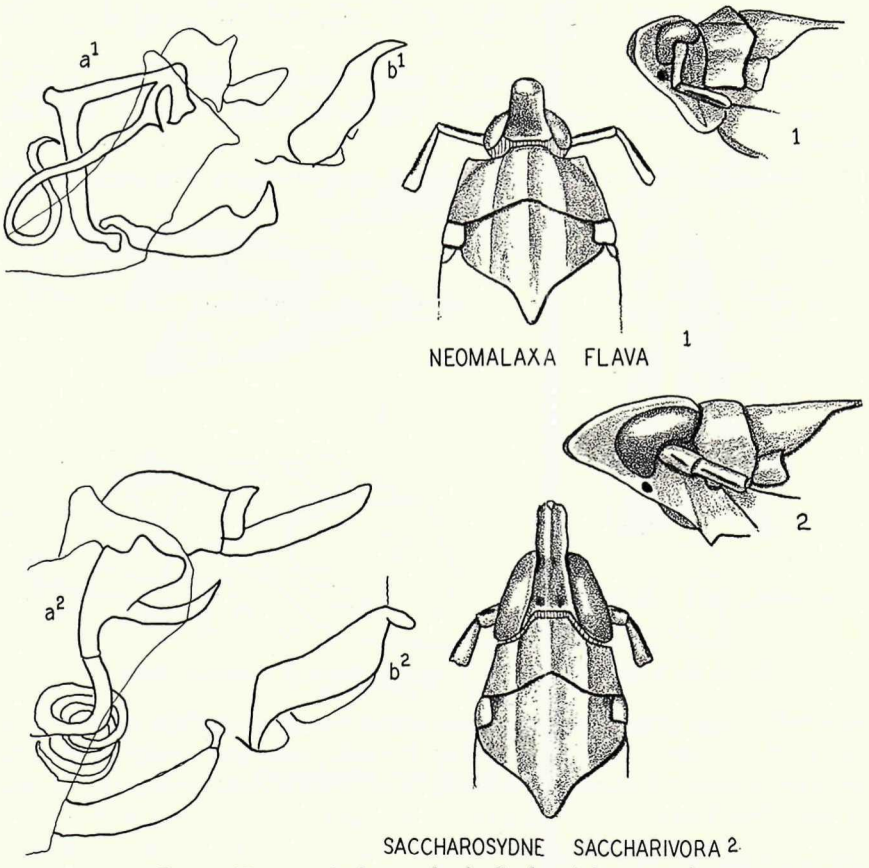


PLATE 12. a, genital capsule, b, Style, right ventral.

1947, by sweeping brushes and shrubs particularly from *Guarea*, *Dendropanax* and *Inga vera*; Ciales-Jayuya Road, Km. 25.8, altitude 2010 ft., Sept. 25, 1947, from weeds.

MEGAMELANUS Ball

1902. Canadian Ent. **33:** 265.

Elongate slender forms. Head subconical. Vertex much longer than broad, without fovae. Face elongate-ovate, with median carina prominent on basal

RECORDS:

Puerto Rico: Tallaboa (Giron's farm) Aug. 28, 1947, on eggplants or "berenjena", *Solanum melongena*; Aguadilla Beach (Columbus Park) Aug. 29, 1947, heavily infesting okra or "quimbombó", *Abelmoschus esculentus* on corn stands nearby; Ponce-Adjuntas Road, Km. 9.6, (H. Girón's house) altitude 400 ft., Sept. 12, 1947, from neon lights (daylight type); Mayagüez, near sea level, Nov. 13, 1947, from "malojillo", *Panicum purpurascens* meadow.

Vieques Island: East Beach, Oct. 23, 1947, among shrubs, weeds and grasses; Navy Base Hill and Hill east center, Oct. 24, 1947, from weeds, grasses and bushes.

St. Thomas, Virgin Islands: Nov. 25, 1947.

PISSONOTUS Van Duzee

1894. Bull. Buffalo Soc. Nat. Sci. **5:** 236.

Usually dark forms with white carinae. Face usually with white band across clypeal suture carried over onto thorax. Head from above quadrate Facial carina forking at apex of head. Pronotum rather broadly transversely rounded; lateral carinae reaching posterior margin. Male anal segment often with spines. Pygofer usually with paired medioventral process. Aedeagus slender, elongate, usually with one or more elongate dorsal processes. Brachypterous forms are the usual order in this group.

KEY TO SPECIES OF PISSONOTUS

1. Male style with long, acute apical projection ..... *absenta*
   Male style without long apical projection ..... *albovenosus*

Pissonotus albovenosus Osborn

1929. *Pissonotus albovenosus* Osborn. Jour. Dept. Agr. P. R. **13:** 110.
1935. *Pissonotus albovenosus* Osborn. N. Y. Acad. Sci. **14:** 247–248.

Length 2–2.7 mm. Generally fuscous to brownish-fuscous with carinae and venation whitish. Abdominal dorsum with narrow white median stripe; tergites with posterior margins light and with elongate ivory callouses laterally. (See Plate 15.)

First segment of antennae half as long as second. Male anal segment with a pair thick, elongate posterior spines. Styles approximate, curved outward, deeply notched on inner margins subapically. Aedeagus with anterior projecting process as long as aedeagus. (See Plate 15.)

RECORD:

Puerto Rico: One pair specimens from Luquillo Beach, Aug. 22, 1947, are conspecific with the Osborn paratype from Río Piedras.

Pissonotus absenta n. sp.

Male anal segment produced dorsoposteriorly but without spines. Pygofer with dorsoposterior angle broadly angulate, with a slender lateroposterior process ventral to angle; medioventral process simple, acute, much reduced in size. Diaphragm a broad plate-like disc extended out of pygofer opening almost to base of anal segment. Aedeagus a very long, slender tube, apically acute; a short anterior projecting process present at about midlength. (See Plate 15.)

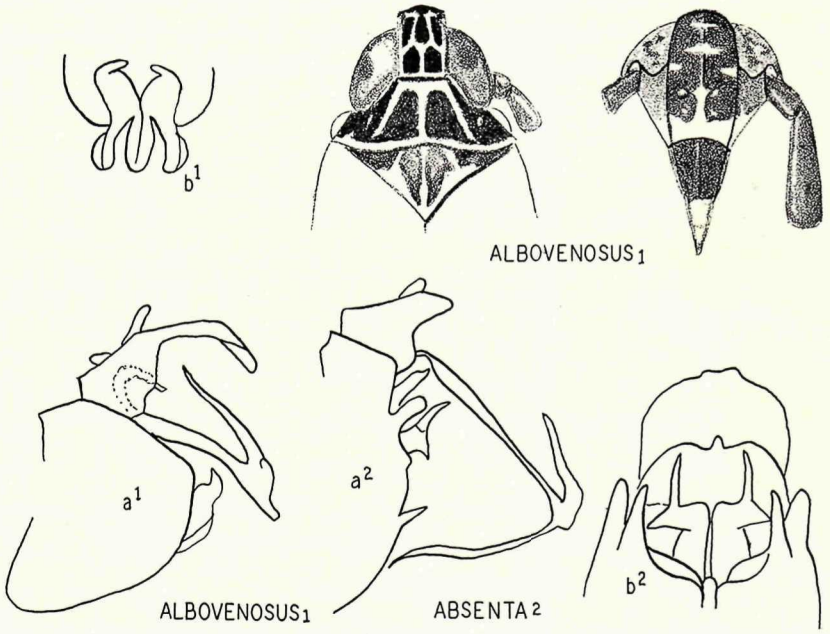


PLATE 15. *Pissonotus*, a, genital capsule, b, styles & pygofer, ventral.

RECORD:

Puerto Rico: Male holotype from Maricao Insular Forest, Oct. 10, 1947, (Caldwell and Martorell).

Most of this specimen was lost in transit. The type material consists of a pair of hind legs and the male genitalia.

MEGAMELUS Fieber

1866. Verh. Zool. Bot. Ges. Wien. **16:** 519.

Head much narrower than pronotum. Face elongate, narrow. Pronotum long; lateral carinae reaching posterior margin. Fore wing slender. Male anal segment with caudal spurs usually out of line. Pygofer folded laterally

forming biscuit-like appendages; medioventral process double. Styles seated well within pygofers.

Megamelus electrae Muir

1926. *Megamelus electrae* Muir. Hawaiian Sugar Plts. Assoc. Exp. Sta. Bull. **18:** 28.

Length of male 4 mm. General color dark brown with light pronotum. Fore wing milky-white with black area at center of cross veins, often infuscate dorsoapically; venation fuscous apically.

Facial carinae forking at apex of head forming a long narrow apical fovae. Aedeagus broad, laterally compressed, with a short dorsomedian spur a little to the left of center; apex with a pair of elongate, twisted processes. (See Plate 16.)

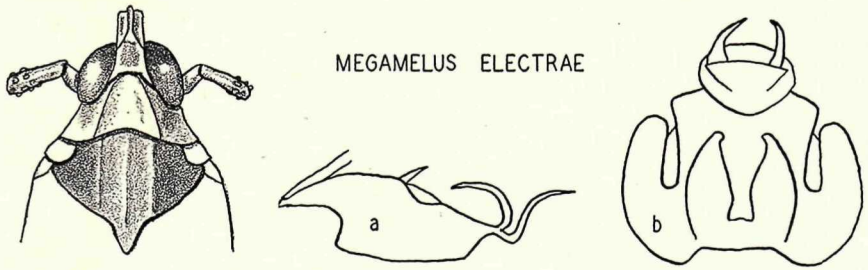


PLATE 16. a, aedeagus, lateral, b, genital capsule & genitalia, ventral.

RECORDS:

Puerto Rico: Taken at Aguirre, Nov. 21, 1947, and at Ponce, at light, March 20, 1936. This species was originally described from Brazil.

PYGOSPINA n. gen.

Rather slender forms. Head from above narrow; vertex little broader than long, slightly narrowed apically; median carina obscure. Frons at least twice as long as broad; median carina forking at apex of head. Segment II of antenna twice as long as I. Lateral carinae of pronotum divergent, reaching hind margin or nearly so. Median tablet of mesonotum relatively flat. Fore wing long, slender, conspicuously broadened anterior to cross veins apex not broadly rounded, appearing more sloped from inner apical angle than from outer. Calcar thin, slender, concave beneath, toothed posteriorly.

Male anal segment elongate, with single medioposterior tooth, or acute posteriorly. Pygofer with a lateroposterior projection on either side and a medioventral projection that is acute apically. Style simple, slender. Aedeagus laterally compressed, curved slightly ventrally, simple, without processes.

At present this genus comprises a distinct and compact group of species with characters of the fore wing and genitalia different than any other of which I am aware. Species included are *Megamelus aurantii* Crawford from Para, Brazil, *Delphacodes spinigra* Fennah from Trinidad, B. W. I., *Kelisia rezendensis* Muir from Rezende, Brazil, and two new forms from Puerto Rico.

Genotype: *Pygospina spinata* n. sp.

KEY TO SPECIES OF PYGOSPINA N. GEN.

1. Male anal segment with one long posterior spine.....*spinata*
   Male anal segment without a long posterior spine.....*reducta*

Pygospina spinata n. sp.

Length of male 4 mm. General color testaceous. A pair of fuscous stripes begin at the clypeal suture and extend the length of the face between carinae, along the lateral margins of the vertex, crossing the pronotum between carinae, and extend the length of the mesonotum inside of either lateral carina. Center of vertex, pronotum, and mesonotum white. Fore wing clear hyaline; yellowish basally, along commisural margin, and dorsoapically; veins concolorus, apical terminations infuscate. (See Plate 17)

Lateral carinae of pronotum not reaching posterior margin. Fore wing almost four times as long as broad. Male anal segment very elongate, with long apical spine. Lateral and ventral projections of pygofer elongate, slender. Style slender, elongate, slightly bulbose apically. Aedeagus long, slender, slightly curved ventrally; apex ventrally truncate, a broad plate-like spur present preapically on right. (See Plate 17.)

RECORDS:

Puerto Rico: Male holotype from Ponce, altitude 400 ft., Sept. 12, 1947, at light. (Caldwell and Martorell). Paratype from Gurabo. (Maldonado.)

Pygospina reducta n. sp.

Length of male 3.5 mm. Brownish yellow over all, face infuscate between carinae. Fore wing clear; veins concolorus except for apical infuscation.

Lateral carinae of pronotum reaching posterior margin. Fore wing over three and a half times as long as broad. Male anal segment short, dorsoposterior margin without a spine. Lateroposterior margins of pygofer with lateral projections small, medioventral projection well developed, minutely notched apically. Style elongate, simple, bearing an apical spine. Aedeagus flattened laterally, strongly curved ventrally, narrowed prebasally, acuminate apically; orifice large, dorsoapical; small teeth or spurs present medioventrally. (See Plate 17.)

RECORD:

Puerto Rico: Male holotype from Gurabo, Dec. 12, 1941. (Maldonado.)

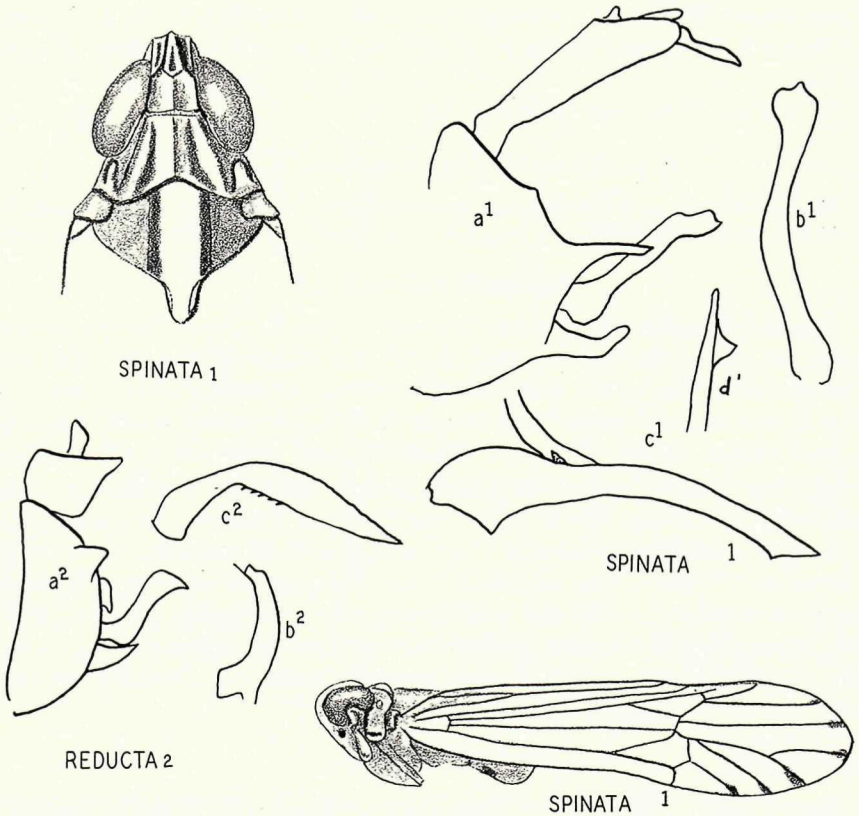


PLATE 17. *Pygospina*, a, genital capsule, lateral, b, style, ventral, c, aedeagus, lateral, d, aedeagus, ventral apex.

PHRICTOPYGA n. gen.

Elongate slightly flattened forms. Vertex, pro- and mesonotum relatively flat, broad, in same horizontal plane. Head from above short, broad-apical carinae slightly obscure. Frons little less than twice as long as broad. Segment II of antenna almost two and a half times as long as I, both relatively short. Lateral carinae of pronotum reaching posterior margin. Fore wing elongate, slender, rather narrow apically. Calcar elongate-triangular concave beneath, toothed posteriorly.

Male anal segment without conspicuous armature; apex usually notched or minutely bifid. Pygofer variously modified but always with a greatly developed medioventral process which is notched apically and usually through

which the aedeagus slides. Diaphragm near base of styles developed into small projection on either side. Styles elongate. Aedeagus usually compressed laterally.

Phrictopyga will include the following species described by Muir in *Kelisia: contorta, curvistilus, escadensis, fuscovittata, urbana,* and *Sogata parvula* Osborn from Puerto Rico.

Genotype: *Kelisia contorta* Muir (1926).

KEY TO SPECIES OF PHRICTOPYGA N. GEN.

1. Male pygofer with lateroposterior margins plain.....*occidentalis*
   Male pygofer with lateroposterior margins deeply lobate.....*contorta*

Phrictopyga contorta (Muir)

1926. *Kelisia contorta* Muir. Hawaiian Sugar Plts. Assoc. Exp. Sta. Bull. **18:** 24.

1926. *Sogata parvula* Osborn. Ann. Ent. Soc. Amer. **19:** 359. (Puerto Rican records, not Cuban record.)

Length 3.5–4 mm. General appearance fulvotestaceous. White median longitudinal stripe present from apex of vertex to tip of mesonotum. Pronotum alternate white and testaceous laterally. Mesonotum with five longitudinal white stripes, the more lateral pair often obsolete. Abdomen fulvotestaceous, visible through wings. Fore wing usually clear but often yellowish in inner half toward commisural margin; veins infuscate apically. (See Plate 18.)

Male anal segment short, posterior apex acute, notched. Lateroposterior margins of pygofer deeply bilobed; ventral lobe elongate, bifid apically with apical angles acute, divergent; medioventral process depressed within pygofer. Style with base well dorsad in pygofer; apex bifid with angles divergent. Aedeagus enlarged, ovate in apical portion in lateral aspect apex slightly narrowed posteriorly and projected slightly ventrally. (See Plate 18.)

RECORDS:

Puerto Rico: Specimens from Toro Negro Mts., and Río Piedras are slightly different than the type from Brazil but I do not believe the differences are of enough magnitude for specific value.

The Osborn material from Arecibo, P. R., determined by him as *Sogata parvula* is conspecific with *contorta* Muir.

Phrictopyga occidentalis (Muir)

1926. *Kelisia occidentalis* Muir. Hawaii. Sugar Plts. Assoc. Exp. Bull. **18:** 22–23.

1938. *Sogata aurantii* Osborn. N. Y. Acad. Sci. **14:** 244. (Not *aurantii* Crawf.)

Length 4.2–4.7 mm. Color and marking of *contorta* but with much more contrast and intensity. Fore wing light fuscous dorsoapically.

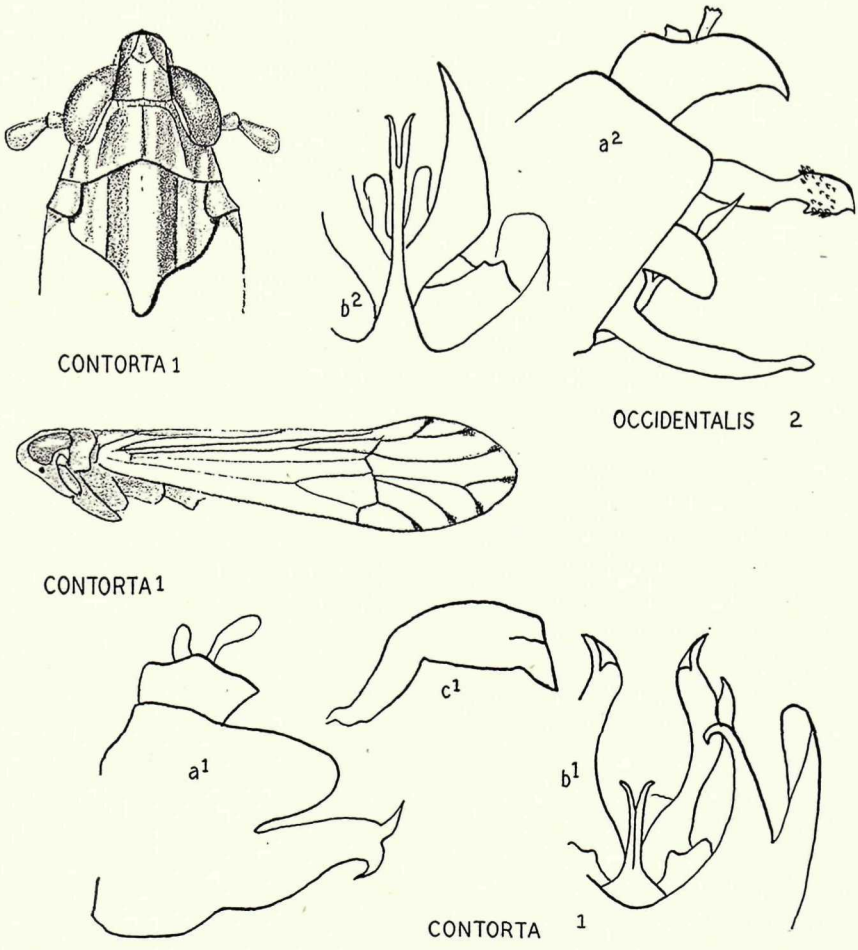


PLATE 18. *Phrictopyga*, a, genital capsule, Styles & pygoger, ventral, c, aedeagus, lateral.

Anal segment of male with shallow notch in dorsoposterior margin forming short lateral spurs. Pygofer with lateroposterior margins entire; medioventral process almost as long as height of pygofer. Style somewhat crescent-shaped. Aedeagus subtubular, narrowed or constricted preapically; apex heavily spurred with concentration of spurs more pronounced apically and ventrally; orifice ventroapical. (See Plate 18.)

We never took this form but I have seen one male from Río Piedras, P. R., Feb. 1, 1912, (T. H. Jones) in the Osborn collection. The type locality is Tena, Ecuador, and I have taken it in the States of Tamaulipas and San Luis Potosi, Mexico. As might be expected over this wide range there is some variation.

SOGATA Distant

1906. Fauna British India, Rhyn. **3:** 471.

Muir and Giffard (1924) have stated that this group is a convenient dumping ground for species which if placed in other genera would break down their characters; however in their work they have largely eliminated this defect and with few exceptions have assembled a homogeneous group of species.

Sogata is close to *Delphacodes* but the species are more slender, the head is slightly longer and narrowed, and most forms have a light dorsal stripe. The lateral pronotal carinae sometimes do not reach the posterior margin but they are not tightly curved behind the eyes as they are in *Deplhacodes* The facial carina is variable at point of furcation but this is probably of little generic significance. The male genitalia are simple and are best defined by reference to the illustrations of the species.

KEY TO SPECIES OF SOGATA

1. Style with prominent subapical process on inner margin.....2
   Style without a subapical process on any margin.....3
2. Aedeagus short, broadly rounded apically, lateral spurs very coarse.....*wallacei*
   Aedeagus elongate, almost acute apically, lateral spurs fine.....*furcifera*
3. Aedeagus straight, tubular.....*approximata*
   Aedeagus curved dorsally or narrowed apically.....4
4. Aedagus elongate, strongly narrowed apically, little curved dorsally...*albifacies*
   Aedeagus short, strongly curved dorsally, little narrowed apically.....*cubana*

Sogata albifacies n. sp.

Length of male 3.5 mm. General color brownish. Face except lateral carinae, vertex, pro- and mesonotum between lateral carinae yellow. Rectangle formed by tegula, antenna, lateral apex of pronotum, and clypeal suture white. Fore wing yellowish, fuscous apically. (See Plate 19.)

Facial carina forked at apex of head. Lateral carinae of pronotum not reaching posterior margin. Antennal segment II twice as long as I. Male anal segment elongate dorsoventrally; posterior margin with a pair of approximate, long, slender spines flattened apically and curved anteriorly. Pygofer practically truncate on lateroposterior margins. Style little narrowed on inner subapical margin; inner apical angle bluntly produced; outer basal angle roundedly produced. Aedeagus elongate, slender, narrowing from base to apex; apex curved gently ventrad. Orifice at left apex; a row of spurs

present beginning near right apex crossing over the dorsal margin to the left at about midlength and uniting with a row of lateroventral spurs that extend from the ventral apex to the base. (See Plate 19.)

RECORD:

Puerto Rico: Male holotype from Río Piedras, Sept. 5, 1947; on grass. (Caldwell and Martorell.)

Sogata approximata (Crawford)

1914. *Megamelus approximata* Crawford. Proc. U. S. Nat. Mus. **46:** 622.

Length 3.5 mm. Usually black with a yellowish-white stripe the width of the vertex and extended from apex of head to tip of mesonotum. Commisural margin light, with a dark area at apex of claval veins; a white spot present subapically along costa.

Male anal segment with a pair of long curved spines on lateroposterior margin. Style broad, flat; inner margin straight, outer margin rounded apically to inner apex. Aedeagus tubular, straight; orifice apical; apex with spurs. (See Plate 19.)

RECORD:

Puerto Rico: Taken at Río Piedras and Caja de Muertos Is., P. R.

Sogata cubana (Crawford)

1914. *Dicranotropis cubanus* Crawford. Proc. U. S. N. Mus. **46:** 595.

Length 3 mm. Generally dark brownish fuscous with whitish yellow median stripe on dorsum. Fore wing hyaline with veins brown toward apex.

Male anal segment with a pair of stout spines on dorsoposterior margin. Style narrowed before apex; apex diagonally truncate with inner angle greatly produced. Aedeagus laterally compressed, narrowed gradually from base to apex, slightly concave at midlength in lateral aspect; orifice dorsoapical; circlet of spines present preapically. (See Plate 19.)

One specimen from Río Piedras at light. Variety *pallida* Osborn described from the female is probably this species.

Sogata furcifera (Horvath)

1899. *Delphax furcifer* Horvath. Termes Fuzetek p. 372.

Length 2–2.5 mm. Yellow to brownish with yellowish median stripe. Fore wing clear with a dorsoapical smoky area present.

Facial carina often forking at level of antennal bases. Lateral carinae of pronotum seldom reaching posterior margin. Male anal segment with a pair of dorsoposterior spines. Style narrowed apically; outer margin concave; inner margin with a thumb-like projection present little more than

half distance from base; apex narrowly rounded. Aedeagus appearing twisted, gradually narrowed from base to apex, curved dorsally; orifice apically on left; a row of spurs present extended from dorsal apex diagonally toward base on left. (See Plate 19.)

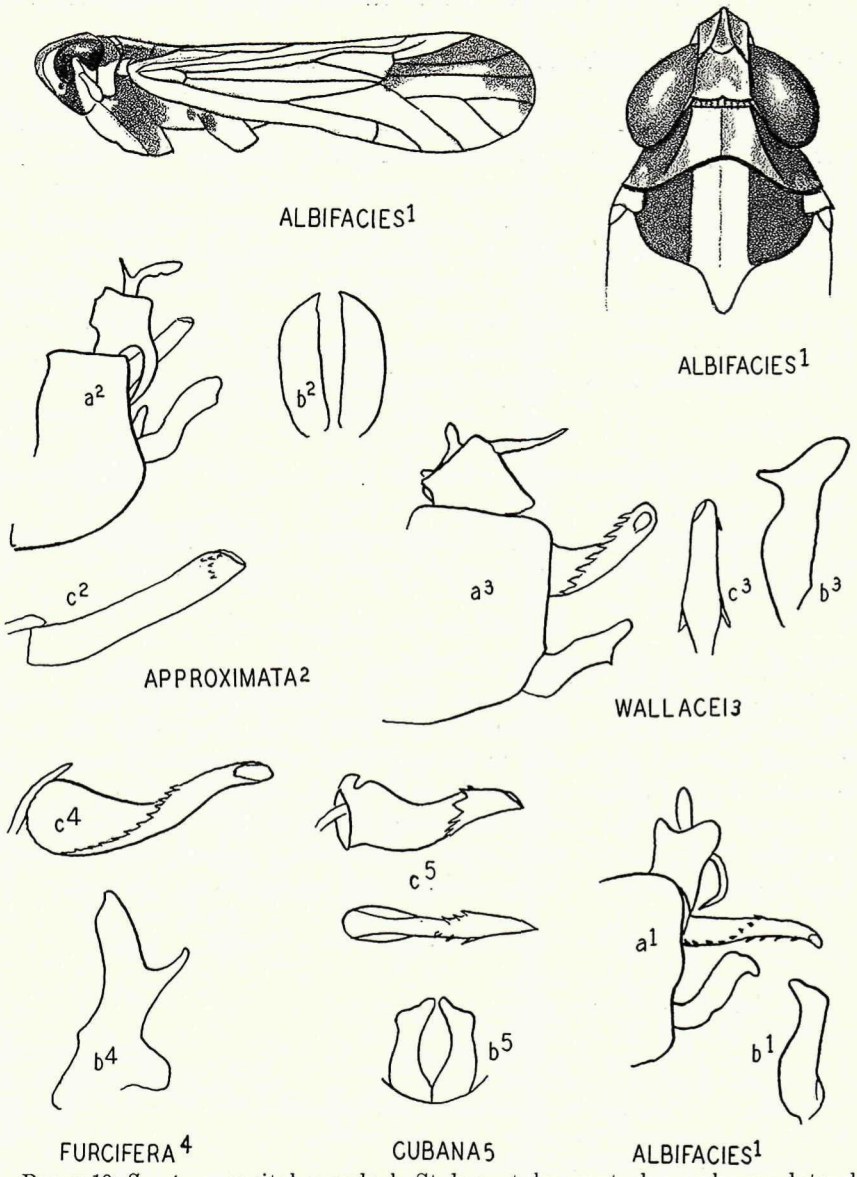


PLATE 19. *Sogata*, a, genital capsule, b, Style or styles, ventral, c, aedeagus, lateral or ventral.

Common around the coastal plains of Puerto Rico and on adjacent islands including St. Thomas and St. Croix, V. I.

Sogata wallacei Muir & Giffard

1924. *Sogata wallacei* Muir & Giffard. Hawaiian Sugar Plts. Assoc. Exp. Sta. Bull. **15:** 13.

1935. *Liburniella fasciatella* Osborn N. Z. Acad. Sci. **14:** 246–247 (Allotype).

Length 3 mm. Face black with light carinae. Vertex and thoracic notum orangish with a light narrow median longitudinal stripe. Fore wing clear hyaline; area posterior to cross veins smoky excepting a clear median cell.

Apical fovae minute. Lateral carinae of pronotum reaching posterior margin. Male anal segment with a pair elongate posterior spines that have their apices curved caudad. Style broad, bent outward near apex, on inner margin opposite the bend a prominent thumb-like projection is present; apex broadly rounded. Aedeagus appearing twisted similar to *furcifera* but much stouter and with much longer spurs. (See Plate 19)

RECORDS:

Puerto Rico: One specimen from dry river bed near Orocovis, altitude 1900 ft., Sept. 11, 1947.

The allotype of *Liburniella fasciatella* Osborn is a male of *Sogata wallacei*. The holotype is a female so its specific identity can not be proven.

DELPHACODES Fieber

1866. Verb. Z. b. Ges. Wien. **16:** 524.

Small rather robust forms with the head relatively short and broad. The lateral pronotal carinae curve around behind the eyes and do not reach the posterior margin of the pronotum. Fore wing not elongate, always broadly rounded apically. Male genitalia not highly modified.

The species are always less robust and smaller than either *Euidella* or *Nilaparvata*, the cranial carinae are more distinct apically, and the hind basal tarsus is not exceedingly elongate nor spined before the apex.

KEY TO THE SPECIES OF DELPHACODES

1. Anal segment with four spines 2
   Anal segment with two spines 5
   Anal segment without any spines 3
2. Aedeagus tubular, gently curved dorsally ..... *vaccina*
   Aedeagus strongly sinuate ventrally ..... *floridae* subsp. *puertoricensis*
   Aedeagus bulbose basally, tubular apically, straight ..... *xerosa*
3. (1). Aedeagus with dorsoapical spine-like process ..... *havanae*
   Aedeagus without dorsal process 4

4. Aedeagus abruptly bent ventrad at midlength ..... *havanensis*
   Aedeagus abruptly bent dorsal at basal fourth ..... *albinotata*
   Aedeagus curved slightly dorsally ..... *balboae*
5. (1). Spines of anal segment serrate apically ..... *teapae*
   Spines of anal segment acute apically, not serrate 6
6. Aedeagus greatly compressed laterally, ventral margin with deep preapical notch ..... *detecta*
   Aedeagus tubular or subtubular, without a ventral notch 7
7. Pygofer with dorsoposterior angle greatly narrowed and produced posteriorly *propinqua*
   Pygofer with dorsoposterior angle neither greatly narrowed nor produced posteriorly 8
8. Style less than twice as long as width at apex ..... *mesada*
   Style at least two and a half times as long as apical width 9
9. Style with inner apical angle rounded, not produced 10
   Style with inner apical angle produced into an acute spur 11
10. Aedeagus narrowed from dorsal margin in apical fourth ..... *humilis*
    Aedeagus tubular throughout, dorsal apex with prominent tooth ..... *fulvidorsum*
11. Aedeagus with orifice dorsoapical toward right ..... *nigra*
    Aedeagus with orifice latroapical on left 12
12. Aedeagus with spurs distributed over apical third ..... *puella*
    Aedeagus with spurs in rows ventrolaterally and across apex ..... *axonopi*

Delphacodes albinotata (Crawford)

1914. *Megamelus teapae albinotatus* Crawford. Proc. U. S. Nat. Mus. **46:** 619.

1935. *Delphacodes pellucida* Osborn. N. Y. Acad. Sci. **14:** 248–249.

Length 3 mm. Fuscous with white pronotum; facial and mesonotal carinae light. Posterior angle of mesonotum white. Fore wing smoky, with black area at apex of claval veins.

Male anal segment lobed dorsoposteriorly and greatly lobed ventroposteriorly. Pygofer slightly produced at dorsoposterior angle. Style shape of "bird head"; apices approximate. Aedeagus very elongate, curved dorsally at basal fifth; one subapical spur present ventrally on left, one preapical and dorsal at left, and one preapical and dorsal at right; orifice apical. (See Plate 20.)

RECORDS:

Puerto Rico: Isabela Sub-Station, Aug. 29, 1947, by sweeping on "yuca", *Manihot utilissima*; material also from Río Piedras.

Vieques Island: Near Navy Base, Oct. 23, 1947, among weeds, grasses and bushes.

Delphacodes axonopi Fennah

1945. *Delphacodes axonopi* Fennah. Proc. U. S. Nat. Mus. **95:** 434–435.

Length of male 2.7 mm. Face black, carinae orange tinged. General

color testaceous with pronotum light yellow. Fore wing clear hyaline with brownish venation darkening apically.

Vertex broad. Head from above short, quadrate. Male anal segment small, with long medioposterior spines. Pygofer rhomboidal in lateral aspect. Style with outer apical angle more pronounced than inner; broadened on inner margin prebasally; with a slight median projection on inner margin. Aedeagus ovate in cross section, greatly curved dorsally; with small spurs over dorsal apex and lateroventrally toward base; orifice at apical left. (See Plate 20.)

RECORD:

Puerto Rico: This species was originally described from Trinidad, B. W. I., on *Axonopus compressa*. We took one specimen from the Carite Mts., on Oct. 2, 1947.

Delphacodes balboae Muir & Giffard

1924. *Delphacodes balboae* Muir & Giffard. Hawaii. Sugar Plts. Expt. Sta. Bull. **15:** 36.

Length 3 mm. Black with white pronotum. Facial carinae orange. Tip of mesonotum white. Fore wing yellowish with dark area at apex of claval veins; veins yellowish darkening apically.

Male anal segment truncate posteriorly. Pygofer with large median concavity in lateroposterior margins. Style clavate basally and apically. Aedeagus ovate in cross section; orifice at dorsal apex; where there is a small spur, two spurs further basad and laterad in a line; an elongate preapical process present on right curved caudad with a shorter spur more basal. (See Plate 20.)

RECORD:

Puerto Rico: Originally described from Jalapa, Mexico. Material from light at Dr. Martorell's home, Villa Palmeras, Sept. 5, 1947.

Delphacodes detecta (Van Duzee)

1897. *Liburnia detecta* Van Duzee. Bull. Buffalo Soc. Nat. Sci. **5:** 298.

Length 3–3.5 mm. Orangish-testaceous. Facial carinae white margined with fuscous; space between often entirely fuscous. Fore wing hyaline; veins yellow darkening apically.

Male anal segment with elongate dorsoposterior spines. Pygofer with lateroposterior margin vertically truncate. Style enlarged and rounded apically, slightly produced on inner apical margin. Aedeagus laterally compressed, narrowed from ventral margin in apical third; apex curved ventrad, armed with small spurs. (See Plate 20.)

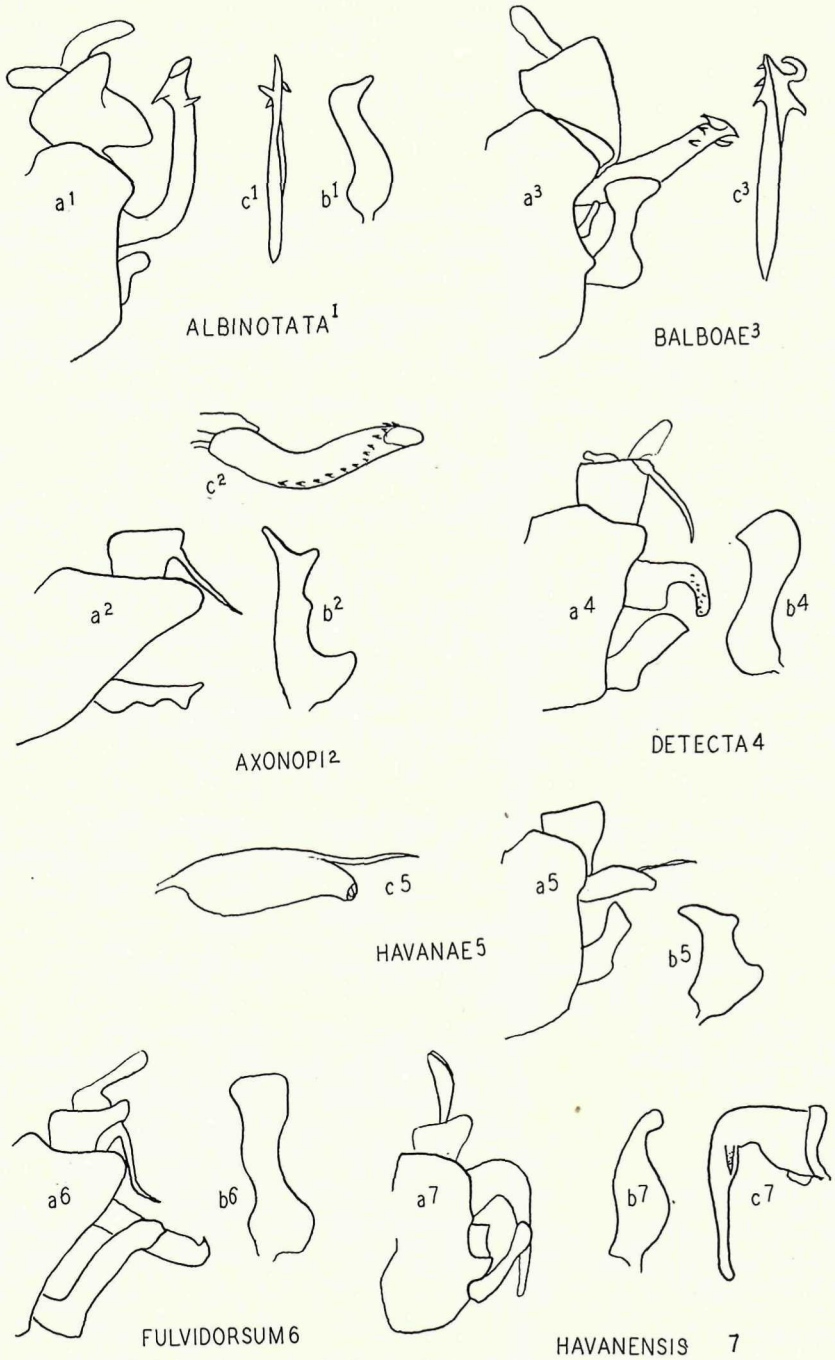


PLATE 20. *Delphacodes*, a, genital capsule, b, style, ventral, c, aedeagus, lateral or ventral.

Material taken around the coastal plain of Puerto Rico and adjacent islands.

RECORDS:

Puerto Rico: Barceloneta Beach-Arecibo Road, Barrio Palmas Atlas, Oct. 16, 1947, from weeds and grasses; Río Piedras-Loiza Road, Nov. 11, 1947, beating bushes, grasses and weeds.

Vieques Island: Northwest coast-near Playa Grande, Oct. 23, 1947, from weeds, grasses and bushes; East Beach, Oct. 23, 1947, among weeds, grasses and shrubs.

St. Thomas, Virgin Islands: Material also collected at this locality.

Delphacodes fulvidorsum (Metcalf)

1923. *Liburnia fulvidorsum* Metcalf. Jour. Elisha Mitchell Sci. Soc. **38:** 210.

Length of brachypterous form 1.7–2 mm. General color light yellow with black eyes, fore wing, and abdomen.

Male anal segment small, with a pair of elongate medioposterior spines. Pygofer subrhomboidal in lateral aspect. Style abruptly projected dorsad from base, clavate apically and basally in ventral aspect. Aedeagus straight, tubular, elongate; dorsoapex with a short spur. (See Plate 20.)

RECORD:

Puerto Rico: Recorded from Florida, Georgia, and Texas. Our material was taken at the Maricao Insular Forest, altitude 2400 ft., Oct. 10, 1947.

Delphacodes havanae Muir & Giffard

1924. *Delphacodes havanae* Muir & Giffard. Hawaiian Sugar Plts. Assoc. Exp. Sta. Bull. **16:** 37–38.

Length 3–3.3 mm. General color black with white pronotum which is darkened behind the eyes. Cranial carinae brownish. Tip of mesonotum white. Fore wing slightly yellowish, with a black spot at apex of claval veins.

Male anal segment truncate posteriorly. Lateroposterior margin of pygofer slightly indented subapically. Style short, broad, basally, narrowed before apex; apex with outer angle greatly produced, inner angle less so. Aedeagus laterally compressed, elongate-ovate in lateral aspect; with a long, slender spine projected from dorsal margin before apex; orifice apical. (See Plate 20.)

RECORDS:

Puerto Rico: Formerly recorded from British Guiana, Cuba, and Guatemala. Puerto Rico material from Río Piedras and Ponce.

Delphacodes havanensis (Crawford)

1914. *Megamelus albidens havanensis* Crawford. Proc. U. S. Nat. Mus. **46:** 672.

Length 3.2 mm. General color white washed with orange. Facial carinae margined with fuscous. Fore wing clear hyaline; veins brownish apically.

Male anal segment truncate posteriorly. Pygofer with a submedian projection on lateroposterior margin. Style broadest at midlength, slightly narrowed basally; narrowed apically from outer margin to small rounded apex that is slightly curved outward. Aedeagus laterally compressed, gradually narrowed to rounded apex, bent abruptly ventrally at basal third, a small spine present on right just ventrad to bend. (See Plate 21.)

RECORDS:

Vieques Island: Airport Road about 2 kilometers from Isabel II, Oct. 23, 1947, from bushes and grasses.

Caja de Muertos Island: Dec. 5, 1947, from grasses.

St. Thomas, Virgin Islands: Material also collected at this locality, Nov. 25, 1947.

Delphacodes humilis (Van Duzee)

1907. *Liburnia humilis* Van Duzee. Bull. Buffalo Soc. Nat. Sci. **8:** 48.
1935. *Delphacodes humilis* Osborn. N. Y. Acad. Sci. **14:** 251–252.
1935. *Delphacodes nigripennis* Osborn. N. Y. Acad. Sci. **14:** 253.

Length 3–3.5; brachypterous form 2 mm. General color orangish-testaceous. Face often smoky. Fore wing hyaline with yellow veins darkening apically. Brachypterous form light yellowish with black fore wing that is often pale basally.

Male anal segment small; medioposterior margin with a pair reverse S-shaped slender spines. Dorsoposterior angle of pygofer roundedly produced posteriorly. Style flat, rather elongate-quadrate; outer apical angle roundedly produced. Aedeagus ovate in cross section, slightly broadened to apical third where it narrows from the dorsal margin to a rounded apex; short apical spurs present. (See Plate 21.)

RECORDS:

Puerto Rico: Río Piedras, (In front of S. José Central along Railroad line up to Cemetery), Aug. 17, 1947, by sweeping on weeds; material also collected at Vega Alta and Ponce. The brachypterous specimen in the Osborn collection is from Cayey.

Delphacodes mesada n. sp.

Length of male 3 mm. Light yellow in color. Pronotum white. Eyes and genital styles black. Fore wing and veins clear-hyaline.

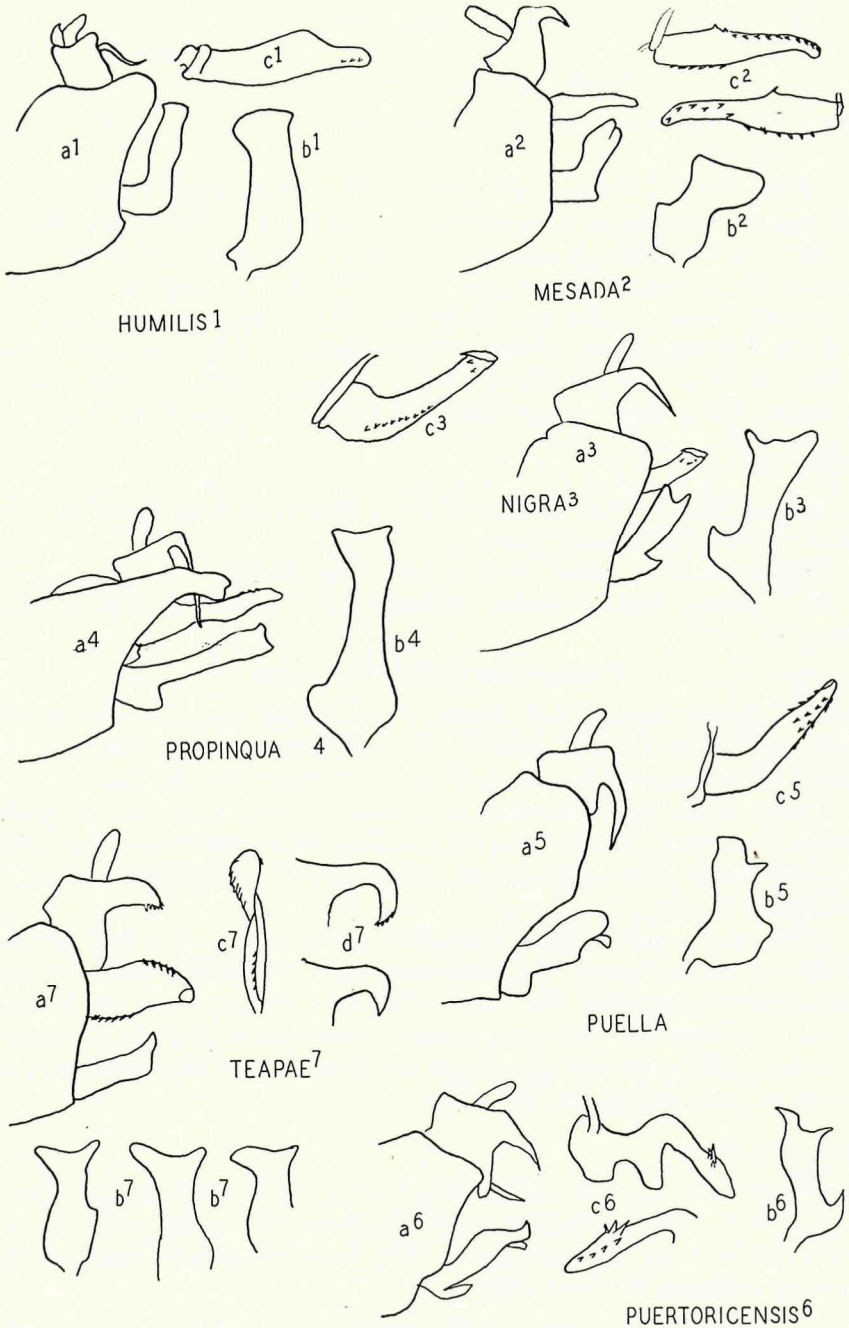


PLATE 21. *Delphacodes*, a, genital capsule, b, style, ventral, c, aedeagus lateral or ventral, d, anal segment, apex.

Head from above longer than broad. Facial carina forked at apex of head, rather obscure. Second antennal segment twice as long as first. Lateral carinae of pronotum straight, divergent, not reaching posterior margin. Male anal segment elongate; with a pair of posterior spines. Pygofer truncate posteriorly. Style extremely short, broad, and flat, slightly narrowed and curved outward at midlength in ventral aspect; outer apical angle broadly rounded, with minute spines on rounded margin. Aedeagus narrowed gradually at midlength to rounded apex which is slightly curved ventrally; orifice dorsoapical; a row of spines present on left extended from apex half way to dorsal base; a row of spurs present on right dorsoapically in apical third thence extended ventrolaterally to ventral base. (See Plate 21.)

RECORD:

Puerto Rico: Male holotype from Río Piedras, Nov. 20, 1947. (Caldwell and Martorell.)

Delphacodes nigra (Crawford)

1914. *Megamelus erectus nigra* Crawford. Proc. U. S. Nat. Mus. **46:** 624.

Length 3 mm. General color yellowish heavily over laid with fuscous. Face fuscous with light carinae. Pronotum dirty-gray. Fore wing hyaline with dark spot at apex of claval veins.

Male anal segment with a pair dorsoposterior spines. Pygofer with dorsoposterior angle roundedly produced and curved inward. Style flat, broad, flared apically with outer angle more produced than inner. Aedeagus ovate in cross section, bent slightly dorsad at base; apex rounded; orifice dorsoapical; a row of spines across apex and ventrolaterally toward base; spines more numerous on left.

The styles, armature of aedeagus and position of orifice are not exactly like those figured for *nigra* by Muir and Giffard (1924. figs. 47, 48, 101); however they are so close that I believe them to be a simple variation. (See Plate 21.)

RECORDS:

Puerto Rico: Barceloneta Beach, Barrio Palmas Altas, Oct. 16, 1947, from weeds and grasses.

Vieques Island: Northwest coast, near Playa Grande, Oct. 23, 1947, from weeds, grasses and bushes; Near Navy Base, Oct. 23, 1947, among weeds, grasses and bushes.

Delphacodes propinqua (Fieber)

1866. *Delphax propinqua* Fieber. Vehr.d.k.k. Zool. Bot. Ges., Wien. **16:** 525.

1938. *Delphacodes propinqua* Osborn. N. Y. Acad. Sci. **14:** 249.
1938. *Delphacodes lutulenta* Osborn. N. Y. Acad. Sci. **14:** 253–254.

Length 3–3.3 mm. General color yellowish-testaceous. Facial carinae margined with fuscous, often the space between entirely fuscous. Pronotum lighter than mesonotum. Fore wing slightly milky; veins yellowish; granulations fuscous apically.

Male anal segment small; dorsoposterior spines long, slender. Pygofer usually greatly elongated at dorsoposterior angles, usually curved inward, but sometimes much reduced and little curved. Style broad, flat, narrowed toward apex where it is slightly broadened; apex truncate with inner angle slightly more produced than outer. Aedeagus ovate in cross section, slightly sinuate, broad at base and narrowed in basal third; dorsal spurs present preapically; orifice apical. (See Plate 21.)

RECORDS:

Puerto Rico: Río Piedras, (In front of San José Central, along Railroad line up to the Cemetery) Aug. 17, 1947, by sweeping on grasses; Isabela Sub-Station, Aug. 29, 1947, by sweeping the underbrush of "papaya" plants; Guánica, Sept. 26, 1947, from *Volkameria aculeata*; Ponce Nov. 21, 1947, on "papaya" foliage.

Vieques Island: Navy Base Hill and East center hill, Oct. 24, 1947, among weeds, grasses and shrubs.

Caja de Muertos Island: Material collected at this locality.

Virgin Islands: Also at St. Thomas and St. Croix.

Delphacodes puella (Van Duzee)

1897. *Liburnia puella* Van Duzee. Bull. Buffalo Soc. Nat. Sci. **5:** 250.

Length 2.5–2.8 mm. General color black with cranial carinae and posterior portion of pronotum white. Fore wing milky with a fuscous area at apex of claval veins.

Male anal segment small, with long stout spines on medioposterior margin. Pygofer with lateroposterior margin concave in ventral half. Style short, broad, angulate-quadrate, with thumb-like process on inner margin preapically; apex truncate. Aedeagus tapered from base to rounded apex; gently curved dorsally at basal fourth; apical area irregularly spinose; orifice preapical on left. (See Plate 21.)

RECORDS:

Puerto Rico: Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Río Piedras-Loiza Road, Nov. 11, 1947, by beating bushes, weeds and grasses; Maricao Insular Forest, (near Observation Tower), altitude 2600 ft., Sept. 12, 1947, by beating on weeds, bushes and shrubs.

Delphacodes floridae subspecies **puertoricensis** n. subsp.

1924. *Delphacodes floridae*. Hawaiian Sugar Plts. Exp. Sta. Bull. **15**: 33–34 (Typical form).

Length of brachypterous male 1.7 mm. General color yellowish-white with fore wing and genital segment fuscous. Face smoky. Pro- and mesocoxae fuscous; legs smoky.

Head from above short, broad; apical fovae small. Face narrowed between eyes. Lateral carinae of pronotum very prominent, divergent, almost reaching posterior margin. Fore wing rounded apically; venation indistinct; granulation prominent. Male anal segment with a pair of rather stout spines on dorsoposterior margin and a pair of small slender spines below these and more mesad. Pygofer with dorsoposterior angle broadly produced. Style broad, convex on outer margin, concave within; outer apical angle produced mesad and dorsad; inner apical angle acute. Aedeagus laterally compressed, broad, with two ventral concavities; apex projected ventroposteriorly; dorsal apex with a circlet of spurs more on right than left; orifice apical. (See Plate 21.)

RECORD:

Puerto Rico: Male holotype and paratype from Ponce. (Maldonado.)

This resembles the typical form but there is considerable difference in the genitalia. The anal segment has four spines, the anal angle of the pygofer is produced; the ventral projections of the aedeagus are more rounded and the spurs are less extended basad and are fewer in number.

Delphacodes teapae (Fowler)

1905. *Liburnia teapae* Fowler. Bio. Cent.-Amer. Homopt. **1**: 135.
1923. *Delphacodes teapae* Wolcott. Jour. Dept. Agr. P. R. **7**: 274.

Length 2.5 mm. General color black with a brownish cast on vertex and a clear area apically on outer margin of fore wing. Often with entire vertex brown and fore wing varied from dark to clear with a fuscous longitudinal cloud apically.

Male anal segment with dorsoposterior margin produced into broad processes that are serrate apically. These processes vary in length and amount of serration and often are acute apically. Pygofer with dorsoposterior angle rounded; sometimes with a minute spur. Style varying in exact contour; usually with lateral margins concave; apex slightly concave with inner angle less produced and more acute than outer. Aedeagus laterally compressed, very broad in lateral aspect, appearing twisted in ventral aspect; spines on dorsoapical portion and ventrobasal portion, spurs varying in size and number among specimens; orifice ventroapical on left. (See Plate 21.)

Our Puerto Rican material is extremely variable and some of our specimens approach *nitens* Muir & Giffard. This species is also found on St. Thomas and St. Croix, V. I., as well as on most islands of the Greater and Lesser Antilles.

RECORDS:

Puerto Rico: El Yunque Mts. (along the Pinnacles and Mt. Britton's trails), altitude 1700–3000 ft., Aug. 22, 1947, by sweeping weeds, shrubs and grasses; Maricao Insular Forest (near block stone Observation Tower), altitude 2600 ft., Sept. 12, 1947, among weeds, bushes and shrubs; Aguas Buenas (E. Castro's farm) 1300 ft., Sept. 13, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Maricao Insular Forest, Oct. 10, 947; Toro Negro Mts., Maravilla Camp Road, altitude 2950 ft., from bushes, weeds and grasses.

Delphacodes vaccina n. sp.

Length of male 3.2 mm. General color black with facial carinae and entire vertex white. Pronotum white below eyes. Tegulae and tip of mesonotum white. Fore wing milky-hyaline with a fuscous area at apex of claval veins. (See Plate 22.)

Male anal segment small; dorsoposterior angles with a pair of short, stout spines and a pair of longer, stouter spines below there. Pygofer with dorsoposterior angle produced into an acute posterior projection. Style broad, flat; inner margin straight; outer margin slanted outward from bulbose base to well produced outer apical angle; apex truncate. Aedeagus gently curved dorsad from base; orifice dorsoapical; spines extended from dorsal apex laterally and ventrally toward base. (See Plate 22.)

Because of the four spines on the anal segment this form resembles *quadrispinosa*, *nigripennis*, *gluciophila* and *securigera* but the details of the aedeagus are different and the styles in this form are much broader than they are in any of the others.

RECORDS:

Puerto Rico: Male holotype from Isabela, Aug. 29, 1947, by beating among weeds and grasses at "papaya" plantation. (Caldwell and Martorell.)

Delphacodes xerosa n. sp.

1935. *Delphacodes andromeda* Osborn. N. Y. Acad. Sci. **14:** 254–255 (Not *andromeda* Van Duzee).

Length of brachypterous male 1.5 mm. General color gray. Head black

except clypeus, vertex, and segment II which are gray. Pronotum black with posterior margin broadly gray. Mesonotum black, tip grayish. Fore wing clear, yellowish with orange metathorax visible beneath. Abdomen smoky orange.

Head from above very short, broad. Facial carina forking at apex of head. Segment II of antenna twice as long as I. Lateral carinae of pronotum not reaching posterior margin. Fore wing broadly rounded apically; venation indistinct. Male anal segment small; lateroposterior margins supporting a pair of crescent-shapes spines with the dorsal apex of the crescent

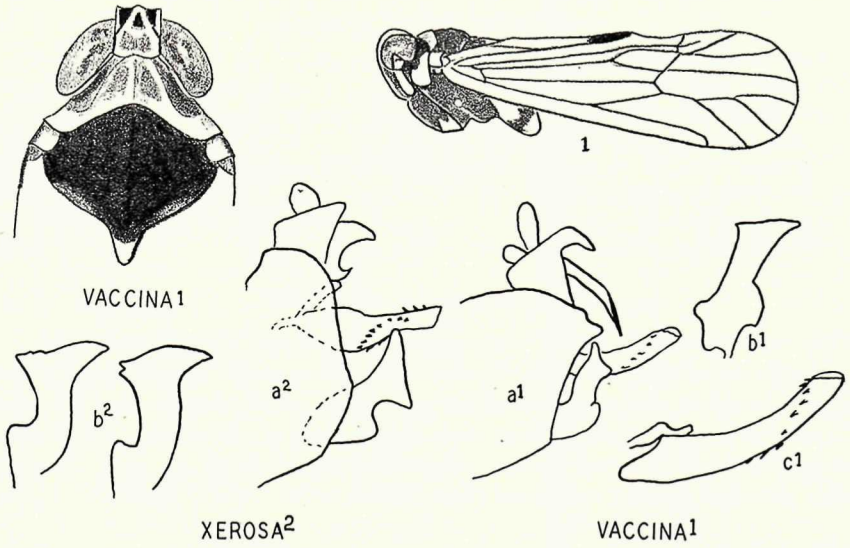


PLATE 22. *Delphacodes*, a, genital capsule, b, style, right ventral, c, aedeagus, lateral.

longer and more obtuse than the ventral. Pygofer with dorsoposterior angle rounded. Style very broad, stout, broadened apically in ventral aspect; apex truncate, outer angle greatly produced, inner angle sometimes notched. Aedeagus bulbose in basal half, apical half tubular, with a row of spines from dorsal apex extended lateroventrally toward base. Orifice apical (See Plate 22.)

RECORDS:

Puerto Rico: Male holotype from dry river bed near Orocovis, altitude 1900 ft., Sept. 11, 1947, from weeds and grasses; paratype genitalia only from La Carmelita-Alto de la Bandera Road (Adjuntas), altitude 2000 ft., Sept. 25, 1947. (Caldwell and Martorell.)

EUIDELLA Puton

1886. Cat. Hemipt. p. 72.

Rather large robust forms. Vertex broader than long. Head little produced before eyes. Median facial carina forking at apex of head. Lateral pronotal carinae not reaching posterior margin. Fore wing broadly rounded apically. Basal metatarsus much longer than other two together. Male styles usually expanded and deeply notched apically. Diaphragm with a pair prominent hook-like processes, these may be fused into one. Aedeagus various.

KEY TO SPECIES OF EUIDELLA

1. Aedeagus bulbose basally.....2
   Aedeagus slender throughout.....3
2. Aedeagus deflected dorsad before apex; spines of anal segment small, dorsoposterior.....*weedi*
   Aedeagus straight or curved slightly ventrally near apex, spines of anal segment large, ventroposterior.....*magnistylus*
3. Style trifurcate apically.....*afasciata*
   Style simple apically.....*fasciatella*

Euidella weedi (Van Duzee)

1897. *Liburnia weedi* Van Duzee. Bull. Buffalo Soc. Nat. Hist. **5**: 352.

Length 3.5–4 mm. Generally dusky to testaceous with light fuscous apical ventation. Male anal segment with a pair short, acute, dorsoposterior spurs. Outer apical angle of style bent outward. Aedeagus bulbose in basal third, straight in central third, apical third bent dorsoposteriorly with extreme apex deflexed posteriorly. (See Plate 23.)

RECORD:

Puerto Rico: Specimen from light trap at Ponce, June 29, 1948. (Maldonado.)

Euidella magnistylus (Crawford)

1914. *Megamelus magnistylus* Crawford. Proc. U. S. Nat. Mus. **46**: 627.

Length 3–3.5 mm. General color grayish testaceous. Male anal segment with a pair of thick, robust, spine-like processes on ventro-posterior margins projected straight posteriorly. Style with outer angle narrowed and projected inward. Aedeagus elongate in apical three-fifths, very slightly deflected ventrally in apical sixth. (See Plate 23.)

RECORDS:

Puerto Rico: Specimens from grass in river bed near Orocovis, Sept. 11, 1947, altitude 2000 ft., and from Río Piedras, Dec. 31, 1947, at light.

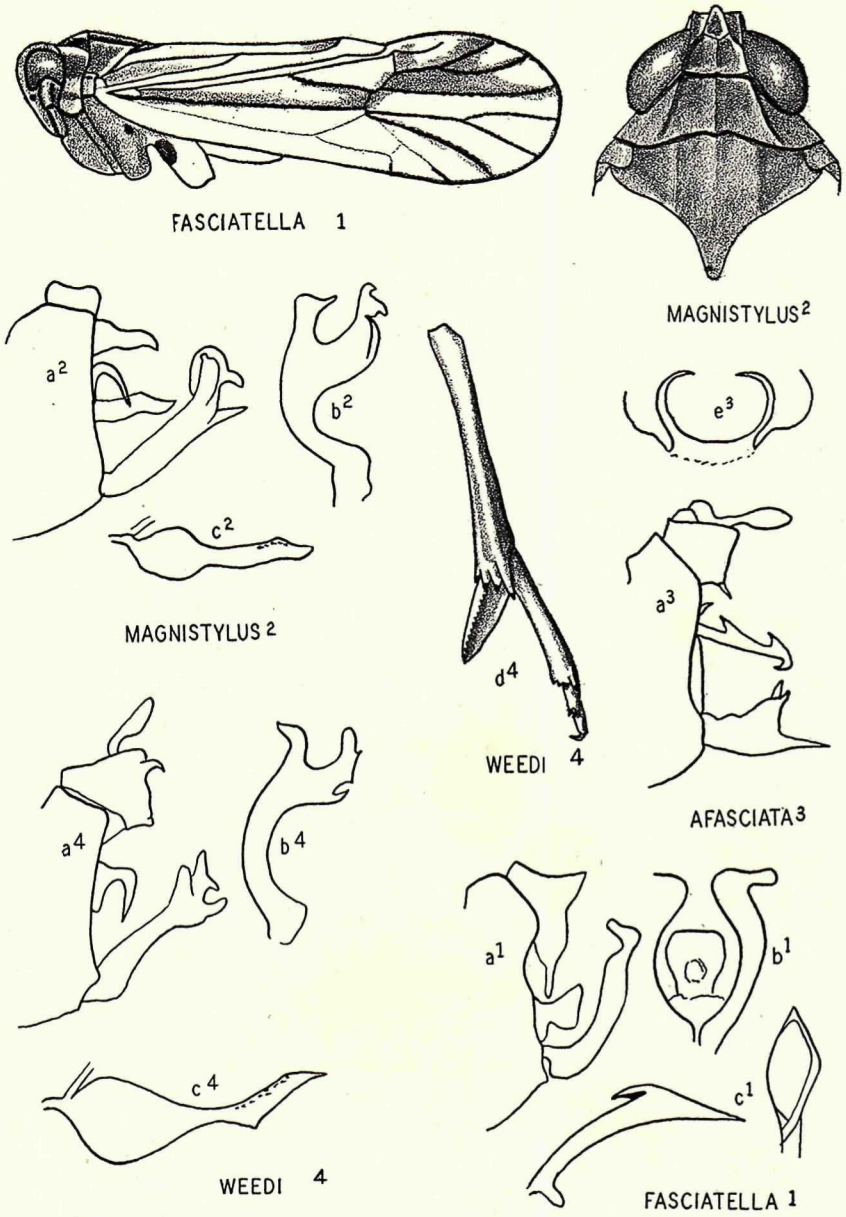


PLATE 23. *Euidella*, a, genital capsule, b, style, ventral, c, aedeagus, lateral or dorsal apex, d, hind leg, lateral apex, e, diaphragm.

Euidella fasciatella (Osborn)

1935. *Liburniella fasciatella* Osborn. N. Y. Acad. Sci. **14:** 246–247.
1935. *Pissonotus striolus* Osborn. N.Y. Acad. Sci. **14:** 247.

Length, male 4 mm.; female 4.3 mm. Head testaceous. Pro- and mesonotum dark brown with carinae broadly whitened. Fore wing whitish, infuscate between M and Cu to cross veins and slightly infuscate dorsoapically; veins posterior to cross veins fuscous. (Brachypterous wing usually fuscous margined with white but often with whitish venation.) (See Plate 23.)

Male anal segment little produced dorsoposteriorly; with elongate spurs ventroposteriorly. Pygofer with dorsoposterior angle roundedly produced. Style elongate, arcuate, slightly enlarged apically with outer angle produced outward. Diaphragm knob-like. Aedeagus with median dorsal crescent-shaped projection forming a broad barb; functional orifice dorsal. (See Plate 23.)

RECORDS:

Puerto Rico: Male allotype from Alto de la Bandera, altitude 2000 ft., Sept. 25, 1947, from weeds and grasses. (Caldwell and Martorell.) Paratypes from the Toro Negro Mts., Luquillo Mts., Maricao Insular Forest, and Río Piedras, Puerto Rico. The species ranges from the lowlands to the mountains but is most abundant at high altitudes.

The specimen originally designated allotype of this species is *Sogata wallacei*. There may be some doubt as to the specific identity of the holotype since it is a female; however the macropterous form of the species described as *Pissonotus striolus* is similar to the holotype of *Liburniella fasciatella*. If I am wrong in my association of species, and the holotype of *fasciatella* should prove to be *wallacei*, then this form will take the name of *striolus*. It may also be noted that a very common species in Mexico, probably the one now known as *Liburnia paladata* Fowler, is very closely related to *fasciatella*.

Euidella afasciata n. sp.

Length, male 2.8 mm.; female 3 mm., both brachypterous. General color brownish-testaceous with carinae a little lighter. Fore wing and veins brownish-yellow; dark spot present at inner apical angle.

Cranial carinae very indistinct. Resembling *fasciatella*. Male anal segment with a pair of small ventroposterior spines. Pygofer gently concave on lateroposterior margin. Style robust, enlarged and trifid apically. Diaphragm with two long, curved spurs. Aedeagus slender, hooked ventroanteriorly at apex; with two stout dorsal spurs, one apical and one medial. (See Plate 23.)

RECORD:

Puerto Rico: Male holotype and female allotype from the Toro Negro Mts. (Caldwell and Martorell.)

ABBROSOGA n. gen.

Elongate rather robust forms. Head and vertex broad. Median facial carina forking at base of frons. Fore wing elongate, sloped from commisural apex toward costal apex; veins R, M, and Cu almost meeting at cross veins.

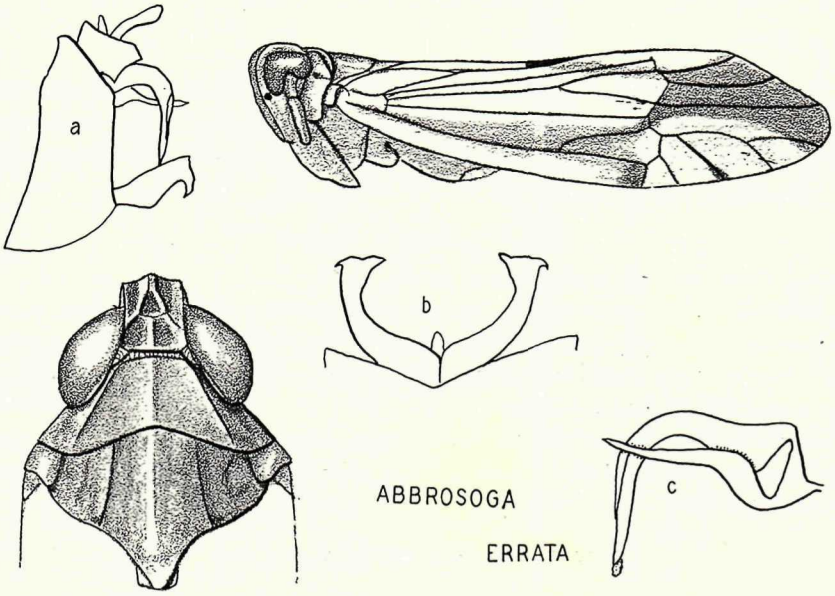


PLATE 24. a genital capsule, b, styles, ventral, c, aedeagus, lateral.

Calcar concave beneath, with posterior teeth. Male anal segment unarmed. Pygofer little if any modified. Diaphragm membranous, without armature. Styles not highly modified. Aedeagus usually curved ventrally; with a process arising at its base or from the small periandrium.

In general build this genus resembles *Nilaparvata*; however the fore wing and genitalia suggest closer relationship to some species of *Columbisoga* from South America.

Abbrosoga errata n. sp. genotype of **Abbrosoga**

Length, male 3.8 mm.; female 4.2 mm. General color grayish-yellow. Median carina of mesonotum whitish, lateral carinae usually fuscous. Fore

wing yellowish, always with a small elongate fuscous spot on commisural margin at apex of claval veins; usually with a fuscous cloud from the cross veins at junction of R extended concavely to the apex leaving the outer apical area clear. (See Plate 24.)

Lateral carinae of pronotum not reaching posterior margin. Male pygofer truncate posteriorly. Styles hooked ventrally in lateral aspect; in ventral aspect, strongly divergent basally then curved dorsally; apices truncate, angles acute. Aedeagus curved ventrally at midlength, with a short acuminate process dorsally at apex of curve; basal process long, acuminate. (See Plate 24.)

RECORDS:

Puerto Rico: Male holotype from the Toro Negro Mts.; female allotype from Maricao Insular Forest. (Caldwell and Martorell.) Paratypes from the Toro Negro Mts., Maricao Insular Forest and Luquillo Mts. All records at altitudes above 2000 ft.

NILAPARVATA Distant

1906. Faun. British India, Rhyn. **3:** 347.

Head quadrate from above. Facial carina forking on base of frons, often indistinct. Lateral carinae of pronotum curving behind eyes, not reaching posterior margin. Basal metatarsus with one or more minute spurs before apex, usually in basal portion.

The character of the spurred tarsus separates this genus from any other and is not as artificial as it seems because all the Puerto Rican species have similar genitalia.

KEY TO SPECIES OF NILAPARVATA

1. Aedeagus long, bifid from base to apex..... *muiri*
   Aedeagus not bifid..... 2
2. Anal segment with a pair of long posterior spines..... *serrata*
   Anal segment unarmed..... *wolcotti*

Nilaparvata wolcotti Muir & Giffard

1924. *Nilaparvata wolcotti* Muir & Giffard. Hawaiian Sugar Plts. Exp. Sta. Bull. **15:** 17.

Length 4 mm. Brownish with lighter carinae. Fore wing hyaline with brown veins; a dark spot present at apex of clavus.

Anal segment of male with outer posterior angles produced but not spined. Style broadly truncate apically; with a slender dorsal projection arising from inner apical angle. Aedeagus short, with a semicircular dorsal projection at dorsoapical third bearing several teeth.

We never took this form. The original material is from Punta Cangrejos and Barceloneta, P. R.

Nilaparvata muiri n. sp.

Length, male 4 mm.; female 4.8 mm. General color yellowish-brown with lighter carinae. Face often infuscate. Fore wing yellowish; venation fuscous apically; granulations scarcely visible.

Segment II of antenna little longer than I. Claval veins united in basal third. Basal metatarsus with one or two small spines in basal portion. Male anal segment with a pair of slender spines on the ventroposterior margin. Style with subapical projection of inner margin. Aedeagus bifid from base; dorsal portion longer, straighter, slightly more stout than ventral; functional orifice subapical; ventral portion curved dorsad apically. (See Plate 25.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from light at Ponce, June 29, 1948. (Maldonado.)

In general build this species is suggestive of *Euidella*; however the genitalia place it in *Nilaparvata*.

Nilaparvata serrata n. sp.

Length of male 4 mm. Top of head and pronotum yellowish-white. Carinae of face and mesonotum brownish. Mesonotum and legs infuscate. Fore wing slightly yellowish basally, clear apically; veins yellow; granulation sparse.

Head short, quadrate from above. Facial carina forking at apex of head. Antennal segments subequal in length. Lateral carinae of pronotum not reaching posterior margin. Basal metatarsus with one to three spines before apex. Male anal segment elongate, low; with a pair ventroposterior spines that are curved ventrally at midlength and flattened apically. Pygofer with dorsoposterior angle rounded; with a small lateroventral projection present on either side. Style bent almost at right angles in apical third; apex with three small spurs; inner margin at level of bend with a thumb-like projection present. Aedeagus elongate, cylindrical, swollen prebasally and preapically; orifice on dorsal apex; a serrate flange bearing about a dozen small teeth present on right side extended to dorsum; a few small spurs present ventrally at apical third. (See Plate 25.)

RECORDS:

Puerto Rico: Male holotype and paratypes from Río Piedras, Dec. 31, 1947. (Caldwell and Martorell.)

Family DERBIDAE

Very fragile forms, usually with elongate fore wings. Antennae variously modified. Apical segment of labium about as broad as long. Ninth abdominal tergite of male fused to anal segment and not to pygofer. Female ovipositor incomplete. Immature development in habitat of rotten wood or under bark.

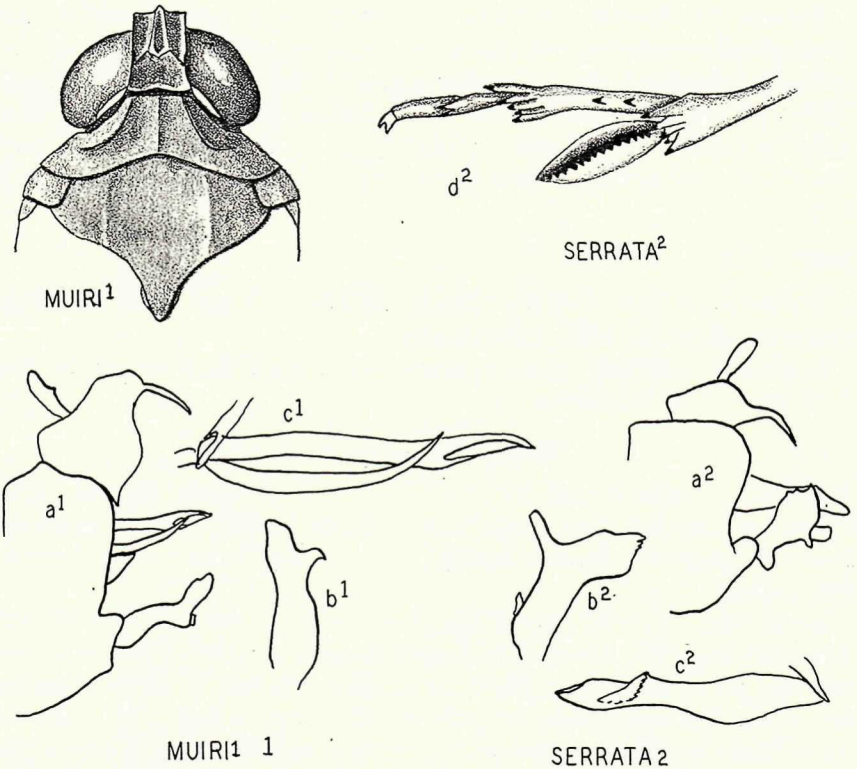


PLATE 25. *Nilaparvata*, a, genital capsule, b, style, ventral, c, aedeagus, lateral, d, hind leg, lateral apex.

The generic grouping of most species is badly in need of revision. While I have used the character of a costal appendage to separate *Sayiana* from other related forms I have doubts that it is a basic character.

KEY TO GENERA OF DERBIDAE

1. Fore wing with clavus open, claval vein extending around apex.....2
   Fore wing with clavus closed, claval vein ending at apex or before.....3
2. Antenna with appendages; costa without prebasal projection.....**Otiocerus**
   Antenna without appendage; costa with prominent projection.....**Sayiana**

3. Side of head with plate-like subantennal process..... **Cedusa**
   Head without subantennal process.....4
4. Pronotum with cup-like antennal fovae..... **Omolicna**
   Pronotum without antennal fovae.....5
5. Small forms; antenna flattened or concave apically..... **Patara**
   Larger forms; antenna short, round in cross section.....6
6. Fore wing broadly ovate; media pectinate, united with Sc and R in basal fifth **Dysimia**
   Fore wing elongate, narrow; media not pectinate, united with Sc and R for a distance equal to or less than length of basal cell..... **Dawnaria**

OTIOCERUS Kirby

1819. Linnean Soc. London **13:** 13.

Head laterally compressed, greatly extended before eyes. Antenna with subprocesses elongate and worm-like. Fore wing elongate, abruptly broadened apically; claval vein continued around apex. Aedeagus asymmetrical. Style with dorsal margin entire, inner ventral margin incised.

Apache is differentiated from this genus by apex of the head which is acute and projected slightly dorsally. It is doubtfully distinct.

Otiocerus schönherri Stål

1859. *Itiocerus schönherri* Stål. Berliner Ent. Zeit. **3:** 327.
1918. *Itiocerus schönherri* (?) Muir. Proc. Hawaiian Ent. Soc. **3:** 420.

Length of female 10.2 mm. General color reddish-fuscous. (See Plate 26.) Clypeus, thoracic ventor, and legs yellowish. Margins of head and venation red, membraneous areas of fore wing cloudy fuscous.

Head twice as long as height across eye; dorsal margin straight with apex elevated. Fore wing extremely long, narrow, greatly broadened before apex. Male anal segment as long as style. Aedeagus with large mediodorsal cup-shaped process; with one spine-like process on either side and a flattened serrate process on left. (See Plate 26.)

According to the shape of the head this species will fall into *Apache.*

RECORDS:

Puerto Rico: Toro Negro Mts. (La Maravilla Camp Road), altitude 3200 ft., Nov. 14, 1947, by beating on weeds and ferns with *Rubus rosaefolius* and *Pothomorphe peltata* in wet and dark ravine.

Maldonado collected one specimen from a light trap at La Maravilla, altitude 3500 ft., and one additional specimen from El Yunque Mts., at high altitudes. Muir records one from Aibonito.

SAYIANA Ball

1928. Canadian Ent. **60:** 197.

Head laterally compressed, ovate in lateral aspect with apex dorsoanter-

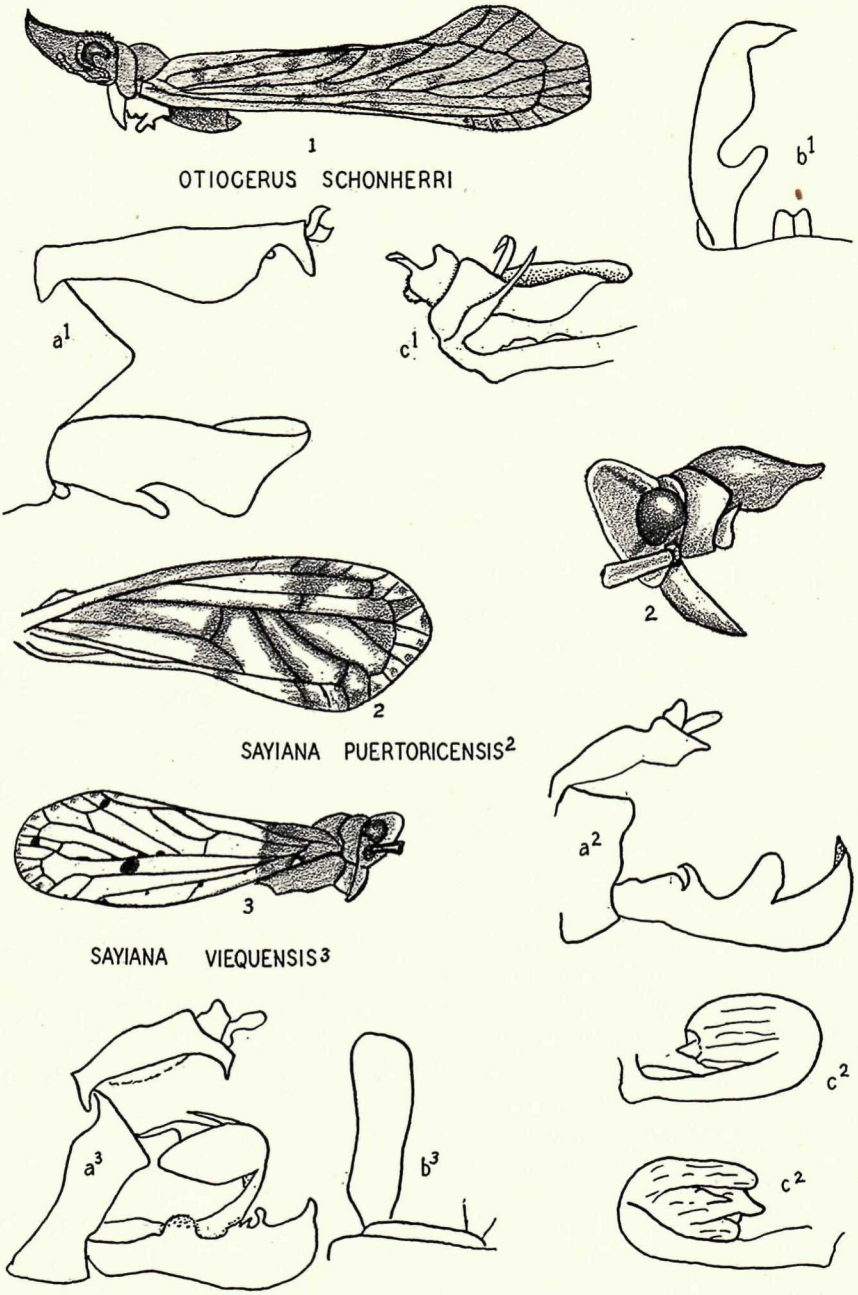


PLATE 26. a, genital capsule, b, Pygofer & left style, ventral, c, aedeagus. lateral.

ior. Antenna elongate, flattened. Fore wing gradually broadened apically; costa with prominent prebasal flap-like appendage. Male style shorter than anal segment, entire on inner ventral margin; dorsal margin with short processes. Aedeagus bulbose apically, with several interior processes that evidently project upon erection.

KEY TO SPECIES OF SAYIANA

1. Fore wing white, with fuscous spots and a basal band.....*viequensis*
   Fore wing white, with veins broadly margined with light fuscous..*puertoricensis*

Sayiana viequensis n. sp.

Length of male 7 mm. Head and thorax yellowish. Antenna black. Fore wing white with fuscous basal band, veins within band red; a prominent fuscous spot present between R and M posterior to median and several smaller spots (7–12) scattered over remainder. (See Plate 26.)

Fore wing with costal appendage acute, broader than long; media with four long main branches. Male anal segment hooked apically. Style quadrate in ventral aspect; dorsal margin with one large prebasal rounded process and three acute preapical processes. (See Plate 26.)

RECORD:

Vieques Island: Male holotype from wooded hill in the eastern end of Vieques Island, Oct. 24, 1947, (Caldwell and Martorell.)

Sayiana puertoricensis n. sp.

Length of male 5.5 mm. Head and thorax whitish-yellow. Fore wing whitish with veins broadly margined with light fuscous or smoky yellow; short apical veins often red.

Fore wing with costal appendage longer than broad, rounded; media with four long main branches. Male anal segment acute apically. Dorsal margin of style with one acute prebasal process and one large ovate median projection. Aedeagus with two median processes. (See Plate 26.)

RECORDS:

Puerto Rico: Male holotype from Ponce, Nov. 14, 1947, at light. (Caldwell and Martorell.) Paratypes from Ponce and Río Piedras, at light.

DYSIMIA Muir

1924. Proc. Hawaiian Ent. Soc. **5:** 462–463.

Head laterally compressed, rounded anteriorly, not produced. Frons widening apically. Fore wing broadly ovate; Sc and R and M united in basal

fifth. Media pectinate, with 7–8 apical veins; cubitus with three apical veins. Aedeagus symmetrical, without apparent processes.

Dysimia maculata Muir

1924. *Dysimia maculata* Muir. Proc. Hawaiian Ent. Soc. **5:** 463–464.

Length 4–4.5 mm. General color whitish with black spots. Mesonotum yellowish. Eyes and two spots before eyes black. Pronotum fuscous laterally at level with eyes. Ventral margin of tegula black. Fore wing with cross veins slightly smoky; with three black spots along media, a larger one on cubitus, and a small one more basad. Hind wing with smoky markings and a black spot along cubitus. (See Plate 27.)

Male anal segment small. Style with an acute prebasal projection and an elongate finger-like median projection on dorsal margin. Aedeagus small, curved, simple. (See Plate 27.)

Taken around Puerto Rico above the coastal plain.

RECORDS:

Puerto Rico: Maricao Insular Forest, altitude above 2000 ft., Oct. 10, 1947; Maunabo-Yabucoa Road, altitude 700–900 ft., Nov. 21, 1947, by beating weeds and ferns; Río Piedras, Aug. 24, 1947. (Caldwell and Martorell.)

DAWNARIA Distant

1911. *Dawnaria* Distant. Ann. Mag. Nat. Hist. **8:** 642.
1912. *Cyclokara* Muir. Hawaiian Sugar Plts. Exp. Sta. Bull. **12:** 32.
1929. *Dawnarioides* Dozier. Amer. Mus. Novitates **37:** 1–2.

Elongate, slender-winged forms. Head laterally compressed. Frons with median groove expanding apically. Pronotum overlapping vertex. Antennae short, rounded. Media in fore wing almost arising from basal cell; with five main branches. All veins very straight. Male anal segment very short style with margins irregular. Aedeagus robust, asymmetrical, with few processes

Dawnarioides musae is conspecific with *Cyclokara sordidulum* hence the two are congeneric. Metcalf (1938. p. 325) states that *Cyclokara* is somewhat anomalous in *Dawnaria* and while this synonomy is not definitely stated *Cyclokara* fails to appear in the key to the genera.

Dawnaria sordidulum (Muir)

1912. *Cyclokara sordidulum* Muir. Proc. Hawaiian Ent. Soc. **3:** 416.
1929. *Dawnarioides musae* Dozier. Amer. Mus. Novitates **37:** 1–2.

Length 5–6 mm. General color grayish-white. Head and thoracic notum yellow. Abdominal dorsum orangish-red posteriorly. Fore wing alternate white and gray banded. (See Plate 27.)

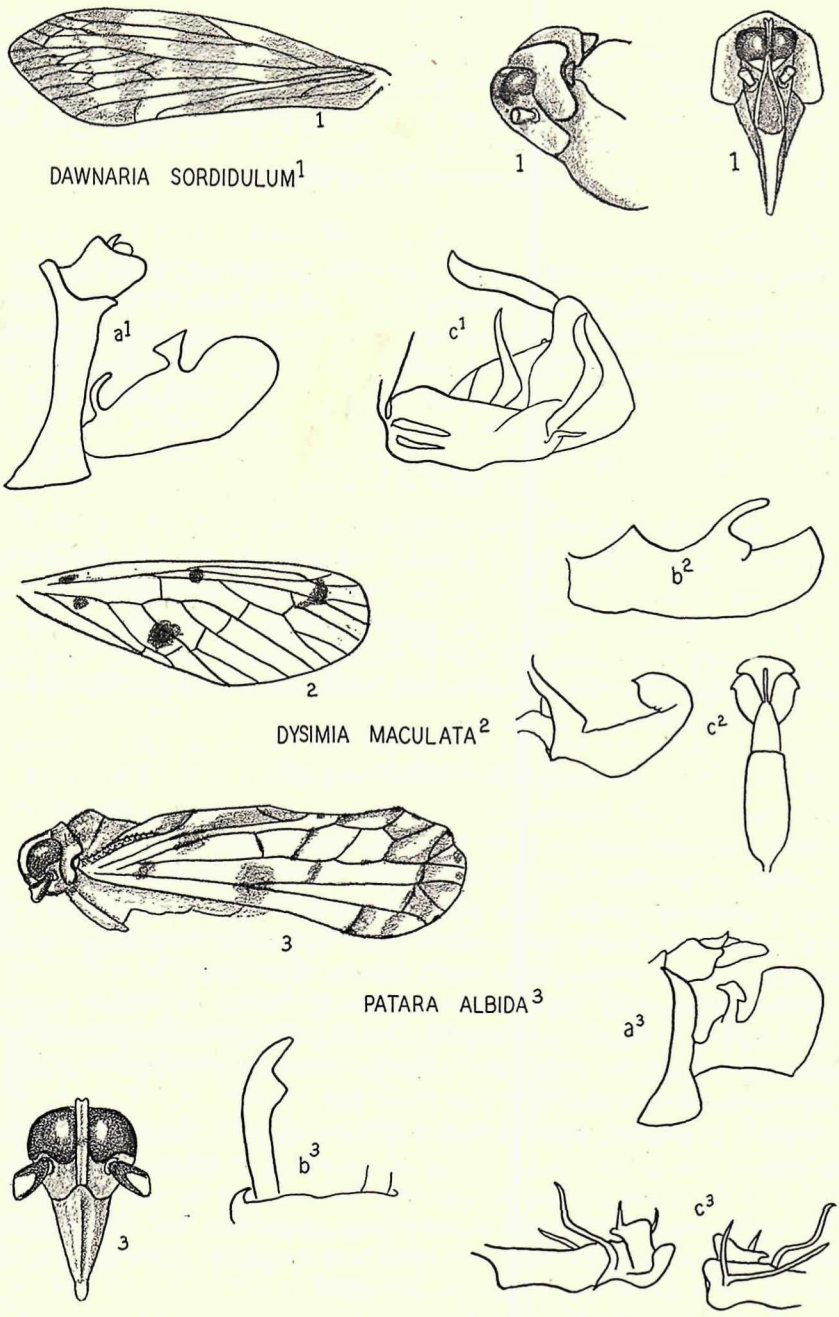


PLATE 27. a, genital capsule, b, style, ventral or lateral, c, aedeagus, lateral or ventral.

or "berenjena", *Solanum melongena*; Mayagüez (Institute of Tropical Agriculture), Aug. 29, 1947, on "papaya" foliage; Aguadilla Beach (Columbus Park), Aug. 29, 1947, by sweeping on a nearly pure stand of squash "calabazas"; Jayuya-Ponce Road at the Jayuya outskirts in front of sugar mill, altitude 1320 ft., Sept. 25, 1947, from "alelaila", *Melia azedarach*; Jayuya-Ponce Road-Alto de la Bandera, altitude 2000 ft. Sept. 25, 1947, from grasses and weeds; Carite Insular Forest, at high altitudes, Oct. 2, 1947, from trees, bushes and weeds; Maunabo Beach, Nov. 21, 1947, by sweeping among grasses and weeds; Mayagüez, Dec. 4, 1947; El Yunque Mts., over 1500 ft., Dec. 12, 1947, from bushes, grasses and weeds.

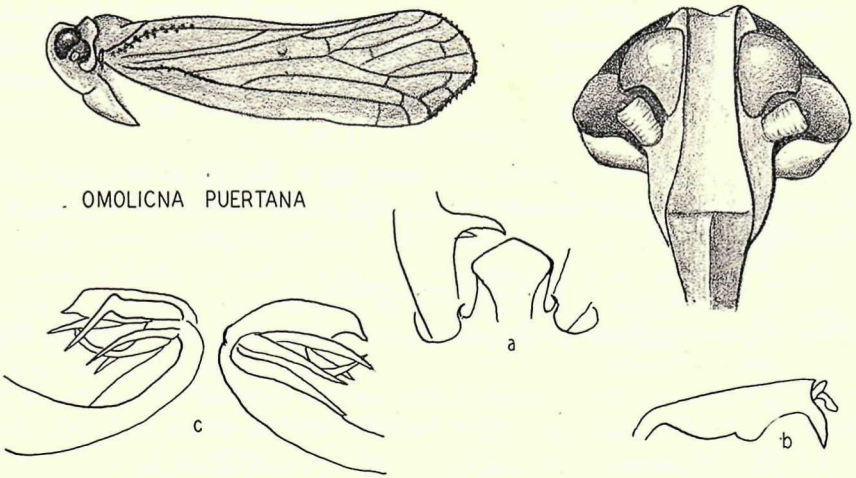


PLATE 28. a, pygofer, ventral, b, anal segment, lateral, c, aedaegus, lateral left or right.

Vieques Island: Oct. 22–23, 1947, from grasses and weeds; East Beach near Naval Base, Oct. 23, 1947, among shrubs, weeds and grasses.

St. Thomas, Virgin Islands: Nov. 25, 1947, from weeds and grasses.

CEDUSA Fowler

1904. Biol. Cent. Amer. Homopt. **5:** 462.

Rather robust forms. Vertex short. Frons quadrate, with or without median carina. Clypeus always with median carina. Subantennal process on cheek saucer-like. Pronotum with lateral carina forming a narrow ridge over either antenna. Fore wing short, broadly rounded. Aedeagus asymmetrical; with numerous processes. Pygofer without ventromedial process.

Other than a few light colored species, all forms look alike and the styles are very similar in many, so it is necessary to base identification upon the characters of the aedeagus.

KEY TO SPECIES OF CEDUSA

1. White with smoky apical spot on fore wing..... *wolcotti*
   Black to bluish-black or possibly brownish.....2
2. Aedeagus with large ovate bifid process on left..... *inflata*
   Aedeagus without bifid process on left.....3
3. Aedeagus with process on left abruptly narrowed and bent dorsad at midlength; right side without slender processes..... *caribbensis*
   Aedeagus with only process on left straight; with one long slender process on right..... *colona*

Cedusa wolcotti Muir

1924. *Cedusa wolcotti* Muir. Proc. Hawaiian Ent. Soc. **5:** 462.

Length 3.7–4.2 mm. Head and thorax light yellow. Fore wing white slightly yellowed at apex of clavus and apically; a round fuscous spot present in inner angle. (See Plate 29.)

Frons with median carina. Dorsoposterior angle of pygofer greatly prolonged posteriorly, slightly serrate on dorsal margin; a short medioventral process (?) present along ventral opening. Style gently swollen medianly, broadly rounded apically, with a slender apical hook in ventral aspect. Aedeagus as figured. (See Plate 29.)

This is the only member of the genus with the posterior prolongation of the pygofer and is very unique in possessing a ventral plate.

RECORDS:

Puerto Rico: Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Doña Juana, Toro Negro Mts., altitude 2600 ft., Oct. 9, 1947; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping weeds, grasses and bushes. Species occurring at high altitudes.

Cedusa inflata (Ball)

1902. *Lamenia inflata* Ball. Canadian Ent. **34:** 262–263.
1924. *Cedusa inflata* McAtee. Ann. Ent. Soc. Amer. **17:** 183.
1929. *Cedusa inflata* (?) Osborn. Jour. Dept. Agr. P. R. **13:** 106.
1935. *Cedusa santaclara* Osborn. N. Y. Acad. Sci. **14:** 227–228.

Length 3.5–4 mm. General color bluish-black. Male style broadened apically, a small median process present on inner margin at midlength; apex deeply incised from inner margin to form a narrow elongate apical hook that projects straight inward. Aedeagus with a very large, deeply bifid, semicircular process on left in addition to others. (See Plate 29.)

RECORDS:

Puerto Rico: The type locality of *inflata* is Hispaniola. We have one specimen from Mayagüez, Dec. 4, 1947. The Osborn material is from Añasco.

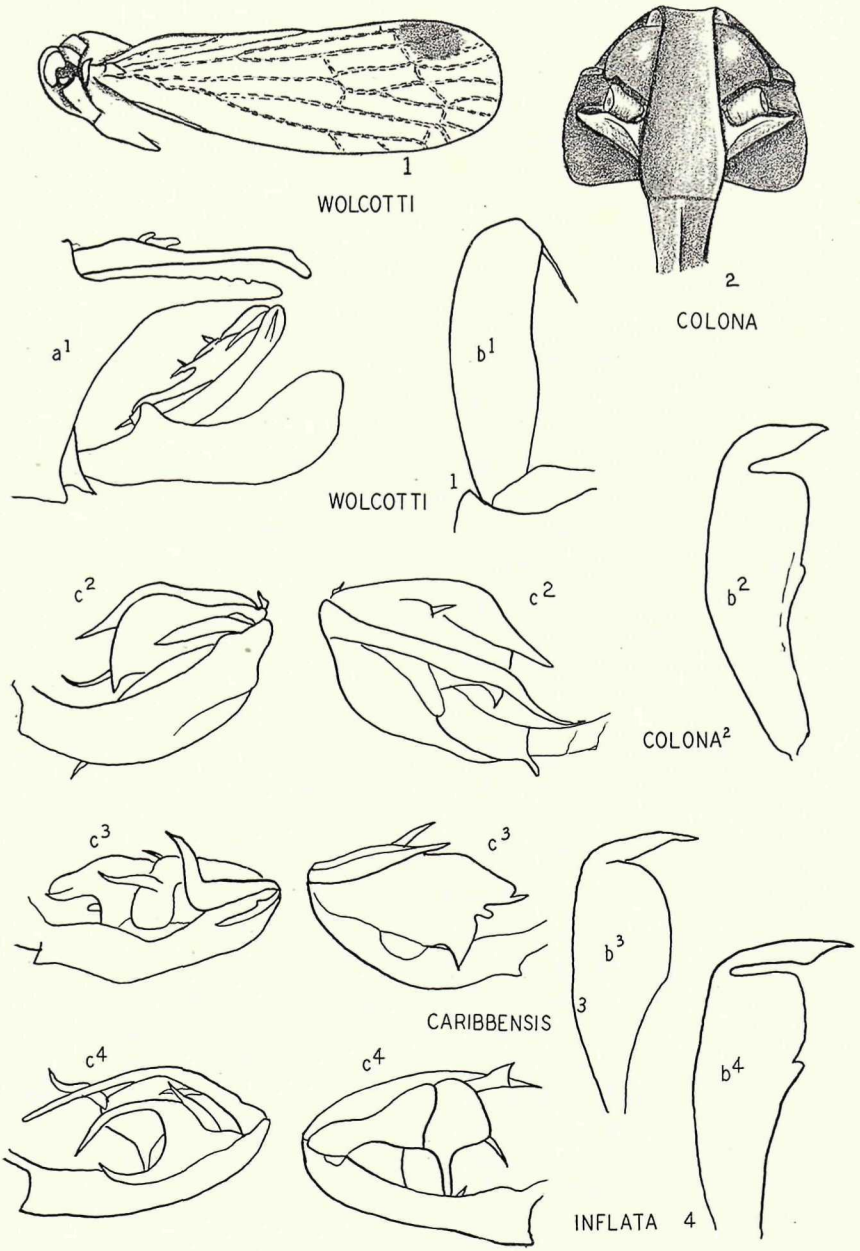


PLATE 29. *Cedusa*, a, genital capsule, b, style, left ventral, c, aedeagus, lateral left or right.

Cedusa caribbensis n. sp.

Length of male 3.5 mm. General color black. Fore wing somewhat fuscous-hyaline.

Frons without median carina, rather strongly narrowed between eyes. Male style broad in apical half, narrow in basal half in ventral aspect; apical hook extended beyond inner margin of style, slightly deflexed apically. Aedeagus with a large process on left bent dorsally and narrowed at mid-length. This process varies in basal width among different specimens. Right side with one slender process and a large flat process that is acute dorsoanteriorly and ventroanteriorly. (See Plate 29.)

RECORDS:

Puerto Rico: Male holotype from Jayuya-Ponce Road, Alto de la Bandera at La Carmelita, Km. 6, over 2000 ft. high, Sept. 25, 1947, by sweeping on *Inga vera* and *Inga laurina* trees. (Caldwell and Martorell.) Paratypes from Carite Insular Forest, at high altitudes, Oct. 2, 1947; El Yunque Mts., at high altitudes over 2500 ft., Dec. 12, 1947, from unidentified bushes. (Caldwell and Martorell.) Prof. Ramos collected this form at Mayagüez on "yerba elefante", *Pennisetum purpureum.*

Cedusa colona n. sp.

1929. *Cedusa edentula* Osborn. Jour. Dept. Agr. P. R. **13:** 107. (Not *edentula* Van Duzee.)

Length of male 3.5 mm. General color black. Frons without median carina. Male style similar to *inflata* Ball; apical hook much stouter and projected more posteriorly. Aedeagus with one short process on left and a very long slender process on right, also various median processes present as illustrated. (See Plate 29.)

RECORD:

Puerto Rico: Male holotype from Mayagüez, Dec. 12, 1947, on grass. (Caldwell and Martorell).

Family ACHILIDAE

Flattened in form. Fore wing nearly horizontal, expanded and closely overlapping the other apically; longitudinal veins crowded together at nodal line. Ovipositor incomplete. Aedeagus complicated; periandrium with many lobes and processes, strongly attached to anal segment; penis? consisting of two rods and projected far into the abdomen. Style apodeme also projected far into abdomen where it is jointed to the penis.

KEY TO THE GENERA OF ACHILIDAE

1. One carina present between vertex and frons.....2
   Two carinae present between vertex and frons.....4
2. Pronotum about twice as broad as head; male genitalia bilaterally symmetrical **Epiptera**
   Pronotum little broader than head; male genitalia asymmetrical.....3
3. Vertex longer than broad; carinae between eye and face.....**Martorella**
   Vertex broader than long; no carinae between eye and face.....**Amblycratus**
4. Vertex with second apical carina tangent to first, visible from above.....**Catonia**
   Vertex with second apical carina not tangent to first and located on face, not visible from above.....**Quadrana**

CATONIA Uhler

1895. Proc. Zool. Soc. London p. 61.

Head short. Vertex triangular, with a median and two tangent apical carinae; apical areolets visible from above. Face broad, with a median carina. Pronotum short, short areolets present behind eyes. Fore wing with main veins forking at about the same level; claval veins connected by an abrupt cross vein. Hind tibia unispinose.

KEY TO SPECIES OF CATONIA

1. Vertex narrow, produced half its length before eyes.....*antillicola*
   Vertex broad, little projected beyond eyes.....2
2. Dorsum with a median longitudinal ivory stripe.....*dorsovittata*
   Dorsum without any light stripes.....3
3. Vertex very flat.....*arida*
   Vertex trough-like with lateral margins elevated.....*cinerea*

Catonia cinerea Osborn

1929. *Catonia intricata* Osborn. Jour. Dept. Agr. P. R. **13:** 107. (Not *intricata* Uhler.)

1929. *Catonia cinerea* Osborn. N. Y. Acad. Sci. **14:** 195–196.

Length 4–4.5 mm. Variable, usually testaceous to pale gray. A dark indistinct band crosses vertex at anterior margin of eyes, posterior angles dark. Mesonotum brown to fuscous with angles yellow. Fore wing often light gray with yellowed costal cell, white punctations usually visible. In darker specimens the fore wing is infuscate with the costa orangish and the other markings intensified.

Medioventral process of male pygofer bifid apically; apices acute, divergent, slightly hooked cephalad. (See Plate 30.)

RECORDS:

Puerto Rico: Allotype male from Maricao Insular Forest, altitude 2500 ft., Sept., 12, 1947. (Caldwell and Martorell.) Paratypes and speci-

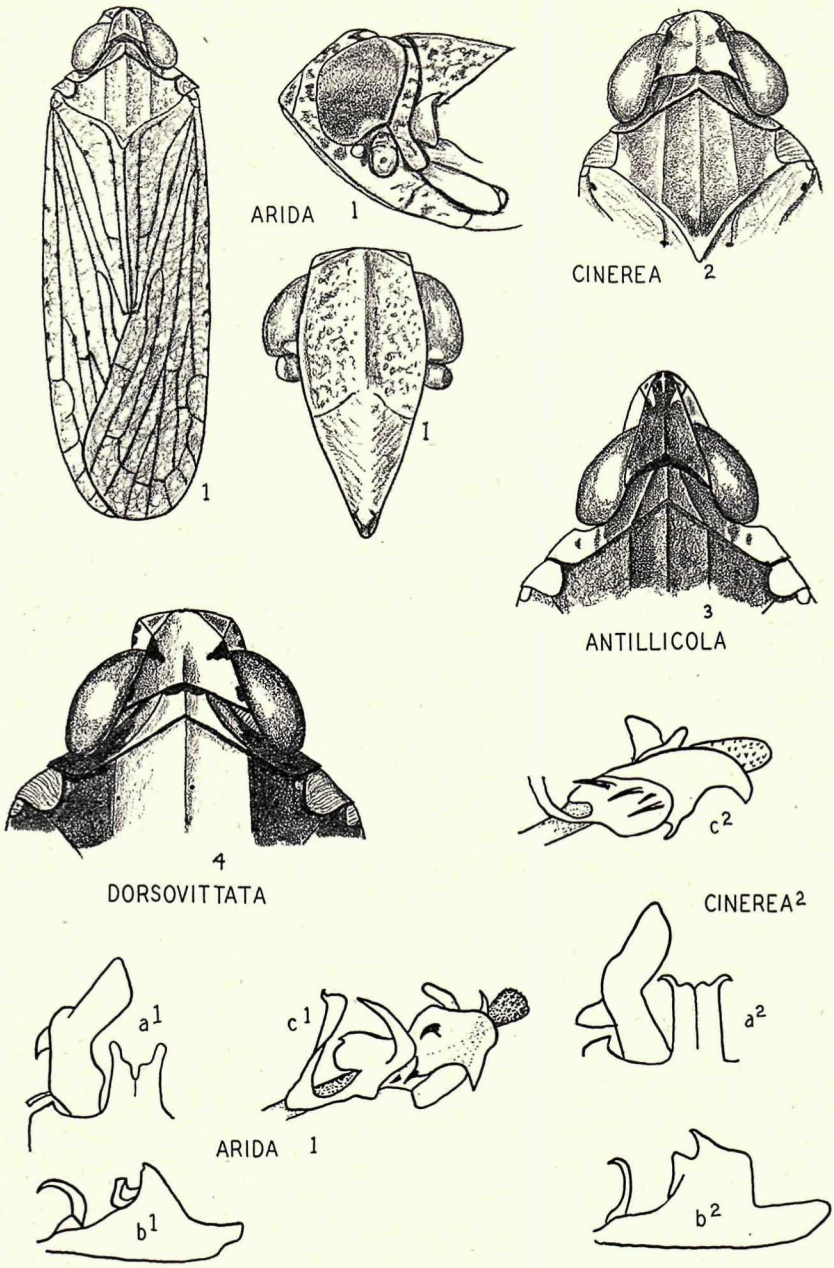


PLATE 30. *Catonia*, a, pygofer & left ventral style, b, style, lateral, c, aedeagus, lateral.

mens from Adjuntas, Aguas Buenas, Cambalache, Jayuya, Loiza, Maricao as follows: Río Piedras, Solis farm, Aug. 17, 1947, from "maga", *Montezuma speciosissima;* Agricultural Experiment Station grounds, Sept. 7, 1947 ,on "guamá", *Inga vera;* Ponce, Ponce-Adjuntas Road, Km. 27.6, altitude 1550 ft., Sept. 12, 1947, from "higuillo", *Piper aduncum;* Maricao-Sabana Grande Road, Km. 15.6, altitude 2400 ft., Sept. 12, 1947, from weeds and grasses; Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Ciales-Jayuya Road, Km. 30.6, 1820 ft. high, Sept. 25, 1947, by sweeping weeds and shrubs particularly *Guarea, Dendropanax* and *Inga vera;* Maricao Insular Forest, Oct. 10, 1947; Cambalache Experimental Forest, Nov. 6–7, 1947, beating weeds and shrubs; Río Piedras-Loiza Road, Nov. 11, 1947, beating grasses and weeds.

Vieques Island: Paratypes from this locality as follows: Oct. 22, 1947; Navy Base Hill and Hill East center, Oct. 24, 1947, from weeds and bushes.

Caja de Muertos Island: Paratypes from this locality as follows: Dec. 5, 1947, from weeds.

Catonia cinerea subspecies **magna** n. subsp.

1935. *Catonia intricata* Osborn. N. Y. Acad. Sci. **14:** 195. (In part, not *intricata* Uhler.)

Length of female 5–6 mm. Resembling the typical form but much larger and darker with a tendency toward a transverse pale band across the claval apex. Face heavily irrorate. More slender with vertex more acute apically.

RECORDS:

Puerto Rico: Female holotype from Carite Mts., at higher elevations, Oct. 10, 1947. (Caldwell and Martorell.) Paratypes from Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, by beating on vegetation along roadsides; Ciales, Ciales-Villalba Road, Km. 35.8, altitude 1500 ft., Sept. 25, 1948, from weeds.

Catonia antillicola Dozier

1936. *Catonia antillicola* Dozier. Jour. Dept. Agr. P. R. **20:** 92–93.

Length of female 5.5 mm. Fuscous marked with small white spots. Face, pronotum except disc, tegula, and base of costa white; remainder of costa reddish.

Vertex narrowly triangular, produced half its length before eyes; apical areolets broadly triangular. Face elongate, narrow. Disc of pronotum narrow, triangularly produced into posterior notch of vertex. (See Plate 30.)

RECORDS:

Puerto Rico: One female from Río Piedras, Nov. 13, 1947; Yabucoa, on the Maunabo Road, altitude 500 ft., Nov. 21, 1947, from weeds and ferns along the roadside. (Caldwell and Martorell); one female from Gurabo. (Maldonado.)

Catonia arida n. sp.

Length, male 3.8 mm.; female 4 mm. Yellow-testaceous mottled with light fuscous and punctate with white. Venation white, sparingly punctate with fuscous, especially basally. (See Plate 30.)

Resembling *cinerea* but with flatter vertex and carinae and with apical carinae less distinct; mesonotum less declivient anteriorly. Male style with interior basal process curved laterad. Mediovent ral process of male pygofers broadly notched apically; apices blunt, relatively straight. Aedeagus with a pair of long recurved basal process in addition to three pair short spurs. (See Plate 30.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from Guánica Insular Forest, Sept. 25, 1947. (Caldwell and Martorell.) Paratypes from Cambalache Experimental Forest, Nov. 6, and Oct. 16, 1947; and Guánica, Sept. 25, 1947.

Caja de Muertos Island: Paratypes from this locality also, Dec. 11, 1947.

Catonia dorsovittata n. sp.

Length of female 6 mm. General color black with vertex, disc of pronotum median tablet of mesonotum, and inner clavus ivory. Vertex with a pair of black marginal dashes on either lateral margin. Face irrorate with white. Fore wing with area between clavus and costal cell and apex light fuscous; clavus other than inner margin, black costal cell reddish, especially apically.

Vertex almost twice as broad as median length; lateral margins highly elevated. (See Plate 30.)

RECORDS:

Puerto Rico: Female holotype from El Yunque Mts., altitude 2500 ft., Dec. 12, 1947, by sweeping on weeds and grasses. (Caldwell and Martorell.)

AMBLYCRATUS Uhler

1895. Proc. Zool. Soc. London, p. 64.

Vertex broad, rounded toward face; with a single apical and a median carina present. Face broad, little narrowed apically, with a median carina.

Pronotum short, disc tricarinate, lunate. Mesonotum very large, tircarinate. Fore wing slender; furcation of Sc, plus R a little farther from base than Cu^1; claval veins strongly joined by a cross vein. Metatibia without spines. Male styles thin, plate-like. Anal flap broad apically, the Puerto Rican forms with an acute tooth on either apical angle.

KEY TO SPECIES OF AMBLYCRATUS

1. Face alternate black and white bars ..... *striatus*
   Face unicolorous, unmarked ..... *testaceus*

Amblycratus striatus n. sp.

Length of male 3.5 mm.; female 4 mm. General color yellowish-gray with brown stripes as follows: A pair on vertex either side of median carina, a pair on disc of pronotum and four either side of disc, and six on the mesonotum. Face white with six transverse blackish bands increasing in width from base to apex, these are carried across the side of the head and thorax. Fore wing mottled with fuscous and white, especially along costa. (See Plate 31.)

Medioventral process of male pygofer small, triangular, acute apically. Style broadly angular apically, small lateral spur present far basally. Anal segment with teeth slightly curved ventrally. Aedeagus with laterobasal process slender, outer arm curved in a complete circle. (See Plate 31.)

RECORDS:

Puerto Rico: Male holotype and paratypes and female allotype from Maricao Insular Forest, Oct. 10, 1947. (Caldwell and Martorell.) Paratypes from Maricao, Nov. 13, 1947, and El Yunque Mts., Dec. 12, 1947. All records at altitudes over 2000 ft.

Amblycratus testaceus n. sp.

Length of male 3.5–4 mm. General color testaceous with vertex, pronotum, and mesonotum yellowish. Eyes black. Apical cells of fore wing with their apices brown, separated by white veins between cells.

Vertex about twice as broad as long. Male pygofer with medioventral process deeply notched apically. Style truncate apically, with a small lateral spur present at center of outer margin. Apical teeth on anal segment projected ventrally. Aedeagus with a stout, bifid, basal process on either side in addition to other processes. (See Plate 31.)

RECORDS:

Puerto Rico: Male holotype and paratype from Maricao Insular Forest, Sept. 24, 1947. Paratypes from Cambalache Experimental Forest, Nov. 6, 1947. (Caldwell and Martorell.)

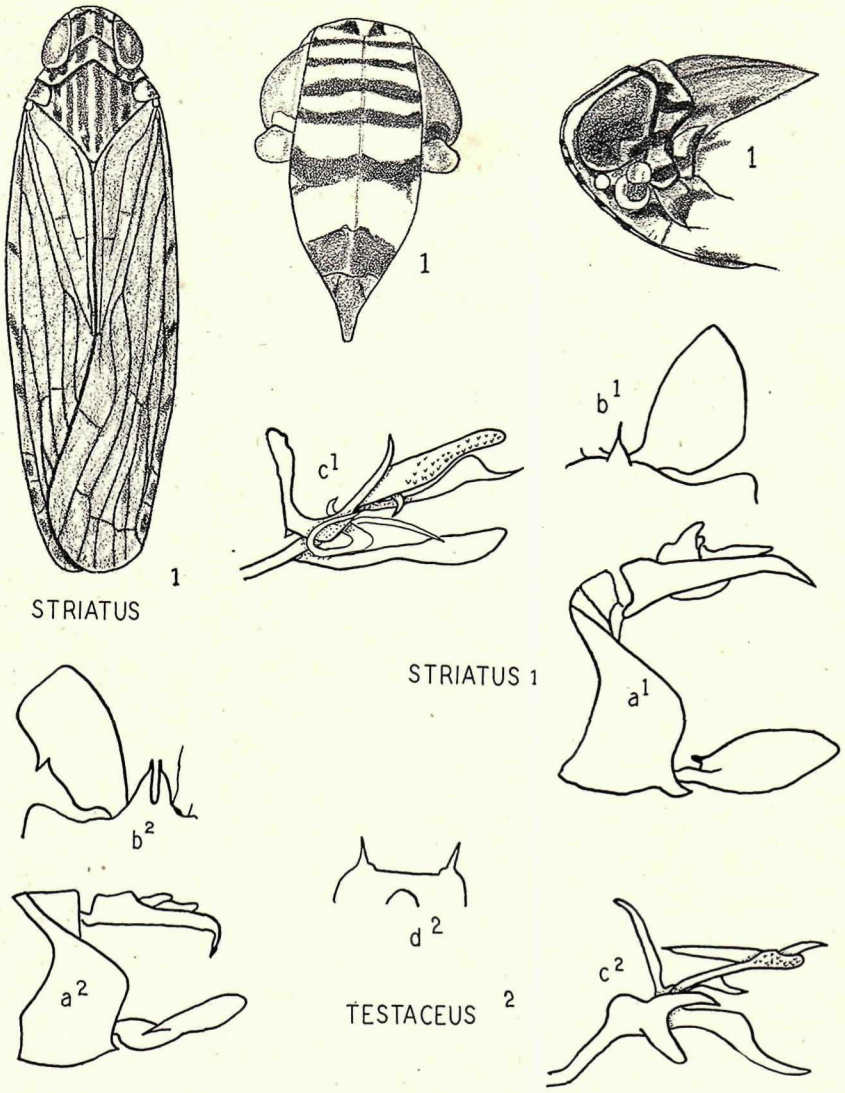


PLATE 31. *Amblycratus*, a, genital capsule, b, pygofer & style, ventral, c, aedeagus, lateral, d, anal segment, dorsal apex.

QUADRANA new genus

Head produced. Vertex longer than broad, almost quadrate in outline, lateral and median carinae present. Frons narrow, twice as long as clypeus, with a median carina and a dorsal carina; dorsal carina invert V-shaped, not tangent to apical carina of vertex but connected by a median carina. Pronotum very narrow; disc tricarinate, median carina extremely short,

lateral carinae diagonally elongate; four to five supernumerary carinae present. Mesonotum tricarinate, with median carina not reaching to apex. Fore wing elongate; costa broadened; principle veins usually forked at about same level. Metatibia unispinose.

Related to *Catonia* but with a much narrower quadrate vertex and one apical carina. The frons with a transverse carina separates this genus from any other genus in the Achilidae.

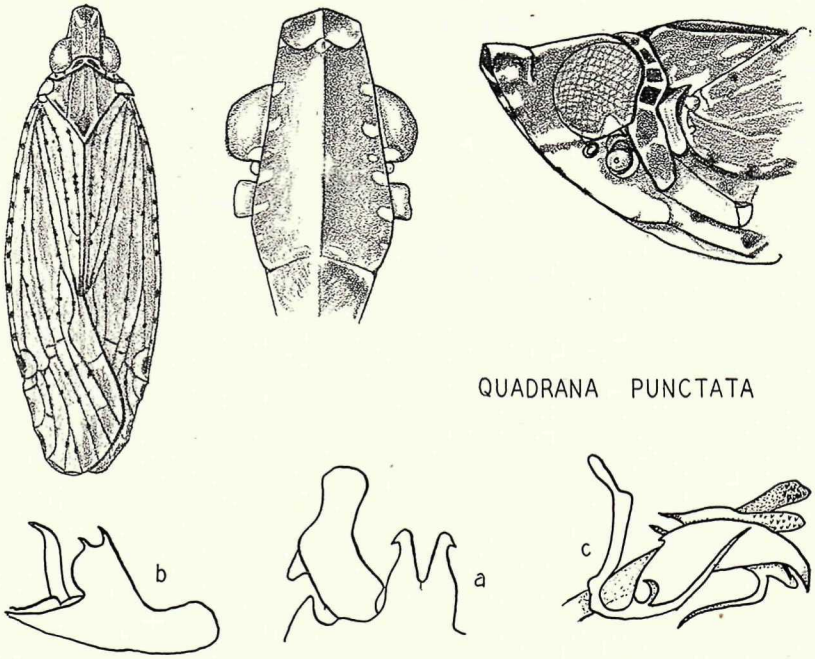


PLATE 32. a, pygoger & left style, ventral, b, style, lateral, c, aedeagus lateral.

Quadrana punctata n. sp., genotype of **Quadrana**

Length, male 5.2 mm.; female 6.5 mm. General color testaceous with black punctations. Vertex black with light carinae and two divergent apical dashes light. Pronotal carinae light. Mesonotum with carinae and other irregular spots light. Lateral carinae of frons alternate brown and white. Abdominal sternites two to four with transverse median bands. Venation alternate black and white, often tinted with red; less maculate in males than females. (See Plate 32.)

Male anal segment spatulate, acuminate apically. Medioventral process of pygofer deeply bifid apically, apices divergent. (See Plate 32.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from Maricao Insular Forest, Nov. 13, 1947. (Caldwell and Martorell.)

Paratypes from Alto de la Bandera, Sept. 25, 1947; Carite Insular Forest, Oct. 2, 1947; Ciales-Jayuya Road near to Casablanca, Sept. 25, 1947; Toro Negro Mts., Nov. 14, 1947; El Yunque Mts., Dec. 12, 1947: All records at altitudes of 2000 ft. or above. Also paratypes from Ponce, Vega Alta, Cambalache Insular Forest and Yabucoa, at low altitudes.

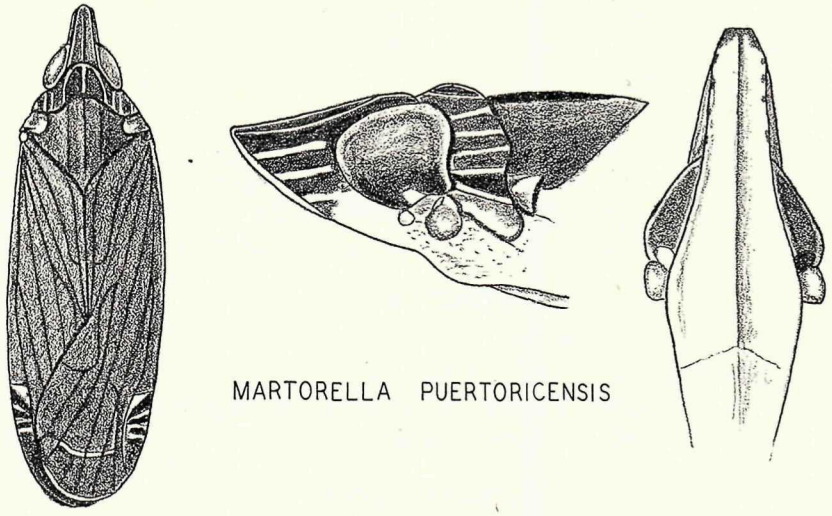


PLATE 33.

MARTORELLA new genus

Head elongate. Vertex narrow, flat, two-thirds of median length produced before eyes, strongly carinate; median carina higher than lateral, especially apically. Single carina between vertex and frons. Face narrow, elongate, little broadened at union of frons and clypeus; frons and clypeus carinate for full length, median carina expecially prominent basally. Two to three prominent carinae present between the eye and frons. Pronotum with five supernumerary carinae in addition to three on disc. Mesonotum tricarinate, longer than broad. Tegulae prominent. Fore wing elongate, narrow, costal and sutural margins almost parallel. Principle veins forked at about the same level; nodal cell calloused. Metatibia unispinose.

Somewhat resembling *Koloptera* but with a more narrow, elongate head and much simpler fore wing.

I take great pleasure in naming this outstanding genus in honor of my

friend and collaborator, Dr. Luis F. Martorell who has contributed much to our knowledge of the biology of the Caribbean region, and especially Puerto Rico.

Martorella puertoricensis n. sp., genotype of **Martorella**

Length of female 5 mm. Dorsum jet black. Carinae of vertex and disc of pronotum grayish-white, supernumerary carinae of head and pronotum pure white. Venter white except apex of face, sides of head above level of eyes, and genital segments. Fore wing veins brownish except basal half of costa, entire apical margin and apical cross veins pure white; costal cell bluish-gray with black streaks; callous area yellow. Legs with tibia and tarsi dusky. All carinae very clean cut and narrow. (See Plate 33.)

RECORDS:

Puerto Rico: Holotype female from the Toro Negro Mts., Nov. 14, 1947; paratype from Maricao Insular Forest, Nov. 13, 1947. (Caldwell and Martorell.) Paratype from Maricao Insular Forest, May 30, 1938. (Ramos.)

EPIPTERA Metcalf

1922. Canadian Ent. **54:** 264.

Single apical carina between face and vertex. Pronotum very broad, about twice as broad as head; median tablet strongly overlapping base of head. Male genitalia bilaterally symmetrical.

Epiptera floridae (Walker)

1851. *Monopsis floridae* Walker. List. Homopt. British Mus. **2:** 326.
1941. *Epiptera floridae* Wolcott. Jour. Dept. Agr. P. R. **125:** 53.

Length 7.5–8 mm. General color brownish lightly irrorate with gray. Side of face at level of antenna with broad white band edged dorsally with fuscous extended across thoracic pleurites.

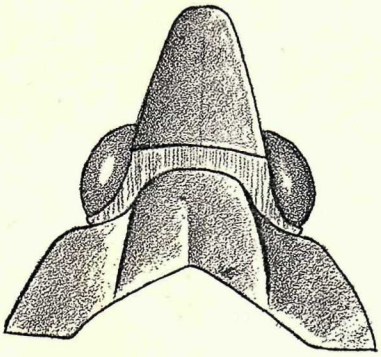
Vertex about as long as broad though appearing longer; broadly triangular with rounded apex. Aedeagus with mid-dorsal extension of periandrium elongate, narrow, stylate. (See Plate 34.)

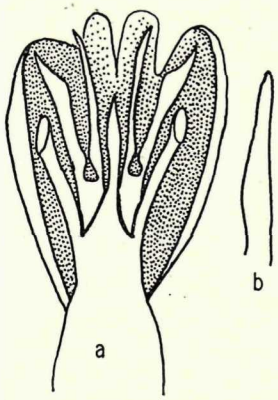
RECORD:

Puerto Rico: Record based on a single female from Puerto Rico. Because distinction between females of closely related forms is impossible at present, this record should be considered as very doubtful until such time a male from Puerto Rico is available for study. My sketches have been made from material from Continental North America.

Family TROPIDUCHIDAE

Mesonotum with a posterior suture across apex. Fore wing usually clear; transverse veins forming a nodal line with venation posterior to line often reticulate; costa usually broadened sometimes forming a costal membrane. Metacoxa with thin plate-like posterior spur present; second tarsus of hind leg without a row of apical spines but with one spine on either side apically. Aedeagus tubular, more or less elliptical in cross section; containing inflatible sacs; with heavily sclerotized processes retracted within the periandrium. Ovipositor incomplete. The family is closely related to Dictyopharidae but the characters of the mesonotum and second metatarsus will separate the two.





EPIPTERA FLORIDAE

PLATE 34. a, aedeagus, dorsal apex, b, dorsomedian process, lateral.

KEY TO THE GENERA OF TROPIDUCHIDAE

1. Fore wing with numerous cross veins in large costal area.....2
   Fore wing with costal area small or much reduced hence no cross veins.....3
2. Principle veins of fore wing forking at approximately the same level....**Ladella**
   Principle veins in fore wing forking at different levels; radius forked close to and cubitus fartherest from nodal line.....**Tangella**
3. Venation reticulate posterior to nodal line.....**Neurotmeta**
   Fore wing with no more than one set of cross veins after nodal line.....4
4. Vertex very narrow, with median vertical plate.....**Parahydriena**
   Vertex about as long as broad, without median plate.....**Arenasella**

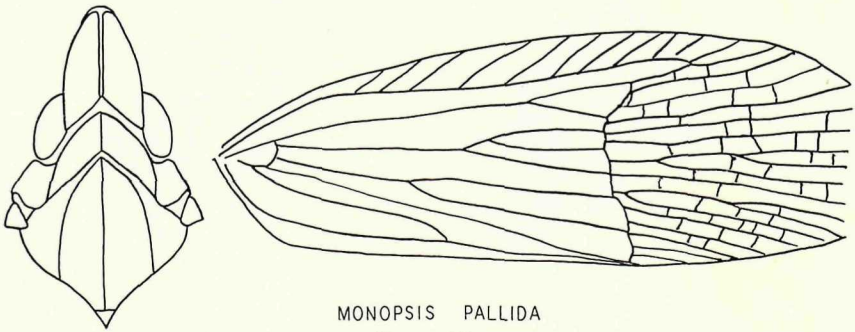
LADELLA Stål

1859. Berlin Ent. Zeitschr. **3**: 319.

According to Dr. China (in correspondence), this genus has been es-

tablished on a misidentified genotype. The species which Stål believed to be *Monopsis pallida* Walker and upon which he based the genus *Ladella* and which was accepted by Melichar in his monograph of Tropiduchidae is not *Monopsis pallida* Walker. As far as we know *pallida* Walker is limited to Jamaica and does not occur in Puerto Rico. Since completion of our work in Puerto Rico, Fennah (1949) has designated *Monopsis pallida* Walker haplotype of *Ladella* and has proposed a new name for *pallida* Stål. (See Plate 35.)

Vertex slightly produced, flat; margins carinate; lateral margins straight; anterior margin gently convex, posterior margin concave; median carina present, not reaching anterior margin. Flat, produced callous area present between vertex and frons. Frons flat, prominent median carina present, lateral margins parallel to below antennae thence suddenly widened. Fore



MONOPSIS PALLIDA
PLATE 35.

wing relatively broad; principle veins forked at approximately the same distance from the base; costal area with 10–15 cross veins; nodal line strongly convex toward base of wing with venation reticulate posterior to this; post nodal line of cross veins distinct in at least outer half of wing.

There may be some doubt that the Puerto Rican forms are congeneric with the genotype from Jamaica.

KEY TO SPECIES OF LADELLA

Mediodorsal process of aedeagus spiniform, as long as aedeagus.....*ståli*
Mediodorsal process of aedeagus shorter than aedeagus, usually much less, greatly flattened.....*nepallata*

Ladella ståli Fennah

1895. *Ladella pallida* Stål. Berl. Ent. Zeitschr. **3:** 319.
1914. *Ladella pallida* Melichar. Verh. Naturf. Ver Brunn. p. 106.
1923. *Tangia angustata* Wolcott. Jour. Dept. Agr. P. R. **7:** 271 (part).

1949. *Ladella ståli* Fennah. Psyche **56:** 56–57. (N.n for *Monopsis pallida* Stål not *M. pallida* Walker.)

Length 9.5–11.5 mm. General color light green fading to yellow. Spines of posttibia and tarsus tipped with black. Often a pair of black spots present on the third or fourth abdominal tergites visible through the wings. Third female valvulae black. (See Plate 36.)

Vertex little broader than median length though appearing otherwise. Second line of cross veins in fore wing forming a definite line across wing and almost reaching the sutural margin. Aedeagus with one slender apical process; a pair of slender medioventral right hand processes present and one broadly flattened left hand mediodorsal process.

RECORDS:

Puerto Rico: Material from the Carite Mts., Oct. 2, 1947, altitude 2200 ft., from weeds and shrubs; Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Luquillo Mts. along the Forest Trail, over 2000 ft., high, Aug. 22, 1947 and Dec. 12, 1947; Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 15.6, altitude 2400 ft., Sept. 12, 1947, from weeds and grasses. (Caldwell and Martorell.)

St. Thomas, Virgin Islands: Sept. 25, 1947.

Ladella ståli subspecies **dubiata** n. subsp.

Length of male 10 mm. General color and form of *ståli ståli.* Aedeagus with mediodorsal process broad, flat, very elongate, almost as long as aedeagus. Venation of fore wing closer to *nepallata* than to typical form. (See Plate 36.)

RECORDS:

Puerto Rico: Male holotype from Río Piedras, Sept. 7, 1947, from nymphs and adults breeding on "guaba", *Inga vera.* (Caldwell and Martorell.) Paratype from Mayagüez, July, 1914 (A. M. N. H.). I associate several females from Arecibo with these males but I am unable to prove the relationship.

It is very probable that this form replaces the typical form in the low coastal country.

Ladella nepallata n. sp.

Length of male 9.5 mm.; female 11.9 mm. Color and form of *ståli.* Vertex slightly more narrow in proportion to length; anterior margin slightly more arcuate. Post nodal line of cross veins in fore wing indefinite from sutural margin to center of wing. Aedeagus with the pair of medio-

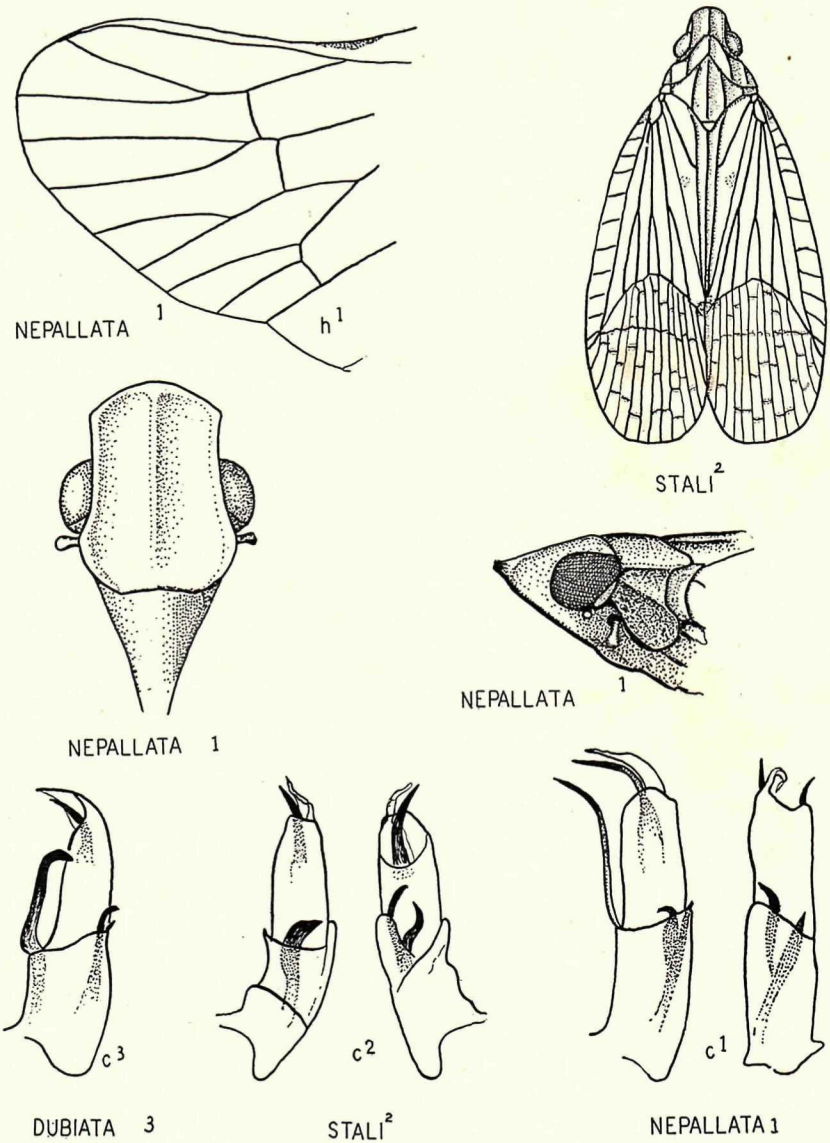


PLATE 36. *Ladella*, c, aedeagus, lateral, h, hind wing, left apex.

ventral processes stouter; mediodorsal process very elongate, slender, reaching to apex of aedeagus. (See Plate 36.)

RECORDS:

Puerto Rico: Male holotype and female allotype from the Toro Negro Mts., Doña Juana, altitude 2800 ft., Oct. 9, 1947, from weeds and grasses.

(Caldwell and Martorell.) Paratypes from Aibonito, Dec. 30, 1947; Barranquitas, Sept. 11, 1947; Ciales-Jayuya Road, Km. 30.6, altitude 1820 ft., Sept. 25, 1947, by sweeping on weeds and shrubs particularly on *Guarea*, *Dendropanax* and "guaba", *Inga vera;* Cayey, Peñon del Collao, altitude 2000–2200 ft., Sept. 13, 1947, from weeds under coffee grove; Ponce, Ponce-Jayuya Road, Alto de la Bandera, above 2000 ft., Sept. 25, 1947, from weeds and grasses; Orocovis-Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, on vines between pockweed, *Phytolacca rivinioides.*

It is equally possible that this is the species Stål had from Puerto Rico; however the average size slightly favors *ståli. Nepallata* is more western in distribution than *ståli.*

TANGELLA Metcalf & Bruner

1930. Psyche **37:** 397.

Robust in form. Vertex over twice as broad as median length; median carina not quite reaching the anterior margin. Flat callous area present between vertex and frons. Frons convex, median carina present. Clypeus ecarinate. Pro- and mesonotum tricarinate. Fore wing almost three times as long as broad; costal margin almost as broad as costal cell, with numerous cross veins present; nodal line straight, crossing at apical third, venation reticulate posterior to nodal line. Radius, medius and cubitus forked once. Aedeagus with four heavily sclerotized apical processes and one pair median.

Tangella schaumi (Stål)

1859. *Tangia schaumi* Stål. Berl. Ent. Zeitschr. **3:** 318.
1935. *Ladella acunae* Osborn. Jour. N. Y. Acad. Sci. **14:** 204.
1949. *Tangella schaumi* Fennah. Psyche **56:** 57.

Length 6–7 mm. Dark green over all with eyes, spines on posttibia and tarsi black. Third valvulae of female dark. (See Plate 37.)

Face little widened before clypeus. Vertex flat; median length almost equal to median length of pronotum. Aedeagus with one medioventral process strongly curved at the apex, the other curved basally. (See Plate 37.)

RECORDS:

St. Thomas, Virgin Islands: Collected at St. Thomas, Nov. 30, 1947. (E. Z. and J. S. Caldwell.)

Puerto Rico: Collected at: Cambalache Experimental Forest, Nov. 6, 1947; Las Cucharas Beach, near Ponce, Sept. 11, 1947, by sweeping on "barbasco", *Canella Winterana;* Guánica Insular Forest, at low altitudes, Sept. 25, 1947; Guánica Ensenada Road, in front of the stone quarry,

breeding abundantly on the bignoniaceous vine, "liana fragante", *Distictis lactiflora;* Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, from bushes and weeds; Salinas Beach at Río Jueyes, Nov. 21, 1947, nymphs

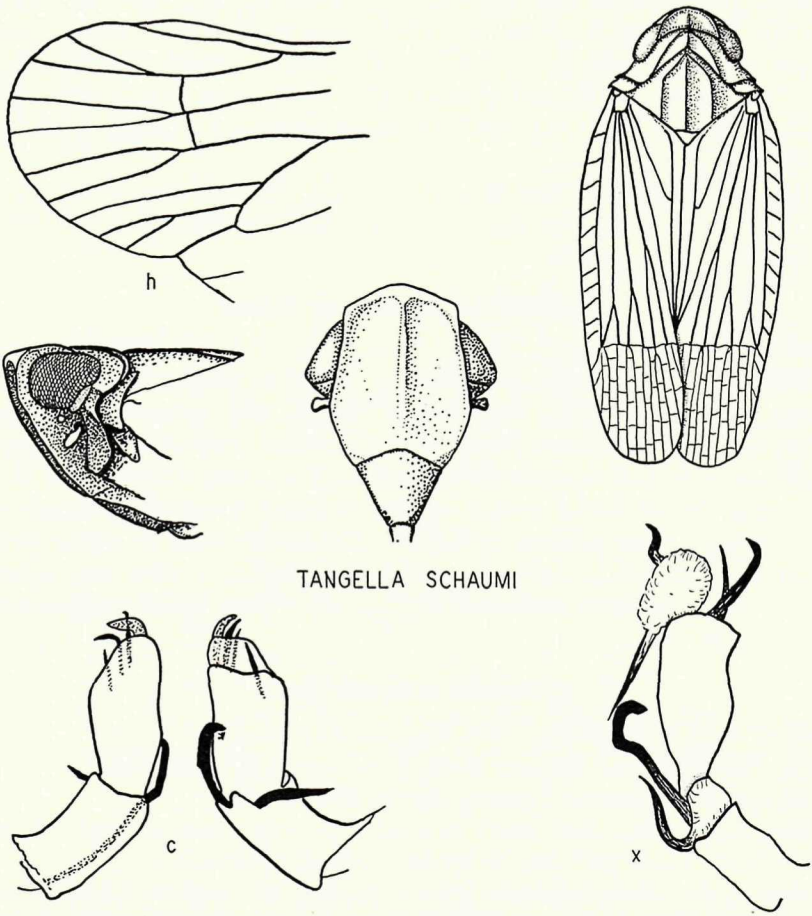


PLATE 37. c, aedeagus, lateral, x, aedeagus inflated, lateral, h, hind wing, left apex.

and adults breeding abundantly on the foliage of "uva de playa" *Coccolobis uvifera.*

Vieques Island: Collected Oct. 23, 1947, breeding on "alelaila", *Melia azedarach,* nymphs and adults abundant; on Airport Road, from weeds and bushes; at Playa Blanca, on East Beach from shrubs and weeds; Oct. 24, 1947, at Navy Base Hill, from shrubs and weeds. All Vieques records at low altitudes.

Caja de Muertos Island: Collected Dec. 5, and 11, 1947, from weeds and shrubs.

Evidently a species of the dry coastal areas, although it was collected once at the Maricao Insular Forest at high altitudes.

NEUROTMETA Guerin-Meneville

1856. Hist. Fisica Homopt. p. 180.

Vertex flat, produced, all margins carinate; median carina present with a tendency toward a posterior fork. This is more a deeply notched posterior margin with the posterior side of the head visible within the notch. The posterior carina of the pronotum joins the median carina and forms the same type of notch as is found in the vertex. Fore wing almost three times as long as broad; costal area almost a third as wide as costal cell but without cross veins; radius forking close to nodal line, media forking

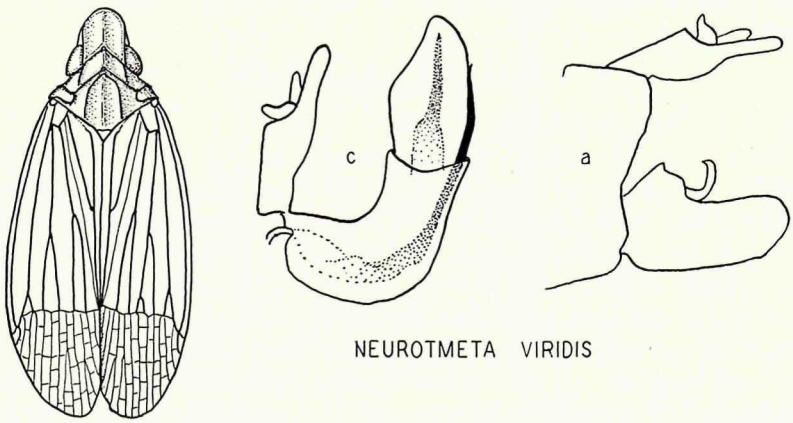


PLATE 38. a, genital capsule, c, anal segment & aedeagus, lateral.

at more than half the distance from nodal line to base, and cubitus (Cu^1) nearer the base than the nodal line. Nodal line transverse, straight crossing at apical third of wing, area posterior to line reticulate. Aedeagus in *sponsa* (genotype) and *viridis* with one heavily sclerotized apical process in addition to basal processes.

Neurotmeta viridis (Walker)

1851. *Monopsis viridis* Walker. List Homopt. Br. Mus. **2:** 325.
1935. *Tangia angustata* Osborn. Jour. N. Y. Acad. Sci. **14:** 205–206 (Part).

Length 7–8 mm. Green fading to yellow. Eyes and apices of spines on hind leg dark. (See Plate 38.)

Vertex flat, little broader than median length, lateral margins parallel; anterior margin convex; posterior margin concave, with a small but distinct median notch. Aedeagus with one apical and a pair basal processes, the right basal process shorter and broader than the left. (See Plate 38.)

Taken around the coastal area of Puerto Rico and adjacent islands, also on St. Thomas (type locality) and St. Croix, Virgin Islands.

RECORDS:

Puerto Rico: Ponce, Las Cucharas Beach, Sept. 11, 1947, by sweeping on "barbasco", *Canella Winterana*, from "yerba bellaca", *Croton humilis* and also breeding on *Suriana maritima*, "temporana", Guánica Insular Forest, Sept. 25, 1947; Ponce, Las Cucharas Beach, Dec. 4, 1947, on *Suriana;* Mayagüez, Dec. 4, 1947.

Vieques Island: Oct. 22, 1947; East Beach, Oct. 23, 1947, among weeds, grasses and shrubs.

Caja de Muertos Island: Dec. 5–11, 1947.

St. Thomas, Virgin Islands: Nov. 25–29, 1947, from weeds, bushes and grasses.

PARAHYDRIENA Muir

1924. Proc. Hawaii. Ent. Soc. **5:** 464.

Vertex narrow, deeply incised posteriorly, with a prominent median, vertical plate anteriorly; plate with anterior margin double and carinate to apex. Frons with a pair of longitudinal intermediate carinae as well as lateral carinae. Clypeus with a median and lateral carinae. Pronotum with a sharp median carina; lateral carinae curving around behind eyes; lateral extensions plate-like facing anteriorly. Mesonotum tricarinate, lateral carinae strongly convergent anteriorly. Fore wing narrow, elongate; costal membrane a narrow calloused area; cubitus forked before nodal line; one set of cross veins present posterior to line hence 6–7 preapical and 12–13 apical cells present. Media with a definite dip and enlarged area present at about half distance to nodal line. Aedeagus broad, greatly flattened laterally, heavily sclerotized; a pair of inflatable sacs present apically tipped with a small spur; a slender elongate process present for full length with a small flagellate medioventral process attached to it at midlength.

Parahydriena hyalina Muir

1924. *Parahydriena hyalina* Muir. Proc. Hawaii. Ent. Soc. **5:** 464–465.

Length, male 7 mm.; female 7.5 mm. General color yellow tinted with brown; facial carinae black tinted with red. Lateral extension of pronotum outlined with red, with a vertical dark stripe in center. Sides of clypeus, a spot on mesa- and metapleurites, postcoxa, abdominal sternites and tergites (except first two), apical rings on tibiae, patches on pro- and mesonotum fuscous. Cross veins black.

Cephalic plate as long as or slightly longer than high, not acute apically.

Aedeagus with medioventral process half as long as basal process. (See Plate 39.)

RECORDS:

Puerto Rico: Male allotype and paratypes from Cambalache Experimental Forest, Oct. 16, 1947, by sweeping bushes, shrubs and trees;

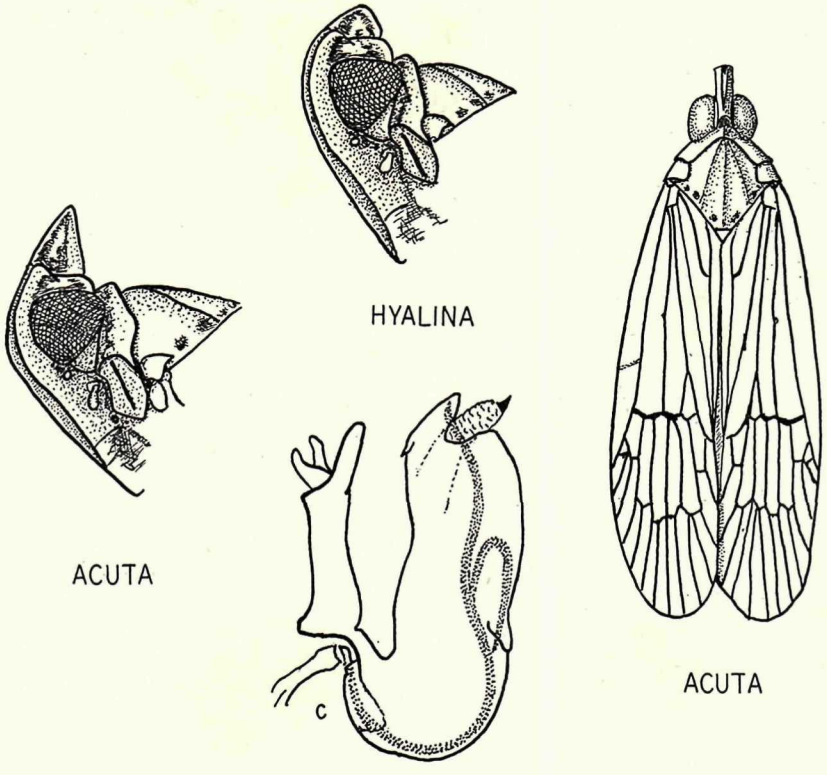


PLATE 39. *Parahydriena*, c, anal segment & aedeagus, lateral.

Cambalache Experimental Forest, Nov. 6–7, 1947, from shrubs; paratypes from Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping in the low forest mostly among melastomaceous shrubs; (Caldwell and Martorell.)

Parahydriena hyalina variety **acuta** n. var.

Color and structure as in typical form except for the more pronounced development of the cephalic process on the vertex. This plate is acute

apically and in vertical height at least slightly longer than half the vertical diameter of the compound eye. (See Plate 39.)

RECORDS:

Vieques Island: Male holotype and female allotype from Vieques, Oct. 24, 1947. (Caldwell and Martorell.)

Puerto Rico: Paratypes from Guánica Insular Forest and Cambalache Experimental Forest, Nov. 6, 1947. One female paratype from St. John, V. I., March, 1925, is in the American Museum N. H.

In Puerto Rico and the Virgin Islands the high headed variety is definitely a low land form and the typical form is from the higher elevations; however they both occur together in the Cambalache area where they are difficult to separate. If the two are biologically distinct I believe that crossing occurs in the Cambalache area. It is interesting to note that R. G. Fennah reports a high headed form from the Dominican Republic. (Psyche **45:** 172–173, 1945.)

ARENASELLA Schmidt

1932. Stett. Ent. Zeit. **93:** 39.

Vertex about as broad as long; anterior margin strongly convex; lateral margins parallel; surface concave, a strong median carina present. A polished curved area present between vertex and frons. Frons with a broad median carina. Pronotum about as long as vertex; disc triangular, with a prominent median carina and less prominent lateral carinae. Mesonotum tricarinate. Fore wing with narrow, calloused costal margin; Sc plus R and M not forked before nodal line. Cubitus (Cu^1) forking very close to nodal line; nodal line just anterior to center of wing; one set of cross veins posterior to nodal line forms six anteapical cells.

The one Puerto Rican representative differs from the genotype (*rubrovittata* Schmidt) in that the apex of the clavus is posterior to the nodal line.

Arenasella maldonadi n. sp.

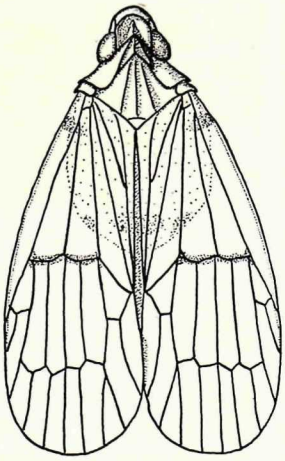
Length of female 5 mm. Milky-white with eyes, a spot on mesopleurites a spot on last entire abdominal sternite (almost concealed by abdomen), the nodal line between Sc plus R to Cu^1, and a faint prebasal costal dash black. Facial carinae yellowish to pink. Last two visible abdominal tergites with a red dash far laterad. (See Plate 40.)

Fore wing approximately three times as long as broad, broadly rounded apically; Cu^1 in left fore wing not branched before nodal line. Ovipositor with eight dorsal teeth on third valvulae.

RECORD:

Puerto Rico: Female holotype and paratype from El Yunque Mts., at light. (J. Maldonado Capriles.)

I take great pleasure in naming this unique species in honor of Sr. J. Maldonado Capriles whose excellent collecting has advanced our knowledge of the Puerto Rican fauna.



ARENASELLA MALDONADI
PLATE 40.

Family FLATIDAE

Head narrower than pronotum, mesonotum large. Fore wing with cross veined costal area (true precostal area); clavus heavily granulate. Second metatarsus with an apical spine on either side. Ovipositor incomplete. Aedeagus usually elongate, tubular, with few processes.

Subsequent division into lower categories and especially genera is unnatural and confused; the same species have often been placed in different genera at the same time. Specific characters are almost confined to those of the male genitalia which make chrotic descriptions and drawings almost superficial.

KEY TO GENERA OF FLATIDAE

1. Fore wing acutely pointed apically ..... **Cyarda**
   Fore wing rounded or truncate apically 2
2. Fore wing steeply tectiform; apical margins meeting in a vertical line 3
   Fore wing at most slightly tectiform; apical margins divergent from dorsal apex .. 5

3. Face subconical. Fore wing with one subapical line.....**Puertormenis**
   Face flat. Fore wing with two subapical lines.....4
4. Frons as broad as long; metatibia always unispinose.....**Petrusa**
   Frons much broader than long; metatibia sometimes bispinose....**Flatormenis**
5. (2) Vertex extremely short and broad (5:1); frons not visible from above..
   Melormenis
   Vertex longer (3:1); frons visible from above.....6
6. Vertex longer than broad; costal margins sinuate.....**Pseudoflatoides**
   Vertex broader than long; costal margins regularly curved.....**Flatoidinus**

PETRUSA Stål

1866. Hemipt. Africana **4:** 237.

Frons approximately as broad as long; with a median carina in basal three-fourths. Clypeus ecarinate. Fore wing slightly broadened toward apex; little over twice as long as broad; costal area as broad as costal cell; nodal line distinct, groove-like, paralleling apical margin, with cross veins anterior to groove; preapical line even, distinct. Metatibia unispinose. Anal segment of male enlarged and deflected apically. Dorsoposterior angle of pygofer slightly produced. Aedeagus with two pair apical processes and a pair of lateral processes usually pivotal near their base or with ventral extremity projected beyond point of attachment.

Petrusina Melichar has been synonomized with *Petrusa* Stål by R. G. Fennah. The former genus was erected to contain *pygmaea* F. which is a light form of *marginata* Brunnich. Kirkaldy (Canad. Ent. 41: 32, 1909) proposed *insulicola* as a new name for *pygmaea* F. but I am unable to find his reason for this action. While there are other species that fit the description of either variation of *marginata*, these other species seem to be confined to Puerto Rico and are very uncommon along the coast. *Marginata* has been recorded from Montserrat, B. W. I. to Mona Is., P.R., and is much more apt to have been the form described by both Brunnich and Fabricius.

KEY TO SPECIES OF PETRUSA

1. Aedeagus with lateral process broad in dorsal portion; dorsal apex single to trifid, curved anteriorly; ventral portion stylate, projected anteriorly....*marginata*
   Aedeagus with lateral process more slender; dorsal and ventral apices directed different direction, or both directed posteriorly, or without a ventral projection.2
2. Lateral process without apparent ventral projection; dorsal portion curved anteriorly following the apical processes.....*decepta*
   Lateral process with a ventral portion; dorsal portion projected posteriorly....3
3. Lateral process somewhat S-shaped.....4
   Lateral process C-shaped; ventral portion often minute.....*torus*
4. Lateral process with dorsal portion broad; with subapex.....*roguensis*
   Lateral process slender throughout; apices simple.....*pivota*

Petrusa marginata (Brunnich)

1767. *Cicada marginata* Brunnich in Linne Syst. Nat. **1:** 710.
1794. *Cicada pygmaea* Fabricius. Ent. Syst. **4:** 30
1909. *Ormenis insulicola* Kirkaldy. Canadian Ent. **41:** 32 (N. n. for *pygmaea* F.)

Length 5.5–6.2 mm. General color greenish yellow with head and apical margins of fore wing golden. Eyes black. This merges into a dark form with center of notum fuscous, and orange laterally; fore wing fuscous with costal area black and costal cell white. Except for all forms of intergrades *pygmaea* could be a color variety of *marginata.* (See Plate 41.)

Male anal segment with an acute ventral preapical projection on either margin. Aedeagus with lateral processes very broad in apical portion; apex acute, single to trifid; ventral portion short, stylate. (See Plate 41.)

Reported from Montserrat, B. W. I., to Mona Is., P. R. Very common along coastal areas and also present in suitable habitat up to 2500 ft., especially along the south coast of Puerto Rico.

RECORDS:

Puerto Rico: Aibonito, Sept. 11, 1947, from unidentified bushes; Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from shrubs, weeds along roadsides and under coffee plants; Cayey, Peñón del Collao, altitude 2000–2500 ft., Sept. 13, 1947, from weeds and bushes; El Pastillo, Sept. 27, 1947, from "barilla", *Batis maritima* and "yerba de mariposa", *Lippia nodiflora;* Cayey-Guayama Road, Km. 20.6, Sept. 27, 1947; Barceloneta Beach-Arecibo Road, Km. 11.4, Oct. 16, 1947, at sand dunes among bushes and weeds; Arecibo-Camuy Road, Km. 84.4, Oct. 16, 1947, on dunes along coast, mostly beating from "hicacao", *Chrysobalanus icaco,* "alelaila", *Melia azedarach* and "palo de vaca", *Bourreria succulenta;* Cambalache Experimental Forest, Oct. 16 and Nov. 6–7, 1947, beating weeds and bushes; Río Piedras-Loiza Road, Nov. 21, 1947, beating bushes, weeds and grasses; Maunabo Beach, Nov. 21, 1947, by sweeping grasses and weeds; Mayagüez, Dec. 4, 1947; Quebradillas, Dec. 5, 1947.

Vieques Island: Oct. 22, 1947; Northwest, near Playa Grande, Oct. 23, 1947, from weeds, grasses and bushes; Pto. Negro, Oct. 23, 1947, by beating large stands of *Volkameria aculeata;* East Beach, Oct. 23, 1947, among weeds, grasses and shrubs; Navy Base Hill and Hill East center, Oct. 24, 1947, from grasses, bushes and weeds.

Caja de Muertos Island: Dec. 5–11, 1947.

St. Thomas, Virgin Islands: Nov. 25, 1947, from bushes, grasses and weeds.

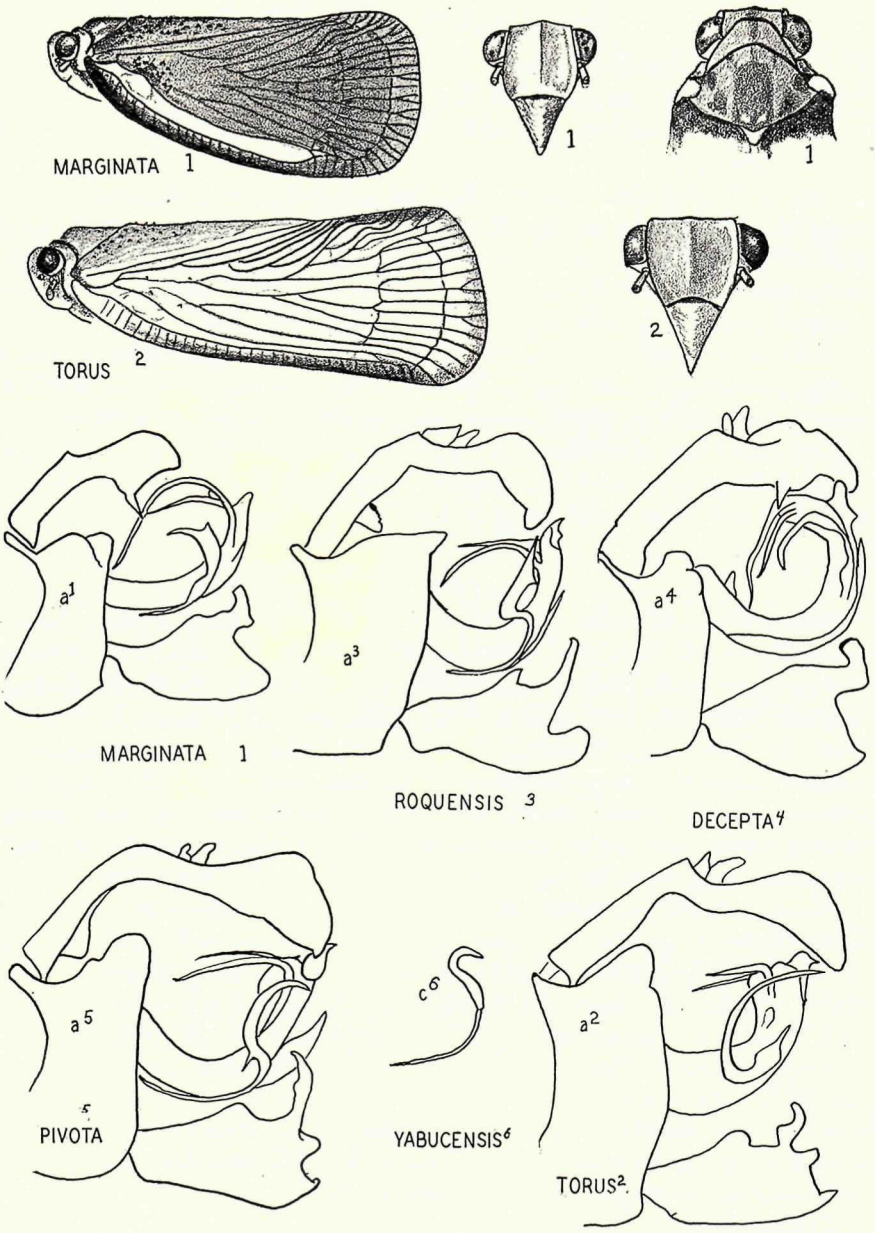


PLATE 41. *Petrusa*, a, genital capsule, c, lateral aedeagal process.

Petrusa decepta n. sp.

Length, male 5.9 mm.; female 7 mm. Fuscous with head and lateral portion of pro- and mesonotum yellowish. Fore wing with costal cell white. This species also grades into a yellowish-green form.

Slightly larger and more robust than the average *marginata*. Male anal segment with similar preapical ventral projections. Aedeagus with lateral process without an apparent ventral portion; dorsal portion curved anteriorly following the apical processes.

The usually larger size helps to differentiate this species from *marginata* and the lateral processes without apparent ventral portions separates *decepta* from any other species. (See Plate 41.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from Aibonito, Dec. 30, 1947. (Caldwell and Martorell.) Paratypes from Aibonito, Barranquitas, Caguas, Cayey, Coamo Springs, Comerio, El Yunque Mts., Maricao, Río Piedras and San Juan.

The records would indicate that *decepta* is primarily a median altitude form occurring in the central elevations but it does occur in some locations along the coast.

Petrusa pivota n. sp.

Length, male 6 mm.; female 7 mm. Generally whitish with green face, black eyes, and greenish-yellow notum. Costal area often light fuscous; apex of fore wing often smoky.

Male anal segment with median basal projection; bent at mid-length at about 45°. Dorsoposterior angle of pygofer produced dorsally. Style with apex deeply notched in lateral aspect. Aedeagus with lateral process S-shaped, with a small additional spur present anteriorly near pivot. (See Plate 41.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from Orocovis, Sept. 11, 1947, 2200 ft. altitude. (Caldwell and Martorell.) Paratypes from Adjuntas, Aibonito, Aguas Buenas, Arecibo, Barranquitas, Cayey, Ciales, Carite Mountains, Jayuya, Luquillo Mountains, Maricao, Mayagüez, Peñón del Collao and Ponce.

Petrusa pivota subsp. **yabucensis** n. subsp.

Resembling the typical form but the fore wings lack the smoky margins. Lateral process of aedeagus with dorsal portion the shape of a backward

English question mark; subspur present near pivot; ventral portion extremely slender, delicate. (See Plate 41.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from Yabucoa, altitude 700 ft., Nov. 21, 1947, breeding on "ortiga", *Urera baccifera*. nymphs and adults abundant. (Caldwell and Martorell.)

Petrusa roquensis n. sp.

Length, male and female 7 mm. Face greenish. Eyes black. Antennae and tegulae orange. Notum fuscous, orangish-yellow laterally. Fore wing fuscous, often slightly whitish along claval suture and in base of costal cell.

Fore wing almost two and a half times as long as broad. Male anal segment twice deflexed at about 60°, with median prebasal process. Dorsoposterior angle of pygofer produced posteriorly. Style with apex entire in lateral aspect. Lateral process of aedeagus with dorsal portion much broader than ventral; apex diagonally bifid. (See Plate 41.)

I take great pleasure in naming this species in honor of Mr. Arturo Roque, Director of the Agricultural Experiment Station of the University of Puerto Rico, at Río Piedras.

RECORD:

Puerto Rico: Male holotype, female allotype, and paratypes from Río Piedras, at low altitude, Aug. 24, 1947. (Caldwell and Martorell.) Male paratypes from Aguas Buenas, altitude 1300 ft., and from Ponce.

More elongate and darker than other related forms. This may be the same species recorded as *Ormenis pruinosa* Say by Wolcott (1936).

Petrusa torus n. sp.

Length, male 7 mm.; female 7.5 mm. Face and pronotum greenish. Eyes black. Antennae and tegulae orange. Fore wing light bluish-green (aqua color) margined with gray and almost fuscous in costal area. This grades into lighter forms almost unmarked and into darker forms very heavily marked. (See Plate 41.)

Fore wing little if any narrowed apically. Male anal segment deflexed at midlength at about 60°. Dorsoposterior angle of pygofer produced dorsally. Style with deeply notched apex in lateral aspect. Lateral process of aedeagus C-shaped; ventral portion often very much reduced. (See Plate 41.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from the Toro Negro Mts., La Maravilla, altitude from 2800–3500 ft., Nov. 14, 1947, from weeds and low shrubs. (Caldwell and Martorell.) Paratypes from Adjuntas, Luquillo Mts., Maricao, Mayagüez and mountains north of Ponce. Paratypes from the Luquillo Mts. are slightly different and may represent a subspecies.

FLATORMENIS Melichar

1923. Genera Ins. **182:** 71.

Vertex very flat. Frons much broader than long, median carina present for basal four-fifths; lateral margins thin, slightly elevated. Clypeus ecarinate. Fore wing broadest subapically; costal area more narrow than costal cell; two preapical lines present paralleling the apical margin, posterior preapical line nearer apical margin than to anterior line. Metatibia unispinose or bispinose (sometime both on same specimen). Anal segment of male with apex narrowed and sharply notched apically. Dorsal projection of style broad apically, usually with outer angles produced. Aedeagus with one pair long, subapical processes which are usually forked, often a short pair of dorsal preapical processes are present.

KEY TO SPECIES OF FLATORMENIS

1. Aedeagus with a pair of short dorsoapical processes in addition to subapical processes; metatibia bispinose ..... *nefuscata*
   Aedeagus with subapical processes only; metatibia unispinose 2
2. Aedeagus with both subapical processes simple, stylate ..... *stylata*
   Aedeagus with either or both subapical processes forked or with subprocesses 3
3. Anal segment of male with ventral margins evenly arcuate ..... *pseudomarginata*
   Anal segment of male with ventral margins strongly undulate ..... *duplicata*

Flatormenis nefuscata n. sp.

1923. *Ormenis infuscata* Wolcott. Jour. Dept. Agr. P.R. **7:** 271. (Not *infuscata* Stål.)

Length, male 6 mm.; female 6.8 mm. Face grayish-yellow. Eyes orange. Pronotum yellowish-gray. Mesonotum reddish-brown. Fore wing fuscous with costal area white. (See Plate 42.)

Fore wing over twice as long as broad. Metatibia bispinose. Male anal segment angled at basal fourth, enlarged apically. Aedeagus with one pair of short, curved, dorsopreapical processes; subapical process with two subspurs before apex. (See Plate 42.)

RECORDS:

Puerto Rico: Male holotype and female allotype from Ponce, Las Cucharas Beach, from "barbasco", *Canella Winterana.* (Caldwell and Martorell.) Paratypes from Quebradillas, Dec. 6, 1947; Aibonito and Caguas (specimens at the American Museum of Natural History).

St. Thomas, Virgin Islands: Nov. 28–29, 1947, from weeds and grasses.

Flatormenis nefuscata subspecies **amplata** n. subsp.

Length of male 5.7 mm. Head yellow. Notum and fore wing fuscous except for white costal area. (See Plate 42.)

Fore wing less than twice as long as broad (9.5:5). Metatibia bispinose. Male anal segment much more produced and more acute apically than in typical form. Subapical process of aedeagus with one subspur before anex. (See Plate 42.)

RECORDS:

Puerto Rico: Male holotype from Tallaboa, Sept. 9, 1947, (Caldwell and Martorell.) The short fore wing and the distinctive genitalia readily sets this subspecies apart from the typical form.

Flatormenis stylata n. sp.

Length of male and female 6.5 mm. Face yellowish to smoky. Eyes orange. Fore wing fuscous except for white costal area.

Fore wing about two and a half times as long as broad. Metatibia unispinose. Male anal segment deeply hood-like throughout, deeply slit apically. Aedeagus with one pair of subapical, simple processes. (See Plate 42.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes from Aguas Buenas, altitude 1300 ft., Sept. 14, 1947, by sweeping on the low forest mostly among melastomaceous shrubs. (Caldwell and Martorell.)

Flatormenis duplicata n. sp.

Length, male 5.5 mm.; female 6 mm. Face brownish. Eyes orange. Notum and fore wing fuscous except for white outer portion of costal area.

Fore wing little over twice as long as broad. Metatibia unispinose. Male anal segment with ventral margin broadly sinuate. Style with dorsal projection apical. Aedeagus with subapical processes very unequally developed; the right process much longer than the left and often without a subspur; left with a subspur at midlength. (See Plate 42.)

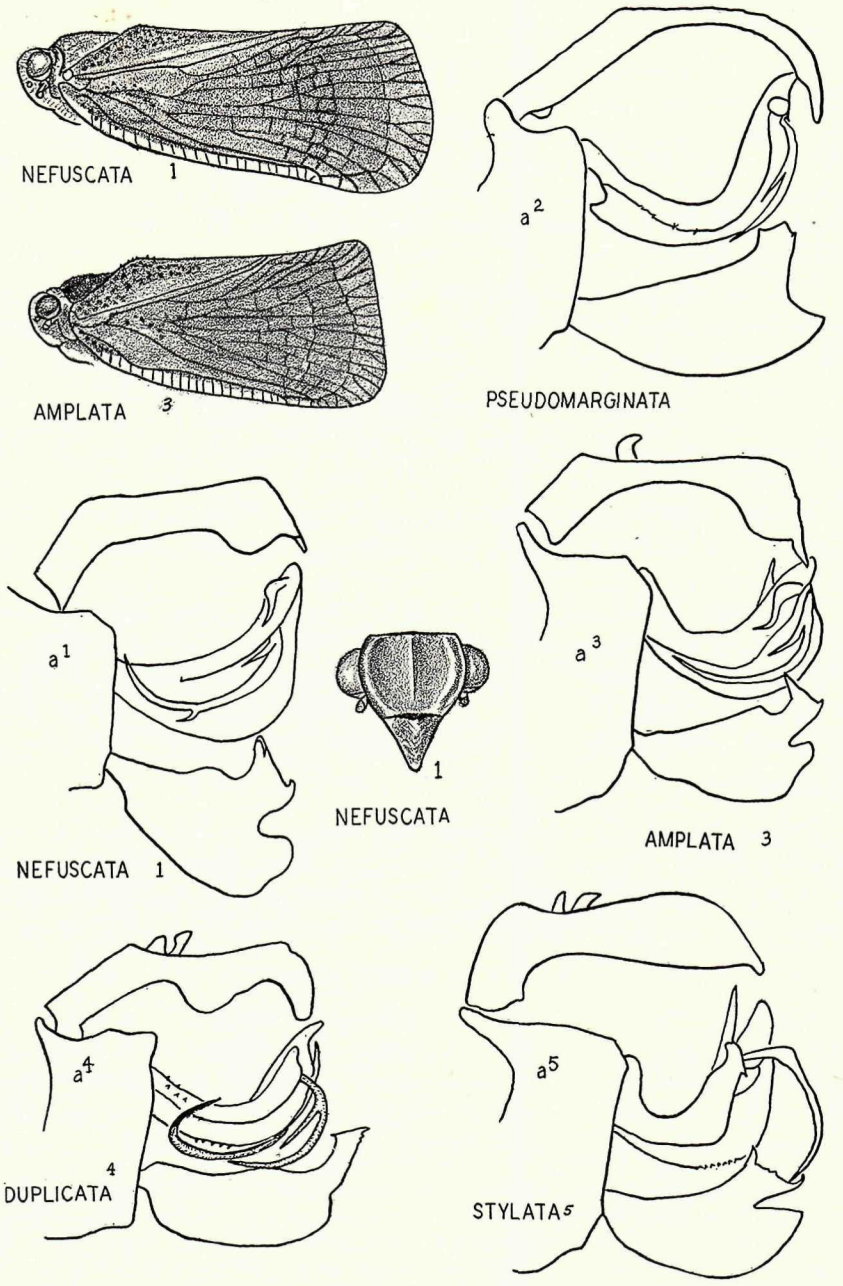


PLATE 42. *Flatormenis*, a, genital capsule, lateral.

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from Maricao Insular Forest, altitude 2300 ft., Nov. 13, 1947, from "cabrilla", *Trema Lamarkiana.* Paratypes from Alto de la Bandera, on the Ponce-Jayuya Road to La Carmelita, Sept. 25, 1947, from *Inga* spp.; Cayey, Peñón del Collao, altitude 1900 ft., Aug. 28, 1947; on the same locality, Dec. 4, 1947, from "guaba", *Inga vera.* Others from: Aibonito, El Yunque Mts. and Adjuntas.

This species is the most common dark form in Puerto Rico and has been identified as *pseudomarginata* or *infuscata.* The undulating anal segment of the male readily identifies this species.

Flatormenis pseudomarginata (Muir)

1924. *Ormenis pseudomarginata* Muir. Proc. Hawaiian Ent. Soc. **5:** 469–471.

Length, male 6 mm.; female 6.5 mm. Face fuscous to brown. Eyes orange. Notum and fore wing fuscous except for outer portion of costal area.

Fore wing almost two and a half times as long as broad. Metatibia unispinose. Male anal segment elongate, narrow, evenly arcuate in lateral aspect. Style with dorsal projection preapical. Aedeagus with subapical processes unequally developed but much less so than in *duplicata;* processes bifid, the left more nearly equally bifid than the right. (See Plate 42.)

RECORDS:

Puerto Rico: Rather uncommon. Our material was taken in the Carite Insular Forest, Oct. 2, 1947; Toro Negro Mts., Doña Juana, altitude 2600 ft., Oct. 9, 1947, from "higuillo", *Piper aduncum* and melastomaceous shrubs; and Luquillo Mts., over 2500 ft. high, from weeds and bushes.

PUERTORMENIS n. gen.[4]

Vertex represented by separated triangular areas next to either eye. Frons meeting anterior margin of pronotum in central third; basal two-fifths transversely concave and produced anteriorly, subconically; apical three-fifths slightly convex and receding; lateral margins thin, almost foliaceous. Clypeus ecarinate. Pronotum produced cephalad to anterior

[4] I am not familiar with *Parthenormenis* Fennah which is based on a single female specimen and it is possible that with sufficient material *Puertormenis* may prove to be a synonym; however *Puertormenis* has a definite vertex area next to either eye separated from the frons by a carina and the frons is conically produced. The fore and hind wing are similar to those of *Parthenormenis* but the wings of *Flatormenis* are also similar so I can draw no generic conclusion from the shape and venation of the wings.

margins of eyes, almost truncate anteriorly. Fore wing little more than twice as long as broad, broadest subapically; apex truncate with angles rounded; costal cell slightly broader than costal area; costa broadly undulating; one definite preapical line present paralleling apical margin; nodal line represented by an irregular cessation of reticulate venation. Metatibia bispinose. Male anal segment relatively short, broad. Dorsoposterior angle

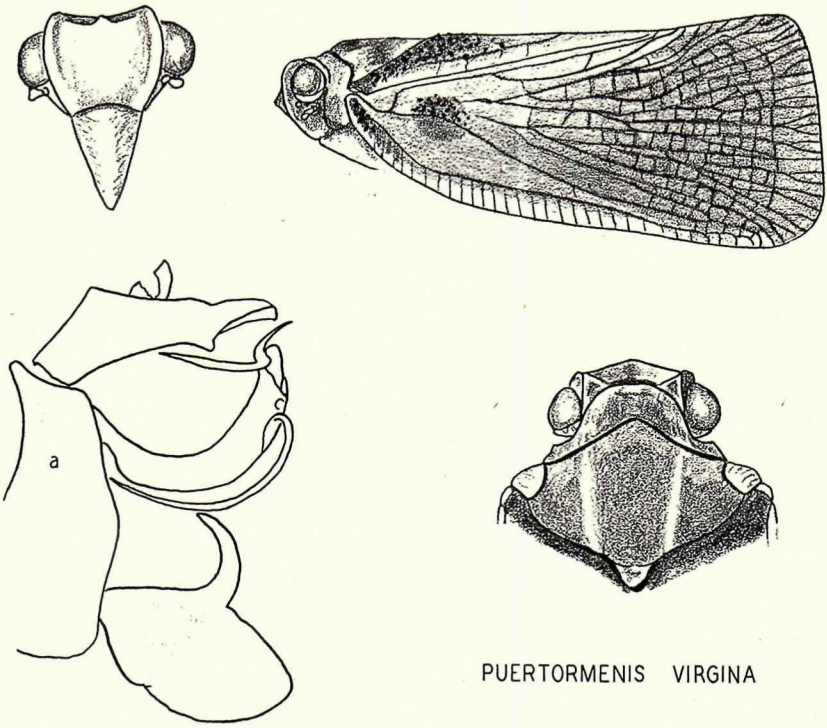


PLATE 43. a, genital capsule, lateral.

of pygofer rounded. Style with dorsal projection median. Aedeagus with one pair apical processes and one pair subapical.

Puertormenis virgina n. sp.: genotype of **Puertormenis**

Length, male 7 mm.; female 8 mm. General color fuscous. Face light. Fore wing grayish along claval suture, with principle veins fuscous; costal area whitish. Mesonotum orange-fuscous. Legs orangish. (See Plate 43.)

Robust in form. Anal segment of male narrowed from ventral margin in apical fourth. Apical process of aedeagus widely bifid with anterior fork elongate, straight; posterior fork short, curved posteriorly; subapical process simple. (See Plate 43.)

RECORDS:

Puerto Rico: Male holotype, Cayey, at Cayey-Guayama Road, Km. 20.6, at middle elevations, Sept. 27, 1947. (Caldwell and Martorell.) Female allotype and two male paratypes from Aibonito, July, 14, 1914, (A. M. N. H.).

St. Thomas, Virgin Islands: One male paratype from St. Thomas, Nov. 28, 1947. (E. Z. and J. S. Caldwell.)

MELORMENIS Metcalf

1938. Bull. Mus. Comp. Zool. Harvard. **82:** 395.

Vertex approximately five times as broad as long. Frons strongly receding, very little if any longer than broad, very slightly broadened before clypeus; basal center tending to be concave; median carina present in basal two-thirds. Pronotum projected to or beyond anterior margin of eyes. Fore wing broader near base than apically; costal margin strongly curved basally; apical margin broadly rounded; one preapical line present paralleling apical margin; nodal line represented by a dip in the surface with an irregular line of cross veins anterior and often posterior to the line; subcosta strongly and abruptly dipped into costal area at nodal line. Metatibia bispinose. Male anal segment usually with prebasal projections. Style with dorsal projection apical. Aedeagus with one pair of subapical processes, if these are simple then an additional pair of lateral processes are present.

The genotype, *Ormenis antillarum* Kirkaldy, is the least modified, hence the most generalized species in the genus.

The recognition of *Melormenis* Metcalf depends upon the specific identity of *Cicada quadripunctata* F. which has been designated orthotype by Dr. Metcalf. The types locality has been given as St. Barthélemy Island laying over 70 miles from the closest Virgin Island. I have never seen any material from the type locality so I have based my interpretation of *antillarum* Kirkaldy = (*quadripunctata* Fabricius) upon the determinations of Prof. Ramos who studied under Dr. Metcalf.

Antillarum Kirk. is not congeneric with *pruinosa* Say[5], *regularis* Fowler, and other undescribed Central American species. The greatly expanded costal area (true precostal area) and the tendency of the fore wing to be gradually tectiform would place *antillarum* near the Flatoidinae. This is not as apparent in the genotype as in other related forms. As I interpretate *Melormenis* it is confined to the Antilles centering around the Virgin Islands.

[5] Metcalfa new genus. Type: *Flata pruinosa* Say. Vertex short, transverse. Frons longer than broad, rather flat. Fore wing broadest subapically; apex truncate; costal cell broader than costal area; the subapical line present with most veins forked beyond. Metatibia bispinose. I dedicate this genus to Dr. Zeno P. Metcalf who had done monumental work with the fulgoroids.

KEY TO SPECIES OF MELORMENIS

1. Aedeagus with lateral processes in addition to subapical processes.....2
   Aedeagus with subapical processes only.....3
2. Lateral process of aedeagus simple.....*antillarum*
   Lateral process of aedeagus strongly bifid.....*dipuncta*
3. Subapical process of aedeagus with one basal subprocess.....*basalis*
   Subapical process of aedeagus with two subprocesses.....4
4. Male anal segment with prebasal projection on left ventral margin.....*magna*
   Male anal segment with or without prebasal projection on both ventral margins..5
5. Male anal segment without a ventral projection.....*roscida*
   Male anal segment with a prebasal projection.....*zyxa*

Melormenis antillarum (Kirkaldy)

1794. *Cicada quadripunctata* Fabricius Ent. Syst. **4:** 30.
1909. *Ormenis antillarum* Kirkaldy. Canadian Ent. **41:** 32. (N.n. for *quadripunctata* F.)

Length 6–7.3 mm. Face testaceous. Notum brown to red-brown. Fore wing greenish-testaceous, usually becoming fuscous apically; with two prominent black splots, one in center of claval area and another larger spot just outside clavus slightly more basal; often a small dark clouded area present along subcosta. (See Plate 44.)

Fore wing broadest at basal third, very slightly narrowed to rounded apical margin. Male anal segment angulate in lateral aspect. Lateral process of aedeagus plate-like, narrowed and roughened apically. (See Plate 45.)

Primarily a coastal species in Puerto Rico and its possessions and in the Virgin Islands but occasionally found inland at moderate elevations.

RECORDS:

Puerto Rico: Río Piedras (In front of San José Central, along the railroad line up to the Cemetery, Aug. 17, 1947, by sweeping on grasses; Mayagüez (Institute Trop. Agric.), Aug. 29, 1947, on the underbrush of "papaya" plantation; Barranquitas, Barranquitas-Aibonito Road, Km. 8.4, Barrio Helechal, altitude 1900 ft., Sept. 11, 1947, from weeds and shrubs (*Solanum*, *Rubus*, *Ipomoea* and *Casearia*); Cayey-Aibonito Road, Km. 74.4, altitude 1600 ft., Sept. 11, 1947, by sweeping along roadsides especially on "higuillo", *Piper amalago* and other bushes; Orocovis River bed, altitude 1900 ft., Sept. 11, 1947, among weeds and grasses; Orocovis Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, from *Piper aduncum*; Maricao Insular Forest, altitude 2000 ft., Sept. 12, 1947, from weeds and bushes; Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Maricao Insular Forest, Oct. 10, 1947; Barceloneta Beach-Arecibo Road, Km. 11.4, Oct. 16, 1947, at sand dunes among weeds and bushes; Arecibo-Camuy

Road, Km. 84.4, Oct. 16, 1947, on sand dunes along coast mostly beating on "hicaco", *Chrysobalanus icaco*, "alelaila", *Melia azedarach* and "palo de vaca", *Bourreria succulenta*; Camabalache Experimental Forest, Oct. 16, 1947, by sweeping trees, bushes and shrubs; Río Piedras-Loiza Road, Nov. 21, 1947, by beating bushes, weeds and grasses; Maricao Insular Forest,

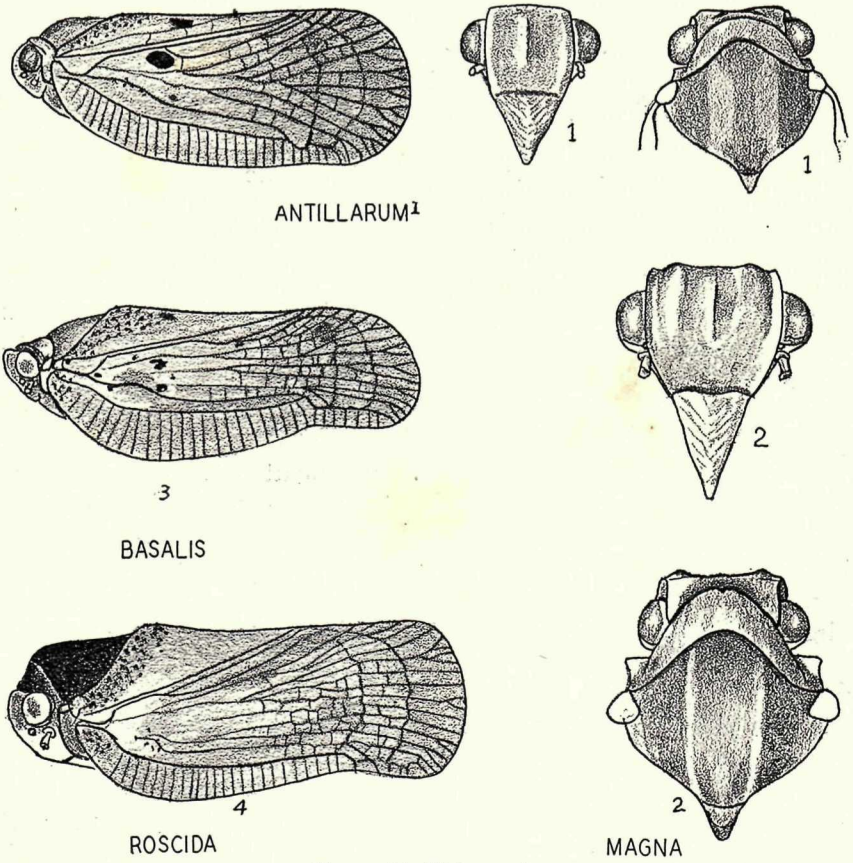


PLATE 44. *Melormenis*

Maricao-Sabana Grande Road, Km. 10.8, altitude 2300 ft., Nov. 13, 1947, by beating *Trema Lamarkiana* or "cabrilla"; Toro Negro Mts., La Maravilla Camp., altitude 3200 ft., Nov. 14, 1947, by beating bushes and weeds; Salinas Beach (Sta. Isabel-Salinas Road-near Rio Jueyes), Nov. 21, 1947, from "botón de oro", *Volkameria aculeata*; Maunabo Beach, Nov. 21, 1947, by sweeping grasses and weeds; Maunabo-Yabucoa Road, altitude 700–900 ft., Nov. 21, 1947, by sweeping grasses, weeds and ferns; Aibonito, Dec. 30, 1947.

Vieques Island: Oct. 22–23, 1947, from *Indigofera*; Airport Road about 2 kilometers from Isabel II, Oct. 23, 1947, from bushes and grasses at pasture on hill; Navy Base Hill and Hill East center, Oct. 24, 1947, from weeds, grasses and bushes.

Caja de Muertos Island: Dec. 5–11, 1947.

St. Thomas, Virgin Islands: Nov. 25, 1947, from weeds, grasses and bushes.

Melormenis dipuncta n. sp.

Length, male 6 mm.; female 6.5 mm. Resembling *antillarum* in color but each fore wing has only one prominent black spot basally between the claval suture and bulla.

Fore wing broadest in basal fourth and more noticeably narrowed apically than in *antillarum*. Male anal segment elongate, evenly arcuate in lateral aspect. Lateral process of aedeagus deeply bifid apically; anterior arm twice as long and more acute than posterior. (See Plate 45.)

RECORD:

Caja de Muertos Island: Male holotype, female allotype, and paratypes from this locality, Dec. 11, 1947. (Caldwell and Martorell.)

Melormenis roscida n. sp.

1935. *Ormenis roscida* Osborn. N. Y. Acad. Sci. **14:** 223. (Not *roscida* Germar.)

Length of male 8 mm. Head and notum dark. Fore wing brownish-fuscous with median central area greenish. (See Plate 44.)

Pronotum and anterior portion of mesonotum strongly descending. Fore wing broadest slightly anterior to basal third, gradually narrowed from costal margin to nodal line thence slightly widened before rounded apex. Male anal segment broadest basally, tapered apically in lateral aspect. Style with apex strongly curved inward and dorsally. Subapical process of aedeagus with two subspurs or trifid. The holotype has one minute preapical spur on the metatibia but this is probably due to maldevelopment because the paratype has the normal two. (See Plate 45.)

RECORD:

Puerto Rico: Male holotype in the American Museum of Natural History from Aibonito, July 14, 1914, labeled "*Ormenis roscida* Germ." by Osborn. Paratype with same data (A.M.N.H.) retained by Caldwell. This form is not related to the South American *roscida* Germar.

Melormenis basalis n. sp.

Length, male 6 mm.; female 6.5 mm. Vertex with dark spot apically next to either eye. Face and notum brownish. Fore wing greenish-testaceous centrally; costal and apical areas usually fuscous to brownish; a small black spot present in clavus, three to four present around bulla, and a larger spot subapically near inner angle. (See Plate 44.)

Margin of vertex and frons next to either eye slightly calloused. Fore wing broadest at basal fourth; noticeably narrowed from this point on costa to nodal line. Male anal segment swollen basally. Subapical process of aedeagus with large basal spur. (See Plate 45.)

Apparently occurring at elevations where coffee would normally be grown in Puerto Rico.

RECORDS:

Puerto Rico: Male holotype, female allotype from Barranquitas, Barrio Helechal, Km. 8.4; on the Aibonito Road, altitude 1900 ft., Sept. 11, 1947, from *Solanum*, *Rubus*, *Ipomoea* and *Casearia*. (Caldwell and Martorell.) Paratypes from Aibonito-Cayey Road, Km. 74.4, altitude 1600 ft., Sept. 11, 1947, by sweeping along the roadside particularly on "higuillo oloroso", *Piper amalago*; Ponce-Adjuntas Road, Km. 10.6, altitude 500 ft., Sept. 12, 1947, from *Piper amalago;* Cayey, Peñón del Collao, altitude 2200 ft., Sept. 13, 1947, by sweeping on weeds and grasses at a coffee grove; Aguas Buenas (E. Castros's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping on the low forest mostly on melastomaceous shrubs; Toro Negro Mts., Mts., Doña Juana, altitude 2600 ft., Oct. 9, 1947.

Melormenis zyxa n. sp.

Length, male 6.3 mm.; female 7 mm. Generally fuscous. Lighter individuals are marked similar to *basalis* but not as light.

Margin of vertex and frons next to either eye slightly calloused. Fore wing broadest at basal fourth, narrowed to nodal line along costa thence slightly expanded before rounded apex; bulla extremely prominent. Male anal segment with a strong prebasal ventral projection. Aedeagus elongate, subapical process trifid. (See Plate 45.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes from El Yunque Mts., Dec. 12, 1947. (Caldwell and Martorell.)

Occurring above 3000 ft. on mountains ferns.

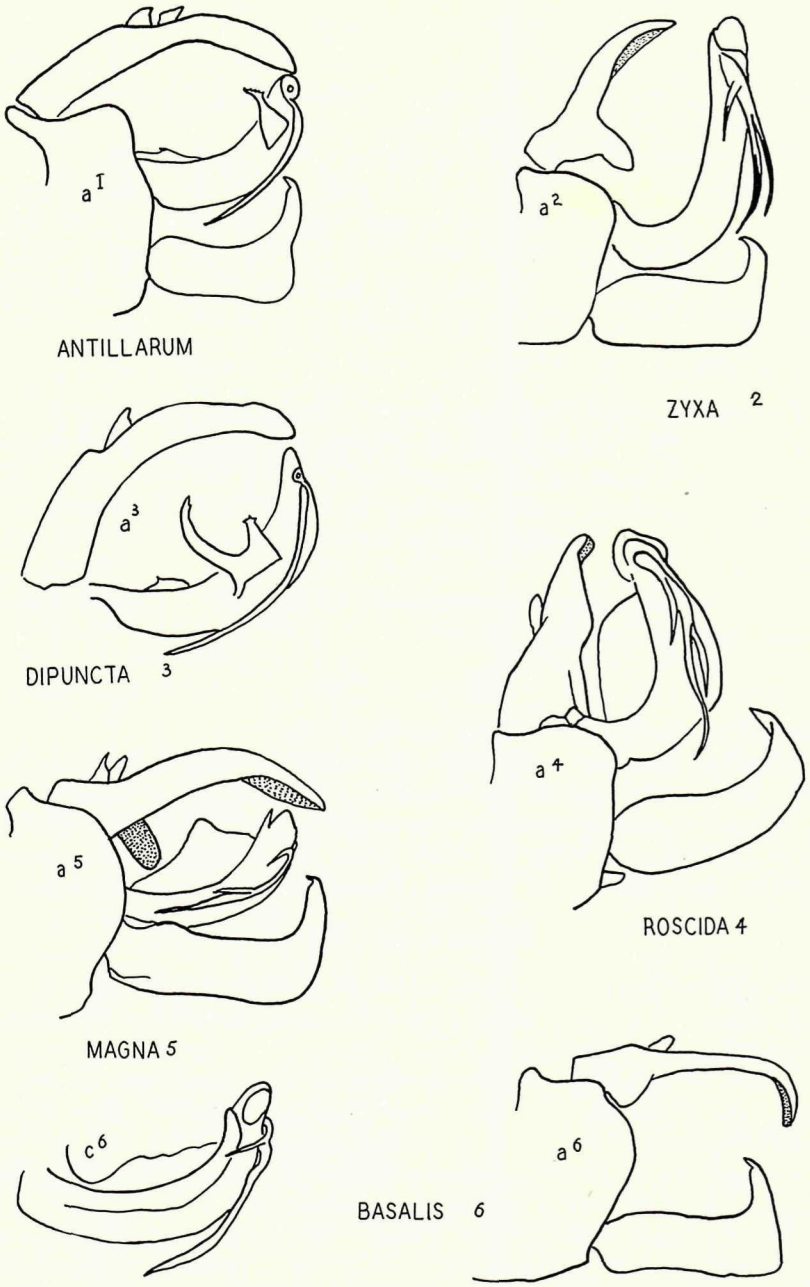


PLATE 45. *Melormenis*, a, genital capsule, c, aedeagus, lateral.

Melormenis magna n. sp.

Length, male 8–9 mm.; female 8–10 mm. Coloring variable: testaceous, greenish, or fuscous. Fore wing always darkest apically, with a large dense, black spot near the inner apical angle.

Head with callousities next to either eye. Fore wing broadest near basal fifth, slightly narrowed from there to nodal line thence slightly expanded before rounded apex. Male anal segment with prebasal projection on right ventral margin; if left ventral projection is present it is basal and usually hidden by the pygofer. Aedeagus with prominent dorsal membrane; subspical process trifid. (See Plates 44 & 45.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from the Toro Negro Mts., La Maravilla, at altitude above 3000 ft., Nov. 14, 1948. (Caldwell and Martorell.) Paratypes from the Carite Mts., Oct. 2, 1947; Ciales-Jayuya Road near Casablanca, Sept. 25, 1947; El Yunque Mts., Dec. 12, 1947; and Maricao Insular Forest, Oct. 10, 1947. All records at high altitudes.

This species is easily distinguished by its large size without recourse to characters of the genitalia.

CYARDA Walker

1858. List. Hompts. British M. Supple. **1:** 121.

Elongate forms with the fore wing greatly narrowed from the basal third of the costal area into an elongate, acute, posterior projection. Vertex quadrate, slightly transversely concave. Frons relatively flat to slightly concave. Fore wing with few cross veins. Metatibia bispinose. Aedeagus with two pair apical processes and one pair lateral preapical processes.

Cyarda salina (Dozier)

1927. *Rhyncopteryx salina* Dozier. Jour. N. Y. Ent; Soc. **35:** 53

Length 4.5–5.5 mm. General color dark testaceous to fuscous with veins and apex of fore wing darker.

Vertex short, almost transverse, shorter than pronotum. Frons with indication of median and transverse carina at base. Fore wing broadest anterior to fork of M thence gradually narrowed along costal margin to acute apex. Aedeagus with lateral processes at lateral center; base with a dorsal pair short processes projected posteriorly.

Occurring around the coast of Puerto Rico and adjacent islands in relatively dry habitats. Taken in Puerto Rico on saltwort or "barilla", *Batis martima*, a plant very abundant on coastal salt flat.

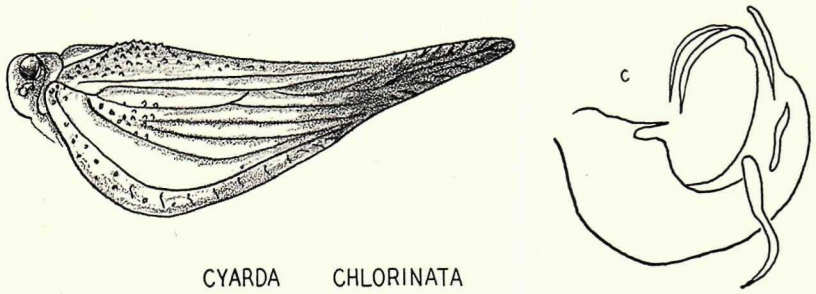
RECORDS:

Puerto Rico: Ponce-Las Cucharas Beach, Sept. 11 and Dec. 4, 1947, on "barilla", *Batis maritima*; Cabo Rojo near lighthouse on salt pools, Aug. 26, 1947, and January 6, 1948, very abundant on *Batis maritima*; Guánica Insular Forest, Sept. 25, from *Batis*.

Caja de Muertos Island: Dec. 5–11, 1947, abundant on its host plant.

Cyarda salina variety **chlorinata** n. var.

Structurally similar to typical form. Colored a yellow or very light testaceous except for fuscous apex of fore wing. This form also has a different host plant occurring on "liana fragante", *Distictis lactiflora*. (See Plate 46.)



CYARDA CHLORINATA

PLATE 46. c, aedeagus, lateral.

RECORDS:

Puerto Rico: Male holotype, female allotype, paratypes from Cabo Rojo, near lighthouse, Aug. 26, 1947, from *Distictis lactiflora;* paratypes from Las Cucharas Beach, Sept. 11, 1947, from *Distictis*. (Caldwell and Martorell.)

Other specimens from Guánica Central Road, in front of stone quarry, Aug. 28, 1947, breeding abundantly on *Distictis lactiflora* vine.

FLATOIDINUS Melichar

1923. Genera Ins. **182:** 117.

Vertex broader than long, shorter than pronotum; frons visible from above appears to be the apex of the vertex. Face almost horizontal. Fore wing with costal area much broader than costal cell; narrowed apically; with two or three irregular preapical lines present. Metatibia bispinose.

The species included in this genus by Melichar are not all congeneric and since I am not familiar with the type species (*convinus* Stål) I have derived my interpretations from Dr. Metcalf.

KEY TO SPECIES OF FLATOIDINUS

1. Aedeagus with one pair preapical bifid processes..... *bifidus*
   Aedeagus without any bifid processes.....2
2. Male anal segment with ventromedian apical or preapical process.....4
   Male anal segment without ventral projections.....3
3. Anal segment evenly arcuate in lateral aspect..... *fumatus*
   Anal segment with apex abruptly projected ventrally..*fumatus* subsp. *angulatus*
4. Anal segment with ventromedian projection apical, acute..... *spinosus*
   Anal segment with ventromedian projection preapical, rounded. *spinosus* subsp. *apicatus*

Flatoidinus fumatus (Melichar)

1902. *Dascalia fumatus* Melichar. Ann. Naturh. Mus. Wien. **17:** 152.
1935. *Flatoides angulifera* Osborn. N. Y. Acad. Sci. **14:** 225–226.
1941. *Flatoides brunneus* Wolcott. Jour. Dept. Agr. P. R. **25:** 54.
1948. *Flatoidinus pallescens* Metcalf & Bruner. Ann. Ent. Soc. Am. **61:** 117–118.

Length 9.7–12 mm. General color grayish-white. Mesonotum orangish, with a large spot near either lateral angle and one or two smaller pair in median tablet black. Commonly greenish or fumate.

Vertex short. Frons from above acute. Male anal segment slender, evenly arcuate in lateral aspect. Dorsal projection of style with basal projection extended caudad. Aedeagus with ventral process stouter, more strongly curved than dorsal; with lateroventral margin serrate. (See Plate 47.)

The most common form of this species is the dark form. If Melichar correctly placed *fumatus* in *Flatoidinus* then *angulifera* is a direct synonym unless one wishes to make a color variety to preserve the name. *Pallescens* from Cuba is synonymous with *angulifera.*

RECORD:

Puerto Rico: Aguas Buenas (E. Castro's farm) altitude 1300 ft., Sept. 14, 1947, from "guamá", *Inga laurina*; Cayey, Peñón del Collao, altitude 2000 ft., Nov. 15, 1947, from "maricao", *Byrsonima spicata*; Alto de la Bandera, on La Carmelita Road, altitude 2000 ft., Sept. 25, 1947, from *Inga vera* and *Inga laurina* trees; Toro Negro Mts., Doña Juana, altitude 2600 ft., Oct. 9, 1947, from bushes.

Fumatus occurs the length of Puerto Rico from sea level to 2600 ft.

Flatoidinus fumatus subspecies angulatus n. subsp.

Length of male 10.2 mm. Greenish. Apex of head and two spots near lateral angles of mesonotum black. Fore wing brownish apically.

Fore wing little narrowed apically. Male anal segment slender, straight; apex abruptly bent ventrad. Aedeagus with processes much more slender than in typical form and with ventral processes the longer. (See Plate 47.)

RECORD:

Puerto Rico: Male holotype from Maricao Insular Forest, altitude 2300 ft., Nov. 15, 1947, from "cabrilla", *Trema Lamarkiana.* (Caldwell and Martorell.)

Flatoidinus bifidus n. sp.

1935. *Flatoides punctatus* Osborn. N. Y. Acad. Sci. **14:** 223–224. (Not *punctata* Walker.)

Length, male 9 mm.; female 11 mm. General color testaceous. Vertex with black longitudinal dash on either side of median line. Pronotum with a pair of median spots and many small lateral punctations. Mesonotum tawny with several paired black spots. Fore wing with few small scattered black punctations and elongate dashes along the commisural margin.

Head as in *fumatus*, possibly more obtuse. Male anal segment broadened basally, flattened and arcuate apically, with a preapical medioventral projection. Aedeagus with one pair of preapical bifid processes in addition to other simple processes. Style with dorsal projection very long. (See Plate 47.)

RECORDS:

Puerto Rico: Male holotype from Ponce, Las Cucharas Beach, Sept. 11, 1947, by sweeping on "barbasco" *Canella winterana*; female allotype and paratypes from Quebradillas (Guajataca) Dec. 6, 1947. (Caldwell and Martorell.) Paratypes from Las Cucharas, Ensenada (American Museum Natural History) and Guánica (Ramos).

Flatoidinus spinosus n. sp.

Length, male 10 mm.; female 11.5 mm. General color dull testaceous. Vertex with very slender longitudinal dash on either side of median line. Notum tawny to orange-tinged, with black spots. Fore wing with a few scattered black punctations. (See Plate 47.)

Head obtuse, more so in male than in female; frons scarcely visible from above in female. Fore wing little narrowed apically. Male anal segment with ventromedian apical projection; projection acutely toothed anteriorly. Dorsal projection of style very long. (See Plate 47.)

RECORDS:

Virgin Islands: Male holotype and female allotype from St. John, paratype from St. Thomas and Tortola. (American Museum Natural History).

Flatoidinus spinosus subspecies **apicatus** n. subsp.

Length of male 9.5 mm. General color dark testaceous. Apex of head black. Vertex with longitudinal dashes. Notum as in *fumatus*. General

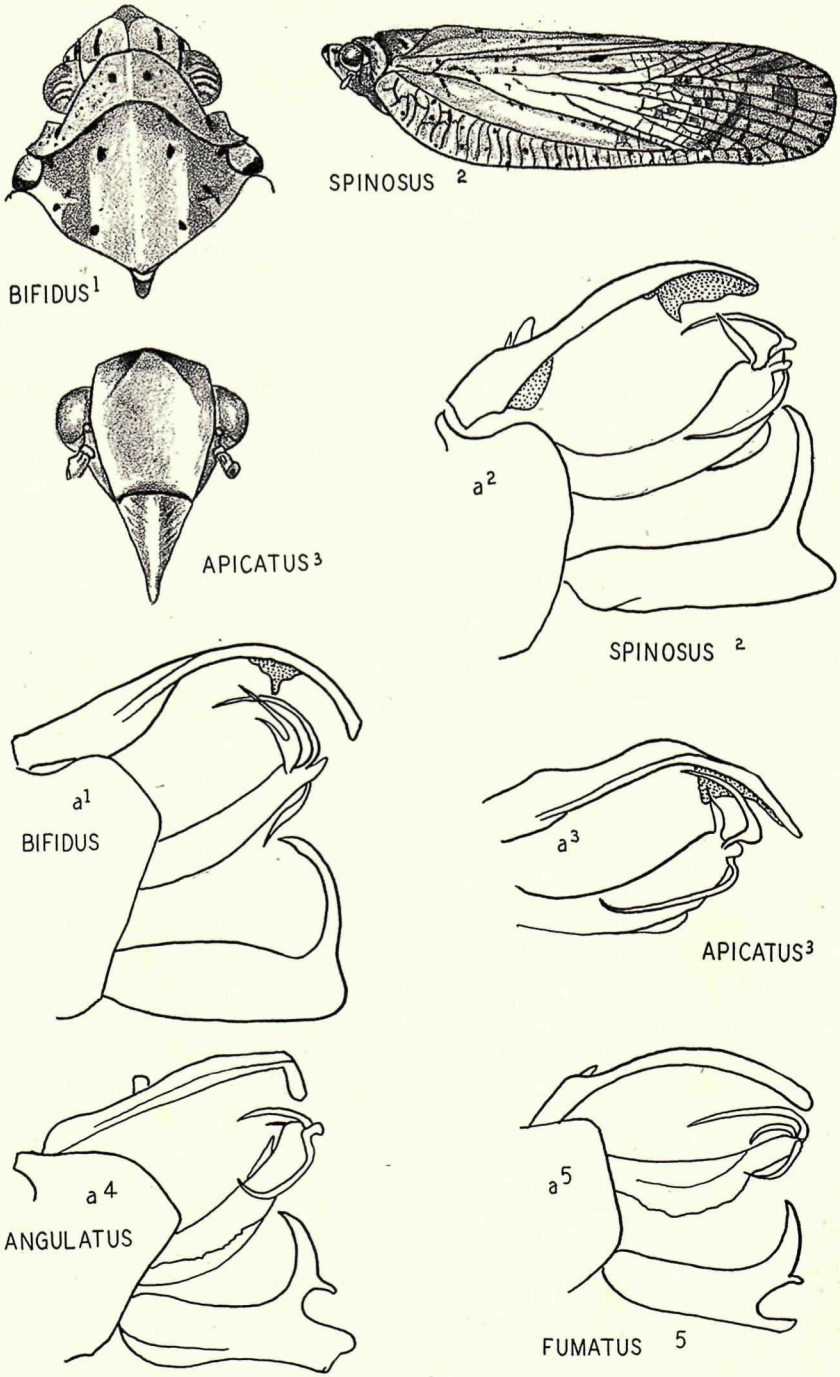


PLATE 47. *Flatoidinus*, a, genital capsule, lateral.

shape and characters similar to typical form except the male anal segment is similar to that in *bifidus*. (See Plate 47.)

RECORD:

Anegada, Virgin Islands: Male holotype from this locality. (American Museum Natural History.)

PSEUDOFLATOIDES Metcalf

1938. Bull. Mus. Comp. Zool. Harvard. **82:** 401.

Large flat forms. Vertex longer than broad. Frons visible from above, elongate; base subconical. Fore wing horizontal, very broad; costal margin broadly sinuate; costal area much broader than costal cell; two subapical

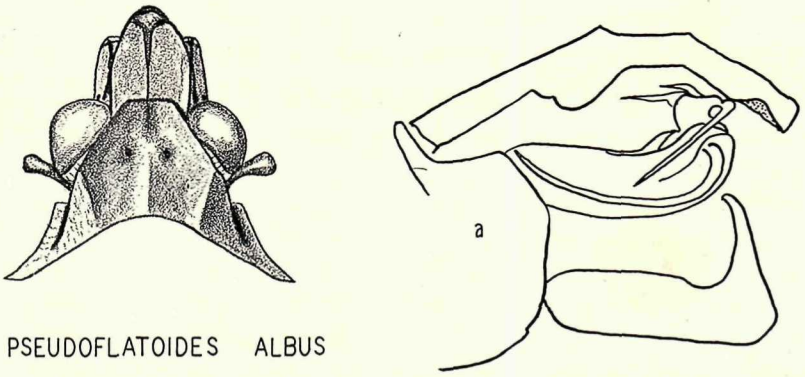


PLATE 48. a, genital capsule, lateral.

lines present. Metatibia bi- or trispinose. Male anal segment little arched in lateral aspect. Style elongate, with dorsal projection posterior.

Pseudoflatoides albus n. sp.

Length, male 13 mm.; female 14.5 mm. General color whitish-yellow becoming lighter posteriorly. Base of frons blackened. A black line present laterally before and behind eye. Usually two dark areas present in costal cell and a small spot outside of claval suture at about midlength.

Vertex slightly longer than broad, shorter than pronotum. Metatarsus trispinose. Anal segment of male broadened on apical two-thirds, hood-like. Aedeagus with three pairs of apical processes and one pair of subapical processes which are elongate. (See Plate 48.)

RECORDS:

Puerto Rico: Male holotype from Río Piedras, Nov. 16, 1947. (Caldwell and Martorell.) Female allotype from Río Piedras, May 21, 1943. (Wolcott.) Paratypes from Isabela, Mayagüez, San Juan and Yabucoa.

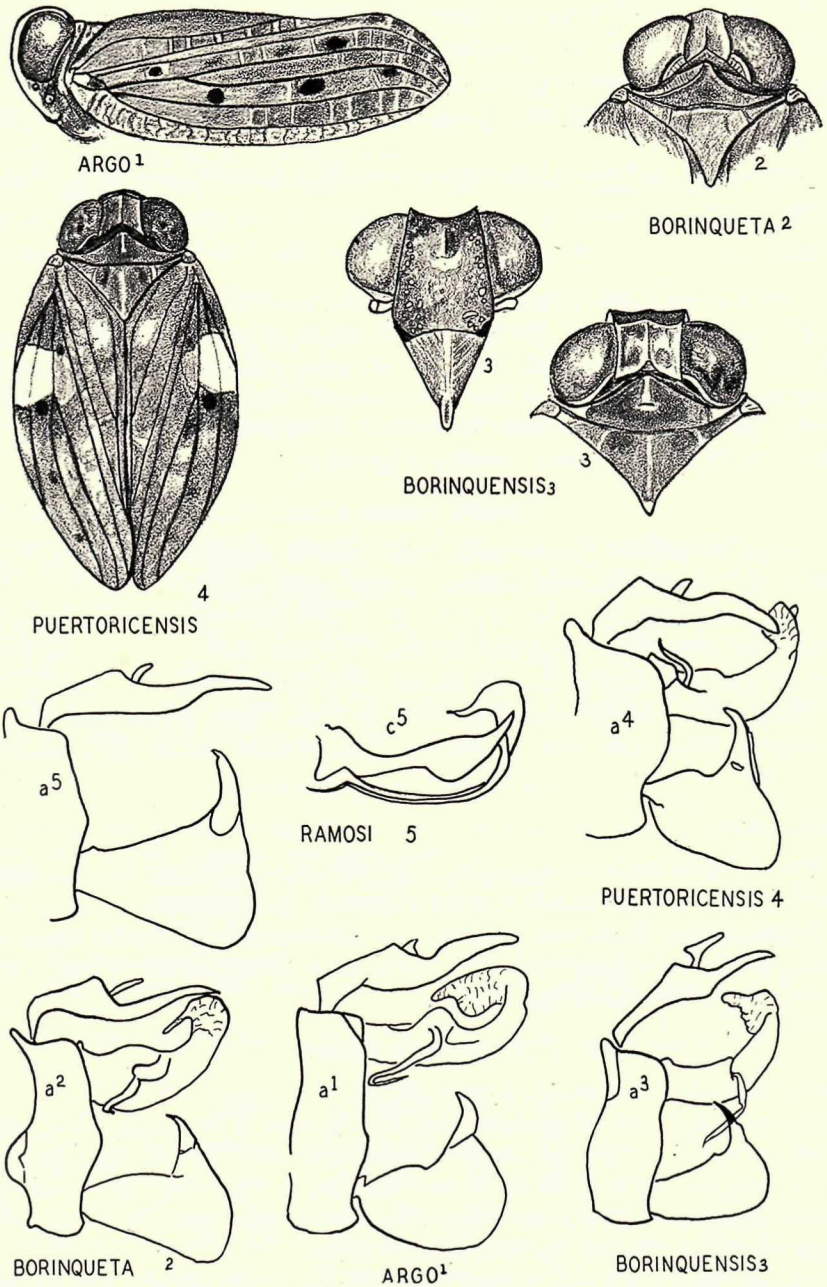


PLATE 49. *Thionia*, a, genital capsule, lateral, c, aedeagus, lateral.

bent at right angles near base and again near apex, evenly acuminate throughout. (See Plate 49.)

Taken almost anywhere in dry coastal habitat on sea grape.

RECORDS:

Puerto Rico: Specimens from Canóvanas, Nov. 11, 1947; Luquillo Beach, Aug. 22, 1947, nymphs and adults abundant on sea grape. (Caldwell and Martorell.) From Guánica also (Ramos).

Vieques Island: Material from Playa Grande, northwest coast, Oct. 23, 1947, from "uva de playa" or sea grape, *Coccolobis uvifera.*

Culebrita Island: Material collected there also by Maldonado Capriles.

St. Thomas, Virgin Islands: At this locality, Nov. 30, 1947. (Caldwell.)

Thionia borinqueta n. sp.

Length, male 5.5 mm.; female 6 mm. General color greenish-testaceous mottled with fuscous spots. Fore wing with prominent prebasal hyaline spot present extended from costa to at least media; often black spots present either side of media.

Broadly ovate in form. Vertex a third broader than long, longer than pronotum; anterior margin angulate. Face as in *borinquensis.* Male with mediolateral process of aedeagus abruptly narrowed near base with apical portion short and curved under aedeagus. (See Plate 49.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes from Cambalache Experimental Forest, at low altitudes, Nov. 6, 1947, from "uvilla", *Coccolobis laurifolia.* Female paratype from Quebradillas, Dec. 6, 1947, on same host as above. (Caldwell and Martorell.)

Thionia puertoricensis n. sp.

Length of male 5 mm.; greatest width 3.7 mm. Light yellowish-green over all; face with median carina and lateral spots green; fore wing gray-green, hyaline. (See Plate 49.)

Extremely rounded in form. Vertex with greatest width equal to greatest length though appearing longer than broad; median carina present for basal two-thirds; anterior margin strongly angular; lateral margins expanded then narrowed posteriorly. Face relatively narrow, elongate; median carina present on dorsal half of frons; lateral submargins roughened. Male with lateral process of aedeagus almost basal, projected dorsoanteriorly. (See Plate 49.)

RECORD:

Puerto Rico: Male holotype from the Toro Negro Mts., La Maravilla, altitude 3600 ft., Nov. 14, 1947. (Caldwell and Martorell.)

COLPOPTERA Burmeister

1835. Handbuch der Entom. **2:** 155.

Eyes prominent. Vertex and pronotum small. Mesonotum large, tricarinate, with lateral carinae forming an invert-V apically. Fore wing narrowed in apical half, usually slightly expanded posterior to nodal line, venation less prominent apically. Hind wing fully developed with large anal fold. Hind tibia unispinose. Anal flap elongate. Aedeagus with preapical processes.

KEY TO SPECIES OF COLPOPTERA

1. Fore wing half as wide at nodal line as at widest part; bifid preapical process of aedeagus with anterior fork twice as long as posterior, typical form, subspecies and varieties of ..... *maculifrons*
   Fore wing little narrowed apically; if preapical process of aedeagus is bifid then forks are subequal in length 2
2. Dorsoposterior angle of male pygofer rounded; ventral process of aedeagus at center ..... *brunneus*
   Dorsoposterior angle of male pygofer produced into a tooth; ventral process of aedeagus subapical 3
3. Approximately 7 mm. Dorsoapical process of aedeagus bifid apically ..... *fusca*
   Approximately 5 mm. Dorsoapical process of aedeagus bifid from base ..... *minuta*

Colpoptera maculifrons Muir

1924. *Colptera maculifrons* Muir. Proc. Hawaii. Eng. Soc. **5:** 466.

Length 5.8–6.5 mm. Brown to brownish fuscous. Fore wing darkened apically and longitudinally medianly. Frons darkened dorsally and slightly laterally with ligher spots in lateral area. Usually a light narrow median stripe present for full length of vertex and thorax.

Vertex almost three times as broad as median length, shorter than pronotum, slightly convex anteriorly. Fore wing with transverse veins along costa; apex rounded, with slight dorsposterior emargination present. Male anal flap elongate, acuminate apically. Styles broadly triangular, with dorsal process T-shaped apically. Aedeagus with a pair bifid apical processes; the more anterior fork twice as long as posterior; two simple ventroapical processes present, the right usually half as long as the left. Last ventral female segment triangularly produced posteriorly with apex rounded. (See Plate 50.)

Maculifrons displays great magnitude for variation in marking, intensity of color, and exact form of the apex of the fore wing. In the male genitalia

three variations in the ventral aedeagal processes have been found; the right shorter or longer than the left and both short. From this we may predict that a form will be found that has both processes elongate and equal. In other Homoptera in which the aedeagus is bilaterally symmetrical this shortening of one or the other process is not unusual and I believe these conditions are strictly varietal; consequently I relegate the forms here to varietal rank. The most typical biological form is *maculata* Dozier because it is the most numerous and widely distributed, however it was described after *maculifrons* so it is nomenclatorily subordinate.

RECORDS:

Puerto Rico: Aguas Buenas (E. Castro's farm) 1300 ft. altitude, Sept. 13, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Peñón del Callao, 2,000 ft. altitude, Sept. 13, 1947; Toro Negro Mts., Sept. 14, 1947; Bayamón, Oct. 1947. (Caldwell and Martorell.)

Colpoptera maculifrons variety **maculata** Dozier

1931. *Colpoptera maculata* Dozier. Am. Mus. Novitates No. **510:** 21–22.

More highly variegated in color than typical form; possibly with the apex of the fore wing more angulate. Aedeagus with left ventral process longer than right. (See Plate 50.)

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, sweeping unidentified ornamentals; El Yunque Mts. (along Pinnacle's and Britton's trail) 1700–3000 ft., altitude, Aug. 22, 1947, by sweeping weeds, shrubs and grasses; Orocovis River bed, Sept. 11, 1947, among weeds and grasses; Ponce, Las Cucharas Beach, Sept. 11, 1947, by sweeping on "barbasco", *Canella winterana*; Maricao-Sabana Grande Road, Km. 16.8, altitude 2200 ft., Sept. 12, 1947, from weeds and bushes; Maricao Road, Km. 11.9, altitude 2200 ft., Sept. 12, 1947, by sweeping on *Trema Lamarkiana*, Cayey, Peñón del Collao, altitude 2000-2500 ft., Sept. 13, 1947, from weeds and bushes; Guánica Insular Forest, Sept. 25, 1947; Barceloneta Beach-Arecibo Road, Km. 11.4, Oct. 16, 1947, from bushes and weeds at sand dunes; Río Piedras-Loiza Road, Nov. 11, 1947, beating bushes, grasses and weeds; Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 10.8, altitude 2300 ft., Nov. 13, 1947; Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, from bushes, grasses and trees; Salinas Beach (Sta. Isabel-Salinas Road near Río Jueyes), Nov. 21, 1947, from *Volkameria aculeata*; Mayagüez, Dec. 4, 1947; Aibonito, Dec. 30, 1947.

Vieques Island: Northwest coast-near Playa Grande, Oct. 22, 1947, from

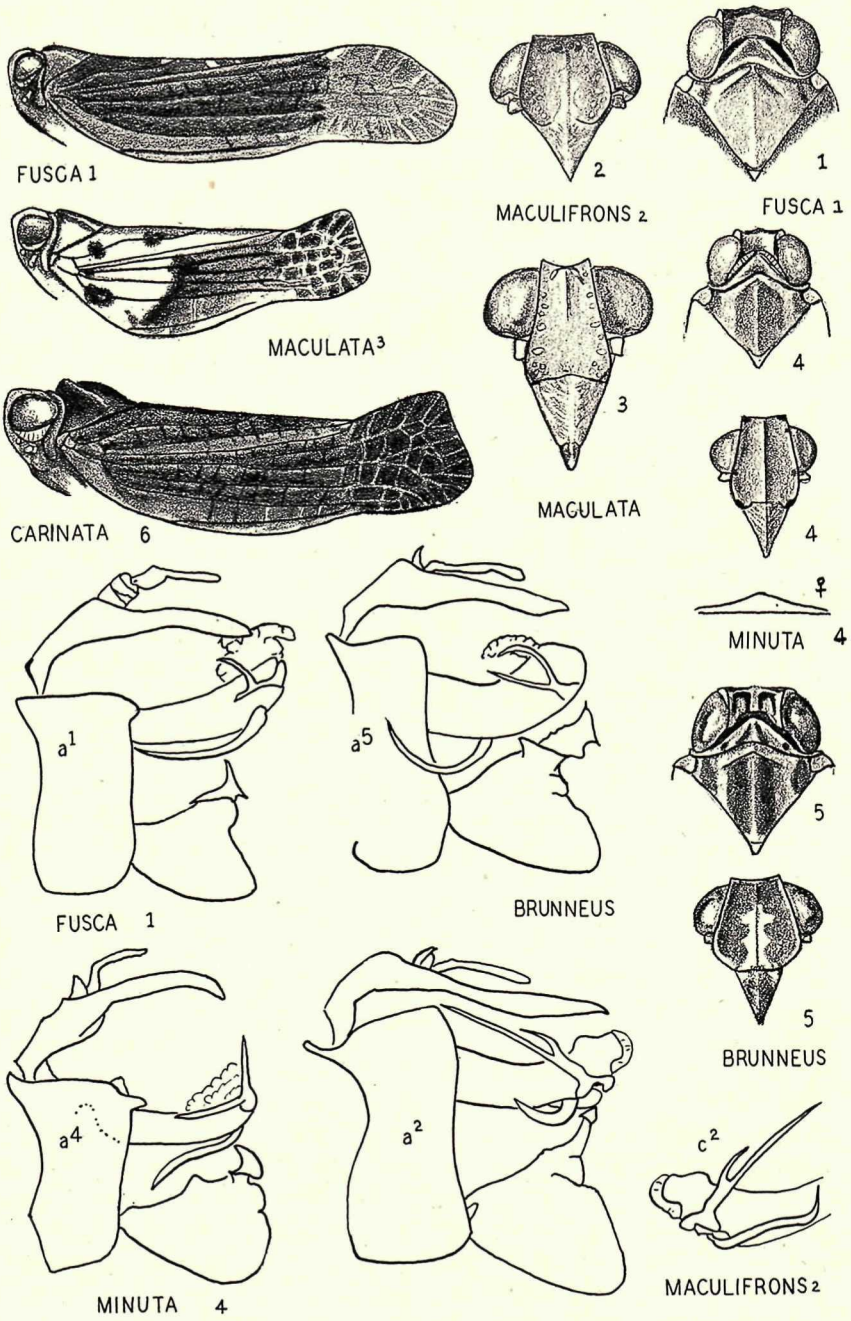


PLATE 50. *Colpoptera*, a, genital capsule, lateral, c, aedeagus, lateral.

bushes and weeds; Puerto Negro, Oct. 23, 1947, by beating large stands of *Volkameria aculeata.*

Caja de Muertos Island: Dec. 5–11, 1947.

St. Thomas, Virgin Islands: Nov. 25, 1947, from weeds, grasses and bushes.

Colpoptera maculifrons variety **flavifrons** Osborn

1935. *Colpoptera flavifrons* Osborn. N. Y. Acad. Sci. **14:** 212.

Little paler than typical form. Aedeagus with both ventral processes short.

RECORDS:

Virgin Islands: One female, June 14, 1917, from Saint Croix; one female, November 25, 1947, from Saint Thomas (Caldwell.)

Colpoptera maculifrons subspecies **carinata** Dozier

1936. *Colpoptera carinata* Dozier. Jour. Dept. Agr. P. R. **20:** 99.

Very dark phase of the typical form, usually larger and possibly with higher anterior carina on the mesonotum. Aedeagus with either right or left ventral process shorter than the other. (See Plate 50.)

Carinata is easily separated from the other forms and is very probably a subspecies of *maculata* replacing it in the higher elevations.

RECORD:

Puerto Rico: Maricao Insular Forest-Sabana Grande Road, Km. 10.8., Nov. 13, 1947, from bushes; Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, from bushes, trees and grasses; Toro Negro Mts. (La Maravilla) altitude 2800 ft., Nov. 14, 1947, from trees and bushes; Toro Negro Mts., after La Maravilla Camp, altitude 3500 ft., Nov. 14, 1947, beating weeds and bushes; Toro Negro Mts. (around radar tower area) altitude 3700 ft., Nov. 14, 1947, from beating weeds and trees; Toro Negro Mts., La Maravilla Camp, 3200 ft. altitude, Nov. 14, 1947, from weeds and bushes.

Colpoptera brunneus Muir

1924. *Colpoptera brunneus* Muir. Proc. Hawaii. Ent. Soc. **5:** 465–466.

Length 5.8–6.8 mm. General color dark brown to fuscous. Clypeus, ventral and median area of frons, carinae of vertex, pronotum, and mesonotum lighter. Fore wing with sutural margin, costal margin, and apical area light brown; several whitish cross veins present near apex of clavus.

Vertex rather flat, shallow. Mesonotum little arched. Fore wing little narrowed apically; apex rounded. Male pygofer with dorsoposterior angle

rounded. Dorsal process of style broad in lateral aspect. Aedeagus with a short pair of bifid preapical processes; ventral processes at center of aedeagus. (See Plate 50.)

Occurring the length of Puerto Rico between 1000–2000 ft.

RECORDS:

Puerto Rico: Ponce-Adjuntas Road, Km. 27.9, altitude 1550 ft., Sept. 12, 1947, from *Piper aduncum*; Maricao Insular Forest, altitude 2000 ft., Sept. 12, 1947, from weeds and bushes; Maricao Insular Forest, near blockstone Observation Tower, altitude 2600 ft., Sept. 12, 1947, among weeds, bushes and shrubs; Ciales-Jayuya Road, Km. 30.6, Sept. 25, 1947, by sweeping from bushes and shrubs particularly from "guaraguao", *Guarea*, *Dendropanax* and *Inga vera*; Jayuya-Ponce Road, Alto de la Bandera-La Carmelita, Sept. 25, 1947, by sweeping *Inga vera* and *Inga laurina*; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; El Yunque Mts. altitude 1500 ft., Dec. 12, 1947, by sweeping weeds, grasses and bushes.

Colpoptera minuta n. sp.

Length, male 5 mm.; female 5.5 mm. General color brown. Fore wing washed with fuscous; cross veins often whitish-hyaline.

Vertex deep; carinae, especially the apical, highly elevated. Mesonotum little arched. Fore wing short, little narrowed apically; apex rounded. Posterior angle of male pygofer produced into a dorsoposterior tooth. Anal flap strongly curved ventrally. Style with dorsal projection strongly curved inward and cephalad. Aedeagus with preapical process bifid from base; forks at right angles to each other; ventral process simple, preapical. (See Plate 50.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes from El Yunque Mts., Dec. 12, 1947, altitude 2500-3000 ft., from bushes. (Caldwell and Martorell.)

Colpoptera fusca n. sp.

Length of male and female 7 mm. General color fuscous. Vertex and pronotum lighter. Fore wing with sutural and costal margins light brown; cross veins in clavus whitish. (See Plate 50.)

Vertex shallow; apical carina not highly elevated. Mesonotum not strongly arched. Fore wing elongate, not strongly narrowed apically, apex rounded; numerous cross veins present in claval area; costal area calloused. Male pygofer with either dorsoposterior angle produced into a tooth.

Style with dorsal projection slender, acute. Aedeagus with preapical process bifid apically, posterior fork slightly longer than anterior; ventral process preapical. Female last ventral segment broadly rounded posteriorly. (See Plate 50.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from El Yunque Mts., Dec. 12, 1947, altitude 2500 ft., from bushes. (Caldwell and Martorell), paratype from Luquillo Nat. Forest, Luquillo Mts., Nov. 12, 1935. (American Museum Natural History.)

NEOCOLPOPTERA Dozier

1931. Amer. Mus. Novitates, No. **510:** 22.

Vertex with marginal carinae usually highly elevated; width usually equal to greatest length. Mesonotum little arched, appearing very elongate because the lateral compartments are almost vertical. Fore wing very elongate, usually over three times as long as broad; rather evenly tapered toward rounded apex.

There is no consistent difference between *Colpoptera* and *Neocolpoptera* other than the elongate form and more tapered fore wing of the latter.

KEY TO SPECIES OF NEOCOLPOPTERA

1. Usually over 8.5 mm. in length. Fore wing clear hyaline with darkened areas in clavus and subapically ..... *puertoricensis*
   Usually much less than 8.5 mm. Fore wing only hyaline along costa and possibly subhyaline in claval area 2
2. Fore wing jet black except costal area and basal spot 3
   Fore wing brownish, longitudinally darkened for median length ..... *rara*
3. Fore wing with white spot at base of clavus; median tablet of mesonotum dark *nemonticolens*
   Fore wing with base of clavus black; mesonotum orange in color .... *monticolens*

Neocolpoptera puertoricensis Dozier

1931. *Neolcolpoptera puertoricensis* Dozier. Am. Mus. Novitates No. **510:** 22–23.

Length 8.5–9.5 mm. Yellowish with carinae of face, vertex, pronotum, mesonotum, and legs black. Fore wing yellowish with black veins; clavus darkened at center and basally; apical area darkened medianly. (See Plate 51.)

Large, robust in form. Pronotum projected between eyes for half their length. Disc of vertex and pronotum greatly depressed. Fore wing little narrowed apically; apex truncately rounded. Male anal flap elongate; apical third narrowed from ventral margin in lateral aspect. Aedeagus with

left ventral preapical process usually three times as long as right, rarely subequal in length. Last ventral female segment truncate apically. (See Plate 51.)

Taken the length of Puerto Rico from 2000–2800 ft.

RECORDS:

Puerto Rico: El Yunque Mts. (along the Pinnacles and Mt. Britton's trails), altitude 1700–3000 ft., Aug. 22, 1947, by sweeping weeds, shrubs and grasses; Barranquitas, Barranquitas-Aibonito Road, Km. 8.4, Barrio Helechal, altitude 1900 ft., Sept. 11, 1947, by sweeping weeds and shrubs (*Ipomoea*, *Solanum*, *Rubus*, and *Casearia*); Maricao-Sabana Grande Road, Km. 15.6, Sept. 12, 1947, from weeds and grasses; Aguas Buenas (E. Castro's farm) altitude 1300 ft., Sept. 13, 1947, by sweeping the low forest mostly among melastomaceous shrubs; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Toro Negro Mts., Doña Juana, altitude 2600 ft., Oct. 9, 1947, from *Vitex* and *Piper aduncum*: Maricao Insular, Oct. 10, 1947; Doña Juana, altitude 2800 ft., Oct. 9, 1947, from weeds and grasses; Toro Negro Mts., La Maravilla, altitude 2800 ft., Nov. 14, 1947, from bushes and trees; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping bushes, grasses and weeds.

Neocolpoptera monticolens Dozier

1931. *Neocolpoptera monticolens* Dozier. Am. Mus. Novitates No. **510:** 24.

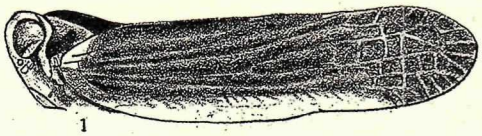
Length 7.5–8 mm. Venter, face, and dorsum light yellow to orange. Carinae of vertex and upper frons often darkened; rarely with pronotum and lateral compartments of mesonotum fuscous. Fore wing fuscous for inner two-thirds leaving the costal margin clear to yellow; apex lighter, margined with brown.

Vertex with median length equal to greatest width which is across the apex. Frons elongate, gradually broadened to clypeus. Disc of pronotum and vertex greatly depressed. Aedeagus with ventroapical process short, strongly curved. Last ventral female segment broadly rounded apically. (See Plate 51.)

This form has approximately the same range as *puertoricensis*.

RECORDS:

Puerto Rico: El Yunque Mts., (along the Pinnacles and Mt. Britton's trails), altitude 1700–3000 ft., Aug. 22, 1947, by sweeping weeds, shrubs and bushes; Lares-Yauco Road, Km. 33.1, altitude 1700 ft., Sept. 12, 1947, on weeds and grasses under coffee plants; Cayey, Peñón del Collao, altitude 2000–2500 ft., Sept. 13, 1947, from weeds and bushes; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Doña Juana, La Maravilla,



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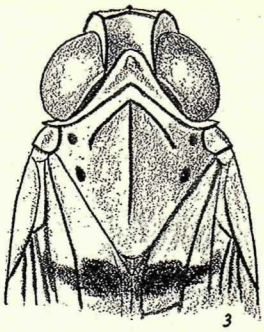
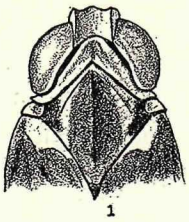
NEMONTICOLENS 1



3

PUERTORICENSIS 3



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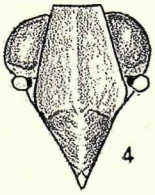
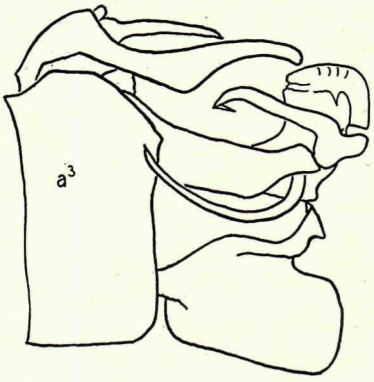
NEMONTICOLENS 1



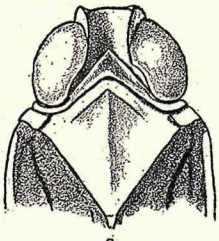
4

RARA 4



a3

PUERTORICENSIS 3



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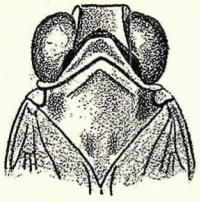
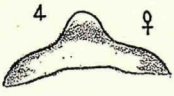
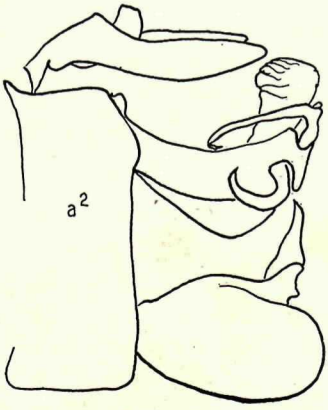
MONTICOLENS 2





4 ♀

RARA 4



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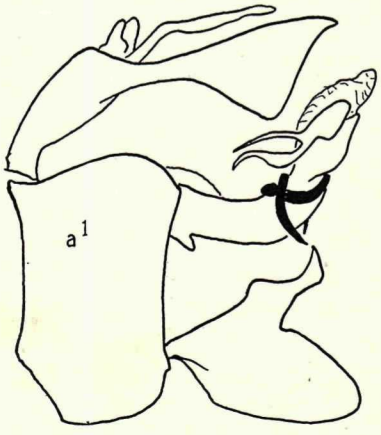
MONTICOLENS 2



a1

NEMONTICOLENS 1

PLATE 51. *Neocolpoptera*, a, genital capsule, lateral.

altitudes 2800–3700 ft., Nov. 14, 1947, from trees and bushes; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, by sweeping weeds, grasses and bushes.

Neocolpoptera nemonticolens n. sp.

Length, male 7.2 mm.; female 7.5 mm. Head and pronotum yellowish-orange. Mesonotum dark orange with median tablet fuscous; lateral compartments lightly infuscate laterally. Fore wing fuscous except light yellowish spot at base of clavus and entire costal area. (See Plate 51.)

Vertex with median length much less than greatest width. Frons short, extremely broad before clypeus. Disc of vertex and pronotum not greatly depressed. Mesonotum with median carina. Fore wing evenly tapered to rounded apex. Anal flap of male greatly expanded apically, hood-like. Aedeagus with dorsoapical process bifid apically; ventroapical process wrapped tightly once around aedeagus. Last ventral female segment with a semicircular projection at center of posterior margin. (See Plate 51.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes from the Carite Mts., altitude 2200 ft., Oct. 2, 1947. (Caldwell and Martorell.)

Neocolpoptera rara n. sp.

Length of female 6.5 mm. General color orangish-testaceous. Base of antenna black. Fore wing light fuscous for median length and apically; costal area clear yellowish-hyaline; claval area orangish-testaceous, almost hyaline.

Vertex twice as broad as median length; disc little depressed, as long as pronotum. Pronotum little depressed. Fore wing evently tapered apically; apex evenly rounded; base of costa greatly flattened horizontally. Last ventral female segment with median of posterior margin produced into an acutely rounded projection. (See Plate 51.)

RECORDS:

Puerto Rico: Female holotype from Maricao Insular Forest, Km. 15.6, Maricao-Sabana Grande Road, altitude 2400 ft., Sept. 12, 1947, from weeds and grasses. (Caldwell and Martorell.)

Virgin Islands: Paratype from St. John, March, 6, 1925. (A. M. N. H.).

The distribution may appear questionable however the two specimens could be twins except for the more faded coloring of the older one.

Family ACANALONIIDAE

The family characters are the same as those of the type genus.

The Acanaloniidae contains several genera. Some of these have been

recognized by various students and some have gracefully been ignored. In this fauna one may believe that *Philatis* and *Chlorochara* are distinct from *Acanalonia:* however if one considers these forms along with the rest of the fauna of the western hemisphere there are no fundamental differences among the three genera. The characters now used for separation are gradational which leave the divisions up to the prerogative of the student. Furthermore it is probable that division into species has also been carried too far; however at this stage it is difficult to know the correct interpretation of chrotic characters in relation to phallic. We probably will not be too far wrong if we follow the logic set forth by Funkhouser (1917, p. 353) that it may naturally be supposed that sexual organs undergo less change when insects come into or are forced into new environments than do motor or protective structures. With this in mind I believe that members of the acanalonids with identical or near identical male genitalia are of the same species and that slight differences in the profile of the fore wing and length of the head are minor and subspecific in nature unless accompanied by a different form of genitalia.

ACANALONIA Spinola

1839. *Acanalonia* Spinola. Ann. Ent. Soc. France **8**(1): 447.
1860. *Philatis* Stål. Rio Janeiro Hemipt. p. 68.
1869. *Chlorochara* Stål. Hemipt. Fab. **2**: 107.

Usually relatively large green forms with the fore wing held vertical. Venation irregular, usually prominent. Hind tibiae without preapical spurs. Male styles fused basally and ventrally. Aedeagus bilaterally symmetrical; a pair of long, apical ribbon-like processes present projected ventroanteriorly.

KEY TO SPECIES OF ACANALONIA

1. Vertex greatly sloped anteriorly ..... *brevifrons*
   Vertex more or less horizontal 2
2. Vertex broader than long; species less than 7 mm ..... *viequensis*
   Vertex as long as or longer than broad; species at least 9 mm. in length, usually much more 3
3. Vertex carinate to apex; fore wing opaque 5
   Vertex not carinate to apex; fore wing vitreous 4
4. Fore wing vertically truncate apically ..... *agilis*
   Fore wing diagonally truncate apically ..... *agilis* subspecies *maricensis*
5. Fore wing angularly narrowed posteriorly from center of costal margin ..... *vivida*
   Fore wing with entire costal margin more or less rounded 6
6. Vertex subequal in length and breadth; fore wing with costal and apical margins almost semicircular ..... *vivida* subspecies *coniceps*
   Vertex longer than broad; fore wing with costal margin gently curved, apical margin not continuing this curve ..... *vivida* subspecies *avivida*

Acanalonia vivida (Fabricius)

1775. *Cicada vivida* Fabricius. Systema Ent. p. 683.
1869. *Chlorochara vivida* Stål. Hemipt. Fab. **2:** 107.

Length 13–16 mm.; greatest width of fore wing 6–8 mm. General color green with a median stripe extended from apex of vertex to apex of fore wing either white edged with brown or all brown. Basal costal area white; media yellowish; black or brownish spots often present in furcations of larger veins. (See Plate 52.)

Head produced, acute. Frons with median carina. Vertex carinate to apex. Pronotum and mesonotum with a pair of lateromedian carinae. Fore wing decidedly broadest at about midlength; costal margin broadly rounded at this point thence projected straight dorsoapically to apical margin; apical margin straight. Female sternite VII with a small broadly rounded projection at center of posterior margin. Male genitalia as shown in the illustration. (See Plate 53.)

Because there are several long headed forms in Puerto Rico it can not be ascertained that this one is the same form described by Fabricius; however this species has been generally accepted as *vivida* and I follow the precedent.

The general impression has been that *vivida* is restricted to the higher elevations; however it occurs down to the coast in the Cambalache area as well as in the mountains from Maricao to El Yunque. The American Museum has several specimens from St. Croix, V. I. which extends the known range. It may also be noted that *gundlachi* Metcalf and Bruner from Cuba is very similar to *vivida*.

RECORDS:

Puerto Rico: El Yunque Mts., altitude 1700–3000 ft., Aug. 22, 1947, by sweeping on shrubs, grasses and weeds; Maricao-Sabana Grande Road, Km. 15.6, altitude 2400 ft., Sept. 12, and Oct. 10, 1947, from bushes; Cambalache Experimental Forest, Oct. 16, and Nov. 6–7, 1947, by sweeping on bushes; Aguas Buenas (E. Castro's farm) altitude 1300 ft., Sept. 14, 1947, from bushes.

Acanalonia vivida subspecies **avivida** n. subsp.

Length, male 10 mm.; female 12 mm.; greatest width of fore wing, male 5.5 mm.; female 6 mm. General color apparently green over all. (Material old.) (See Plate 52.)

Vertex produced, acute, carinate to apex, median length to greatest width in proportion of **6:** 4.5. Fore wing broadest at about midlength; costal margin gently rounded, not greatly narrowed posteriorly; apical margin slightly convex. Female sternite VII as in typical form. Aedeagus

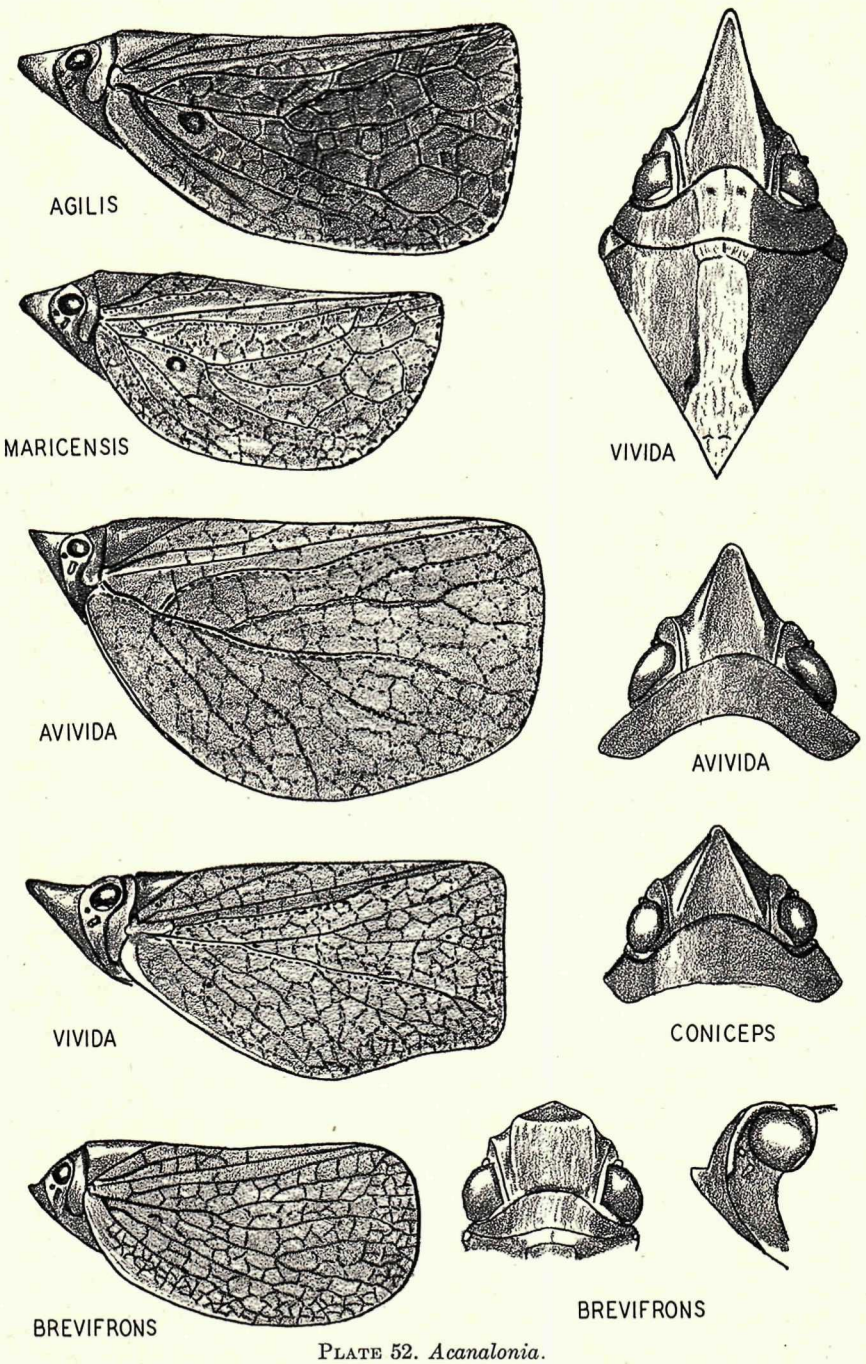


PLATE 52. *Acanalonia*.

with apical process straighter in apical portion than in typical form. (See Plate 53.)

RECORDS:

Puerto Rico: Male holotype, female allotype, three male paratype and one female paratype from Tallaboa near Ponce, July, 23, 1914, in the American Museum Natural History. One female paratype from Aguadilla, Nov. 2, 1946, (Ramos) is in his collection at Mayagüez.

Acanalonia vivida subspecies **coniceps** Osborn

1929. *Acanalonia coniceps* Osborn. Jour. Dept. Agr. P. R. **8:** 018.

Length 9 mm.; greatest width of fore wing 5 mm. General color green with a light stripe extended from apex of vertex to apex of fore wing.

Vertex acute, produced, carinate to apex, length and breadth subequal. Fore wing with costal margin almost evenly rounded from base through apical margin to dorsal apex. Female sternite VII as in typical form. Male plates slightly shorter apically than in typical form; prebasal ventral process of aedeagus with apex appearing twisted, apical process straighter than in typical form.

The shorter, broader, upturned vertex separates this form from *avivida*. Apparently *coniceps* occurs in drier habitats and the difference between the two may be more physiologic than apparent. (See Plates 52 & 53.)

RECORDS:

Puerto Rico: As far as known *coniceps* has only been taken at Salinas. (Osborn), and Caja de Muertos Island, P. R. (R. Bonilla.)

Acanalonia agilis (Melichar)

1901. *Batusa agilis* Melichar. Ann. K. K. Naturh., Hogmus. **16:** 192.
1923. *Philatis agilis* Melichar. Genera Ins. p. 8.
1931. *Acanalonia viriditerminata* Dozier. Am. Mus. Novitates No. **510:** 13.
1935. *Philatis agilis* Osborn. N. Y. Acad. Sci. **13:** 218.

Length 9–12 mm.; greatest width of fore wing 4–5 mm. Green with a brown to whitish stripe extended from apex of vertex to apex of fore wing. Margin of fore wing usually alternate black and green. Fore wing vitreous-hyaline; with a redbrown callous present near the base of the media. (See Plate 52.)

Head conically produced, not carinate to apex. Frons with faint median carina. Pronotum without longitudinal carinae. Mesonotum with a pair of lateromedian longitudinal carinae diverging posteriorly; an impressed line present apically forming a scutellum-like area. Fore wing with costal and sutural margin almost parallel; apical margin perpendicular, slightly

convex. Female sternite VII very slightly convex on median of posterior margin. Male with apical process of aedeagus relatively slender, rounded apically.

In all probability this may be *viriditerminata* Leth.; however I know this is *agilis* Melich. and retain this name even though it may later be proven synonomus with the former. (See Plate 53.)

Most commonly taken around 2000 ft. from Maricao to El Yunque.

RECORDS:

Puerto Rico: El Yunque Mts., altitude 1700–3000 ft., Aug. 22, 1947, by sweeping on the foliage of the "cacao motillo", *Sloanea Berteriana*; Barranquitas, Barranquitas-Aibonito Road, Barrio Helechal, Km. 8.4, altitude 1900 ft., Sept. 11, 1947, from weeds, shrubs and unidentified grasses (*Solanum*, *Ipomoea*, *Rubus* and *Casearia*); Aguas Buenas (E. Castro's farm), altitude 1300 ft., Sept. 14, 1947, by sweeping on the foliage of "guamá", *Inga laurina*; Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, beating from bushes, grasses and weeds, El Yunque Mts., altitude over 1500 ft., Dec. 12, 1947, from bushes, grasses and weeds; Aibonito, Dec. 30, 1947; Cayey Peñón del Collao, altitude 1900 ft., Dec. 4, 1947, from "guasávara", *Eugenia aeruginea*.

Acanalonia agilis subspecies **maricensis** n. subsp.

Length of female 9–11 mm.; greatest width of fore wing 4 mm. General color green with less prominent marking than typical form.

Differing from the typical form as follows: Head more bluntly produced; fore wing proportionally shorter, much more strongly rounded from costal to apical margin with the apical margin diagonally truncate rather than perpendicular. (See Plate 52.)

RECORDS:

Puerto Rico: Female holotype from Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, from low bushes. (Caldwell and Martorell); two paratypes from Maricao, July, 1914 (A. M. N. H.), and one paratype from Matrullas, Toro Negro Mts. (Villalba), Oct. 11, 1946. (Ramos.)

Maricensis is readily separated from the typical form and seems to be found in the higher elevations of southwestern and western Puerto Rico.

Acanalonia brevifrons Muir

1924. *Acanalonia brevifrons* Muir Proc. Hawaii. Ent. Soc. **5:** 467.

Length 7–8 mm.; greatest width of fore wing 3.5–4 mm. General color green with a light or brownish stripe extended from apex of vertex to apex of fore wing; basal costa white. (See Plate 52.)

Vertex produced, bluntly angular in dorsal aspect, greatly depressed to just before apex; apex abruptly projected straight cephalad or slightly

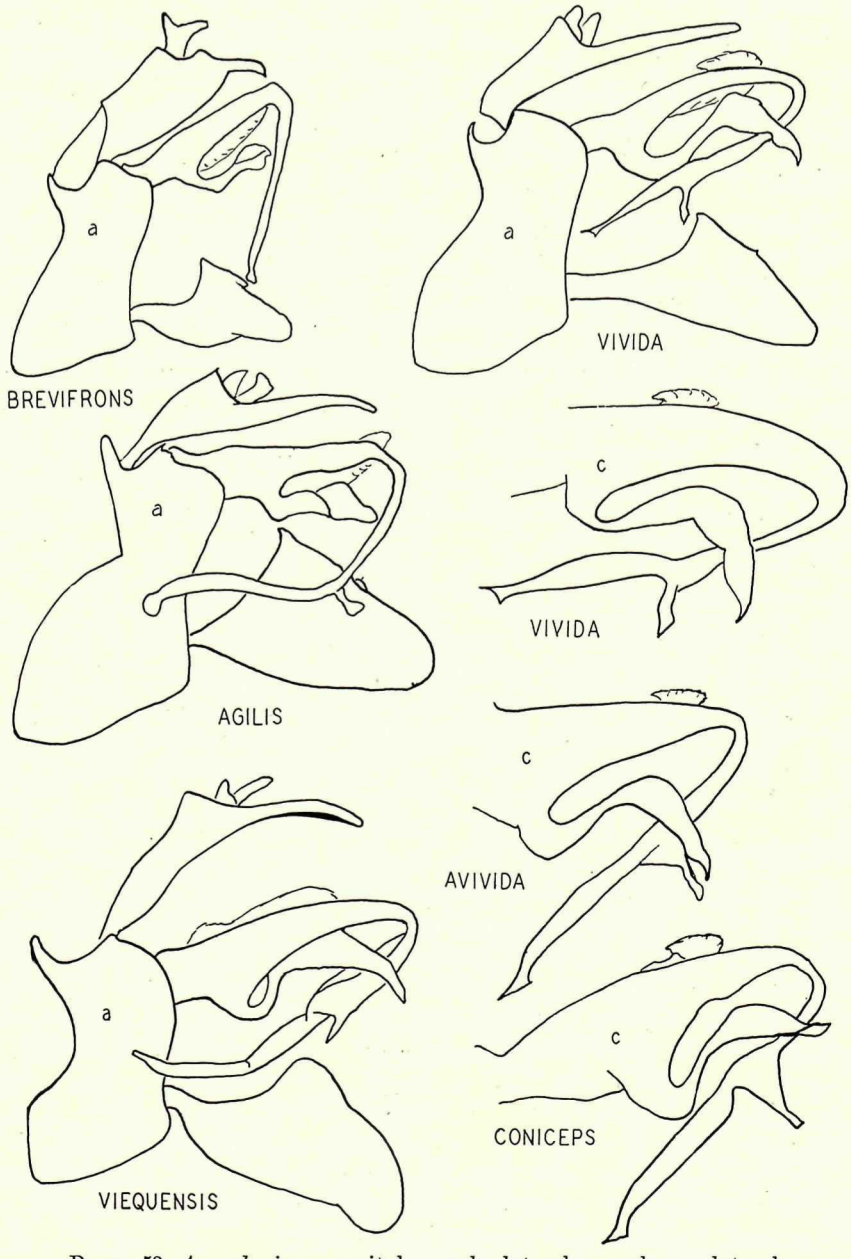


PLATE 53. *Acanalonia*, a, genital capsule, lateral, c, aedeagus lateral.

dorsad, appearing pinched in lateral aspect. Fore wing elongate-ovate; longitudinal veins more prominent than cross veins. Female sternite VII with a small rounded median projection at center of posterior margin. Aedeagus with prebasal ventral process plate-like apically; apical process broadly rounded apically, lateromedian process very small. (See Plate 53.)

RECORD:

St. Thomas, Virgin Islands: Female allotype from St. Thomas, Nov. 30, 1947. (E. Z. and J. S. Caldwell.)

This is evidently a low land form occurring more abundantly on St. Thomas and St. Croix, V. I., than in Puerto Rico. We have a brilliantly pink specimen; however pink forms are not too uncommon within this genus. A specimen in the American Museum (N. H.) from Anegada, V. I., is slightly more elongate with the costal margin less curved than the others.

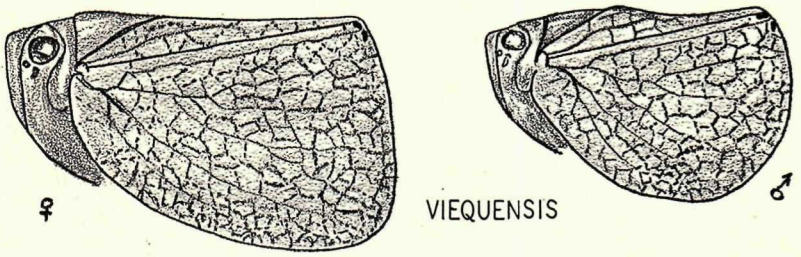


PLATE 54. *Acanalonia.*

Acanalonia impressa Metcalf and Bruner from Cuba is closely related to *brevifrons.*

Acanalonia viequensis n. sp.

Length, male 4.8 mm.; female 6 mm.; greatest width of fore wing, male 2.9 mm.; female 4.7 mm. General color green over all with two small black spots at the dorsal apex of the fore wing.

Head slightly produced, obtuse, carinate to apex; a faint longitudinal median carina present. Fore wing with venation evenly reticulate; costal margin almost evenly rounded through apical margin to dorsal apex in male. Female fore wing broadest just before apex; costal margin almost straight, except basad; apical margin diagonally truncate, slightly convex. Female sternite VII retracted under preceeding sternite but appearing to have a broadly rounded median projection. Aedeagus as illustrated. (See Plate 54.)

RECORDS:

Vieques Island: Male holotype, female allotype and few paratypes of either sex from Vieques Island, Oct. 23, 1947, specimens collected by sweep-

ing on bay lavender or "nigua de playa", *Mallotonia gnaphalodes*. (Caldwell and Martorell.)

Antigua, B. W. I. A pair of paratypes from this locality at the American Museum Natural History.

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WOLCOTT, G. N., 1936. Insectae Borinquenses. Jour. of Agr. Univ. Puerto Rico. **20**: 71–110.

NEW SYNONOMY

Acanalonia Spinola equals (*Philatis* Stål & *Chlorochara* Stål)
Dawnaria Distant equals (*Dawnarioides* Dozier & *Cyclokara* Muir)
Dawnaria sordidulum (Muir) equals (*Dawnarioides musae* Dozier)
Flatoidinus fumatus (Melichar) equals (*Flatoides angulifera* Osborn & *Flatoidinus pallescens* Metcalf & Bruner)
Euidella fasciatella (Osborn) equals *Pissonotus striolus* Osborn)
Oliarus complectus Ball equals (*Oliarus campestris* Fennah)

NEW NAMES

Pintalia martorelli n.n. for *infuscata* Osborn nec. *infuscata* Muir.

NEW COMBINATIONS NOT CONTAINED IN INDEX

Delphacodes spinigra Fennah to *Pygospina*
Kelisia rezendensis Muir to *Pygospina*
Kelisia contorta, curvistilus, escadensis, fuscovittata, & *urbana* Muir to *Phrictopyga*
Megamelus aurantii Crawford to *Pygospina*
Melormenis pruinosa (Say) to *Metcalfa*

RECORDS WHICH ARE APPARENTLY IN ERROR (SYNONOMY NOT REPEATED)

Acanalonia viriditerminata Dozier, not Lethierry.
Bothriocera bicornis Wolcott, not Fabricius.

Bothriocera venosa Wolcott, not Fowler.
Catonia intricata Osborn, not Uhler.
Cedusa edentula Osborn, not Van Duzee.
Cedusa santaclara Osborn, not Myers.
Delphacodes andromeda Osborn, not Van Duzee.
Delphacodes lutulenta Osborn, not Van Duzee.
Delphacodes nigripennis Osborn, not Crawford.
Delphacodes pellucida Osborn, not Fabricius.
Flatoides brunneus Wolcott (probably Mona Is.) not Muir.
Flatoides punctata Osborn, not Walker.
Ladella acunae Osborn, not Metcalf & Bruner.
Ladella pallida Wolcott, not Walker.
Megamelanus elongatus Osborn, not Ball.
Myndus obscurus Wolcott, not Uhler.
Nuerotmeta (Tangia) angustata Wolcott, not Uhler.
Oliarus franciscanus Wolcott, not Stål.
Ormenis infuscata Wolcott, not Stål.
Ormenis pruinosa Wolcott, not Say.
Ormenis roscida Osborn, not Germar.
Phaciocephalus cubanus Osborn, not Myers.
Pintalia decorata Osborn, not Uhler.
Sogata aurantii Osborn, not Crawford.
Sogata parvula Osborn, Puerto Rican record not Cuban record.

INSECT INDEX*

This index includes families, subfamilies, generic and specific insect names. The family names will be in CAPITALS, the subfamily names in small capitals, generic names in boldface type and specific names in romans. Names in synonymy will be in *italics*. New combinations are marked with two asterisks (**).

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