

THE JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO

Issued quarterly by the Agricultural Experiment Station of the University of Puerto Rico, for the publication of articles by members of its personnel, or others, dealing with any of the more technical aspects of scientific agriculture in Puerto Rico or the Caribbean Area.

Vol. XXXIV

January, 1950

No. 1

REVIEW OF THE AUCHENORYNCHOUS¹ HOMOPTERA OF PUERTO RICO

PART I CICADELLIDAE

BY JOHN S. CALDWELL²

Circleville, Ohio

AND

LUIS F. MARTORELL³

Entomologist, Agricultural Experiment Station, Rio Piedras, Puerto Rico

The necessity for a systematic review of the Homoptera of Puerto Rico is apparent when an attempt is made to identify specimens by means of the only available publication, the section of the "Scientific Survey of Puerto Rico and the Virgin Islands", relating to the Homoptera (Osborn 1935). This section lists 152 forms of which eight are definitely referred to the Virgin Islands. Scattered subsequent publications and additional plant quarantine records which are listed in "Insecta Borinquenses" and "Supplement" (Wolcott 1936 & 41) have added about 26 more forms for Puerto Rico. A recent faunistic treatment lists 28 species for Saint Croix, V. I. (Beatty 1944), and a similar treatise (Ramos 1947), includes 23 forms from Mona Island. While Mona Island is a political subdivision of Puerto Rico its fauna shows closer affinity to that of Hispaniola, therefore Mona Island will not be included in this review. On the other hand Saint Thomas, V. I., though politically separated, is ecologically related and forty records for this island are included herein even though these records were secured in four hours collecting and certainly are very incomplete.

The larger part of the material and data upon which this review is based was obtained by the writers during an insect survey, relating to "bunchy-top" disease of papaya, sponsored by the Agricultural Experiment Station of the University of Puerto Rico from August 1947 to mid-January 1948. The purpose of this review is to present a summation of our knowledge of the Homoptera of Puerto Rico as complete and accurate as possible. Perfection in such work is an objective never to be reached and we realize that

¹ The term Homoptera 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.

the largest error lies in the fact that faunal representation is incomplete because the period of intensive collecting in the field did not extend over at least one entire season; however data from the collections of Prof. J. A. Ramos and Mr. J. Maldonado Capriles tends to balance this defect because these collections were acquired over a period of years. The collection of the Agricultural Experiment Station at Rio Piedras also contains much valuable information. All these collections have made it possible to add over 100 new records for Puerto Rico including Vieques Island and Caja de Muertos Island which lie within five miles of the coasts of Puerto Rico. Approximately 40 species that have been based on misidentifications and synonymy of one kind or another are withdrawn from formal record.

In presentation, Prof. J. A. Ramos will be responsible for the sections dealing with the Cicadidae, Membracidae, Cercopidae, and Kinnaridae of the Fulgoroidea; J. S. Caldwell is responsible for the Cicadellidae and the Fulgoroidea excepting the Kinnaridae; L. F. Martorell is responsible for the biologic and ecologic data throughout the text.

Because complete solution of the many taxonomic and nomenclatorial problems might delay publication of a complete treatise for many years it is deemed advisable to publish sections as they are completed.

In order to give to this review utility for the average economic worker as well as the specialist we have attempted to restrict descriptions of established species to well defined and outstanding characters that serve to differentiate one form from another. Keys at their best are tedious to follow. We have tried to make ours as simple as practical and where possible we have tried to restrict key characters to those readily seen without special preparation of material. In some groups, and especially the smaller cicadellids and delphacids, the recognition of species is entirely dependent upon characters of the male genitalia, and for assistance in recognition of all forms we have included an illustration of the internal male genitalia whenever males were available for study. While the genitalia may not settle all systematic problems, they do furnish many more characters that are not otherwise available for evaluation of relationships. In a few cases in which our determinations are doubtful the original description may be quoted. Original citations are always given but detailed synonymy is not attempted because most of this is available in publications devoted to such enterprises; however for the sake of clarity we have indicated synonymy wherever it has been necessary and where in such cases it has been possible to accurately trace. Detailed distributional records for known forms have been presented by Wolcott (1936, 1941) and are not repeated herein; instead we have made an effort to define the habitat and general distribution, but this has not always been possible.

ACKNOWLEDGMENTS

This publication represents considerable expenditure of time, money, and energy of many institutions and individuals without whose unqualified cooperation it would have been impossible for us to complete our work. At this time, we are especially indebted to Mr. Arturo Roque, Director of the Agricultural Experiment Station of the University of Puerto Rico, for initiation of the survey and procurement of funds to carry it, through to completion. We are indebted to the U. S. Coast Guard for transportation to and from the island of Caja de Muertos, and to the U. S. Forest Service for transportation to and from Cambalache Experimental Forest. We extend our deepest gratitude to Sr. Heraclio Girón for many favors while collecting around his farms. We appreciate the fatherly advice of Dr. G. N. Wolcott and are indebted to him for many suggestions and access to his unpublished data.

We have received the fullest cooperation of many museums and their staff to whom we are indebted for comparison and loan of type material and pertinent information. These are: Dr. Rene Malaise of the Stockholm Museum, Dr. W. E. China of the British Museum (NH), Dr. Mont Cazier of the American Museum of Natural History, Dr. C. E. Palm of Cornell University, and Dr. D. M. Delong of the Ohio State University. Mr. C. F. W. Muesebeck of the U.S.D.A., Division of Insect Identification, provided assistance for the tedious task of mounting and labelling the survey material.

We gratefully acknowledge the assistance of Dr. P. W. Oman of the U.S.D.A., Division of Insect Identification, who has given much of his time and has contributed invaluable advice concerning taxonomic and nomenclatorial problems, checking many determinations and names, and discussing general problems of presentation.

CLASSIFICATION

The exact limitations of higher categories such as superfamilies and families is not agreed upon by students of the order throughout the world; hence treatment herein is not to be taken as absolute but should be looked upon as a more convenient method of classification adapted to this region. Some genera are as yet only relatively defined and in some forms classification into species or subspecies is dependent upon the arbitrary definition of such groups. While this lack of definition is not one to please the systematist and student it is nevertheless natural because nature seldom draws hard and fast lines and her forms are plastic and have not been developed with the idea of classification.

A few genera as represented here are apparently polyphyletic and un-

natural and several are retained in subfamilies where it is evident that they are out of place; however, it is beyond the scope of this work to unravel and correct all apparent discrepancies especially where the work involves extensive revision of groups poorly represented in this fauna.

KEY TO THE PUERTO RICAN FAMILIES OF HOMOPTERA

1. Large forms at least 15 mm. in length; three ocelli present on vertex; males with tympanium.....CICADIDAE
Less than 15 mm. in length, usually much less; at most two ocelli present on vertex; males without tympanium.....2
2. Pronotum greatly developed, usually extending over the abdomen
MEMBRACIDAE
Pronotum not greatly developed nor extended over abdomen.....3
3. Antennal base on side of head below eyes.....5
Antennal base on face in front of or between eyes.....4
4. Hind tibia with a double row of setae.....CICADELLIDAE
Hind tibia with several preapical spurs and a circulet of spurs at apex
CERCOPIDAE
5. Second segment of hind tarsus not very small; apex more or less truncate, with a row of small spines; fore wing without a costal area or with a small one without cross veins.....6
Second segment of hind tarsus small; apex rounded or acute, without a row of spines or with one on either side, costal area either present or absent, with or without cross veins.....10
6. Abdominal tergites six, seven, and eight with wax-secreting pores; ovipositor much reduced.....KINNARIDAE
Tergites six, seven, and eight without wax pores.....7
7. Hind tibia with apical calcar or movable spur.....DELPHACIDAE
Hind tibia without apical calcar.....8
8. Fragile, delicate forms; apical segment of labium about as broad as long
DERBIDAE
Robust forms; apical segment of labium distinctly longer than broad.....9
9. Greatly flattened forms; forewing usually overlapping apically; claval vein entering apex of clavus.....ACHILIDAE
Not greatly flattened; claval vein entering commissure before apex of clavus
CIXIIDAE
10. Fore wing membranous, transparent; posterior angle of mesonotum with a transverse line or groove.....TROPIDUCHIDAE
Fore wing usually leather-like, opaque; mesonotum without a transverse line posteriorly.....11
11. Clavus distinctly granulate; costal area with many cross veins...FLATIDAE
Clavus not granulate; costal area, if present, without cross veins.....12
12. Fore wing unusually large and broad, steeply tectiform; hind tibia without preapical spurs; male genitalia bilaterally symmetrical.....ACANALONIIDAE
Fore wing normal; hind tibia with preapical spurs; male genitalia asymmetrical.
ISSIDAE

Family CICADELLIDAE

The cicadellids are separated from the other related groups of Homoptera by the hind tibia being prismatic in cross section and bearing a double row

of spines. Further division into subfamilies herein does not necessarily indicate categories of equivalent value.

We record 139 forms from Puerto Rico, 15 are new records and 55 are new to science. Eighteen former records are withdrawn. Primary types of cicadellids, unless otherwise noted in the script, are deposited in the U.S. National Museum, Washington, D. C.

KEY TO THE SUBFAMILIES OF CICADELLIDAE

1. Vertex and pronotum striate; male plates reduced in size Iassinae
Vertex and pronotum not striate; male plates normal or filamentous apically . . . 2
2. Ocelli on dorsal surface of head, removed from anterior margin and from eyes . . . 3
Ocelli, if present, on frontal surface of head or on anterior margin next to either eye 4
3. Lateral sutures of face continued on dorsal surface of head to ocelli . . . Tettigellinae
Lateral sutures of face ending below anterior margin of head Ledrinae
4. Fore wings without cross veins anterior to apical cross Cicadellinae
Fore wing with cross veins anterior to apical cross veins 5
5. Ocelli on face 6
Ocelli on or near anterior margin of head 7
6. Fore wing with large prominent appendix Idiocerinae
Fore wing with appendix small or absent Agallinae
7. Ocelli removed from eyes Aphrodinae
Ocelli next to either eye 8
8. Vertex blunt cephalad, widely expanded behind eyes Coelidiinae
Vertex not blunt cephalad nor expanded behind the eyes 9
9. Vertex produced, anterior margin thin, sharp; sexes dimorphic Dorydiinae
Vertex may be produced but margin not foliaceous; chrotic characters of sexes identical or very similar 10
10. Fore wing usually with three anteapical cells, hind wing usually with four apical cells; basal segment of hind tarsus not sulcate basally Euscelinae
Fore wing never with three anteapical cells; basal segment of hind tarsus sulcate basally Balcluthinae

Subfamily Tettigellinae

This group usually contains the larger, more elongate forms of cicadellids with the lateral sutures of the front extended upon the dorsal surface of the head to the ocelli.

KEY TO THE GENERA OF TETTIGELLINAE

1. Apex of fore wing with reticulate venation Carnecephala
Apex of fore wing without reticulate venation 2
2. Vertex much broader than long, with a transverse stripe Tylozygus
Vertex as long or longer than broad, without a transverse stripe 3
3. Vertex with solid lineate lines; fore wing with short, subapical cell along costa Sibovia
Vertex without solid lineate lines; fore wing without a short subapical cell along costa 4
4. Vertex acute in dorsal aspect; anteapical cells in fore wing much longer than apical cells Hortensia

Vertex broadly rounded in dorsal aspect; anteapical cells as short or shorter than apical cells in fore wing..... *Poeciloscarta*

SIBOVIA China

1927. *Ann. & Mag. Nat. Hist.* **20**: 283.

Vertex produced, blunt, rounded to front. Antennae very long. Pronotum carinate laterally. Fore wing slender, elongate, with one short anteapical cell along costa, without apical reticulations. Entire dorsum with black longitudinal lines.

KEY TO SPECIES OF *SIBOVIA*

1. Black lines nearly parallel on vertex, not meeting..... *coffeaphila*
Black lines on vertex meeting before apex..... 2
2. Green with strongly contrasting black lines..... *coffeacola*
Blue to greenish-yellow with narrow, often interrupted black lines..... *lineata*

Sibovia coffeacola (Dozier)

1926. *Cicadella coffeacola* Dozier. *Jour. Dept. Agr. P. R.* **10**: 264.

1931. *Entogonia coffeacola* Dozier. *Am. Mus. Novitates*, No. 510 p. 6.

Length 7-9 mm. General color green with definite, black longitudinal stripes; inner pair uniting on vertex before anterior margin. (See Plate 1.)

Vertex obtuse, rounded. Pronotum convex. Scutellum small. Female sternite VII greatly produced posteriorly from lateral margins to acute median apex. Male aedeagus with dorsal portion reverse S-shaped, stout apically; basal portion long, slender, curved dorsad and bent slightly to the right.

This species occurs all over Puerto Rico at approximate altitudes where coffee is normally grown. We also collected several specimens from Cambalache Experimental Forest near sea level.

RECORDS:

Puerto Rico: El Yunque Mts., altitude 1700 to 3000 ft., Aug. 22, 1947, on shrubs, bushes and grasses; Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from shrubs, weeds and underbrush at coffee plantation; Lares-Yauco Road, Km. 33, 1700 ft., Sept. 12, 1947, on weeds and grasses at coffee plantation; Maricao-Sabana Grande Road, Km. 16.8, altitude 2200 ft., Sept. 12, 1949, on weeds and grasses; Aguas Buenas (Enrique Castro's farm) 1300 ft., Sept. 14, 1947, on melastomaceous shrubs in a low forest; Ciales-Jayuya Road, Km. 23.2, Sept. 25, 1947, on foliage of "palo de goma" (*Castilla elastica*); Doña Juana, Toro Negro Mts., 2600 ft., Oct. 9, 1947, on weeds; Mariaco Insular Forest, Oct. 10, 1947, from weeds; Cambalache Experimental Forest, at Arecibo, Nov. 6-7, 1947, on weeds and bushes, near sea level; La Maravilla, Toro Negro Mts.,

3200 ft., Nov. 14, 1947, on weeds and ferns with *Rubus rosaefolius* and *Pothomorphe peltata* in between; El Yunque Mts., 1500 ft., Dec. 12, 1947, on weeds, grasses and bushes.

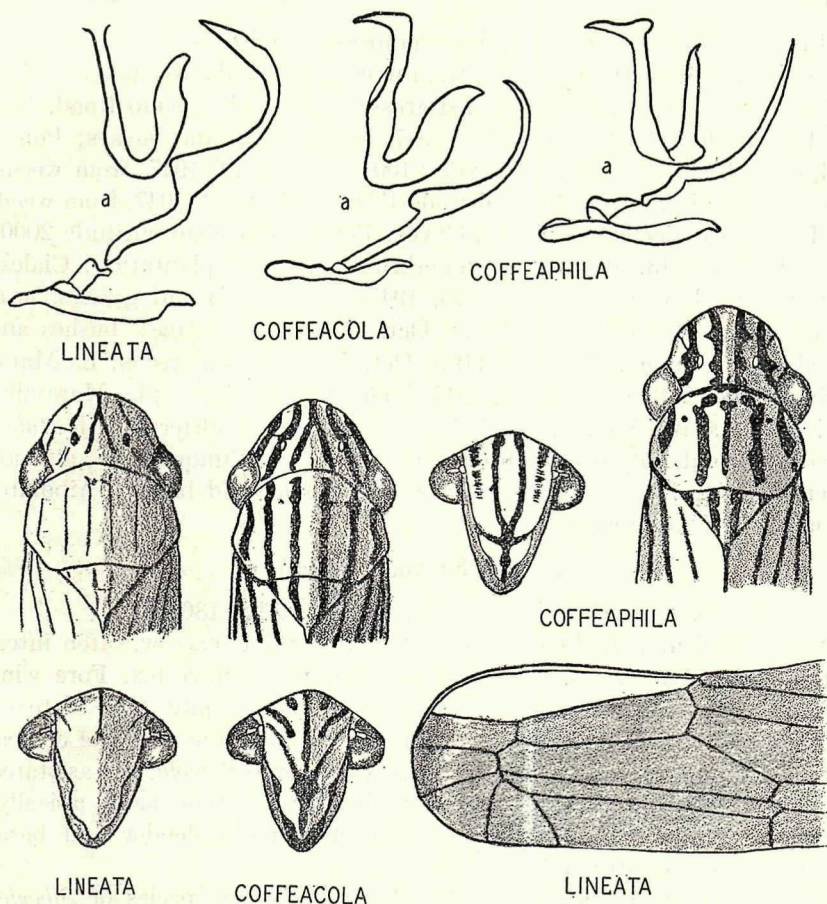


PLATE 1. *Sibovia*, a, internal genitalia, lateral.

Sibovia coffeaphila (Dozier)

1926. *Cicadella coffeaphila* Dozier. Jour. Dept. Agr. P. R. **10**: 263.

1931. *Entogonia coffeaphila* Dozier. Am. Mus. Novitates, No. 510, p. 6.

Length 8–10 mm. Green with black stripes over dorsum, inner pair not meeting on vertex. Slightly more robust than *coffeacola*.

Vertex broadly rounded anteriorly. Pronotum convex. Scutellum small. Female sternite as in *coffeacola*. Male aedeagus with dorsal portion L-shaped, slender; ventral portion slender, curved dorsally and to right. (See Plate 1.)

Occurs with *coffeacola* in the higher altitudes. Immatures were found on

Rubus rosaefolius, "fresa", but it probably breeds on a variety of plants because it was found abundantly in areas where *Rubus* did not grow.

RECORDS:

Puerto Rico: Barranquitas (Barranquitas-Aibonito Road, Barrio Helechal), Km. 8.4, altitude 1900 ft., from weeds and shrubs (*Solanum*, *Rubus*, *Ipomoea*, *Casearia* and unidentified grasses); Orocovis-Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, from weeds and bushes; Ponce-Adjuntas Road, Km. 23.7, altitude 2100 ft., Sept. 12, 1947, from weeds; Lares-Yauco Road, Km. 33.1, altitude 1700 ft., Sept. 12, 1947, from weeds and grasses under coffee plants; Cayey, Peñón del Collao, altitude 2000-2200 ft. Sept. 13, 1947, from underbrush on coffee plantation; Ciales-Jayuya Road, Km. 30.6, Sept. 25, 1947, from weeds and grasses, near coffee grove; Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Doña Juana, altitude 2600 ft. Oct. 9, 1947, from weeds; La Maravilla, altitude 2800 ft., Nov. 14, 1947, from bushes and trees; La Maravilla, altitude 3200 ft., Nov. 14, 1947, beating on weeds and ferns with *Rubus rosaefolius* and *Pothomorphe peltata* in between; El Yunque Mts., altitude over 1500 ft., Dec. 12, 1947, from weeds, grasses and bushes; Aibonito, Dec. 30, 1947, from weeds.

Sibovia lineata (Osborn)

1935. *Entogonia lineata* Osborn. N. Y. Acad. Sci. **14**: 136.

Length 7-9 mm. Light greenish-yellow with faint, narrow, often interrupted brownish stripes, the median pair uniting on vertex. Fore wing usually with a blue sheen along inner clavus and apically. (See Plate 1.)

Head broadly rounded; face with a noticeable bump in center of clypeal area. Pronotum convex. Female sternite VII as in *coffeacola*, not as stated in original description. Male pygofer with lateral margins acute apically. Aedeagus similar to *coffeacola*; dorsal portion more slender and basal portion much stouter apically.

Always found at higher altitudes above the other species of *Sibovia*. Male allotype and paratypes from El Yunque Mt., P. R.

RECORDS:

Puerto Rico: El Yunque Mt., Luquillo National Forest, altitude over 1500 ft., Dec. 12, 1947, from weeds, grasses and bushes.

POECILOSCARTA Stål

1869. K. Svenska Vet. Akad. Handl. **8**: 73.

Head broader than pronotum; eyes prominent; vertex broadly roundedly produced, rounded to face. Fore wing with three short antepical cells, not reticulate apically.

Poeciloscarta laticeps Metcalf & Bruner

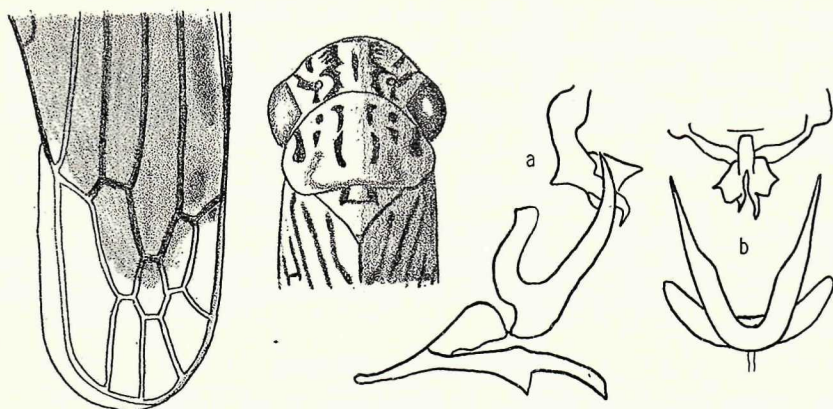
1923. *Tettigonia sirena* Wolcott. Jour. Dept. Agr. P. R. **8**: 259.

1929. *Cicadella sirena* Osborn. Jour. Dept. Agr. P. R. **13**: 93.

1936. *Tettigonia interrupta* Wolcott. Jour. Dept. Agr. P. R. **20**: 78.

1937. *Poeciloscarta laticeps* Metcalf & Bruner. Jour. Dept. Agr. P. R. **20**: 933-936.

Length 5-6 mm. Color variable from yellow to reddish-purple with black markings. Vertex with broken longitudinal dashes; ocelli ringed with black. Pronotum with interrupted longitudinal dashes except caudally. Fore wing usually with veins dark brown to black.



POECILOSCARTA LATICEPS

PLATE 2. a, internal genitalia, lateral, b, aedeagus ventral.

Robust in form. Female sternite VII with median notch on posterior margin. Male pygofer broadly rounded posteriorly on either side. Style sharply narrowed apically on ventral margin. Aedeagus with dorsal portion short, bifid apically, with a pair of unequal length apical hooks; ventral portion bifid in apical half, divergent, narrowed apically, projected dorsad and curved cephalad near apex. (See Plate 2.)

This is a very common form occurring from the beaches up into the higher elevations. Our specimens from Vieques are smaller and intense red in color as are the specimens from St. Thomas.

RECORDS:

Puerto Rico: Aguadilla Beach, August 29, 1947, among weeds; Orocovis-Coamo Road Km. 53.4, altitude 2200 ft., September 11, 1947, from weeds and grasses; Maricao Insular Forest (near observation tower, altitude 2600 ft., on Sept. 12, 1947, from weeds and grasses; Alto de la Bandera (Jayuya-Ponce Road) Sept. 25, 1947, from weeds and grasses; Arecibo-

Barceloneta Road, Km. 11.4, Oct. 16, 1947, at sea level, from weeds and grasses on sand dunes along the beach; Arecibo-Camuy Road Km. 80, at sea level, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Rio Piedras-Loiza Road, Nov. 11, 1947, from weeds and grasses; Salinas Beach (between Salinas and Santa Isabel, near Río Jueyes) Nov. 21, 1947, from *Volkameria aculeata*; Ponce (Ponce-Guayama Road), Nov. 21, 1947, from "papaya", *Carica papaya* foliage; Ponce, Nov. 21, 1947, by beating on the weeds growing under the shade of "papaya" plantation; Ponce-Las Cucharas Beach, Dec. 4, 1947, beating on *Batis maritima*; Mayagüez, Dec. 4, 1947, from beach vegetation; Cabo Rojo, Jan. 6, 1947, from weeds.

Caja de Muertos Island: Dec. 5-11, 1947, from weeds.

St. Thomas, V. I., Nov. 25, 1947, from bushes, grasses and weeds.

Vieques: Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds.

HORTENSIA Metcalf & Bruner

1937. Jour. Dept. Agr. P. R. **20**: 928.

Head produced, as wide as pronotum vertex angulate anteriorly, rounded to face; face tumid. Fore wing with all apical cells hyaline, without reticulate venation.

Hortensia similis (Walker)

1851. *Tettigonia similis* Walker. List Homopt. B. M. **3**: 769.

1929. *Cicadella similis* Osborn. Ann. Carn. Mus. **16**: 212.

1936. *Hortensia similis* Metcalf & Bruner. Jour. Dept. Agr. P. R. **20**: 930.

Length 6-7 mm. General color greenish. Vertex yellow with short black dashes somewhat radiating from ocelli; a black triangle is outlined near the apex. Face black with black and yellow stripes above. Pronotum broadly yellow anteriorly, punctate with small black dashes in yellow color. Scutellum yellow. Fore wing green with yellow veins. (See Plate 3.)

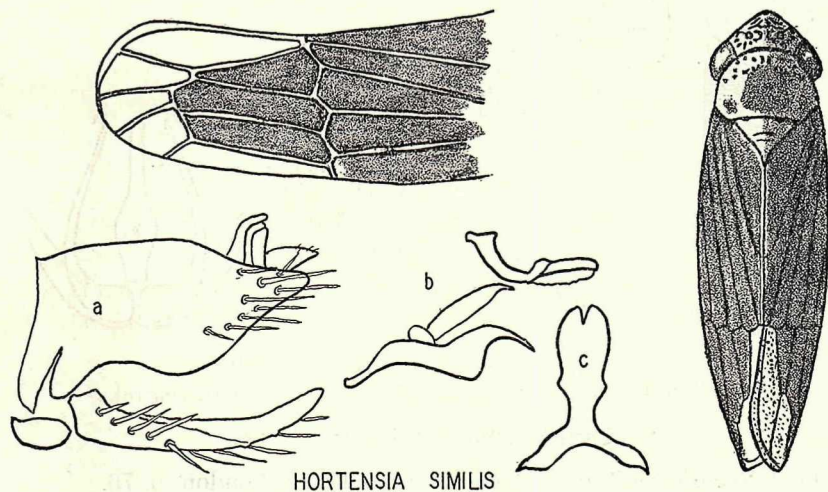
Female sternite VII practically truncate posteriorly. Male pygofer greatly produced posteriorly on either side. Style short, greatly narrowed from ventral margin apically; apex acute. Aedeagus short, spatulate or lingulate, projecting caudad; basal portion absent or consisting of connective to styles. (See Plate 3.)

Very abundant in low moist areas but found from sea level to higher meadows on low growing vegetation.

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, on grasses; Añasco (Añasco-Mayagüez Rd. at the Añasco River bridge), Aug. 29, 1947, on *Erythrina*

berteroana trees; Añasco (Añasco-Mayagüez Rd. at the Añasco River bridge), Aug. 29, 1947, on water hyacinths, *Piaropus crassipes*; Rincón, Barrio Punta, Aug. 29, 1947, on *Cajanus indicus*; Isabela Sub-Station, Aug. 29, 1947, on weeds and grasses under "papaya" trees; Aibonito, Sept. 11, 1947, from unidentified bushes; Aibonito-Barranquitas Road Km. 34, Sept. 11, 1947, from weeds; Maricao Insular Forest (Observation tower 2600 ft.), Sept. 12, 1947, from weeds and bushes; Aguas Buenas (Enrique Castro's) 1300 ft., Sept. 14, 1947, from melastomaceous shrubs in the low forest; Alto de la Bandera (Jayuya-Ponce Rd.) Sept. 25, 1947, from weeds and grasses; Maricao Insular Forest, Oct. 10, 1947, from weeds;



HORTENSIA SIMILIS

PLATE 3. a, genital capsule, b, internal genitalia, lateral, c, aedeagus, ventral.

Arecibo-Barceloneta Road, Km. 11.4, Oct. 16, 1947, from weeds and grasses on sand dunes; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Canóvanas, Nov. 11, 1947, from weeds and grasses; Bayamón, near District Hospital, Nov. 13, 1947, by sweeping "malojillo" grass, *Panicum purpurascens*; Mayagüez, at sea level, Nov. 13, 1947, on "malojillo" meadow; Toro Negro Mts., altitudes 2800-3200 ft., Nov. 14, 1947, from weeds and bushes; Ponce (Ponce-Adjuntas Rd.) Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Ponce (Ponce-Adjuntas Road). Nov. 21, 1947, by beating on weeds growing under the shade of "papaya" plantation; Luquillo, El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, from bushes and weeds.

Vieques Island: Airport Road, south of Isabel Segunda, 2 kilometers from town, Oct. 22, 1947, from bushes on hill; Near Naval Base, Oct. 23, 1947, from weeds, grasses and bushes; Isabel Segunda-La Esperanza

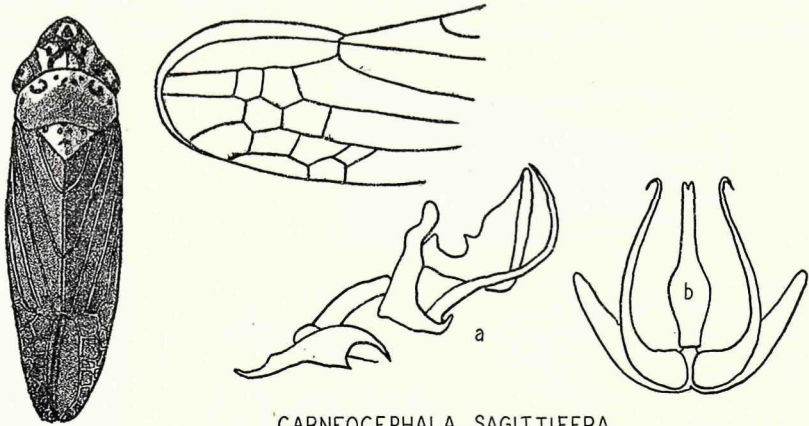
Road, Oct. 23, 1947, by using auto lights against white sheet; Naval Base Hill and hill east center, Oct. 24, 1947, from grasses, weeds and bushes.

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

CARNEOCEPHALA Ball

1927. Florida Entomologist 11: 39.

Vertex greatly produced, acute anteriorly in dorsal aspect, rounded to face. Face tumid. Fore wing with reticulate venation at apex.



CARNEOCEPHALA *SAGITTIFERA*

PLATE 4. a, internal genitalia, lateral, b, aedeagus, ventral.

Carneocephala sagittifera (Uhler)

1895. *Tettigonia sagittifera* Uhler. Proc. Zool. Soc. London. p. 76.

1923. *Draeculacephala sagittifera* Wolcott. Jour. Dept. Agr. P. R. 6: 260.

1927. *Carneocephala sagittifera* Ball. Florida Ent. 11: 40.

Length 4-5 mm. General color greenish. Vertex orangish marked with black, a prominent black triangle present at apex ringed with white. Pronotum yellow on anterior margin marked with fuscous. Scutellum yellowish with small black basal spots. Fore wing dark green to blackish with greenish-yellow veins. (See Plate 4.)

Head wider than pronotum; vertex acute. Fore wing with inner apical cell clear hyaline. Female sternite VII sinuate on posterior margin. Pygofer of male produced caudad. Style short, bifid apically. Aedeagus with dorsal portion short, broad, basally triangular in lateral aspect; ventral portion longer than dorsal, strongly curved.

Commonly found in low moist habitats on grasses.

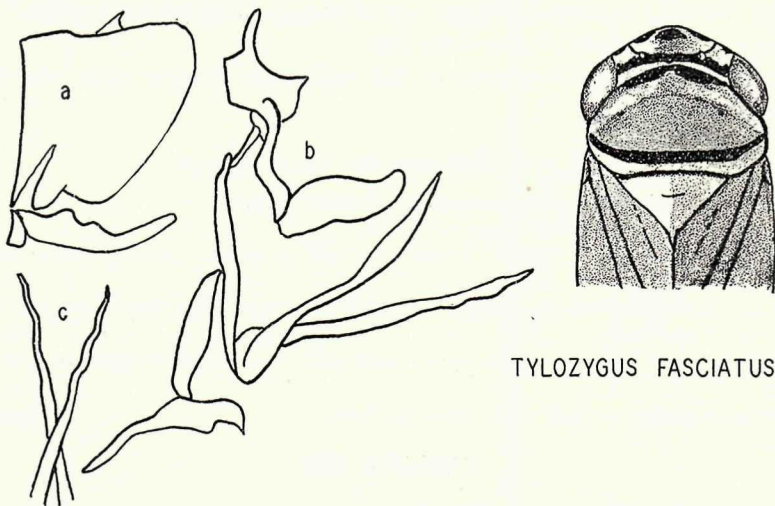
RECORDS:

Puerto Rico: Guánica, Sept. 26, 1947, from *Volkameria aculeata*; Arecibo-Camuy Road Km. 80, at sea level, Oct. 16, 1947, from pasture mainly

composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Salinas Beach (between Salinas and Sta. Isabel near Río Jueyes), Nov. 21, 1947, from *Volkameria aculeata*; Ponce, Nov. 21, 1947, beating weeds and grasses on "papaya" groves; Cabo Rojo, Jan. 6, 1947, from weeds.

Vieques: Oct. 22, 1947, from weeds; Near Naval Base, Oct. 23, 1947, from weeds and grasses; Isabel Segunda-La Esperanza Road, Oct. 22, 1947, at lights. (automobile lights against white sheet) (8:00-10:00 P.M.)

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



TYLOZYGUS FASCIATUS

PLATE 5. a, genital capsule, b, internal genitalia, lateral, c, aedeagal processes, ventral.

TYLOZYGUS Fieber

1866. Verh. Zool.-Bot. Ges. Wein **16**: 501.

Head subconical anteriorly; vertex much broader than long, with transverse stripes. Fore wing with one anteapical cell, not reticulate apically.

For the information concerning the status of *Kolla* and *Tylozygus* I am indebted to Dr. Oman, who collaborated on this problem with Dr. China.

Tylozygus fasciatus (Walker)

1851. *Tettigonia fasciata* Walker. List Homop. B. M. **3**: 780.

1917. *Kolla bifida* var. *fasciata* Van Duzee. Catalogue, p. 599.

Length 5-5.5 mm. General color green striped with black. Vertex with black anterior band and one between eyes. Pronotum with transverse band; margins yellowish. Fore wing with black venation. Abdominal segments annulate with red.

Vertex rounded; face tumid. Female sternite VII bluntly produced at center of posterior margin. Male style short, acute apically. Dorsal portion of aedeagus short, blunt, projected caudad; ventral portion bifid from base long, acute, strongly sinuate in apical third. (See Plate 5.)

Found fairly common in grassy meadows from sea level to higher elevations.

Subfamily Iassinæ

Relatively broad forms with body flattened dorsoventrally. Head and pronotum transversely striate. Fore wings broad with either appendix very narrow, elongate, and closely overlapping the other; first apical cell not enlarged. Valve in male and at least base of plates concealed by sternite VIII; plates much reduced in size and ligulate.

In the association of genera in this subfamily I agree with and have followed Dr. Oman.

KEY TO THE GENERA OF IASSINÆ

1. Ocelli on vertex removed from eyes and anterior margin.....2
Ocelli on face or anterior margin of vertex.....3
2. Solid greenish species; head little narrower than pronotum; most striae on vertex longitudinal.....*Gypona*
Highly variegated on color; head much narrower than pronotum; most striae on head transverse.....*Ponana*
3. Angle between vertex and face acute with ocelli on this margin next to eyes
Krisna
Vertex rounded to face with ocelli on face.....*Stragania*

PONANA Ball

1920. Ann. Ent. Soc. Amer. **13**: 93.

Vertex much narrower than pronotum, with rather definite depression before thick anterior margin. Face weakly inflated. Male with aedeagus consisting of a long, slender, posterior portion and a pair of short, stout, basal processes that project dorsad.

KEY TO SPECIES OF *PONANA*

1. Pronotum with few very large spots.....*puertoricensis*
Pronotum densely punctate posteriorly.....2
2. Female sternite VII and male pygofer punctate.....*insularis*
Female sternite not punctate (Male unknown).....*magna*

Ponana puertoricensis n. sp.

Length of female 7.5 mm. General color grayish-yellow with the following marks: A brownish spot on basal margin of vertex behind either ocellus, a pair median spots on anterior portion of pronotum, a spot on margin be-

hind either eye with a spot further basad behind eye spots, basal angles with a brownish dash, posterior margin and median basal portion light hyaline. Scutellum with a pair median pits and basal angles brown. Fore wing mottled with brown and darker areas along costa and commissural margin; apex somewhat clear hyaline. Posterior margin of female sternite VII medianly embrowned. (See Plate 6.)

Vertex broadly rounded anteriorly, almost twice as broad as long. Fore wing long, broadly rounded apically. Female sternite VII broadly rounded posteriorly, produced into a blunt median tooth.

RECORDS:

Puerto Rico: Female holotype from San Germán, Feb. 7, 1947, (C. Ortíz), is in the collection of J. A. Ramos at the College of Agriculture, Mayagüez, P. R.

***Ponana magna* n. sp.**

Length of female 9.5 mm. General color brownish-tan. Vertex and anterior portion of pronotum mottled with indefinite yellow patches. Median and posterior portion of pronotum densely punctate with reddish-black specks. Scutellum with four small yellow spots evenly spaced across anterior margin, two angular spots present near apex. Fore wing yellowish, mottled and dotted with orange flecks, a few hyaline areas distributed over entire surface; veins orange, apices of claval veins darkened. Female sternite VII white with posterior margin embrowned in center. (See Plate 6.)

Head much narrower than pronotum. Vertex broadly rounded, almost two and a half times as broad as long; ocelli nearer apical margin than basal. Fore wing long, narrow, rounded apically. Female sternite VII broadly produced at center of posterior margin.

RECORDS:

Puerto Rico: Female holotype from Guánica Insular Forest, July 1937, (E. Mora), is in the collection of J. A. Ramos, at the College of Agriculture, Mayagüez, P. R.

Caldwell and Martorell collected a large yellow gypona-like nymph in the same locality on "liana fragante", *Distictis lactiflora*, which may have been this species.

***Ponana insularis* n. sp.**

Length, male 8 mm.; female 8.5 mm. Specimens white from immersion in preserving fluid; however, dark punctations are visible on vertex, pronotum, and scutellum. Scutellum blackened basally. All cells of fore wing filled with numerous dark circular spots. Male and female genital segments punctate. (See Plate 6.)

Vertex little over twice as broad as long, almost acutely produced; depression before anterior margin very pronounced. Fore wing rather broad. Female sternite VII broadly sinuate posteriorly with a broad median lobe. Male pygofer much shorter than plate. Style greatly narrowed before apex; apex quadrately expanded. Aedeagus with elongate posterior arm bearing a pair of apical processes that project ventrad along arm. (See Plate 7.)

RECORDS:

Puerto Rico: Male holotype and female allotype bearing the following data: San Juan, Ard. #20, Dec. 19, 1947, Lot. 48-3302, were received from the U. S. National Museum.

GYPONA Germar

1921. *Magazin der Entomologie* 4: 73.

Head narrower than pronotum but not greatly so. Vertex with anterior margin produced, relatively thin. Face slightly inflated. Pronotum not greatly sloping. Fore wing smooth, venation simple. Entire insect unicolorous, greenish, with small black dash on fulcrum of either fore wing. Aedeagus short, simple, without processes.

The forms from Puerto Rico probably come closer to *Acusana* than to typical *Gypona* but the phallic characters show that they are a separate group and actually can not be contained in any restricted genus described from the Americas.

The five forms found in Puerto Rico and neighboring islands are very similar and can only be reliably separated by characters of the male genitalia; however they are readily separated by these structures and because they occur either at different elevations or upon different host plants I prefer to give them specific rank rather than subspecific.

KEY TO SPECIES OF *GYPONA*

1. Aedeagus, in lateral aspect, semicircular, slender, of even width throughout... 2
Aedeagus, in lateral aspect, thick, short, not semicircular..... 3
2. Male style relatively slender, acuminate apically..... *puertoricensis*
Male style broad, deeply bilobed on inner margin..... *montana*
3. Style truncate apically..... *viequensis*
Style acuminate or bluntly rounded apically..... 4
4. Style evenly arcuate and acuminate apically..... *sancti-thomasi*
Style slightly recurved apically, expanded subapically..... *mediata*

Gypona puertoricensis n. sp.

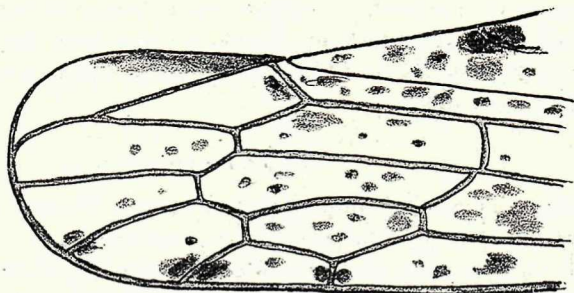
Length, male 6.5 mm.; female 7 mm. General color dark greenish-yellow

with lateral pronotal carinae and costae ivory white. Ocelli red; eyes brownish. Fore wing with appendix fuscous.

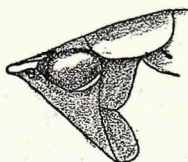
Robust, vertex little over twice as broad as long. Fore wing short,



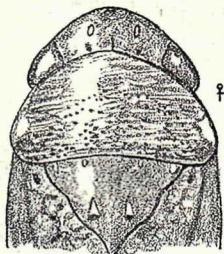
GYPONA VIEQUENSIS



PONANA INSULARIS



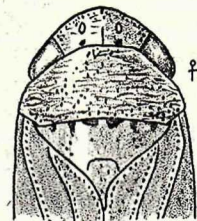
GYPONA VIEQUENSIS



PONANA MAGNA



PONANA PUERTORICENSIS



PONANA INSULARIS.

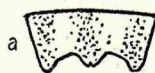
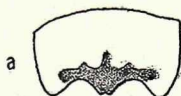


PLATE 6. a, female sternite VII.

broad. Female sternite VII with a very small notch at center of posterior margin which is slightly concave. Male style relatively slender, gradually acuminate to bluntish apex. Aedeagus in apical portion slender, semicircular in lateral aspect. (See Plate 7.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of both sexes from Guánica, Sept. 26, 1947, on salt flats at sea level, abundant, breeding on *Volkameria aculeata*; paratypes from Salinas.

Caja de Muertos Island: Paratypes also from this locality. This species breeds abundantly on *Volkameria aculeata* which is its definite host. (Caldwell & Martorell)

Gypona montana n. sp.

Length, male 7.3 mm.; female 7.5 mm. General color and marking of *puertoricensis* but definitely darker, brownish.

Head little more produced. Female sternite VII broadly but gently concave caudad with a short median split in center of concavity. Male style very broad, deeply sinuate on inner margin in lateral aspect. Aedeagus with apical portion curved, semicircular, thickened basally. (See Plate 7.)

RECORDS:

Puerto Rico: Male holotype from Maricao Insular Forest, Nov. 13, 1947; Maricao-Sabana Grande Road, Km. 10.8, altitude 2300 ft., breeding on *Trema Lamarkiana*, "cabrilla"; female allotype and male paratype from La Maravilla, Toro Negro Mts., Nov. 14, 1947, altitude 3200 ft., on bushes and weeds along trail, open low forest; and one male paratype from Villalba, P. R. (Caldwell and Martorell).

Gypona viequensis n. sp.

Length, male 6.8 mm.; female 7 mm. Color of *puertoricensis* except appendix is less fuscous.

Female sternite VII deeply concave caudad with a blunt bilobed tooth in center of concavity. Male style quadrate in outline, truncate apically. Aedeagus short, curved, slightly concave on posterior apical margin. (See Plates 6 and 7.)

RECORDS:

Vieques Island, P. R.: Male holotype, female, female allotype, a paratype of each sex, and immatures from Puerto Negro on the eastern section of Vieques Island, Oct. 23, 1947, breeding on *Volkameria aculeata*. (Caldwell and Martorell) This species may be a subspecies of *puertoricensis* since they both breed on the same host. Regardless of assigned rank the quadrate styles of the male readily separates *viequensis* from any related form.

***Gypona sancti-thomasi* n. sp.**

Length of male 6 mm. General color and marking of *puertoricensis*.

Head less produced anteriorly. Male style evenly arcuate and acuminate in apical portion; apex slightly deflected. Aedeagus with inner margin of curved portion forming a "J", this portion evenly narrowed to apex. (See Plate 7.)

RECORDS:

St. Thomas, Virgin Islands: Male holotype from St. Thomas, Nov. 29, 1947, (E. Z. and J. S. Caldwell). Host undetermined but definitely not *Volkameria*.

***Gypona mediata* n. sp.**

Length, male 7 mm.; female 7.3 mm. General color and form of *puertoricensis* with head and thorax possibly more declivent.

Female sternite VII gently concave caudad with a small produced area present either side of median notch. Male style gently sinuate in apical half, gently swollen subapically. Aedeagus short, stout, scarcely curved; apex notched posteriorly. (See Plate 7.)

RECORD:

Puerto Rico: Male holotype, female allotype, and paratypes of each sex from Aguas Buenas, Enrique Castro's farm, altitude 1300 ft., Sept. 14, 1947, on "maricao", *Byrsonima spicata* trees. (Caldwell and Martorell). A form that may be a subspecies of *mediata* was taken from Cambalache Experimental Forest. The subapical swelling of the male style is more pronounced than in typical *mediata*.

***KRISNA* Baker**

1919. Philippine Jour. Sci. **15**: 213.

Large greenish-yellow forms with the appearance of a gyponid except that the ocelli are on the margin of the vertex and face next to either eye. Pronotum little widened posteriorly, surface transversely striate. Fore wing long, narrow; venation reticulate apically. Hind tibia greatly flattened. Male styles extremely long.

***Krisna insularis* Oman**

1936. *Krisna insularis* Oman. Pan Pacific Ent. **12**: 3.

Length 9.5-11.5 mm. Color pale green fading to pale yellow. Eyes dark. Area around ocelli reddish. Fore wing with two small black spots between first and second sectors on cross veins.

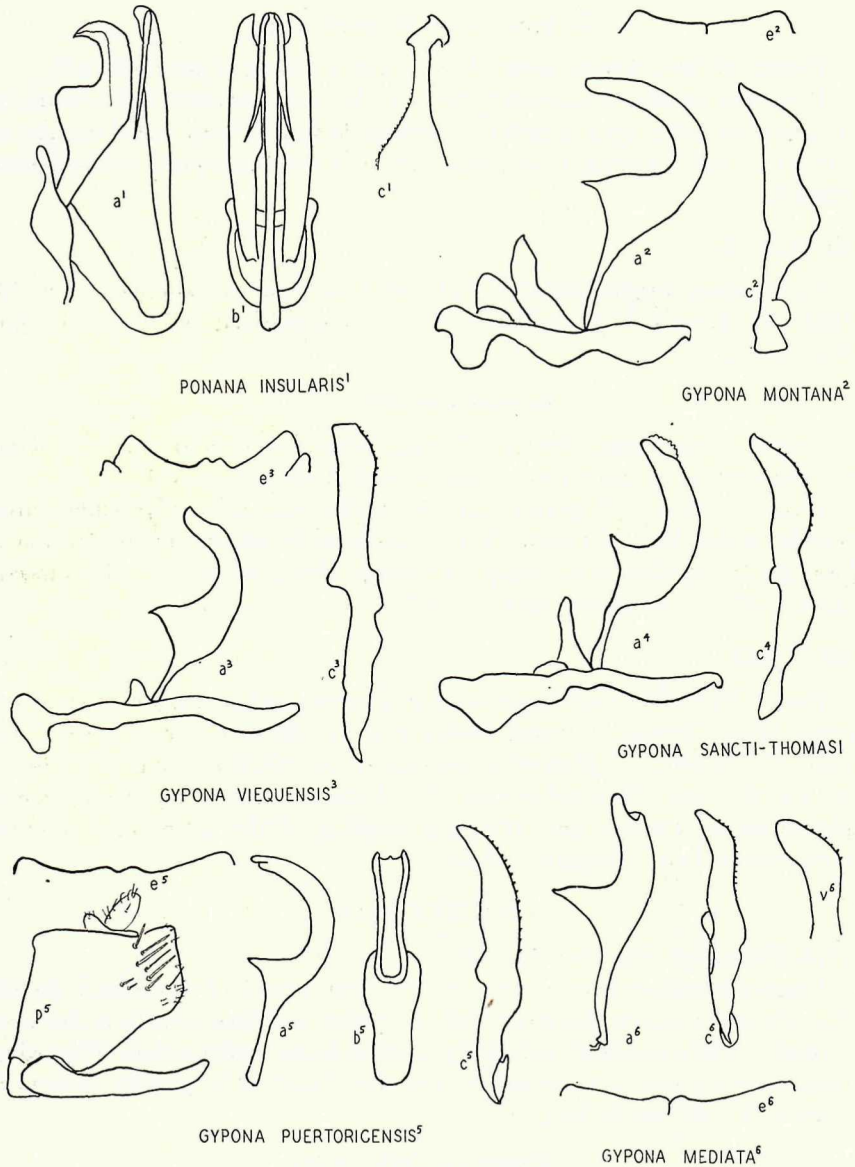


PLATE 7. a, internal genitalia or aedeagus, lateral, b, aedeagus, posterior, c, style, ventral, e, female sternite VII, v, variation in apex of style.

Head almost as broad as pronotum. Face relatively flat. Vertex less than twice as broad as long, rather acute apically in dorsal aspect but this is variable; anterior margin thin. Fore wing slender, acute apically. Female sternite VII short, truncate caudad. Male pygofer bilobed on either poste-

rior margin in lateral aspect. Plates short with convergent apices. Styles apex curved dorsad, acute; small spur present ventrally just before apex. Aedeagus curved dorsally, bifid apically; a pair of slender, prebasal processes present following curve of aedeagus but a little shorter. (See Plate 8.)

RECORDS:

Puerto Rico: Specimens from Luquillo, Toro Negro, and Carite Mountains. There is considerable variation in the exact shape of the vertex and

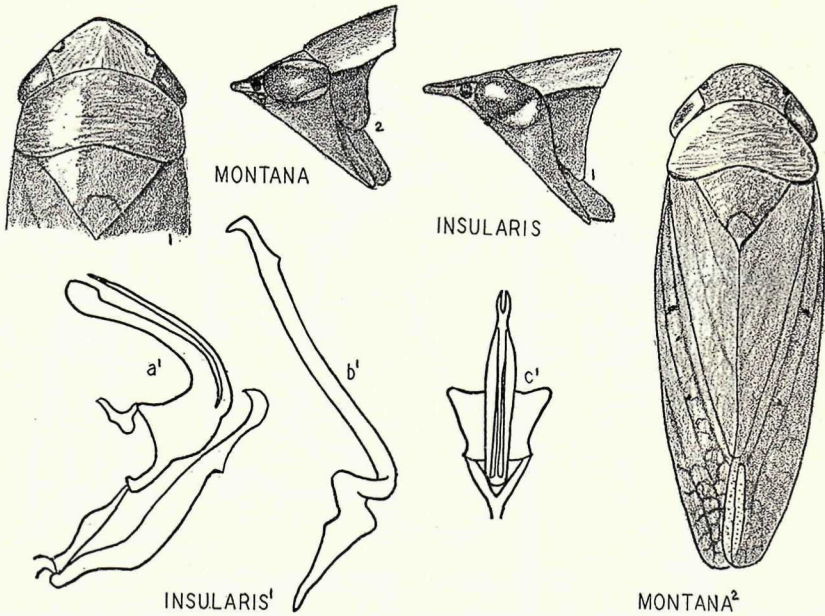


PLATE 8. *Krisna*, a, internal genitalia, lateral, b, style, ventral, c, apex of aedeagus, ventral.

in the male styles. If subspecific relationships are present I am not able to figure these out with the material at hand. A female allotype is erected at this time from Doña Juana, Toro Negro Mts., altitude 2800 ft., Oct. 9, 1947, from shrub along the forest border.

Krisna montana n. sp.

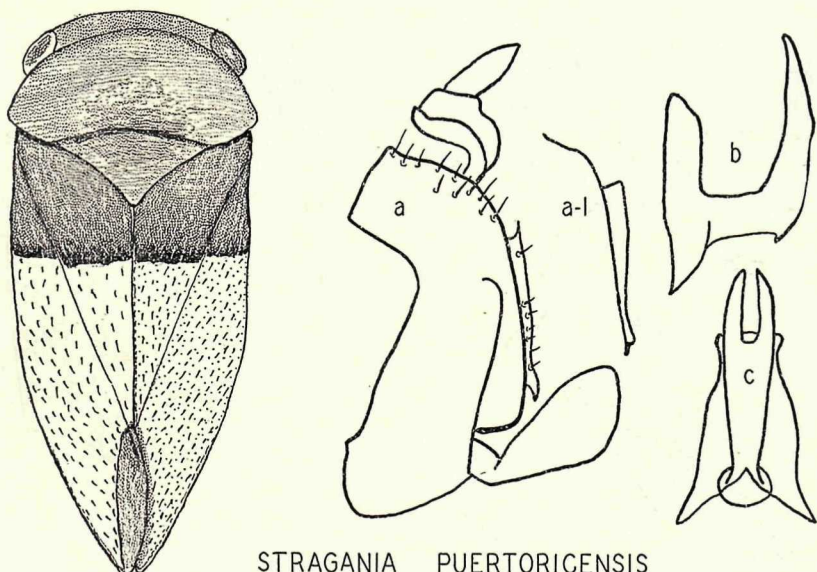
Length of female 8.5 mm. Color pale green fading to pale yellow in dried material. Eyes with longitudinal red stripe; ocelli red. Fore wing with small black spot on first and second cross vein in left wing; right fore wing with extra cross vein between first and second sectors and a black spot on each one making three spots. (See Plate 8.)

Head almost as wide as pronotum. Face slightly inflated. Vertex twice

as broad as long, not greatly produced; anterior margin broadly rounded in dorsal aspect. Fore wing scarcely exceeding apex of genital segment; broadly rounded apically. Female sternite VII slightly produced and gently sinuate caudally.

RECORD:

Puerto Rico: Female holotype and paratype from La Maravilla camp, Toro Negro Mts., altitude 3300 ft., Nov. 14, 1947, from unidentified bushes and shrubs along trail. (Caldwell and Martorell).



STRAGANIA PUERTORICENSIS

PLATE 9. a, genital capsule, a-1 variation, b, aedeagus, lateral, c, aedeagus ventral.

Differing from the other species by the smaller size, shorter less produced vertex, and sinuate genital segment of female.

STRAGANIA Stål

1859. Handl. K. Sven. Vetén.-Akad. **3**: 49.

Head narrower than pronotum, steeply rounded in front, short and parallel margined in dorsal aspect. Pronotum and scutellum transversely striate. Pronotum carinate laterally. Fore wing strongly setose; appendix and first apical cell not separated.

Stragania puertoricensis n. sp.

Length, male 3.7 mm. Female 4-4.5 mm. Female green over all. Male green with head and pronotum yellowish, with brownish area in median

of basal half of pronotum and scutellum. Basal third of fore wing red-brown bounded posteriorly with black; remainder of fore wing greenish with indefinite infusate area at end of clavus.

Short, robust. Vertex approximately six times broader than long. Fore wing somewhat hyaline. Female sternite VII slightly produced caudad. Pygofer in male setose dorsally, each latro-posterior margin with narrow, elongate flap which is very acute at the extremities in males from Maricao and truncate at the ends in the males from the Toro Negro Mts. Plate greatly expanded apically, curved dorsad. Style short, abruptly divergent in apical third, acute apically. Aedeagus in lateral aspect shape of "7"; anterior portion deeply bifid in caudal aspect. (See Plate 9.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of either sex from Maricao Insular Forest; paratypes from the Toro Negro Mts. (Caldwell and Martorell) Paratypes from Maricao Insular Forest. (Ramos)

Adults and immatures taken on cabrilla, *Trema Lamarkiana*, Sept. 12, 1947, altitude 2600 ft. at Maricao Insular Forest.

Subfamily Ledrinae

Anterior portion of body flattened dorsoventrally; posterior portion compressed laterally. Dorsal surface including fore wings, pitted and roughened. Episternum entirely exposed, or with only the anterior margin concealed by the gena.

XEROPHLOEA Germar

1839. *Zeits fur Entomologie*. **1**: 190.

Head flattened dorsoventrally. Dorsal surface of head and thorax deeply pitted. Pronotum carinate laterally. Fore wing compressed laterally, especially apically; appendix extending around apex. Species dimorphic; male usually smaller, much darker, with less angulate vertex than female.

Xerophloea viridis (Fabricius)

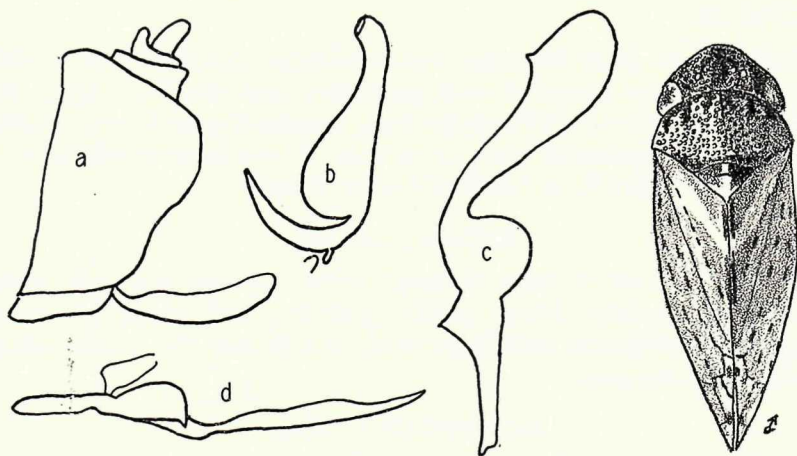
1784. *Cercopis viridis* Fabricius. *Ent. Syst.* **3**: 50.

1935. *Xerophloea breviceps* Osborn. *N. Y. Acad. Sci.* **13**: 143.

Length 4-7 mm. Female usually green with apices of fore wings fading to hyaline. Male brownish-gray, sometimes greenish. Vertex dark fuscous with longitudinal ridges either side of median line light to white basally. Pronotum with anterior margin narrowly darkened and six fuscous elongate spots extending a short distance posteriorly, the median spots separated by a white carina; posterior margin indefinitely infusate. Scutellum black with median white stripe enlarging and fading apically. Fore wing

embrowned basally; claval veins broadly whitish, suture blackish; veins alternately brown and white.

Vertex in female more produced and more angulate than in male. Vertex in either sex with two parallel ridges for full length, depression between ridges with a small carina carrying over to center of pronotum flaring posteriorly. Scutellum small. Fore wing with clavus setose. Female sternite VII broadly bilobed posteriorly. Male pygofer broadly lobate posteriorly on either side. Plate rounded apically. Style strongly curved outward, clavate apically with a short spur on inner margin subapically. Aedeagus with short, curved horizontal portion; apical portion pear-shaped; apex curved cephalad. (See Plate 10.)



XEROPHLOEA VIRIDIS

PLATE 10. a, genital capsule, b, aedeagus, lateral, c, style, ventral, d, style, lateral.

The only unique point concerning the type of *breviceps* is its small size. Other smaller males of *viridis* (down to 4.5 mm. in length) are exactly proportioned and marked the same as *breviceps*. The illustration showing the markings of *breviceps* (Osborn, fig. 15, 1935) is very misleading if it was taken from the type. It is also pertinent to note that there are two small males of *viridis* from Luquillo and Ensenada approaching *breviceps* in size in the Osborn collection that are not mentioned in his works.

Occurring on grasses and low vegetation in Puerto Rico, Caja de Muertos and Vieques Island, at low altitudes near sea level.

RECORDS:

Puerto Rico: Cago Rojo, Sept. 26, 1947, from grasses and weeds; Arecibo-Camuy Road, Km. 80, Oct. 16, 1947, from pasture mainly composed

of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Río Piedras, Loiza Road, Nov. 11, 1947, from weeds and grasses.

Vieques Island: Oct. 22, 1947, from weeds.

Caja de Muertos Island: Dec. 5-11, 1947, from weeds.

Subfamily Idiocerinae

Wedge shaped forms with vertex short and broadly rounded to face. Ocelli on face. Fore wing with extra large appendix.

IDIOCERUS Lewis

1835. Ent. Soc. London Trans. 1: 47.

Head broader than thorax, broadly rounded to flat face. Vertex short, broad. Fore wing longer than abdomen, with a very large appendix.

It is extremely doubtful that the Puerto Rican species properly belong in *Idiocerus* as represented by the European or Nearctic forms. The male genitalia of the species from the two regions are so radically different that to place the two together makes the genus polyphyletic.

KEY TO SPECIES OF IDIOCERUS

1. Head and pronotum yellow, fore wing black.....*maricensis*
Head pronotum, and fore wing almost unicolorous, greenish.....2
2. Face with two large orangish spots; male pygofer with caudal processes.....*parvulus*
Face solid greenish; male pygofer without caudal processes.....*myrctiae*

Idiocerus maricensis n. sp.

Length of female 4.3 mm. Head, pronotum and scutellum bright yellow. Eyes and lateral margins of pronotum black. Apex of scutellum white. Fore wing generally infuscate. Apex of clavus and apex of claval veins ivory white. A hyaline spot present in basal half of wing along costa bounded along costa by a yellowish band and around remainder by a black band slightly broadened posteriorly. A black area present along costa at apex of outer apical cell. Appendix and apical area lighter than rest of infuscate areas. Abdomen yellow ventrally with yellow color overlapping sides near the base, rest of abdomen brown to black.

Vertex approximately two and a half times as broad as long; more arcuate cephalad than in other species. Pronotum over twice as broad as long. Abdomen, not including genital segments, scarcely reaching as far as apex of clavus. Female sternite VII short, truncate caudad. (See Plate 11.)

RECORD:

Puerto Rico: Maricao-Sabana Grande Road, Km. 11.8, altitude 2200 ft., Nov. 19, 1947, from unidentified bushes.

Female holotype from Maricao Insular Forest. (Caldwell and Martorell).

Idiocerus parvulus Osborn

1935. *Idiocerus parvulus* Osborn. N. Y. Acad. Sci. **13**: 132.

Length 3.5–4 mm. General color greenish-yellow. Vertex with two large yellowish-orange spots extending over onto face. Pronotum hyaline in caudal half. Scutellum yellow with basal angles greenish and apex infuscate. Fore wing greenish-hyaline; costa broadly greenish, commissural margin lightly infuscate.

Head broad; eyes very prominent, almost overlapping entire lateral margins of pronotum. Vertex four times as broad as long. Female sternite VII truncate apically. Male pygofer broadly rounded posteriorly on either side. Plate short, broad. Style bifid apically with a small curved finger-like projection reaching beyond dorsal apex of plate. Aedeagus long, posteriorly, projecting dorsad with apex slightly bent cephalad. (See Plate 11.)

Common around Puerto Rico at low to median elevations.

RECORDS:

Puerto Rico: Barranquitas, Barranquitas-Aibonito Road, Barrio Helechal, Km. 8.4, altitude 1900 ft., from weeds and shrubs, (*Solanum*, *Rubus*, *Ipomoea* and *Casearia*); Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, collected at neon lights (day light type) at Mr. Heraclio Giron's farm; Cabo Rojo, Sept. 26, 1947, apparently breeding on *Cordia nitida* trees, at sea level.

Vieques Island: Naval Base grounds, Oct. 24, 1947, from weeds, bushes and grasses at sea level.

Idiocerus myrciae n. sp.

Length, male 2.8 mm.; female 3.2 mm. Head and pronotum greenish yellow without markings. Fore wing very lightly infuscate to hyaline with dark veins from hind wing visible through membrane; a dark area present at apex of clavus and a darker spot present between first and second sectors at midlength; appendix and apical cells clear hyaline.

Vertex twice as broad as long. Pronotum little longer than vertex. Female sternite VII very gently sinuate on posterior margin, very short. Male pygofer with three terminal processes on either latroposterior margin, the more dorsal process projecting over the other two. Plate long, gradually enlarged apically in lateral aspect. Style simple, rounded apically with apex abruptly bent outward. Aedeagus stout basally; caudal portion long, slender. (See Plate 11.)

RECORDS:

Puerto Rico: Male holotype, female allotype, and paratypes of either sex from Carite Mountains, Oct. 2, 1947, on *Myrcia splendens*. (Caldwell

and Martorell) Paratypes from Toro Negro Mts., La Maravilla, altitude 2800 ft., Nov. 14, 1947, from *Myrcia splendens*.

Subfamily Agalliinae

Ocelli on frontal surface of head. Vertex short, broad. Fore wing with appendix small or absent. Pronotum not carinate laterally.

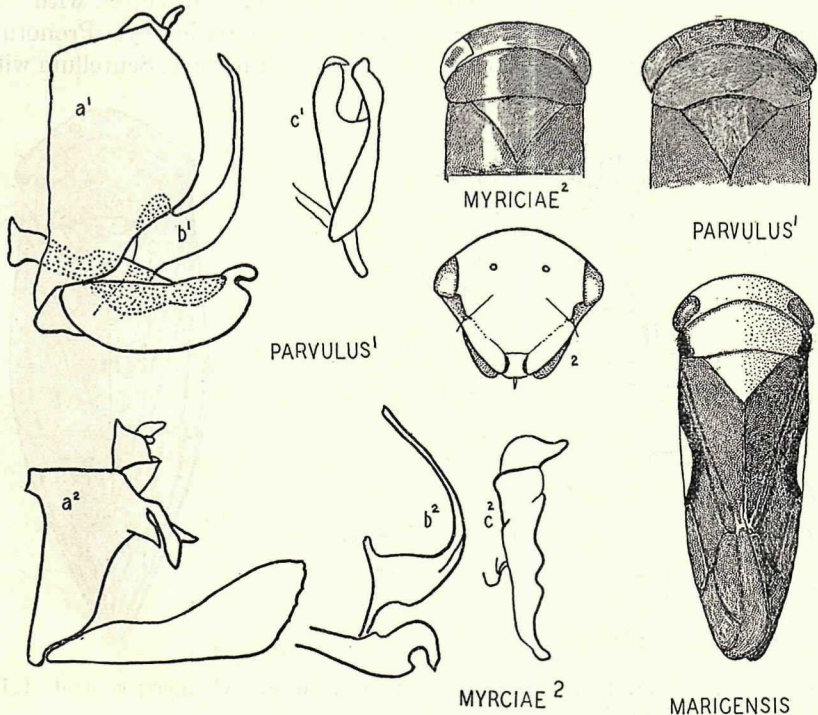


PLATE 11. *Idiocerus*, a, genital capsule, b, internal genitalia, lateral, c, ventral of style.

KEY TO GENERA OF AGALLIINAE

- 1. Pronotum pitted..... *Agalliana*
- Pronotum transversely rugose..... *Aceratagallia*
- Pronotum finely granulate..... 2
- 2. Vertex with posterior margin broadened, sinuated, and extended behind the eyes..... *Agalliopsis*
- Vertex with posterior margin not broadened nor prominently extended behind eyes..... *Agallia*

AGALLIANA Oman

1933. Tech. Bull. U. S. Dept. Agr. No. 372: 70.

Vertex of even length throughout, not extended behind eyes. Pronotum with pits which are usually black; anterior margin produced. Ovipositor

of female projecting beyond pygofer. Male with tenth or anal segment bearing spines. Styles bifid apically. Aedeagus short, stout, with latroapical projections.

Agalliana sticticollis (Stål)

1859. *Bythoscopus sticticollis* Stål. K. Sven. Frega. Eug. 2: 291.

Length 3-3.5 mm. General color light to dark brown. Vertex with two black spots equal distance from each other and from either eye. Pronotum with black circular pits except for an area behind either eye. Scutellum with

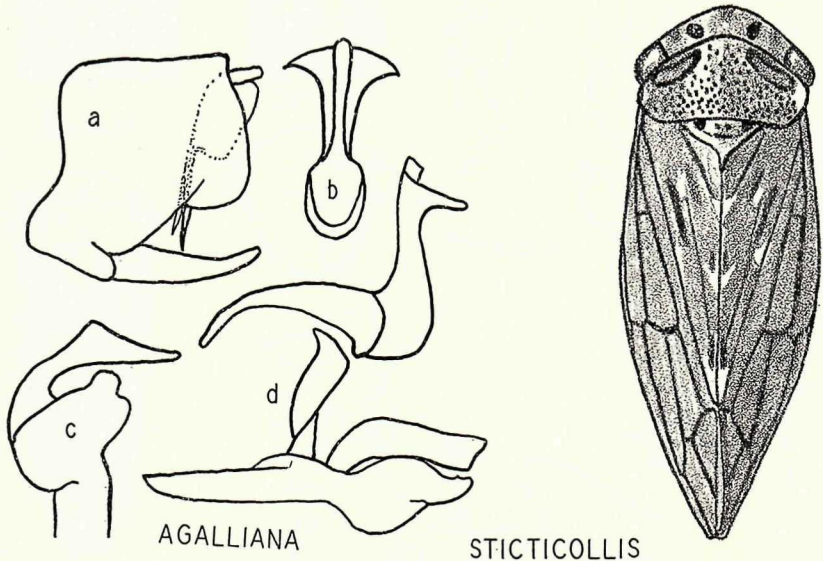


PLATE 12. a, genital capsule, b, aedeagus, ventral, c, style apex, ventral, d, internal genitalia, lateral.

a light, almost obscure median stripe, basal angles dark. Fore wing light brown with dark veins; claval area lighter. Posterior notch in female sternite VII edged with brown.

Vertex slightly longer at center than next to either eye. Fore wing with second cross vein present, with three anteapical and four apical cells. Female sternite VII deeply notched caudad. Male tenth segment with a pair of long bifurcate spines. Plate shorter than height of pygofer. Style bifid apically; inner arm foot-like extending over short blunt outer arm. Aedeagus roughly V-shaped with posterior portion bearing a pair subapical lateral processes which are curved caudad. (See Plate 12.)

Taken in the dryer areas along the coast of Puerto Rico, St. Thomas and other islands.

RECORDS:

Puerto Rico: Aguadilla Beach, Aug. 29, 1947, on weeds; Guánica Insular Forest, Sept. 26, 1947, from grasses; Arecibo-Barceloneta Road, Km. 11.4 (Beach Road), Oct. 16, 1947, from weeds and grasses; Arecibo-Camuy Road, Km. 84.4, Oct. 16, 1947, from bushes along sand dunes, also on pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between.

Vieques Island: Isabel Segunda-La Esperanza Road, Oct. 23, 1947, at lights, (automobile lights against white sheet at early night).

Caja de Muertos Island: December 5, 1947, from weeds.

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

AGALLIOPSIS Kirkaldy

1907. Hawaii. Sugar Planters' Assoc. Exp. Sta. Bull. 3: 30.

Vertex shorter medianly than next to either eye, produced and extended sinuately behind eyes. Pronotum with lateral margins obsolete, surface finely granulate. Fore wing slender. Male style bifid apically. Aedeagus elongate, with short apical processes.

Oman (p. 8, 1933) has noted that the forms in *Agalliopsis* form several distinct groups indicating that as the genus now stands it is probably polyphyletic.

Agalliopsis pepino (DeLong & Wolcott)

1923. *Agallia pepino* DeLong & Wolcott. Jour. Dept. Agr. P. R. 7: 258.

1933. *Agalliopsis pepino* Oman. Tech. Bull. U. S. Dept. Agr. No. 372: 12.

Length 2.5–3.3 mm. General color grayish-yellow. Vertex with a dark spot next to either eye, one above either ocellus, and a small median spot. Pronotum with a dark median line, a dark spot on either side anteriorly and a large grayish spot margined with fuscous on either side posteriorly, sometimes a fuscous dash farther laterad on either side. Scutellum with basal angle black, median suture and pits black. Fore wing brownish with whitish veins that are more or less margined with fuscous, a roughly circular whitish ring present near apex of clavus across both wings.

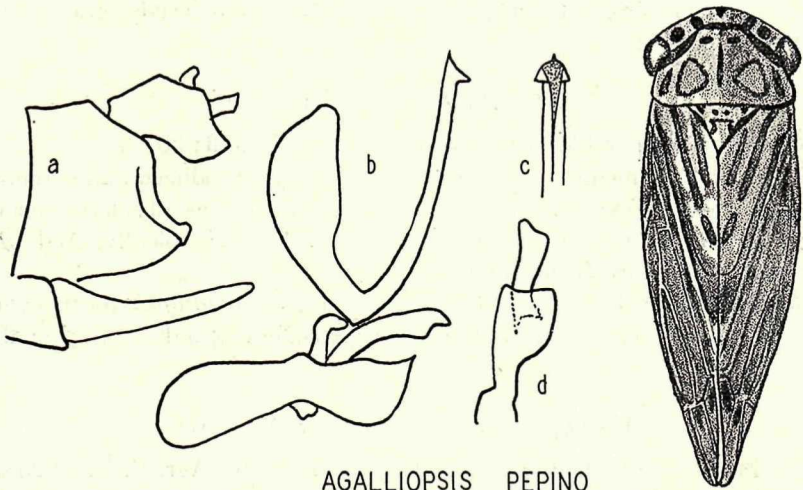
Vertex longest next to eyes. Pronotum greatly arcuate anteriorly. Female sternite VII deeply notched caudad. Male pygofer with a slight knobbed projection on either latrocaudad margin. Plate as long as height of pygofer. Style bifid apically; ventral arm short, stout, truncate apically; dorsal arm longer, slender. Aedeagus with posterior portion long, slender, with a pair of small acute apical flaps. (See Plate 13.)

Taken from low costal areas well up into the mountains but seems to be

more abundant in the lower dryer sections along the north coast of Puerto Rico and the coastal area of St. Thomas.

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, on grasses; Vega Alta, Aug. 19, 1947, on unidentified ornamentals; Cayey, Peñón del Collao, altitude 1900 ft., Aug. 28, 1947, from weeds; Barranquitas, Barranquitas-Aibonito Road, Barrio Helechal, Km. 8.4, altitude 1900 ft., from weeds and shrubs (*Solanum*, *Rubus*, *Ipomoea*, and *Casearia*); Aibonito outskirts, Sept. 11, 1947, from unidentified bushes; Orocovis-Coamo Road, Km. 53.4, altitude



AGALLIOPSIS PEPINO

PLATE 13. a, genital capsule, b, internal genitalia, lateral, c, apex of aedeagus, dorsal, o, style apex, ventral.

2200 ft., Sept. 11, 1947, from weeds and grasses; Aguas Buenas, (Enrique Castro's farm) altitude 1300 ft., Sept. 11, 1947, from melastomaceous plants in the low forest; Cayey-Guayama Road, Km. 20.6, Sept. 27, 1947, from weeds; Barceloneta Beach-Arecibo Road, Barrio Palmas Altas, along the coast, Oct. 16, 1947, from weeds and grasses; Canóvanas, Nov. 11, 1947, from weeds and grasses; Maricao Insular Forest, Maricao Sabana Grande Road, Km. 10.8, Nov. 13, 1947, by beating on *Trema Lamarkiana* "cabrilla"; Maricao Insular Forest, altitude 2700 ft., Nov. 13, 1947, among weeds, bushes and ferns; Aibonito, Dec. 30, 1947, from weeds; Maunabo-Yabucoa Road, altitude 700-900 ft., Nov. 21, 1947, among weeds, bushes and ferns.

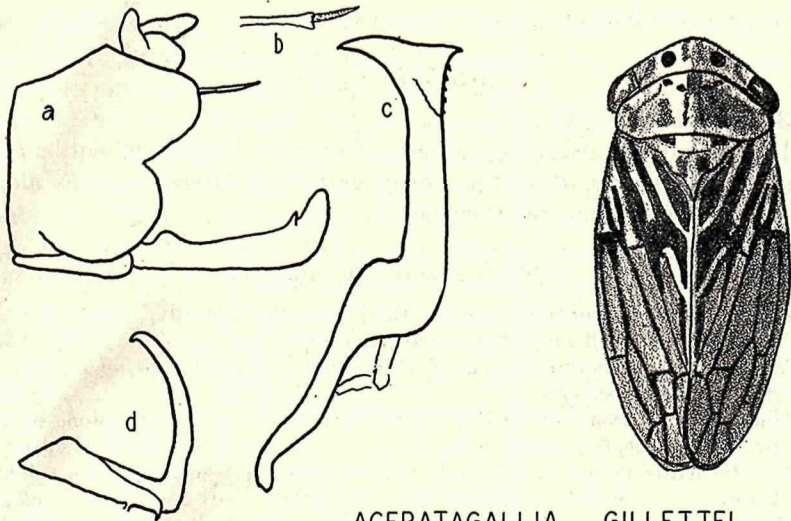
Vieques Island: Oct. 22, 1947, from weeds; Near Naval Base, Oct. 23, 1947, from weeds, grasses and bushes.

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

ACERATAGALLIA Kirkaldy

1907. Hawaii. Sugar Planters' Assoc. Exp. Sta. Bull. 3: 30.

Vertex longer at middle than next to eyes, not produced behind eyes. Pronotum transversely striate. Fore wing short, broad. Males with spinate tenth segment. Styles long, boot-shaped, not forked apically.



ACERATAGALLIA GILLETTEI

PLATE 14. a, genital capsule, b, dorsal spine, c, style, ventral, d, aedeagus, lateral.

Aceratagallia gillettei (Osborn & Ball)

1899. *Agallia gillettei* Osborn & Ball. Davenport Acad. Nat. Sci. Proc. 7: 60.

1933. *Aceratagallia gillettei* Oman. Tech. Bull. U. S. Dept. Agr. No. 372: 66.

Length 2.7–3 mm. General color brown marked with dark brown and fuscous. Vertex with two black spots about equal distance from each other and from eyes; a brown patch present next to either eye and a brown stripe on either side of median line. Pronotum with faint brown stripes on either side of median line and four indistinct posterior spots and four anterior spots. Scutellum with dark basal angles and sometimes a spot between these. Fore wing brownish with brown veins except white claval veins and white along base of corium.

Short, robust. Vertex appearing slightly angularly produced. Fore wing short, broad, second cross vein, three anteapical cells, and four apical cells

El Yunque Mts. 1700-3000 ft., Aug. 22, 1947, from shrubs, grasses and bushes; Doña Juana, Toro Negro Mts., altitude 2600-2800 ft., Oct. 9, 1947, from weeds and grasses; La Maravilla, Toro Negro Mts., altitude 2950 ft., Nov. 1947, from weeds, grasses and bushes; La Maravilla, altitude 3200 ft., Nov. 14, 1947, from weeds, grasses and ferns with *Rubus rosaefolius* and *Pothomorphe peltata* in between; La Maravilla, altitude 3200-3500 ft., Nov. 14, 1947, from weeds and bushes.

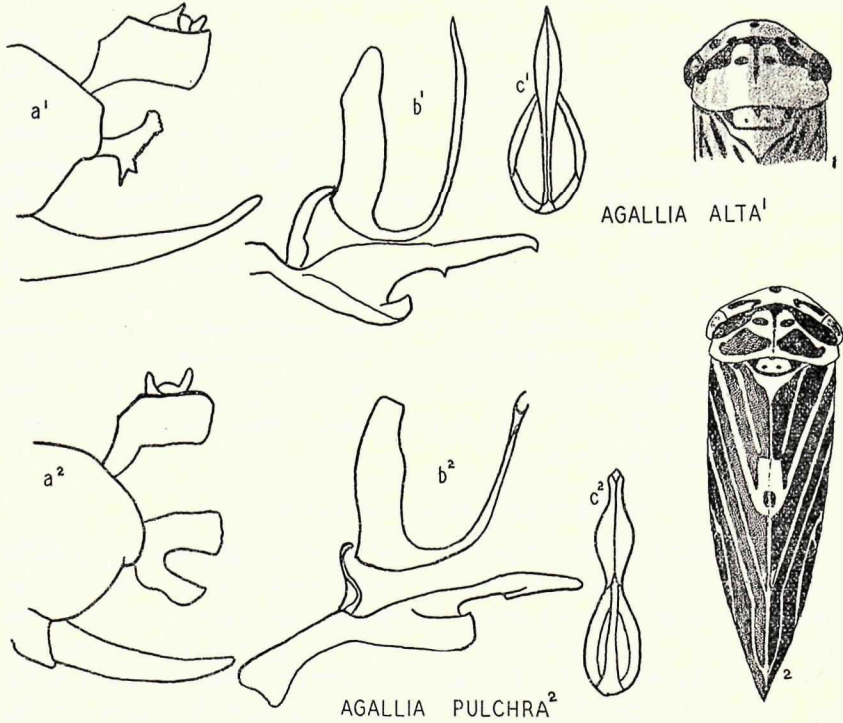


PLATE 15. a, genital capsule, b, internal genitalia, lateral, c, aedeagus, ventral.

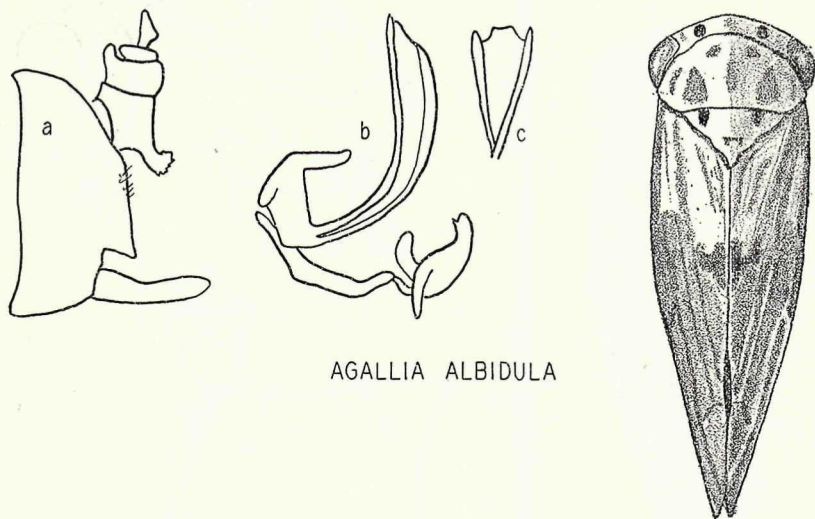
Agallia albidula (Uhler)

1895. *Agallia albidula* Uhler. Proc. Zool. Soc. London p. 84.

Length 3-4 mm. General color brownish-white. Vertex with two black spots closer to each other than to either eye. Pronotum with elongate brown median dash, a large triangular spot on either side followed by a thin dash farther laterad, and a brown spot on anterior margin behind either spot on vertex. Scutellum with brown basal angles, a short transverse suture and brown median pits. Fore wing brownish-white with veins more whitish, especially basally; a dark spot present at center of sutural

margin with the claval area broadly yellowish-white anterior to this spot. (See Plate 16.)

Vertex slightly longer next to either eye than at middle. Eyes prominent. Pronotum with anterior margin produced a little beyond anterior margin of eyes. Female sternite VII gently concave caudad. Male pygofer short, sharply notched ventroposteriorly around base of plates. Plate short, approximately half as long as height of pygofer. Tenth segment with ventroposterior lobes that are serrate apically. Aedeagus stout, strongly curved dorsad; apex broad and twisted to right. (See Plate 16.)



AGALLIA ALBIDULA

PLATE 16. a, genital capsule, b, internal genitalia, lateral, c, apex of aedeagus, ventral.

Probably the commonest species in the lower elevations of Puerto Rico and St. Thomas.

This species has been reported as a vector of a virus disease of tomato in Saõ Paulo, Brazil, by H. F. G. Sauer. *O Biológico* 12(6): 176-178, 1946.

RECORDS:

Puerto Rico: Luquillo Beach, Aug. 22, 1947, from weeds; Tallaboa, Aug. 28, 1947, on egg plants, *Solanum melongena*; Orocovis, (Orocovis-River bed), Sept. 11, 1947, among weeds and grasses; Jayuya-Ponce on La Carmelita Road, Sept. 25, 1947, from grasses and weeds; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Ponce, Nov. 21, 1947, by beating among weeds on papaya grove; Cabo Rojo, Jan. 6, 1947, from weeds; Mayagüez, Dec. 4, 1947, from weeds.

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

Agallia configurata Oman

1933. *Agallia configurata* Oman. Tech. Bull. U. S. Dept. Agr. No. 372: 36.

Length 3.5-4 mm. General color light brown or gray. Vertex with two

AGALLIA CONFIGURATA

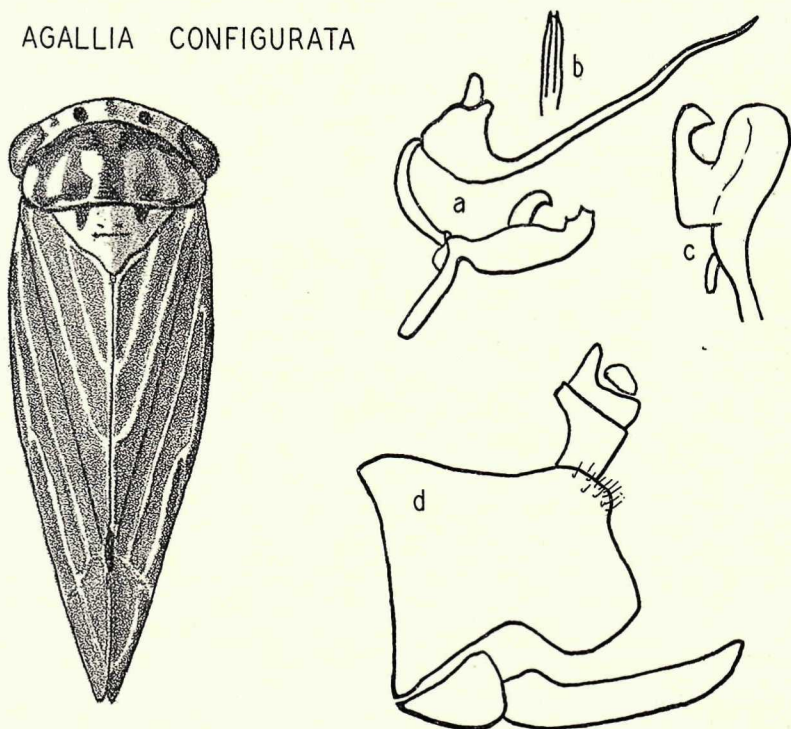


PLATE 17. a, internal genitalia, lateral, b, apex of aedeagus, posterior, c, style, ventral, d, genital capsule.

black spots equal distance from each other and from eyes. Pronotum mottled fuscous-brown in apical half with five broad brown stripes projecting to posterior margin, the intermediate stripes broadened posteriorly. Scutellum with basal angles dark brown. Fore wing gray to light brown with whitish veins.

Vertex short, about four times as broad as long. Pronotum with anterior margin produced forward to anterior margin of eyes. Female sternite VII broadly sinuate. Male pygofer broadly lobate ventroposteriorly. Plate very long, slender, as long as height of pygofer. Aedeagus long, slender, sinuate apically in lateral aspect. (See Plate 17.)

RECORDS:

Puerto Rico: Though less common, this form has the same range as *albidula* and is also found on St. Thomas. The long male plates readily separate *configurata* from *albidula*.

Subfamily Aphrodinae

Vertex produced, angular, usually with a median carina. Ocelli on margin of face and vertex removed from eyes.

Actually this subfamily is not represented in Puerto Rico because *Xestocephalus* does not belong in this group even though all published works place it here. The only character common to it and the other members of the subfamily is that of the ocelli being roughly on the margin of face and vertex and removed from the eyes. Dr. Oman places this genus in a new subfamily and because I do not want to chance anticipating his publication I leave *Xestocephalus* in Aphrodinae.

XESTOCEPHALUS Van Duzee

1892. Amer. Ent. Soc. Trans. 19: 298.

General form robust, small ovate. Head narrower than pronotum, subconical. Ocelli on rounded margin removed from eyes. Fore wing without appendix. Male styles elongate, acutely spatulate apically. Aedeagus with apical processes.

KEY TO SPECIES OF *XESTOCEPHALUS*

1. Species white with two prominent black spots along costa and one along commissural margin, two smaller spots present along cubitus; aedeagus with two pair latroapical processes projecting dorsad. *punctatus*
Species dark or figured; if two pair processes are present on aedeagus these are directed ventrally 2
2. Vertex with a sinuate transverse line apically; aedeagus with three pair latroapical processes. *triatius*
Vertex without transverse apical line; aedeagus with less than three pair processes. 3
3. Fore wing contrastingly brown and white in large patches, or faintly marked and yellowed with three black costal spots; aedeagus with one pair dorsal projecting processes. 4
Fore wing brownish with small well defined white spots especially prominent at apices of claval veins; aedeagus with two pair ventral projecting processes
maculatus
4. Fore wing conspicuously brown and white in large patches. *pulicarius*
Fore wing faintly tessellate or yellowed, three black spots along costa
pulicarius variety *pallidus*

Xestocephalus pulicarius Van Duzee

1894. *Xestocephalus pulicarius* Van Duzee Buffalo Soc. Nat. Sci. Bull. 5: 215.

Length 2.5–3 mm. General color brown with large whitish areas especially apically. Vertex with a pair median spots which are often white in the center, with dark lines projecting anteriorly from these spots. Pronotum brown with a pair white median spots near anterior margin and a white crescent posterior to these; a white spot present behind either eye and a white crescent behind these. Scutellum with brown basal angles. Fore wing brown basally with large white patches apically and along costa. (See Plate 18.)

Head broadly rounded. Pronotum little longer than vertex. Fore wing short, broad. Female sternite VII gently sinuate caudad. Male pygofer broadly produced on either latroposterior margin, irregularly narrowed ventrad; a simple process present dorsally, closely appressed. Style elongate in apical portion, curved dorsad, barbed on ventral margin near apex. Aedeagus with one pair subapical, lateral, spiniform processes. (See Plate 18.)

Probably the most common species in this genus in all of Puerto Rico occurring from sea level to approximately 3200 ft.

RECORDS:

Puerto Rico: Lares-Yauco Road, Km. 33.1, altitude 1700 ft., Sept. 12, 1947, on weeds and grasses under coffee plantation; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, on neon lights (daylight type); Alto de la Bandera (Jayuya-Ponce Road to La Carmelita) Sept. 25, 1947, from grasses and weeds; Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 10.8, Nov. 13, 1947, by beating on "cabrilla", *Trema Lamarkiana*; La Maravilla, Toro Negro Mts., altitude 3200 ft., Nov. 14, 1947, from weeds and bushes.

Xestocephalus pulicarius var. *pallidus* Osborn

1935. *Xestocephalus pallidus* Osborn. N. Y. Acad. Sci. **14**: 146.

Length 2.5–3 mm. General color almost white covered with faint tessellations. Costa with three black spots, area between more basal pair yellowed. (See Plate 18.)

Form and shape of typical *pulicarius* with identical male genitalia except for more slender and acute apex of style. (See Plate 18.)

This is believed to be a simple variation of *pulicarius* because both forms occur together at higher elevations and the light phase is almost confined to the female sex. In all of our collecting we were able to find only two males with this light marking. Dr. Brown of Cornell informs me that the type of *pallidus* can not be located at Cornell; therefore I erect a neotype female and set up an allotype male for *pallidus* from the Toro Negro Mts. P. R.

RECORDS:

Puerto Rico: Carite Insular Forest, Oct. 2, 1947, from trees, bushes and weeds; Doña Juana altitude 2600 ft., Oct. 9, 1947, from weeds; Doña Juana, altitude 2800 ft., Oct. 9, 1947, from weeds and grasses; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, from bushes, weeds and grasses; El Yunque Mts., altitude 1500 ft., Dec. 12, 1947, from bushes, weeds and grasses; Toro Negro Mts., Maravilla Camp, altitude 3200 ft., Nov. 14, 1947, from weeds and ferns with *Rubus rosaeifolius* and *Pothomorphe peltata*, in a very wet situation.

Xestocephalus maculatus Osborn

1929. *Xestocephalus maculatus* Osborn. Jour. Dept. Agr. P. R. **13**: 94.

Length 3-3.3 mm. General color dark brown mottled with fuscous. Vertex light brown with brown ring around each ocellus, a U-shaped mark present posterior to either ring and a median elongate dash between the U-shaped marks. Pronotum maculate with white. Fore wing maculate with fuscous, with three prominent spots along costa and one on inner apical cell; veins alternate brown and white, white especially prominent at apices of claval veins. Color more pronounced in female than in male. (See Plate 18.)

Head rounded, little more acute in female than in male. Pronotum short. Fore wing broadly ovate. Female sternite VII concave caudad. Male pygofer with a closely appressed bifid process on either side within. Style slender; apex scarcely enlarged or barbed, bent at right angle dorsally. Aedeagus short, thick, with two pair apical processes projecting ventrally. (See Plate 18.)

Common from the lowlands through 2000 ft. in wooded areas. Usually taken on *Inga vera* and low growing vegetation in shaded situations.

RECORDS:

Puerto Rico: Rio Piedras, Experiment Station, Sept. 7, 1947, on *Coffea arabica*; Barranquitas, Barranquitas-Aibonito Road, Barrio Helechal, Km. 8.4, altitude 1900 ft., from weeds and shrubs, (*Solanum*, *Rubus*, *Ipomoea* and *Casearia*); Ponce, Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from shrubs, weeds and underbrush of coffee plants; Lares-Yauco Road, Km. 33.1, altitude 1700 ft., Sept. 12, 1947, from weeds and grasses under coffee plants; Maricao Insular Forest, Oct. 10, 1947, from weeds; Cambalache Experimental Forest, Oct. 16, 1947, from weeds, shrubs and bushes; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Maricao Insular Forest (Maricao-Sabana Grande Road) Km. 11.8, Nov. 13, 1947, from bushes; Maunabo-Yabucoa Road, altitude 700-900 ft., Nov. 21, 1947, from weeds, brush and ferns.

Xestocephalus punctatus n. sp.

Length of male 3.6 mm. Whitish with black spots on fore wing as follows; one basad removed its own diameter from costa, one almost touching costa anterior to a line drawn perpendicular through apex of clavus; a small lighter spot posterior to this midway between costa and apex of clavus, one at apex of first claval vein and a smaller one between this spot and costa. The inner apical cell may be very lightly embrowned and the other apical cells are slightly yellowed. In some specimens there may be a very small black spot on the costa at the base of the outer apical cell.

Large broad headed species. Vertex very slightly angulate anteriorly. Pronotum twice as long as vertex. Fore wing long. Male pygofer broadly rounded on latroposterior margins. Style similar to *pulicarius* var. *pallidus* with apex a little more robust. Aedeagus with two pair latrosubapical processes; the dorsal pair S-shaped in lateral aspect. (See Plate 18.)

RECORDS:

Puerto Rico: Male holotype and two male paratypes from El Yunque Mt., Dec. 12, 1947. (Caldwell & Martorell).

Xestocephalus triatus n. sp.

Length, male 3 mm.; female 3.2 mm. General color golden brown with whitish-yellow spots. Vertex with a transverse black line between the eyes abruptly arched anteriorly around a pair of prominent yellow spots; two yellow spots present beside either eye. Pronotum with a pair of large median spots anteriorly and a small one behind either eye; four spots present near posterior margin, the inner pair transversely elongate. Scutellum white with brown basal angles and a dusky median area. Fore wing orangish basally becoming somewhat hyaline apically; veins with elongate white spots; apices of claval veins broadly white, commissural margin between these veins black; costa with two fuscous spots; fuscous spot present at apex of clavus; apical veins lightly infuscate.

Vertex somewhat acute apically. Pronotum twice as long as vertex. Fore wing rather elongate. Sternite VII of female almost as long as rest of abdomen, truncate posteriorly. Male pygofer with latroposterior margins bilobed, a simple process present within is closely appressed. Style with apical portion curved dorsad at right angle to basal portion; apical barb elongate. Aedeagus with three pair of latrosubapical processes. (See Plate 18.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratype of either sex from Toro Negro Mts., altitude 3000 ft., Nov. 14, 1947. This species was

taken from low herbage along with *pulicarius* and *pulicarius* var. *pallidus*. (Caldwell and Martorell).

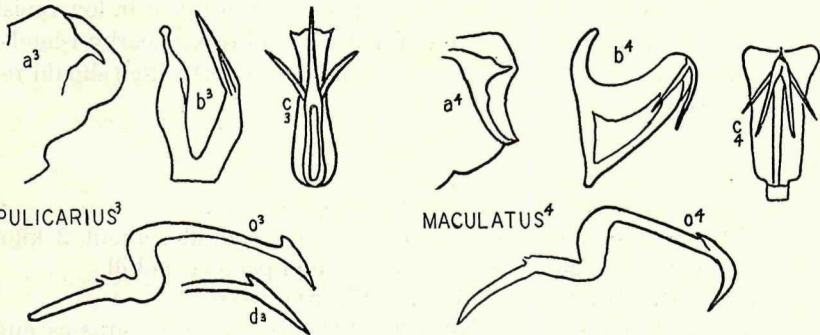
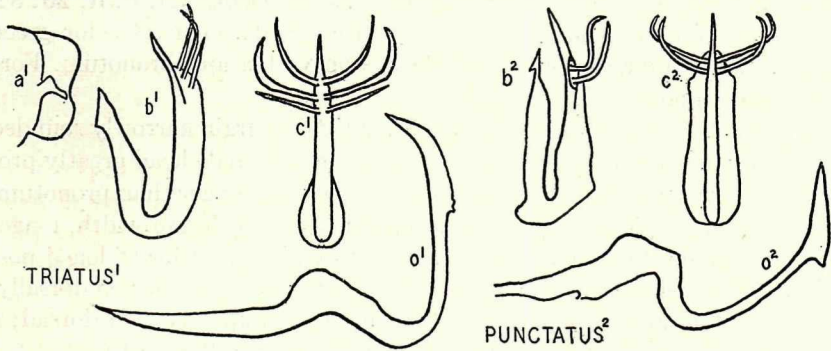
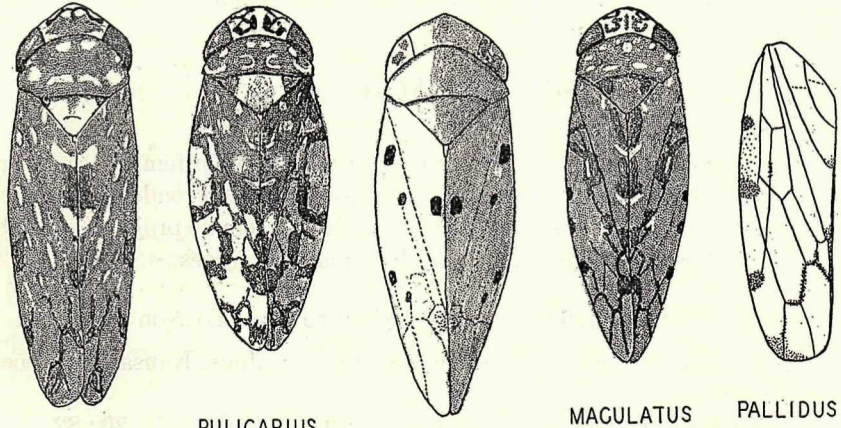


PLATE 18. *Xestocephalus*, a, pygofer, lateral, b, aedeagus, lateral, c, aedeagus, posterior, o, style lateral, d, style apex in *pallidus*.

Subfamily Dorydiinae

Vertex produced. Angle between vertex and face sharp with ocelli located on this margin next to either eye. Margin thinner and more foliaceous in female than in male.

SPANGBERGIELLA Signoret

1879. Ann. Ent. Soc. France. **9**: 273.

Head strongly declivient, anterior margin foliaceous in female; ocelli on sharp margin between face and vertex. Pronotum much broader than long. Fore wing with four short apical cells. Ovipositor in female projecting much beyond pygofer. Aedeagus in male with latroapical processes.

Spangbergiella vulnerata variety *convexa* Lawson

1932. *Spangbergiella vulnerata* var. *convexa* Lawson. Jour. Kansas Ent. Soc. **5**: 118-119.

1936. *Spangbergiella vulnerata* Wolcott. Jour. Dept. Agr. P. R. **20**: 82.

1936. *Spangbergiella* sp. prob. new, Wolcott. Jour. Dept. Agr. P. R. **20**: 82.

Length 5-7 mm. Female much longer than male. General color green with elongate orangish convergent dashes on vertex and pronotum. Fore wing with orangish-yellow venation.

Male head bluntly rounded anteriorly; anterior margin narrowly rounded to face. Vertex and pronotum subequal in length. Female head greatly produced; anterior margin very thin, foliaceous. Vertex longer than pronotum. Fore wing with apical cells in female subequal in length and width, longer in male. Female sternite VII truncate caudad. Male pygofer widened posteriorly in lateral aspect. Valve short. Plate acute apically, curved dorsally. Style narrowed apically. Aedeagus horizontal with apex curved dorsad; a pair of broad, flat, latroapical processes present. (See Plate 19.)

Originally described from Florida this form has been taken in low moist areas in Puerto Rico, on the hillsides of Vieques and other nearby islands. Very probably all records for the typical form from Puerto Rico should refer to the variety.

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, from grasses.

Vieques Island: Airport Road south of Isabel Segunda, about 2 kilometers from town, Oct. 23, 1947, from bushes and pasture on hill.

Caja de Muertos Island: Dec. 5-11, 1947, from weeds.

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

Subfamily Coelidiinae

Blunt headed forms with the vertex widened behind the eyes. Frons long, narrow. Fore wing broad. Legs, especially tibiae very long.

COELIDIA Germar

1803. Syst. Rhyng. p. 85.

Robust, quadrate in appearance. Legs appearing very long. Vertex quadrate, slightly carinate laterally. Fore wing with one closed anteapical cell; appendix distinct. Sternal apodemes long, slender, almost dorsal in origin.

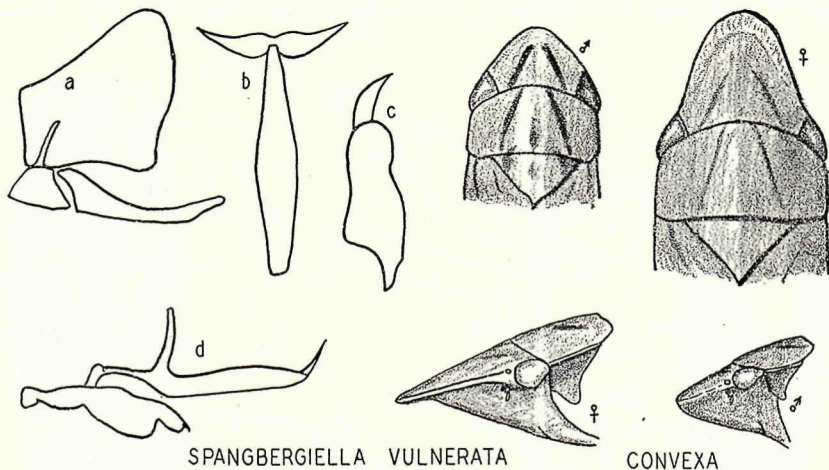


PLATE 19. a, genital capsule, b, aedeagus, ventral, c, style, ventral, d, internal genitalia, lateral.

Female ovipositor exceeding pygofer in length. Male pygofers with terminal flap or process on either side. Aedeagus and styles filamentous.

Coelidia obligata (Osborn)

1935. *Jassus obligatus* Osborn, N. Y. Acad. Sci. 14: 167-168.

Length, male 4.5 mm.; female 6 mm. General color black with bright yellow lineate stripe along inner claval suture, an irregular transverse stripe across apical cross veins, and an elongate dash in center of precostal area. Female with longitudinal veins yellowed. Male with apex of vertex yellow. (See Plate 20.)

Female with sternite VII twice as long as preceding segment, produced. Male with apex of aedeagus flattened dorsoventrally, broadly bifid. (See Plate 20.)

I have only seen the original Uhler material. The one Puerto Rican specimen was sitting on *Ficus laevigata*.

Coelidia salina n. sp.

Length, male 4.8 mm.; female 5.7 mm. Male orange with black face, pronotum, scutellum, and apex of fore wing except for orange area just posterior to apical cross veins which extends from costa to inner apical cell. Female white with frons touched with orange; pronotum heavily mottled with orange or fuscous; fore wing mottled basally with orange or fuscous, transversely irregularly blackened from apex of clavus to costa, apex infuscate. (See Plate 20.)

Vertex longer than pronotum. Pronotum much broader than long. Female with sternite VII three times as long as preceding segment, broadly

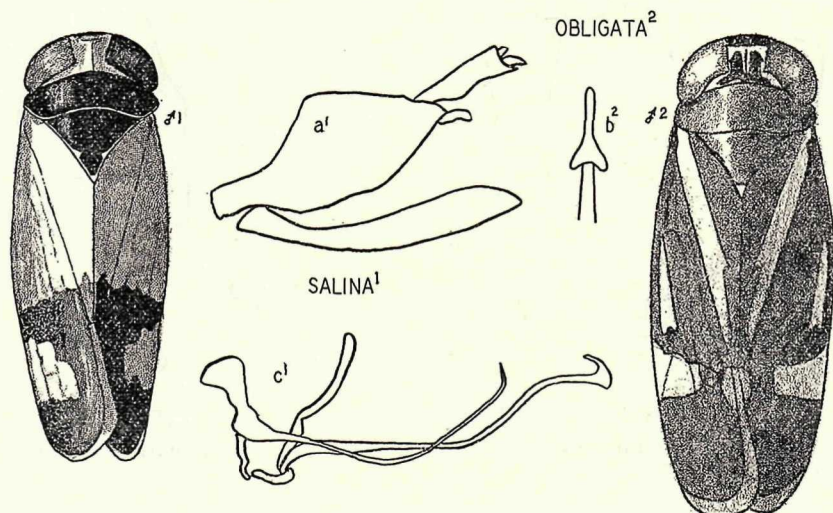


PLATE 20. *Coelidia*, a, genital capsule, b, apex of aedeagus, dorsal, c, internal genitalia, lateral.

produced at center of posterior margin. Male with aedeagus long slender, apex flattened laterally. (See Plate 20.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes of both sexes from Las Cucharas Beach, Ponce-Guayanilla Road, Sept. 11, 1947. Both immatures and adults were taken from "yerba bellaca", *Croton humilis*. (Caldwell and Martorell)

Subfamily Euscelinae

Ocelli on anterior margin of head between vertex and face. Fore wing usually with three anteapical cells and hind wing with four apical cells. Basal tarsus of hind leg not sulcate basally.

KEY TO GENERA OF EUSCELINAE

1. Genae visible behind eyes in dorsal view. Scaphytopius
Genae not visible behind eyes from above. 2
2. Fore wing acutely pointed apically. Acinopterus
Fore wing rounded apically. 3
3. Fore wing with two antepical cells. 4
Fore wing with more than two antepical cells. 5
4. Vertex slightly produced; fore wing with three apical cells. Cicadulina
Vertex transverse; fore wing with four apical cells. Macrosteles⁴
5. (3) Fore wing with veins from outer apical cell to costa broadly darkened apically;
male plates filamentous apically. Osbornellus
Fore wing with veins from outer apical cell to costa, if present, not darkened;
male plates normal. 6
6. Second cross vein present in fore wing. 7
Second cross vein not present in fore wing. 13
7. Claval suture with many prominent cross veins present on both sides. Maricaona
Fore wing with no extra cross veins or with extra veins in claval area only. 8
8. Fore wing with extra cross veins in claval area. Polyamia
Fore wing without extra cross veins. 9
9. Fore wing with venation simple, obscure. Laevicephalus
Fore wing with venation very prominent. 10
10. Vertex with four apical spots; male aedeagus with basal processes. Haldorus
Vertex variously marked; aedeagus without basal processes. 11
11. Fore wing with apical cells extremely short; posterior half of inner antepical
cell ovate. Sanctanus
Fore wing with apical cells normally elongate; posterior half of inner antepical
cell rectangular. 12
12. Robust species; vertex much broader than long. Amplicephalus
Small species; vertex about as long as broad. Deltoccephalus
13. (6) Fore wing with large appendix extended around apex. Exitianus
Fore wing with normal appendix not extending around apex. 14
14. Vertex with prominent transverse apical black band. Limotettix
Vertex without black band (*Chlorotettix nigromaculatus* has a faint transverse
line on the vertex.) 15
15. Vertex with four to six marginal spots. Graminella
Vertex unmarked or with a faint line. 16
16. Larger species; usually greenish-yellow; aedeagal processes, if present, projected
cephalad. Chlorotettix
Smaller species; usually pink to yellow; aedeagal processes forming an apical
circle. Circulifer

SCAPHYTOPIUS Ball

1931. Canadian Ent. 63: 218.

Head greatly produced, acute apically. Genae visible behind eyes from above. Fore wing with second cross vein and many dark reflexed veinlets along costa.

Male genitalia of two general types; in one the aedeagus is bifid apically

⁴ Baldulus will also key to *Macrosteles*, but it is differentiated from it by the elongate form relative acute vertex with two black spots, elongate basal tarsus of the hind leg, and male pygofer without processes.

and strongly attached to the connective between styles; in the other the aedeagus is more of a simple tube more strongly attached to the upper pygofer and anal segment. This latter type is accompanied by a pair of long, slender basal processes attached to the connective between the styles. In the Continental American fauna this group of species has been divided into several genera but not on the bases of type of male genitalia; therefore it is probably better at this time to treat the Puerto Rican fauna as one genus.

KEY TO SPECIES OF SCAPHYTOPIUS

1. Scutellum predominately white..... *albascutellus*
Scutellum variegated, not white..... 2
2. Vertex yellow, unicolorous..... *jandacephalus*
Vertex dark, variegated..... 3
3. Face light yellowish..... 4
Face dark, clypeus and lora may be light..... 5
4. Face irrorate with red and black; aedeagus with straight apical processes
neloricatus
Face with apical marking only; aedeagal processes bent..... *fuliginosus*
5. Vertex brown, face black over all..... *nigrinotus*
Vertex yellow with longitudinal dark stripes; lora and clypeus yellow in contrast to brown face..... *lineacephalus*

Scaphytopius albascutellus n. sp.

Length 3.5-4.5 mm. General color brownish-black. Face light yellow with very few scattered red specks. Vertex with white as follows; a dash cephalad either eye and a pair more median dashes inside of eye spots, an irregular median dash at apex, and a pair basal dashes either side of median line. Pronotum with five irregular longitudinal hyaline lines. Scutellum ivory white with basal angles, transverse suture, and median pits dark. Fore wing fuscous, irrorate with darkened spots, bars, and lines; hyaline areoles present over all especially in claval area and area along costa; apical area including appendix hyaline. (See Plate 21.)

Vertex twice as long as width between eyes, twice as long as pronotum. Female sternite VII short, with blunt median projection caudally. Male style shallowly bifid apically. Aedeagus U-shaped; posterior portion with pair thin, laterally sinuate, apical processes. (See Plate 21.)

RECORDS:

Puerto Rico and Caja de Muertos Island: Male holotype from Caja de Muertos Island, Nov. 5, 1947, female allotype from Aguirre, Nov. 21, 1947. (Caldwell and Martorell). Paratypes from Muertos Island (Caldwell and Martorell) and from Guánica Insular Forest, (Ramos).

Scaphytopius nigrinotus n. sp.

Length of male 4.5 mm. General appearance black. Face dark with two gray transverse apical bands. Eyes red. Vertex yellowish heavily overcast

with black; apex black. Pronotum yellowish next to vertex; five faint longitudinal whitish lines present. Scutellum black with faint yellowish spots near basal angles. Fore wing black with indistinct hyaline markings; base of costa white. (See Plate 22.)

Vertex twice as long as width between eyes. Fore wing elongate. Male plate short, rounded apically. Style deeply bifid apically; inner arm thick, truncate apically; outer arm thin, curved, acute apically. Aedeagus a thin short tube; ventral processes elongate, barbed on inner margins apically. (See Plate 22.)

RECORD:

Puerto Rico: Male holotype and paratype from red mangrove, "mangle colorado", *Rhizophora mangle*, in Guánica Insular Forest, Sept. 26, 1947. (Caldwell and Martorell)

Scaphytopius lineacephalus n. sp.

Length, male 4.5 mm.; female 5 mm. General appearance orange-brown. Face brown, yellowish basally, apex with two transverse white lines, a yellow median spot present below apical lines. Vertex brownish-yellow with a yellow median stripe and a yellowish dash next to either eye. Pronotum yellowish laterally and apically, remainder hyaline maculate with brown. Scutellum yellow irrorate with brown in basal area. Fore wing orange-brown with black maculations, two white areoles present in claval area and one in each apical cell; veins black. (See Plate 21.)

Head produced, rather blunt. Eyes appressed. Vertex two-thirds as broad as long. Fore wing long. Male style bifid apically; outer portion short, obtuse; inner portion extremely long, thick, acute apically. Aedeagus U-shaped, with a small spur on anterior-basal surface of posterior portion; ventral processes crossing at mid-length, apices twisted, divergent. (See Plate 21.)

RECORDS:

Puerto Rico: Male holotype from Doña Juana Unit, Toro Negro Mts., altitude 2600 ft., Oct. 10, 1947, female allotype from Carite Mts., Oct. 2, 1947, (Caldwell and Martorell). Female paratype from San Germán, P. R. Nov. 5, 1947, (Maldonado).

Scaphytopius neloricatus n. sp.

1929. *Platymetopius loricatus* Osborn. Jour. Dept. Agr. P. R. **13**: 95.

Length, male 3.8 mm.; female 4 mm. Face yellow, irrorate predominately with red, a few fuscous flecks present apically and laterally. Vertex brownish with the following whitish dashes; a median one apically, a pair pre-

ocular, a pair basal, and a pair anterior to basal spots between basal and ocular. Pronotum hyaline irrorate with fuscous spots omitting five hyaline lines. Scutellum irrorate with brown, all angles darkened. Fore wing white irrorate with fuscous spots and bars, a few clouded areas present especially

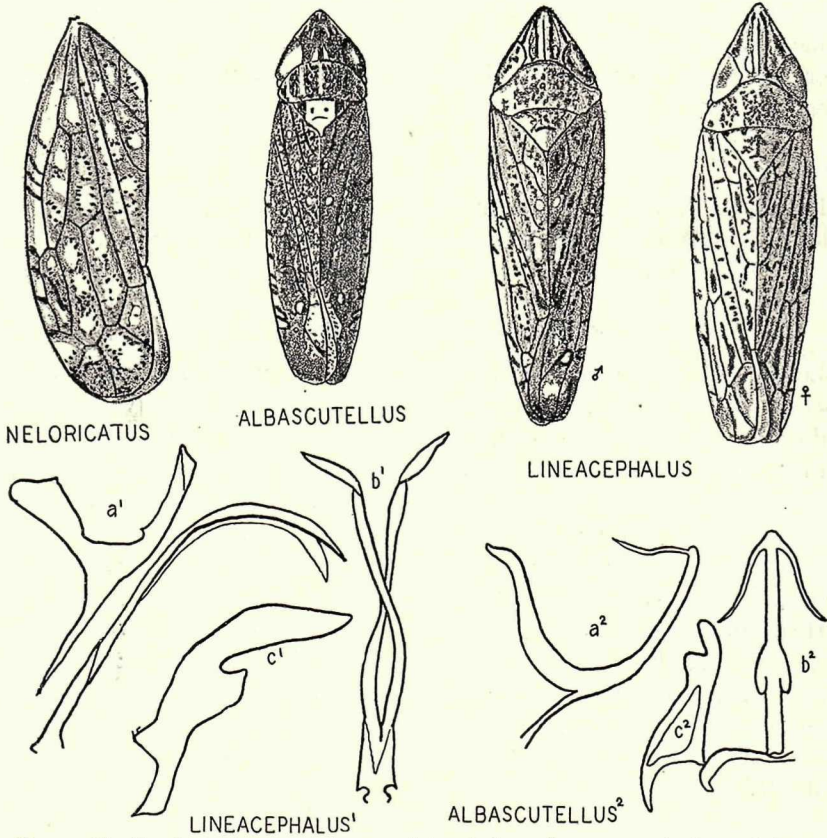


PLATE 21. *Scaphytopius*, a, aedeagus, lateral, b, aedeagus, ventral, c, style, ventral.

apically. Color pattern more dense in female than in male. (See Plates 21 and 22.)

Vertex acute, longer in female than in male. Female sternite VII almost truncate posteriorly, with a small median projection notched apically. Male style elongate, simple, apex curved outward. Aedeagus U-shaped with posterior apex bearing straight, lateral processes that project cephalad. (See Plate 22.)

RECORDS:

Puerto Rico: Male holotype from Aguas Buenas, altitude, 1300 ft., Sept. 14, 1947, by sweeping on low forest among melastomaceous shrubs;

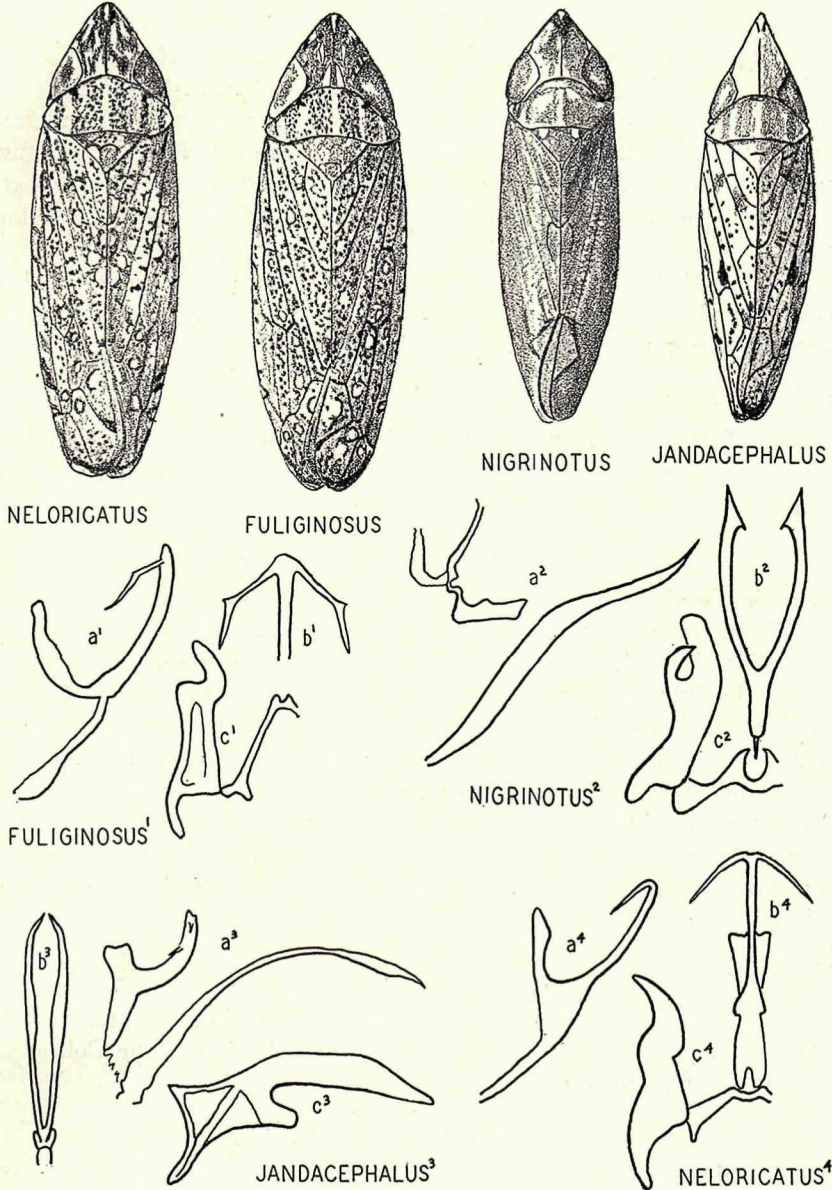


PLATE 22. *Scaphytopius*, a, aedeagus, lateral, b, aedeagus, ventral, c, style, ventral.

female allotype from Cambalache Experimental Forest, Arecibo, Nov. 7, 1947, female paratype from near Isabela, Aug. 29, 1947, and male paratype from Alto de la Bandera, Sept. 25, 1947, (Caldwell and Martorell).

Scaphytopius fuliginosus (Osborn)

1923. *Platymetopius fuliginosus* Osborn. Ann. Carn. Mus. **15**: 34.

1936. *Platymetopius frontalis* Wolcott. Jour. Dept. Agr. P. R. **20**: 83.

Length 4 mm. General color brown to tan. Face yellow, lightly irrorate along dorsal margin. Vertex with white dashes as in *neloricatus*. Pronotum punctate with black, with five white stripes. Scutellum yellowish irrorate with black, four whitish spots present basally. Fore wing brownish-yellow punctate with black; many white aeroles present. (See Plate 22).

Male style shallowly bifid apically, inner arm long, bent outward. Aedeagus U-shaped, with latroapical processes, that are bent at midlength with a very minute spur at this point. (See Plate 22.)

RECORDS:

Puerto Rico and Vieques Island: Taken around the western end of Puerto Rico from Isabela to Guánica. Also collected at Vieques, Naval Base, Oct. 23, 1947, by beating among weeds.

Scaphytopius jandacephalus n. sp.

Length of male 4 mm.; head almost 0.9 mm. General appearance yellow. Face smoky, with a pair transverse apical lines. Vertex golden, very thinly margined with black and with a pair short, thin black lines apically. Pronotum yellowish, with five indistinct whitish stripes. Scutellum yellowish-red. Fore wing white, but very lightly irrorate with fuscous spots; veins orangish darkening apically; cross veins dark; a dark spot present in center of wing and one along costa. (See Plate 22.)

Vertex extremely long, acute. Male plate short, blunt. Style with inner fork greatly extended. Aedeagus very small, U-shaped, with two pair very small spurs on caudal portion; basal processes long, spiniform, evenly arcuate in lateral aspect. (See Plate 22.)

RECORD:

Puerto Rico: Male holotype from Guánica Insular Forest, Aug. 3, 1945, on "linguam", *Capparis indica*, in the Ramos collection at the College of Agriculture, Mayagüez, P. R.

OSBORNELLUS Ball

1932. Washington Acad. Sci. Jour. **22**: 10, 17.

Head little more narrow than pronotum. Vertex produced, slightly

angulate. Fore wing without second cross vein; veinlets present from outer apical cell to costa. Male plates extremely long, filamentous apically.

Osbornellus bimarginatus (DeLong)

1923. *Scaphoideus bimarginatus* DeLong. Jour. Dept. Agr. P. R. 7: 261.

Length 4–4.3 mm. General color brownish-yellow, with apical terminations of most veins broadly infusate. Apex of head between eyes with three broad whitish bands alternated with four black bands. Pronotum and scutellum lightly washed with brown. Fore wing subhyaline, brownish; cross veins from outer apical cell to costa broadly darkened. (See Plate 23.)

Vertex angularly produced, width about equal to length. Fore wing with central antepical cell constricted, usually divided, the posterior portion

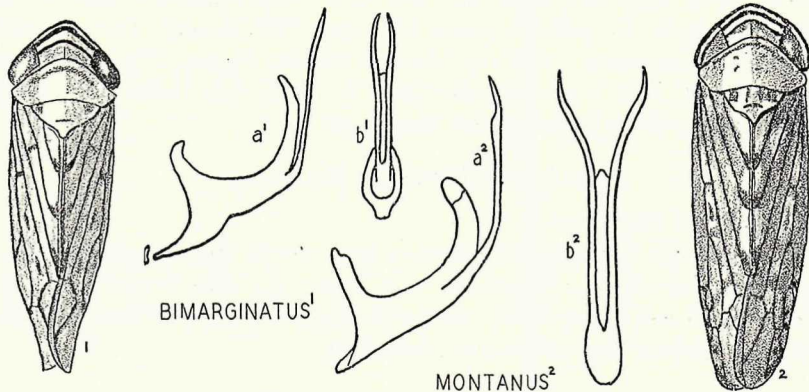


PLATE 23. *Osbornellus*, a, aedeagus, lateral, b, aedeagus, ventral.

ovate. Female sternite VII with posterior margin produced into a broad median tooth. Male style short; apex curved outward, acute. Aedeagus slender, crescent-shaped, with a pair slender, ventroposterior processes projected dorsad well beyond posterior portion of aedeagus. (See Plate 23.)

RECORDS:

Puerto Rico: Male allotype and paratypes from Cambalache Experimental Forest, Arecibo, Nov. 7, 1947, altitude 300 ft., from weeds and grasses. Paratypes from around the coastal plains of Puerto Rico.

Vieques Island: Paratypes from Vieques Island are very small, measuring 3.5 mm., Oct. 23, 1947, Navy Base grounds, from weeds and grasses. (Caldwell and Martorell).

Osbornellus bimarginatus subspecies *montanus* n. subsp.

Length, male 4.5 mm.; female 5 mm. Resembling the typical form but with vertex distinctly broader than long, rounded anteriorly eyes. Distal

portion of aedeagus much stouter, bluntly rounded; processes stouter, narrow and divergent apically. (See Plate 23.)

It may be questionable that this form is distinct but it does replace the typical form in the higher elevations away from the coastal plains and it can be differentiated by either chrotic or phallic characters, therefore I give it subspecific rank.

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of either sex from mountains north of Ponce, Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from shrubs, weeds and the underbrush on coffee plantation. Paratypes from the higher elevations as follows: Ciales-Jayuya Road, Km. 30.6, Sept. 25, 1947, from bushes and low shrubs, near coffee plantation; Luquillo, Yunque Mts. over 1500 ft. high, Dec. 12, 1947, from weeds, grasses and bushes; Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 11.8, altitude 2500 ft., Nov. 13, 1947, from weeds, grasses and bushes. (Caldwell and Martorell)

DELTOCEPHALUS Burmeister

1838. *Genera Insectorum* 1: 41.

Vertex bluntly produced, rounded to face, length and breadth subequal, usually marked with black spots or bars. Fore wing with second cross vein; central apical cell constricted, usually divided. Aedeagus of male without processes, without style-aedeagus connective.

KEY TO SPECIES OF *DELTOCEPHALUS*

1. Fore wing dark with costal margin contrastingly yellow..... *flavicosta*
Fore wing light, without contrasting light costa..... 2
2. Vertex with six small apical spots..... *maculellus*
Vertex with a pair small apical spots and a larger spot next to either eye, six lighter dashes more basad..... *sonorus*

Deltocephalus sonorus Ball

1900. *Deltocephalus sonorus* Ball. *Canadian Ent.* 32: 344.

Length 3-3.5 mm. General color brownish-yellow. Vertex with two pair postmarginal apical spots, the apical pair the smallest, a pair fuscous dashes present either side of median line between the eyes. Pronotum yellowish, basal angles dark. Fore wing brown; veins white more or less margined with fuscous. (See Plate 24.)

Vertex bluntly angled, little broader than long. Fore wing with central antepical cell constricted but not divided. Female sternite VI with median lobe on concave posterior margin. Male style with outer arm very elongate, straight; inner arm short, acute. Aedeagus with apical portion

almost right angled to basal portion, narrowed, projected dorsad in lateral aspect; apex deeply bifid. (See Plate 24.)

RECORDS:

Puerto Rico: Guánica Insular Forest, Sept. 26, 1947, from grasses; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Ponce, Nov. 21, 1947, by beating on grasses and weeds in papaya (*Carica papaya*) grove; Cabo Rojo, Jan. 6, 1947, from weeds.

Caja de Muertos Island: Dec. 5, 1947, among weeds.

St. Thomas, Virgin Islands: Common along the coastal plains of the island, on grasses.

Deltocephalus flavicosta Stål

1862. *Deltocephalus flavicosta* Stål. Rio Janeiro Hemip. 2: 53.

Length 3-3.5 mm. General color usually dark brown to black with costal margins yellowed from base to apical cells. Lighter forms light brown; vertex usually with a pair of black apical spots and an elongate dash before either eye with the median area clouded. Fore wing light brown; veins white except for yellow costa; apical cells infusate. Female sternite VII margined with black posteriorly. Male plates with a median black dash.

Vertex bluntly angled. Fore wing with central anteapical cell constricted, divided. Female sternite VII almost truncate posteriorly with a slight median dip. Male pygofer with a blunt projection dorsad posterior to anal segment on either side. Style not distinctly bifid apically. Aedeagus curved cephalad, with a pair of small lateral subapical processes, a small process present on posterior margin near basal curve. (See Plate 24.)

Probably the commonest species of *Deltocephalus* found in Puerto Rico and St. Thomas.

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, from grasses; Isabela Sub-Station, Aug. 29, 1947, from weeds and grasses under "papaya" trees; Isabela Sub-Station, Aug. 29, 1947, sweeping "yuca", *Manihot utilissima*; Orocovis (Orocovis River bed) Sept. 11, 1947, among weeds and grasses; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (daylight type); Cayey, Peñon del Collao, altitude 2000-2500 ft., Sept. 13, 1947, from bushes and weeds; Alto de la Bandera (Jayuya-Ponce Road), Sept. 25, 1947, from weeds and grasses; Maricao Insular Forest, Oct. 10, 1947, from weeds, Río Piedras-Loiza Road, Nov. 11, 1947, from weeds and grasses; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Ponce, Nov. 21, 1947, by beating on weeds and grasses at "papaya" grove; Aibonito, Dec. 30, 1947, from weeds.

Vieques Island: Oct. 22, 1947, from weeds; Airport Road, south of Isabel Segunda, 2 kilometers from town, Oct. 23, 1947, from bushes and pasture on hill; East Beach, Oct. 23, 1947, among weeds, grasses and shrubs; Isabel Segunda, La Esperanza Road, Oct. 23, 1947, at lights, automobile lights against white sheet (8:00 P.M.-10:00 P.M.)

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

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

Deltocephalus maculellus Osborn

1929. *Deltocephalus maculellus* Osborn. Jour. Dept. Agr. P. R. **13**: 96.

Length 3.5-3.8 mm. General color light grayish-yellow with dark maculation in some cells of the fore wing. Vertex with three pair marginal spots, the apical pair a little the larger; median area posterior to these spots clouded with brown and a brown dash present posteriorly on either side parallel to eyes. Fore wing grayish-yellow with appendix and next two apical cells hyaline; apices of claval veins and apex of inner antepical spots usually present between claval suture and adjacent vein. (See Plate 24.)

Vertex bluntly angled, little broader than long. Fore wing with central antepical cell constricted, divided. Female sternite VII broadly concave posteriorly. Male style with inner arm blunt; outer arm acute. Aedeagus small, short, robust; apical third bent abruptly dorsad; apex bifid, short spur present on anterior margin. (See Plate 24.)

Osborn's type series is a mixture of species; however I have taken my determination from the type specimen in the U. S. N. M.

RECORDS:

Puerto Rico: Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (daylight type); Juana Díaz-Losey Field Road, Km. 3.7, Oct. 9, 1947, from weeds and grasses; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Ponce, Nov. 21, 1947, by beating among grasses and weeds in "papaya" groves.

Vieques Island: Airport Road, south of Isabel Segunda, 2 kilometers from town, Oct. 23, 1947, from bushes and pasture on hill; Isabel Segunda-La Esperanza Road, Oct. 23, 1947, from auto lights against white sheet (8:00 P.M.-10:00 P.M.); Navy Base Hill and hill east center, Oct. 24, 1947, from weeds, bushes and grasses.

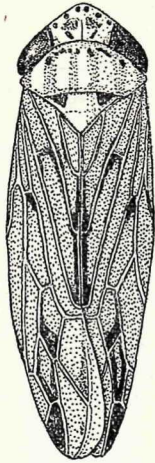
Caja de Muertos Island: Dec. 5, 1947, among weeds.

HALDORUS Oman

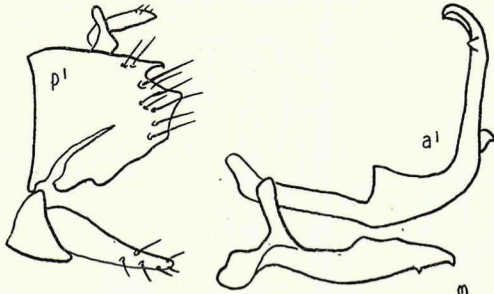
1938. Bull. Univ. Kansas **24**: 373.

More or less slender species. Vertex produced, acute, but with anterior margin rounded to face, with two to three pair apical spots. Fore wing

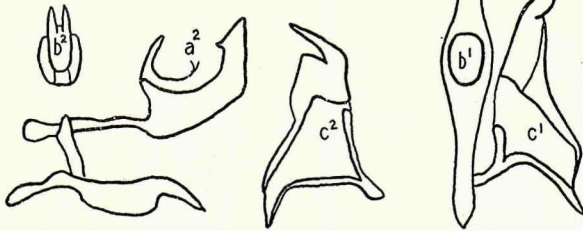
with second cross vein; central anteapical constricted, divided; appendix long, slender; usually two costal veinlets present. Male aedeagus with a pair of basal processes.



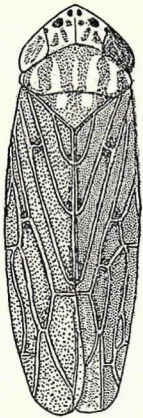
MACULELLUS²



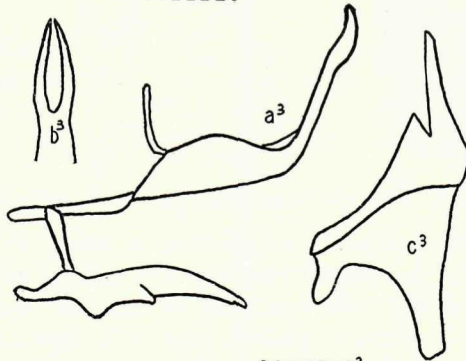
FLAVICOSTA¹



MACULELLUS²



SONORUS³



SONORUS³

PLATE 24. *Deltocephalus*, p, genital capsule, a, internal genitalia, lateral, b, aedeagus, ventral c, style, ventral.

KEY TO SPECIES OF HALDORUS

- 1. Vertex and pronotum with longitudinal orange stripes.....*furcatus*
- Vertex and pronotum without orange stripes.....*australis*

Haldorus australis (DeLong)

1926. *Deltocephalus australis* DeLong. Ohio State Univ. Studies 2: 90.

Length 3.2 mm. General color gray washed with brown; veins white margined with brown. (See Plate 25).

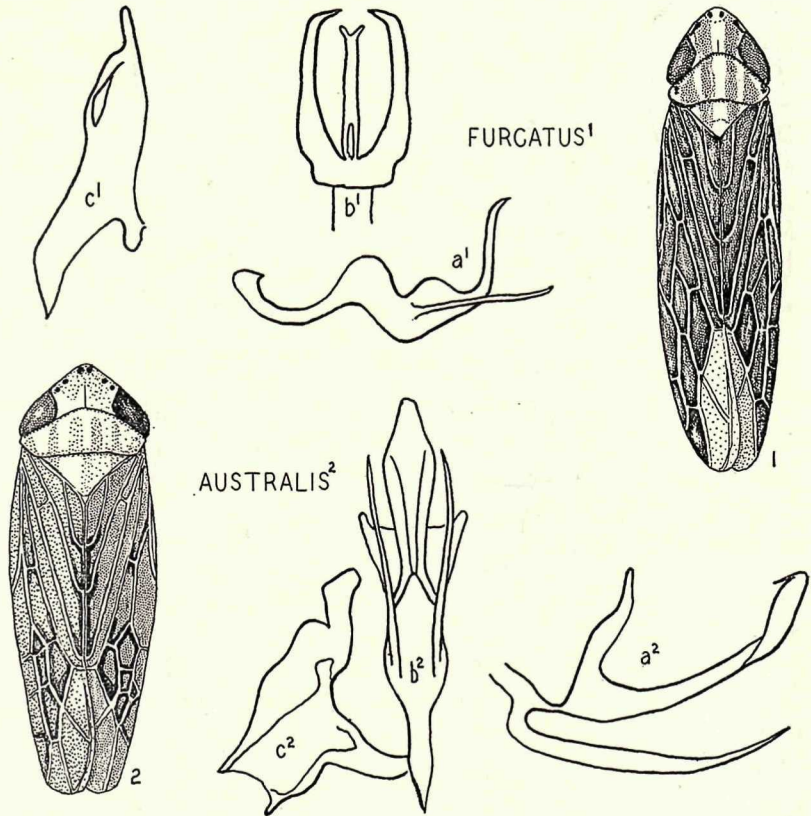


PLATE 25. *Haldorus*, a, aedeagus, lateral, b, aedeagus, ventral, c, style, ventral.

Vertex bluntly angled, as long as broad, shorter than pronotum. Fore wing short; central anteapical cell divided into three parts. Male style blunt apically. Aedeagus long, slender; posterior portion with apical third appearing twisted cephalad; apex with cephalic projecting spur; a pair of ventral processes present which are long, slender, acute apically. (See Plate 25.)

RECORD:

Puerto Rico: We only took this species at lights around Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., (Mr. Heraclio Giron's Farm), from neon lights (daylight type). (Caldwell and Martorell)

Haldorus furcatus n. sp.

Length, male 3.4 mm.; female 3.8 mm. Face white heavily marked with curved fuscous bars. Vertex white with two orange stripes on either side of median extending length of vertex across pronotum and in to basal angles of scutellum; apex of vertex with a small black spot on either side and a comma-shaped spot in front of either eye. Pronotum white, with six orange stripes. Fore wing brown except appendix and two inner apical cells which are hyaline; veins whitish margined with fuscous. (See Plate 25.)

Vertex slightly longer than width between eyes, shorter than pronotum. Fore wing with two costal veinlets. Male type with central antepical cell of left fore wing divided, the right undivided. Female sternite VII produced into a blunt median tooth posteriorly; the segment seems to be split to the base on either side of tooth. Male pygofer serrate on ventral margins. Style broad basally, acuminate apically, with a loop-like projection just before apex on outer margin. Aedeagus strongly sinuate in lateral aspect; apex broadly bifid; elongate, lateral processes present. (See Plate 25.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., (Mr. Heraclio Giron's Farm) from neon lights (daylight type) (Caldwell and Martorell).

POLYAMIA DeLong

1926. Ohio State Univ. Studies **2**: 20, 46.

Head bluntly produced. Fore wing with second cross vein; central antepical cell constricted, divided; claval area with numerous prominent cross veins, especially along suture.

Polyamia trilobata (DeLong)

1923. *Deltocephalus trilobatus* DeLong. Jour. Dept. Agr. P. R. **7**: 263.

Length 2.8–3.4 mm. Face light brown with indistinct white areas. Vertex yellow, with white on either side of median line, along eyes and anterior margin, and around two yellow apical spots. Pronotum yellowish, five longitudinal white stripes present. (See Plate 26.)

Scutellum with basal angles yellow, two median pits orange. Fore wing brownish; veins white margined with fuscous.

Male style short, broad; apex rounded from outer margin to short acute extension of inner margin. Aedeagus barbed on anterior margin before apex; apex appearing bifid. (See Plate 26.)

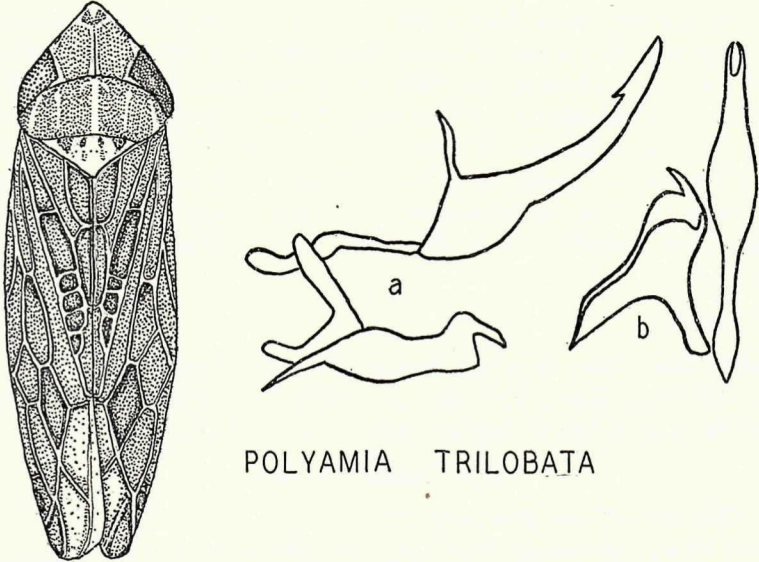
RECORD:

Puerto Rico: Found on grasses along coastal plain.

SANCTANUS Ball

1932. Jour. Washington Acad. Sci. **22**: 10.

Head as wide or wider than pronotum. Vertex slightly produced. Pronotum with lateral margins almost obsolete. Fore wing with second cross vein, appendix, and sometimes extra veinlets in costal area; central anteapical cell constricted, divided, with apical cells appearing to radiate from it. Male plates short.



POLYAMIA TRILOBATA

PLATE 26. a, internal genitalia, lateral, b, internal genitalia, ventral.

Sanctanus fasciatus (Osborn)

1900. *Scaphoideus fasciatus* Osborn. Jour. Cincinnati Soc. Nat. Hist. **19**: 190.

1932. *Sanctanus fasciatus* Ball. Jour. Washington Acad. Sci. **22**: 10.

Length 4–5 mm. Intensity of color and pattern variable. Face always light brown with two dark transverse apical lines, one below antennal bases. Vertex often unmarked but usually with a pair apical spots and a pair short transverse dashes behind these between the eyes. One of our specimens has a broken apical line around anterior margin of vertex. Pronotum usually a little darkened behind vertex, with indefinite dark areas well posterior to eyes. Fore wing with area next to scutellum white with others as follows; an oblique dash at apex of claval veins, an area along costa posterior to base and an area from costa to outer apical cell; part of inner anteapical cell and adjoining apical cell; appendix; all veins and ex-

treme apex of wing. Remainder of fore wing some shade of brown usually infusate next to white areas and apically. Some specimens with fore wing uniformly light brown except for white veins and slightly infusate areas. (See Plate 27.)

Vertex more angular in female than male. Female sternite VII with a median ridge extending to posterior margin. In ventral aspect, viewed from a slightly cephalic angle this ridge appears as a median tooth on the posterior margin, viewed perpendicularly the posterior margin appears evenly concave, and viewed from a slightly caudal angle the ridge gives an illusion of a slight median notch in the posterior margin. Male plates short, almost truncate apically, with long dense setae arising from inner apical angle.

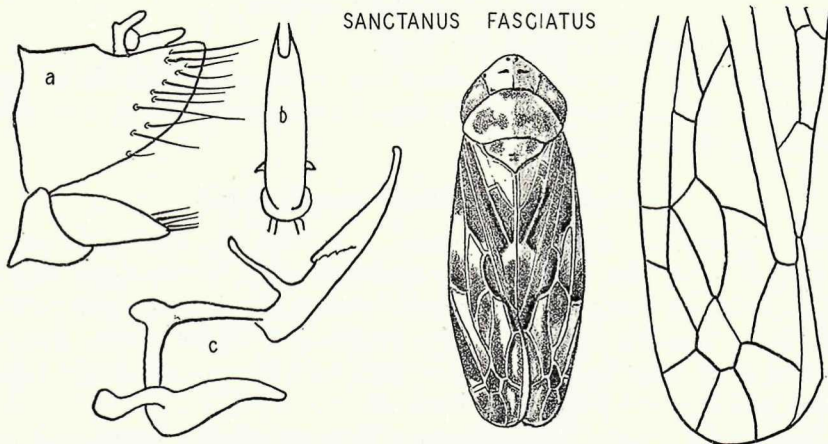


PLATE 27. a, genital capsule, b, aedeagus, ventral, c, internal genitalia, lateral, d, fore wing.

Style projected to apex of plate, tapered. Aedeagus in caudal aspect, notched apically; a sharp excavation present on dorsal surface near base, the dorsal corners of this excavation usually flared laterally. (See Plate 27.)

A careful comparison of material from all over Puerto Rico reveals that there are many extremes in color, pattern, and shape of vertex that have identical male genitalia making it possible to name many varieties if one so chooses. The only variation that has received a name is *variabilis* Osborn.

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, on unidentified ornamentals; Lares-Yauco Road, Km. 33.1, 1700 ft., Sept. 12, 1947, from grasses and weeds under coffee plants; Maricao Insular Forest, Sept. 12, 1947, 2000 ft. high, from weeds and bushes; Maricao-Sabana Grande, (Maricao In-

sular Forest) Km. 16.8, altitude 2200 ft., from weeds and bushes along road sides; Cabo Rojo, Sept. 26, 1947, from grasses and weeds; Guánica Insular Forest, Sept. 26, 1947, from grasses; Barceloneta-Barrio Palmas Altas, along the coast, Oct. 16, 1947, from weeds and grasses; Aguirre Golf Club, Nov. 21, 1947, from weeds and bushes; Ponce, Nov. 21, 1947, by beating on weeds in "papaya" grove.

Vieques Island: Oct. 22, 1947, from weeds; Oct. 23, 1947, from "papaya" foliage; Isabel Segunda-La Esperanza Road, Oct. 23, 1947, at lights (automobile lights against white sheet) (8:00-10:00 P.M.); Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds.

AMPLICEPHALUS DeLong

1926. Ohio State Univ. Studies **2**: 20, 83.

Broad, robust in form. Vertex much broader than long; anterior margin broadly rounded. Fore wing with second cross vein, central anteapical cell constricted and divided.

Amplicephalus albivenosus (Osborn)

1926. *Deltocephalus albivenosus* Osborn. Ann. Ent. Soc. Amer. **19**: 345.

Length 3.6-4 mm. General color brownish-white. Vertex dusty with a pair pair of faint, infuscate apical spots; median area between eyes yellowish. Pronotum light brown with five longitudinal whitish stripes and extreme lateral margins whitish. Fore wing light brown, apical and costal areas hyaline; veins white. (See Plate 28).

Head much broader than pronotum. Eyes prominent. Vertex with anterior margin rounded. Fore wing with venation prominent. Female sternite VII concave caudad, a blunt tooth present in center of concavity. Male style minutely notched subapically; apex straight, acute in ventral aspect. Aedeagus bent cephalad and narrowed in apical half; apex slightly bifid, slightly produced subapically on anterior margin. (See Plate 28.)

RECORD:

Puerto Rico: Found around the coastal plains of the island on grasses.

LAEVICEPHALUS DeLong

1926. Ohio State Univ. Studies **2**: 21, 64.

Head slightly produced, acute. Fore wing with second cross vein; central anteapical cell constricted; venation not prominent. Color usually greenish-yellow.

The one Puerto Rican species provisionally placed here has the fore wing black basally and apically.

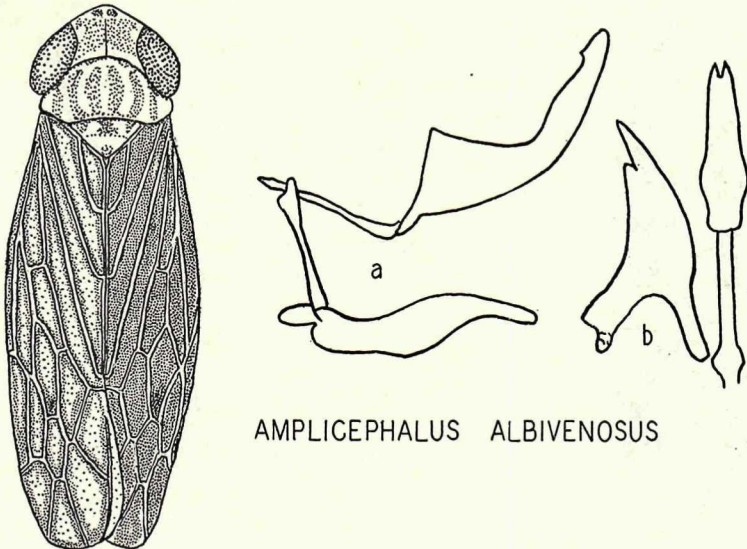
***Laevicephalus nigripennis* (DeLong)**

1923. *Deltocephalus nigripennis* DeLong. Jour. Dept. Agr. P.R. **7**: 263.

1941. *Deltocephalus flaveolus* Wolcott. Jour. Dept. Agr. P.R. **25**: 51.

Length 4-4.5 mm. Face black variegated with yellow lines. Vertex, pronotum, and scutellum yellowish-green. Fore wing broadly yellowed along inner margin of clavus and across entire width just posterior to center. (See Plate 29.)

Vertex more acute in female than in male, about as broad as long. Fore wing long. Female sternite VII with two broad posterior lobes and a broad



AMPLICEPHALUS ALBIVENOSUS

PLATE 28. a, internal genitalia, lateral, b, internal genitalia, ventral.

but shorter lobe between. Male style very deeply bifid apically, each fork acute. Aedeagus broad in basal two-thirds, with apical third constricted and curved caudad. (See Plate 29.)

RECORDS:

Puerto Rico: Found in marshy areas in the lowlands of Puerto Rico. *Flaveolus* Osborn is a different species and as far as we know is not found in Puerto Rico although they both occur in Cuba.

MARICAONA n. gen.

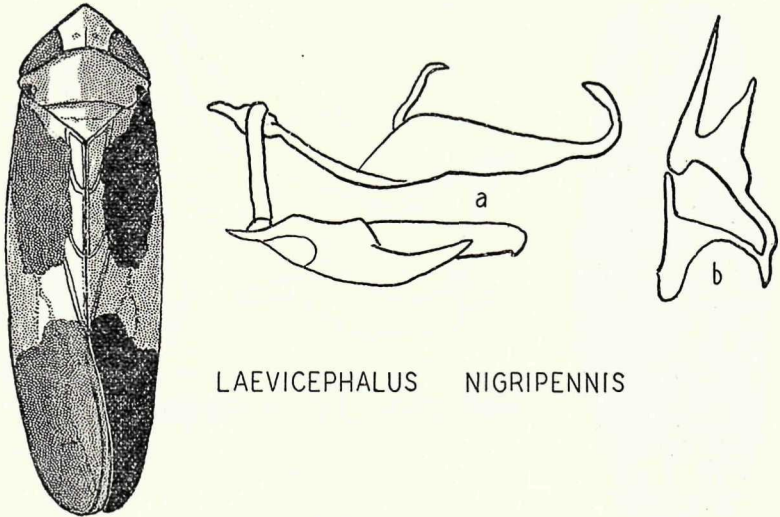
Head produced, broader than pronotum. Face tumid; ocelli on margin next to eyes. Vertex acute apically, surface concave. Lateral margins of pronotum obsolete. Fore wing long, slender; appendix present for two-fifths

of length; claval area with many cross veins; a net-work of veins present extending from center of clavus through center of wing into the central anteapical cell; outer anteapical cell divided, with veinlets to costa; inner apical cell largest with each cell progressively smaller to outer.

Related to the general group of deltocephaloid leafhoppers.

Maricaona polyamia n. sp., genotype of *Maricaona*

Length of female 4.5 mm. General color yellowish. Vertex with six black marginal spots; the outer spots next to either eye and above either ocellus. Two broad golden stripes present extending length of vertex and continued



LAEVICEPHALUS NIGRIPENNIS

PLATE 29. a, internal genitalia, lateral, b, style, ventral.

across pronotum. Scutellum with basal angles orange. Fore wing orange, with a fuscous spot at apex of clavus; veins predominantly white. (See Plate 30.)

Female sternite VII with posterior margin produced and bearing a blunt median tooth. (See Plate 30.)

RECORD:

Puerto Rico: Female holotype from Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 15.6, altitude 2400 ft., Sept. 12, 1947, from weeds and grasses. (Caldwell and Martorell.)

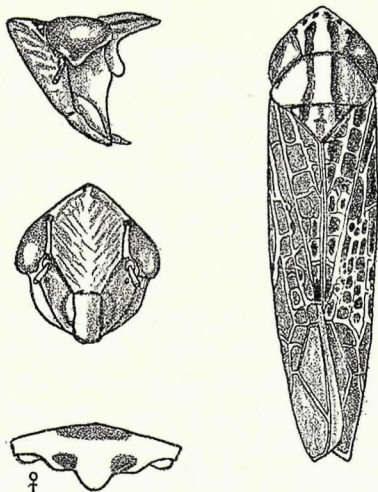
GRAMINELLA DeLong

1936. Ohio Jour. Sci. 36: 218.

Vertex slightly produced, blunt. Fore wing without second cross vein;

central anteapical cell slightly constricted. Usually small yellowish species with dark apical spots on vertex.

In this fauna I have been unable to differentiate between *Unerus* and *Graminella*; therefore I have included all forms under the latter.



MARICAONA POLYAMIA

PLATE 30. Dorsal aspect, lateral & frontal of head, & female sternite VII.

KEY TO SPECIES OF GRAMINELLA

1. Vertex almost as long as broad, acute, with a larger black spot next to either eye and a small pair apically sometimes obsolete; aedeagus broadly and deeply bifid apically.....*cognita*
Vertex little more than half as long as broad, more rounded apically, with four to six spots.....2
2. Vertex broadly rounded, spots next to eyes larger than apical; male pygofer with ventral process.....*colonus*
Vertex with spots of equal size or with six spots.....3
3. Vertex with four equal sized spots; aedeagus gently curved apically.....*nigrifrons*
Vertex with six spots (including blackened ocelli), the intermediate pair the larger; aedeagus bent at right angles.....*punctata*

Graminella colonus (Uhler)

1895. *Deltocephalus colonus* Uhler Proc. Zool. Soc. London, p. 80.

1929. *Thamnotettix cubana* Osborn Ann. Ent. Soc. Amer. **19**: 350.

1929. *Thamnotettix comatus* Osborn Jour. Dept. Agr. P. R. **13**: 98.

Length 3.5-4 mm. General color whitish-yellow with a pair of large black lateral spots and a pair of small blackish apical spots on anterior margin of vertex. Fore wing lightly infumed; veins whitish. (See Plate 31.)

Robust species with blunt vertex. Vertex half as long as broad, half as long as pronotum. Fore wing broad. Female sternite VII concave posteriorly. Male pygofer with long, slender tooth at median of either latroposterior margin. Style not deeply bifid apically. Aedeagus long, slender, bifid apically, bent dorsad at apical third; apical fourth narrowed, bent slightly cephalad. (See Plate 31).

Through the courtesy of Dr. Oman I have been able to examine a drawing of "*Delt. colonus* Uhler" prepared by Dr. China of the British Museum from the type male from St. Vincent, B. W. I., (H.H. Smith). It is the same as a paratype male of *cubanus* Osborn from Cuba. Osborn's record of *comatus* Ball is based upon his and the following species, being a mixture of both.

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, on grasses; Isabela Sub-Station, Aug. 29, 1947, on weeds and grasses under "papaya" trees; Orocovis (Oro-covis River bed) Sept 11, 1947, among grasses and weeds; Maricao Insular Forest, (Observation Tower-2600 ft.,) Sept. 12, 1947, from weeds and bushes; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (daylight); Alto de la Bandera (Jayuya-Ponce Road) Sept. 25, 1947, from weeds and grasses; Maricao Insular Forest, Oct. 10, 1947, from weeds; Arecibo-Camuy Road, Km. 80, Oct. 16, 1947, almost at sea level, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; La Maravilla, altitude 2950 ft., Nov. 14, 1947, from weeds, grasses and bushes; La Maravilla, altitude 3200 ft., Nov. 14, 1947, from weeds and ferns with *Rubus rosaefolius* and *Pothomorphe peltata* in between; Ponce, Ponce-Adjuntas Road, altitude 400 ft., Km. 10, Nov. 14, 1947, at lights; Maunabo-Yabucoa Road, altitude 700-900 ft., Nov. 21, 1947, from weeds, brush and ferns.

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

Graminella cognita n. sp.

1929. *Thamnotettix colonus* Osborn. Jour. Dept. Agr. P. R. **13**: 97.

1929. *Thamnotettix comatus* Osborn. Jour. Dept. Agr. P. R. **13**: 98 (Part).

Length, male 3.3 mm.; female 3.7 mm. General color golden. Face yellow faintly marked with brown, very dark triangular spot present under antennal bases. Vertex with a very large black spot next to either eye and a small apical pair. Anterior margin of pronotum narrowly black behind vertex and extending half way across behind eyes. Fore wing yellowish-white, slightly infusate basally; veins yellow. (See Plate 31.)

Female sternite VII truncate caudad. Male styles deeply bifid apically. Aedeagus bulbose in basal third; apex very deeply and broadly bifid, apices of forks convergent apically. (See Plate 31.)

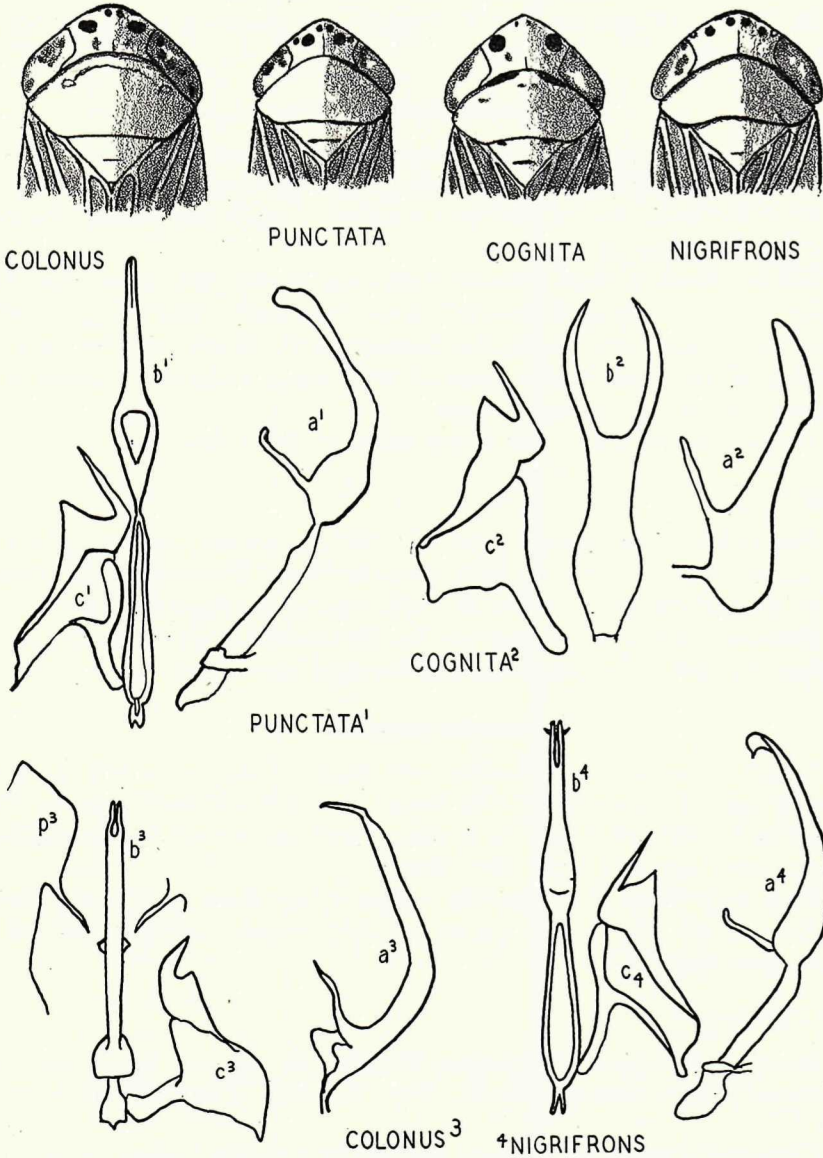


PLATE 31. *Graminella*, a, aedeagus, lateral, b, aedeagus, ventral, c, style, ventral, p, pygofer, ventral.

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes from Río Piedras; paratypes from all over Puerto Rico on grass.

St. Thomas, Virgin Islands: This species also occurs in the island, along with *colonus*.

Graminella nigrifrons (Forbes)

1885. *Cicadula nigrifrons* Forbes. 14th. Rept. Ill. State Entom. p. 67.

Length 3.4-3.6 mm. General color dusky-yellow; face black marked with yellow bars. Vertex with four equal sized black spots along anterior margin. (See Plate 31.)

Vertex almost a third broader than long, shorter than pronotum. Female sternite VII truncate caudad. Male style deeply bifid apically; outer arm acute, inner arm very acute. Aedeagus long, slender, swollen basally, greatly curved dorsad; apex rounded, with a pair of small subapical projections present on anterior margin.

Common on grass over the island of Puerto Rico. (See Plate 31.)

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, on grasses; Aguadilla Beach, Aug. 29, 1947, on pure stand of squash; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (day light).

Vieques Island: Isabel Segunda-La Esperanza Road, Oct. 28, 1947, collected at lights, by using auto lights against white sheet.

Graminella punctata n. sp.

Length of male 3 mm. Yellow, fore wing whitish. Face yellow, with brown bars. Vertex yellow, with three pairs of black spots counting the black ocelli; the apical pair the smaller. Fore wing whitish-hyaline slightly embrowned in claval area. (See Plate 31.)

Male style sharply bifid apically similar to *nigrifrons*. Aedeagus bulbous in basal fourth, thence directed dorsad, apex rounded and projected cephalad. (See Plate 31.)

RECORDS:

Puerto Rico: Male holotype from Río Piedras, on grass. Paratypes from Ponce, at light, altitude 400 ft., Nov. 14, 1947. (Caldwell and Martorell.)

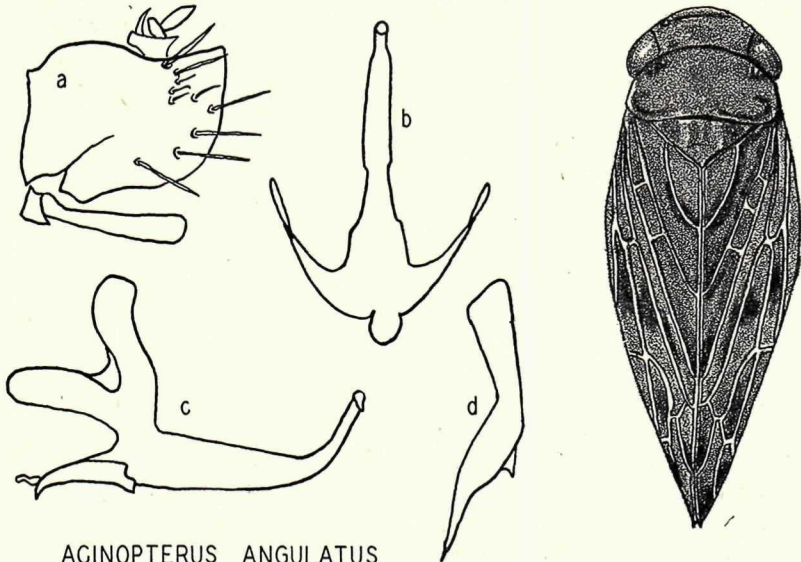
Form and appearance of *nigrifrons* but with six black spots of unequal size apically on vertex.

ACINOPTEROUS Van Duzee1892. *Psyche* 5: 307.

Head narrower than pronotum. Vertex short, somewhat bluntly produced. Fore wing long, narrowed apically from costal margin to very acute apex; veins prominent. Aedeagus trifurcate.

Acinopterus angulatus Lawson1922. *Acinopterus angulatus* Lawson. *Kansas Univ. Sci. Bull.* 14: 119.

Length 4.5-5.5 mm. General color brownish-gray. Fore wing with apices



ACINOPTERUS ANGULATUS

PLATE 32. a, genital capsule, b, aedeagus, ventral, c, aedeagus, lateral, d, style, ventral.

of cells darkened, some white areas present along central costal margin. (See Plate 32.)

Vertex little longer medianly than next to eyes. Fore wing broad at mid-length before narrowing to apex. Female sternite VII truncate caudad. Male pygofers rather truncate caudad. Valve short. Plate short, broad, apices rounded. Style blunt, diagonally truncate apically. Aedeagus trilobed. (See Plate 32.)

Relatively common on grass in the lower elevations of Puerto Rico.

RECORDS:

Puerto Rico: Aguadilla Beach, Aug. 29, 1947, on pure stand of squash; Cabo Rojo, Sept. 26, 1947, from weeds and grasses; Juana Diaz-Losey

Field Road, Km. 3.7, Oct. 9, 1947, from weeds and grasses; Arecibo-Camuy Road, Km. 80, Oct. 16, 1947, almost at sea level, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Arecibo-Camuy Road, Km. 84.4 at sea level, Oct. 16, 1947, on sand dunes, mostly beating on grasses and low bushes; Aguirre Golf Club, Nov. 21, 1947, from weeds and grasses.

Vieques Island: Isabel Segunda-La Esperanza Road, Oct. 23, 1947, at lights, by using auto lights against white sheet; Vieques East Beach, Oct. 23, 1947, from weeds, grasses and shrubs.

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

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

LIMOTETTIX Sahlberg

1871. *Cicardariae* Finlands p. 224.

Head broadly rounded apically. Vertex parallel margined, broadly rounded to face. Fore wing long, narrow, without second cross vein; apical cells narrow, elongate, Aedeagus short, robust.

Limotettix striolus (Fallen)

1806. *Cicada striola* Fallen. Svenska Vet. Akad. Handl. **27**: 31.

Length 4.5-5 mm. General color greenish-yellow lightly washed with brown. Face yellow heavily barred with black. Vertex with black preapical bar and a small black spot in each basal angle. Pronotum with four preapical spots and indistinct maculations near center of posterior margin. Fore wing brownish, hyaline apically; veins whitish. (See Plate 33.)

Vertex almost three times as broad as long, less than half as long as pronotum. Female sternite VII concave on posterior margin. Male pygofer with long, ventrally projecting process, posteriorly on either lateral margin. Plate thick, stout. Style with long, narrow apical projection. Aedeagus short, robust, with a pair subapical and a pair prebasal flaps. (See Plate 33.)

RECORD:

Puerto Rico: Taken in swampy ground at Cataño. (Maldonado)

EXITIANUS Ball

1929. Amer. Ent. Soc. Trans. **55**: 2, 5.

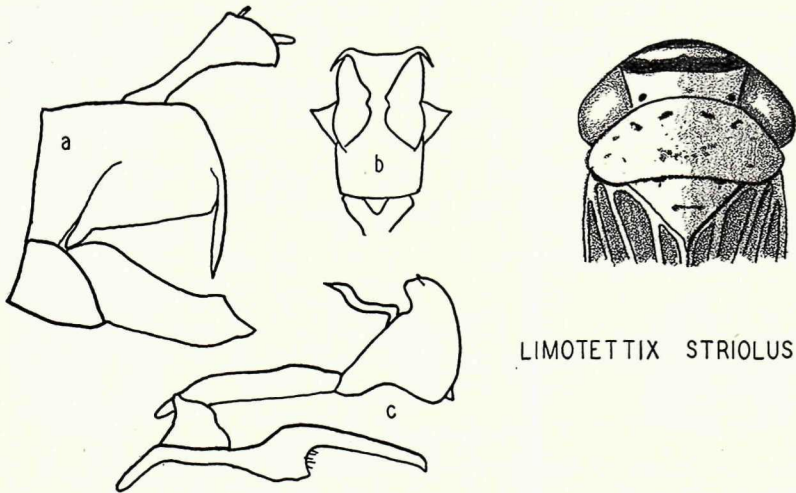
Head bluntly angled, rounded to front. Fore wing without second cross vein; appendix very large, extended around apex of fore wing. Ovipositor in female greatly extending beyond pygofers. Male pygofer with short, very robust, lateral setae present.

Exitianus exitiosus (Uhler)

1880. *Cicadula exitiosa* Uhler. Amer. Entom. **3**: 72.

Length 3.5–4.5 mm. General color grayish-white with black markings. Male usually much darker; with color, intensity, and pattern varying considerably in both sexes.

Vertex with anterior margin between ocelli and a transverse band between eyes black; these bands may be broken to form various spots and dashes or be almost obsolete. Pronotum with black spots. Scutellum with three black stripes, the median one often obsolete. Fore wing with fuscous to black veins. (See Plate 34.)



LIMOTETTIX STRIOLUS

PLATE 33. a, genital capsule, b, aedeagus, ventral, c, internal genitalia, lateral.

Vertex more angled in female than in male. Fore wing broadly rounded apically. Female sternite VII slightly convex on posterior margin. Male pygofer greatly produced caudad on either side, with two or usually three large apical setae. Style suddenly narrowed apically; apex acute, projected outward in ventral aspect, diagonally; truncate in lateral aspect with inner and outer angles produced. Aedeagus roughly J-shaped; apex narrowed on anterior margin. (See Plate 34.)

The genus has recently been revised by DeLong and Hershberger (1947) and *exitiosa* Uhler reestablished as a valid species which is probably correct; however in the Puerto Rican fauna the transverse bands on the vertex may be broken into spots and dashes and arranged in a series grading from solid bands to small spots. In some males the diagnostic setae on the pygofers may be three in number on one side and two on the other. The

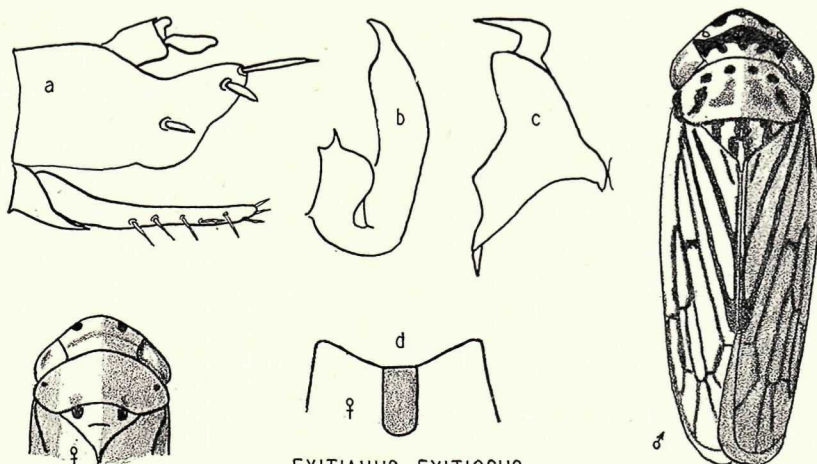
sexes are so different in appearance that I have seen the males labeled one species and the female another in various collections.

Common all over Puerto Rico lowlands on grasses. Also from St. Thomas.

RECORDS:

Puerto Rico: Isabela Sub-Station, Aug. 29, 1947, from "yuca", *Manihot utilissima*; Guánica, Sept. 26, 1947, from *Volkameria aculeata*; Arecibo-Camuy Road, Km. 80, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Hyptis capitata* and *Mimosa pudica* in between.

Vieques Island: Oct. 22, 1947, from weeds; North west coast, near



EXITIANUS EXITIOSUS

PLATE 34. a, genital capsule, b, aedeagus, lateral, c, style, ventral, d, female sternite VII.

Playa Grande, Oct. 23, 1947, from bushes, weeds and grasses; Isabel Segunda-La Esperanza Road, Oct. 23, 1947, by using auto lights against white sheet; Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds.

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

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

CIRCULIFER Zakhvatkin

1935. Wiss. Ber. Moskauer Staats Univ. 4: 111.

Rather robust species. Vertex short, parallel margined, convex. Pronotum with lateral margins short. Fore wing short, broad apically, with distinct appendix, without second cross vein; apical cells short. Aedeagus of male symmetrical, with apical processes forming a circle.

Circulifer tenellus (Baker)

1896. *Thamnotettix tenellus* Baker. Psyche 7: 24.

1907. *Thamnotettix rubicundula* Van Duzee. Bull. Buffalo Soc. Nat. Sci. 8: 70.

Length 3.2-4 mm. General color red or yellowish heavily irrorate with red. Occasionally pale yellowish.

Female sternite VII with a small semicircular notch at center of slightly concave posterior margin. Male pygofer with strong, dorsally directed process on either posterior margin. Style deeply notched on outer apical margin, blunt apically. Aedeagus with apical processes forming a circle in posterior aspect; apices bent anteriorly. (See Plate 35.)

This is the common beet leafhopper of North America and has been taken

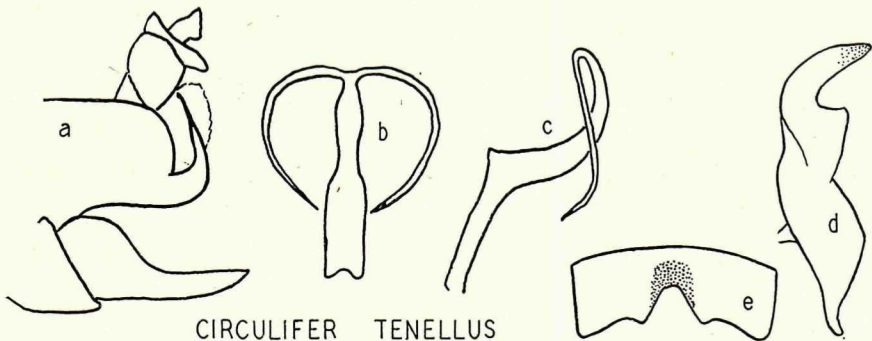


PLATE 35. a, genital capsule, b, aedeagus, ventral, c, aedeagus, lateral, d, style, ventral, e, female sternite VII.

in Puerto Rico almost every month of the year on *Sesuvium portulacastrum*. Our material from Vieques Island was taken back from the beach association and is light yellowish which indicates a different food plant as host.

RECORDS:

Puerto Rico: Cabo Rojo (near salt pools lighthouse) Sept. 26, 1947, from *Sesuvium portulacastrum*; Barceloneta Beach-Arecibo Road, (Barrio Palmas Atlas along coast), Oct. 16, 1947, from weeds and grasses; Cabo Rojo, Jan. 6, 1947, from weeds.

Vieques Island: Near Naval Base, Oct. 23, 1947, from weeds, grasses and bushes.

CHLOROTETTIX Van Duzee

1892. Psyche 6: 306.

Robust species with vertex broad, of uniform length, broadly rounded to face. Fore wing long, hyaline, without second cross vein; appendix well de-

veloped. Male pygofer usually with some sort of ventrolateral processes. Aedeagus usually with processes. (*tethys* excepted.)

Usually greenish-yellow species without markings therefore placement is dependent upon the characters of the male genitalia.

KEY TO THE SPECIES OF CHLOROTETTIX

1. Fore wing whitish with dark stripes.....*nigromaculatus*
Fore wing plain or with faint spots..... 2
2. Fore wing usually with faint spots; aedeagus without processes.....*tethys*
Fore wing always plain; aedeagus with apical processes..... 3
3. Pygofer process black, prominent, projecting beyond pygofer.....*congitus*
Pygofer process hidden by pygofer or very minute..... 4
4. Pygofer process serrate ventroapically; aedeagus with two pair
apical processes.....*minimus*
Pygofer process small, short, blunt; aedeagus with one pair apical
processes.....*montanus*

Chlorotettix nigromaculatus Delong and Wolcott

1923. *Chlorotettix nigromaculatus* Delong and Wolcott. Jour. Dept. Agr. P.R. **7**: 265 (Holotype).

1945. *Chlorotettix nigromaculatus* Delong. Lloydia **8**: 24-25 (Allotype).

Length 5-5.5 mm. General color grayish-white. Brown bar across vertex. Basal angles of scutellum black. Fore wing with broad, brown stripes in spaces between longitudinal veins. (See Plate 36.)

Vertex little longer medianly than next to eyes, almost angulate anteriorly. Fore wing with vein very thin, delicate. Female sternite VII concave caudad with a slight median notch in concavity. Male pygofer with small bump and minute spur at median of either latroposterior margin. Aedeagus trifurcate with lateral arms very long, bent dorsally; apices appearing twisted. (See Plate 36.)

RECORDS:

Puerto Rico: Taken at lights around the coastal plains of the island.

Vieques Island: Also found in Vieques at low altitudes; Oct. 23, 1947, from weeds and grasses.

Chlorotettix tethys Van Duzee

1907. *Chlorotettix tethys* Van Duzee. Bull. Buffalo Soc. Nat. Sci. **5**: 71.

Length 5-5.6 mm. General color greenish-yellow, often with faint fuscous spots on the fore wing.

Vertex little longer medianly than next to eyes. Female sternite VII with notched median tooth on posterior margin. Male pygofer with indistinct closely appressed pad-like process in center of either ventral margin.

Style long, stout, blunt. Aedeagus simple, tubular, 7-shaped; apex curved to the left. (See Plate 36.)

Very common over all the islands on grass.

RECORDS:

Puerto Rico: Arecibo-Camuy Road, Km. 80, at sea level, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Cambalache Experimental Forest, Nov. 6-7, from weeds and bushes; Ponce, Nov. 21, 1947, by beating on grasses and weeds in papaya, *Carica papaya* grove.

Vieques Island: Isabel Segunda-La Esperanza Road, Oct. 23, 1947, at lights, using lights against a white sheet; Airport Road, south of Isabel Segunda, 2 kilometers from town, Oct. 23, 1947, from bushes and pasture on hill.

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

Chlorotettix minimus Baker

1898. *Chlorotettix minimus* Baker. Canadian Ent. **30**: 220.

Length 4.5-5 mm. General color greenish-yellow.

Female sternite VII with center of posterior margin deeply incised. Male pygofer with ventral process long, broad, serrate apically on ventral margins; serrations sometimes present on dorsal margins. Aedeagus with two pair filiform apical processes; the more lateral and apical pair longer, recurved basally; the subapical pair strongly divergent. (See Plate 36.)

RECORDS:

Puerto Rico: Rincón, Barrio Punta, Aug. 29, 1947, on *Cajanus indicus*; Orocovis, Orocovis River bed, Sept. 11, 1947, among grasses and weeds; Cabo Rojo, Sept. 26, 1947, from weeds and grasses; Guánica, Sept. 26, 1947, from *Volkameria aculeata*; Juana Diaz-Losey Field Road, Km. 3.7, Oct. 9, 1947, from weeds and grasses; Río Piedras-Loiza Road, Nov. 11, 1947, from weeds and grasses; Ponce, Nov. 21, 1947, by beating on weeds in papaya, *Carica papaya* grove.

Vieques Island: Oct. 22, 1947, from weeds; Isabel Segunda-La Esperanza Road, Oct. 23, 1947, at lights, by using auto lights against a white sheet.

Caja de Muertos Island: Dec. 11, 1947, from weeds.

Chlorotettix cognitus n. sp.

1929. *Chlorotettix viridius* Osborn. Jour. Dept. Agr. P.R. **6**: 309.

1936. *Chlorotettix viridius* Wolcott. Jour. Dept. Agr. P.R. **20**: 86.

Length 4-4.5 mm. General color greenish-yellow.

Head broadly rounded. Vertex slightly longer medianly than next to

eyes. Female sternite VII slightly concave posteriorly with a small median notch present. Male plate short, broad. Pygofer with very prominent ventral process on either side curving dorsally and extended beyond caudal margins of pygofer. Aedeagus extremely long, thin, with two pair apical processes. (See Plate 36.)

This very common species has been overlooked because of the superficial resemblance of the pygofer process to *viridius*. The aedeagus is entirely different in that *viridius* lacks the two apical processes found in *cognitus*. Very probably all references to *viridius* from Puerto Rico and the Virgin Islands to date should refer to *cognitus*.

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of either sex from Arecibo, Barceloneta Road, (Barrio Palmas Altas) along the coast, Oct. 16, 1947, from weeds and grasses. Paratypes from all the islands taken from grasses. (Caldwell and Martorell.)

Chlorotettix montanus n. sp.

Length, male 4 mm.; female 4.3 mm. General color greenish-yellow; ocelli narrowly ringed with orange.

Vertex longer medianly than next to eyes, this is quite apparent without measurement. Female sternite VII with latroposterior angles produced and rounded, a broad median tooth present posteriorly. Male pygofer with short, thick, ventral process on either side closely appressed except at apex. Aedeagus with apical processes directed cephalad, as long as aedeagus; apices appearing twisted. (See Plate 36.)

RECORDS:

Puerto Rico: Male holotype from Ponce, Ponce-Adjuntas Road, Km. 12.6, altitude 800 ft., Sept. 12, 1947, from weeds under coffee trees, female allotype from Maricao Insular Forest, Maricao Sabana Grande Road, Km. 11.8, Nov. 13, 1947, from unidentified bushes; paratypes of either sex from Aibonito, (Aibonito-Barranquitas Road,) Km. 8.4, altitude 1900 ft., from weeds and shrubs.

MACROSTELIS Fieber

1866. Zool.-Bot. Gesell. Wien Verhandl. **16**: 504.

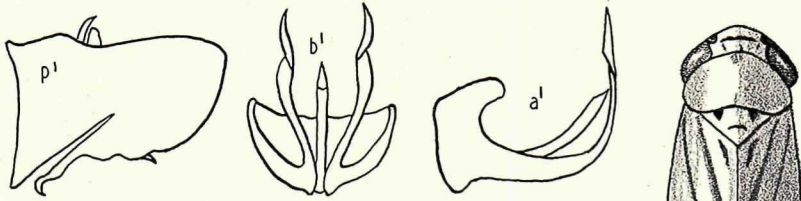
Head broadly produced. Vertex longer medianly than next to eyes. Fore wing long, two antepical and four apical cells present. Usually yellow with black on vertex.

Marcrosteles divisus (Uhler)

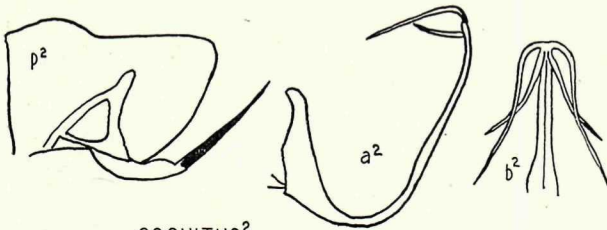
1877. *Jassus divisus* Uhler. U.S. Geol. and Geog. Surv. Bull. **3**: 472.

Length 3.5-4 mm. Vertex with a pair of black spots near posterior margin,

a pair of preapical transverse bars, and a pair of apical bars just over the anterior margin; a black longitudinal bar usually present between eye and ocellus. Fore wing usually with a darkened area present at apex of clavus. (See Plate 37.)

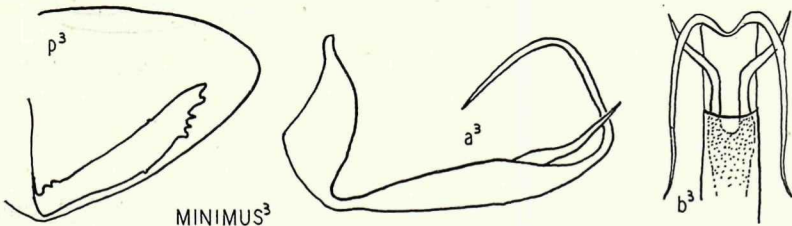


NIGROMACULATUS¹

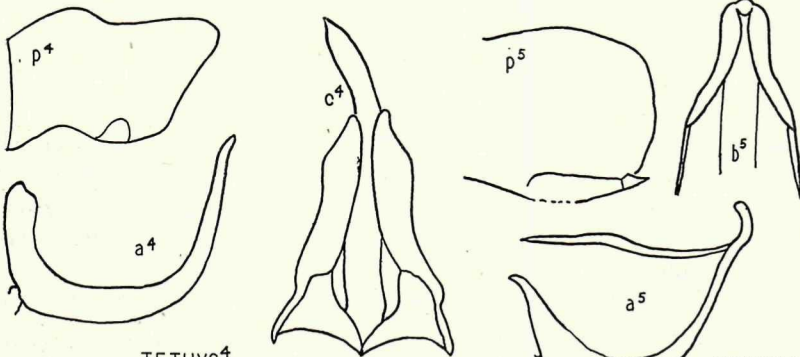


COGNITUS²

NIGROMACULATUS¹



MINIMUS³



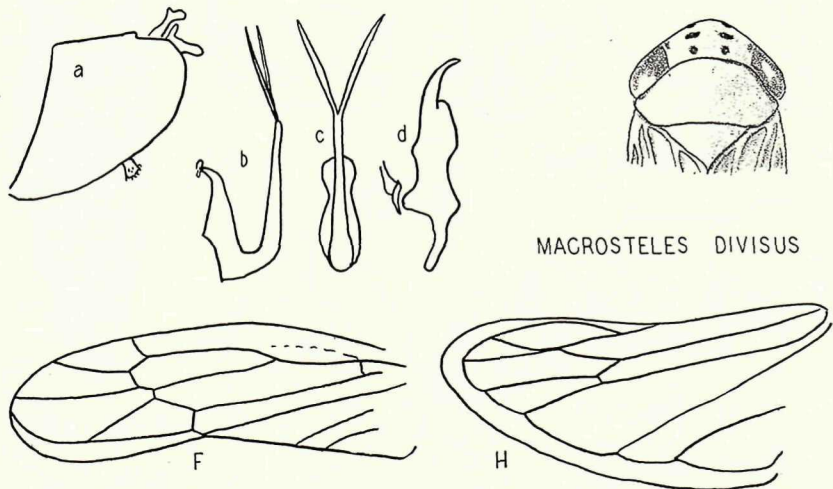
TETHYS⁴

MONTANUS⁵

PLATE 36. p, pygofer, lateral, a, aedeagus, lateral, b, apex of aedeagus, dorsal, c, internal genitalia, ventral.

Female sternite VII very slightly convex on posterior margin. Male pygofer with small, rounded, medioventral process on either side. Style acute apically. Aedeagus with a pair of long, spiniform apical processes extended dorsally and slightly divergent.

Common on grass throughout Puerto Rico. Osborn has noted some variation in the thickness of the bars on the vertex. (See Plate 37.)



MACROSTELIS DIVISUS

PLATE 37. a, pygofer, lateral, b, aedeagus, lateral, c, aedeagus, ventral, d, style, ventral, f, fore wing, h, hind wing.

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, from grasses; Isabela Sub-Station, Aug. 29, 1947, on grasses and weeds under "papaya" trees; Maricao Insular Forest, altitude 2000 ft., Sept. 12, 1947, from weeds and bushes.

Vieques Island: Oct. 22, 1947, from weeds.

BALDULUS Oman⁴

1934. Proc. Washington Ent. Soc. **36**: 79.

Head obtuse, more acute in female than male. Vertex rather narrowly rounded to face. Fore wing elongate; with two anteapical cells, both appearing to be closed basally; four apical cells present. Hind wing with four apical cells. Basal tarsus of hind leg, elongate, slender, over twice as long as last two tarsi together.

The reduction in number of apical cells in both wings separates *Cicadulina*

⁴ *Baldulus* will also key to *Macrosteles*, but it is differentiated from it by the elongate form relative acute vertex with two black spots, elongate basal tarsus of the hind leg, and male pygofer without processes.

from this genus and the elongate form with the elongate basal tarsus of the hind leg will readily set *Baldulus* apart from *Macrosteles*.

***Baldulus maidis* (DeLong & Wolcott)**

1923. *Cicadula maidis* DeLong & Wolcott. Jour. Dept. Agr. P. R. **7**: 265.

1936. *Baldulus maidis* Oman. Bull. Univ. Kansas Sci. **24**: 392.

Length 3.7–4.2 mm. Yellow with two large black spots on anterior margin of vertex. Venation light. (See Plate 38.)

Vertex produced, almost acute, narrowly rounded to face. Female sternite VII with shallow concavity in center of posterior margin. Male pygofer elongate. Plate elongate, slightly curved dorsally apically. Style notched on

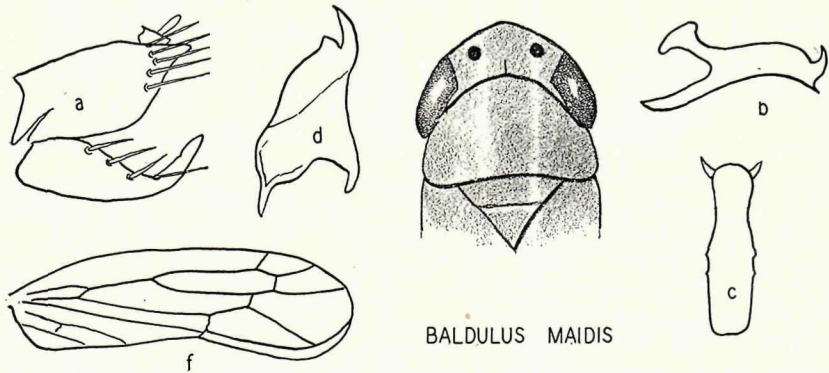


PLATE 38. a, genital capsule, b, aedeagus, lateral, c, aedeagus, ventral, d, style, ventral, f, fore wing.

outer margin apically, apex acute. Aedeagus short, stout, horizontal, with a pair of dorsal apical hooks projected dorsally, a ventromedian plate present below orifice. (See Plate 38.)

Other than the type series I have never seen this form from Puerto Rico. This species is recorded by Kunkel (Proc. Natl. Acad. Sci. **32**(9): 246–247) to be the vector of a virus disease, corn stunt, in California and Texas. The Osborn record of *maidis* from Puerto Rico refers to the new species of *Cicadulina* and has been included under that form.

***CICADULINA* China**

1926. Bull. Ent. Res. **17**: 43.

Head bluntly angled. Vertex broadly rounded to face. Fore wing elongate, with distinct appendix; two antepical cells present, one closed and short, the other long and open basally; three apical cells present. Hind wing with three apical cells. Basal tarsus of hind leg without apparent basal sulcus.

Cicadulina tortilla n. sp.

Length, male 2.9 mm.; female 3.4 mm. General color light yellow. Two black spots present on vertex. Fore wing whitish-hyaline.

Vertex almost twice as broad as long. Scutellum small. Fore wing elongate. Female sternite VII with a median notch in posterior margin. Male genital capsule rounded in profile. Pygofer with simple posterior process projected ventrally from either lateral margin. Valve long, overlapping plates. Plate strongly curved dorsally in apical third. Style shape of a bird-

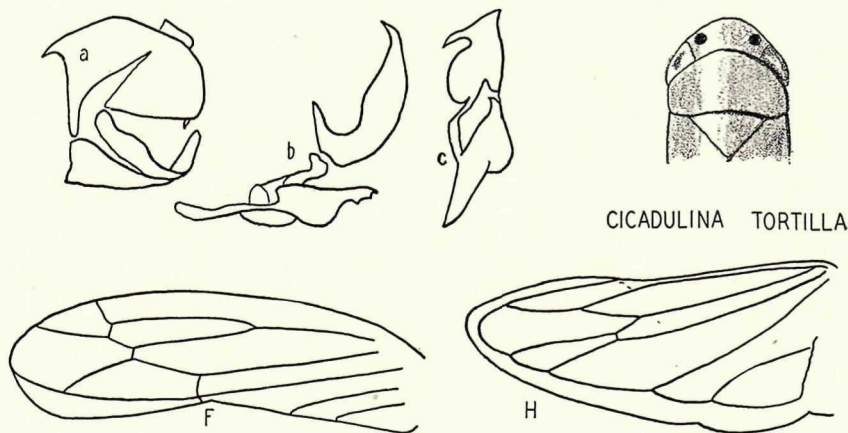


PLATE 38A. a, genital capsule, b, internal genitalia, lateral, c, style, ventral, f, fore wing, h, hind wing.

head with "bill" projected laterad. Aedeagus robust, curved dorsad, narrowed apically and projected slightly cephalad. (See Plate 38A.)

RECORDS:

Puerto Rico: Male holotype from Río Piedras, Nov. 20, 1947, female allotype from Ponce, Nov. 14, 1947, at light. Paratypes from Arcibo, Cayey, Guayama, Mayagüez, Río Piedras, Maricao Insular Forest and Villalba, Puerto Rico; (Caldwell and Martorell), and from Colombia, Perú and Mexico.

We collected this species sparingly on grass around the coastal plains and at high altitudes.

This form has been reported as an important pest of corn but the material from Puerto Rico was not definitely taken from this plant. Most members of this genus are pests of corn and several species are proven vectors of virus diseases.

Subfamily Balcluthinae

Head broadly rounded. Vertex narrow. Fore wing with two anteapical cells and four apical. Hind wing with three apical cells. Basal tarsus of hind leg with a basal sulcus. Aedeagus simple, without processes.

This group is scarcely far enough removed from the related members of Euscelinae to deserve subfamily rank but they certainly are a distinct group and merit tribal consideration. However in this fauna the forms in Euscelinae are not numerous enough, except in this group, to require such a method of classification, therefore for the sake of constancy and convenience I have used Balcluthinae with the reservation that my usage does not necessarily indicate categories of equivalent value.

The two genera represented here can not logically be separated. The distinction between the two is purely a matter of convenience with the so called *Balclutha* more arctic in distribution and the *Nesosteles* more tropical. Physical separation has for the most part been based on the relative width of the head to thorax or pronotum. I have taken as my primary criterion the length of the vertex next to either eye as compared to the median length which is equally artificial but slightly easier to observe.

Throughout this group certain forms are apparently distributed around the tropical regions of the world; therefore, the indicated synonymy can not be final and I have possibly added to it, but conclusive results can only be accomplished by a world wide analysis of all forms.

KEY TO GENERA OF BALCLUTHINAE

1. Vertex with anterior and posterior margins parallel; head usually broader than pronotum..... *Nesosteles*
 Vertex longer medianly than next to eyes; head usually narrower than pronotum..... *Balclutha*

BALCLUTHA Kirkaldy

1900. Philippine Jour. Sci. **23**: 374.

Usually larger, more robust than *Nesosteles* and more arctic in distribution. Head usually narrower than pronotum. Vertex longer medianly than next to eyes. Male pygofers usually without processes.

Balclutha abdominalis (Van Duzee)

1892. *Gnathodes abdominalis* Van Duzee. Canad. Ent. **24**: 113.

1935. *Balclutha abdominalis* Davidson & DeLong. Proc. Ent. Soc. Wash. **37**: 99-100.

Length 3-3.5 mm. General color gray to whitish-yellow.

Vertex broadly rounded, very little longer medianly than next to eyes. Female sternite VII truncate apically. Male pygofer with blunt ventral

projection on either lateral margin near apex. Style notched apically, as long as connective. Aedeagus evenly curved with posterior portion slightly

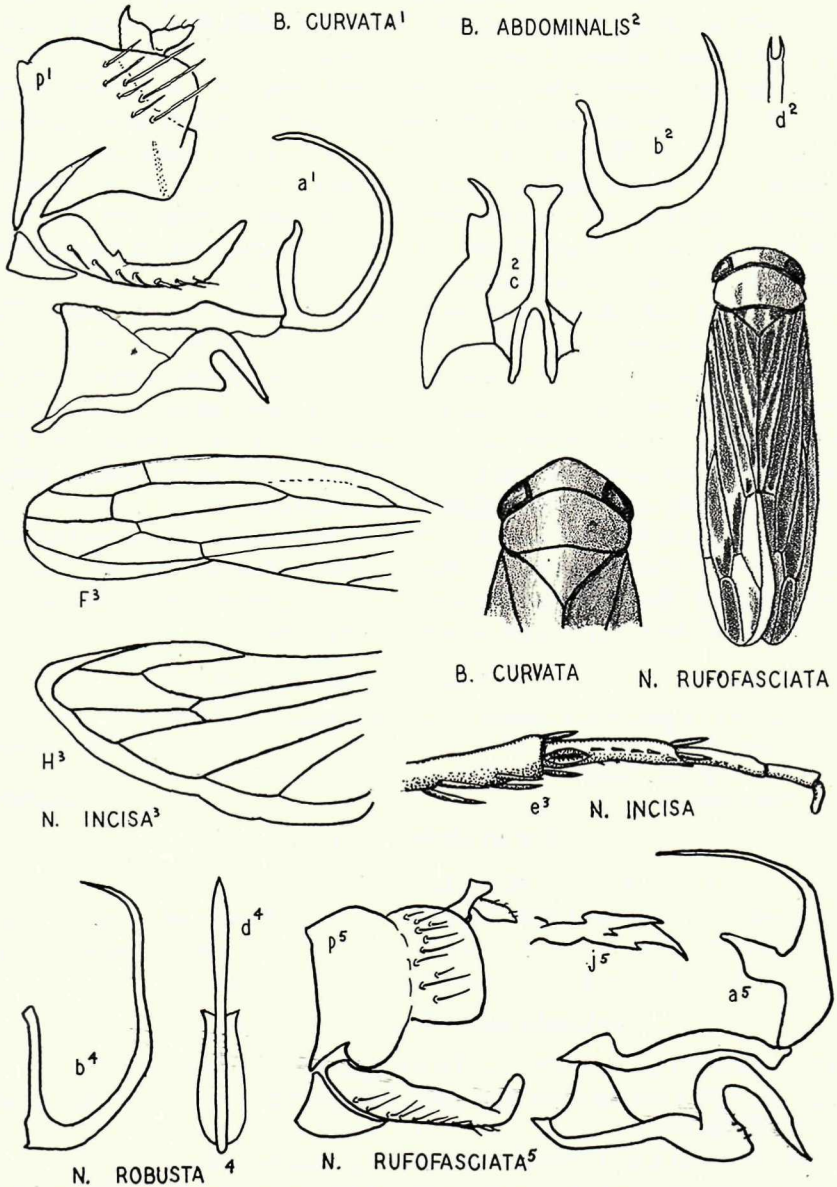


PLATE 39. B., *Balclutha*, N., *Nesosteles*, p, genital capsule, a, internal genitalia, lateral, b, aedeagus, lateral, c, style & connective, ventral, d, aedeagus or apex, ventral, e, hind tarsi, j, pygofer process.

longer and more acuminate apically than anterior; posterior portion notched apically. (See Plate 39.)

RECORDS:

Puerto Rico: Material examined in Osborn's collection from Cayey, Mayagüez, Lares, and Arecibo. Our only record is from Arecibo on grass.

Balclutha curvata n. sp.

Length 3-3.4 mm. General color yellowish-green with dark eyes.

Appearing robust. Vertex produced, angulate, little longer medianly than next to either eye. Fore wing with either inner apical cell approximately twice as large as both outer apical cells together. Male pygofer slightly produced at center of either latroposterior margin. Styles throughout, strongly curved with apex projecting anteriorly. (See Plate 39.)

RECORD:

Puerto Rico: Male holotype and two paratypes from Ponce, at lights. (Maldonado.)

NESOSTELES Kirkaldy

1906. Bull. No. 1, pt. 9. Exp. Sta. Hawaii. S.P.A. p. 343.

Small, slender, bluntheaded species. Head as broad or broader than pronotum. Vertex short, very broad, lateral margins practically parallel. Male pygofers usually with processes.

Color and marking extremely variable in some forms. Positive determination of species only possible by reference to characters of the internal male genitalia using sufficient power of magnification.

KEY TO SPECIES OF *NESOSTELES*⁵

1. Fore wing with dark or fuscous apical dash along second apical cell 2
Fore wing without dark apical dashes 3
2. Pygofer process bifid apically *rufofasciata*
Pygofer process simple, not bifid *lineata*
3. Aedeagus with small prebasal processes *incisa*
Aedeagus without any processes 4
4. Aedeagus flagellate apically, extremely long *floridana*
Aedeagus not flagellate apically 5
5. Aedeagus with apex broadened, cleft 6
Aedeagus tubular, not cleft 7
6. Aedeagus cleft in apical third *virescens*
Aedeagus with apical cleft little deeper than width *hyalina*
7. (5) Pygofer process projecting its length beyond pygofer *guajanae*
Pygofer process not apparent or appressed to pygofer 8

⁵ *rosaceus* Osborn is omitted because it is known only from the female sex.

8. Aedeagus with apex narrowed on anterior margin.....*neglecta*
 Aedeagus with apex not narrowed.....9
9. Aedeagus with apex straight, basal portion but very broad.....*dubiata*
 Aedeagus with apex bent, caudad, basal portion slender.....*minuta*
 Aedeagus with apex bent cephalad, of even width over all.....*robusta*

Nesosteles incisa (Matsumura)

1902. *Gnathodus incisus* Matsumura. Termeztrajzi Fuzetek **25**: 360.

1923. *Eugnathodus bisinuatus* DeLong. Jour. Dept. Agr. P. R. **7**: 266.

1926. *Eugnathodus pallidus* Osborn. Ann. Ent. Soc. Amer. **19**: 352.

Length 3.5–4 mm. General color pale yellow, green, dark brown, or a mixture of these colors. The dark forms have the last three apical cells and appendix clear hyaline. (See Plate 39.)

Female sternite VII with median of posterior margin broadly notched, bottom of notch convex. Male pygofer with prominent posterior process on either side curved dorsally. Style notched apically with inner arm long, projected outward. Aedeagus with basal portion supporting a pair of blunt processes that project caudad; apical portion strongly curved posteriorly. (See Plate 40.)

This is the most common form over all the islands and is the only species in which there are basal processes on the aedeagus.

RECORDS:

Puerto Rico: Bayamón, near District Hospital, Nov. 13, 1947, by sweeping "malojillo", *Panicum purpurascens*; Mayagüez, at sea level, Nov. 13, 1947, from "malojillo" meadow; Ponce, Ponce-Adjuntas Road, Km. 10, 400 ft., Nov. 14, 1947, at lights.

Vieques Island: Airport Road, south of Isabel Segunda, 2 kilometers from town, Oct. 23, 1947, from bushes and pasture on hill; Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds.

Caja de Muertos Island: Dec. 5-11, 1947, from weeds.

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

Nesosteles guajanae (DeLong)

1923. *Eugnathodus guajanae* DeLong. Jour. Dept. Agr. P. R. **7**: 267.

1933. *Eugnathodus calcarus* Davidson & DeLong. Ohio Jour. Sci. **33**: 57.

Length 3.4–4 mm. Color variable, yellow, pinkish, or slightly embrowned.

Female sternite practically truncate caudad, with a faint median notch. When the apical portion of this sternite is lifted from the pygofers it appears rounded apically and the curling of lateral margins results in the appearance of a strong median notch. Male pygofers with prominent processes projected ventrad on either latroposterior margin. Style with inner arm

very prominent, curved outward. Aedeagus slender, curved anteriorly in apical three-fourths; anterior-basal portion with two broad lateral lobes. (See Plate 40.)

Almost as common as *incisa* on grasses.

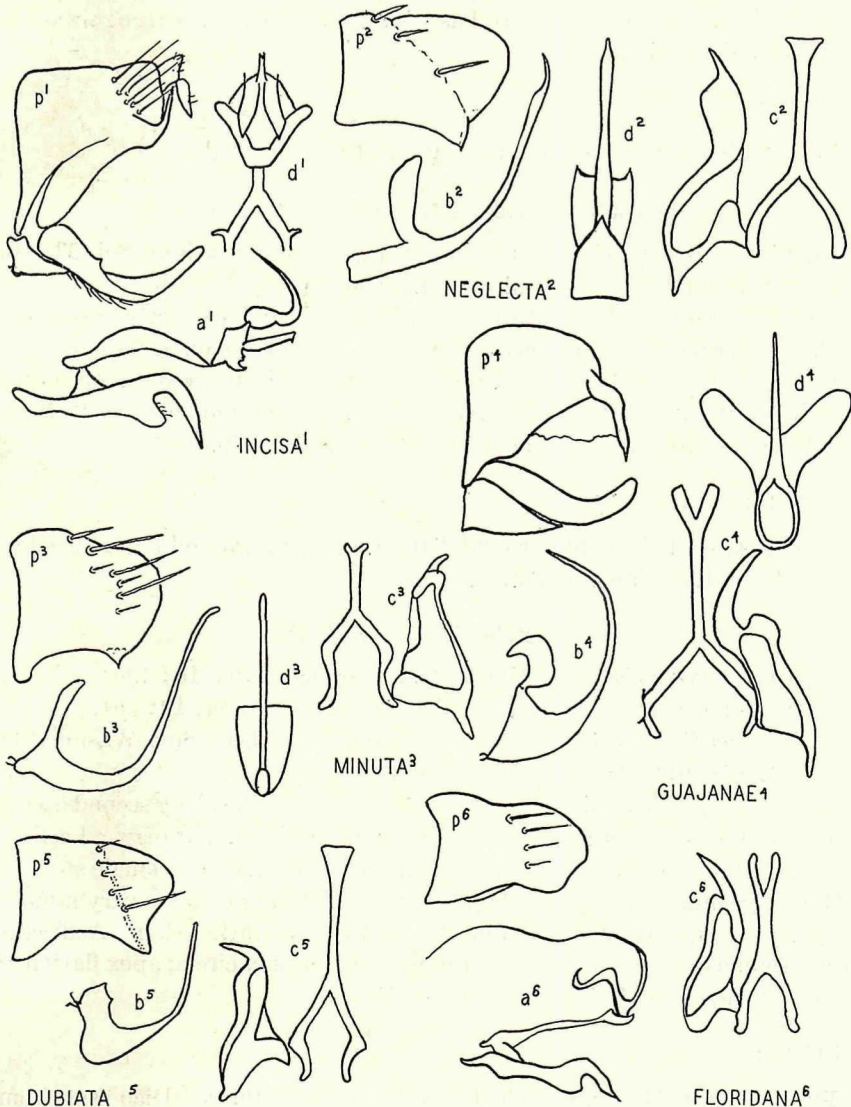


PLATE 40. *Nesosteles*, p, genital capsule, a, internal genitalia, lateral, b, aedeagus, lateral, c, style & connective, ventral, d, aedeagus, ventral.

During a study of the DeLong types two males were found in the paratype series of *guajanae* which were supposedly all females. These males are conspecific with the type of *calcarus*. Further observation reveals that there is a tendency for the female sternite VII to lift from the pygofer and curl resulting in an entirely different profile in either position as noted above. It may also be noted that there has been no distinct male recognized for *guajanae* before this time.

RECORD:

Puerto Rico: Aguadilla Beach, Aug. 29, 1947, on weeds.

Nesosteles floridana (DeLong & Davidson)

1933. *Eugnathodus floridanus* DeLong & Davidson. Ohio Jour. Sci. **33**: 56.

Length 2.8–3.2 mm. General color light green to yellowish.

Female sternite VII sinuate posteriorly, outer angles slightly produced. Male pygofer without apparent processes, slightly lobate on ventroposterior margins. Style scarcely notched apically but greatly narrowed from outer margin, acute apically, gently curved outward. Aedeagus extremely long, flagellate apically extending far cephalad. (See Plate 40.)

RECORD:

Puerto Rico: Taken only around 2500 ft. and upward and at sea level in Cambalache Experimental Forest.

Nesosteles lineata (Osborn)

1924. *Eugnathodus lineatus* Osborn. Ann. Carnegie Mus. **15**: 499.

1926. *Eugnathodus flavidus* Osborn, Ann. Ent. Soc. Amer. **19**: 351.

1935. *Agellus lineatus* DeLong & Davidson. Proc. Ent. Soc. Washington **37**: 108–109 (*flavidus* synonymized).

Length 3 mm. General color yellowish with a dark line along second apical cell of fore wing sometimes extended over into adjoining anteapical cell.

Vertex almost acutely pointed, of even width throughout. Female sternite VII gently sinuate caudad. Male pygofer with lateral processes very minute if apparent. Style deeply bifid apically. Connective rather short. Aedeagus very prominent, strongly curved, almost completing a circle; apex flattened dorsoventrally, deeply bifid. (See Plate 41.)

RECORD:

Puerto Rico: The only male I have seen from Puerto Rico was from Naguabo and is in the U.S. National Museum.

Nesosteles robusta n. sp.

Length, male 2.5 mm.; female 3 mm. General color green; eyes black; fore wing whitish.

Head broadly rounded, as broad as pronotum. Vertex half as long as pronotum, of even width throughout. Pronotum with lateral margins almost obsolete. Fore wing relatively short, broad. Female sternite VII truncate apically. Male pygofer bilobed on either latroposterior margin. Styles deeply bifid apically. Aedeagus slender throughout; apex acute, bent anteriorly. (See Plate 39.)

RECORD:

Puerto Rico: Male holotype, female allotype and paratypes of both sexes from Orocovis, altitude 2200 ft., Sept. 11, 1947, among weeds and grasses on river bed. (Caldwell and Martorell.)

Nesosteles neglecta (DeLong & Davidson)

1933. *Erugnathodus neglectus* DeLong & Davidson. Ohio Jour. Sci. **33**: 55.

Length 3–3.8 mm. General color gray to brownish, often with orangish stripes across vertex and pronotum.

Female sternite VII truncate posteriorly. Male pygofer with center of either latroposterior margin produced into a blunt tooth. Style not bifid apically but narrowed from outer margin to acute apex. Aedeagus rather straight in apical portion; apex narrowed from anterior margin, acute, slightly curved anteriorly; anteriorbasal projection broad, with transverse apical notch. (See Plate 40.)

RECORDS:

Puerto Rico: Found over the lowlands of Puerto Rico on grasses and especially on the south coast. Drawing from paratypic male, Mt. Manitu, Colorado.

Nesosteles minuta (Osborn)

1929. *Erugnathodus minutus* Osborn. Jour. Dept. Agr. P. R. **13**: 101.

Length 2.5–3 mm. General color gray to yellowish.

Female sternite VII with small median tooth on posterior margin. Male pygofer with pointed projection on either ventroposterior margin. Valve very small. Style not bifid apically; apex short, small, blunt. Aedeagus slender, slightly S-shaped, not notched apically; anterior-dorsal portion truncate apically. (See Plate 40.)

RECORDS:

Puerto Rico: Most abundant along the southern coast of the islands from Ponce to Aguirre. Drawing of paratype male from Aguirre; Río Piedras, Aug. 17, 1947, on grasses; Aguadilla Beach, Aug. 29, 1947, on weeds.

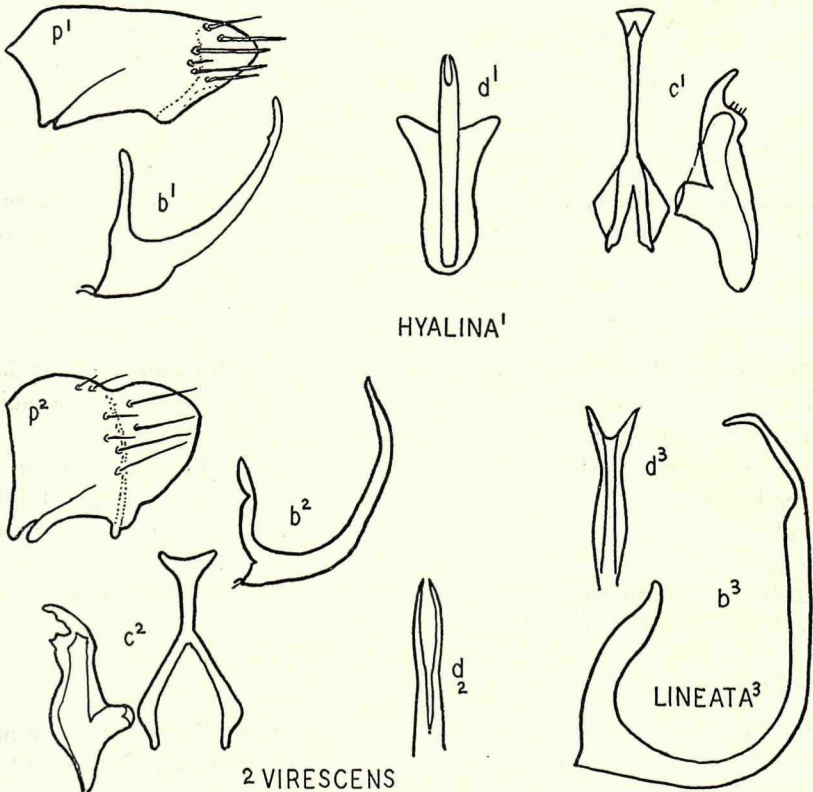


PLATE 41. *Nesosteles*, p, genital capsule, b, aedeagus, lateral, c, style & connective, ventral, d, aedeagus or apex, ventral.

Nesosteles hyalina (Osborn)

1926. *Balclutha hyalina* Osborn. Ann. Ent. Soc. Amer. **19**: 352.

1945. *Nesosteles hyalina* DeLong & Knull. Grad. Sch. Studies. Biol. Sci. Ser. No. **1**: 66 (Ohio.)

Length 3–3.5 mm. General color greenish to yellowish.

Female sternite VII truncate posteriorly. Male pygofer with lateral processes closely appressed to sides. Style not bifid apically but narrowed from outer margin; apex acute, short. Aedeagus with apex curved dorsad;

apex slightly projected anteriorly, with shallow rounded notch, a very small subapical spur present on anterior margin. (See Plate 41.)

RECORDS:

Puerto Rico: Taken from grasses at sea level to 2000 ft. at western end of Puerto Rico. El Yunque Mts. (over 1500 ft.) Dec. 12, 1947, from weeds, grasses and bushes.

Nesosteles virescens (Osborn)

1926. *Eugnathodus virescens* Osborn. Ann. Ent. Soc. Amer. **19**: 351.

Length 3–3.3 mm. General color light green to light yellow.

Female sternite VII sinuate posteriorly, slightly produced. Male pygofer with process on either side directed ventrally. Style short, notched apically; outer arm short, roughened apically; inner arm short, projected outward. Aedeagus slender throughout, apical third definitely bent anteriorly, deeply notched apically. (See Plate 41.)

RECORDS:

Puerto Rico: Taken around the coastal plain of Puerto Rico. The type is a female and the series is a mixture of species. I have taken my interpretation from a paratypic male from the same locality as the Cuban type.

Specimens from Cambalache Experimental Forest, Nov. 6–7, 1947, from weeds and bushes.

Nesosteles sandersi subspecies *dubiata* n. subsp.

1935. *Agellus sandersi* DeLong & Davidson. Proc. Washington Ent. Soc. **37**: 108 (typical form.)

Length of male 2.7 mm. General color grayish with brown lines on vertex and pronotum.

Male pygofer with blunt tooth on either ventroposterior margin. Style not bifid but narrowed from outer margin to a blunt apex which is bent abruptly outward. Style-aedeagus connective very long. Aedeagus broad basally, narrowed apically; apical portion projected anteriorly. Differing from the typical form by a more narrow aedeagal base which is slightly narrowed from the posterior margin. (See Plate 40.)

RECORDS:

Puerto Rico: Male holotype and paratypes from Aguadilla, Aug. 29, 1947, along the beach. (Caldwell and Martorell.)

Nesosteles rufofasciata Merino

1936. *Nesosteles rufofasciatus* Merino. Philippine Jour. Sci. **61**: 381–382.

Length 3.7–4 mm. General color gray with red intervenular stripes on

fore wing, a broad fuscous stripe present bordering the two inner apical cells; some specimens entirely whitish-gray except for fuscous marking on fore wing. (See Plate 39.)

Long slender species with appendix half as long as fore wing. Female sternite with median notch posteriorly. Male pygofer with lateral process on either side bifurcate apically. Plate suddenly narrowed apically and curved dorsally. Style S-shaped apically. Aedeagus relatively short, narrowed apically and projected dorso-anteriorly. (See Plate 39.)

RECORDS:

Puerto Rico: Taken sparingly around Ponce. Very abundant on St. Thomas, Virgin Islands on a tall unidentified grass.

The species *rufofasciata* may be a synonym of *rubrostriatus* Melichar but without material this point must remain in doubt.

Subfamily Cicadellinae

Slender, fragile forms without cross veins anterior to the apical cross veins in the fore wings. The genera are for the most part based upon venational characters of the wings which must result in an artificial concept. (See Plate 42.) Recognition of species in most genera is absolutely dependent upon characters on the male genitalia.

KEY TO THE GENERA OF CICADELLINAE

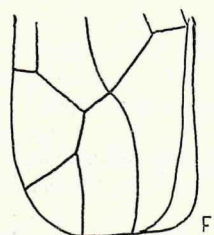
1. Fore wing with appendix.....**Protalebra**
Fore wing without appendix.....2
2. Hind wing with submarginal vein.....3
Hind wing without submarginal vein.....**Typhlocybella**
3. Hind wing with one or more apical cells.....4
Hind wing without any apical cells.....**Hybla**
4. Hind wing with only one apical cell.....5
Hind wing with either two closed apical cells or with one or two closed apical cells and a branched vein forming a partial second or third.....6
5. Vertex bluntly rounded; male styles acuminate apically.....**Empoasca**
Vertex acute; male styles short, bifid apically.....**Idona**
6. Hind wing with one or two close apical cells and a branched vein forming another partial cell.....**Joruma**
Hind wing with two closed apical cells only.....7
7. Fore wing with third apical cell sessile and usually rectangular....**Dikraneura**
Fore wing with third apical cell strongly pedicellate, triangular or semi-circular.....**Alconeura**

PROTALEBRA Baker

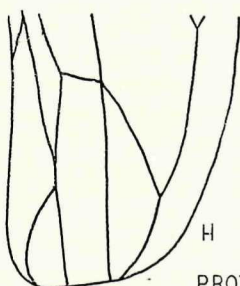
1899. *Psyche* 8: 405.

Fore wing with appendix. Hind wing without a distinct submarginal

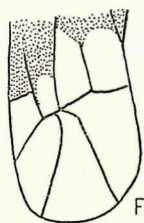
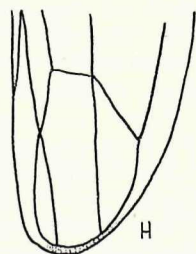
vein. Aedeagus with processes. Most forms are well marked which makes it possible to determine species from either sex.



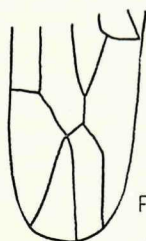
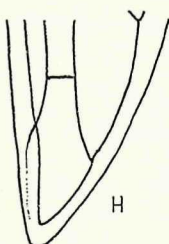
PROTALEBRA



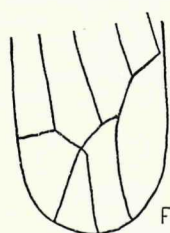
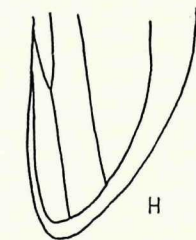
PROTALEBRA



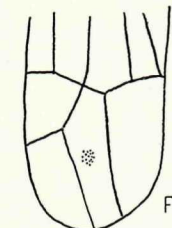
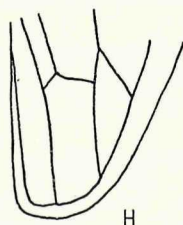
JORUMA



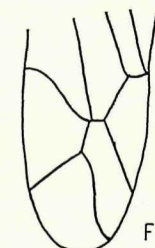
HYBLA



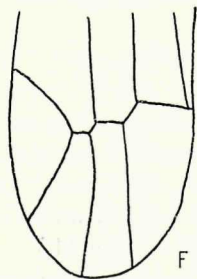
DIKRANEURA



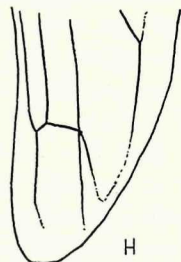
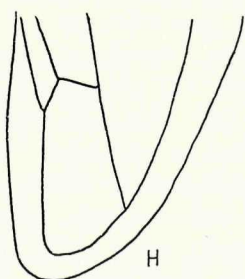
ALCONEURA



TYPHLOCYBELLA



EMPOASCA



TYPHLOCYBELLA

PLATE 42. Cicadellinae, F, fore wing, H, hind wing.

KEY TO SPECIES OF PROTALEBRA

1. Fore wing plain or with faint longitudinal stripes only 2
 Fore wing checkered or with conspicuous spots 3
 Fore wing with conspicuous bars or transverse lines 5
2. Fore wing with faint yellow longitudinal stripes, cross veins not margined with fuscous; central apical cell containing a black spot *aureovittata*
 Fore wing plain, cross veins margined with fuscous; central apical cell clear *montana*
3. (1) Head, pronotum and basal portion of fore wing black with conspicuous yellowish-white spots *maculata*
 Head not spotted, pronotum may be variegated 4
4. Fore wing light yellow irregularly checkered with white *insularis*
 Fore wing fuscous, with three large yellow patches; fuscous areas with conspicuous clear hyaline spots *braziliensis*
5. (1) Fore wing dark, with light diagonal stripes *ziczac*
 Fore wing with transverse stripes only, or with transverse and longitudinal stripes 6
6. Fore wing with transverse stripes only 7
 Fore wing with transverse and longitudinal stripes 9
7. Fore wing dark, with two transverse whitish stripes *brunnea*
 Fore wing light, with dark transverse stripes 8
8. Fore wing with stripes across center and one anterior to basal cells *tabebuiae*
 Fore wing with stripe just behind scutellum and one posterior to cross veins *lenticula*
9. (6) Fore wing with many black longitudinal stripes interrupted in center by a transverse stripe *similis*
 Fore wing with a transverse black line edged with white across center of clavus followed by longitudinal curved stripes that unite with a transverse line following the cross vein *cordiae*

Protalebra aureovittata (DeLong)

1923. *Alebra aureovittatus* DeLong. Jour. Dept. Agr. P. R. 7: 267.

1928. *Protalebra pallida* Osborn. Ann. Carnegie Mus. 16: 260.

Length 3-3.5 mm. White over all. Fore wing with two faint yellow longitudinal stripes, sometimes smoky apically; apex of clavus infuscate; second apical cell with a fuscous area. (See Plate 43.)

Head narrower than pronotum. Vertex long, narrow, rather acute. Fore wing elongate. Female sternite VII produced posteriorly. Male pygofer rounded posteriorly on either side. Valve short. Plate extremely long, with two to three latroventral setae at midlength. Tenth segment projected laterally at base with apices of projections slightly concave. Style long, narrow, simple, acute apically. Aedeagus long, slender, S-shaped; anterior-dorsal portion broadened laterally, outer angles acute. (See Plate 44.)

Found wherever "moral" or white manjack, *Cordia sulcata* occurs, in Puerto Rico and St. Thomas.

RECORDS:

Puerto Rico: Barranquitas, Barranquitas-Aibonito Road, Km. 8.4, altitude 1900 ft., from weeds and shrubs (*Solanum*, *Rubus*, *Ipomoea*, and *Casearia*); Orocovis-Coamo Road, Km. 53.4, altitude 2200 ft., Sept. 11, 1947, from *Cordia sulcata*; Aguas Buenas (Enrique Castro's) altitude 1300 ft., from melastomaceous shrubs in the low forest; Aibonito, Dec. 30, 1947, from weeds.

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

Protalebra braziliensis Baker

1899. *Protalebra braziliensis* Baker. Psyche **8**: 405.

Length 2.5-3 mm. General color yellowish-white marked with fuscous. Vertex entirely white. Pronotum white, with anterior margin and three longitudinal areas posterior to it fuscous. Scutellum fuscous, with three white spots. Fore wing yellowish with sutural margin broadly fuscous except area between center and apex of clavus; a broad diagonal fuscous band present from costa to the clear claval spot; round hyaline spots present in claval area at costa, in claval spot, and subapically in apex of wing. (See Plate 43.)

Head little broader than long, bluntly rounded. Female sternite VII truncate posteriorly. Male pygofer produced posteriorly on either side; dorsal process slender, acute, projected ventrally. Aedeagus deeply bifid apically; posterior portion swollen basally. (See Plate 44.)

RECORDS:

Puerto Rico: Vega Alta, Aug. 19, 1947, on unidentified ornamentals; Maricao Insular Forest (Observation Tower) 2600 ft., Sept. 12, 1947, on weeds, bushes and shrubs; Alto de la Bandera (Jayuya-Ponce Road), Sept. 25, 1947, from grasses and weeds; Arecibo-Camuy Road, Km. 80 at sea level, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes; Río Piedras-Loiza Road, Nov. 11, 1947, from weeds and bushes; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Salinas Beach (between Salinas and Sta. Isabel near Río Jueyes), Nov. 21, 1947, from *Volkameria aculeata*.

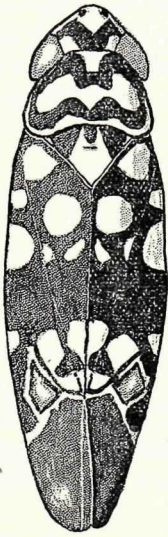
Vieques Island: Oct. 22, 1947, from weeds; Northwest coast near Playa Grande, Oct. 23, 1947, from bushes, weeds and grasses.

Protalebra brunnea Oman

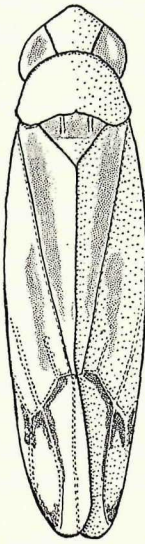
1937. *Protalebra brunnea* Oman. Jour. Dept. Agr. P. R. **21**: 567.

Length 2.5-2.7 mm. General color brown. Vertex pale apically. Pronotum

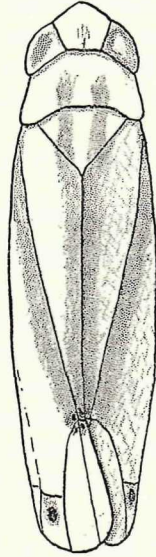
with posterior margin whitish-hyaline. Fore wing with whitish sinuate band bordered with black extending from base of sutural margin to middle



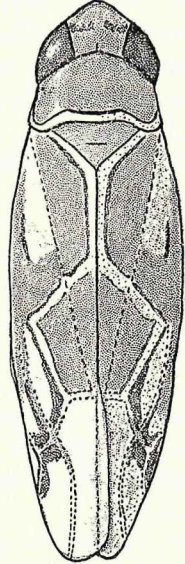
MACULATA



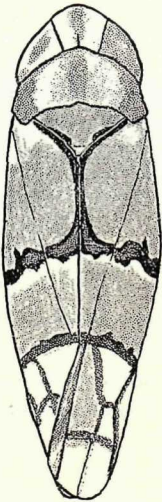
MONTANA



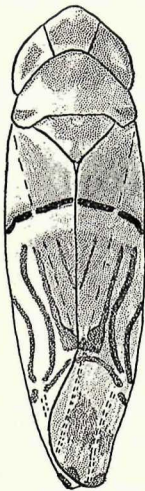
AUREOVITTATA



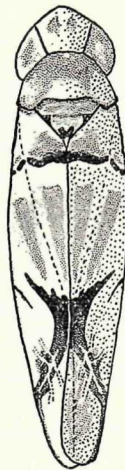
ZICZAC



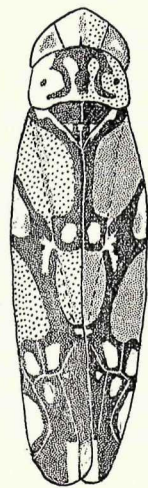
TABEBUIAE



CORDIAE



LENTICULA



BRAZILIENSIS

of costa then back across clavus to center of commissural margin; a whitish spot present at apex of clavus and a yellow spot opposite on costa; apex clear hyaline, sometimes smoky apically. (See Plate 44.)

Vertex little longer than broad, bluntly rounded. Pronotum with posterior margin angularly concave. Fore wing short, broad. Female sternite VII with a median tooth posteriorly. Male pygofer produced into a curved, acute process on either latroposterior margin. Aedeagus broad in basal three-fifths, tapered from base thence abruptly bent dorsally; apex with a pair of short, lateral processes curved cephalad. (See Plate 44.)

RECORDS:

Puerto Rico: Cayey, Peñón del Collao, Salinas Road, 1900 ft., Aug. 28, 1947, on *Cedrela mexicana* Roem; Doña Juana, Toro Negro Mountains, 2600–2800 ft., Oct. 9, 1947, from weeds and grasses; La Maravilla, Toro Negro Mts., altitude 2800 ft., Nov. 14, 1947, from bushes and trees. (Caldwell and Martorell.)

Protalebra cordiae Osborn

1929. *Protalebra cordiae* Osborn. Jour. Dept. Agr. P. R. **13**: 102–103.

Length 2.5–3 mm. General color white with yellow and fuscous markings. Vertex white with broad yellow band between eyes. Pronotum white with broad yellow arch on anterior margin; sides and lateral angles splashed with red. Scutellum white and yellow. Fore wing white and yellow basally to a slightly oblique fuscous transverse band from center of clavus to costa which is followed by a white band; between white band and apical cross veins is a broad whitish vitta broadly edged with fuscous and highly arcuate; a plain fuscous arc present from costa to cross veins; all veins white edged with fuscous; apex slightly smoky. (See Plate 43.)

Vertex narrowly rounded, longer than broad. Female sternite VII narrowed from lateral margins, greatly produced posteriorly, apex minutely truncate or slightly convex. Male pygofer rounded posteriorly on either side, with curved posterior processes. Aedeagus simple, slender, J-shaped. (See Plate 44.)

RECORDS:

Puerto Rico: Cayey, Peñón del Collao, 1900 ft., Salinas Road, Aug. 28, 1947, breeding on *Cordia alliodora*; Cayey-Guayama Road, Km. 20.6, Sept. 27, 1947, from weeds; Salinas Beach (between Salinas Sta. Isabel, near Río Jueyes) Nov. 21, 1947, from *Volkameria aculeata*. This species breeds on "capá prieto" or Spanish elm, *Cordia alliodora*.

Vieques Island: Oct. 22, 1947, from weeds.

Protalebra insularis n. sp.

Length, male 2.7 mm.; female 3 mm. General color white with yellow markings. Vertex white. Eyes greenish. Pronotum with a broad elongate yellow spot behind either eye and one medianly. Scutellum with angles yellowed. Fore wing appearing checkered with yellow; a diagonal, double, fuscous stripe present from apex of clavus to apex of costa; apex smoky; clavus with a yellow basal spot, a preapical orange spot, and a yellow median circle in the center. (See Plate 44.)

Vertex appearing acute, almost half longer than broad. Female sternite VII slightly roundedly produced posteriorly. Male pygofer rounded on either side posteriorly. Valve truncate. Plate elongate, triangular. Style simple, elongate. Aedeagus with posterior portion broad, elongate in lateral aspect; apex with a short process on left and a long process on right projected ventrolaterally; anterior-apical portion broadly bilobate latroapically. (See Plate 45.)

The generic position of this form is doubtful because the hind wing has an indistinct submarginal vein which should place it in *Alebra*. However it does not belong in *Alebra* as represented by the European type. I believe that it will cause less confusion to place *insularis* in *Protalebra* until such time a comprehensive study of the tropical Cicadellinae indicates its true position.

RECORD:

St. Thomas, Virgin Islands: Male holotype, female allotype, and paratypes of either sex from St. Thomas, Nov. 28, 1947. (E. Z. and J. S. Caldwell.)

Protalebra lenticula Osborn

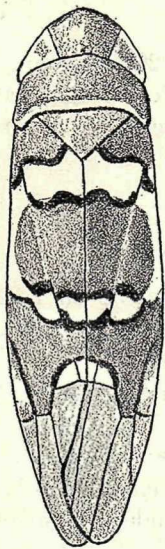
1927. *Protalebra bifasciata* Dozier. Jour. Dept. Agr. P. R. **10**: 260.

1920. *Protalebra lenticula* Osborn. Jour. Dept. Agr. P. R. **13**: 103-104.

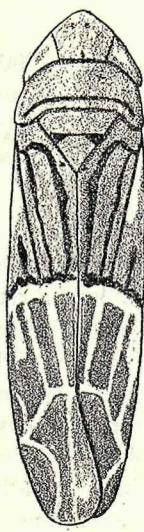
Length 2.5-3 mm. General color yellowish-white with dark transverse bands across fore wing basally and subapically. Eyes greenish. Vertex yellowed between eyes. Pronotum golden anteriorly. Scutellum black at outer edges of suture and at apex. Fore wing with black band across base of claval area sometimes preceded by gold or fuscous-yellow; apical cross veins broadly fuscous, the fuscous color continuing anteriorly and ventrally toward costa leaving a yellowish costal spot; cross veins contrastingly white in fuscous area.

Vertex about as broad as long, broadly rounded. Female sternite VII angulate posteriorly. Male pygofer with acute process posteriorly on either lateral margin. Style narrowed apically on ventral margin, apex acute. Aedeagus broad, somewhat rectangular basally; apex narrow, elongate projected dorsally. (See Plate 45.)

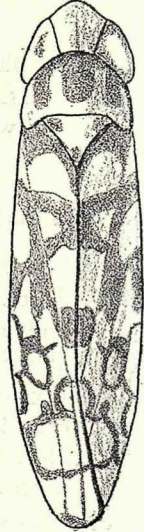
I have never seen the specimen of *bifasciata* Gillette upon which the Dozier record is based and I can not believe that he had the Brazilian spe-



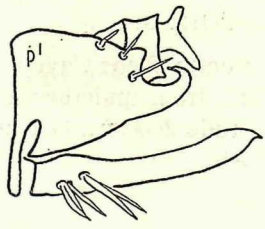
BRUNNEA



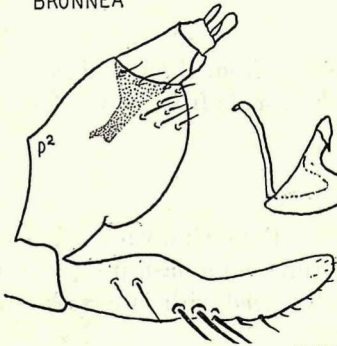
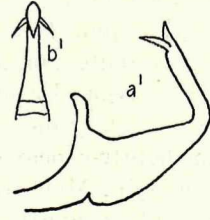
SIMILIS



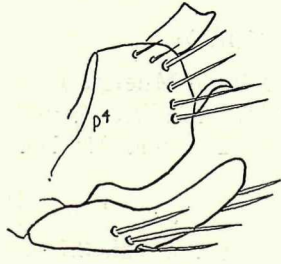
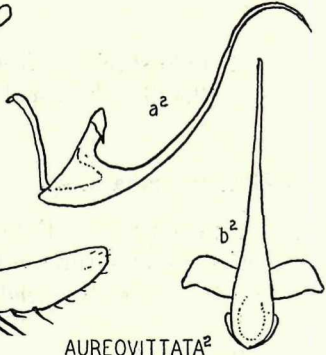
INSULARIS



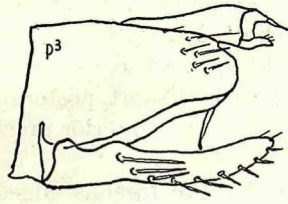
BRUNNEA¹



AUREOVITTATA²



CORDIAE



BRAZILIENSIS³

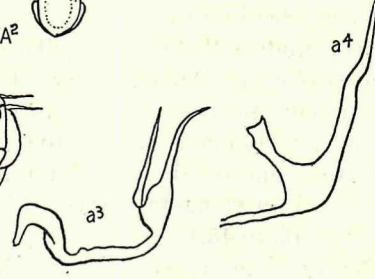
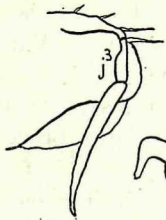


PLATE 44. *Protalebra*, p, genital capsule, a, aedeagus, lateral, b, aedeagus, posterior, j, pygofer process, lateral.

cies. Since the two forms are somewhat similar in appearance I believe Dozier had *lenticula* Osborn.

RECORDS:

Puerto Rico: Cayey, Peñón del Collao, altitude 2000–2200 ft., Sept. 13, 1947, from underbrush of coffee plants; Doña Juana, Toro Negro Mts., altitude 2600 ft., Oct. 9, 1947, from weeds; Aibonito, Dec. 30, 1947, from weeds.

Protalebra maculata Baker

1903. *Protalebra maculata* Baker. Invertebrata Pacifica 1: 6–7.

Length 2 mm. General color black with larger ivory spots on vertex, pronotum, scutellum, and basal and subapical areas of fore wings; apex of fore wing fuscous-hyaline with yellow venation. (See Plate 43.)

Vertex slightly produced, broadly rounded, about as long as broad. Pronotum slightly concave caudad. Female sternite VII broad, convex on posterior margin. Male pygofers with ventrolateral processes on either side; apices acute, convergent. Aedeagus horizontal, broadly triangular in basal portion; apical portion directed dorsad, very long, slender, slightly S-shaped. (See Plate 45.)

RECORD:

Caja de Muertos Island: One female specimen from the island of Caja de Muertos, Dec. 5, 1947. (Martorell.) Sketch of male from material from Santa Engracia, Mexico.

Protalebra montana n. sp.

Length of male 3.7 mm. General color white. Fore wing with indefinite yellowish dash in claval area along base of suture and a dash just out side of clavus in median third; cross veins narrowly edged with fuscous; apical cells clear. (See Plate 43.)

Vertex produced, obtuse apically, about as long as broad. Fore wing not especially elongate. Male pygofer with either latroposterior margin rounded, with an acute posterior process at center. Valve short. Plate long, with a series of setae in line from base to apex. Style simple, apex acute, bent outward. Aedeagus quadrate in lateral aspect; apex with a short posterior process and an elongate curved anterior process; base with anterior processes. (See Plate 45.)

Differing from *aureovittata*, which it resembles by the fuscous edged cross veins of the fore wing and male genitalia as noted in the description.

RECORD:

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

***Protalebra similis* Baker**

1899. *Protalebra similis* Baker. Psyche **8**: 403.

Length 2.5–3 mm. General color orangish with black stripes. Vertex orange, yellow apically with a black band just over anterior margin. Pronotum orange, with a submarginal black band posteriorly. Fore wing greenish-yellow in basal half, fuscous in apical portion; a black band present across center of clavus followed by a white band beyond which the veins are broadly yellowed; clavus with two longitudinal black stripes; claval suture black with whitish basal area just outside. (See Plate 44.)

Vertex bluntly angularly produced; surface flat. Female sternite VII with posterior margin gently sinuate. Male pygofer with deeply forked ventrolateral process on either side. Plate with apex directed dorsally. Aedeagus inverted from apparent normal position; ventral portion short, broad, strongly narrowed from dorsal margin to an acutely dorsal projected process; dorsal portion bifid from base, long, slender, greatly curved ventrally, bifid pieces crossed before apex; a short rectangular structure present at base of bifid pieces. (See Plate 45.)

RECORDS:

Puerto Rico: Most commonly taken on sweet potato, *Ipomoea batatas*, at Rio Piedras and Peñón del Collao, 2400 ft., high, Sept. 13, 1947, also collected at the Cambalache Experimental Forest, Nov. 6–7, 1947, on morning glory, *Ipomoea rubra*.

***Protalebra tabebuiae* Dozier**

1927. *Protalebra tabebuiae* Dozier. Jour. Dept. Agr. P. R. **10**: 260.

1928. *Protalebra bicincta* Osborn. Ann. Carnegie Mus. **18**: 259.

Length 3–3.7 mm. General color whitish-yellow marked with orange and fuscous. Vertex white with a broad, median, indistinctly limited, yellowish-orange stripe. Pronotum white with lateral margins and an elongate median spot orange. Scutellum yellow with a black spot on center of either lateral margin. Fore wing whitish-yellow; inner margin of clavus fuscous to center where a double fuscous band crosses the entire wing; a single band of fuscous present from apex of clavus to costa; outer apical cells usually infusate. (See Plate 43.)

Vertex longer than broad, roundedly produced. Female sternite VII sinuate posteriorly. Male pygofer produced posteriorly into acute dorsal

processes on either side. Aedeagus slender, greatly curved, almost completing 360° in lateral aspect. (See Plate 45.)

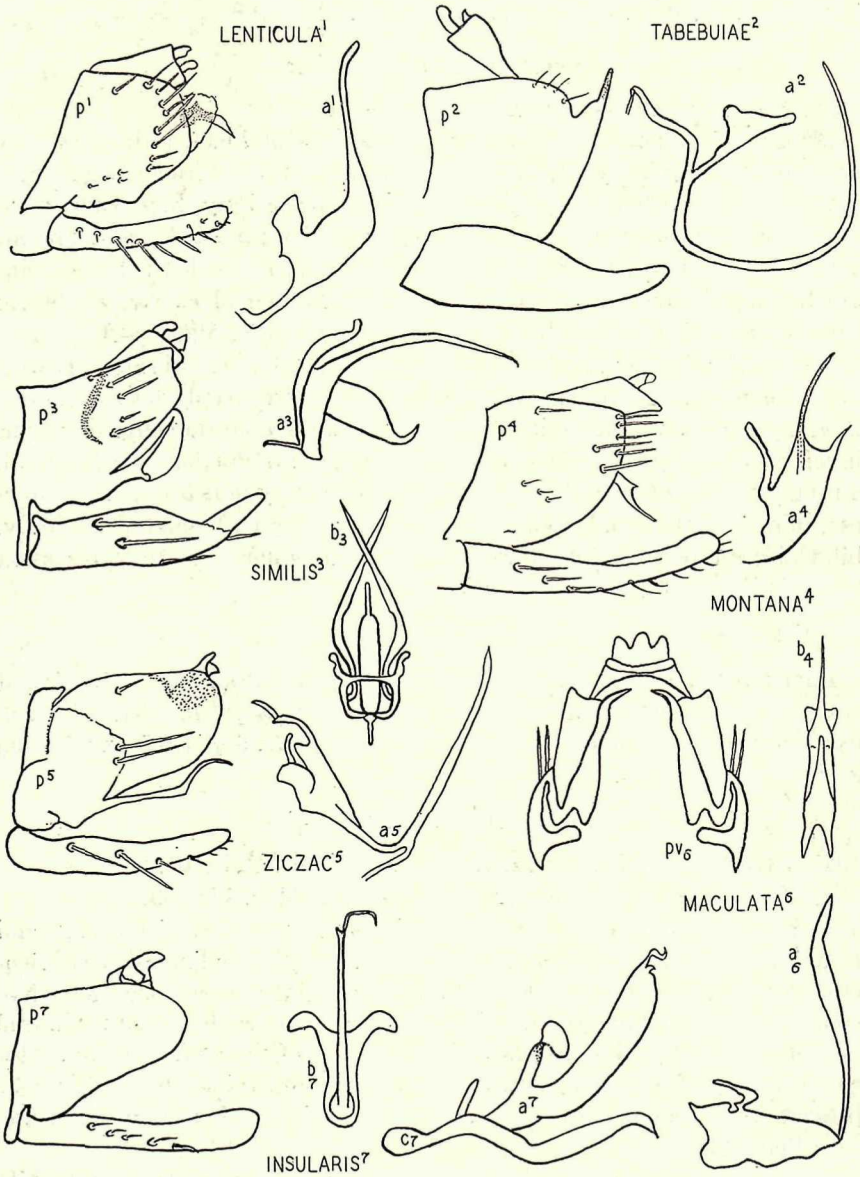


PLATE 45. *Protalebra*, p, genital capsule, a, aedeagus, lateral, c, style, lateral, pv, pygofer, ventral.

RECORDS:

Puerto Rico: Ponce, Ponce-Adjuntas Road, Km. 24.6, altitude 1900 ft., Sept. 12, 1947, from "roble" *Tabebuia pallida*.

Caja de Muertos Island: Dec. 5-11, 1947, from weeds.

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

This species breeds on "roble" *Tabebuia pallida* from the lowlands to the middle altitudes where its host tree grows.

Protalebra ziczac Osborn

1929. *Protalebra ziczac* Osborn. Jour. Dept. Agr. P. R. **13**: 104.

Length, male 2.2 mm.; female 2.8 mm. General color yellowish-orange with whitish-hyaline markings. Head orange apically. Vertex with obscure grayish band between eyes. Pronotum orange with posterior margin whitish-hyaline, edged anteriorly with black. Scutellum orangish. Fore wing yellowish with zigzagged whitish diagonal stripes. (See Plate 43.)

Vertex not as angular in male as in female, almost as long as pronotum. Female sternite VII truncate posteriorly. Male pygofer with ventrolateral process on either side curved dorsally thence caudally at apex; with a pair of prominent medio-lateral setae. Aedeagus with basal portion small, triangular; apical portion right angled to basal, long, slender. (See Plate 45.)

RECORDS:

Puerto Rico: Paratypes from Arecibo, Cambalache Experimental Forest, Nov. 6-7, 1947, from weeds and bushes. (Caldwell and Martorell.)

Vieques Island: Male allotype from Vieques Island on Oct. 23, 1947, from grasses and weeds.

JORUMA McAtee

1924. Florida Entom. **8**: 34.

Ocelli usually prominent. Hind wing with submarginal vein, one or two closed apical cells, and a spurious vein forming a partial or open cell near the apex. Male tenth segment with elongate basal spurs or processes.

KEY TO THE SPECIES OF JORUMA

1. Fore wing dark smoky all over.....*brevidens*
Fore wing definitely bicolored or light greenish-yellow.....2
2. Fore wing smoky-green basally, apex smoky-hyaline.....*neascrupta*
Fore wing light greenish-yellow.....3
3. Aedeagus bifid apically, styles acute apically.....*apicata*
Aedeagus not bifid apically, styles bifid apically.....*duplicata*

Joruma apicata n. sp.

Length of male 2 mm. Face yellow. Ocelli black. Vertex, pronotum, scutellum and basal half of fore wing golden yellow. Apical portion of fore wing clear hyaline. (See Plate 46.)

Vertex short, bluntly produced; surface around eyes broadly concave. Pronotum shorter than vertex. Fore wing relatively short, slender, color boundary of wing forming a series of cells about equal in size to adjacent apical cells. Male with spurs of tenth segment much longer than height of pygofer. Plate elongate triangular, evenly tapered apically. Style acute apically. Aedeagus horizontal, curved dorsally apically; apex deeply bifid. (See Plate 46.)

Differing from other species by the cell-like spots in the fore wing and by the male genitalia as noted in the description.

RECORD:

Puerto Rico: Male holotype from Río Piedras, Agricultural Experiment Station, Sept. 7, 1947, on "guaba" *Inga vera*. (Caldwell and Martorell.)

Joruma brevidens (DeLong)

1923. *Empoasca brevidens* DeLong. Jour. Dept. Agr. P. R. 7: 269.

Length of male 2.6 mm. General color dusky brown with a yellow face. Ocelli red. Basal half of fore wing greenish-yellow, faintly iridescent. (See Plate 46.)

Vertex longer than broad, roundedly produced, not strongly narrowed posteriorly. Fore wing elongate. Hind wing with one closed apical cell. Female sternite VII with latroposterior angles slightly produced, posterior margin very slightly convex. Male with spurs of tenth segment three-fourths as long as height of pygofer, blunt apically. Plate very long, slender, straight, with a row of prominent setae for full length. Aedeagus with median portion large, general shape as in *neascripta* but with a pair of lateral, very long, spine-like processes on posterior margin at midlength. (See Plate 46.)

RECORD:

Puerto Rico: Allotype male from the hills behind Ponce, Mr. Heraclio Giron's Farm, altitude 400 ft., Km. 10, Ponce-Adjuntas Road, at light. The male compares favorably with the female type. (Caldwell and Martorell.)

Joruma duplicata n. sp.

Length of male 2.2 mm. Straw-yellow with black ocelli; fore wing fading to clear hyaline apically. (See Plate 46.)

Vertex obtusely rounded apically, little longer than broad, depressed along eyes in basal portion. Pronotum shorter than vertex. Male with spurs of tenth segment longer than height of pygofer, acute apically; with an additional invert T-shaped process present on either side. Plate elongate, triangular, with apex suddenly narrowed. Style bluntly notched apically. Aedeagus horizontally elongate with apex curving dorsally; apex not appearing bifid. (See Plate 46.)

Resembling *apicata* but with the color in the fore wings fading apically and with different genitalia as noted in the description.

RECORDS:

Puerto Rico: Male holotype from Barceloneta (Barrio Palmas Altas) on the Barceloneta Beach-Arecibo Road, Km. 11.4 along the coast; Oct. Oct. 16, 1947, from bushes and weeds on sand dunes; paratype from Cambalache Experimental Forest, Arecibo, Nov. 7, 1947, (Caldwell and Martorell).

Joruma neascripta Oman

1937. *Joruma neascripta* Oman. Jour. Dept. P. R. **21**: 568.

Length 2.2–2.7 mm. General color greenish-yellow anteriorly, fuscous-hyaline posteriorly. Vertex yellowish, after red apex. Pronotum yellowish. Fore wing greenish-yellow to iridescent green in basal portion, remainder smoky-hyaline including costal margin but excepting a light spot on costa at first cross vein. (See Plate 46.)

Vertex bluntly rounded, almost as long as broad. Hind wing with two closed apical cells. Female sternite VII triangularly produced caudad. Male with spurs of tenth segment half as long as height of pygofer. Valve very small. Plate abruptly bent dorsad at midlength; apical portion of two types, sometimes elongate, sometimes short and broad. Styles very long, needle-like apically, with a subapical elongate setae on outer margin. Aedeagus broad medianly; posterior-apical portion slender, projected dorsad with apex bent cephalad; anterior portion bifid. (See Plate 46.)

Differing from other Puerto Rican species by the presence of two closed apical cells in the hind wing. While I have not included Dozier's record of *pisca* in the above synonymy I believe that it belongs here; however there is a remote possibility that it could have been a specimen of *brevidens* and without the specimen I can not be certain which synonymy would be correct.

RECORDS:

Puerto Rico: We collected this species from low vegetation at Río Piedras and also at the Cambalache Experimental Forest, Nov. 6–7, 1947, from

weeds and bushes; also at Toro Negro Mts., La Maravilla, altitude 2950 ft., Nov. 14, 1947, from grasses and bushes.

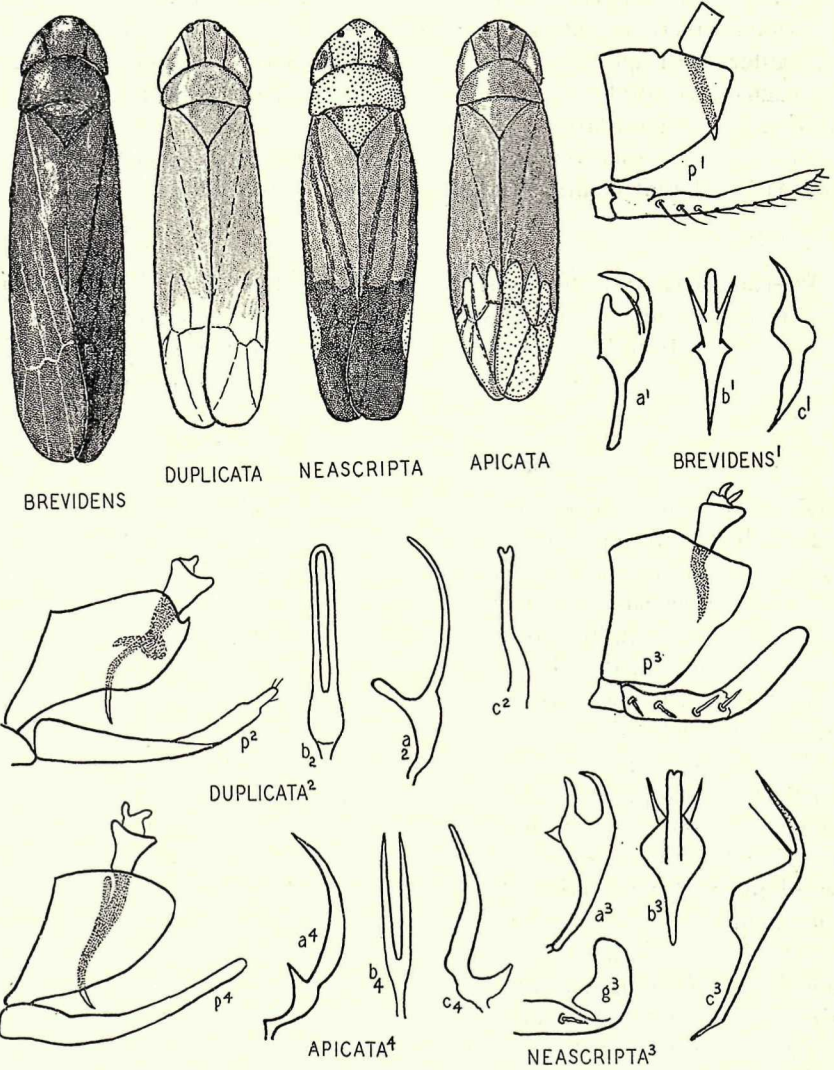


PLATE 46. *Joruma*, p, genital capsule, a, aedeagus, lateral, b, aedeagus, ventral, c, style, ventral, g, plate variation.

DIKRANEURA Hardy

1850. Trans. Tyneside Nat. Field Club. 1: 423.

Vertex usually acutely produced. Fore wing with second apical cell sessile

usually rectangular. Hind wing with submarginal vein and two apical cells. Male pygofers usually with processes.

The subgenus *Hyloidea* McAtee, has been erected to contain the forms that are greatly flattened dorsoventrally.

Most of the species are similar in color and marking, making it necessary to resort to characters of the male for reliable determinations. Ten forms are known to occur here, but two of these are represented by unique females and remain unidentified. One of these is pure white and the other is white with two red dashes on the fore wing.

KEY TO THE SPECIES OF DIKRANEURA

1. Pygofer without spines or processes.....*albatron*
 Pygofer with spines or processes present.....2
2. Pygofer process thin, ventral, longer than plates.....*pseudomarginella*
 Pygofer process dorsal or apical, shorter than plates.....3
3. Aedeagus without processes, simple.....*pistola*
 Aedeagus with processes present.....4
4. Aedeagus with prominent pair of crossed processes.....*delicata*
 Aedeagus without any crossed processes.....5
5. Plate with a heavy spur at center of dorsal margin.....*cedrelae*
 Plate without any heavy spur on the dorsal margin.....6
6. Aedeagus with apical processes elongate, divergent.....*depressa*
 Aedeagus without apical processes, processes basal.....7
7. Aedeagus with one pair slender basal processes.....*orphanda*
 Aedeagus with two pair basal processes enlarged apically.....*aurulenta*

Dikraneura albatron n. sp.

Length of male 2 mm. White all over. Fore wing very lightly tinted with yellow; with a small opaque spot in the outer and inner apical cell.

Head small, conically produced. Vertex almost one-third longer than broad, almost subequal in length to pronotum. Fore wing with second apical cell triangular. Male pygofer produced, subtruncate posteriorly on either side; processes not apparent. Style with apex strongly bent inward; with a short, obtuse spur at base of bend and one apically projected posteriorly. Aedeagus slender, projected posteriorly and dorsally, with apical half curved ventrally; apex deeply bifid. (See Plate 47.)

RECORD:

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

Dikraneura aurulenta Lawson

1930. *Dikraneura aurulenta* Lawson. Canadian Ent. **62**: 41-42.

Length 2.7-3 mm. General color orangish-yellow. Vertex golden; an-

terior margin, median basal dash, and an irregular area around the eyes whitish. Pronotum orange with white angular spots along anterior margin.

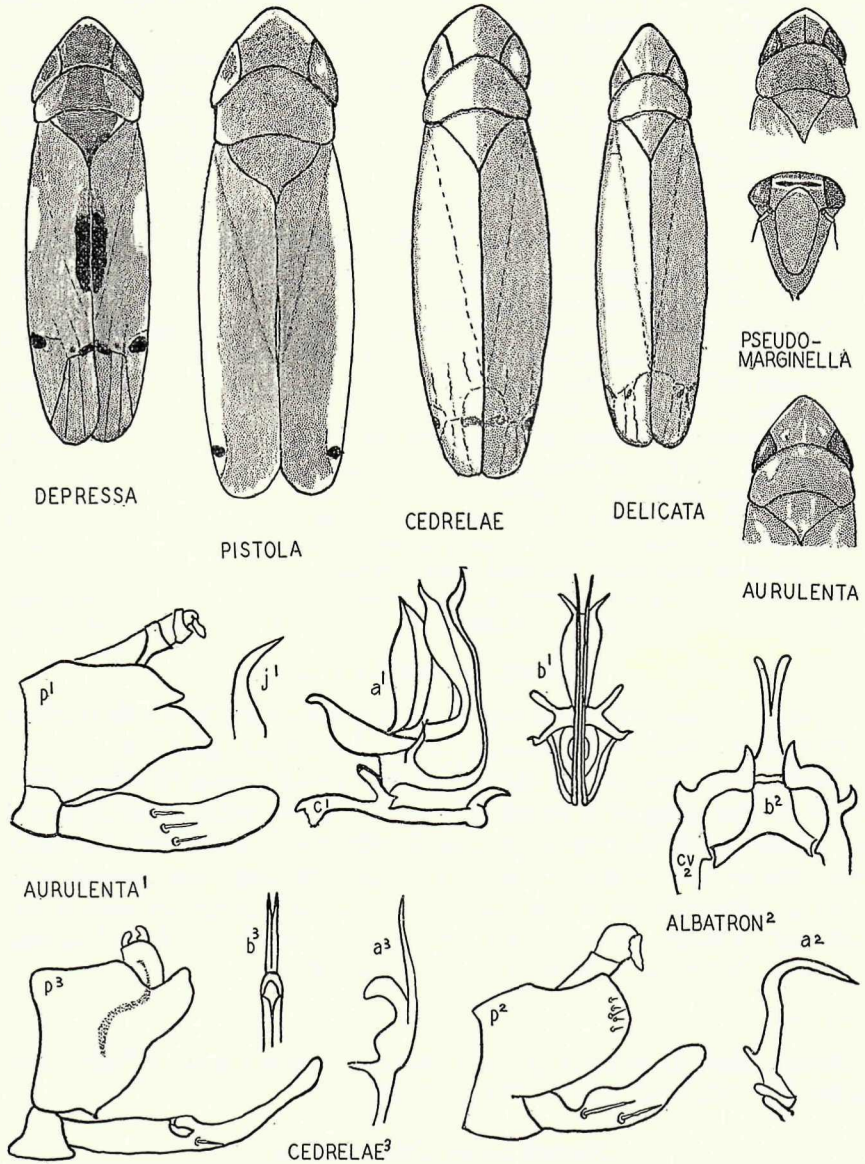


PLATE 47. *Dikraneura*, p, genital capsule, a, internal genitalia or aedeagus, lateral, b, aedeagus, ventral, or posterior, & internal genitalia, ventral.

Scutellum orange with a pair of irregular, white median stripes. Fore wing greenish-yellow with costal margins tending toward white. (See Plate 47.)

Vertex produced, acute, as long as broad. Fore wing with apical cells elongate. Female sternite VII slightly convex posteriorly; outer angles diagonally truncate. Male pygofer with dorsal process curving inward on either latroposterior margin. Style with apex bent inward. Aedeagus with a pair of long basal processes projected dorsally, apices enlarged and bent caudad; a pair of broad, median processes present projected dorsally with their apices narrow, divergent; and two single processes present closely appressed posteriorly and anteriorly. (See Plate 47.)

RECORD:

Puerto Rico: Ponce, Aug. 28, 1947, breeding on "zarcilla" or wild tamarind, *Leucaena glauca* trees at sea-level.

Dikraneura cedrelae Oman

1937. *Dikraneura cedrelae* Oman. Jour. Dept. Agr. P. R. **21**: 269-270.

Length 3-3.4 mm. Light yellow above, white beneath. Fore wing with fuscous spot in outer and inner apical cell. (See Plate 47.)

Vertex little broader than long, bluntly angled anteriorly. Fore wing relatively long. Female sternite VII rounded posteriorly, with a slight median notch. Male pygofer process slender, projected caudad then dorsad. Plate very long, slender, with a prominent lateral spur on dorsal margin at midlength. Style long, narrowed before apex; apex broadened. Aedeagus broad in middle; with a pair of long caudal processes projected straight dorsad. (See Plate 47.)

Taken in the middle and higher altitudes of Puerto Rico on *Cedrela* and often occurring in sufficient numbers to cause injury.

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, on "cedro" or cedar, *Cedrela mexicana*; Cayey, Peñón del Collao, Salinas Road, altitude 1900 ft., Aug. 28, 1947, from *Cedrela mexicana*; Aibonito, Aibonito-Barranquitas Road, Km. 34, Sept. 11, 1947, resting on weeds, below cedar trees. The species breeds all year around on *Cedrela mexicana* and *Cedrela odorata*, most abundant during dry periods of the year causing intense chlorosis and heavy defoliation. (Caldwell and Martorell.)

Dikraneura delicata Osborn

1935. *Dikraneura (Hyloidea) delicata* Osborn. Jour. Dept. Agr. P. R. **14**: 190-191.

1937. *Dikraneura centrosemae* Oman. Jour. Dept. Agr. P. R. **21**: 568-569.

Length 2.2–3 mm. General color white. Fore wing tinted with yellow, fuscous marks present in apical cells. (See Plate 47.)

Long, slender species. Vertex greatly produced, one and a half times as long as broad, as long as pronotum. Fore wing long, slender. Female sternite VII bluntly produced caudad. Male pygofer produced posteriorly, acute apically on either side; a small curved process present arising preapically from dorsal margin. Style S-shaped in lateral aspect. Aedeagus trifurcate apically; posterior processes appressed with their apices crossed and projected laterad. (See Plate 48.)

Very common over most of Puerto Rico especially around 1500 ft. on *Centrosema* = *Bradburya*.

The primary author of this species evidently was not familiar with the generic and subgeneric characters of *Dikraneura*. The species can not be delicate and rounded and belong to *Hylloidea* which is composed of robust and greatly flattened forms. The Osborn types in the Ohio State University were unmarked and unlabeled; however a series was found that had been segregated bearing the correct localities and dates corresponding to the original designation with one exception. These have subsequently been labeled by Prof. J. N. Knull.

RECORDS:

Puerto Rico: Lares-Yauco Road, Km. 33.1, altitude 1700 ft., from weeds and grasses under coffee plantations; Aguas Buenas (Enrique Castro's farm) altitude 1200 ft., Sept. 14, 1947, by sweeping on low shrubs under coffee trees; Doña Juana, altitude 2600 ft., Oct. 9, 1947, from weeds; Ponce, Nov. 21, 1947, by beating on weeds and grasses in "papaya" (*Carica papaya*) grove.

Dikraneura pseudomarginella n. sp.

1929. *Dikraneura marginella* Osborn. Jour. Dept. Agr. P. R. **13**: 106.

Length, male 2.5 mm.; female 3 mm. General color orangish-green. Apex of head between eyes broadly white with a dark median, transverse line present within the white band not reaching to the eyes. Vertex orange, anterior margin whitish. Pronotum greenish with anterior and lateral margins broadly orange. Scutellum greenish-orange. Fore wing olive green with apical cells clear hyaline. (See Plate 47.)

Vertex broader than long, obtuse, shorter than pronotum. Fore wing short. Female sternite VII sinuate posteriorly, with a slight median notch. Male pygofer greatly narrowed from ventral margins on either side posteriorly; a very long, slender, process apparently arising from the base of pygofer projects posteriorly as far as apex of plate. Plate long, triangular, narrowed in apical half. Aedeagus long, broad, apex curved cephalad, with

a pair of shorter lateral spurs at the curve; anterior margin produced into a ventral projecting process at midlength. (See Plate 48.)

This species has been confused with *marginella* Baker for many years because of the similar marks on the vertex. I have also seen specimens of this species from Florida in various collections.

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of either sex from Arecibo, Arecibo-Camuy Road, Km. 80, at sea level, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; paratypes from Ponce, Sept. 11, 1947, by sweeping on "aroma" or casha *Vachellia farnesiana*. (Caldwell and Martorell.)

St. Thomas, Virgin Islands: Paratypes from St. Thomas.

Caja de Muertos Island: Dec. 5, 1947, from "zarcilla", *Leucaena glauca*.

Subgenus *Hyloidea* McAtee

1926. Jour. New York. Ent. Soc. **34**: 162.

Robust *Dikraneura* that are greatly flattened dorsoventrally.

Dikraneura (Hyloidea) depressa McAtee

1926. *Dikraneura (Hyloidea) depressa* McAtee. Jour. N. Y. Ent. Soc. **34**: 162.

Length 2.2-3 mm. General color yellowish marked with brown. Vertex brown with anterior margin white. Pronotum brown with lateral margins broadly yellowed. Scutellum brown with basal angles white. Fore wing yellowish with a large black spot at center of claval area and one on the first cross vein. (See Plate 47.)

Vertex greatly produced, acute anteriorly, broader than long, as long as pronotum. Fore wing short, broad, broadly rounded apically. Female sternite VII produced medianly and laterally on posterior margin. Male pygofer with short, stout process of either dorsoposterior margin. Style with apex strongly bent inward and caudally. Aedeagus slender, with three pair processes; posterior-apical pair long, projected cephalad; postmedian pair short, projected ventrally; anterior-median pair short, projected ventrally. (See Plate 48.)

RECORD:

Puerto Rico: Species breeding abundantly on the undersides of "maga" (*Montezuma speciosissima*) leaves from low to middle altitudes where the host tree grows.

Dikraneura (Hyloidea) *pistola* n. sp.

Length, male 3 mm.; female 3.3 mm. General color orangish-green. Vertex orange with anterior margin broadly white; color boundary not

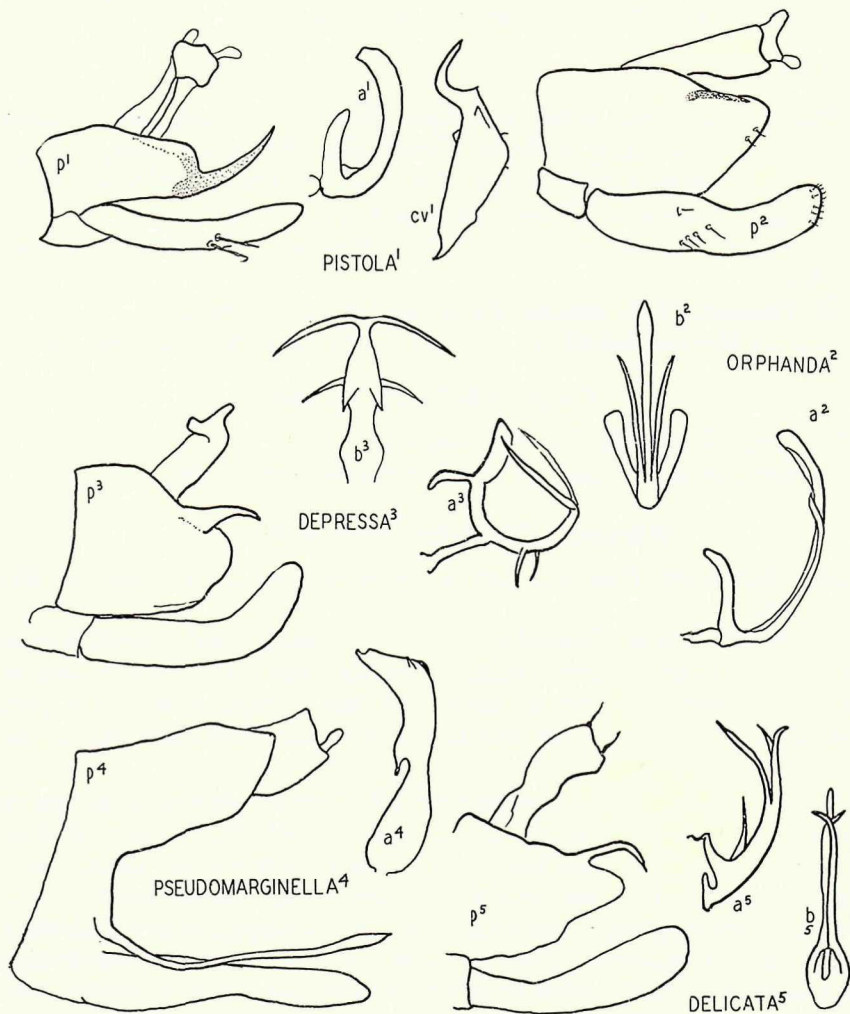


PLATE 48. *Dikraneura*, p, genital capsule, a, aedeagus, lateral, b, aedeagus, posterior, cv, style, ventral.

sharply defined. Pronotum and scutellum orangish-green. Fore wing light yellowish-green with costal margin whitish-hyaline; outer apical cell with black spot. (See Plate 47.)

Vertex very broad, greatly produced, little shorter than pronotum;

apex narrowly rounded. Fore wing slender, short, broad, broadly rounded apically; veins very slender. Female sternite VII broadly truncate posteriorly. Male pygofer produced posteriorly into a long, stout spur on either side. Style broad; apex narrowed, projected outward then caudad in ventral aspect. Aedagus a simple tubular, U-shaped organ with anterior arm shorter than posterior. (See Plate 48.)

RECORDS:

Puerto Rico: Male holotype and paratypes from light at Río Piedras, Nov. 21, 1947; female allotype and paratypes from Río Piedras on the foliage of "javilla" or "molinillo" monkey-pistol, *Hura crepitans*. (Caldwell and Martorell.) Paratypes from Ponce, at light. (Maldonado.)

Dikraneura (*Hyoidea*) *orphanda* n. sp.

Length of male 3 mm. General color of specimen preserved in alcohol, white with a large fuscous dash across base of two inner apical cells.

Species broad, flattened. Vertex greatly produced, broadly rounded anteriorly, as long as broad. Male pygofer with either posterior margin acute; dorsal process small, acute. Style elongate; apex acute, curved ventrally. Aedeagus with posterior portion long, slender, curved dorsoanteriorly; a pair of slender processes present appressed to aedeagus and extending from base for three-fourths length; anterior portion short, deeply bifid. (See Plate 48.)

RECORD:

Puerto Rico: Unique male from lowlands of Puerto Rico. Exact locality unknown. (Caldwell and Martorell.)

ALCONEURA Ball & DeLong

1925. Ann. Ent. Soc. Amer. **18**: 324, 334.

Small but robust species resembling *Dikraneura* in venation of hind wing. Fore wing with second apical cell pedunculate, triangular or semicircular. Aedeagus usually very broad in lateral aspect, without apical processes.

KEY TO SPECIES OF *ALCONEURA*

1. White with bright reddish spots on dorsum.....*rubramaculata*
- Greenish-yellow with longitudinal, light stripes.....*dorsalis*

Alconeura rubramaculata n. sp.

Length, male 2.7 mm.; female 3 mm. General color white with reddish spots; a median pair on vertex between eyes; four along anterior margin of pronotum; three on scutellum; and five before the cross veins in fore

wing in addition to one in basal costal area. Cross veins and veins beyond margined with fuscous; black spot in fourth apical cell sometimes absent. (See Plate 49.)

Head conically produced. Vertex little broader than long, shorter than pronotum. Female sternite VII broadly, triangularly produced caudad; apex blunt. Male pygofer appearing to have a circular notch in either

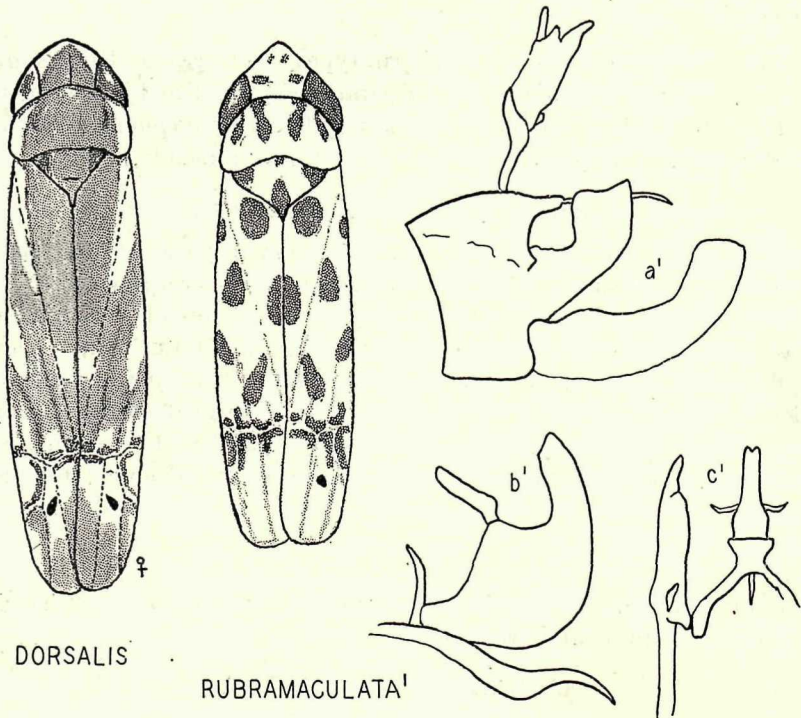


PLATE 49. *Alconeura*, a, genital capsule, b, internal genitalia, lateral, c, internal genitalia, ventral.

dorsoposterior margin before apex; spiniform process present projected straight caudad from dorsal margin of notch. Style long, slender. Aedeagus extremely broad in basal two-thirds; apical third narrowed from anterior margin curving slightly cephalad. (See Plate 49.)

RECORDS:

Puerto Rico: Male holotype and female paratypes from Ponce, at light. (Maldonado.) Female allotype and paratype from Ponce, Ponce-Adjuntas, Road, Km. 10, altitude 400 ft., Mr. Heraclio Giron's farm, at neon lights (daylight type). (Caldwell and Martorell.)

***Alconeura dorsalis* (DeLong)**

1924. *Dikraneura unipuncta dorsalis* DeLong. Jour. N. Y. Ent. Soc. **32**: 67-68.

1936. *Alconeura dorsalis* Griffith. Univ. Kansas Sci. Bull. **24**: 321-322.

Length of female 3 mm. General color brownish-yellow with white stripes around margin of head, crossing lateral margins of pronotum and half way up claval suture of fore wing. A white spot present near apex of clavus and one outside of clavus farther laterad. Costal margin and apical cells hyaline with the inner margins of the apical cells lined with fuscous. A black spot sometimes present in third apical cell.

Head produced, obtuse apically. Vertex broader than long, half as long as pronotum. Female sternite VII broadly triangularly produced posteriorly. (See Plate 49.)

RECORD:

Puerto Rico: One female specimen from Maricao Insular Forest, Maricao-Sabana Grande Road, altitude 2200 ft., Km. 11.9, Sept. 12, 1947, by sweeping on "cabrilla", *Trema Lamarkiana* trees.

***TYPHLOCYBELLA* Baker**

1903. Invertebrata Pacifica **1**: 3.

Small cylindrical species with long fore wings. Fore wing without appendix; second apical cell pedunculate, broadly triangular, embracing the entire apex. Hind wing without submarginal vein.

KEY TO SPECIES OF *TYPHLOCYBELLA*

1. General color yellowish all over.....*minima*
 General color fuscous splashed with green and yellow.....*maculata*

***Typhlocybella minima* Baker**

1903. *Typhlocybella minima* Baker. Invertebrata Pacifica **1**: 3.

Length 2-2.2 mm. Sordid yellow mottled with white. Vertex and pronotum with longitudinal median white stripe. Fore wing smoky-hyaline apically. (See Plate 50.)

Head bluntly, conically produced. Vertex broader than long, shorter than pronotum. Female sternite VII triangularly produced posteriorly. Male pygofer with small circular notch in center of either latroposterior margin. Aedeagus broad basally, narrowed apically, with a pair elongate, slender, lateral processes projected dorsad with their apices bent abruptly outward. (See Plate 50.)

Common over all the islands on grasses, including St. Thomas.

Depressed in form. Vertex angularly produced, almost as long as broad, almost as long as pronotum. Female sternite VII broadly, triangularly produced posteriorly; apex rounded. Male pygofer gently produced caudally, acute. Plate elongate. Style long, slender; apex acute, curved outward.

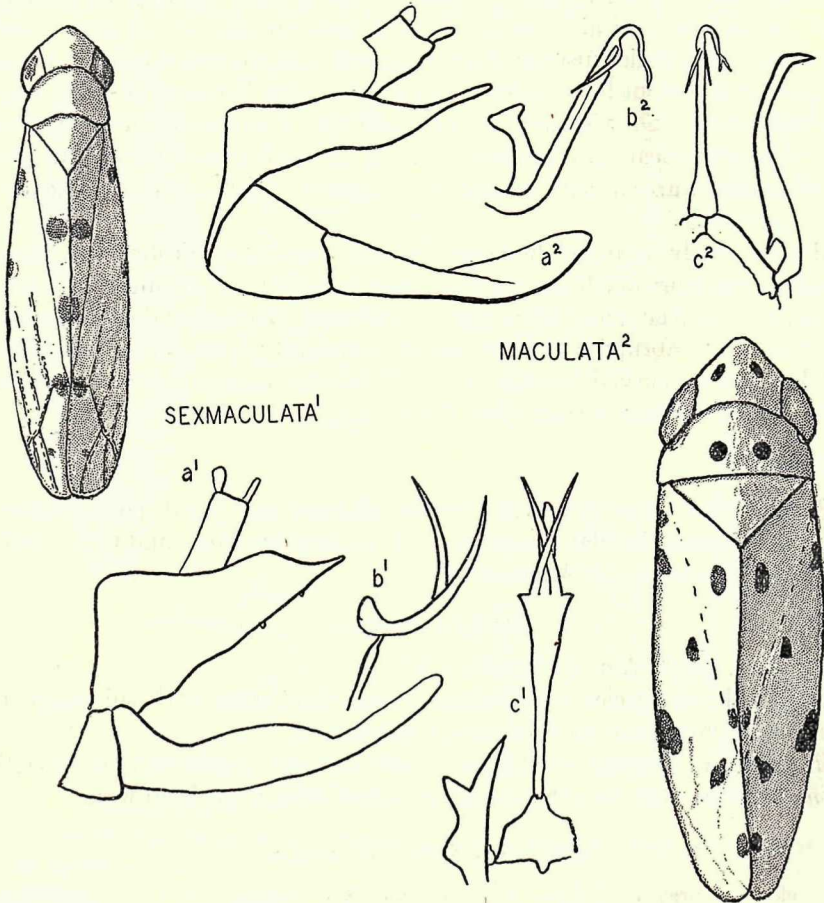


PLATE 51. *Hybla*, a, genital capsule, b, aedeagus, lateral, c, internal genitalia, ventral.

Aedeagus long, slender; apical portion strongly curved ventrally, bifid; two lateral projecting processes present. (See Plate 51.)

RECORD:

Puerto Rico: Taken at Cayey, Peñón del Collao, 2000 ft., high, Dec. 4, 1947, by sweeping on the foliage of a large "guasávara" or "murta" tree, *Eugenia aeruginosa*.

Hybla sexmaculata (DeLong)

1923. *Empoasca sexmaculata* DeLong. Jour. Dept. Agr. P. R. 7: 270.

Length 2-2.5 mm. General color white to yellowish usually with orangish spots on fore wing; one near base of costa, one in center of clavus, one on base of inner apical cell, and a lighter mark in apex of clavus. Eyes greenish. Spots on fore wing sometimes brownish to fuscous, sometimes almost obsolete. (See Plate 51.)

Vertex bluntly produced, median length two-thirds that of width between eyes. Female sternite VII broadly convex posteriorly. Male pygofer greatly produced posteriorly, dorsoposterior angles narrow. Plate elongate. Style broadly notched apically; inner arm longer, more acute than outer. Aedeagus set up on a long slender basal connective; trifurcate apically with the lateral, arms crossing ventrally before apex. (See Plate 51.)

RECORDS:

Puerto Rico: Abundant, from lowlands to middle elevations, where host tree grows. The species breeds on the foliage of "emajagua" or mountain mahoe, *Pariti tiliaceum*.

The foliage of *Pariti* tree develops an intense chlorosis during heavy attacks of this species. Very common species in the Island.

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

IDONA DeLong

1931. Tech. Bull. U. S. Dept. Agr. 231: 14, 50.

1948. Bull. Illinois Nat. Hist. Surv. No. 24, Art. 2, p. 352.

Small greenish species which may or may not be spotted with fuscous. Hind wing with submarginal vein and a cross vein forming one apical cell.

Separated from *Hybla* by the presence of one apical cell in the hind wing and from *Empoasca* by the different type of aedeagus and by the bifurcate styles.

Idona minuenda (Ball)

1921. *Empoasca minuenda* Ball. Proc. Biol. Soc. Washington 34: 23.

Length 2 mm. General color greenish-yellow, often with dark spots as in *Hybla maculata* except the vertex is always clear.

Vertex conically produced, length and width subequal. Female sternite VII with posterior margin convex. Male pygofer greatly produced posteriorly; either dorsoposterior angle deeply notched with more dorsal portion stout, spiniform; a long slender process present arising cephalad and projected caudad along either side dorsally. Styles slightly bifid apically.

Aedeagus trifurcate; posterior portion composed of a pair long, slender, acuminate processes; anterior portion slender, single, reverse S-shaped. (See Plate 52.)

RECORDS:

Puerto Rico: Taken on avocado or "aguacate", *Persea gratissima* on the lowlands. Also collected at the Maricao Insular Forest, Maricao-Sabana Grande Road, Km. 10.8, Nov. 13, 1947, by beating on the foliage of "ca-brilla", *Trema Lamarkiana*.

The color variations in this species have received varietal names.

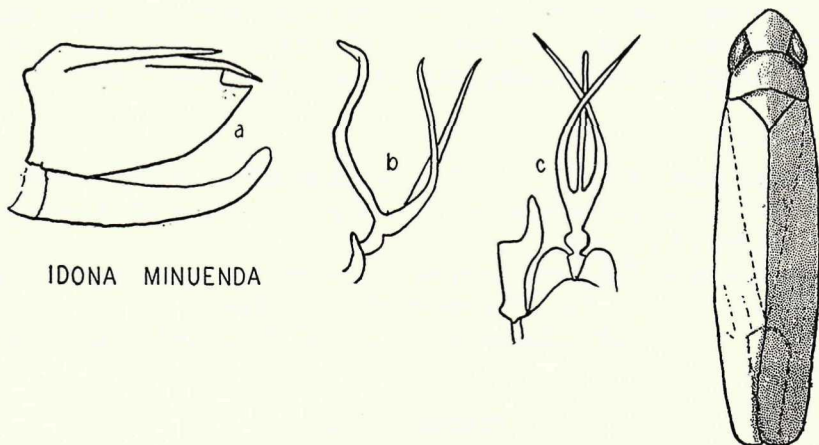


PLATE 52. a, genital capsule, b, aedeagus, lateral, c, internal genitalia, ventral.

EMPOASCA Walsh

1864. Proc. Boston Soc. Nat. Hist. **9**: 315.

Slender greenish species with bluntly rounded heads. Hind wing with submarginal vein and one apical cell. Styles in male slender, acuminate apically.

Twenty-six forms are known to occur in Puerto Rico and doubtless more await to be taken. One of our species is represented by a very large female and remains undetermined. The known forms all belong to the typical subgenus. The species can only be determined by characters of the male genitalia.

KEY TO THE SPECIES OF *EMPOASCA*

- | | |
|---|------------------|
| 1. Genitalia without lateral processes..... | 2 |
| Genitalia with lateral processes present..... | 3 |
| 2. Genitalia without true dorsal spine..... | <i>insularis</i> |
| Genitalia with dorsal spine present..... | <i>nilila</i> |

3. Dorsal spine bifurcate apically 4
 Dorsal spine not bifurcate apically 7
4. Apical notch in dorsal spine sharply angular *montana*
 Apical notch in dorsal spine broadly rounded 5
5. Lateral process setose apically *pseudosetigera*
 Lateral process not setose apically 6
6. Dorsal spine twice as long as apical notch; lateral process shorter than height of pygofer *gossypii*
 Dorsal spine only as long as apical notch; lateral process much longer than height of pygofer *prona*
7. (3) Lateral process bifurcate apically 8
 Lateral process not bifurcate apically 9
8. Lateral process long, slender, curved; posterior fork of apex twice that of anterior *papayae*
 Lateral process short, broad, straight, prongs of apical fork subequal in length *chelata*
9. Dorsal spine projected abruptly caudad in apical half *bovina*
 Dorsal spine not projected abruptly caudad 10
10. Dorsal spine acute apically 11
 Dorsal spine blunt, broadly rounded apically 20
11. Dorsal spine two-thirds as long as height of pygofer 12
 Dorsal spine at most half as long as height of pygofer 13
12. Dorsal spine broad, strongly sinuate; aedeagus a simple tube, reverse S-shaped apically *fabalis*
 Dorsal spine narrow, but slightly curved; aedeagus with many posterior processes *ramosae*
13. Lateral process very broad for central 3/5, narrowed basally and apically. *fabae*
 Lateral process not broadened in central 3/5, but may be slightly swollen subapically 14
14. Lateral process slightly enlarged subapically 15
 Lateral process gradually acuminate apically 16
15. Dorsal spine strongly sinuate; style suddenly narrowed apically with apex angular in projection *sativae*
 Dorsal spine almost straight; style gradually acuminate and evenly arcuate *taraxa*
16. Dorsal spine broad basally, apical portion abruptly narrowed from ventroanterior margin, curved slightly caudad *zyxa*
 Dorsal spine gradually acuminate apically 17
17. Lateral process much longer than height of pygofer, apex hooked dorsad in lateral aspect *muricata*
 Lateral process not longer, if as long, as height of pygofer, apex straight or slightly bent 18
18. Lateral process shorter than aedeagus; dorsal spine of even width to apex, apical portion abruptly bent at right angles to basal portion; sternal apodemes about as long as one abdominal segment *dicyrta*
 Lateral process as long or longer than aedeagus; dorsal spine curved not angularly bent, sternal apodemes at least as long as two abdominal segments 19
19. Dorsal spine very strongly curved; lateral process almost evenly narrowed to apex *obliqua*

- Dorsal spine almost straight; lateral process abruptly narrowed on anterior margin in apical third..... *incisa*
20. (10). Dorsal spine short, almost hemispherical..... *gongyla*
Dorsal spine elongate, pendulant, lobular..... 21
21. Dorsal spine strongly curved anteriorly; lateral process short, slender, sharply hooked apically..... *cypha*
Dorsal spine almost straight; lateral process elongate..... 22
22. Aedeagus broad in lateral aspect, pitcher-shaped..... *eweraformis*
Aedeagus not pitcher-shaped in lateral aspect..... 23
23. Aedeagus with light membranous process arising from central fork.... *dilitara*
Aedeagus without any membranous process arising from any fork..... 24
24. Aedeagus two branched in lateral aspect..... *plebeia*
Aedeagus three branched in lateral aspect; lateral process with apical spur or short process..... *canavalia*.

Empoasca bovina n. sp.

Length of male 3 mm. Vertex broadly rounded. Male with dorsal spine of tenth segment elongate, projected ventrad in basal portion then bent and projected straight caudad. Pygofer process short, slender, projected dorsad. Aedeagus with apical third abruptly projected caudad and slightly dorsad. Sternal apodemes long, divergent. (See Plate 53.)

RECORD:

Puerto Rico: Male holotype from Río Piedras, Sept. 7, 1947, from "taguatagua", *Passiflora foetida*. (Caldwell and Martorell.)

Empoasca canavalia DeLong

1932. *Empoasca canavalia* DeLong. Jour. Dept. Agr. P. R. **16**: 114-115.

Length 2.5-3 mm. Vertex appearing broad. Male with dorsal spine of tenth segment broad, straight, blunt apically. Pygofer process elongate, enlarging from base to subapex; apex usually short, acute, however exact shape is extremely variable. Aedeagus in lateral aspect, trifurcate; posterior portion bifid to base with either half equal in length to the other or with one only half as long as the other. Sternal apodemes separated to base, little over two abdominal segments in length. (See Plate 53.)

Common in the coastal areas of all the islands including St. Thomas. This species was originally described from Haiti (Hispaniola) from jack beans, *Canavalia ensiformis*.

RECORDS:

Puerto Rico: Juana Díaz, El Pastillo, Sept. 27, 1947, from "lirio de mar" and "yerba mariposa"; Juana Díaz-Losey Field Road, Km. 3.7, Oct. 9, 1947, from "higuereta" *Ricinus communis*; Salinas Beach, between Salinas and Sta. Isabel near Río Jueyes, Nov. 21, 1947, from *Volkameria aculeata*.

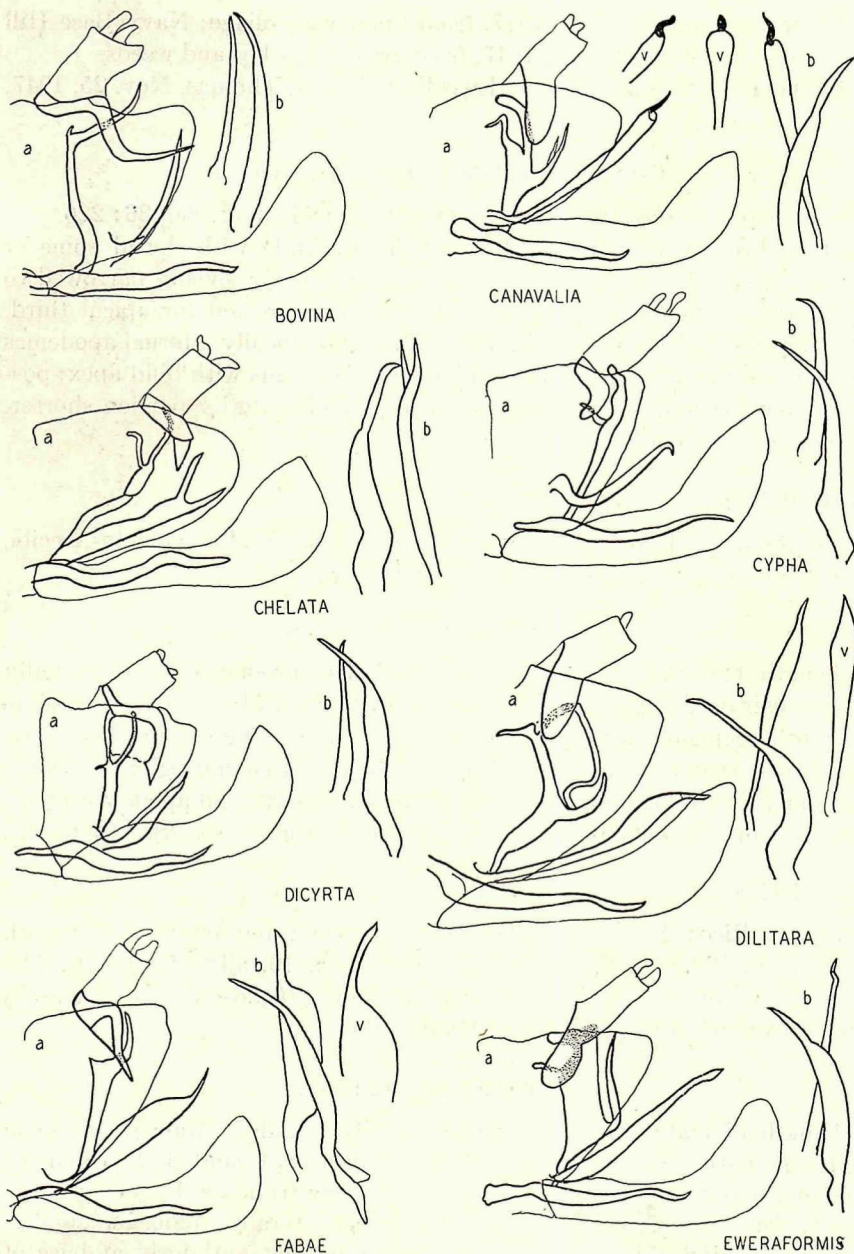


PLATE 53. *Empoasca*, a, genital capsule & internal genitalia, lateral, b, process & style, ventral, v, process variation.

Vieques Island: Oct. 23, 1947, from "papaya" foliage; Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds.

St. Thomas, Virgin Islands: Also collected at St. Thomas, Nov. 25, 1947, (Caldwell).

***Empoasca chelata* DeLong & Davidson**

1926. *Empoasca chelata* DeLong & Davidson. Ohio Jour. Sci. **36**: 226.

Head broadly rounded, slightly produced. Male with dorsal spine of tenth segment broad, evenly curved ventroanteriorly, evenly narrowed to apex with a slight central constriction. Style narrowed for apical third. Pygofer process broad, deeply and broadly bifid apically. Sternal apodemes elongate, robust, contiguous for full length. Aedeagus with bifid apex; posterior portion long, slender, apex bent cephalad; anterior portion shorter, apex bent cephalad, rounded. (See Plate 53.)

RECORDS:

Puerto Rico: Taken at Aguirre, Ponce, and on the Barceloneta-Arecibo Road. Previously recorded only from Mississippi.

***Empoasca cypha* n. sp.**

Length, male 2.5 mm.; female 2.8 mm. Vertex produced, obtuse, usually with a pair of divergent white dashes between eyes. Male with dorsal spine of tenth segment short, reverse L-shaped, blunt. Pygofer process short, slender; apex curved inward. Aedeagus with apical fourth irregular in width; a subapical projection present on anterior margin. Sternal apodemes about two abdominal segments in length, divergent from bases. (See Plate 53.)

RECORDS:

Puerto Rico: Male holotype, female allotype and paratypes of both sexes from Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Mr. Heraclio Giron's farm, Sept. 13, 1947, at lights. (Caldwell and Martorell) and in August, 1948, at lights. (Maldonado.)

***Empoasca dicyrta* n. sp.**

Length of male 2.8-3 mm. Head broadly rounded. Male with dorsal spine of tenth segment narrow, elongate, projected caudad then bent at midlength and projected ventrad; apex obtusely truncate. Pygofer process short, slender; apex very slightly curved dorsolaterally. Aedeagus appearing evenly bifid apically with a short spur present anteriorly at base of anterior fork. Sternal apodemes very short, appearing as two humps. (See Plate 53.)

RECORDS:

Puerto Rico: Male holotype from Aguas Buenas, Mr. Enrique Castro's farm, altitude 1300 ft., Sept. 14, 1947; paratypes from Arecibo, Cambalache Experimental Forest, Nov. 6-7, 1947, and Aguadilla, Aguadilla Beach, Aug. 29, 1947, from weeds. (Caldwell and Martorell.)

Empoasca dilitara DeLong & Davidson

1935. *Empoasca dilitara* DeLong & Davidson. Ohio Jour. Sci. **35**: 36-37.

Length 2.5-3 mm. Vertex produced, obtuse. Male with dorsal spine broad, apex narrowly rounded. Pygofer process elongate; apex compressed, acute. Noticeable variation present in exact shape of process but the apex is always constricted. Style narrow, stylate in apical third. Aedeagus bent cephalad at midlength and again at apex; with a pair of posterior processes arising at ventral bend; a light tubular process present arising from base of processes projected dorsad then bent cephalad to join the apex of the aedeagus. The area between tubular process and dorsal portion of aedeagus is covered by a thin membrane which is not easily visible. Sternal apodemes large, broad, rounded apically. (See Plate 53.)

Since the pygofer processes are somewhat variable and a slight difference in point of view exaggerates the apparent difference, the most reliable characters and most constant, are the dorsal spine and aedeagus.

One of the most common forms in Puerto Rico and the islands including St. Thomas. It has been taken on "papaya" (*Carica papaya*) in Cuba and Florida but not in Puerto Rico.

RECORDS:

Puerto Rico: Ponce, Ponce-Guayanilla Road-Ford house, Sept. 11, 1947, on "aroma", *Vachellia farnesiana* and "bejuco de caro" *Cissus sicyoides*; Juana Díaz, Losey Field Road, Km. 3.7, Oct. 9, 1947, from "higuereta" or castor bean, *Ricinus communis*.

Caja de Muertos Island: Dec. 5, 1947, among weeds.

St. Thomas, Virgin Islands: Collected at this locality, Nov. 25, 1947. (Caldwell.) Charlotte Amalie, Dec. 16, 1946, on "papaya" foliage. (Martorell and Adsuar.)

Empoasca eweraformis n. sp.

Length of male 2.5 mm. Head slightly obtuse. Male with dorsal spine of tenth segment broad, broadly ovate in lateral aspect. Pygofer obtuse on either side posteriorly; lateral process long, slender; apex slightly swollen in lateral aspect, acute and slightly off-set in ventral aspect. Style greatly narrowed from inner margin to apex. Aedeagus quadrate-truncate apically;

anterior notch present subapically; with a pair of posterior basal processes closely appressed and curving slightly posteriorly near apex. Sternal apodemes large. (See Plate 53.)

RECORD:

Puerto Rico: Male holotype from Orovois, in river bed, altitude 1900 ft., Sept. 11, 1947, by sweeping among weeds and grasses. (Caldwell and Martorell.)

Empoasca fabae (Harris)

1841. *Tettigonia fabae* Harris. Rept. Ins. Massachusetts p. 186.

Length 3-4 mm. Varying from solid green to sometimes spotted with white on head and pronotum. Vertex rounding. Male with spine of tenth segment the shape of an English question mark with a membrane across the anterior basal curve. Pygofer process narrow in basal fourth, broadened in median half, with apex narrowed in apical fourth; exact shape and form of apex variable. Aedeagus slender; apex bifid in posterior aspect, curved dorso-posteriorly in lateral aspect; the usually short processes present anteriorly at base of apex. Sternal apodemes very small, widely separated, almost acute apically. (See Plate 53.)

The most common *Empoasca* throughout the islands including St. Thomas, Virgin Islands.

RECORDS:

Puerto Rico: Río Piedras, Aug. 17, 1947, from "gandules" or pigeon peas *Cajanus indicus*; Vega Alta, Aug. 19, 1947, on unidentified ornamentals; Tallaboa, Aug. 28, 1947, on egg-plants, *Solanum melongena*; Mayagüez, Aug. 29, 1947, on the underbrush of papaya plants; Añasco, near the Añasco River bridge, Aug. 29, 1947, on "bucayo enano", *Erythrina berteroana*; Rincón, Barrio Punta, Aug. 29, 1947, on *Cajanus indicus*; Aguadilla Beach (Columbus Park) Aug. 29, 1947, on "quimbombó", *Abelmoschus esculentus*; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (day light type); Ciales-Jayuya Road, Km. 25.8, Sept. 25, 1947, on foliage of "gandules" *Cajanus indicus*; Cabo Rojo, Sept. 26, 1947, from "cerezo", *Cordia nitida*; Arecibo-Camuy Road, Km. 84.4, Oct. 16, 1947, sea-level, on sand dunes by beating on bushes along the beach "hicaco" or coco plum, *Chrysobalanus icaco*, "alilaila", *Melia azedarach* and "vaca", *Bourreria succulenta*.; Río Piedras-Loiza Road, Nov. 11, 1947, from weeds and grasses; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights; Mayagüez, Dec. 4, 1947, from weeds; Quebradillas, Dec. 6, 1947, from weeds.

Vieques Island: Oct. 22-23, 1947, from "añil", *Indigofera*, very abun-

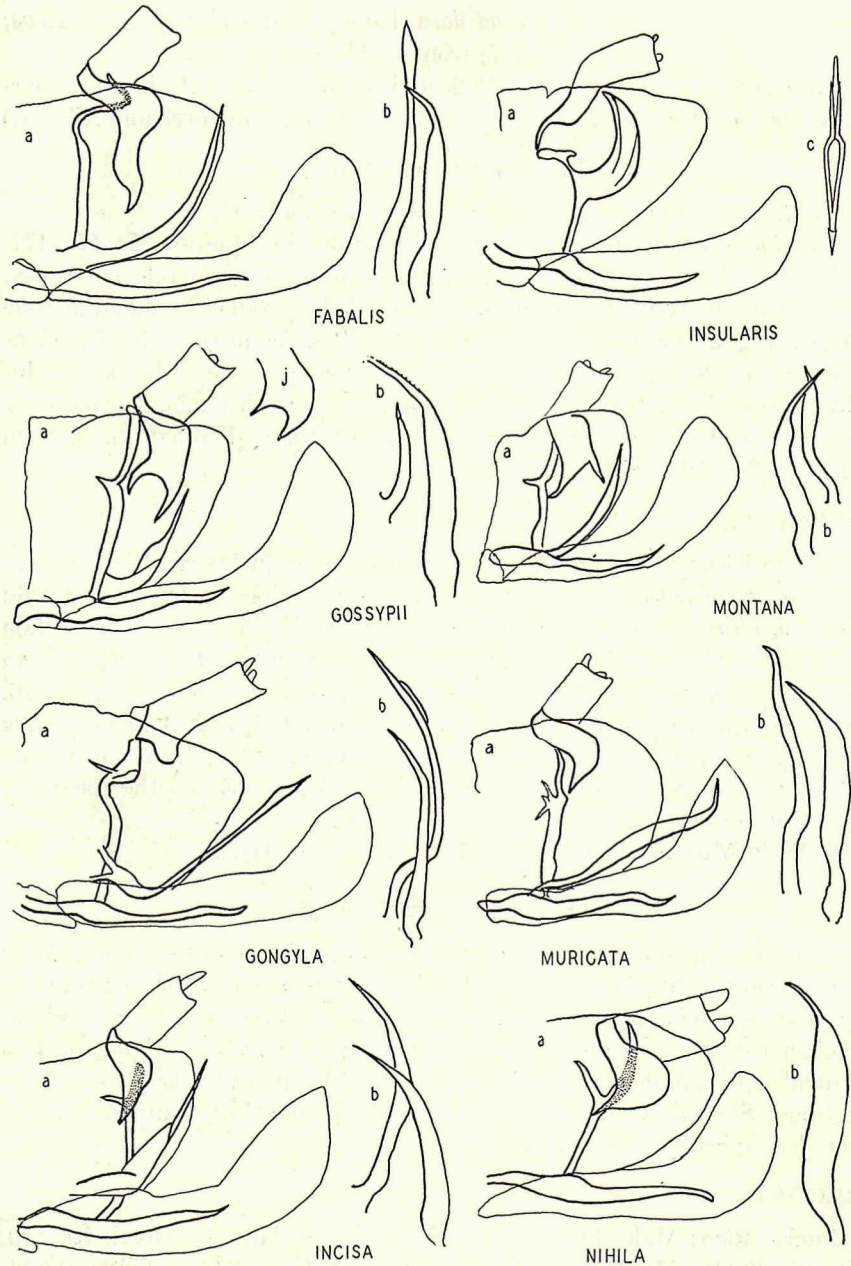


PLATE 54. *Empoasca*, a, genital capsule & internal genitalia, lateral, b, process & style or style, ventral, c, aedeagus, posterior, j, variation in dorsal spine.

dant; from "gallito", *Agati grandiflora*; from "gandules" *Cajanus indicus*; Near Naval Base, Oct. 23, 1947, from weeds and grasses.

St. Thomas, Virgin Islands: Collected at this locality (Caldwell) Charlotte Amalie, Dec. 16, 1947, from "papaya" foliage. (Martorell and Adsuar.)

Empoasca fabalis DeLong

1930. *Empoasca fabalis* DeLong. Canadian Ent. **43**: 92.

1933. *Empoasca batatae* Poos. Proc. Ent. Soc. Washington **35**: 176-177.

Length 3-3.3 mm. Head more produced than in *papayae*. Male with dorsal spine of tenth segment broadened and roundedly produced caudad at base thence undulating ventrally to acute apex. Pygofer process slender, elongate, curved dorsally, slightly enlarged subapically. Style with apex gradually narrowed and bent outward. Aedeagus slender throughout, reverse S-shaped apically. Sternal apodemes less than three abdominal segments in length. (See Plate 54.)

RECORDS:

Puerto Rico: *Fabalis* has been commonly taken in Puerto Rico on "batata" or sweet potato, *Ipomoea batatas*, and on "bejuco de puerco" or wild morning glory vines, *Ipomoea rubra*, *Ipomoea tiliacea*, etc. Cayey, Peñón del Collao (Cayey-Salinas Road) 2400 ft., altitude, Sept. 13, 1947, from sweet potato, *Ipomoea batatas*; Arecibo-Camuy Road, Km. 80, Oct. 16, 1947, from pasture mainly composed of *Bidens pilosa* with *Mimosa pudica* and *Hyptis capitata* in between; Loiza, Nov. 11, 1947, from weeds and grasses; Santurce (Dept. of Health "patio") Aug. 1947, on the foliage of *Ipomoea crassicaulis*, causing intense chlorosis.

Caja de Muertos Island: Dec. 11, 1947, from weeds.

Empoasca gongyla n. sp.

Length of male 3.5 mm. Long, slender form with long fore wings. Very light green to whitish-hyaline. Male with dorsal spine of tenth segment appearing as a semicircular projection. Pygofer process very long, straight, swollen before acute apex in lateral aspect; strongly curved outward in ventral aspect. Aedeagus enlarged apically, with a pair prebasal, lateral projections. Sternal apodemes almost two abdominal segments in length, rounded apically. (See Plate 54.)

RECORD:

Puerto Rico: Male holotype from Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Mr. Heraclio Giron's farm, Nov. 14, 1947, at lights. (Caldwell and Martorell.)

Empoasca gossypii DeLong

1932. *Empoasca gossypii* DeLong. Jour. Dept. Agr. P. R. **16**: 114.

Length 2.5–3 mm. Broad headed form with vertex little produced. Male with dorsal spine of tenth segment broad; apex deeply semi-circularly notched, posterior apex usually little longer and straighter than anterior apex. Pygofer process short, narrow in apical portion. Style long, with acute apex hooked outward. Aedeagus slender, straight, with small anterior projection at mid-length. Sternal apodemes very short, rounded, not contiguous. (See Plate 54.)

RECORDS:

Puerto Rico: Orocovis, Orocovis River bed, Sept. 11, 1947, among grasses and weeds; Ponce, Las Cucharas Beach, Sept. 11, 1947, from unidentified bushes and weeds; Ponce (Giron's farm) Sept. 13, 1947, by sweeping "higuereta" or castor bean, *Ricinus communis*; Ponce, Ponce-Adjuntas Road, Km. 9.6, altitude 400 ft., Sept. 12, 1947, from neon lights (day light type); Aguas Buenas (E. Castro's farm) altitude 1300 ft., Sept. 14, 1947, from melastomaceous shrubs in the low forest.

We could not recover this species on cotton. (Caldwell and Martorell.)

Empoasca incisa n. sp.

Length of male 3 mm. Head broadly rounded. Male with dorsal spine of tenth segment broad basally, evenly narrowed to acute apex. Pygofer process broad in basal two-thirds; apical third greatly narrowed from inner margin to styliform apex in lateral aspect; evenly narrowed and sulcate in ventral aspect. Aedeagus Y-shaped with apical fork small. Sternal apodemes broad, joined at base, divergent, rounded apically. (See Plate 54.)

RECORD:

Puerto Rico: Male holotype from Ciales-Jayuya Road, Km. 30.6, Sept. 25, 1947, from bushes and low shrubs. (Caldwell and Martorell.)

Empoasca insularis Oman

1936. *Empoasca insularis* Oman. Jour. Washington Acad. Sci. **26**: 40.

Length 2.5–3 mm. Vertex slightly produced, broadly rounded. True dorsal spine not present, however tenth segment of male is prolonged basally on either side appearing as an elongate, sinuate spine that is acute apically. Pygofer without processes. Style relatively short, gradually acuminate. Aedeagus broadly lunate apically; a pair of short processes present on medioposterior margin very closely appressed to lunate portion of aedeagus and not readily apparent. (See Plate 54.)

RECORDS:

Puerto Rico: Ponce-Guayanilla Road near Ford House, Sept. 11, 1947, by sweeping on "aroma", *Vachellia farnesiana* and "bejuco de caro", *Cissus sicyoides*; Ponce, Ponce-Adjuntas Road, Km. 10.6, altitude 500 ft., Sept. 12, 1947, from "guandules", *Cajanus indicus*; Ponce, Giron's farm), Sept. 13, 1947, by sweeping "higuereta" or castor bean, *Ricinus communis*; Arecibo-Camuy Road, Km. 80, at sea level, Oct. 16, 1947, by sweeping on low bushes on sand dunes, "hicaco", *Chrysobalanus icaco*, "alilaila", *Melia azedarach* and "vaca", *Bouyeria succulenta*; Cambalache Experimental Forest, Arecibo, Oct. 16, 1947, from weeds, shrubs and trees.

Vieques Island: Navy Base Hill and hill east center, Oct. 24, 1947, from grasses, bushes and weeds; collected on Dec. 16, 1947, from "papaya", *Carica papaya* foliage. (Martorell and Adsuar.)

***Empoasca montana* n. sp.**

Length of male 3 mm. Vertex rounded, slightly produced. Male with dorsal spine of tenth segment broad, quadrate; apex with a broad V-shaped notch; anterior portion of notch very long with its apex bent cephalad; posterior portion straight, spiniform, shorter than anterior portion. Pygofer short; process elongate, curved dorsally in lateral aspect; slightly sinuate with apex narrowed from inner margin in ventral aspect. Aedeagus long, slender, apical portion gently lunate. Sternal apodemes very short, rounded. (See Plate 54.)

RECORDS:

Puerto Rico: Male holotype from Carite Mts. at high altitudes, Nov. 2, 1947; paratypes from Toro Negro Mts., La Maravilla, altitude 3500 ft., Nov. 14, 1947. (Caldwell and Martorell.)

***Empoasca muricata* n. sp.**

Length of male 3 mm. Male with dorsal spine of tenth segment broad basally, curved ventrally, and acuminate apically. Pygofer broadly rounded on either posterior margin; process elongate, slightly broadened at mid-length, thence narrowed and turned dorsad to acute apex. Aedeagus narrowed and sinuate apically; with three short, median projections on anterior margin in lateral aspect. Sternal apodemes elongate. (See Plate 54.)

RECORD:

Puerto Rico: Male holotype from Aibonito-Barranquitas Road, Km. 34, Sept. 11, 1947. (Caldwell and Martorell.)

Empoasca nihila n. sp.

Length of male 2.9 mm. Green with white anchor-shaped mark on median of vertex. Head broadly roundedly produced. Male with dorsal spine of tenth segment almost hemispherical in profile with an acute apex projected from cephalic margin. Pygofer without processes. Style broad, stout, greatly narrowed apically to needlelike apex in ventral aspect. Aedeagus broadly Y-shaped with anterior portion shorter and straighter than posterior. (See Plate 54.)

RECORD:

Puerto Rico: Male holotype from Ponce, Ponce-Adjuntas Road, Km. 10, at Mr. Heraclio Giron's farm, altitude 400 ft. Sept. 13, 1947, at lights. (Caldwell and Martorell.)

Empoasca obliqua n. sp.

Length of male 3.4 mm. Vertex produced, obtuse. Male with dorsal spine of tenth segment almost semicircular in outline, evenly narrowed to apex with subapical area appearing minutely roughened. Pygofer process short, extremely diagonally truncate for apical half in lateral aspect. Aedeagus with prominent subapical projection on anterior margin. Sternal apodemes with bases widely separated; postbasal portions quadrate, with rounded apices. (See Plate 55.)

RECORDS:

Puerto Rico: Male holotype from Río Piedras, Aug. 18, 1947, from "gandules", pigeon peas, *Cajanus indicus*.

Caja de Muertos Island: Paratypes from this locality.

Empoasca papayae Oman

1937. *Empoasca papayae* Oman. Jour. Dept. Agr. P. R. **21**: 570.

Length 3-3.3 mm. Slender in form. Vertex little produced. Male with dorsal spine of tenth segment elongate, straight, with apical fourth narrowed and bent slightly cephalad. Pygofer process very long, slender, projected beyond pygofer dorsally; subapex with strong thumb-like projection on anterior margin half as long as apex. Aedeagus with long, curved apical portion. Sternal apodemes short, blunt. (See Plate 55.)

RECORDS:

Puerto Rico: Tallaboa, Aug. 28, 1947, on "papaya" *Carica papaya*; Mayagüez, College of Agriculture, Aug. 29, 1947, on "papaya"; Mayagüez, Sept. 18, 1947, on "papaya"; Ponce, Ponce-Adjuntas Road, Km. 10, alti-

tude 400 ft., Nov. 14, 1947, at lights; Ponce, Ponce-Guayama Road, Nov. 21, 1947, from "papaya" foliage; Río Piedras, Agricultural Experiment Station, Oct. 1947, at lights. (Caldwell and Martorell.)

E. papayae is the most common species of leafhopper in P. R., breeding on "papaya", *Carica papaya*. The insect occurs from the lowlands to the middle elevations. The species was not collected in Vieques, St. Thomas nor St. Croix Islands during a recent survey in those localities. (Martorell.)

Empoasca plebeia DeLong & Davidson

1935. *Empoasca plebeia* DeLong & Davidson. Ohio Jour. Sci. **35**: 34-35.

Length 3 mm. Male with dorsal spine of tenth segment broad, elongate, blunt apically. Pygofer process very elongate, straight, slender; apex narrowed, spiniform, slightly curved. Aedeagus deeply bifid apically; posterior portion long, slender, curved dorsally and anteriorly; anterior portion little shorter, stouter, rounded apically. Sternal apodemes broad, three abdominal segments in length, rounded from inner margins apically. (See Plate 55.)

RECORDS:

Puerto Rico: Tallaboa, Aug. 28, 1947, on "berengena" or egg-plant, *Solanum melongena*; Aguadilla Beach, Aug. 29, 1947, on weeds; Isabela Sub-Station, Aug. 29, 1947, on weeds and grasses under "papaya" trees; Arecibo-Camuy Road, Km. 84.4, Oct. 16, 1947, at sea level, from weeds on sand dunes; Maunabo-Yabucoa Road, altitude 700-900 ft., from weeds, brush and ferns. (Caldwell and Martorell.)

Empoasca prona DeLong & Davidson

1940. *Empoasca prona* DeLong & Davidson. Ann. Ent. Soc. Amer. **33**: 610-611.

Length 3.3 mm. Light hyaline-green in color. Slender in form. Head produced, obtuse. Male with dorsal spine of tenth segment semicircular; anterior apex short; posterior apex long, curved, acute. Pygofer process elongate, acuminate; apex crossing other process and curved inward. Aedeagus lunate apically. Sternal apodemes broadly united at the bases, relatively short, separated apically. (See Plate 55.)

RECORDS:

Puerto Rico: Found in the mountains from east to west in Puerto Rico. Ponce, Ponce-Adjuntas Road, Km. 23.7, altitude 2100 ft., Sept. 12, 1947, from along roadsides; Ponce, Ponce-Adjuntas Road, Km. 27.9, altitude 1550 ft., from weeds and grasses particularly "romerillo" or "margarita"

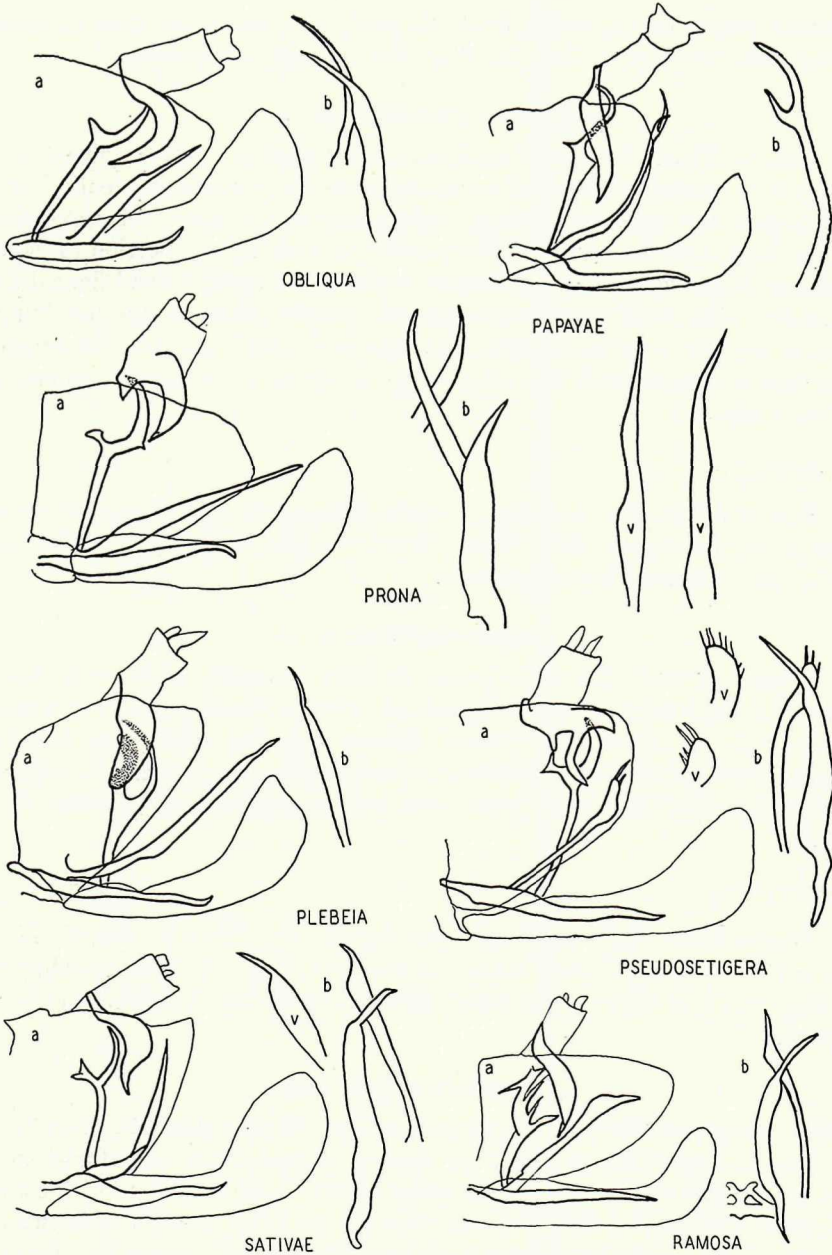


PLATE 55. *Empoasca*, a, genital capsule & internal genitalia, lateral, b, process & style or process, ventral, v, process variation.

Bidens pilosa; La Carmelita, Sept. 25, 1947, from weeds and grasses; Carite Mts., Barrio Guavat, Oct. 12, 1947, from weeds and grasses.

Empoasca pseudosetigera n. sp.

Length of male 3.3 mm.; female 3.5 mm. Vertex scarcely produced very broadly rounded. Male with dorsal spine of tenth segment broadly bifid; dorsoposterior apex short, stout, slightly curved ventrally; ventroposterior apex long, slender, curved ventroposteriorly in apical portion. Pygofer process long, slender; apex enlarged, bulbose-flattened, curved dorsad and inward, with stout apical setae present usually three in number but as many as eight may be present. Aedeagus with long basal stalk; apex little broadened and curved. Sternal apodemes very short, quadrate, separated. (See Plate 55.)

RECORD:

Puerto Rico: Male holotype, female allotype, and paratypes of either-sex from Ponce, at light. Paratypes from Río Piedras, Adjuntas and Maricao. (Caldwell and Martorell.)

Empoasca ramosa n. sp.

Length of male 2.5 mm. Vertex broadly rounded. Male with dorsal spine of tenth segment gently S-shaped, robust. Pygofer greatly produced posteriorly on either side; process slender, enlarged apically to foot-like apex. Aedeagus with three posterior branches before apex. Sternal apodemes undeveloped. (These may have been lost during dissection.) (See Plate 55.)

RECORD:

Puerto Rico: Male holotype from Ponce, Mr. Heraclio Giron's farm, near Ponce, Barrio Canas, almost at sea-level, Sept. 13, 1947, breeding on "higuereta", or castor bean plant, *Ricinus communis*. (Caldwell and Martorell.)

Empoasca sativae Poos

1933. *Empoasca sativae* Poos. Proc. Ent. Soc. Washington **35**: 174-175.

Length 3 mm. Vertex appearing narrow, obtuse. Male with dorsal spine of tenth segment as in *fabae* but without membrane across anterior curve. Pygofer process directed dorsad, enlarged on inner margin subapically; apex narrow, acute. Exact form variable. Style suddenly narrowed apically. Aedeagus definitely forked subapically; posterior portion elongate, curved, acute; anterior portion short, minutely bifid apically in lateral aspect.

Sternal apodemes rectangular, widely separated, about two and a half abdominal segments in length. (See Plate 55.)

RECORDS:

Puerto Rico: Ponce, Ponce-Guayanilla Road, Aug. 28, 1947, from "zarcilla" *Leucaena glauca* trees almost at sea level; Aguadilla Beach, Aug. 29, 1947, on pure stand of squash; Maricao Insular Forest, Oct. 10, 1947, on weeds; Ponce, Ponce-Adjuntas Road, Km. 10, altitude 400 ft., Nov. 14, 1947, at lights.

Empoasca taraxa n. sp.

Length of male 2.5 mm. Head broadly rounded. Male with dorsal spine of tenth segment relatively short, blunt, little narrowed before apex.

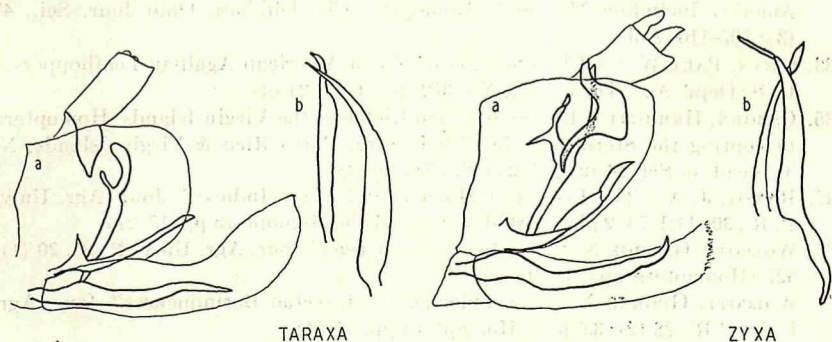


PLATE 56. *Empoasca*, a, genital capsule & internal genitalia, lateral, b, process & style, ventral.

Pygofer process short, narrowed from inner margin before apex; apex acute, hooked outward. Aedeagus short, slender, curved anteriorly apically; with short subapical anterior projection. Sternal apodemes large, broad, divergent from bases to apices. (See Plate 56.)

RECORD:

Puerto Rico: Male holotype from Barceloneta, Barceloneta-Arecibo Road, Oct. 16, 1947. (Caldwell and Martorell.)

Empoasca zyxa n. sp.

Length of male 3 mm. Head very broadly rounded. Male with dorsal spine of tenth segment broad, somewhat quadrate basally, slightly roundedly produced caudoventrally; with long ventroanterior apical projection slightly curved posteriorly, acute apically. Pygofer process appearing tri-segmented in lateral aspect; with apex curved posteriorly. Style with apex

appearing jointed, styliform in ventral aspect. Aedeagus long, slender apically; with small T-shaped midiocephalic projection present. Sternal apodemes slender, three abdominal segments in length, close to each other but not appressed for full length. (See Plate 56.)

RECORD:

Puerto Rico: Male holotype from Cambalache Experimental Forest, at Arecibo, 300 ft. altitude, Nov. 7, 1947. (Caldwell and Martorell.)

CITATIONS

1944. BEATTY, HARRY A. "Fauna of St. Croix, V. I." (Biographical sketch by O. C. Skov.). Jour. Agr. Univ. P. R., 28 (3-4); 103-185 (July-Oct. 1944, Homoptera pp. 123-125).
1947. DELONG, D. M. AND HERSHBERGER, R. V. "The Genus *Exitianus* in North America Including Mexico." (Homoptera:Cicadellidae). Ohio Jour. Sci., 47 (3): 107-116, 2 pls.
1933. OMAN, PAUL W. "A Classification of North American Agallian Leafhoppers." U. S. Dept. Agr. Tech. Bull. No. 372, pp. 1-93, 24 pls.
1935. OSBORN, HERBERT. "Insects of Porto Rico and the Virgin Islands. Homoptera (excepting the Sternorhynchi)." Sci. Surg. Porto Rico & Virgin Islands, N. Y. Acad. of Sci. 14 (2):111-260, fig. 71, ref. 48.
1947. RAMOS, J. A. "The Insects of Mona Island (West Indies)." Jour. Agr. Univ. P. R., 30 (1):1-74, 2 pls. (Dated: January 1946, Homoptera pp. 15-21).
1936. WOLCOTT, GEORGE N. "Insectae Borinquenses" Jour. Agr. Univ. P. R., 20 (1): 627 (Homoptera pp. 71-110).
1941. WOLCOTT, GEORGE N. "A Supplement to Insectae Borinquenses" Jour. Agr. Univ. P. R., 25 (2): 33-158, (Homoptera pp. 50-54).

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*.

- abdominalis, **Balclutha**, *Gnathodes* 79, 80
ACANALONIIDAE 4
Aceratagallia 27, 31
 gillettei illus. 31
ACHILIDAE 4
Acinopterus 45, 67
 angulatus illus. 67
Agallia 27, 31, 32, 33, 34, 35, 36
 albidula 32, 34, illus. 35, 37
 configurata 32, illus. 36, 37
 gillettei 31, 32
 pulchra 32, 33, illus. 34
 pulchra sub. sp. alta 32, 33, illus. 34
Agalliana 27, 28
 sticticollis illus. 28
AGALLINAE 5, 27
Agalliopsis 27
 pepino 29, illus. 30
Agellus 84
 lineatus 84
 sandersi 87
 albascutellus, **Scaphytopius** 46, 48
 albatron, **Dikraneura** 103, 104
 albidula, **Agallia** 32, 34, 35, 37
 albivenosus, **Amplicephalus**, *Deltocephalus* 60
Alconeura 88, illus. 89, 109, 110, 111
 dorsalis 109, illus. 110, 111
 rubramaculata 109, illus. 110
Alebra 90, 94
 aureovittatus 90
 alta, **Agallia** pulchra 32, 33, 34
Amplicephalus 45, 60, 61
 albivenosus 60, illus. 61
 angulatus, **Acinopterus** 67
APHRODINAE 5, 37
 apicata, **Joruma** 90, 100, 102
 aureovittata, **Protalebra** 90, 92, 95, 96
 aureovittatus, *Alebra* 90
 aurulenta, **Dikraneura** 103, 104
 australis, *Deltocephalus*, **Haldorus** 55, 56
 Balclutha 79, 80, 81
 abdominalis 79, illus. 80
 curvata illus. 80, 81
 hyalina 86
BALCLUTHINAE 5, 79
Baldulus 45, 76, 77
 maidis illus. 77
 batatae, *Empoasca* 124
 bicincta, *Protalebra* 97
 bifasciata, *Protalebra* 94, 95
 bifida, *Kolla* 13
 bimarginatus, **Osbornellus**, *Scaphoideus* 51
 bimarginatus var. montanus, **Osbornellus** 51
 bisinuatus, *Eugnathodus* 82
 bovina, **Empoasca** 117, 118, 119
 braziliensis, *Protalebra* 90 91
 breviceps, *Xerophloea* 23
 brevidens, *Empoasca*, **Joruma** 99, 100, 102
 brunnea, *Protalebra* 90, 91, 95
 calcarus, *Eugnathodus* 82, 84
 canavalia, **Empoasca** 118, illus. 119
 Carneocephala 5, 12
 sagittifera illus. 12
 cedrelae, **Dikraneura** 103, 104, 105
 centrosemae, *Dikraneura* 105
CERCOPIDAE 4
 chelata, **Empoasca** 117, 119, 120
 Chlorotettix 45, 71, 72, 73, 74
 cognitus 72, 73, illus. 75

* The authors are indebted to the following for their kind assistance in correcting proof, indexing, and typing of this publication: Mr. Mario E. Pérez, Asst. Entomologist, Miss Felicita Rodríguez and Mrs. Lucy Franqui de Santiago, Secretaries, Division of Entomology, Agricultural Experiment Station.

- minimus 72, 73, illus. 75
 montanus 72, 74, illus. 75
 nigromaculatus 72, illus. 75
 tethys 72, illus. 75
 viridius 73, 74
Cicada 68
 striola 68
Cicadella
 coffeacola 6
 coffeaphila 7
 similis 10
 sirena 9
 CICADELLIDAE 4, 5
 CICADELLINAE 5, 88, 89
 CICADIDAE 4
Cicadula 66
 excitiosa 69
 maidis 77
 nigrifrons 66
Cicadulina 45, 77, 78
 tortilla illus. 78
Circulifer 45, 70, 71
 tenellus, illus. 71
 CIXIIDAE 4
Coelidia 43, 44
 obligata 43, illus. 44
 salina illus. 44
 COELIDIINAE 5, 43
coffeacola, *Cicadella*, *Entogonia*, *Sibovia*
 6, 7, 8
coffeaphila, *Cicadella*, *Entogonia*, *Sibovia*
 6, 7
cognita, *Graminella* 63, 64, 65
cognitus, *Chlorotettix* 72, 73, 74, 75
colonus, *Graminella*, *Deltocephalus*,
 Thamnotettix 63, 64, 65
comatus, *Thamnotettix* 63, 65
configurata, *Agallia* 32, 36, 37
convexa, *Spangbergiella* *vulnerata* 42, 43
cordiae, *Protalebra* 90, 92, 93
cubana, *Thamnotettix* 63
cubanus 64
curvata, *Balclutha* 80, 81
cypha, *Empoasca* 118, 119, 120
delicata, *Dikraneura*, also *Dikraneura*
 (*Hylloidea*) 103, 104, 105
 DELPHACIDAE 4
Deltocephalus 45, 52, 53, 54, 55, 56
 albivenosus 60
 australis 56
 flaveolus 61
 flavicosta 52, 53, illus. 55
 maculellus 52, 54, illus. 55
 nigripennis 61
 sonorus 52, illus. 55
 trilobatus 57
 depressa, *Dikraneura* also *Dikraneura*
 (*Hylloidea*) 103, 104, 107, 108
 DERBIDAE 4
dicyrta, *Empoasca* 117, 119, 120
Dikraneura 88, illus. 89, 102, 103, 104, 105,
 106, 107, 108, 109
 albatron 103, illus. 104
 aurulenta 103, illus. 104
 cedrelae 103, illus. 104, 105
 centrosemae 105
 delicata 103, illus. 104, 105, illus. 108
 depressa 103, illus. 104, 107, illus. 108
 marginella 106, 107
 orphanda 103 illus. 108
 pistola 103, illus. 104, illus. 108
 pseudomarginella 103, illus. 104, 106,
 illus. 108
 unipuncta dorsalis 111
dilitara, *Empoasca* 118, 119, 121
divisus, *Macrosteles*, *Jassus* 74, 76
dorsalis, *Alconeura*, *unipuncta dorsalis*
 Dikraneura 111
 DORYDIINAE 5, 42
Draeculacephala 12
 sagittifera 12
dubiata, *Nesosteles sandersi* 82, 83, 87
duplicata, *Joruma* 90, 100, 102
Empoasca 88, illus. 89, 116, 119, 120, 121,
 122, 123, 124, 125, 126, 127, 128, 129,
 130, 131
 batatae 124
 bovina 117, 118, illus. 119, 120
 brevidens 100
 canavalia 118
 chelata 117, illus. 119, 120
 cypha 118, illus. 119, 120
 dicyrta 117, illus. 119, 120
 dilitara 118, illus. 119, 121
 everaformis 118, illus. 119, 121
 fabae 117, illus. 119, 122
 fabalis 117, illus. 123, 124
 gongyla 118, illus. 123
 gossypii 117, illus. 123
 incisa 118, illus. 123
 insularis 116, illus. 123
 minuenda 115

- montana 117, illus. 123, 126
 muricata 117, illus. 123, 126
 nihila 116, illus. 123, 127
 obliqua 117, 127, illus. 129
 papayae 117, 127, illus. 129
 plebeia 118, 128, illus. 129
 prona 117, 128, illus. 129
 pseudosetigera 117, illus. 129, 130
 ramosa 117, illus. 129, 130
 sativae 117 illus. 129, 130
sexmaculata 115
 taraxa 117, illus. 131
 zyxa 117, illus. 131
Entogonia 6
 coffeacola 6
 coffeaphila 7
 lineata 8
Eugnathodus 82, 84
 bisinuatus 82
 flavidus 84
 floridanus 84
 lineatus 84
 minutus 85
 neglectus 85
 pallidus 82
 virescens 87
EUSCELINAE 5, 44, 45
 eweraformis, **Empoasca** 118, 119, 121
 Exitianus 45, 68, 69, 70
 exitiosus 69, illus. 70
exitiosa, *Cicadula* 69
 exitiosus, **Exitianus** 69, 70
 fabae, **Empoasca**, *Tettigonia* 117, 119, 122
 fabalis, **Empoasca** 117, 123, 124
fasciata *Tettigonia*, *Kolla bifida* 13
 fasciatus, **Sanctanus**, *Tylozygus*, *Sca-*
 phoideus 13, 58, 59
FLATIDAE 4
flaveolus, *Deltocephalus* 61
 flavicosta, *Deltocephalus* 52, 53, 55
flavidus, *Eugnathodus* 84
 floridana, **Nesosteles** 81, 83, 84
floridanus, *Eugnathodus* 84
frontalis, *Platymetopius* 50
fuliginosus, *Platymetopius* 50
 fuliginosus, *Scaphytopius* 46, 49, 50
 furcatus, **Haldorus** 55, 56, 57
 gillettei, *Aceratagallia*, *Agallia* 31
Gnathodus 82
 incisus 82
 gongyla, **Empoasca** 118, 123, 124
 gossypii, **Empoasca** 117, 123, 124
Graminella 45, 62, 63, 64, 65, 66
 cognita, 63, 64 illus. 65
 colonus 63, illus. 65
 cubanus 64
 nigrifrons 63, illus. 65, 66
 punctata 63, illus. 65, 66
 guajanae, **Nesosteles** 81, 82, 83, 84
Gypona 14, 16, 17
 mediata 16, illus. 17, 19, illus. 20
 montana 16, illus. 17, 18, illus. 20
 puertoricensis 16, illus. 17, illus. 20
 sancti-thomasi 16, illus. 17, 19, illus. 20
 viequensis 16, illus. 17, 18, illus. 20
Haldorus 45, 54, 55, 56, 57
 australis 55, illus. 56
 furcatus 55 illus. 56, 57
Hortensia 5, 10
 similis 10
 hyalina, **Nesosteles**, *Balclutha* 81, 86
Hybla 88, illus. 89, 113, 114, 115
 maculata 113, illus. 114, 115
 sexmaculata 113, illus. 114, 115
Hyloidea, *Dikraneura* (*Hyloidea*) 105, 106,
 107
 delicata 105
 depressa 107
 orphanda 109
 pistola 108
IASSINAE 14
IDIOCERINAE 5, 25
Idocerus 25, 26, 27
 maricensis 25, illus. 27
 myrciae 25, 26, illus. 27
 parvulus 25, 26, illus. 27
Idona 88, 115, 116
 incisa, **Empoasca**, **Neososteles** 80, 82,
 83, 118, 123, 125
incisus, *Gnathodus* 82
 insularis, **Krisna**, **Ponana**, **Protalebra**,
 Empoasca 14, 15, 19, 21, 90, 94, 95,
 116, 123, 125
interrupta, *Tettigonia* 9
ISSIDAE 4
 jandacephalus, *Scaphytopius* 46, 49, 50
Joruma 88, illus. 89, 99, 100, 101, 102
 apicata 99, 100, illus. 102
 brevidens 99, 100, illus. 102
 duplicata 99, 100, illus. 102
 neascripta 99, 101, illus. 102

- Jassus* 43
 divisus 74
 obligatus 43
 KINNARIDAE 4
 Kolla 13
 bifida var. *fasciata* 13
 Krisna 14, 19, 21
 insularis 19, illus. 21
 montana illus. 21
 Laevicephalus 60, 61, illus. 62
 nigripennis 61, illus. 62
 laticeps, *Poeciloscarta* 9
 LEDRINAE 5, 23
 lenticula, *Protalebra* 90, 92, 94, 96, 98
 Limotettix 45, 68, 69
 striolus 68, illus. 69
 lineacephalus, *Scaphytopius* 46, 47, 48
 lineata, *Sibovia*, *Entogonia*, *Nesosteles*
 6, 7, 8, 81, 84, 86
 lineatus, *Agellus*, *Eugnathodus* 84
 loricatus, *Platymetopius* 47
 Macrosteles 45, 74, 76, 77
 divisus 74, illus. 76
 maculata, *Hybla*, *Protalebra*, *Typhlocy-*
 bella 90, 92, 93, 111, 112, 113, 114, 115
 maculatus, *Xestocephalus* 37, 39, 41
 maculellus, *Deltocephalus* 52, 54, 55
 magna, *Ponana* 14, 15
 maidis, *Baldulus*, *Cicadula* 77
 marginella, *Dikraneura* 106, 107
 Maricaona 61, 62, 63
 polyamia 62, illus. 63
 maricensis, *Idiocerus* 25, 27
 mediata, *Gypona* 17, 19, 20
 MEMBRACIDAE 4
 minima, *Typhlocybella* 111, 112
 minimus, *Chlorotettix* 72, 73, 75
 minuenda, *Idona*, 115, illus. 116
 minuta, *Nesosteles* 82, 83, 85
 minutus, *Eugnathodus* 85
 montana, *Empoasca*, *Gypona*, *Krisna*,
 Protalebra 17, 18, 20, 21, 90, 92, 98,
 117, 123, 126
 montanus, *Osbornellus* var. *bimargina-*
 tus, *Chlorotettix* 72, 74, 75
 muricata, *Empoasca* 117, 123, 126
 myrciae, *Idiocerus* 25, 26, 27
 neascripta, *Joruma* 99, 101, 102
 neglecta, *Nesosteles* 82, 83, 85
 neglectus, *Eugnathodus* 85
 neloricatus, *Scaphytopius* 46, 47, 48, 49, 50
 Nesosteles 79, 80, 81, 82, 83, 84, 85, 86, 87
 floridana 81, illus. 83, 84
 guajanae 81, 82, illus. 83
 hyalina 81, illus. 86
 incisa 81, 82, illus. 83, illus. 80
 lineata 81, 84, illus. 86
 minuta 82, illus. 83, 85
 neglecta 82, illus. 83, 85
 robusta 82, 85, illus. 80
 rufofasciata 81, 87, illus. 80
 rufofasciatus 87
 sandersi subs. *dubiata* 82, illus. 83, 87
 virescens 81, illus. 86, 87
 nigrifrons, *Graminella*, *Cicadula* 63, 65,
 66
 nigrinotus, *Scaphytopius* 46, 49
 nigripennis, *Laevicephalus*, *Deltocephalus*
 61
 nigromaculatus, *Chlorotettix* 72, 75
 nihila, *Empoasca* 116, 123, 127
 obligata, *Coelidia* 43, 44
 obligatus, *Jassus* 43
 obliqua, *Empoasca* 117, 127, 129
 orphanda, *Dikraneura*, also *Dikraneura*
 (*Hyloidea*) 103, 108, 109
 Osbornellus 45, 50, 51
 bimarginatus illus. 51
 bimarginatus var. *montanus* illus. 51
 pallida, *Protalebra* 90
 pallidus, *Eugnathodus*, *Xestocephalus* 38,
 82
 papayae, *Empoasca* 117, 127, 129
 parvulus, *Idiocerus* 25, 26, 27
 pepino, *Agalliopsis* 29, 30
 pistola, *Dikraneura*, also *Dikraneura*
 (*Hyloidea*) 103, 104, 108
 Platymetopius 50
 frontalis 50
 fuliginosus 50
 loricatus 47
 plebeia, *Empoasca* 118, 128, 129
 Poeciloscarta 6, 8, 9
 laticeps illus. 9
 Polyamia 45, 57, 58
 trilobata 57, illus. 58
 polyamia, *Maricaona* 62, 63
 Ponana 14, 20
 insularis 14, 15, illus. 17, 20
 magna 14, 15, illus. 17
 puertoricensis 14, illus. 17
 prona, *Empoasca* 117, 128, 129

- Protalebra** 88, illus. 89, 90, 91, 92, 93, 94,
 95, 96, 97, 98, 99
aureovittata 90, illus. 92, 95
bicincta 97
bifasciata 94
braziliensis 90, illus. 92, illus. 95
brunnea 90, 91, illus. 95
cordiae 90, illus. 92, 93, illus. 95
insularis 90, 94, illus. 95, illus. 98
lenticula 90, illus. 92, 96, illus. 98
maculata 90, illus. 92, 96, illus. 98
montana 90, illus. 92, 96, illus. 98
pallida 90
similis 90, illus. 95, 97, illus. 98
tabebuiae 90, illus. 92, 97, illus. 98
ziczac 90, illus. 92, illus. 98, 99
pseudomarginella, *Dikraneura* 103, 104,
 106
pseudosetigera, *Empoasca* 117, 129, 130
puertoricensis, *Gypona*, *Ponana*, *Stragania* 14, 16, 17, 18, 19, 20, 22
pulchra alta, *Agallia* 32, 33, 34
pulchra, *Agallia* 32, 33, 34
pulicarius, *Xestocephalus* 37, 38, 41
pulicarius var. *pallidus*, *Xestocephalus*
 37, 38, 40, 41
punctata, *Graminella* 63, 65, 66
punctatus, *Xestocephalus* 37, 40, 41
ramosa, *Empoasca* 117, illus. 129, 130
robusta, *Nesosteles* 80, 82, 85
rubicundula, *Thamnotettix* 71
rubramaculata, *Alconeura* 88, 89, 109,
 110, 111
rubrostriatus 88
rufofasciata, *Nesosteles* 81, 87, 88
rufofasciatus, *Nesosteles* 87
sagittifera, *Carneocephala*, *Tettigonia*,
Draeculacephala 12
salina, *Coelidia* 44
Sanctanus 45, 58, 59
fasciatus 58, illus. 59
sancti-thomasi, *Gypona* 17, 19, 20
sandersi subsp. *dubiata*, *Agellus*, *Nesosteles* 82, 87
sativae, *Empoasca* 117, 129, 130
Scaphoideus 51, 58
bimarginatus 51
fasciatus 58
Scaphytopius 45, 46, 47, 48, 49, 50
albascutellus 46, illus. 48
fuliginosus 46, illus. 49, 50
jandacephalus 46, illus. 49, 50
lineacephalus 46, 47, illus. 48
neloricatus 46, 47, illus. 48, illus. 49, 50
nigrinotus 46, illus. 49
sexmaculata, *Hybla*, *Empoasca* 113, 114,
 115
Sibovia 5, 6, 7, 8
coffeacola 6, illus. 7, 8
coffeaphila 6, illus. 7
lineata 6, illus. 7, 8
similis, *Hortensia*, *Tettigonia*, *Cicadella*,
Protalebra 10, 85, 90, 95, 97, 98
sirena, *Cicadella*, *Tettigonia* 9
sonorus, *Deltocephalus* 52, 55
Spangbergiella 42, 43
vulnerata 42, 43
vulnerata var. *convexa* 42, illus. 43
sticticollis, *Agalliana* 27, 28
Stragania 14, 22
puertoricensis illus. 22
striola, *Cicada* 68
striolus, *Limotettix* 68, 69
tabebuiae, *Protalebra* 90, 92, 97, 98
taraxa, *Empoasca* 117, 131
tenellus, *Circulifer*, *Thamnotettix* 71
tethys, *Chlorotettix* 72, 75
 TETTIGELLINAE 5
Tettigonia 122
fabae 122
fasciata 13
interrupta 9
sagittifera 12
similis 10
sirena 9
Thamnotettix 63, 64
colonus 64
comatus 63, 64
cubana 63
rubicundula 71
tenellus 71
tortilla, *Cicadulina* 78
triatrus, *Xestocephalus* 37, 40, 41
trilobata, *Polyamia* 57, 58
trilobatus, *Deltocephalus* 57
 TROPIDUCHIDAE 4
Tylozygus 5, 13
fasciatus illus. 13
Typhlocybella 88, illus. 89, 111, 112
maculata 111, illus. 112
minima 111, illus. 112

- Unerus** 63
unipuncta dorsalis, *Dikraneura* 111
viequensis, *Gypona* 17, 18, 20
virescens, *Nesosteles*, *Eugnathodus* 81,
 86, 87
viridius, *Chlorotettix* 73
viridis, *Xerophloea*, *Cercopis* 23, 24
vulnerata, *Spangbergiella* 42
vulnerata var. *convexa*, *Spangbergiella*
 42, 43
Xerophloea 23, 24
breviceps 23, 24
viridis 23, illus. 24
Xestocephalus 37, 38, 39, 40, 41
maculatus 37, 39, illus. 41
pulicarius 37, 38, illus. 41
pulicarius var. *pallidus* 37, 38, 40, illus.
 41
punctatus 37, 40, illus. 41
triatus 37, 40, illus. 41
ziczac, *Protalebra* 90, 92, 98, 99
zyxa, *Empoasca* 117, 131

HOST PLANT INDEX

This index includes the scientific and common names of plants mentioned in this paper. The common names will be printed in roman type, the generic and specific names in italics.

- Abelmoschus esculentus* 122
aculeata, *Volkameria* 10, 12, 13, 18, 70,
 73, 91, 93, 118
aeruginea, *Eugenia* 114
Agati grandiflora 124
 aguacate 116
 alilaila 122, 126
alliodora, *Cordia* 93
 añil 122
 aroma 107, 121, 126
 avocado 116
azedarach, *Melia* 122, 126
 batata 124
batata, *Ipomoea* 97, 124
Batis maritima 10
 bejuco de caro 121, 126
 bejuco de puerco 124
 berenjena 128
berteroana, *Erythrina* 10, 11, 122
Bidens pilosa 10, 13, 25, 29, 64, 68, 70, 73,
 91, 107, 124, 130
Bouyeria succulenta 122, 126
Bradburya 106
 bucayo enano 122
Byrsonima spicata 19
 cabrilla 18, 23, 111, 116
Cajanus indicus 11, 73, 122, 124, 126, 127
Canavalia ensiformis 118
 capá prieto 93
Capparis indica 50
capitata, *Hyptis* 10, 13, 25, 29, 64, 68, 70,
 73, 91, 107, 124
Carica papaya 10, 53, 73, 106, 121, 126, 127
 128
Casearia 8, 26, 30, 33, 39, 91
 casha 107
Castilla elastica 6
 castor bean 121, 125, 130
Cedrela mexicana 93, 105
Cedrela odorata 105
 cedro 105
 cerezo 122
Centrosema 106
Chrysobalanus icaco 122, 126
Cissus sicyoides 121, 126
 coco plum 122
 coffee, 6, 8, 33, 39, 52, 59, 74, 96, 106
communis, *Ricinus* 118, 121, 125, 126, 130
Cordia alliodora 93
Cordia nitida 26, 122
Cordia sulcata 90, 91
 corn 78
crassicaulis, *Ipomoea* 124
crassipes, *Piaropus* 11
crepitans, *Hura* 109
Croton humilis 44
Distictis lactiflora 15
 egg-plants 35, 122, 128
elastica, *Castilla* 6
 emajagua 115
ensiformis, *Canavalia* 118
esculentus, *Abelmoschus* 122
Eugenia aeruginea 114
Erythrina berteroana 10, 11, 122
farnesiana, *Vachellia* 107, 121, 126
 ferns 7, 8, 30, 34, 64
Ficus laevigata 43
foetida, *Passiflora* 118
 fresa 8
 gandules 122, 124
 gallito 124
glauca, *Leucaena* 105, 107, 131
grandiflora, *Agati* 124
gratissima, *Persea* 116
 guaba 100
 guasávara 114
 hicaco 122, 126
 higuera 118, 121, 125, 126, 130
humilis, *Croton* 44
Hura crepitans 109
Hyptis capitata 10, 13, 25, 29, 64, 68, 70,
 73, 91, 107, 124
icaco, *Chrysobalanus* 122, 126
indica, *Capparis* 50

- indicus, Cajanus* 11, 73, 122, 124, 126, 127
Indigofera 122
Inga laurina 33
Inga vera 33, 39, 100
Ipomoea 8, 26, 30, 33, 39, 91
Ipomoea batatas 97, 124
Ipomoea crassicaulis 124
Ipomoea rubra 97, 124
Ipomoea tiliacea 124
 jack beans 118
 javilla 109
lactiflora, Distictis 15
laevigata, Ficus 43
Lamarkiana Trema 18, 23, 30, 111, 116
laurina, Inga 33
Leucaena glauca 105, 107, 131
 liana fragante 15
 linguam 50
 lirio de mar 118
 maga 107
 malojillo grass 11, 82
 mangle colorado 47
mangle, Rhizophora 47
Manihot, utilisissima 53, 70
 margarita 128
 maricao 19
maritima, Batis 10
Melia azedarach 122, 126
melongena, Solanum 35, 122, 128
mexicana, Cedrela 93, 105
Mimosa pudica 10, 13, 25, 29, 64, 68, 70,
 73, 91, 107, 124
 molinillo monkey-pistol 109
Montezuma speciosissima 107
 moral 90
 morning glory 97, 124
 mountain mahoe 115
 murta 114
Myrcia splendens 26, 27
nitida, Cordia 26, 122
odorata, Cedrela 105
pallida, Tabebuia 99
 palo de goma 6
Panicum purpurascens 11, 82
 papaya 10, 11, 13, 35, 53, 54, 60, 64, 73, 76,
 106, 112, 120, 121, 122, 124, 126, 127, 128
papaya, Carica 10, 53, 73, 106, 121, 126,
 127, 128
Pariti tiliaceum 115
Passiflora foetida 118
 patio 124
peltata, Photomorphe 7, 8, 34, 64
Persea gratissima 116
Piaropus crassipes 11
 pigeon peas 122
pilosa, Bidens 10, 13, 25, 29, 64, 68, 70,
 73, 91, 107, 124, 130
portulacastrum, Sesuvium 32, 71
Pothomorphe peltata 7, 8, 34, 64
pudica, Mimosa 10, 13, 25, 29, 64, 68, 70,
 73, 91, 107, 124
purpurascens, Panicum 11, 82
 quimbombó 122
 Red mangrove 47
Rhizophora mangle 47
Ricinus communis 118, 121, 125, 126, 130
 roble 99
 romerillo 128
rosaefolius Rubus 7, 8, 34, 64
rubra, Ipomoea 97, 124
Rubus 8, 26, 30, 33, 39, 91
Rubus rosaefolius 7, 8, 34, 64
Sesuvium portulacastrum 33, 71
sicyoides Cissus 121, 126
Solanum 8, 26, 30, 33, 39, 91
Solanum melongena 35, 122, 128
speciosissima, Montezuma 107
spicata, Byrsonima 19
splendens, Myrcia 26, 27
succulenta, Bourreria 122, 126
sulcata, Cordia 90, 91
 sweet potato 124
Tabebuia pallida 97
 taguatagua 118
tiliacea, Ipomoea 124
tiliaceum, Pariti 115
Trema Lamarkiana 18, 23, 30, 111, 116
utilisissima, Manihot 53, 70
 vaca 122, 126
Vachellia farnesiana 107, 121, 126
vera, Inga 33, 39, 100
 verdolaga rosada 32
Volkameria aculeata 10, 12, 13, 18, 19, 70,
 73, 91, 93, 118
 water hyacinths 11
 white manjack 90
 wild tamarind 105
 yerba bellaca 44
 yerba mariposa 118
 yuca 53, 70
 zarcilla 105, 107, 131