

## FAUNISTIC AND ECOLOGIC NOTES ON CUBAN HOMOPTERA.\*

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The Tropical Plant Research Foundation of Washington, D. C., is conducting in Cuba an investigation of sugar cane production problems for the Cuba Sugar Club. This work is in charge of Local Director D. L. Van Dine and has its headquarters at the Cuba Sugar Club Experiment Station of the Foundation at Central Baraguá in the Province of Camaguey.

In connection with one of their important problems, the sugar cane mosaic, a disease known to be transmitted by *Aphis maidis*, the Foundation desired to ascertain the species of insects occurring in or around cane fields which by reason of their relationship and habitat might be suspected of being carriers of mosaic, and invited me to make a survey of the Cuban Homoptera as a basis for the disease transmission studies which are being made by Mr. C. F. Stahl, Entomologist of the Foundation.

The period from February 1 to March 31, 1925, was spent in Cuba. My collections were made with special reference to the forms of Homoptera associated with sugar cane diseases but included also various other ecological situations. Thus, while most time was spent on various sugar plantations in collecting insects from sugar cane and plants associated with it, many collections were made in pastures and meadows and in gardens and truck patches, so that a considerable variety of crops were covered. Comparatively little work was done in wooded sections and none in the higher mountains.

Geographically the trip extended as far west as Herradura in the Province of Pinar del Rio and east to Central Ermita and to Preston and Banes in the Province of Oriente.

Sugar cane in Cuba is grown mainly upon the lower elevations and much of it is but little above sea level, though planting is carried on in places over rolling land and foothills.

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Ecologically, most Cuban cane fields occupy areas which were originally covered with a mixed hardwood forest. Some of the older regions in western Cuba were cleared generations ago, but in the central and eastern part of the country we collected in fields where the forest had been cut and burned and sugar cane planted within ten years or less. Occasional "Savannas" occur, where the predominant vegetation is grasses and scattered palms.

A discussion of the economic status of some of the more important species has been published elsewhere. (Osborn, '26.)

The region is in latitude 20° to 23°. It is distinctly tropical and it was a matter of considerable interest to compare the fauna with that of Central America and northern South America to both of which there is considerable affinity. It is notable that the island is by no means so abundantly supplied with species as the mainland either for southern United States or Central American region or South America and may be considered as being distinctly insular in character with close affinity to the other islands of the Antillean region. A detailed list of the species collected with notes concerning their ecologic and economic status is presented but it may be of interest to indicate some of the major ecologic groupings. First with reference to the species strictly associated with sugar cane it may be said that while there are but few species that can be considered as distinctly dependent upon sugar cane, there are a large number that by migration from grasses or adjacent plant societies may occur in considerable abundance and doubtless with economic importance to the sugar cane.

Of the species which occur normally upon cane or breed upon this plant we have *Stenocranus saccharicida*, *Eugnathodus guajanae*, and of those occurring commonly on cane but not restricted to it are noticeable *Cicadella similis*, *Deltocephalus flavicosta*, *Deltocephalus sonorus*, *Chlorotettix viridius*, *Oliarius franciscanus*, *Phasiocephalus cubanus*, *Tomaspis bicincta*.

The various grasses support a large number of species and as many of these may migrate to cane for part or all of their life stages they naturally constitute a very important grouping, especially as the mosaic disease may occur on a number of the grass species. Of the common grasses in Cuba, parana is one of the abundant species and on this is found a large variety

of leaf hoppers, some of the most conspicuous ones being *Cicadella similis*, *Euscelis obscurinervis*, *Draecuacephala mollipes*, some *Delphacids* and others less abundant. On a native grass, "Pitillo," are a number of what are evidently distinctly indigenous species, particularly *Chlorotettix viridius*, *Deltocephalus* sps, a species of *Ormenis*, and *Lepyronia angulifera*.

Guinea grass, which is an introduced species from Africa and used quite extensively as a pasture grass, is infested by *Spangbergiella vulnerata*, *Thamnotettix cubanas*, and *Deltocephalus flavicosta*.

A tall native grass called "barba de Indio" is interesting as a support of *Eugnathodus guajanæ* which occurs normally, and breeds, upon sugar cane.

A rather distinct ecologic unit is found in the tidal flats or "playas" which support an abundant growth of marsh grass and various sedges, bushes, etc. In these locations are found as common species, *Scaphoideus fasciatus*, *Deltocephalus littoralis*, *Draeculacephala* sps; *Cyrpoptus*, sp., *Myndus enotatus*, *Bothriocera* sps, and several species of *Delphacids*.

Of the woods fauna for which comparatively few records were made there may be noted particularly *Cicadella histrio*, *Platymetopius* sp., *Agallia maculata*, *Cyrpoptus belfragii*, *Catonia rufula*.

A very interesting association was found in the needle clusters of the Cuban pine at Herradura from which I could secure by beating *Cyrpoptus belfragii*, *Catonia rufula*, *Agallia maculata*, *Scaphoideus bimarginatus*, and *Oliarus pinicolus*. All of these were apparently permanent residents of this particular association and particularly well adapted for living in this rather peculiar habitat.

A rather striking feature of the collections was the almost complete absence of *Bythoscopidæ*, very likely due to the season; the small number of species of *Cicadella* as compared with what may be found in the South American fauna and also the small number of *Typlocybids*, which should be more abundant in summer. On the other hand, the *Jassinæ* were quite numerous.

Considering the accessibility of Cuba there has been but little work done on the Homoptera, much less in fact than for some of the neighboring islands of the Antilles. Scattering

descriptions based on specimens from Cuba appear in the writings of Guerin ('56), Walker, ('52 and '58), Spangberg ('78), Stål ('69), Uhler ('64 and '95), Signoret ('52), VanDuzee ('07), Melichar ('01 and '06), Baker ('99), Crawford ('12), Wolcott and DeLong ('23), and the recent catalogues by Metcalf and Bruner cover practically all that has been published hitherto. Undoubtedly more intense collecting covering all the ecologic habitats of the island and continued through all seasons of the year should result in large additions to the present list.

The grasses most frequently referred to in the following records and which may be mentioned by the common cuban name only are "pitillo" *Opilsmaenus hirtellus* (L.); Guinea grass, *Panicum maximum* Jacq.; Para or Parana, *Panicum barbinode* Trin.; Bermuda Grass; *Paspalum* spp. and Natal grass *Tricholaena rosea* (Nees).

The following grasses have been reported as host plants for the mosaic of sugar cane. Sugar cane; corn "maiz"; sorghum; grama pintada, *Echinochloa colonum*; foxtail, *Chaetochloa glauca*; goose grass, *Eleusine indica*; *Paspalum virgatum*; *Syntherisma sanguinalis* and *digitata*.

I wish to express my appreciation of the many favors received from the officers of the Foundation and the Cuba sugar Club and the managers of the various centrals. I am especially indebted to the Local Director, Capt. D. L. VanDine and to Mr. C. F. Stahl who accompanied me on many of the collecting trips and have supplied additional material. I may mention also Messrs. J. S. Orme, Baraguá; E. S. Walker, Preston; James Hillary, Banes; B. B. Dewitt, Jatibonico; J. A. Pepper, Jobabo; V. Y. Medina, Ermita and Federico Poey, Jaronú, who were particularly helpful in arranging for me to reach desirable collecting grounds. Mr. Chas. Ballou very kindly arranged for me to see the collection at the Santiago de las Vegas Experiment Station and the Gundlach collection in Havana.

Type and paratype specimens of the species described as new and sets of the other species collected will be preserved in the National Museum and collection of the author.

## CICADELLIDÆ.

*Agallia maculata* n. sp.

Head distinctly produced, vertex very short, hind border elevated merging into a projecting ridge toward center. Front slightly convex, ocelli distant from base, antennal pits narrow, cheeks angular, margins very thin. Pronotum much advanced before the eyes, sub-triangular, hind border truncate; elytral veins rather indistinct. Genitalia: Female, last ventral segment short, scarcely longer than preceding, truncate. Male, valve small, triangular; plates narrow, triangular, slightly acuminate.

Color: Light grey, almost white, with pale fuscous spots a little more extended or darker in male than in the female. Vertex with central fuscous line, a short oblique line each side and darker dot above the ocellus. Pronotum with two blackish points anteriorly, a faint brownish median line and two oblique dashes on the disk. The fuscous maculæ on the elytra are arranged in rather indefinite bands, the most distinct one behind the middle of the clavus, another at the tip of the clavus and the apical part mostly infuscated in the cells, with white nervures. The spots on the basal third are faintly grey in this part and distinctly whiter in appearance.

Length: Female, 3.25 mm. Male, 2.75 mm.

This very handsome and unique little species was beaten from the clusters of needles on pine twigs of the long leafed Cuban pine (*Pinus cubana*?) at Herradura, March 15-16, 1925. In this locality they were associated with species of *Cyrpoptus*, *Oliarus*, *Catonia* and *Scaphoideus bimarginatus*. As the species was not taken at any other point and only in this particular habitat it seems it must be its natural food plant, possibly a distinctly restricted host, and must occur in considerable abundance, although it requires hard beating to dislodge them from their concealment in the needle clusters.

*Agallia albidula* Uhl. Baraguá, Feb. 6, in company or batey garden on carrot. Jobabo, Feb. 9, 10, 12; Preston, Feb. 20; Jaronú, Feb. 24; Herradura, Mar. 14. This species was described from St. Vincent, of the Lesser Antilles, and appears to be a common species in tropical America occurring from Brazil to Cuba. It has been taken from various plants other than grasses, but a definite host plant has not been determined. Recorded as *tenella* Ball in Wolcott's list for Porto Rico.

*Agallia scortea* Van D. Jobabo, Feb. 14. Taken at roadside in beating bushes, agrees closely with the description by Van Duzee (1907) in Jamaican Hemiptera.

*Agallia pepino* Wolcott and DeLong. Jobabo, Feb. 10, 12, from grassy lane especially from a broad leaf plant in pasture. Ermita, Feb. 17, in wood bordering cane and on garden shrubs. Baraguá,

Mar. 2, from Citrus trees; Mar. 3, low places in palm grove. Not taken in cane fields and probably not important in connection with cane culture.

*Agallia 4-punctata* (Prov.). Noted for the Island, but not taken during my winter stay.

*Agallia constricta* Van D. Hershey, Mar. 18. Calabazan, April 20 (Hine). Common and injurious to leguminous plants in U. S.

*Agallia sanguinolenta* (Prov.). Jobabo, Native plant in grass; Ermita, Feb. 17, in cane fields on a cruciform weed resembling pepper grass. No record of actual occurrence on cane. A species of very wide distribution in the U. S. and sub-tropical America. Often a serious pest in clover and for other legumes, but not commonly troublesome to grass crops.

*Bythoscopus robustus* (Uhl.) Ermita, Feb. 16, on "Ragweed." Cunagua, Feb. 25. Evidently quite scarce at this season and apparently associated with plants other than grass or cane.

*Cicadella sanguinicollis* (Sign.) No record except the original description from Cuba.

*Cicadella sirena* (Stål.). Ermita, Feb. 16, Croton bush, numerous; Feb. 17, wood bordering cane; Preston, Feb. 19; Banes, Feb. 21; Jaronū, Feb. 27, bushes in cane land. Wolcott records it from sugar cane and gramma grass, but I have not found it on grasses or in cane separate from woody plants.

*Cicadella histrio* (Fab.) (=robusta Walk. Sign.). Collected from a small tree at Jatibonico, Mar. 11. Very similar to *sirena* Stål, but the lines on the elytra are interrupted and the picture of the vertex and face somewhat different.

*Cicadella similis* (Walk.). Baraguá, Feb. 5, 7, Mar. 1, 2, 3, 4; Jobabo, Feb. 12, 15; Ermita, Feb. 16, 17; Preston, Feb. 19, 20; Banes, Feb. 21; Jaronū, Feb. 23, 24; Cunagua, Feb. 25; Jatibonico, Mar. 9 and 11; Herradura, Mar. 13 and 15; Hershey, Mar. 18. This is one of the most abundant species to be met with in the tropical parts of America ranging from the southern part of the United States through Central America, West Indies and South America. It is found on a large number of grasses, but is particularly common on the Parana and Guinea grass and some of the native species of the region. It also occurs in cane fields, but has been taken more particularly on young cane, and doubtless makes excursions into the cane fields at times when the native vegetation is less succulent and attractive. It has been taken at every locality where collections have been made, and occurs on a great variety of plants not only in the fields, but also along roadsides, gullies, arroyas, etc.

Considering the abundance of the species and its wide range of food habit, there seems to be good reason to consider it a possible carrier of plant diseases and it deserves careful experimentation to determine its possible relationship to mosaic in cane. So far, I understand, experiments have been negative, but there is, of course, a possibility of its being a carrier under suitable conditions.

*Kolla hartii* (Ball). Baraguá, Feb. 5. On grass adjacent to cane. Guinea grass. Herradura, Mar. 16. This is a common species in the southern U. S., but has been collected only at Baraguá and Herradura, in Cuba. It is a grass feeding species and if found to have wider distribution may deserve attention as of economic importance.

*Kolla fasciata* (Walk). Ermita, Feb. 16, 25, on lawn and in grass along railroad; Banes, Feb. 21, Mex. grass and weeds. A common species for tropical and sub-tropical America; certainly injurious to grasses, but not noted in cane.

*Kolla geometrica* (Sign.). A neotropical species, not taken during my stay in Cuba, but recorded from Gundlach Collection.

*Draeculacephala sagittifera* (Uhler). This is another very abundant species and is common to the West Indian region, occurring particularly in Bermuda grass, but is also found on other species, and frequently along the roadways adjacent to cane. Records are for Baraguá, Feb. 5; Jobabo, Feb. 16, 17; Preston, Feb. 19, Banes, Feb. 21; Jaronú, Feb. 23 and 24; Cunagua, Feb. 25; Jatibonico, Mar. 10, 11; Herradura, Mar. 15; Hershey, Mar. 18; Santiago de les Vegas, Mar. 19. It was found to be particularly abundant at Cunagua in a stand of nearly pure Bermuda grass in a roadway.

*Draeculacephala reticulata* (Sign). Described from Cuba and listed in collection of the Experiment Station, but none were collected during my visit. It seems peculiar that no specimens were taken in Cuba, but so far as my collections show, it is entirely replaced by *sagittifera*. Collected at Paradise Key, Fla., on Bermuda grass.

*Draeculacephala mollipes* (Say). Baraguá. Abundant on *Panicum barbinodum*, along railway on Feb. 5, also nymphs. Not as plenty as *C. similis*. On various grasses. One taken in field of Natal Grass, but not on this grass; Jobabo, Feb. 12, on rank grass, *P. Barbinode?* Feb. 9 and 10; Preston, Feb. 20; Banes, Feb. 21; Jaronú, Feb. 23 and 24; Cunagua, Feb. 25. A very common species for U. S., West Indies, and Central America on rank grasses. Not taken on cane.

*Draeculacephala mollipes* var. *minor* (Walk). Baraguá, Mar. 2, 1925.

*Gypona cubana* n. sp. Head moderately wide, broadly subangulate; vertex scarcely longer at middle than next the eye, anterior border bluntly angular; ocelli before the middle, a little farther from each other than from eye; front slightly depressed at base, margins curved; clypeus nearly twice as long as width at base, slightly expanded at tip. Pronotum nearly three times as long as vertex, hind border scarcely emarginate. Elytra long tapering apically. Female last ventral segment slightly longer than preceding, bisinuate with broad median lobe margined with brown.

Color, chestnut brown, the vertex with six yellow suffused dots, pronotum with a series of four dots parallel to anterior border and two close to the eyes; four conspicuous dots on base of scutellum light yellow or ivory white; elytra with fuscous dots alternating with dull

yellowish; veins brown. Beneath yellow, front with lateral arcs of front, base of coxa, pleural spot, band on femora, tips of tibia and spines fuscous; pygofer brown; ovipositor blackish. Length, 8.5 mm.

One female (type) taken in woods at Jatibonico Feb. 10th, 1925. I have also a female (paratype) from Holguin, Dec. 17, 1904. It is barely possible this may be the female of *annulipes* Spg., described from male, but there seems too great disparity in size to refer it to that species without more evidence.

*Gypona albimaculata* n. sp. Head broad, evenly rounded before; vertex a little longer at middle than at eye; ocelli scarcely before middle, less than twice as far from each other as from eye, twice as far from each other as from base; front flattened; pronotum two and a half times as long as vertex; elytra narrowing apically. Male last ventral segment as long as preceding truncate; plates fairly broad, widening at base, tapering gradually to blunt spoon-shaped tips.

Color, pale gray, irregularly spotted with white and punctured and dotted with fuscous; anterior femora and tibiae twice banded with fuscous; hind tibiae with fuscous margin and dots at base of spines; front brown with central spot and lateral arcs yellow; clypeus with whitish Y-mark; margin of lorae and spot on cheek pale yellow. Length, 9 mm.

Two specimens Boriato, Cuba, Feb. 7, 1904, (type and paratype) also one male (paratype), Soledad "10 III 1925," J. G. Myers.

*Xerophloea viridis* (Fabr.). Jobabo, Feb. 10, 12; Ermita, Feb. 17, from weeds and grass in roadway and in cane field; Preston, Feb. 19 and 20; Banes, Feb. 20; Jaronū, Feb. 23 and 24; Cunagua, Feb. 25. A common widely distributed species occurring from southern S. Am. through the tropics to northern U. S. Occurs on a great variety of grasses and doubtless feeds on many different species. Has been taken at practically all localities in Cuba where collections have been made, but at no place in great abundance and only in adult stage or with few exceptions. It evidently lives throughout the "winter" in Cuba as adult.

On account of its very wide dispersal in cane growing regions and its occurrence in grass and weedy areas adjacent to cane fields, it would seem a favorable species for distributing diseases, but its infrequent occurrence on cane itself would give it less apparent importance in this respect.

*Xestocephalus pulicarius* Van Duzee. This species is widely distributed throughout the United States and tropical America and appears to live on a variety of plants. It may be expected to occur as a common species in all parts of Cuba in favorable localities, but so far collected only at Banes, Feb. 21, where it was swept from coarse grass near the railroad, and at Baraguá, and on grass near the "playa."



*Xestocephalus brunneus* Van D. Ermita, Feb. 17; Preston, Feb. 19; Baraguá, Mar. 1. Beaten from Mango blossoms; Herradura, Mar. 14. This species has been recorded from widely scattered localities from Northern U. S. to South America. Specimens referred to this species have been taken at Jobabo (Stahl). Probably of general occurrence throughout the island. It does not appear to be of major importance in connection with plant diseases, but on account of general distribution may deserve some watching.

*Xestocephalus tessellatus* Van Duzee. Jatibonico, Mar. 10; Herradura, Mar. 14 and 15. This is another species of very wide distribution and sometimes occurring in abundance but probably on account of the season it was taken only rarely during my trip.

*Spangbergiella vulnerata* Uhler. Baraguá, Feb. 5, (playa) Feb. 7; Jobabo, Dec. 28 to 30, 1924, (Stahl), Feb. 11 on Guinea grass in pasture; Ermita, Feb. 17, on Guinea grass on roadway; Preston, on Guinea grass, Feb. 20 (playa); Banes, Feb. 21, coarse grass; Jaronú, Feb. 24, low ground coarse grass, Guinea? Jatibonico, Mar. 10. A large, handsome species, light green with oblique orange stripes on head and pronotum. Occurs generally on coarse grasses throughout southern U. S. and the tropical Americas. While common on coarse grass, especially Guinea grass, I have not taken it on sugar cane.

*Scaphoideus fasciatus* Osborn. Ermita on Lippia, Feb. 16 (Stahl); Preston, Feb. 20; Banes, Feb. 21, in grassland. A fairly common species in the West Indies and also recorded for southern U. S. No records of association with cane.

*Scaphoideus bimarginatus* DeLong. Ermita, Feb. 17, in canefield; Herradura, Mar. 15 and 16, on pine trees. Described from Porto Rico, and not hitherto noted from any other region.

*Platymetopius frontalis* Van D. Ermita, Feb. 17; Herradura, Mar. 15. A very common species in the United States and south into tropics, but apparently much less common in Cuba at this season than *loricatus*. However, if it appears more common at other times of the year, it may deserve attention as a species of probably economic importance, especially as it occurs in meadows and pastures.

*Platymetopius loricatus* Van D. Baraguá, Feb. 5, in grass sweeping, yellow face, long vertex, Jobabo, Feb. 12; nymph? Pasture, Feb. 11; Ermita, Feb. 17; bushes in cane field; Preston, Feb. 19 and 20; Banes, Feb. 21; Jaronú, Feb. 23. Widely distributed and common, but generally associated with shrubs or woody plants.

*Platymetopius nanus* Van D. Preston, Feb. 20; Jatibonico, Mar. 10.

*Platymetopius brevis* Van D. Banes, Feb. 21; Hershey, Mar. 18.

*Platymetopius limbatus* n. sp. Head about as wide as pronotum, vertex long, about one-third longer than width between eyes, distinctly angulate, front four times as long as wide, narrowing nearly uniformly to clypeus; clypeus elongate, widened toward the apex; loræ long; cheeks with nearly straight margins. Pronotum about two-thirds as long as

vertex, emarginate behind; elytral veins distinct, about seven oblique cross-veins in costal area.

Female, last ventral segment narrow, produced, notched at tip; pygofer ciliate toward the tip; male, valve large, rounded behind, with a sub-marginal furrow; plates short, rounded at tips, ciliate on the margin, reaching about half way from tip of valve to apex of pygofer.

Color, olive green, mottled with fuscous, vertex with a discal darker area and apical patch including a broad whitish wedge; front fuscous, a narrow white line at base; elytra greenish fuscous on the inner border, the outer portion mostly hyaline except for the dark veins and the oblique cross-veins which are deeply fuscous, especially the nodal dash; apex narrowly white, with a sub-margin of fuscous; legs yellow, in the male tinged with red.

Described from two specimens, female (type), male (allotype), collected at Ermita, Feb. 17, 1925, from bushes or low herbage in woods. This is a very handsome little species, easily distinguished by the hyaline costal portion of the wing.

*Deltocephalus trilobatus* DeLong and Wolcott. Jobabo, Feb. 11, on Pitillo. Described from Porto Rico. Not taken commonly and probably of little economic importance.

*Deltocephalus micarius* Ball. Collected at Herradura, March 14. The species is fairly common in the southern U. S. in grasses of low ground or swampy tracts.

*Deltocephalus balli* Van D. Specimens referred to this species were taken by the writer at Baraguá, Feb. 5 and 6, Mar. 2, and also "at light" by Mr. C. F. Stahl, Oct. 23, 24, 25 and 27, 1925. Doubtful specimens were also taken at Jobabo, Feb. 12, and at some other localities. Balli is a widely distributed and destructive species in the United States affecting grasses and grains, but was not abundant enough to be counted injurious in Cuba and at no time was collected in cane. It is a quite variable species, but the Cuban specimens agree quite closely with some of the lighter colored individuals of the states.

*Deltocephalus flaveolus* n. sp. Head slightly wider than pronotum; vertex moderately flat, obtusely angular, one-third longer at middle than next the eye, wider than long, bluntly angular to front; front broad, lateral margins rounded; clypeus rather long, sides nearly parallel; loræ broad; cheeks slightly sinuate below the eye. Pronotum one-third longer than vertex, hind border scarcely concave. Elytra long, extended beyond tip of abdomen. Genitalia, female, last ventral segment long, narrowed posteriorly with a distinct notch at middle. Male, valve small, transverse, plates triangular, longer than broad, narrowing to sharp upturned tips. Color, bright yellow, face black with a few yellow points and indistinct arcs. Border of clavus and base of corium, fuscous. Apex beyond tip of clavus, smoky or infuscate. Beneath base of abdomen and the band on pygofer black, legs, except base of fore femora, yellowish. Length, female, 4 mm.; male, 3.2 mm.

Described from specimens taken at Herradura March 15, by the writer; Paso Real and Calabazar, April, 1924, by Prof. J. S. Hine. Also specimens taken at light, Baraguá by C. F. Stahl, October 24, 1925. These specimens show quite a little variation in the amount of coloring. The males usually being darker and the females lighter, some individuals having the face largely yellow, the front and loræ black, and the elytra a lighter fuscous with brassy reflection. The Herradura specimens were collected in numbers from a very rank grass in low land and a single specimen from near by *Paspalum*.

*Deltocephalus albivenosus* n. sp. Slender, head slightly wider than pronotum, vertex obtusely angular, nearly as long as width between eyes, one-fourth longer at middle than next the eye; front rather narrow; clypeus narrow, slightly narrowed at tip, loræ broad. Pronotum scarcely longer than vertex. Elytra long and slender, much longer than abdomen, veins conspicuous, middle anteapical cell divided. Female, last ventral segment long, narrowed behind, hind border truncate.

Color, brownish gray; vertex with four black points on anterior margin and milky whitish border next to the eye. Pronotum with five whitish stripes. Elytra with conspicuous ivory white veins. A patch in base of outer claval cell, the inner anteapical and two outer apical cells infuscate. Face black, the front with faint whitish arcs; loræ and clypeus white, the latter with blackish bands. Abdomen blackish. Ventral segment and pygofer light brown. Fore femora banded. Length, 4 mm.

One specimen Baragua, Cuba "at light" by C. F. Stahl.

*Deltocephalus maculellus* n. sp. Small, slender, head slightly wider than pronotum. Vertex bluntly angular, little wider than length at middle, one-fourth longer at middle than next eye, obtusely angular, the front narrow, tapering from antennæ to base of clypeus; clypeus long, sides parallel; loræ broad, extending nearly to margin of cheek; border of cheek distinctly sinuate. Pronotum one-fourth longer than vertex. Elytra exceeding abdomen, veins distinct. Female last ventral segment one-half longer than preceding, hind border very thin, slightly emarginate. Male valve triangular; plates broad at base, tapering to acute upturned tips, the margins ciliate.

Color, dull gray, vertex with two conspicuous black points at tip, two minute dots either side above the ocelli; face with two dots next the eye; front dusky with whitish arcs. Base of clypeus and upper border of loræ and inner streak on cheek blackish; pronotum with five pale stripes; elytra subhyaline, the base of outer claval cell, discal cell, and apex of all claval cells, the inner anteapical and two outer anteapical cells more or less infuscate; veins whitish, middle of costa faintly

yellowish. Beneath, venter yellowish, base of lateral margins and dots on tip of pygofer blackish. Length of female 3 mm. Male, 3 mm.

Described from specimens collected at Ermita, and Preston, by the author and one specimen at light, Baragua, Cuba, C. F. Stahl. This species is very similar to *albivenosus* in general characters and color pattern, but aside from being slightly smaller, differs in the markings of the face, color of the abdomen and details of genitalia.

***Deltocephalus marginellus* n. sp.** Broad, head distinctly wider than pronotum. Vertex short, scarcely angulate, twice as wide as length at middle, one-fourth longer at middle than next the eye; front broad, margins sinuate, narrowed to clypeus; clypeus long, sides nearly parallel; loræ broad. Pronotum one-half longer than vertex, concave behind. Elytra rather broad, distinctly exceeding abdomen. Genitalia; female last ventral segment a little longer than preceding, lateral angles somewhat longer, hind border sinuate, bluntly produced at middle with a black marginal spot either side. Male valve rather large, rounded in front, hind border nearly straight, plates short, about twice as long as valve, narrowed rather abruptly to bluntly rounded tips.

Color, pale fulvus. Vertex with two black spots at apex and a short brown line each side and a red margin next the eye; front black with light arcs; clypeus pale yellowish with a black median line expanded at tip; loræ and cheeks whitish; pronotum with five whitish stripes; elytra with whitish veins, the areoles margined with fuscous; legs pale, tips of femora blackish; venter of female brown, males, blackish. Length of female, 3.75 mm. Male, 3.25 mm.

Described from a series of specimens collected by the author at Herradura, March 14, '25.

***Deltocephalus pellucidus* n. sp.** Head broad, rather short, obtusely angulate; vertex a little wider than long, one-fourth longer at middle than next the eye, obtusely angulate to the front; front slightly convex, narrowing from antennal pits to clypeus; clypeus nearly parallel sided; loræ rather small, cheek margins nearly straight. Pronotum about half longer than vertex scarcely concave behind, elytral veins distinct, middle ante-apical cell divided. Genitalia; female last ventral segment a little longer than preceding, outer angles rounded, median part faintly concave; male, valve long, rounded behind, plates short, triangular, tips sub-acute reaching tip of short pygofer.

Color: pale luteous, vertex and front unmarked or very faintly irrorate with whitish, pronotum with five faint whitish stripes, elytra sub-hyaline slightly infuscated, veins ivory white, basal half of costa light yellow, outer apical cell fuscous. Female segment broadly black on apical border. Male plates with a black spot at base, and on male black dash at each side of base of front.

Length: female, 3.5 mm.; male, 3 mm.

Described from specimens collected at Ermita, partly in woods, and cane fields, and one specimen on *Canatilla*, Feb. 17, 1925. These resemble pale specimens of *flavicosta* but are larger and the marking while very faint, appears different, so that it seems that they cannot be referred to that species. They resemble *flavicosta* in the yellow border of costa, the divided ante-apical cell, and the fuscous outer apical cell.

*Deltocephalus lunatus* n. sp. Head rather narrow, vertex as long as width between the eyes, distinctly angular, about one-third longer at middle than next the eye, front narrow, curved and tapering to clypeus; clypeus short and broad, parallel sided; loræ semi-circular; cheeks sinuate. Pronotum as long as vertex, truncate behind; elytral veins large, middle ante-apical narrow and divided at center. Genitalia; female, last ventral segment rounded, slightly notched at apex; male valve short, obtusely angular behind; plates narrow, triangular, exceeding the pygofer.

Color: dark fuscous, vertex with a broad yellowish median stripe expanding anteriorly to cover the apical part and including four black spots, the anterior ones touching the black base of the front; front mostly black or dark fuscous with a few whitish spots at base, a series of pale arcs and below a yellow lunate spot, the base of which touches the apex of front with the lower arm reaching the clypeus a little before the tip. Pronotum with five whitish stripes, four black points near the anterior margin; scutellum with two black dots at base, and fuscous median dash; elytra dark fuscous; veins broadly white, costa narrowly and very faintly yellow, the cells margined with fuscous, the two outer apical cells infuscated.

Length: female, 2.75 mm. Male, 2.5 mm.

Described from specimens collected at Jaronū, Feb. 24, 1925 from coarse grasses in low ground. This belongs with the *flavicosta* group, of which it might seem to be a variety but the pattern of the face, especially the lunate yellow spot, and the genitalia are sufficiently different to merit description.

*Deltocephalus flavicosta* Stål. Baraguá, Feb. 5, March 1, fairly common; Jobabo, (Stahl) Feb. 9 and 11, pasture (H. O.) Feb. 12, (H. O.) Ermita Feb. 16 and 17—common in grasses and canefield—taken on cane, also woods bordering cane with grass; Preston, Feb. 19 and 20—plenty on grass near cane; Banes, Feb. 21—plenty. Jaronū, Feb. 23 and 24—cane fields and grass; Jatibonico, March 9th and 11. Herradura, March 13-14-15. Cunagua, Feb. 25,—cane fields and grass. Fairly common on grass. Bermuda and on various grasses. It occurs from Argentina to Canada—a distinctly economic species, and should be studied as a possible agent in carrying mosaic and other plant disease. On sugar cane and "malojillo grass" (vide Wolcott). "Carrots" (Wolcott).

*Deltocephalus littoralis* Ball. Baraguá (Playa). Feb. 7, March 2. On tidal flats on salt marsh grass—only at or near tide level—common along Atlantic and Gulf coasts—probably submerged at times of high tide—probably of little economic importance unless the salt marsh grass on which it occurs is used as forage.

*Deltocephalus obtectus* O. & B. Swept from grass, Jobabo Feb. 11, Banes Feb. 21. Very close if not identical with our species. Not taken on Bermuda grass, which seems to be a common food plant in Florida.

*Deltocephalus sonorus* Ball. Baraguá, Feb. 5, March 2—not common, on *Panicum barbinode*—on Bermuda and Guinea grass. Jobabo, Feb. 9, *sonorus* (var.?) More distinctly marked than usual for U. S. species—pattern same—also found Feb. 12 and 25; Ermita, Feb. 17; Preston, Feb. 19; Banes, Feb. 21; Jaronū, Feb. 23; Jatibonico, March 10; Herradura, March 15.

*Euscelis pallidus* n. sp. Head slightly wider than pronotum. Vertex broad, more than twice as wide as length at middle, one-fourth longer at middle than next the eye, front broad, scarcely as wide as long. Clypeus narrowed to the tip; loræ large, nearly reaching border of cheek; cheek border distinctly sinuate. Pronotum nearly one-half longer than vertex, hind border scarcely concave. Elytral veins very indistinct. Male last ventral segment slightly longer than preceding, valve small, narrow, angulate behind; plates broad at base, narrowed nearly uniformly to acute tips, the border with a few stiff, brown bristles.

Color very pale yellowish, the ocelli and the outer angles of scutellum orange, the claval suture with a narrow brown line, the apical veins brownish toward tip. Otherwise elytra are clearly hyaline. Length, 3.25 mm.

Described from one specimen, male, Hershey, Cuba, March 18, 1925. This specimen is so light colored that it might be considered teneral, but some of the markings are distinct and the genitalia appear to be mature.

*Euscelis obscurinervis* (Stål) (*E. exitiosa* Uhl.). Baraguá, Feb. 5 and 6, Mar. 2 and 7, (in Bermuda grass and mixed grasses, both adults and nymphs); Jobabo, Feb. 9, 10 and 11, (mostly in Bermuda grass); Ermita, Feb. 16 and 17, (very abundant in all stages); Preston, Feb. 19 and 20; Banes, Feb. 21; Jaronū, Feb. 23; Jatibonico, Mar. 9 and 11; Herradura, Mar. 13 and 15; Hershey, Mar. 18; Santiago de las Vegas, Mar. 19. The species has not been observed on cane, but it is distributed very generally upon all kinds of grasses, some of which are known to harbor mosaic disease, so that the species may have a possible relationship in this connection. Its wide distribution and great abundance should make it a favorable bearer in case it is found to occur at times on cane.

*Euscelis obtutus* (Van D.). Baraguá, Feb. 5, sweeping mixed grasses; Jobabo, Feb. 11, pasture and mixed vegetation; Herradura,

Mar. 14. An extremely abundant species in southern United States, but not taken in large numbers in Cuba at any points where I collected. None recorded as occurring on cane. Widely distributed in U. S. and south.

*Euscelis bicolor* (Van D.). Baraguá, Feb. 7 and Mar. 2, (Playa), on grass near tidal flat; Jobabo, Feb. 12; Ermita, Feb. 17. A common and widely distributed species for tropical and north temperate America. Often abundant enough to be of economic importance. Not taken in cane fields, but common on grasses of various kinds.

*Euscelis cuneatus* Uhl. Baraguá, Mar. 2; Banes, Feb. 21. In grass.

*Euscelis mexicanus* O. & B. Jatibonico, Mar. 10. In grass.

*Euscelis caudatus* n. sp. Head decidedly conical, similar to *bicolor*; vertex one-third longer at middle than next the eye; front convex, narrow, about twice as long as wide; clypeus long; cheeks short. Pronotum almost as long as vertex, slightly concave behind, elytral veins distinct.

Vertex greenish yellow, with two large black spots near the tip; front, black, with pale arcs and a central pale line; clypeus greenish with a central fuscous spot; cheeks greenish, with fuscous dots; pronotum and scutellum olivaceous; elytra hyaline, tinged with olive, beneath black; margins of the segments greenish; pygofer and ovipositor black, margined with pale; tergum blackish on the disc, greenish-yellow on the margins; legs olive green, somewhat infusate.

Female, last ventral segment slightly longer than the preceding, hind border truncate, pygofer elongate and exceeded by the ovipositor by nearly half its length. Length, female, 3 mm.

This species somewhat resembles *oblutus*, especially the forms which have distinctly hyaline elytra, but aside from the different picture on the vertex the ovipositor is more produced.

Described from a single specimen collected in rank grass at Jaronū, Cuba, Feb. 24th, 1925.

*Phlepsius fuscipennis* Van D. Baraguá, Feb. 7, (Playa); Hershey, Mar. 18; Herradura, Mar. 15 and 16; Paso Real, April 24 and 28, 1924, and Calabazar, April 30, 1924, (Hine). A common species in Eastern United States, New York to Florida and now recorded for Cuba.

*Phlepsius cinereus* Van D. My collection contains specimens collected by Mr. Robert Combs at or near Cienfuegos about the year 1895. Labels read only "Cuba Combs." This species occurs commonly in the United States from Texas to Florida and north to Kansas, Ohio, and North Carolina. The Cuban specimens average a little smaller, but do not seem to vary in other respects from the typical forms.

*Acinopterus acuminatus* Van D. Taken at Jobabo, Feb. 10, in patch of native grass (one specimen); Ermita, Feb. 17, on grassy roadway in cane field; Banes, Feb. 21 and 22, few. Widely distributed in southern

United States and in tropical America. Not abundant in any locality covered in this survey; apparently confined to native grasses.

*Thamnotettix colonus* (Uhl.). Baraguá, Feb. 5; Jobabo (Stahl), Feb. 12; Ermita, Feb. 17; Preston, Feb. 19, common; Banes, Feb. 21, common; Jaronū, Feb. 23 and 24, common; Cunagua, Feb. 26; Jatibonico, Mar. 10 and 11; Herradura, Mar. 13 and 15. A very common and widespread species in tropical America and north in the Gulf states. Especially common in Bermuda grass and on *Paspalum*. May be considered a possible carrier of plant grass diseases, and, on account of general distribution, an important species.

*Thamnotettix nigrifrons* Forbes. Preston, Feb. 20; Cunagua, Feb. 25; Jatibonico, Mar. 10; Hershey, Mar. 18. Mr. Stahl secured specimens at light Nov. 12, 1925. This is an abundant species throughout the eastern U. S. and apparently widely distributed in Cuba, but not found in cane. What appears to be a rather extreme variety has larger spots on the vertex and darker bands on the elytra.

*Thamnotettix cubanus* n. sp. Light yellowish with pale nervures, vertex with two large black spots and two minute points near the apex. Head slightly wider than pronotum, vertex nearly twice as wide as long, about one-third longer at middle than next the eye, sub-angulate to front; front oval, sutures distinct; clypeus elongate, sides nearly parallel; cheeks broad, sinuate beneath the eye. Pronotum half longer than vertex, uniformly curved in front, slightly concave behind; elytral venation distinct. Female, last ventral segment short, sinuate or excavated near the center. Male, valve rounded behind; plates short, sub-triangular, margins sinuate, tips bluntly rounded.

Color, light olivaceous yellow, pronotum a little darker than vertex, front with distinct fuscous arcs, and a clear whitish space on the middle, extending from near the base to the clypeus; elytra sub-hyaline, with faint metallic luster; veins whitish, and the cells faintly infuscate; costa white. Length of female, 4 mm.; male, 3 mm.

This species was taken quite commonly upon grasses at Baraguá, Jobabo, Banes, Jaronū, and other points, especially upon guinea grass. It is apparently quite closely related to *hyalinipennis*, a clear winged species, described from Rio Janeiro, Brazil, by Stal. It differs, however, in the frontal picture and in the arrangement of the vertex spots. Type specimens in author's collection and National Museum.

*Chlorotettix viridius* V. D. Baraguá, Feb. 25, in grass; Jobabo, Feb. 10, Mar. 2, native grass and salt marsh; Ermita, Feb. 16 and 17, grasses in and bordering cane fields; Preston, Feb. 19 and 20; Banes, Feb. 21; Jaronū, Feb. 23 and 24; Cunagua, Feb. 25; Jatibonico, Mar. 10 and 11; Herradura, Mar. 13 to 15. This species occurs throughout much of tropical America and north in the United States to the Great Lakes. Its wide range and grass feeding habit make it one of the important economic species, and, while not common on cane, it may distribute mosaic among grasses.



*Chlorotettix minimus* Baker. Baraguá, Feb. 5; Jobabo, Feb. 12; Ermita, Feb. 16; Preston, Feb. 19 and 20; Banes, Feb. 21; Jaronū, Feb. 23 and 24; Cunagua, Feb. 25; Jatibonico, Mar. 10 and 11; Herradura, Mar. 13 and 15. Commonly taken in sweeping grass.

*Cicadula maidis* De Long. Jobabo, Jan. 19 and 27, 1925 (Stahl), on corn, very plenty. Banes? This species recently described from Porto Rico occurs in all stages on corn, and, while this is evidently its normal host, it has been recorded by Wolcott from carrots and sugar cane. It therefore deserves attention in connection with the studies of possible carriers of mosaic.

*Eugnathodus bisinuatus* De Long. Baraguá, Feb. 5, Mar. 2, from grasses; Jobabo, Dec. 29, 1924, "Parana grass" (Stahl); Banes; Jaronū. On Natal grass?

*Eugnathodus guajanæ* De Long. Jobabo, Dec. 29, 1924 (Stahl); Parana grass; Ermita, Feb. 16, cane; Preston, Feb. 20; Banes, Feb. 21; Jaronū, Feb. 23 and 24, cane and "barba de Indio;" Cunagua, Feb. 25; Jatibonico, Mar. 11, 1925. This species is of special interest on account of its occurring in all stages in the "arrows" of sugar cane and apparently well adapted to the carrying of cane diseases.

*Eugnathodus abdominalis* Van D. Jobabo, Feb. 15, 1925, in grass adjacent to cane, possibly in cane, also taken on small bush in railroad right of way, the leaves showing severe puncturing.

*Eugnathodus flavidus* n. sp. Head slightly wider than pronotum, sub-angulate. Vertex short, scarcely longer at middle than next the eye; front broad, tapering from antennæ to clypeus; clypeus small, narrow at base, widening toward tip; loræ broad; cheek margin sinuate. Pronotum two and one-half times length of vertex, strongly arched in front, faintly concave behind. Elytra hyaline, veins distinct. Genitalia: female last ventral segment as long as preceding, truncate. Male valve short, transverse; plates small, triangular, tips acute and upturned.

Color, pale yellow with dashes of sulphur yellow on anterior border of pronotum and base of costa. Elytra milky hyaline with a tinge of orange in the discal cells and a fuscous stripe occupying most of the second apical cell. Wings milky hyaline with a clouded apical vein. Length, male and female, 3 mm.

Described from specimens collected at Jaronū, Feb. 24, 1925 from grass or sedge in the swampy habitat. This species is especially distinguished by the fuscous apical cell.

*Eugnathodus virescens* n. sp. Head slightly wider than pronotum, distinctly rounded in front. Vertex scarcely longer at middle than next the eye; front rather short, tapering from antennæ to base of clypeus; clypeus narrow, sides nearly parallel. Pronotum twice as long as vertex, moderately arched in front, hind border slightly concave. Elytra broad, veins distinct. Female last ventral segment a little longer than preceding, hind border slightly incised to form a central lobe. Male valve long, triangular; plates short, narrowed to bluntly rounded tips, extending to or beyond a short pygofer.

Color, light green; elytra greenish hyaline, abdomen yellowish green above, the borders of the segments distinctly yellowish; legs whitish. Length of male and female, 3 mm.

Described from specimens taken from grass at roadsides at Banes, Feb. 21, 1925.

*Eugnathodus pallidus* n. sp. Similar to *abdominalis*, but more pallid and dorsum of abdomen pale or with pale borders on the segments in male. Head scarcely wider than pronotum, rounded before. Vertex short, not longer at middle than next the eye; front tapering slightly nearly to base of clypeus, then contracting; clypeus long, sides parallel; loræ broad; cheek margins distinctly sinuate. Pronotum three times as long as vertex, distinctly arcuate in front, hind borders scarcely concave. Elytra long and narrow, veins distinct. Female last ventral segment about two times as long as preceding, hind border convex, faintly lobed at middle. Male valve long, angular behind; plates short, tapering to obtusely rounded apices, reaching tip of pygofer.

Color, pale olive green. Elytra milky hyaline, faintly infusate in apical veins; female abdomen above, yellow or whitish, male dusky with whitish borders on segments or pale as in female. Length of female, 3.25 mm.; male, 3 mm.

Described from specimens collected at Preston, Rancho 8, Feb. 20, 1925. Quite similar to *virescens*. Elytra longer and coloration much lighter.

*Balclutha hyalina* n. sp. Head scarcely as wide as pronotum, rounded anteriorly; vertex as long at middle as next the eye, about four times as wide as long, front rather narrow, tapering slightly and abruptly narrowed to clypeus; clypeus narrow, sides parallel; loræ broad, cheek margins slightly sinuate. Pronotum a little more than twice as long as vertex, produced anteriorly, hind border nearly straight. Female last ventral segment one-half longer than preceding, truncate. Male valve large, rounded behind; plates small, scarcely longer than valve, triangular, the acute upturned tips extending a little more than half way to tip of pygofer.

Color, uniformly light gray with a faint tinge of rose, the vertex and scutellum a little suffused with white. Elytra milky hyaline, veins indistinct; wing veins distinct, apex slightly smoky; abdomen above dusky. Length of male and female, 3 mm.

Described from specimens collected from sedge at Jaronū, Feb. 24, 1925. This species has the appearance of *Eugnathodus*, but the head is narrower than pronotum. It is smaller and lacks the coloration of *impictus*. This and the species of *Eugnathodus*, particularly those on cane, have a special interest since the *Balclutha mbila* Naudé (1924) has been connected with the "streak disease" of corn in South Africa.

*Protalebra cubana* n. sp. Similar to *terminata* Baker, but smaller and the color pattern different. Head as wide as pronotum, distinctly produced, broadly rounded and slightly conical; face elongate, border of cheeks nearly straight. Pronotum about one-fourth longer than vertex. Male last ventral segment as long as preceding, truncate; valve wanting; plates elongate, tumid at base, slightly separated at middle, tips converging, bluntly pointed.

Color, light yellow, vertex and face almost white; pronotum with two broad, oblique, orange stripes near outer margin; elytra with golden spots at base, center and apex of clavus and on disc of corium; veins beyond clavus yellow, bordered with fuscous; the areoles hyaline with a broad, smoky patch at apex, margined with white; beneath pale yellow; legs whitish; plates with a black spot at center. Length, 2.5 mm.

Described from one specimen collected at Hershey, Cuba, March 18, 1925. This must be closely related to *terminata*, but it is much smaller and the color pattern differs in some important respects from examples I have of Baker's Brazilian species.

*Protalebra braziliensis* Baker. Baraguá, Feb. 5 and 6; Jobabo, Feb. 9; Ermita, Feb. 16 and 17; Preston, Feb. 19; Banes, Feb. 21; Jaronū, Feb. 25; Cunagua, Feb. 25; Jatibonico, Mar. 11; Herradura, Mar. 14; Hershey, Mar. 18. Abundant on a variety of plants, especially carrots and other vegetables in gardens. Often in mixed growth in and around cane fields. Specimens also from Mariango, Paso Real and Calabazar (J. S. Hine).

*Protalebra similis* Baker. Ermita, Feb. 16; Baraguá, Mar. 2; Herradura, Mar. 14. Not common and apparently of little economic importance in Cuba.

*Protalebra maculata* Baker. Rancho 8, Preston, Feb. 20, in grass. The species was described from Nicaragua and occurs in South America.

*Empoasca fabæ* Harr (=mali LeB.). Baraguá, Jobabo, Ermita, etc. A very common species ranging from Southern Canada to Argentina and known as the carrier of "hopper burn" in potatoes. It was noted especially on wild morning glory and sweet potatoes and while it feeds on a great variety of plants it is not known to attack cane or other members of the grass family.

*Empoasca flavescens* Fab. Jatibonico, Mar. 10; Herradura, Mar. 18. This is quite similar to *fabæ* and like it has a very wide range, but it was not observed as of as frequent occurrence in my collecting. It is not known to occur on cane or grasses.

*Empoasca* sp. Herradura, Mar. 14.

*Typhlocybella minima* Baker. Cunagua, Feb. 25; Baraguá, Mar. 7, (near Gloria); Jatibonico, Mar. 9 and 10; Herradura, Mar. 13. This is a very small species apparently rather abundant at times in grass but probably of no great economic importance. Recorded for Soledad by McAtee.

Just as this paper goes to the printer I have received the June number of the Journal of the New York Entomological Society containing an article by W. L. McAtee on Neotropical Eupteryginæ which includes records for a number of Cuban species including several described as new, most of them from specimens collected by Mr. J. G. Myers at Mina Carlota and Soledad. The following are not included in my records:

- Dikraneura myersi* McAtee. Soledad.
- Dikraneura cruentata* Gillette, Soledad.
- Dikraneura debilis* McAtee, Soledad; Mina Carlota, Trinidad Mts.
- Dikraneura unipuncta* Gillette. Soledad.
- Dikraneura dorsalis* DeLong. Mina Carlota, Trinidad Mts.
- Joruma subaurata* McAtee. Mina Carlota, Trinidad Mts.
- Joruma peltata* McAtee, Soledad.
- Joruma semenula* McAtee, Mina Carlota, Trinidad Mts.
- Joruma atratula* McAtee. Mina Carlota, Trinidad Mts.

No records of host plants for these species are given but there is no indication that any of them are found on sugar cane.

#### FULGORIDÆ

*Dictyophara spinolæ* (Auct?) In Gundlach coll. A species with long tapering vertex. Specimens agreeing very closely with the Gundlach specimen were taken at Baraguá (playa) Feb. 7th and at Jobabo Feb. 12 and 13, on coarse grass of low ground.

*Dictyophara cultellator* Walk? A specimen in my collection from Boriato, Feb. 12, '05, is referred to this species with some doubt. It was described by Walker from West Indies, "St. Domingo."

*Pelitropis rotulata* Van D. On Croton—Ermita, Feb. 16. One specimen. This stands in Cuban Collections as *Peliotropis mitratus* Uh., but is not given in Uhler's bibliography and is probably a MS. name used in reporting on Cuban collections.

*Cyrtoptus belfragii* Stål. Herradura March 15 and 16. Beaten from needles of long leafed Cuban pine, not abundant, some pairs. The males and females differ considerably in marking but I think there can be no question as to their relationship. Specimens in my collection also from Boriato, Dec. 2, '04 and Holguin, Dec. 19, '04.

*Cyrtoptus obtusa* Uhl. In collection of the Experiment Station at Santiago de las Vegas and the Gundlach collection. Similar to specimens collected from "wild tobacco." Preston, Feb. 20.

*Oliarus franciscanus* Stål. Baraguá, (Playa) Feb. 7, March 5, 7; Jobabo, Feb. 10, native grass; Ermita, Feb. 16; Preston, Feb. 19, 20; Banes, Feb. 21; Jaronū, Feb. 24; Jatibonico, March 9; Herradura, March 14, 15, 16. A very common and widely distributed species, ranging throughout most of the United States and from Atlantic to Pacific, the West Indies, and Central America, and on account of its abundance in grass land and cane fields, it may be considered as open to suspicion as a carrier of diseases occurring in plants upon which it feeds.

*Oliarus pinicolus* n. sp. Head narrower than pronotum. Vertex long, nearly twice as long as width between the eyes, projected distinctly before the eyes, distinctly depressed, front rather narrow, carinae distinct. Pronotum short but distinctly visible, hind border deeply angulate. Scutum has five distinct carina, the mid-lateral ones curved. Elytra with veins distinctly punctate. Female last ventral segments narrow, ovipositor long, sharp. Male genital segment long with median spine, lateral borders expanded; plates broad, flat, widening apically and strongly recurved, forming a lyrate appearance.

Color: chestnut brown, the carina paler, elytra milkyhyaline, veins with conspicuous, alternating black and white dots, discal and apical transverse veins and tips of apical veins, infuscate, stigma fuscous with a whitish vein before and a denser line internally; face brown, the lateral angles and middle of clypeal carina a little paler. Length of female to tip of elytra, 7 mm. Male, 6 mm.

Described from a long series, sixteen females and eleven males, collected in the clusters of pine needles on the Cuban Pine at Herradura, Cuba, March 15 and 16, 1925. This species was taken in association with *Cyrpoptus*, *Agallia* and *Scaphoideus* and considering its abundance it seems likely to have an economic importance, especially if it should prove that nymphs live upon the same tree.

*Bruchomorpha* sp. Herradura Mar. 15, 16 '25. In grass land with ferns.

*Catonia rufula* n. sp. Head narrower than pronotum, vertex broad, about as long as wide, narrowed slightly toward the tip, front distinctly carinate, widening to near the clypeus; clypeus triangular carinate. Pronotum short, angulate with a distinct carina at the middle; mesonotum tricarinate; elytral veins strong, punctate, without cross veins except in the membranous portion; apical cells nine, increasing in length to inner border.

Male, last segment with distinct central spine, plates broad, somewhat pearshaped, nearly meeting posteriorly.

Color: a dark brown, somewhat suffused with rufous; vertex and front minutely dotted with whitish; clypeus pale; pronotum and mesonotum minutely dotted; elytra sub-hyaline, veins distinctly reddish, membrane clouded with fuscous, and with a conspicuous row of sub-marginal fuscous spots in the apical cells. Wings smoky iridescent. Beneath paler, legs whitish, the tips of the hind femora tinged with reddish; tarsal claws blackish. Length: Male, 4.5 mm. To tip of abdomen 3.5 mm.

Described from a single specimen beaten from clusters of pine needles at Herradura, Feb. 16, 1925.

This species appears to be nearly related to *intricata* Uhl. but differs distinctly in markings and also in size.

*Cubana tortrix* Uhl. Recorded for Cuba by Uhler. ('95)

*Cubana irrorata* Uhl. Uhler's record refers to collection by Gundlach.

*Cyarda melichari* Van D. Banes, Feb. 21, on bushes "wild tobacco," in considerable numbers, and in border of wood and on bushes along ditch at side of railroad. At Herradura on small shrubby plant at roadsides. At Hershey in mixture of small shrubs and weeds.

*Bothriocera undata* (Fab.) Baraguá (Playa) Feb. 7 and March 2, grass, at near tide level; Banes, Feb. 21, Jaronū, Feb. 24; Jatibonico, March 9.

*Bothriocera bicornis* (Fab.) Jaronū, Feb. 24.

*Myndus enotatus* Van D. Baraguá, (Playa) Feb. 7 and March 2, grass at tidal flat and vicinity; Preston, tidal flat grass near Preston; Jaronū, Feb. 24, low ground, marshy. This is a very common and abundant species in the salt marsh grasses of the coastal flats of the south Atlantic and Gulf states as well as in the West Indies. None were taken in cane fields or pastures on higher ground.

*Myndus crudus* Van D. Baraguá, Feb. 7 (Playa). Baraguá, March 2 at Playa tide level. Preston, Feb. 20, in coarse grass; Banes, Feb. 21, in coarse grass; Jaronū in coarse grass, Feb. 24; Herradura, March 15. One of the most common and widely distributed species occurring on grasses. Not taken, however, on sugar cane.

*Ciocixius dorsivittatus* Van D. Baraguá, Oct. 5, 1925 "at light" (C. F. Stahl.) Described from Florida.

*Vincentia interrupta* Uhler. A male specimen in my collection which I refer to this species has "Cuba '05" as the only record. It is smaller than a female from Barbados referred to this species but seems to agree in all essential characters.

*Phasiocephalus cubana* Myers. Baraguá, Feb. 7; Jobabo, Dec. 29 (Stahl) Parana grass, Feb. , Ermita, Feb. 17 on cane and various plants around cane fields; Preston, Feb. 19, 20; Banes, Feb. 21; Jaronū, Feb. 23, 24; Cunagua, Feb. 25; Jatibonico, March 9, 10; Herradura, March 15; Hershey, March 18.

Recorded by Bruner (1922) under *Phasiocephalus* sp. as occurring in old cane fields.

A common species at all points and frequently taken in cane but occurring in a very great variety of locations and evidently a very migratory species and deserving attention as a possible carrier of plant diseases.

*Cedusa inflata* Ball. Preston, Feb. 20; Jatibonico, March 10; Baraguá, Oct. 24 (Stahl).

*Cedusa obscura* Ball? Jaronū, Feb. 24.

*Cedusa* sp. An unidentified species from Baraguá, Oct. 19 and Nov. 10, 1925, at light (Stahl) agrees closely with *vulgaris* Fitch, but only females are represented.

*Amalopota fitchii* Van D. Rio Cauto, Aug. 23-25, taken on sugar cane.

*Cyphoceratops furcatus* Uhler. Described as from Cuba. Not seen.

*Acanalonia servillei* Spin. Recorded by Guerin and there is a specimen in the Gundlach collection.

*Acanalonia sublinea* Walk. A specimen from Holguin, Jan. 3, '05, is placed here. It was described from St. Domingo and Melichar gives his *viridis* from Haiti as the same or very near.

*Ormenis pruinosa* Say. Ermita, Feb. 17. Boriato, Nov. 29, '04. A common species in the U. S., and evidently generally distributed in Cuba as it is recorded by Melichar but it was not taken in cane-fields or where there would seem to be opportunity for association with mosaic infested plants.

*Ormenis contaminata* Uhl. Uhler described this species from St. Vincent and Melichar lists it for Cuba. Specimens I place here are rather small but otherwise agree well with the original description. It was taken quite commonly, records including Preston, Cunagua, Baraguá and Jatibonico.

*Ormenis* sp. A very small species of this genus was taken at nearly every locality especially on the native grass Pitillo. It agrees closely with the description of *elevans* Walk, which Melichar has referred to *Colpoptera* but I am not aware of the reasons for such reference.

*Flatoides punctatus* Walk. Boriato, Feb. 12, '05 and April, '15. Baraguá, March 1. On Orange tree (Batey) Central Baraguá. A specimen of what is quite certainly the nymph of this species was taken at the same time and also beaten from orange tree though possibly from a different tree. It is depressed, the vertex short, deeply emarginate for reception of the much produced pronotum which is also short and deeply excavated for anterior production of mesonotum. The wing pads short, scarcely extended over outer part of first two abdominal segments; abdomen about as long as thorax, seven visible segments, the terminal one with divergent lobes on which is a pustulate area. Pronotum, mesonotum and bases of wing pads pustulate, wing pads with marginal dots blackish. Front sub-oval as broad as long, flat. Clypeus slightly elevated with shallow median furrow, antennæ cylindrical joints about equal; seta as long as two basal joints together; legs short, minutely and faintly maculate; abdomen at tip pruinose or slightly cottony. Color, greenish gray with fuscous dots, eyes with same concentric brown lines as adult. Length, 3.2 mm. Width of pronotum nearly 2 mm., of abdomen, 15 mm. From appearance this may be 3rd or 4th instar. Melichar includes *acuta* Uhl. under this species.

*Flatoides tortrix* Guerin. A specimen in my collection of date "April, '05" is referred to this species. It is a very broad flat species and distinctly marked but is evidently rare or seldom taken. Its coloration and marking would protect it beautifully on bark or among lichens. The species also is represented in the Gundlach Collection.

*Copicerus irroratus* Schwarz. Baraguá, Feb. 6. Swept from carrots in garden; Jobabo (Stahl); Banes, Feb. 21; Jaronú, Feb. 24; Cuna-

gua, Feb. 25; Jatibonico, March 10. This is a common tropical species recorded from West Indies, Mexico and Central America but no records I have seen show it to occur in cane fields. It is more commonly taken from shrubs or localities where shrubs or woody plants occur.

*Peregrinus maidis* Ashm. Baraguá Feb. 6 in and near garden; Jobabo, Feb. 9. On potato near corn; Banes, Feb. 21, on Mexican grass; Herradura, March 15. This is the common species affecting corn and it has a very wide distribution, having been recorded from many of the southern states and also from Hawaii, Ceylon, South Africa, Porto Rico, etc. It is not found frequently on cane, but since it has been determined that it can transmit mosaic from corn to corn in Hawaii, it must be looked upon with suspicion.

*Peregrinus cubana* Crawf. The species was described by Crawford from specimens collected in the vicinity of Havana and I have specimens that fairly agree with his description but they may be only small specimens of *maidis*. The species is probably a grass feeder.

*Stobaera tricarinata* (Say). Jobabo, Feb. 10. Sweeping native grass near batey; Ermita, Feb. 16-17, in roadways or weeds; Preston, Feb. 19, on weeds; Banes, Feb. 21, on weeds and shrubs in thicket; Baraguá, March 2, on weeds. Some of the specimens secured were paler and smaller than the usual forms for the northern states and may constitute varieties but Crawford has grouped all such varieties under this species and they may be so indicated at least for the present. They do not appear to have any importance in canefields.

*Stenocranus sacharivora* Westw. Baraguá, Feb. 5, 7, March 2—Sabana Jobabo, March 9, 10, 11, on grasses and cane. Found also in pastures three or four kilometers from cane field on land never in cane; Ermita, in cane; Preston, in cane and grass; Banes, in cane and grass; Jaronū, in cane Feb. 24, also in grass; Cunagua, in cane and Feb. 25, also in grass; Jatibonico, March 10, 11; Herradura, March 14; Hershey, March 18. This is the common West Indian cane leaf hopper which has a wide distribution throughout tropical America, occurring in southern United States as well as in Central America and in the West Indian Islands. It is at times quite a serious pest upon cane but so far has not been demonstrated to carry the mosaic of sugar cane and grasses. It has been taken very commonly on grasses and sometimes at considerable distances, several miles, from cane fields which indicates that it has periods of quite general flight and may feed upon a variety of grasses. I have no records of its being found in the nymphal states on anything except sugar cane.

*Stenocranus rostrifons* Crawf. Cunagua, Feb. 25, on bunch grass near R. R.; Baraguá, March 2, on bunch grass; Paso Real (Hine 1924) apparently abundant on a single species of grass but not taken from any other plant. Probably does not fly so freely as *sacharivora*. This species is peculiar in the bent or flaring condition of the fore wings.

*Stenocranus vittatus* Stål. Jaronū, Feb. 24, on grass or sedge in low ground, common in Florida and Central America but not taken



commonly during my stay in Cuba. Probably not of particular importance in connection with the mosaic disease, at least for sugar cane.

*Sogata aurantii* (Crawf.) (*Stenocranus hinei* Dozier). Baraguá, Nov. 10, '25, "at light" (C. F. Stahl). Dozier's description was from specimens taken in Guatemala. The food plant is not known.

*Sogata parvula* n. sp. Head about as wide as pronotum, vertex short, scarcely longer than wide, carinæ rather blunt; front scarcely narrowed between the eyes, median carinæ distinct; lateral carinæ rather thin; pronotum nearly as long as vertex, lateral carinæ slightly curved and reaching hind border; scutellum with carinæ distinct; elytra much longer than abdomen; female plates broad.

Color: light brown, a distinct white stripe on vertex, pronotum and scutellum, and a lateral whitish stripe outside the carinæ on pronotum and scutellum. Margin of clavus white. Elytra with a smoky stripe, more intense on the membrane, the veins of which are terminated with fuscous spots; costal half of elytra whitish hyaline; face pale, unmarked; antennæ pale brownish, legs whitish; tips of tarsal claws brownish. Length: female 3.5 mm.

Described from one specimen collected on grass or sedge at Jaronū, Feb. 24, 1925. This agrees pretty closely with *S. aurantii*, but is smaller and lacks the black lines of the face.

*Sogata cubana* (Crawf.) Described from Havana specimens.

*Euidella magnistylus* (Crawf.) Credited to Cuba by Muir.

*Eurysa dorsilinea* (Van D.) Baraguá "at light." (C. F. Stahl).

*Chloriona slossoni* (Ball.) Baraguá Nov. 12, "at light" (C. F. Stahl.)

*Delphacodes erectus* var. *nigripennis* (Crawf.) Jobabo, Feb. 10, 12 and 13, on the native grass "pitillo" or in mixed grasses where this grass was present. The species occurred in rather small numbers and always where the pitillo was an element in the vegetation.

*Delphacodes cultus* (Van D.)? Herradura, March 15; Hershey, March 18, specimens are referred here with doubt as Mr. Muir seems to consider the species of doubtful validity.

*Delphacodes havanæ* Muir. Havana, (Muir.)

*Delphacodes 4-spinosa* Muir, Havana.

*Delphacodes pellucida* (Fabr.) Listed by Crawford and specimens referred here taken at Baraguá.

*Delphacodes havanensis* (Crawf.) The type locality is Havana.

*Delphacodes cayamensis* (Crawf.) Described from Cuba.

*Delphacodes propinqua* (Fieber). Muir includes under this species *terminalis* Van D., *tuckeri* Van Duzee and *erectus* (in part.) I took what I referred to *terminalis* at Jobabo, Feb. 13; Ermita, Feb. 16; and Baraguá, Feb. 5; Preston, Feb. 20 "on Playa." *Tuckeri* as I placed it by comparison with specimen determined by Van Duzee was taken at Ermita, Feb. 16 and by Prof. Hine at Paso Real and Aquaducto in April, 1924.

*Delphacodes puella* (Van D.) Jobabo, Feb. 10, native grass "Pitillo;" Ermita, Feb. 16. This is a very small species common over a large part of the United States and ranging to the West Indies and into Central America, and probably of some importance in connection with grasses but not taken on cane, and probably not of special importance as a possible carrier of disease.

*Delphacodes andromeda* (Van D.) Jobabo, Feb. 10; Ermita, Feb. 16; Banes, Feb. 21; Jaronū, Feb. 23; Cunagua, Feb. 25; Jatibonico, March 10; Herradura, March 14, 15. This species has been taken at a number of locations in some places occurring in very large numbers, particularly on low growing grasses, *Paspalum*. On account of its abundance and wide distribution it might have a relation to the mosaic disease.

*Delphacodes teapæ* (Fowl.) Jobabo, Feb. 19, 20; Banes, Feb. 21; Jaronū, Feb. 23, 24; Cunagua, Feb. 25; Jatibonico, March 10; Herradura, March 14, 15. Like the preceding species, this has a very wide distribution occurring through Southern United States, Central America, and the West Indies, and is especially abundant upon various species of grasses. Of the minute hoppers this species would perhaps have the most significance as a possible carrier of mosaic. However, no evidence of this has been brought to light as yet.

*Delphacodes albolineosa* (Fowl.) Jobabo, Feb. 10; Preston, Feb. 24. This is another small species of subtropical distribution, occurring in Central America and the West Indies commonly, and sometimes abundant in grasses but is not as general or abundant as *teapæ*, though apparently quite similar in habits.

#### MEMBRACIDÆ

But few members of this family were taken in locations adjacent to cane and probably none are to be considered important in relation to sugar culture.

*Micrutalis calva* Say. A common species in the U. S. and doubtless an abundant species in Cuba in proper season. It was taken at Ermita, Feb. 16th. Metcalf and Bruner record it for Santiago de las Vegas, Camaguey, Macanillo and Pico Turquino.

*Stictocephala rotundata* Stål. Taken at all points where I collected and evidently a common and abundant species throughout the island. Not associated with cane.

*Monobelus flavidus* Fairm. Collected at Banes, Feb. 21, '26. Metcalf and Bruner record it from Santiago de las Vegas, Nagua, Taco Taco and Candelero.

*Idioderma picta*, n. sp. A small species with distinct picture on pronotum. Head broad, face short, slightly rugose; clypeus small, elevated on center. Pronotum broad, with a faint carina, reaching nearly to tip of elytra. Elytra hyaline not coriaceous except at base of clavus, which is punctate. Pale yellowish green, the pronotum with a brown picture broad anteriorly with scattered yellowish dots.

a lunate band posteriorly touching margin each side and a few irregular splashes near apex. Beneath greenish yellow. Length 3.5 mm.

This very small species is decidedly distinct from any species I have ever seen.

Described from one male taken at Baraguá, Feb. 5, 1925. It differs from *varia* in being much smaller and in the color pattern.

The following additional species are included in the list by Metcalf and Bruner:\*

- *Brachytalis fuscus* M. & B. Pico Turquino, Sierra Maestra.
- Brachytalis fuscoalis* M. & B. Sierra Maestra.
- Idioderma virescens* Van F. Santiago de las Vegas and Bolondron.
- Idioderma varia* Van D. Santiago de las Vegas.
- Enchotypa fairmairii* Guerin. Havana, Santiago de las Vegas and Camaguey.
- Enchotypa cocinna* Fowler. Santiago de las Vegas.
- Orthobelus havanensis* Fairm. Nagua and Camaguey.
- Orthobelus poeyi* Fairm. Hoya, Colorado.
- *Goniolomus tricorniger*, Stål. Camaguey.
- Nessorhinus gracilis*, n. sp. M. & B. Camaguey. July.
- Monobelus fasciatus* Fabricius. Pico Turquino and Sierra Maestra.
- Monobelus lateralis* Stål. "Cuba." Camaguey and Bolondron.
- Monobelus turquinensis* M. & B. Pico Turquino.
- Monobelus niger* M. & B. Camaguey and Taco Taco.
- Monobelus irroratus* M. & B.
- Brachycentrotus punctatus* M. & B.
- Brachycentrotus hirsutus* M. & B.
- Tolania punctata* M. & B.

#### CERCOPIDÆ.

• *Tomaspis bicincta*—(Say.) Var. *fraterna* Uhl. Banes—1924—on sugar cane (E. W. Russell Coll.), Preston, No. 48, in grass near cane; Banes; Jaronū, Feb. 24, low ground; Cunagua, —? Herradura, March 15. This is a very common insect for southern United States and the West Indies. Its occurrence in cane fields has been noted frequently enough so that it may be considered an important species. It occurs in grasses and probably feeds rather promiscuously upon different members of the grass family and considering its size and general distribution it would seem to be a suitable subject for careful observation in connection with the studies of mosaic carriers.

\* Membracidae of Cuba. Bulletin, Brooklyn Entom. Soc., Dec., 1925, Vol. XX, pp. 203-214.

*Lepyronia angulifera* Uhl. Jobabo, Feb. 10, 11—on various plants "pitillo;" Banes, Feb. 21, very abundant in pasture with pitillo?; Jaronū; ?; Baraguá, March 2, Sabana; Jatibonico, March 14. The species is common to a large portion of sub-tropical America, but especially abundant in Cuba where it is found on a variety of grasses, particularly in tracts of grass land containing the common native grass, pitillo. No records have been made of its occurrence on sugar cane.

*Clastoptera stolidus* Uhl. Jaronū, Feb. 24th, low ground. Baragua. The species was described many years ago by Uhler from specimens which he received from Poey. Our specimens agree very perfectly with the description so I think there can be no question as to their identity. The species was taken only in swampy ground upon low bushes and probably does not occur on plants closely related to cane.

*Clastoptera undulata* Uhl. Described from Cuba. Not seen.

The following species have been described as new by Metcalf and Bruner in their recent paper (1925) on the Cercopidæ of Cuba.

*Monecphora flavifascia* M. & B. Perico, Matanzas.

*Leocomia grisea* M. & B. Sierra Maestra.

*Leocomia balloui* M. & B. Pico Turquino.

*Leocomia nagua* M. & B. Nagua, Oriente.

*Leocomia maestralis* M. & B. Sierra Maestra.

*Leocomia pileæ* M. & B. Pico Turquino.

*Leocomia fulva* M. & B. Pico Turquino.

*Enocomia maestralis* M. & B. Sierra Maestra and Pico Turquino.

*Dasyoptera variegata* M. & B. Pico Turquino.

*Lepyronia robusta* M. & B. Santiago de las Vegas and Manzanillo.

*Clastoptera flavidorsa* M. & B. Sierra Maestra.

*Clastoptera cuba* M. & B. Palma Mocha Mt., Sierra Maestra.

Mr. J. G. Myers (1926) in a recent paper entitled "Dry Season Studies of Cane Homoptera at Soledad, Cuba," has discussed the following species:

*Kolla similis*, *Draculacephala minor*, *Oliarus franciscanus*, *Myndus crudus*, *Saccharodysne saccharivora*, *Peregrinus maidis*, *Phasiocephalus cubanus*, *Aphis maidis*, *Sipha flava*, *Pseudococcus sacchari*, *Ripersia* n. sp., *Targioni sacchari*.

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## EXPLANATION OF PLATES

## PLATE XXX

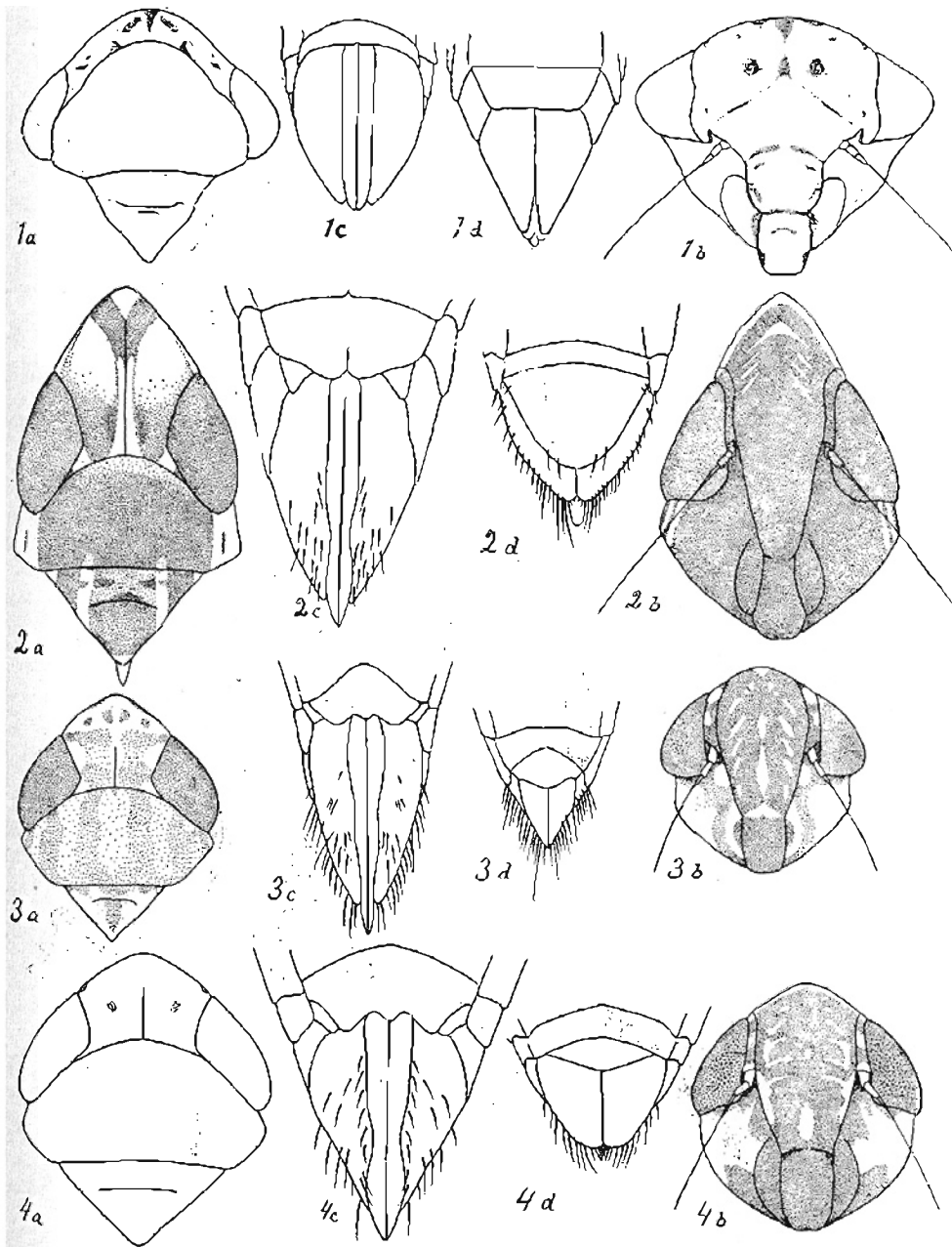
- Fig. 1. *Agallia maculata* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female; *d*, male genitalia.
- Fig. 2. *Platymetopius limbatus* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female; *d*, male genitalia.
- Fig. 3. *Deltocephalus lunatus* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female; *d*, male, genitalia.
- Fig. 4. *Deltocephalus flaveolus* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female, *d*, male, genitalia.

(From drawings by D. G. Hall).

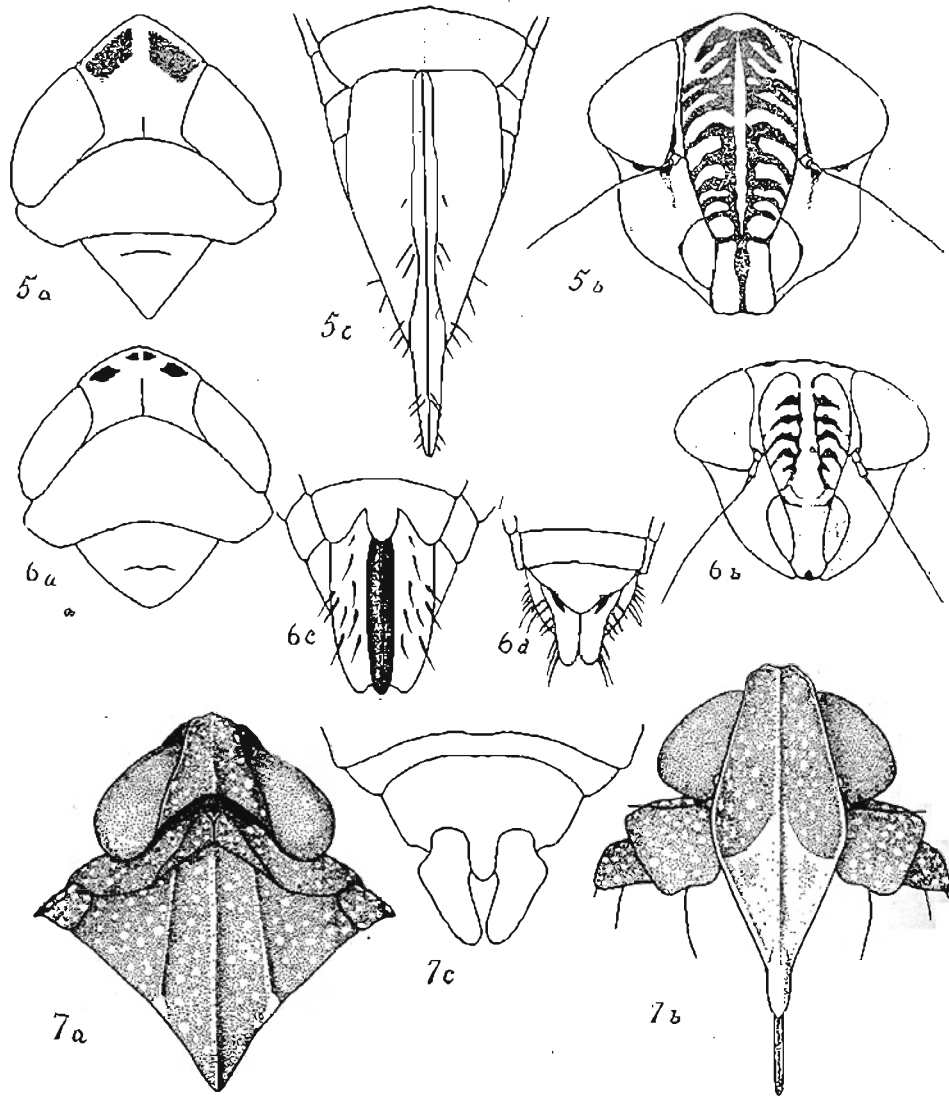
## PLATE XXXI

- Fig. 5. *Euscelis caudatus* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female genitalia.
- Fig. 6. *Thamnotettix cubanus* n. sp. *a*, vertex and pronotum; *b*, face; *c*, female, *d*, male, genitalia.
- Fig. 7. *Catonia rufula* n. sp. *a*, vertex and pronotum; *b*, face; *c*, male genitalia.

(From drawings by D. G. Hall).



Herbert Osborn



*Herberti Osborni*