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Insects of Porto Rico and the Virgin Islands

Homoptera (excepting the Sternorhynchi)—*Herbert Osborn*

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INSECTS OF PORTO RICO AND THE VIRGIN ISLANDS

HOMOPTERA (EXCLUSIVE OF STERNORHYNCHI)

BY HERBERT OSBORN

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INTRODUCTION

FIELD WORK AND COLLECTIONS MADE

During the winter of 1929 I had the opportunity to spend a couple of months in Porto Rico and to collect at many favorable locations. Naturally, I became much interested in the homopterous fauna and I was assisted in many ways by residents of the island, who will be men-

tioned later. The results of the rather brief survey were published by the Insular Experiment Station, which had helped in the survey, but a more detailed, systematic and descriptive treatment seems desirable and the invitation to prepare a paper for the Scientific Survey was welcome.

To quote from my previous paper: "The notes published in 1929 were based mainly on collections made during a brief visit to Porto Rico in the winter of 1929. Previous records in the group have been made by Van Dine, Smyth, Wolcott, Muir, Dozier and others, but all up to 1923 have been enumerated in Wolcott's Insectæ Portoricensis (1923)."

The larger part of my time, from January 7 to March 20, was spent on the south shore of the island at Aguirre, where my son, Herbert T., lived, and where I had the advantage of assistance and courtesies from officers of the Aguirre Sugar Company. The period from February 5 to 14 was devoted to the north side, where the kind cooperation of the Department of Agriculture and the Insular Experiment Station enabled me to visit many localities along the north shore and some of those of the interior.

While the abundance of the Homoptera was evidently greatly reduced by the severe hurricane of September, 1928, I was able to secure specimens from many points and to add a number of species to the known fauna of the island, and some species which appear to be new to science.

It was impracticable to make trips to the higher mountain peaks but collections were obtained at various elevations up to 2000 feet. The larger number, however, were taken near sea level and in regions largely under cultivation. Collections from the various important crop plants —sugar cane, coffee, tobacco, sweet potatoes, beans, etc.—were made as complete as practicable.

Collections on strictly native plants were confined largely to the beaches, playas, salt flats and former marsh lands adjacent to the coast and still occupied by a considerable element of the endemic flora.

Repeated rains, especially when in the mountains, and high winds, almost every day in the field, interfered in some degree with rapidity of work, although the winds undoubtedly offset the discomforts of tropical sun and the attacks of mosquitoes and gnats, which must be endured in the habitats most promising for interesting captures.

Acknowledgments

Frequent use was made of the valuable "Insectæ Portoricensis" by Wolcott (1923) and the "Ecological Survey of the Flora of Porto Rico" by Cook and Gleason (1928), the former as a guide to the known fauna

and the latter especially for location of desirable collecting grounds and recognition of unfamiliar plants.

I wish to express my obligation to the former Commissioner of Agriculture, Dr. Carlos E. Chardon, to Director R. Fernandez-Garcia, Dr. Mel T. Cook and Mr. Francisco Sein, of the Insular Experiment Station, for generous assistance in visiting a number of localities on the north side of the island, and to the officers of the Aguirre and Guanica Sugar Companies for many courtesies. The help of my son, Herbert T., was of great service in finding suitable collecting localities in the southern part.

Dr. N. L. Britton, who has encouraged the preparation of this report, took occasion to assist in collecting and was also very kind in giving identifications of certain plants that were hosts for some of the species of leafhoppers; and the Ohio State University generously granted some assistance in the expenses involved in the collecting. Specimens from The American Museum of Natural History and from Dr. M. D. Leonard have added to the records available. I have also been favored with opportunity to examine specimens in the National Museum, including a number of the Uhler types, and also Walker types in the Natural History Museum in London through the kindness of officials in charge of these collections. Several species thought to be undescribed have been turned over to me from the National Museum and Cornell University collections.

Sources of Homopterous Fauna

The source of the homopterous fauna of the island is a most interesting problem and was touched upon in my previous article, some paragraphs of which may be quoted, or presented in modified form. If we compare the homopterous fauna of Porto Rico with that of San Domingo, Jamaica or Cuba, we are struck with the much smaller number of species, and the question naturally arises as to the reason for such a paucity.

Wolcott lists 39 Cicadellidæ and 33 other species of Homoptera (total 72) for Porto Rico, which includes the records made at the Insular Experiment Station through a number of years as well as such scattered records as have appeared in the numerous papers on Porto Rican insects up to the date of his publication. While such collections were mostly made by persons not specialists in Homoptera, still they must represent fairly well the occurrence of all but the rarer forms.

Van Duzee (1907) has enumerated 102 species taken in Jamaica during a rather brief collecting trip on that island and the list would doubtless be increased if all records of species were added. Osborn

(1926) listed 180 species in Cuba on the basis of collections made in February and March, with additions of other records for that island.

There is no detailed list for San Domingo and Haiti so far as I have noted but, notwithstanding the scattered records from that island, I am confident the numbers must far exceed those known from Porto Rico.

Some of the more striking occurrences for most of the Greater Antilles are *Agallia albidula, Cicadella similis, sirena* and *occatoria; Kolla fasciata; Carneocephala sagittifera; Xerophlœa viridis; Spangbergiella vulnerata, Sanctanus fasciatus; Deltocephalus flavicosta, sonorus* and *balli; Exitianus* (*Euscelis*) *obscurinervis; Acinopterus angulatus* (*acuminatus*); *Thamnotettix colonus, comatus* and *nigrifrons; Cicadula 6-notata; Nesosteles neglectus; Protalebra braziliensis* and *similis.* All of these have a very wide distribution in the Neotropics and many of them have been seen as far north as the Gulf States and some of them even extend to the northern United States or Canada.

The species common to Porto Rico and South America are *Agallia sticticollis, Cicadella similis, Deltocephalus flavicosta, Exitianus* (*Euscelis*) *obscurinervis, Thamnotettix colonus* and *comatus, Protalebra braziliensis, Empoasca fabæ* and *Empoasca flavescens.* Of the immense number of Cicadellinæ, embracing hundreds of species, and the great aggregations of species of Cicadidæ, Membracidæ, Cercopidæ and Fulgoridæ known from South America, Porto Rico has almost none; an exception are the Delphacidæ, which are represented by a number of species and some of these species by hosts of individuals.

The species common to Porto Rico and Central America are *Cicadella similis; Kolla fasciata; Xerophlœa viridis; Spangbergiella vulnerata; Sanctanus fasciatus; Deltocephalus flavicosta; Exitianus* (*Euscelis*) *obscurinervis; Thamnotettix colonus* and *comatus; Nesosteles neglectus; Dikranera marginella; Protalebra similis* and *braziliensis.*

The species now credited to Porto Rico and not known from any other region number 40, including the species described as new. It seems evident that there are fewer species common to Porto Rico and South America than there are species common to Porto Rico and Central America and many less than are common to Porto Rico and other islands of the Greater Antilles or even to Porto Rico and Florida.

Of the species common throughout the tropics most could have been distributed by human agencies, as the insects live on cultivated crops, or grasses used for pasturage, such as Para, St. Augustine, Bermuda and Guinea grasses. Scarcely any of the endemic species seem to have any affinity with or indication of derivation from South America.

It may be noted that the principal winds and particularly the tropical storms and hurricanes, as well as regular trade winds, travel from east to west, and, so far as wind agency is concerned, and also probably surface currents bearing drift material on the water, the direction of dispersal would be from east to west. That is, Porto Rican insects might conceivably be carried to Santo Domingo or other islands to the west but there would be much less probability of a return distribution. Porto Rico as related to the great expanse of the ocean is but a dot on the map, and the probabilities of an insect reaching the island by natural agencies in such numbers as to stand a chance of establishment would be quite remote.

Another phase of wind agency may be the possible depletion or even extinction of rarer species in Porto Rico by the devastating hurricanes which sweep the island and strip the vegetation of bloom, leaves and even twigs or branches, while larger trees may be felled and killed. Such destruction must sweep away or destroy insects dependent upon particular host plants. Storms of devastating fury have swept large areas, practically the whole island, and such a storm as occurred in September, 1928, must have a tremendous effect on the leafhopper fauna, especially those species living on trees and shrubs. Species living on grasses or low herbage probably have a better chance of survival, although I am told that large expanses of grass land were so damaged that they appeared as if ravaged by fire. The common *C. similis* was taken by my son in large numbers at Guanico in November (9th). These tropical hurricanes may have occurred throughout the entire insular history of this faunal unit and the present day fauna may be the result of long-continued recurrences.

Another factor to be noted is the immense change in the plant life of the island, resulting from the intensive cultivation since occupation by man. It is probably less generally appreciated that this has resulted in the destruction of the native flora and, as pointed out by Cook and Gleason, a very complete substitution of cultivated plants or a reoccupation by plants of foreign derivation. It is stated that only on the highest parts of the loftiest mountains is there what can be called an approach to the primitive conditions for plant life. Practically all of the mountains have been denuded of the primitive forest and very many of them planted with crops of coffee, tobacco, bananas and other minor field or garden species; and even sugar-cane fields are in some places carried well up on the hillsides.

It may seem rash to draw conclusions from records that are manifestly fragmentary, but collections in Porto Rico have been more extended and

cover a longer period of time than for any other island of the West Indies. While few of the collectors have been specialists in Homoptera, a number have given sufficient attention to the group to justify the conclusion that the collecting is fairly representative for the more common species at least. Moreover, in my own collecting I have been able to secure examples of practically every species catalogued by Wolcott and, in addition, have added only 78 species, of which 23 appear to have been undescribed.

If, then, we are warranted in venturing any conclusion, it would be that in the long period during which Porto Rico was isolated, variously estimated as running back to Tertiary or Cretaceous time, and with early land connections probably to the west rather than to the south, there has been accession, both by immigration and by evolution or modification and adaptation, to Porto Rico's meager homopterous fauna; that the accessions by immigration include species mainly now common to the whole Neoptropic realm and that many have been brought in by the introduction of crop plants, possibly as long ago as during the migration of the aboriginal Caribs; that species developing on the island have been transported to adjacent islands and that there has been rather an unusual opportunity for the elimination of species dependent upon the foliage of particular trees and shrubs.

The discussion by Dr. W. T. M. Forbes (1930) on the affinities of the Lepidoptera and the probable sources from which they were derived seems to apply very closely to the Homoptera treated here. As with the Lepidoptera there seems much to indicate affinity with Mexican and Central American fauna. There is perhaps even greater disparity for Homoptera in comparison with Lepidoptera of South America, as strikingly shown in the Cicadidæ, Cercopidæ and Membracidæ.

Even where the endemic flora has survived, as on some of the most inaccessible or infertile of the mountain peaks, or in the gorges of some of the most precipitous mountain valleys, the remnant of isolated plants offers poor opportunity for the perpetuation of fragile insects exposed to torrential rains and devastating wind storms. We have also to take account of the host of predators—lizards, birds, spiders and predatory or parasitic insects—as well as presumptive fungous diseases, as factors in the reduction or elimination of these insects. Altogether, the Homoptera, especially leafhoppers, in Porto Rico, have had a precarious and stormy life and the existing species represent stock which by rapid multiplication or adaptation to specially favored locations or special host plants has been able to resist extinction. Even those species of wide distribution, found on cultivated plants, appear to be kept within moderate numbers,

as compared with other regions, and their economic importance is therefore modified.

Possibly, at the time of my visit, the abundance of the pasture and grass-feeding species had been much reduced by the recent hurricane, but nowhere did I find such swarms of leafhoppers as may often be observed in the United States or in other tropical localities.

It is manifest that it is a hopeless task to determine certainly the point of origin and the paths of dispersal or the means of transportation for the numerous species now scattered throughout the tropical parts of the Western Hemisphere. However alluring the problem may be as a source of speculation, its futility is too evident to warrant such discussion here. With the many changes in land connections, and in elevations and depressions, which have altered the vegetation, we can be assured that there have been extensive adaptations, migrations and extinctions in the history of such an island as Porto Rico.

Host Plants

The Homoptera are essentially plant-feeding insects and necessarily associated with such vegetation as may furnish a suitable food supply. Many species are restricted to particular host species, others to certain groups of plant hosts, while a few seem to have the ability to live on a great variety of plants. In the main certain genera of Homoptera are limited to certain genera or groups of plants, as the species of *Deltocephalus, Euscelis, Cicadula* and *Eugnathodus,* to plants of the grass family, and most of the Typhlocybinæ to woody plants. It follows that the local distribution of species is mainly dependent upon the distribution of the flora, and the ecological associations are almost entirely determined by the plant distribution.

Ecological Associations

I shall not attempt to discuss the various ecological associations of the island as a whole, as my observations have been too limited to warrant such a discussion. However, some of the associations which I have studied are so well marked that a brief discussion is in place, especially as this will include mention of the relation to some of the cultivated crops of importance on the island.

Native Associations

Among the primitive groupings within which I have worked are the coastal complexes, both of the beach and tidal flats or playas. While many of the Homoptera occurring here are by no means limited to such

association, there are some forms that are very distinctly restricted to the vegetation characteristic of this habitat.

On the sandy dunes which support a sparse growth of sea grape, *Coccolobis,* with associated plants, will be found the common *Bothriocera venosa, Ormenis pygmæa* and *marginata* while the grasses will yield occasional specimens of *Deltocephalus trilobatus* and *sonorus, Chlorotettix tethys* and *minimus* and *Typhlocybella minima.*

The mangrove association here seems quite free from Homoptera, although in Panama I have taken some peculiar species in it. But associated sedges, and especially the *Sesuvium* complex, furnish some interesting species. A creeping succulent plant, *Sesuvium portulacacastrum,* at Aguirre, was found to be swarming with *Cicadella sirena,* including many nymphs of various stages, so that it must be counted a distinct host plant, although the species is found on many different plants even up to relatively high altitudes, 1000 to 2000 feet. It supports also a remarkable rose-colored *Thamnotettix* (*T. rubicundula*), and several species of fulgorids, including *Oliarus franciscanus,* and two or three species of delphacids.

On the sedge *Fimbristylis spadicea* I took a peculiar, highly colored species of *Nesosteles* (*N. rosaceous* Osb.) which, so far as collections indicate, is limited to this particular association, though possibly occurring also on the associated *Cyperus lævigatus.*

On the beach grass, *Sporobolus virginiensa,* I captured a few specimens of the widespread, grass-feeding *Exitianus* (*Euscelis*) *obscurinervis,* and some delphacids.

In the forest association it has been more difficult to segregate species because of the intermingling of species and the limited opportunity to collect from isolated trees. The native *Cordia* is host to a striking species of *Protalebra* (*P. cordiæ* Osb.) and the Inga trees were scantily infested with *Xestocephalus maculata* Osborn.

The native grasses, growing on the hillsides, were very sparsely populated with leafhoppers, possibly the result of close cropping by cattle or goats, or of the hurricane and torrential rains of the September storm. *Deltocephalus trilobatus,* taken on a hillside above Salinas at an elevation of from 1200 to 1500 feet, is the principal member in this association but is a frequent associate in other grassy habitats.

Economic Importance

While this paper is essentially a faunistic study, it seems not out of place to mention that very many of these insects have great ability to

destroy cultivated crops and a number of the species have been credited with serious damage by serving as carriers for certain plant diseases. It is therefore of economic as well as of biologic interest to know what species occur in the region and also the probable conditions favoring their distribution and multiplication.

Taxonomy

In the following pages an attempt is made to bring together records and descriptions of all known species of Homoptera belonging to the Auchenorhyncous division in such manner as to enable students of the fauna to recognize the different forms. The Sternorhynchi, including the families Psyllidæ, Aleurodidæ, Aphidæ and Coccidæ, are not considered as the author does not feel competent, with collections at hand or time available, to attempt the treatment of these important families. A preliminary record of the species known in Porto Rico will be found in Wolcott's *Insectæ Portoricensis* (1923).

The sequence of families and genera follows pretty closely that adopted by Van Duzee in his *Catalogue of Hemiptera of North America north of Mexico*. The nomenclature agrees in general with this valuable work except where more recent publications require modification or in cases where groups of Neotropic forms are not treated in his work. In addition, the writings of Melichar, Muir, Ball, Metcalf, Myers, Giffard, Crawford, Baker and others have been freely consulted and in many cases original descriptions have been quoted in order that students who do not have the widely scattered papers dealing with the group accessible for use may come as nearly as possible to original treatments. Figures have been obtained from various sources, but all illustrations not otherwise credited have been drawn by Mrs. Celeste Taft under the author's supervision, her services having been made possible by a grant from the N. Y. Academy of Sciences. The terminology used is for the most part that in general use for insects and special terms are explained where deemed necessary. In most cases the terms applied for venation are those found in earlier descriptive work but there should be no difficulty in interpreting them as equivalents of later systems.

It may be in order to mention that the group Homoptera as here treated may be considered as a distinct order or as a group of equal rank with the Heteroptera. These two groups formerly, and also in many recent publications, are placed together in the Order Hemiptera or Rhynchota. All agree in having mouth parts fitted for suction, the Homoptera including the forms which have uniformly membranous or

coriaceous forewings (elytra) and the Heteroptera those in which the elytra are coriaceous for the basal part and membranous for the apical part.

SYSTEMATIC ACCOUNT

HOMOPTERA

Beak free from the sternum.....*Auchenorhynchi*
Beak fused to the sternum.....*Sternorhynchi*

AUCHENORHYNCHI (Group included in this paper)

Key to Families

A. Ocelli on the upper part of the head.
  B. Ocelli three in number placed near together.
    a. Hind tibiæ at tip not surrounded with a circlet of spines.
      b. Pronotum not greatly developed, not extending over the abdomen.....Cicadidæ
      bb. Pronotum greatly developed, extending over the abdomen .....Membracidæ
    aa. Hind tibiæ armed with a circlet of spines.....Cercopidæ
  BB. Ocelli two, or wanting, hind tibiæ with a double series of spines .....Cicadellidæ
AA. Ocelli and antennæ on lower part of head or under the eyes.....Fulgoridæ

Cicadidæ

Representatives of this family are very few in number and the species have been treated by Mr. W. T. Davis (1928). His article may be drawn on for records and should be consulted for detailed descriptions.

It was mentioned in my earlier account that "No cicadas were collected during my stay in Porto Rico, probably because the species occur mainly at other times of year, although Davis remarks that 'It appears likely that a cicada may be taken in Porto Rico on any day of the year.' Wolcott (13)[1] lists two species, and Davis in a later paper (2)[2] discusses these two species, one constituting a new genus and species. He remarks that since Haiti has six species known to him it may be that those for Porto Rico will be doubled in number. However, this discrepancy in number seems to agree with that in other groups and there is again a

[1] A reference to "Insectæ Portoricensis," by G. N. Wolcott, Jour. Dept. Agr. P. R., 1923, vii.

[2] A reference to "The Cicadas of Porto Rico with Descriptions of a New Genus and Species," by W. T. Davis, Jour. N. Y. Entom. Soc., 1928, xxxvi, pp. 29-34, 1 plate.

very marked difference in number of species as compared with South America, where the family is very rich in species."

Further study is evidently needed to determine exactly the cicadan fauna for the island, but, considering the large size and conspicuous character of these insects, it is doubtful whether many more species will be found. Neither of the species known seems to be abundant enough to merit economic consideration.

Proarna Stål

1864. *Proarna* Stål, Stet. Ent. Zeit., xxiv, p. 61.

Genotype, *C. hilaris* Germar.

Proarna hilaris (Germar)

1834. ***Cicada hilaris*** **Germar, in Silb. Rev. Ent., ii, pp. 69.**
1864. ***Proarna hilaris*** **Stål, Stet. Ent. Zeit., xxiv, p. 61.**
1928. ***Proarna hilaris*** **Davis, Jour. N. Y. Ent. Soc., xxxvi, p. 30.**

FIG. 1.—*Proarna hilaris* (Ger.)
Male genitalia (After Davis)

A small species, mostly light gray in color, and the wings but sparsely maculate. (Fig. from Davis).

Apparently this is the most abundant species, since numerous records are given by Wolcott, and others by Davis, who remarks that it seems to be most common from October to May.

Borencona Davis

1928. *Borencona* Davis, Journal N. Y. Ent. Soc., xxxvi, p. 31.

Genotype, *B. aguadilla* Davis.

Borencona aguadilla Davis

1928. ***Borencona aguadilla*** **Davis, Jour. N. Y. Ent. Soc., xxxvi, pp. 31-33.**
1929. ***Borencona aguadilla*** **Osborn, Jour. Dept. Agr. P. R., xiii, p. 90.**

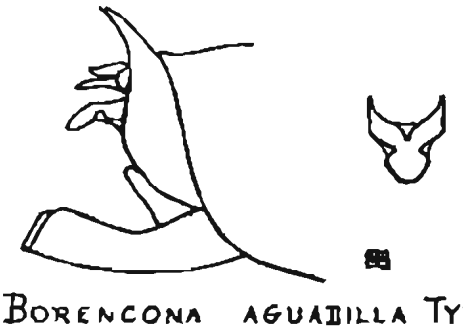

FIG. 2.—*Borencona aguadilla* Davis
Male genitalia (After Davis)

This is a large species and the color is "brown greenish about the tympana and the margins of the pronotum, with a narrow and irregular darker dorsal stripe extending from the front of the head to the hind margin of the pronotum or collar." (Davis).

Length of body, male 22 mm., female 21 mm. Expanse of wings, male 56 mm., female 61 mm.

This was listed as *Zamnara* sp. by Wolcott, and Davis records his type specimens, now in American Museum of Natural History, as from Yauco.

MEMBRACIDÆ

The family of tree hoppers, like the Cicadidæ and Cercopidæ, are very poorly represented in Porto Rico. The species are known by the greatly developed pronotum, which usually overhangs the head and extends backward to or beyond the tip of the abdomen.

KEY TO PORTO RICAN GENERA

Pronotum not produced far beyond head.....*Monobelus*
Pronotum produced far beyond head.....*Nessorhinus*

Monobelus Stål

1866. *Monobelus* Stål, Analect. Hem., p. 368.

Genotype, *Membracis fasciatus* Fab.

Monobelus fasciatus (Fabricius)

1798. *Membracis fasciatus* Fabricius, Ent. Syst. Suppl., pp. 515-13.
1866. *Monobelus fasciatus* Stål, Analect Hem., p. 368.
1923. *Monobelus fasciatus* Wolcott, Jour. Dept. Ag. P. R., vii, p. 257.
1929. *Monobelus fasciatus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 90.

This is a small robust species with the pronotum extending slightly over the head and covering only the inner border of the elytra with margin of pronotum yellow.

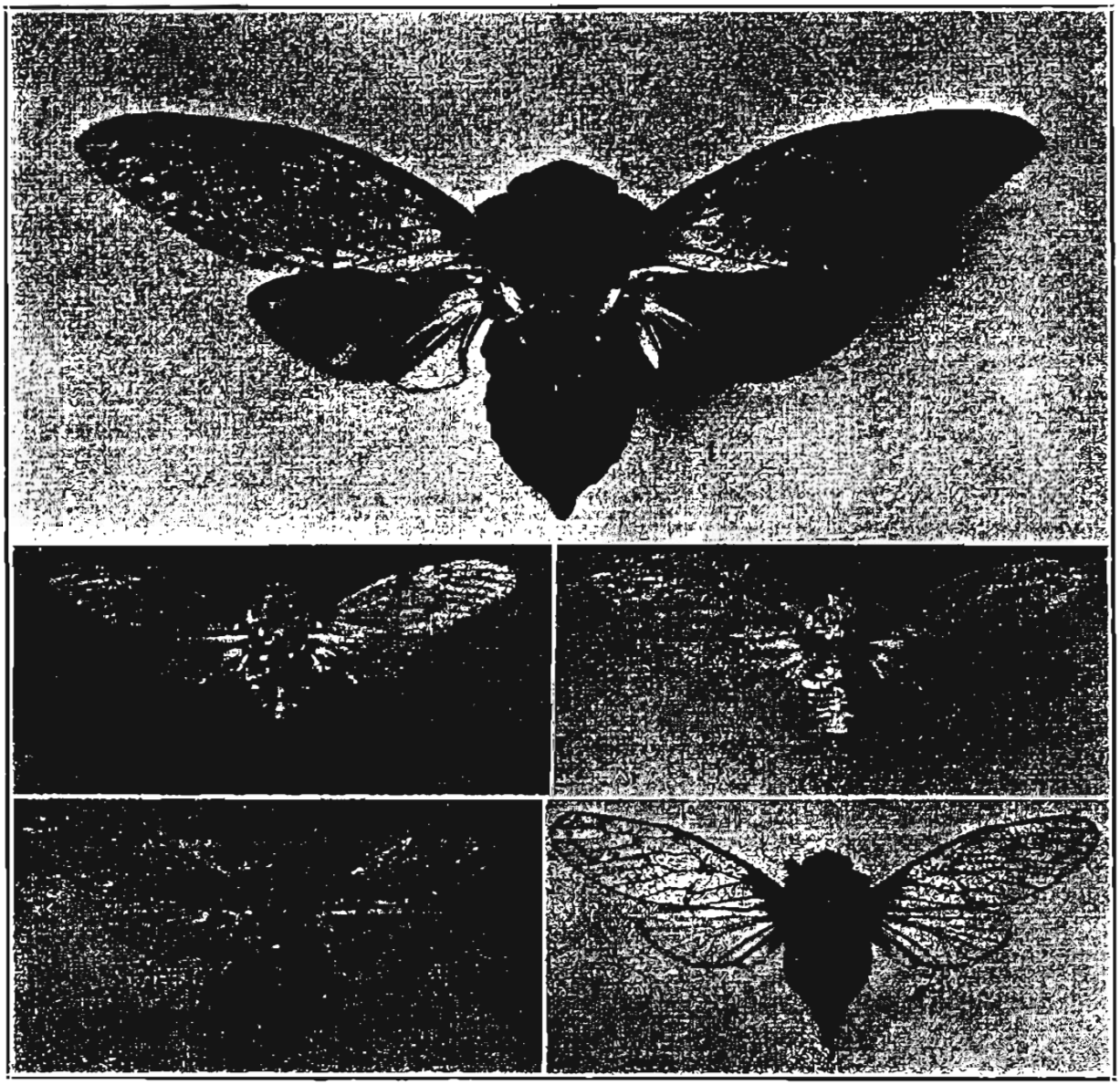

FIG. 3.—*Proarna hilaris* (2 & 3)

Borencona aguadilla (4 & 5) (After Davis)

The figure (1) of *Juanaria poeyi* included on this plate represents a West Indian species not found in Porto Rico.

It has been recorded generally from the West Indies, and Wolcott lists it as occurring on coffee and several other host plants.

Nessorhinus Amyot et Serville

1843. *Nessorhinus* Amyot et Serville, Hemiptères, p. 542.

Genotype, *N. vulpes* Amyot et Serville.

Key to Porto Rican Species

1. Produced pronotum upcurved at tip (Fig. 6) ..... *vulpes*
   Produced pronotum not or scarcely upturned 2
2. Without distinct elevated crest on pronotum (Fig. 4) ..... *gibberulus*
   With distinct elevated crest on pronotum (Fig. 5) ..... *graciloides*

Nessorhinus gibberulus Stål

1869. *Nessorhinus gibberulus* Stål, Bid. Memb. Kan., p. 294.
1927. *Nessorhinus gibberulus* Funkhouser, Gen. Cat. Hem. Fasc. Memb., p. 150.
1931. *Nessorhinus gibberulus* Dozier, Am. Mus. Novitates, No. 510, p. 3.

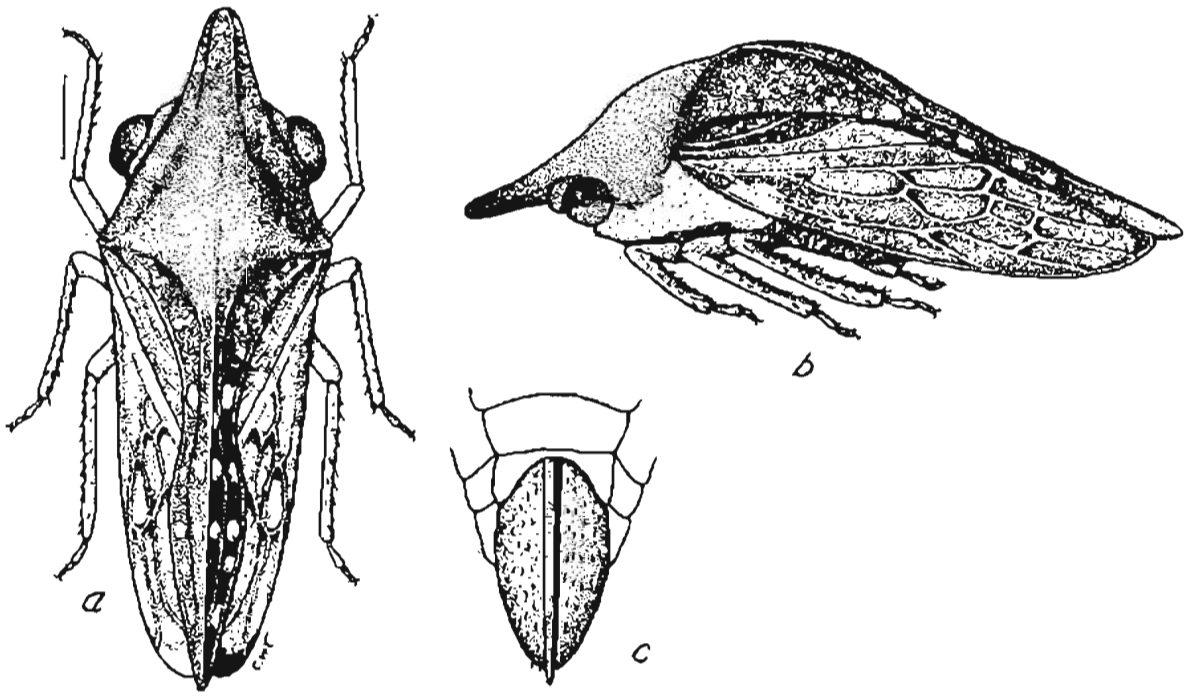

Fig. 4.—*Nessorhinus gibberulus* Stål

a, dorsal view, *b*, lateral view, *c*, genitalia female (Original)

According to Dozier this is the most common species of the genus in Porto Rico, and records of *Antianthe expansa* Germar in Wolcott's "Insectæ Portoricensis" should be referred to this species.

The anterior process of head is not curved dorsally and there is but little elevation of the dorsal crest on the pronotum. In our specimens

there is a series of whitish spots bordering the carina of the posterior process of the pronotum.

Stål's description was based on a female. "Long. 7, Lat. 2½ mill.- Portorico."

One specimen received from Dr. W. T. M. Forbes, labeled "Dorado, P. R., Mar. 20, 1930. Cornell University, Lot 795, Sub. 1." In this specimen the yellowish white stripe on the posterior process is broken. The two specimens taken at Lares are both females, and Dozier's *graciloides* is described from a single male. If the high angular crest shown in Dozier's figure should prove to be a secondary sexual character, the two forms may be one species, in which case *graciloides* would become a synonym.

Nessorhinus graciloides Dozier

1931. *Nessorhinus graciloides* Dozier, Am. Mus. Novitates, No. 510, p. 3.

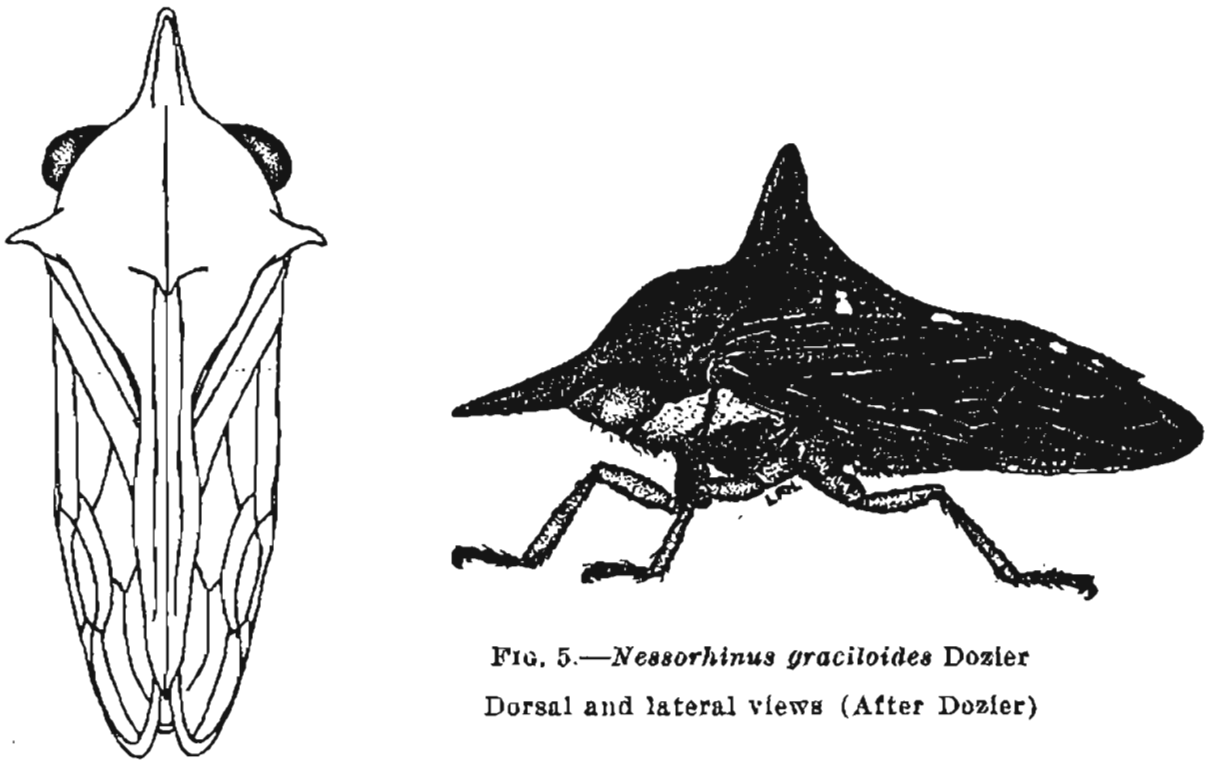

FIG. 5.—*Nessorhinus graciloides* Dozier
Dorsal and lateral views (After Dozier)

The figure reproduced from Dozier will suffice to show the characters of this form, and comparison with the figure of the female *gibberulus* will enable the reader to recognize the close agreement of the two. Length 7 mm.

Nessorhinus vulpes Amyot et Serville

1843. *Nessorhinus vulpes* Amyot et Serville, Hemiptères, p. 542.
1929. *Nessorhinus vulpes* Osborn, Jour. Dept. Agr. P. R., xiii, p. 90.

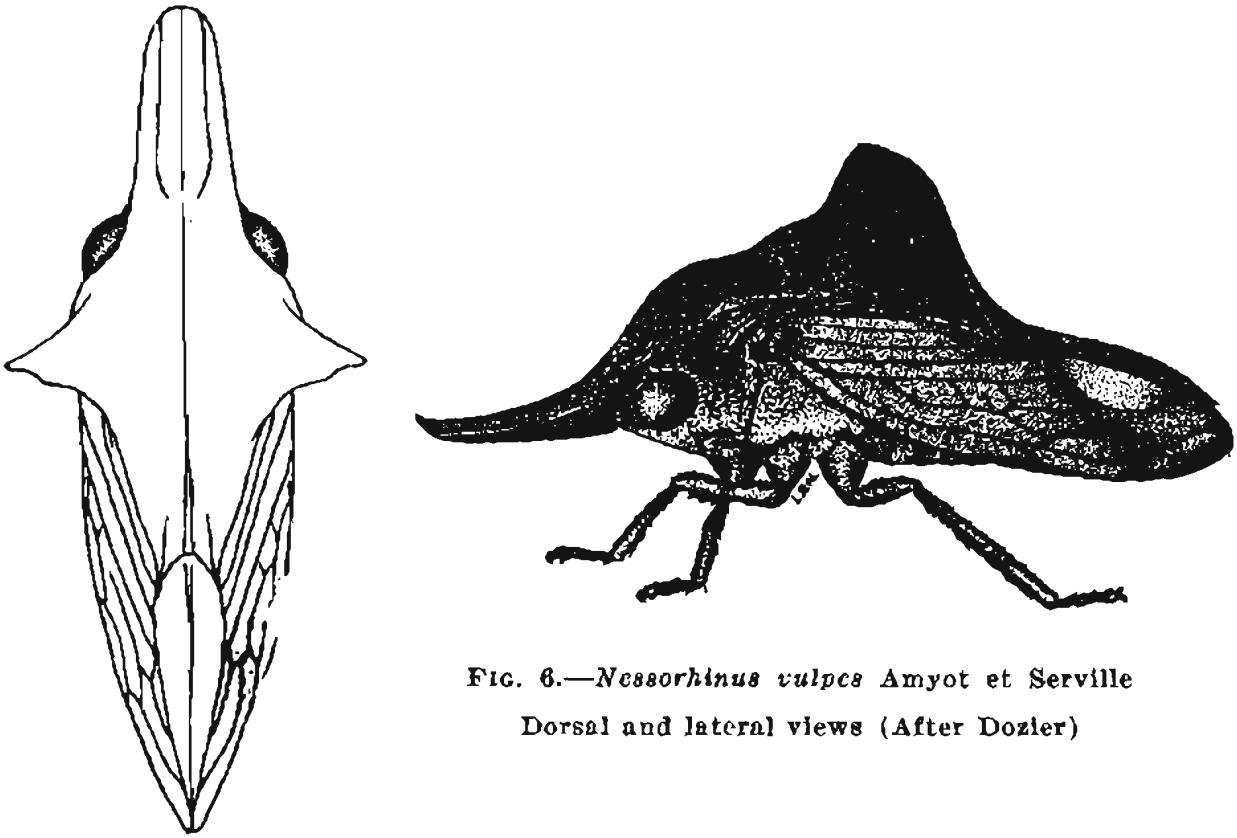

FIG. 6.—*Nessorhinus vulpes* Amyot et Serville
Dorsal and lateral views (After Dozier)

My record for this species was based on a specimen labelled "Mayagüez" in the National Museum and determined by Dr. Funkhouser, which I took to be the same as my specimen. The Museum specimen, however, lacks the white hairy patches on the sides of the posterior process, but has the wide, white stripe on the side of the prothorax. Also, the anterior process of the head is curved upward. Another specimen in the National Museum is labelled Bayamon, Aug. 10, 1913.

CERCOPIDÆ

This family, the "Frog hoppers" or "Spittle insects," so familiar from the froth masses of the nymphs, although abundantly represented in the South American fauna, is very scarce in Porto Rico, only two species having been recorded. The members of the family may be recognized at once by the circlet of spines that arm the tip of the hind tibiæ.

Of the two genera so far known, *Epicranion* is distinguished by narrow, flattened form, the large head produced far beyond the eyes, the vertex obtusely angulate at tip and the scutellum elongate; and *Philœnus* by narrow, less flattened body, the vertex and pronotum not carinate, the scutellum not longer than broad.

Epicranion Fowler

1897. *Epicranion* Fowler, Biol. Cent. Am. Homop., ii, p. 197.

Genotype, *E. championi* Fowler.

Epicranion championi Fowler

1897. *Epicranion championi* Fowler, Biol. Cent. Am. Homopt., ii, p. 197.
1923. *Epicranion championi* Wolcott, Jour. Dep. Ag. P. R., vii, p. 257.
1929. *Epicranion championi* Osborn, Jour. Dep. Ag. P. R., xiii, p. 90.

"Of a unicolorous brown colour, dull above, more shining below; metopidium broadly and very shallowly excavate in the middle, with the projection of the vertex forming hollows on each side of the central portion; pronotum about twice as broad as long, very finely rugose; tegmina at the shoulders about as broad as the pronotum, slightly narrower behind, but subparallel and very little narrowed before the apex, extremely finely and closely punctured; base of the rostrum pitchy, very shining; chest pitchy; abdomen and legs testaceous.

"Long. 7 millim.; lat. max. 3 millim." (Fowler).

Wolcott has listed this as collected from coffee and from *Inga laurina,* a tree used as shade in coffee plantations. No specimens were found in my collecting in 1929, but the coffee and sugar trees had been so completely stripped by the hurricane of September, 1928, that, whatever insects were present, could have been very completely wiped out. The species was described from Panama and may have been introduced from there or other Central American localities and possibly with introductions of coffee trees.

Wolcott quotes Von Zwaluwenburg as "Fairly common (on coffee); spittle masses around a berry cluster, often contains as many as six nymphs."

Specimens received from the American Museum of Natural History may be referred here, although smaller than stated in Fowler's description. They are: "San Juan, P. R., Feb. 11–14, 1914; Aibonito, June 1–3, 1915, July 14–17, 1914; Mayagüez, P. R., July 24–29, 1914; Maricao, P. R., July 27, 1914."

Philænus Stål

1864. *Philænus* Stål, Stet. Ent. Zeit., xxv, p. 66.

Genotype, *Cercopis spumarius* (Fall.) [= *leucophthalmus* (Linn.)].

Philænus fusco-varius Stål

1864. *Philænus fusco-varius* Stål, Stet. Ent. Zeit., xxv, p. 66.
1923. *Philænus fusco-varius* Wolcott, Jour. Dep. Ag. P. R., vii, p. 257.
1929. *Philænus fusco-varius* Osborn, Jour. Dep. Ag. P. R., xiii, p. 91.

The species is gray, varied with fuscous, minutely pilose. Length about five millimeters. Wolcott records this species as occurring on weeds and mulberry.

Clastoptera Germar

1838. *Clastoptera* Germar, Zeit. f. Ent., i, p. 187.

Genotype, *C. achatina* Germar.

Clastoptera brevis Walker

This species is credited to Porto Rico by Lallemand, who makes Walker's *signifera* a synonym. A specimen from the American Museum of Natural History, "Aibonito, P. R., July 14–17, 1914," probably belongs here, although it lacks a brown band on the pronotum.

Cicadellidæ

This group includes, as now constituted, five well-marked subfamilies, their common characters being found in the tibiæ, which are usually more or less prismatic, and have, especially in the case of the hind tibiæ, two rows of spines posteriorly.

Key to Subfamilies of Cicadellidæ

A. Elytral nervures forking on the disk and with crossveins forming discal cells.
  b. Ocelli located on front distinctly below border of vertex. Bythoscopinæ
  bb. Ocelli located on the disk of the vertex.
    c. Not depressed nor flattened ..... Cicadellinæ
    cc. Bodies depressed, head more or less flattened, vertex margin thin ..... Gyponinæ
  bbb. Ocelli located on border between vertex and front, or, rarely, on vertex close to border ..... Jassinæ
AA. Elytral nervures forking at base and running without crossveins nearly to apex. Ocelli usually wanting, or inconspicuous ..... Typhlocybinæ

Porto Rico has representatives of all these subfamilies but the Cicadellinæ and Gyponinæ have very few species as compared with South or Central America.

Bythoscopinæ

This subfamily includes those genera in which the ocelli are located on the front, well below the vertex. The vertex is very short and merges without any indication of margin into the front. The heads are usually broad, often wider than the pronotum, so that the insects have a wedge-shaped appearance. Most of the species are present on woody plants and in many cases are quite strictly confined to particular species or genera, but in *Agallia* the habit is more general and the food consists of low, herbaceous plants. So far only species of the genus *Agallia* have been recorded from Porto Rico, but a species of *Idiocerus* is at hand among specimens collected by Dr. W. T. M. Forbes of Cornell University.

Agallia Lewis

1833. *Agallia* Curtis, Entom. Mag., i, p. 193.

Genotype, *A. consobrinus* Curtis (= *Jassus puncticeps* Germ.)

This genus includes a small group of usually gray or dust-colored species, which have no ledge over the antennal pits and no appendix to the elytra. The Porto Rican species are, except *pulchra,* known to occur in the West Indies generally.

Key to the Porto Rican Species

1. Pronotum not densely punctate..... 2
   Pronotum densely punctate.....*sticticollis*
2. Pronotum marked with orange.....*pulchra*
   Pronotum not marked with orange..... 3
3. Smaller, dark gray.....*pepino*
   Larger, elytral veins and clavus whitish.....*albidula*

Agallia pulchra DeLong and Wolcott

1923. *Agallia pulchra* DeLong and Wolcott, Jour. Dept. Agr., P. R., vii, p. 259.
1929. *Agallia pulchra* Osborn, Jour. Dept. Agr. P. R., xiii, p. 91.

"Light yellow. Length 3-3.5 mm. Vertex cadmium yellow, longest near sides because of dark protruding eyes; a pair of transverse black dots on or near posterior margin making it appear angled; a pair of much larger black spots in front of eyes, a smaller median spot on anterior margin and usually another median one on front. Pronotum bright orange, fading to canary yellow on posterior margin, with black anterior margin, and median line extending between a pair of large black spots, often coalesced with margin broadened behind eyes. Scutellum yellow with black depression and a pair of black spots anteriorly. Elytra black, but with venation broadly outlined in greenish-yellow on clavus, lighter on corium, almost obliterating the black near the outer margin, and entirely so between distal portions of sections of the clavus.

"Genitalia: *Female* last ventral segment longer than preceding, lateral angles produced, posterior margin concavely excavated with a narrow median incision at middle. *Male* valve short, almost concealed under last ventral segment, apex bluntly rounded. Plates rather broad at base, three times as long as last ventral segment, gradually narrowed to rather blunt tips.

"From carrots (686-17); from sugar cane at Guánica (138-21); from *Inga laurina* at Lares (164-22 TYPE); from coffee at Lares (393-21);

at Utuado (476-21), from mountains north of Yauco (305-21, 85-22)." (DeLong and Wolcott).

I took it on roadside vegetation near Cayey, January 28 and March 16, at elevations of 2000 to 2100 feet. Also at Lares, February 12, at elevations of 1200 to 1300 feet.

Agallia pepino DeLong and Wolcott

1923. *Agallia pepino* DeLong and Wolcott, Jour. Dept. Agr. P. R., vii, p. 258.
1929. *Agallia albidula* Osborn, Jour. Dept. Agr. P. R., xiii, p. 91.

"Bluish-white. Length 2.5 mm. Eyes dark brown with creamy margins. Vertex only slightly broader behind the eyes, with lenticular median piceous spot, and a pair of round piceous spots near the anterior angle of the eyes extending on to the front and an irregular-shaped pair on the posterior margin between the others. Large yellow ocelli ringed with piceous and an inverted Y with arms extending towards bases of the antennæ. Anterior margin of pronotum light chestnut, becoming broader and piceous laterally, behind the eyes; a pair of large, pear-shaped dull-yellow areas with irregular piceous margins posteriorly; a lenticular piceous median spot and indistinct brownish spots near lateral angles. Scutellum with a pair of piceous spots and the broadened ends of the piceous depression partly under the pronotum. Elytra dull brown, semi-transparent, venation dull bluish-white; a bright bluish-white semi-circle connecting the inner and outer sectors of the clavus with the median inner margin.

"Genitalia: *Female* last ventral segment rather narrow, one-half longer than preceding segment. Posterior margin rather broadly notched one-fourth the distance to base so as to form two rather broadly rounded lobes. *Male* valve short and broad, convexly rounding. Plates long and narrow, rather broad at base, abruptly constricted before their middle and produced into long narrow acute tips.

"From carpet grass, *Axonopus compressus,* at Ciales (64-21 TYPE); on sugar cane at San Sebastian (G.N.W.)." (De Long and Wolcott).

I took specimens at many different localities during January and February.

Agallia albidula Uhler

1895. *Agallia albidula* Uhler, Proc. Zool. Soc. London, p. 84.
1929. *Agallia albidula* Osborn, Jour. Dept. Agr. P. R., xiii, p. 91.

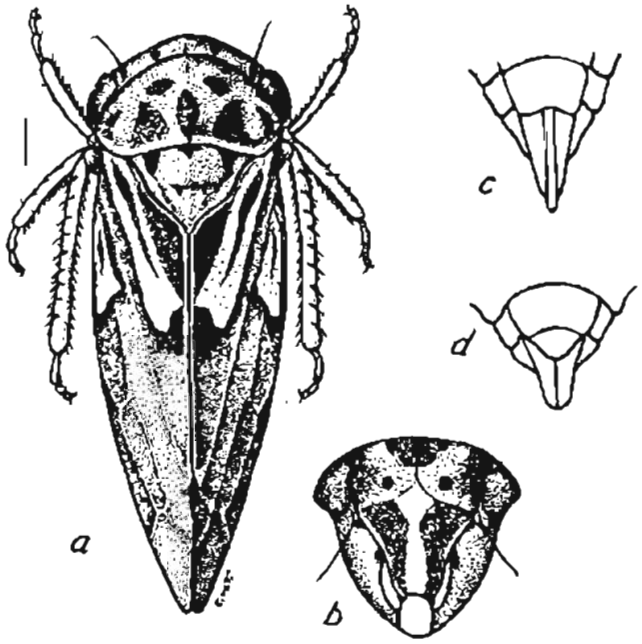

FIG. 7.—*Agallia albidula* Uhl. *a*, dorsal, *b*, face, *c*, female, *d*, male genitalia (Original)

This is one of the most abundant species and occurs very generally throughout the West Indies. It is one of the larger species of the genus. It has pale nervures and the base of clavus is pale. The figure will serve for recognition of the species.

Length 3.5–3.75 mm.

Agallia sticticollis (Stål)

1859. *Bythoscopus sticticollis* Stål, Eug. Resa., Ins. Hem., p. 291.
1923. *Agallia carrotovara* Wolcott and DeLong, Jour. Dept. Agr. P. R., vii, p. 258.
1923. *Agallia sticticollis* Osborn, Ann. Carnegie Mus., xv, p. 12.
1929. *Agallia sticticollis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 91.

"Head distinctly wider than pronotum; vertex short, strongly and subangularly rounded, as long at middle as at eye; front broad, rounded near apex to clypeus; clypeus narrow at tip, nearly elliptical; loræ broad; cheeks wide, sinuate; pronotum with hind border scarcely concave, hinder part faintly carinate and granulate; scutellum very small, granulate; elytra with usual venation. *Genitalia of male:* valve short, rounded behind; plates slender, tapering to blunt tip; about length of pygofer.

"Dull yellowish, with numerous spots and lines of black; vertex with two large roundish black spots touching hind border; a faint double median line; two oblique lines next eye; a lunate line at base of front; a number of short arcs; sutures of front and clypeus black or fuscous; pronotum yellowish, with an irregular black band near anterior border; three faint longitudinal lines and numerous granules black; scutellum

black, apical margins whitish; elytra pellucid, with blackish veins, except tips of claval veins, which are white.

"Length; 3 mm." (Osborn).

A dark species with pronotum and scutellum distinctly punctate or granulate with black.

"Taken at San Juan on Sweet Potato Feb. 8. Recorded as from carrots by Wolcott (1923). The DeLong type and the specimens I collected appear to be identical with specimens from Brazil which I have identified as *A. sticticollis* Stål. This gives it a wide range and furnishes an instance of the occurrence of a South American species in Porto Rico." (Osborn).

Idiocerus Lewis

1835. *Idiocerus* Lewis, Tr. Ent. Soc. London, i, p. 97.

Genotype, *Bythoscopus adustus* H. S.

Idiocerus parvulus, new species

Head much wider than pronotum; eyes prominent; vertex short, broadly rounded in front; front tumid; ocelli near the base; pronotum slightly longer than the vertex, slightly concave on hind border; elytra narrow, veins inconspicuous. Female, last ventral segment truncate; pygofer rather broad, equalling ovipositor in length. Male, plates rather short, nearly parallel-sided, slightly narrowed to the obtusely rounded black tips; pygofer with hind border rounded to ventral border, meeting above the plates, which therefore appear to be extruded.

Pale green, the vertex and base of front with a broad, pale orange spot partly divided on the median line, the border greenish; pronotum with faint, orange band on anterior half, the posterior half subhyaline; elytra hyaline, the inner border of clavus narrowly lined with fuscous; the disc of abdomen infuscate in some specimens, in others the fuscous area is wanting but the dorsum is more or less suffused with pale orange. Length, female 3.25 mm., male 3 mm.

Described from seven specimens, two females, five males. Female (holotype) San Germán, P. R., Apr. 17, 1930, Cornell University, Lot 795, Sub. 36; the others, one female (paratype), male (allotype) and three males (paratypes) also from San Germán, P. R., Apr. 16, 1930, Cornell University, Lot 795, Sub. 34; W. T. M. Forbes, collector. Types in Cornell University Museum. Paratype (male) in Osborn Collection.

Cicadellinæ

Of this subfamily there are few species in the Porto Rican fauna, especially as compared with the immense number of species known in South America. Cicadellinæ are distinguished by the position of the

ocelli on the disk of the vertex, a character shared with the Gyponinæ. In this group the body is usually about as deep as wide, seldom much flattened, and the head is not depressed, although the vertex may be flat and in some cases separated by an angular border from the front. The few species represented in Porto Rico are mostly included in the genus *Entogonia,* as recently defined by Melichar, but I have retained the use of the old genus *Cicadella* for the species *sirena* and *similis,* the location of which is in doubt, as they are not treated in the parts of Melichar's work now available.

KEY TO PORTO RICAN GENERA

A. Elytral cells not reticulate apically
   b. Vertex long, broadly rounded to front.....*Entogonia, Cicadella*
   bb. Vertex short, much wider than long, subangulate to border.....*Kolla*
B. Elytral cells reticulate.....*Carneocephala*

Entogonia Melichar

1927. *Entogonia* Melichar, Ann. Mus. Nat. Hungarici, xxiii, p. 360.

Genotype, *T. sagata* Sign.

Entogonia (Cicadella) coffeaphila (Dozier)

1926. *Cicadella coffeaphila* Dozier, Jour. Dept. Agr. P. R., x, p. 263.
1929. *Cicadella coffeaphila* Osborn, Jour. Dept. Agr. P. R., xiii, p. 92.
1931. *Entogonia coffeaphila* Dozier, Am. Mus. Novitates, No. 510, p. 6.

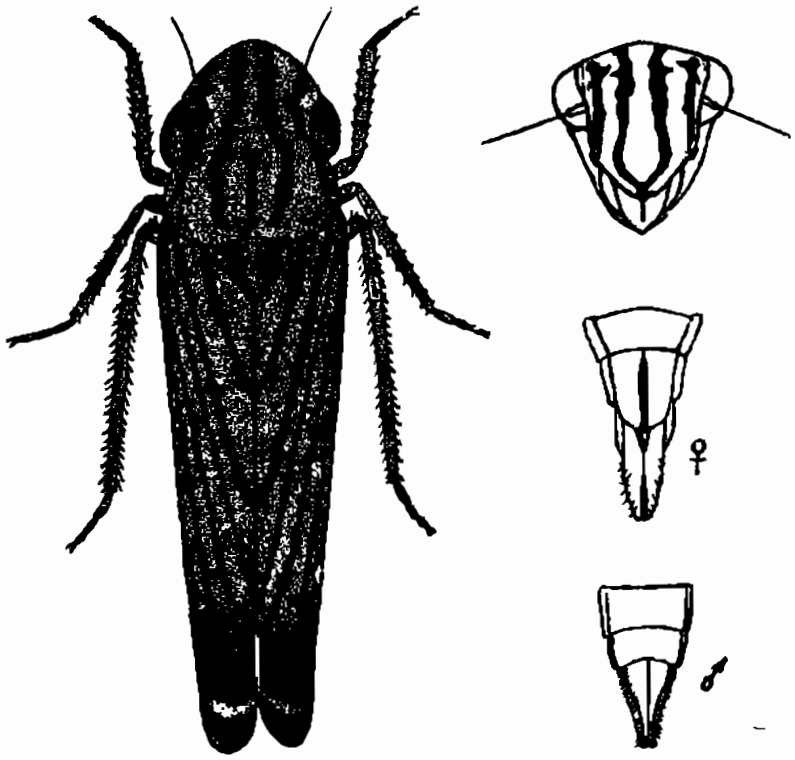

FIG. 8.—*Entogonia (Cicadella) coffeaphila* (Doz.)
Dorsal view (After Dozier)

"Vertex as long as basal width, strongly produced beyond the eyes, obtusely rounded, nearly two-thirds as long as the pronotum. Pronotum convex, about as broad at posterior margin as the head. Elytra long and narrow.

"General color greenish, the vertex, anterior third of pronotum, and scutellum partially, yellow. Vertex with four irregular more or less longitudinal stripes or vittæ that extend over onto the frons where the two median ones converge just before the apex. Pronotum with five more or less broken and irregular black vittæ. Scutellum with two rather thick black vittæ. The elytra dark green with the veins heavily marked with black, just before the apex is a crescent-shaped transverse band of yellow. Body beneath yellowish, the abdomen along middle marked longitudinally more or less with black. Male genital plates distinctly yellow contrasting with the dark pygofers. Legs pale.

"Genitalia: female segment over twice as long as the preceding, the median line elevated into a strong keel, the posterior margin strongly angled, the apex formed by the convex keel. Male ultimate segment well-rounded on posterior margin; plates broadened at base, rapidly narrowed to very long acute points that are not or scarcely exceeded by the pygofers.

"Length to tip of elytra, 6–6.25 mm." (Dozier.)

"Dr. Dozier describes this species as occurring on coffee and remarks that it was abundant at many points. No trace of the species was found on any of the coffee trees I examined and considering the almost complete defoliation of trees in all the plantations I visited I should think there would have been little chance for survival of these insects." (Osborn).

Entogonia (Cicadella) coffeacola (Dozier)

1926. *Cicadella coffeacola* Dozier, Jour. Dept. Agr. P. R., x, p. 264.
1929. *Cicadella coffeacola* Osborn, Jour. Dept. Agr. P. R., xiii, p. 92.
1931. *Entogonia coffeacola* Dozier, Am. Mus. Novitates, No. 510, p. 6.

"Very similar in general appearance with *Cicadella coffeaphila* but easily distinguished by the different markings on vertex, frons and pronotum.

"Vertex greatly produced beyond the eyes, obtusely rounded, length and width subequal, two-thirds as long as the pronotum. Pronotum about as broad at posterior margin as the head, convex. Elytra long and narrow.

"General color greenish, the vertex yellow with four black stripes or vittæ, the two median ones converging to a point at the apex, the outer

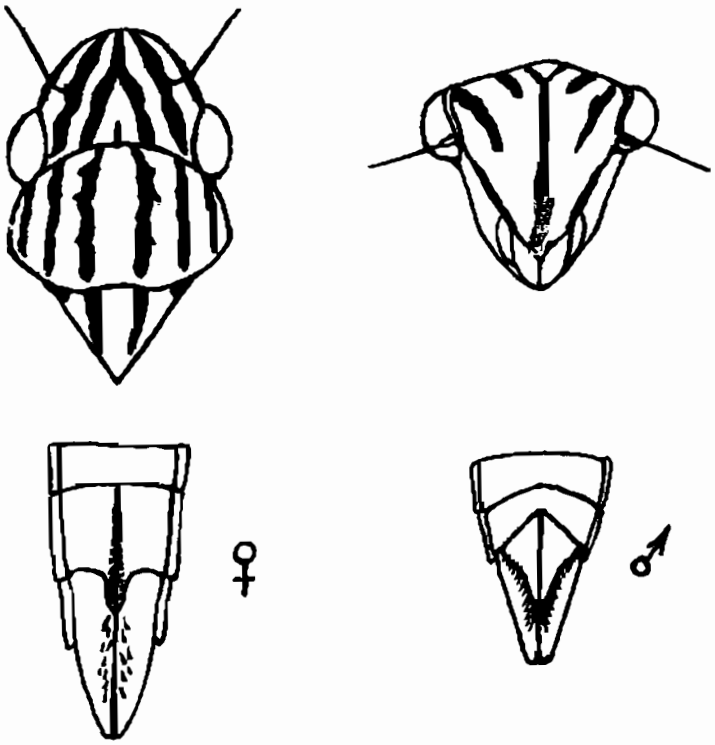

FIG. 9.—*Entogonia* (*Cicadella*) *coffeacola* (Doz.)
Dorsal view (After Dozier)

lateral margins outlined with black. Frons yellow with black median stripe and the lateral ones of the vertex continued over on frons part of its length, the lower sides of frons with black edging; clypeus black. Pronotum greenish, yellow along the anterior third, six distinct black longitudinal stripes running semi-parallel. Scutellum yellow, with two black median stripes and a black spotting in the upper angles. Elytra deep green, the veins broadly marked in black. Body beneath for the most part yellow, the abdomen marked with broken black along median length. Male plates yellow, the pygofers black. Legs pale.

"Genitalia: female segment twice as long as preceding, male ultimate rather deeply incised on hind margin; plates rather broad at base, rapidly narrowing to long acute points, greatly exceeded by the pygofers.

"Length to tip of elytra, 6–6.25 mm." (Dozier.)

"Described from a female taken at Río Piedras, Porto Rico, Aug. 1921, G. N. Wolcott (Acc. 266-21); a female collected by the writer on coffee, El Yunque, Feb. 17, 1925; and numerous males and females collected by Lutz and Mutchler in American Museum of Natural History collection from Cayey, May 30, 1915; Aibonito, June 1, 1915; and Adjuntas, June 26, 1915." (Dozier).

"No specimens were found in any of the plantations visited although I made a special effort to collect from coffee trees." (Osborn).

Entogonia lineata, new species

Size and general shape of *occatoria* but paler and with lines converging and uniting at middle of vertex. Head wider than pronotum, vertex about as long as wide; ocelli twice as far from each other as from margin of eye; front moderately inflated; pronotum as long as vertex, faintly emarginate on posterior border. Female, last ventral segment truncate, pygofers with margin much curved and slightly bristled.

Color pale yellow to greenish white, head more whitish than pronotum, which becomes bluish on the hind border; elytra pale blue on clavus and inner portion of corium, costa and base and tip of clavus suffused with yellowish green, wings blackish; face and legs white, tinged with greenish; abdomen above blackish, beneath bluish white; margin of ovipositor infuscate; legs whitish, tips of tarsi dusky; distinct fuscous or blackish lines on the head, consisting of an inverted Y-shaped median mark; two oblique lines running from just in front of ocelli to margin of vertex and two curved lines from base of eye on to near middle of front, six parallel lines on the pronotum, outer ones faint, two parallel lines on the clavus, two bordering claval suture; veins of the corium and discal and apical veins blackish; ocelli jet black; antennæ except at base blackish. Length, 7.25. mm.

Described from one specimen (holotype) received from Cornell University and labeled "El Yunque, P. R., Luquillo Mts., 2000–3500 ft., Mar. 29, 1930, Cornell Univ. Lot 795 Sub. 8."

This appears to come fairly close to Dozier's *coffeacola,* but the stripes of pronotum and elytra are much narrower and the lines of the vertex converge to meet nearer the middle, slightly in front of the ocelli, and extend as a single line to the middle of the front.

Cicadella Latr.

1817. *Cicadella* Latreille in Cuvier: Règne Animal, iii, p. 406.

Genotype, *C. viridis* Linn.

Cicadella sirena (Stål)

1864. *Tettigonia sirena* Stål, Stett. Ent. Zeit., xxv, p. 76.
1899. *Tettigonia sirena* Fowler, Biol. Cent.-Am., Homopt., ii, p. 253.
1923. *Tettigonia sirena* Wolcott, Jour. Dept. Agr. P. R., vii, p. 259.
1929. *Cicadella sirena* Osborn, Jour. Dept. Agr. P. R., xiii, p. 93.

Head wider than pronotum, vertex broad, nearly twice as wide as length at middle; front tumid; clypeus ridged, especially toward the tip; cheeks narrow; pronotum scarcely concave behind. Female: last ventral segment elongate, narrowed apically with a faint median notch, and polished blackish discal spot; pygofer as long as the last segment, not

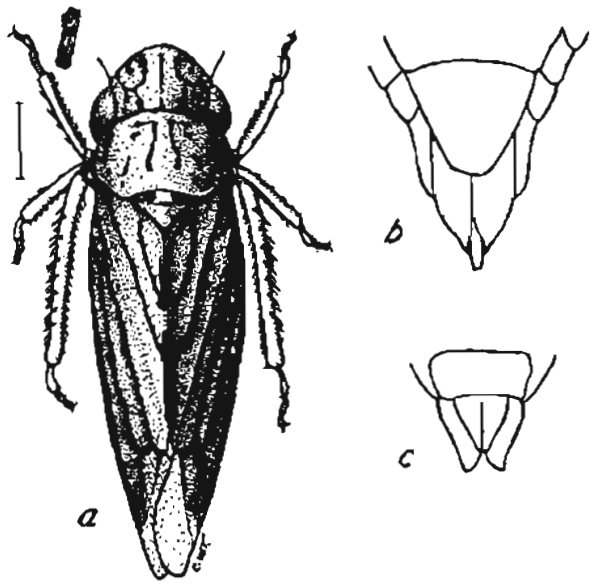

FIG. 10.—*Cicadella sirena* (Stål)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

exceeded by ovipositor. Male: valve hidden; plates narrow, triangular with acute apices upturned and reaching nearly to the tip of pygofer.

Color, pale yellowish; vertex with black lines, one median and two short ones near the eye touching on a broad V-shaped figure near border of vertex. Front with two divergent, black lines on the middle and outer converging lines meeting on the clypeus and including a series of short, transverse, black lines. Pronotum yellowish olive with four longitudunal, black lines. Scutellum with two short, black stripes extending to the disk; elytra purplish on the inner clavus and disk of corium with costa and claval suture golden yellow. Veins infuscate.

Length: female 5½ mm.; male 5 mm.

"Wolcott lists this species as occurring on a large variety of plants including grasses, garden vegetables, grape fruit, weeds and sugar cane. I took it at nearly all points where collecting was done and upon a considerable variety of host plants at different elevations. At Aguirre it occurred in all stages on *Sesuvium* in the salt flats so that there can be no question that this plant serves at times as a perfect host plant for the species. It was also taken near Ponce from *Barita* which may also serve as a host plant although it was found on this plant on but one occasion. Other localities are Sabana Abaca Feb. 5, Arecibo Feb. 13, Salinas Jan. 21. When occurring on garden crops and other cultivated plants of economic value it must be counted injurious." (Osborn).

Cicadella similis (Walker)

1851. *Tettigonia similis* Walker, List Homopt. B. M., iii, p. 769.
1854. *Tettigonia herbida* Signoret, Ann. Soc. Ent. Fr., (3), ii, p. 18, Pl. ii, fig. 4.
1858. *Helechara communis* Walker, List Homopt. B. M., Suppl., p. 235.
1862. *Tettigonia herbida* Stål, Rio Jan. Hemipt., ii, p. 42.

1895. *Tettigonia herbida* Uhler, Proc. Zool. Soc. London, p. 77.
1900. *Tettigonia prolixa* Fowler, Biol. Cent.-Am., Homopt., ii, p. 275, Pl. xviii.
1908. *Kolla herbida* Distant, Ann. Mag. Nat. Hist., (8), i, p. 529, ii, p. 62.
1926. *Cicadella similis* Osborn, Ann. Carn. Mus., xvi, p. 212.
1929. *Cicadella similis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 92.

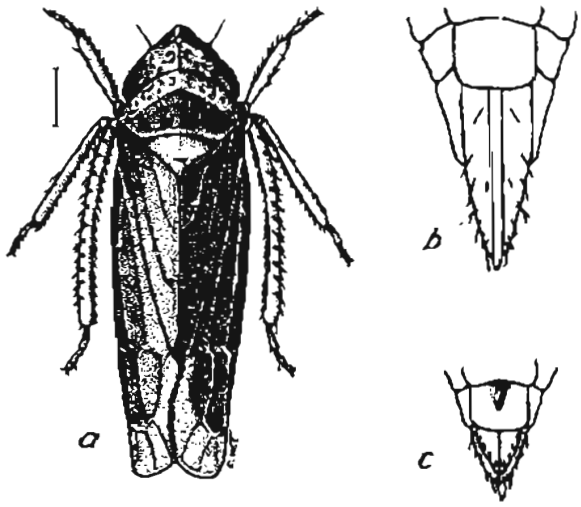

FIG. 11.—*Cicadella similis* (Walk)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

Head as wide as pronotum; vertex obtusely angulate, rounded to front, front tumid; pronotum slightly larger than vertex, nearly truncate behind; elytral veins indistinct.

"*Genitalia:* Female, last ventral segment carinate, hind border nearly truncate; *male,* valve minute or covered, plates short, acuminate, borders setose.

"Light green; head, anterior border of pronotum, scutellum and underside, light yellowish-green; an apical point and an intricate pattern of narrow lines on the vertex, numerous arcs on the front, inscribed lines on anterior border of pronotum, and usually a dot or series of short lines on the scutellum, black. Length: female, 6.5 mm.; male, 6 mm." (Osborn).

"This species is very widely distributed throughout the West Indies and parts of South America, Central and subtropical North America and seems to be everywhere present in Porto Rico, occurring on a great variety of plants, especially the "malojillo" grass (*Panicum barbinode*). It occurs occasionally on sugar cane and Wolcott records nymphs and eggs as well as adults but in my own collecting I have taken only adults and it seems probable that occurrences of eggs and nymphs are exceptional and that the migrations to cane result from the clearing out or ripening of the grass plants which have served as their hosts. It is seldom abundant on Guinea grass as compared with "malojillo" but on some of the pasture grasses it must really be destructive and to be counted of

economic importance. Wolcott's (13)[1] records for grape fruit, coffee and some other plants, not of the grass family are probably based on captures of adults occurring only temporarily or accidentally on these plants although in my own collecting they have been taken in many unexpected places." (Osborn).

Kolla Distant

1908. *Kolla* Distant, Fauna Brit. Ind., Rhynchota, iv, p. 780.

Genotype, *K. insignis* Distant.

Kolla fasciata (Walker)

1851. *Tettigonia fasciata* Walker, List Homopt. B. M., iii, p. 780.
1900. *Tettigonia fuscolinella* Fowler, Biol. Cent-Am., Homopt., ii, p. 290, Pl. xix, fig. 25.
1917. *Kolla bifida* var. *fasciata* Van Duzee, Catalog, p. 599.
1923. *Kolla fasciata* Wolcott, Jour. Dept. Agr. P. R., vii, p. 260.
1926. *Kolla fasciata* Osborn, Ann. Carnegie Mus., xvi, p. 232.
1929. *Kolla fasciata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 93.

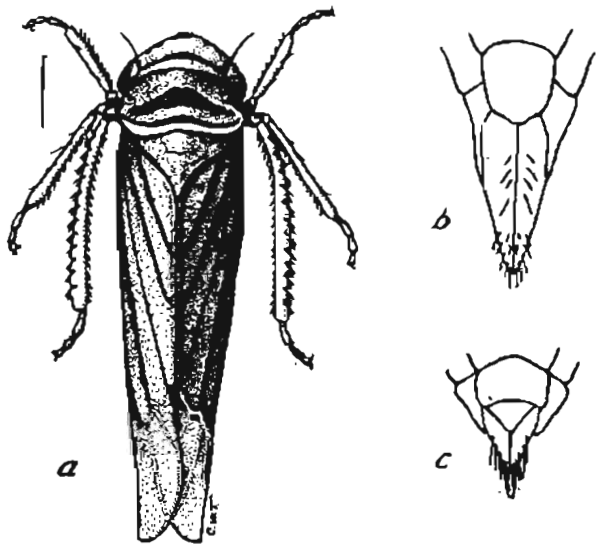

FIG. 12.—*Kolla fasciata* (Walk.)
a, dorsal, *b*, female, *c*, male genitalia (Original)

"Head broad, wider than pronotum, short, rounded in front; vertex slightly longer at middle than next the eye; front slightly tumid; clypeus contracted toward the tip; pronotum twice as long as vertex, side margins short, hind border convex. *Genitalia: female,* last ventral segment nearly twice as long as preceding; hind border produced, about one-fourth the length of the segment, bluntly angulate at middle; *male,* last ventral segment truncate, valve hidden, plates very short, triangular, tips acute and slightly divergent, reaching about one-third the length of the pygofer.

[1] See previous footnote.

"Olive-green or brownish; vertex at tip, a band between the eyes, a submarginal band at the base of pronotum and the veins of elytra, black; pronotum greenish olive or brownish, the anterior and posterior borders light yellow or whitish, with brownish suffusion at collar; abdomen more deeply tinged with reddish.

"Length: female, 5.5 mm.; male, 5 mm." (Osborn).

This species has a wide range in the neotropics, occurring in the southern United States, Mexico and Central America, northern South America and the West Indies.

"It is a common species in Porto Rico and has been taken at most of the localities where I have collected. Guayama, Aguirre, Salinas, Guánica, Yabucoa, Río Piedras, Lares, Ciales, Arecibo, Vega Alta and other points throughout the time of my visit. It occurs on a number of different species of grass and may be swept from mixed vegetation of great variety although probably its natural food plants are in the grass family. It is often in such abundance that it must be counted of economic importance; Wolcott (13)[1] records it for the 'St. Augustine, Bermuda and Carpet grass, on sugar cane and malojillo.' I have taken it commonly in sweeping mixed grasses and weeds especially on hillsides." (Osborn).

Carneocephala Ball

1927. *Carneocephala* Ball, Florida Entom., xi, p. 39.

Genotype, *Dræculacephala floridana* Ball.

Carneocephala (Draeculacephala) sagittifera (Uhler)

1895. *Tettigonia sagittifera* Uhler, Proc. Zool. Soc. London, p. 76.
1923. *Draeculacephala sagittifera* Wolcott, Jour. Dept. Agr. P. R., vi, p. 260.
1927. *Carneocephala sagittifera* Ball, Florida Entom., xi, p. 40.
1929. *Draeculacephala sagittifera* Osborn, Jour. Dept. Agr. P. R., xiii, p. 93.

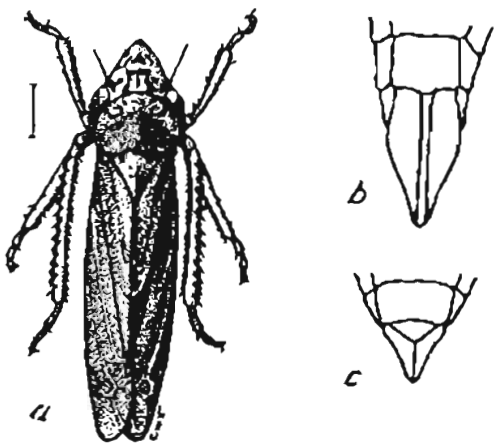

FIG. 13.—*Carneocephala (Draeculacephala) sagittifera* (Uhl.)

a, dorsal, *b*, female, *c*, male genitalia (Original)

[1] See previous footnote.

Head slightly wider than pronotum; vertex long, subconical rounding to the front; front tumid, clypeus narrowed and keeled toward the apex; pronotum broadly notched, faintly concave behind; elytra reticulated at apex. Female: last ventral segment faintly bi-sinuate. Male: valve broad, short, slightly convex behind; plates short, triangular, with an upturned filament at tip, reaching nearly to tip of pygofer.

Color, dull olive; vertex and anterior border of pronotum yellowish, vertex with a black triangular spot near the tip and a curved, black patch inside of ocelli; front maculate with fuscous and faint lateral arcs; elytra dull olive or brownish, veins light greenish, costa whitish, apex smoky hyaline, beneath pale yellowish more or less tinged with green, legs pale. Length: female 4½ mm.; male 4 mm.

"This species may be expected to occur at every point where Bermuda grass is present as this seems to be its favorite host. Adults are abundant and active throughout the winter. While the grass does not appear to show great evidence of the work of the insect there can be no doubt that where these insects occur by the millions, as is often the case, there must be a heavy drain on the plants and a corresponding loss in forage value to the live stock pastured on the infested fields. Wolcott gives a record for sugar cane but this can hardly be counted a normal host." (Osborn.)

GYPONINÆ

This subfamily is scarcely represented in Porto Rico and so far by only one genus, *Xerophlœa*.

Xerophlœa Germar

1839. *Xerophlœa* Germar, Zeit. f Ent., i, p. 190.

Genotype, *X. grisea* Germ. = *C. viridis* Fab.

Xerophlœa viridis (Fabricius)

1794. *Cercopis viridis* Fabricius, Ent. Syst., iv, p. 50, 13.
1839. *Xerophlœa grisea* Germar, Zeits. F. G. Entom., i, p. 190.
1854. *Xerophlœa virescens* Stål, Ofv. Vet. Ak. Forh., p. 94, 30.
1869. *Xerophlœa viridis* Fabricius, Stål. Hemiptera Fabriciana, ii, p. 59.
1877. *Parapholis peltata* Uhler, Bull. U. S. Geol. and Geog. Surv., iii, p. 461.
1884. *Xerophlœa peltata* Uhler, Stand. Nat. Hist., ii, p. 248.
1897. *Xerophlœa viridis* Osborn and Ball, Iowa Acad. Sci., iv, p. 179.
1923. *Xerophlœa viridis* Wolcott, Jour. Dept. Agr. P. R., vii, p. 261.
1929. *Xerophlœa viridis* Osborn, Jour. Dept. Agr. P. R. xiii, p. 93.

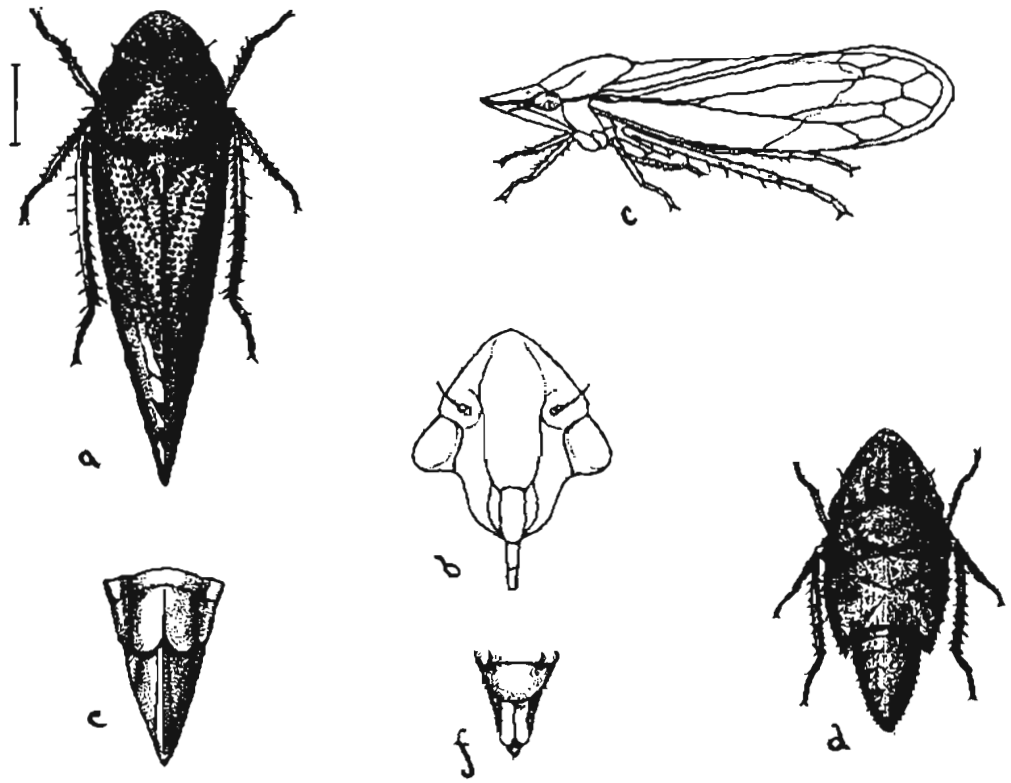

FIG. 14.—*Xerophloea viridis* (Fab.)

a, dorsal, *b*, face, *c*, side, *d*, nymph; *e*, female, *f*, male genitalia (after Osborn and Ball)

Head broad, flat, scarcely as wide as pronotum, margin acute, vertex nearly twice as wide as length at middle, obtusely angulate, front depressed, clypeus narrow, sides nearly parallel, apex rounded; pronotum distinctly excavate behind; vertex, pronotum, and elytra have numerous distinct punctures, including setæ. Female: last ventral segment elongate, distinctly carinate and notched at the tip. Male: last central segment longer than the preceding, slightly convex, valve wanting or hidden; plates tapering to subacute tips, reaching tip of pygofer.

Color, females usually light green, the elytra hyaline especially toward the tip; males with fuscous central stripe on the vertex and with fuscous maculations on vertex, pronotum and base of elytra and sometimes fuscous lines or dots on the veins toward the apex; ocelli red. The fuscous markings of the elytra sometimes appear on the female as well as the male. Length: female, 6 mm.; male, 5 to 5½ mm.

"This species occurs from Southern South America to Northern United States and often in great abundance. Only scattering specimens have been taken this season and I think it must have been reduced in numbers by the storm. Records for Guayama Jan. 12, Aguirre Jan. 17, Guánica on grass Jan. 18, on *Barita* near Ponce March 2. Wolcott records it as common on carrots but is generally found on grasses and probably breeds mainly, if not entirely, on species of the grass family." (Osborn.)

A specimen labelled "Desecheo Is., W. I., Feb. 18–20, 1914," is in the American Museum of Natural History.

Xerophlœa breviceps, new species

Resembles male of *viridis* but much smaller and with a much shorter vertex. The head nearly as broad as pronotum, vertex about one-half as long as width between the eyes, obtusely angulate, front scarcely inflated; pronotum with hind border slightly convex, pronotum and clavus pustulate; scutellum small, apex acute; elytra with veins prominent, margined with punctures. Male: last ventral segment rounded, plates tapering slightly to rounded tips. Color comparatively gray, vertex and pronotum with rather narrow fuscous stripes extending back to middle of pronotum; ocelli red; elytra hyaline, commissure with two whitish spots, apical margin with three fuscous spots; venter fuscous, legs pale gray. Length 4 mm.

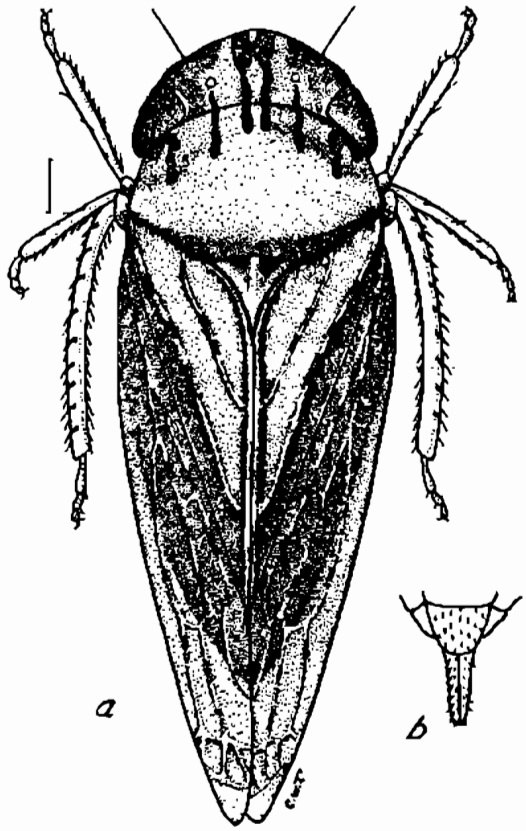

FIG. 15.—*Xerophloea breviceps* Osb. *a*, dorsal, *b*, male genitalia (Original)

This species approaches the gray-colored male of *viridis* but is much smaller and the vertex shorter and less angulate. In Lawson's key it would run to *oraclis,* from which it differs in the much shorter and more obtusely angulate vertex as well as in being much smaller in size.

Described from a single male specimen (holotype) collected at San Juan, P. R., Febr. 10, 1929 (H. O.).

JASSINÆ

While this group is much more fully represented than the preceding two, there are few species as compared with the continental area of North

America. The ocelli are on the border between vertex and front or very close to the border on the vertex.

KEY TO PORTO RICAN GENERA

1. Small, elliptical species, ocelli on vertex close to border.....*Xestocephalus*
   Mostly larger species, ocelli directly on border between vertex and front 2
2. Head produced, flattened, clavus with one vein.....*Spangbergiella*
   Head not flattened, clavus with two veins..... 3
3. Elytra with three anteapical cells..... 4
   Elytra with two anteapical cells..... 10
4. Elytra with two cross nervures on disk..... 5
   Elytra with one cross nervure..... 7
5. Middle anteapical cell divided; face with cross bars
   Sanctanus (*Scaphoideus*)
   Middle anteapical cell not divided or, if so, no cross bars on face..... 6
6. Front long, narrow; vertex acute.....*Platymetopius*
   Front broader; vertex produced but not acute.....*Deltocephalus*
7. Head short, broad; veins distinct.....*Exitianus* (*Euscelis*)
   Head more or less angled; veins usually concolorous..... 8
8. Elytra terminating in acute angle.....*Acinopterus*
   Elytra rounded at apex..... 9
9. Color varied, not green.....*Thamnotettix*
   Color usually green or pale straw-color.....*Chlorotettix*
10. Vertex narrow .....*Jassus*
    Vertex wide 11
11. Vertex spotted .....*Cicadula*
    Vertex not spotted..... 12
12. Head not wider than pronotum.....*Balclutha*
    Head wider than pronotum.....*Nesosteles* (*Eugnathodus*)

Xestocephalus Van Duzee

1894. *Xestocephalus* Van Duzee, Trans. Am. Ent. Soc., xix, p. 298, 1892 (Nomen nudum); Bull. Buffalo Soc. Nat. Hist., v, pp. 197, 215.

Genotype, *X. pulicarius* Van Duzee.

Xestocephalus pulicarius Van Duzee

1894. *Xestocephalus pulicarius* Van Duzee, Bull. Buffalo Soc. Nat. Hist., v, pp. 197, 215.
1929. *Xestocephalus pulicarius* Osborn, Jour. Dept. Agr. P. R., xiii, p. 94.

Small, robust; head scarcely as wide as pronotum, rounded in front; vertex one-half longer at middle than next the eye. Genitalia: female, last ventral segment twice as long as preceding, truncate, or faintly sinuate; male, valve hidden; plates narrow, spine-like, acute at tip, extending to tip of pygofer.

Light brown or fulvous with fuscous and whitish spots; vertex with a central white stripe with a median fuscous line, on each side of which is a quadrate fuscous spot, connected with an exterior broken band, which includes the white-bordered ocelli; elytra with elongated white spots on the veins and two yellowish transparent spots on the costa, the outer one enclosing a fuscous dot.

Length: 2.5 mm. to 3 mm.

"This widely distributed species, included in Wolcott's catalogue, was taken in small numbers at Aguirre, Feb. 12, Sabana Abaca, Feb. 5, Guayama, Feb. 7, Río Piedras, Feb. 8, Lares, Feb. 12, Cayey Road, 2,000 ft. elevation, Mar. 16." (Osborn.)

Xestocephalus maculatus Osborn

1929. *Xestocephalus maculatus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 94.

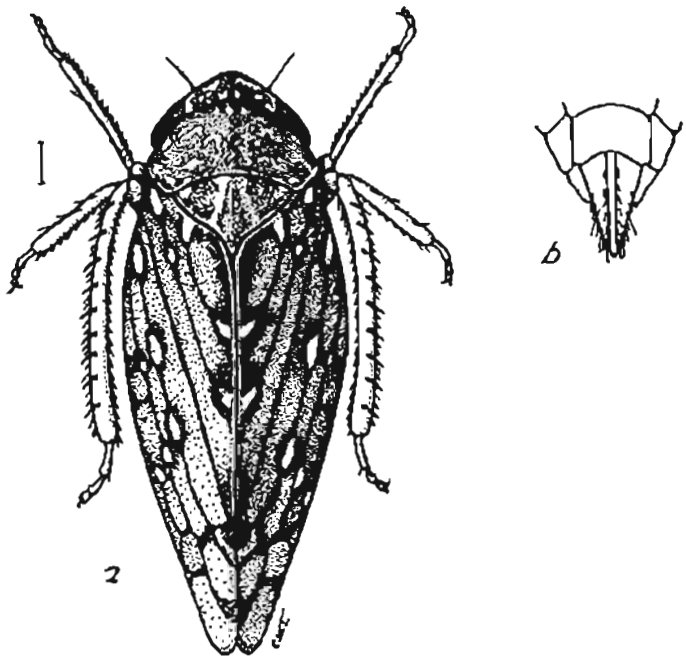

FIG. 16.—*Xestocephalus maculatus* Osb.

a, dorsal view, *b*, female, (Original)

"Head small; vertex broad half longer at middle than next the eye, front convex, polished. Pronotum longer than vertex widening posteriorly. Elytra narrowing to apex. Female last ventral segment slightly notched; pygofer with dense setæ. Male valve hidden; plates elongate, triangular, densely setose.

"Dark brown with numerous black or fuscous maculations. Costa of elytra beyond basal third with alternating squarish tessellations, black and whitish or subhyaline and about ten conspicuous white dots on each elytron and two small elongate spots on apical ends of claval veins; veins of apical half blackish.

"Length 3.25 mm.

"Described from a series of specimens (type female, allotype male, and paratypes) collected on the Cayey Road, Jan. 28 and Mar. 16, at about 2,000 ft. elevation, most of them from *Inga* trees, which appear to be normal host plants. It is the size and form of *X. tessellatus* but much darker and the picture quite different." (Osborn.)

Xestocephalus pallidus, new species

Small, head nearly as broad as pronotum; vertex short, slightly longer at middle than next to the eye; ocelli fairly close to anterior border; front convex, as broad as long, width between eyes equal to length, tapering to a narrowed clypeus, which widens distinctly toward the apex; loræ large, nearly touching the border of cheek; pronotum nearly twice as long as vertex, hind border slightly concave; elytral veins distinct. Female: last ventral segment with a broad notch on the hind border; pygofer short, as long as ovipositor, thickly setose.

Pale gray tinged with fuscous; two distinct, black spots on the subcosta separated by yellowish costal border, a fuscous spot on the commissure between the tips of claval veins and one at the tip of costal areole, apical cells somewhat smoky, beneath infuscate; legs paler, tips of tibiæ, base of abdomen and tip of ovipositor blackish. Length 2.5 mm.

This small species is described from a single specimen, female (holotype) labelled "El Yunque, P. R., Luquillo Mts., 2,000–3,500 ft., Apr. 23, 1930, Cornell University, Lot 795 Sub. 40," received from the Cornell University collection, where type specimen is placed.

The species has somewhat the appearance of *tessellatus* but with very faint tessellations and it is very much smaller in size.

Spangbergiella Signoret

1879. *Spangbergiella* Signoret, Ann. Ent. Soc. Fr., (5), ix, p. 273.

Genotype, *G. vulnerata* Uhler.

Spangbergiella vulnerata (Uhler)

1877. *Glossocratus vulnerata* Uhler, Bull. U. S. Geol. and Geogr. Survey, iii, p. 464.
1917. *Spangbergiella vulnerata* Van Duzee, Catalog, p. 624.
1923. *Spangbergiella vulnerata* Osborn, Ann. Carn. Mus., xv, p. 30.
1929. *Spangbergiella vulnerata* Osborn, Jour. Dept. Agr. P. R., xiii. p. 94.

"Head narrower than pronotum; vertex obtusely angled, nearly twice as wide as long, rounded to front; front somewhat swollen; clypeus nearly twice as long as wide; loræ close to margin of cheek; border of cheek distinctly sinuate. Pronotum a little longer than vertex, hind margin con-

cave. *Genitalia: male,* the valve very small, almost concealed; plates narrow, tapering to acute slightly upturned tips; pygofer strongly setose.

"Light green; vertex and pronotum with orange-red converging stripes, nearly meeting anteriorly; a fainter short median stripe on pronotum; elytral veins greenish-yellow; beneath dull greenish.

"Length: male 4.75 mm." (Osborn.)

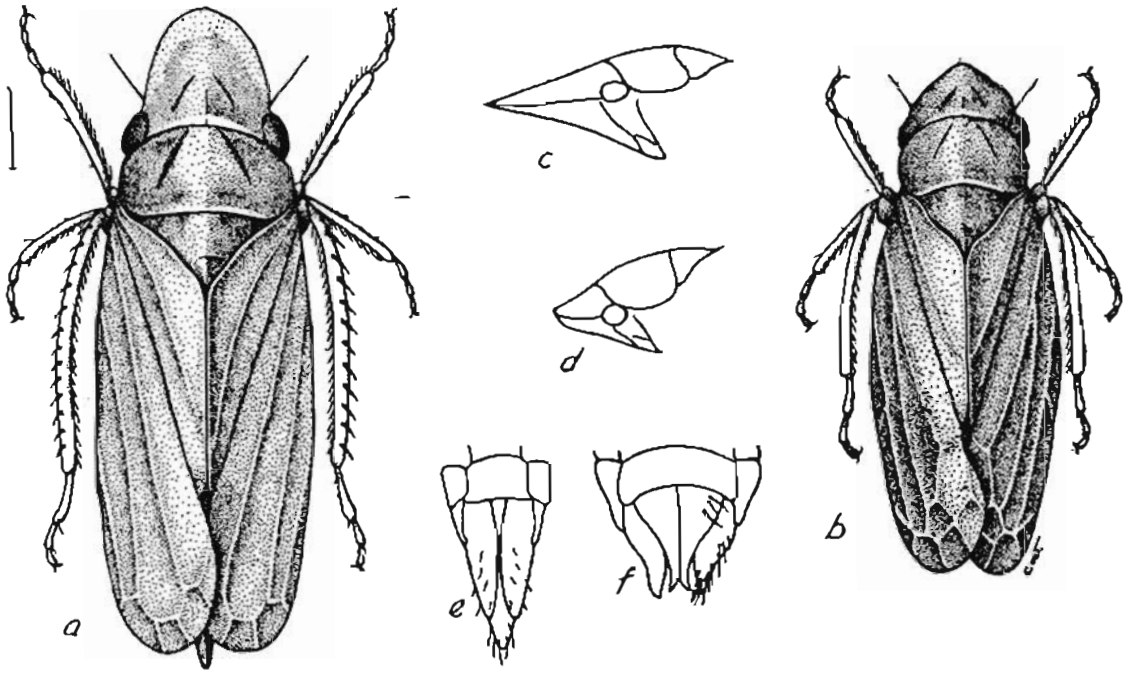

FIG. 17.—*Spangbergiella vulnerata* (Uhl.)

a, dorsal view, female, *b*, dorsal view, male, *c*, lateral, female, *d*, male, *e*, female, *f*, male genitalia (Original)

"This species was taken at several different points but in small numbers and usually upon Guinea grass which appears to be a common food plant. Specimens were secured at Aguirre from Guinea grass pasture and there are records for San Juan, Río Piedras and there are specimens from Vieques in the Experiment Station. Wolcott's records include one from 'Sugar cane and malojillo grass'." (Osborn.)

Sanctanus Ball

1932. *Sanctanus* Ball, Jour. Wash. Acad. Sci., xxii, p. 10.

Genotype, *J. sanctus* Say.

1889. *Scaphoideus* Uhler, Trans. Maryland Acad. Sci., i, p. 33 (in part).

Sanctanus (Scaphoideus) fasciatus (Osborn)

1900. *Scaphoideus fasciatus* Osborn, Jour. Cinc. Soc. Nat. Hist., xix, p. 190.
1907. *Scaphoideus fasciatus* Van Duzee, Bull. Buffalo Soc. Nat. Sci., viii, p. 69.
1910. *Scaphoideus fasciatus* Osborn, Ohio Naturalist, xi, p. 252.

1923. *Scaphoideus fasciatus* Wolcott, Jour. Dept. Agr. P. R., vii, p. 261.
1924. *Scaphoideus fasciatus* Osborn, Ann. Carn. Mus., xv, p. 406.
1929. *Scaphoideus fasciatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 94.
1932. *Sanctanus fasciatus* Ball, Jour. Wash. Acad. Sci., xxii, p. 10.

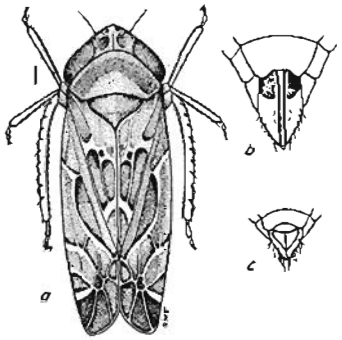

FIG. 18.—*Sanctanus (Scaphoideus) fasciatus* (Osb.)
a, dorsal view, b, female, c, male genitalia (Original)

"Head wider than pronotum, obtusely angulate; vertex about one-third longer at middle than next the eye; margin subacute; front broad, narrowing to base of clypeus; clypeus long; lorae distant from margin of cheeks. Pronotum strongly arched in front, truncate behind; lateral margins very short; elytral appendix narrow. *Genitalia: female,* last ventral segment somewhat concavely excavated, slightly prominent at the middle. *male,* valve short; plates oval, short, one-half as long as pygofer, bluntly rounded at apex with a discal brown fascia, as described from Haytian specimen.

"Ivory-white; vertex with obsolete pair of dots near apex; faint fuscous spot on the disk; face white with two marginal bands above; a band between lower part of eyes, including antennal pits and a band across clypeus, lorae and lower border of cheek, fuscous. Pronotum with fuscous points on anterior border; a larger patch behind the eye, the basal angles of scutellum, a cruciate patch on elytra, and a darker border, fuscous; the hinder part of the cruciate mark is reduced at the middle, the distinct darker border separating it from a lighter patch, beyond which next to costa is a darker oblique patch; the veins toward apex fuscous; the first and fourth apical areoles, hyaline; second and third more or less infuscate; legs whitish; femora annulate or largely fuscous.

"Length: 4.5 mm." (Osborn.)

This species was described from specimens some of which were from Haiti and the species has a wide distribution in the West Indies and the southern United States. The Porto Rican records are Río Piedras, Añasco, Mayagüez, Guayama, Sabana Abaca, and beach near San Juan.

Sanctanus fasciatus var. **variabilis,** new variety

Vertex shorter and the female segment with a projection. Vertex scarcely more than half as long as width between eyes; obtusely angulate; pronotum one and one-half times length of vertex; elytral venation similar to *fasciatus* but apical veins varied, apical areoles short. Female: last ventral segment sinuate, the median lobe bordered with fuscous and base of pygofer not infuscate. Male: valve very short, sometimes hidden; plates short, rounded to apex.

Pale straw color, the vertex with distinct fuscous dots and a dark pattern on the elytra similar to *fasciatus* but with different pattern on apical third. Length: female and male 4 mm.

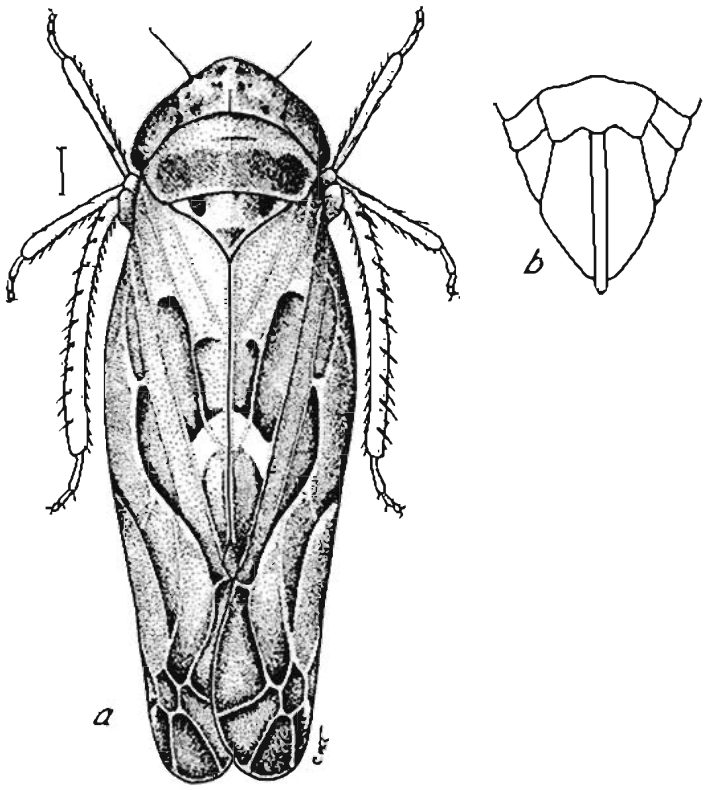

FIG. 19.—*Sanctanus fasciatus* var. *variabilis* Osb.

a, dorsal, *b*, female genitalia (Original)

The venation of the apical part of elytra may be aberrant but the differences in genitalia seem to warrant separation from typical *fasciatus*. Holotype, female from Aguirre, Jan. 18, 1929; allotype, male, Patillas, P. R., Jan. 22, 1929; paratypes one female one male, Aguirre, Jan. 18, 1929. (H. Osborn.)

Scaphoideus Uhler

1889. *Scaphoideus* Uhler, Trans. Maryland Acad. Sci., i, p. 33.

Genotype, *J. immistus* Say.

Scaphoideus bimarginatus DeLong

1923. *Scaphoideus bimarginatus* DeLong, Jour. Dept. Agr. P. R., vii, p. 261.
1929. *Scaphoideus bimarginatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 95.

"Resembling *auroniteus* Provancher in general appearance, but with two parallel bands above, and one beneath the ocelli. Length: 4 mm.

"Vertex very bluntly angled, a little wider between the eyes than length at middle. Pronotum longer than vertex, twice wider than long. Elytra little longer than abdomen.

"Color: Vertex dull golden yellow, a curved band just above ocelli and parallel to anterior margin, a second one just posterior to it and as far distant as the width of the first, the space between silvery white. Pronotum and scutellum golden yellow, mottled with brown. Elytra pale brownish, subhyaline, veins and a few small areas dull brown. Face with a heavy black band just below ocelli, a narrow pale band beneath it, the remainder of the face pale brown shading to yellow on clypeus with no indication of arcs. Beneath yellow, marked with brown.

"Genitalia: *Female* last ventral segment about twice as long as preceding, lateral margins short, gradually produced to form a broad, short median tooth." (DeLong.)

"Described by DeLong (1923) from one female collected at light at Pt. Cangrejos, Feb. 27, 1920, by Wolcott, but no other Porto Rican specimens have been noted. I collected it from Cuban pines at Herradura, Cuba, in March, 1925, and also at Ermita without host record." (Osborn.)

Platymetopius Burmeister

1838. *Platymetopius* Burmeister, Genera Quedam Insectorum, sub. gen. 4.

Genotype, *P. undatus* (DeG.)

Platymetopius loricatus Van Duzee

1894. *Platymetopius loricatus* Van Duzee, Bull. Buffalo Soc. Nat. Sci., v, i, p. 205.
1923. *Platymetopius loricatus* Osborn, Ann. Carn. Mus., xv, pp. 35-36.
1929. *Platymetopius loricatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 95.

"Head narrower than pronotum; vertex one and one-half times as long as broad; apex bluntly angular, margin sub-acute; front narrow; clypeus widening to tip; loræ elongate; margin of cheeks nearly straight from eye to clypeus; pronotum sharp, distinctly sinuate behind the eyes, while on margin slightly concave; venation of elytra of the typical form. *Genitalia: male,* valve rather short; hind margin rounding; plates broad at

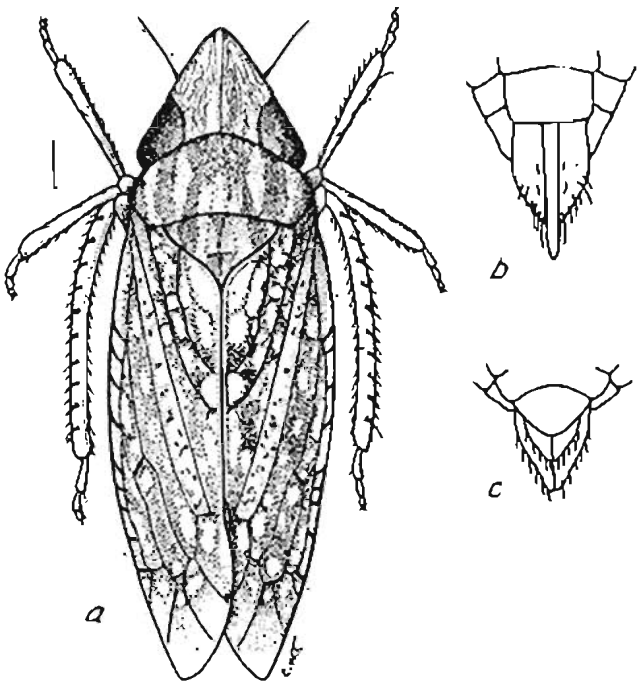

FIG. 20.—*Platymetopius loricatus* Van D.
a, dorsal, *b*, female, *c*, male genitalia
(Original)

base; outer margins straight; tips acute, each plate forming half of an equilateral triangle.

"Yellowish gray above, the vertex slightly brownish, with light lines running from the margin on to the disk; the pronotum with five faint whitish longitudinal lines; scutellum with whitish dots; elytra with rounded whitish hyaline spots on a ground-work of brownish with minute fuscous dots; costal margin with about ten oblique fuscous veinlets; face yellowish with minute fuscous dots and a pale spot at base; legs and obdomen yellowish, dotted with fuscous.

"Length: 3.60 mm." (Osborn.)

"Two specimens of this species were secured at Aguirre, Feb. 18, in sweeping mixed vegetation on waste land at sea level. The species is common over the southern United States and in Central America. The Porto Rican specimens agree perfectly with those from Guatemala in my collection. This is probably the species given as '*Platymetopius* sp' 'on string beans' in Wolcott's list." (Osborn.)

Deltocephalus Burmeister

1838. *Deltocephalus* Burmeister, Genera Quedam Insectorum, i, Pl. xiv, sub. gen. 3.

Genotype, *C. pulicarius* (Fallen).

Deltocephalus trilobatus DeLong

1923. *Deltocephalus trilobatus* DeLong, Jour. Dep. Ag. P. R. vii, p. 263.
1929. *Deltocephalus trilobatus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 95.

"Resembling *D. micarius* Ball in form, size and coloration. Vertex more produced and genitalia distinct. Length: 2.5 mm.

"Vertex distinctly angled, a little longer on middle than between eyes. Pronotum shorter than vertex, twice wider than long. Elytra with clavus reticulate; central anteapical cell constricted and divided.

"Color: Vertex dull yellow with a pair of orange triangular spots at apex and two small brownish spots just above either ocellus. Median impressed line brown. A darker longitudinal area extends back on either side, crossing pronotum and terminating on basal angles of scutellum. Two other longitudinal stripes on pronotum lateral of the central pair. Elytra dull yellow, veins more or less heavily infuscated. Face brownish with traces of pale arcs. Beneath, yellow marked with brown.

"Genitalia: *Female* last ventral segment about as long as preceding; side margins very short, lateral angles produced and rounded, between which, the posterior margin gradually slopes to a slight emargination on either side of a rounded, rather broad, but short median tooth which scarcely exceeds lateral angles in length. Underlying membranes conspicuous at either side.

"Described from a single female at light at Pt. Caugrejos. Dec. 16, 1919 (GNW)." (DeLong.)

"A number of specimens of this well marked species were swept from a native grass on the rocky mountain side in Salinas valley at 1,500 to 1,800 ft. elevation. The grass was scant but pastured and in places close cropped and the leaf hoppers evidently rare as they were secured only by persistant sweeping and then in but small numbers. The markings agree with DeLong's description but the triangular spots at anterior angle of vertex are brown rather than orange. There are conspicuous fuscous blotches in a discal cell and in first and second apical areoles.

"The species has been taken also at lower elevations, but in very small numbers and can have little economic importance. Arecibo, Beach at Sabana Abaca, and Aguirre." (Osborn.)

Deltocephalus albivenosus Osborn

1926. *Deltocephalus albivenosus* Osborn, Ann. Ent. Soc. Am., xix. p. 345.
1929. *Deltocephalus albivenosus* Osborn, Jour. Dep. Ag. P. R., xiii. p. 96.

"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, lore broad. Pronotum scarcely longer than vertex. Elytra long and slender, much longer than abdomen, veins conspicuous, middle ante-

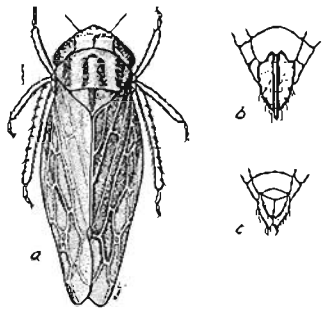

FIG. 21.—*Deltocephalus albicrassus* Osb.
a, dorsal view, *b*, female, *c*, male genitalia (Original)

apical 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." (Osborn.)

"This species was described from Cuba and specimens were taken in Porto Rico at San Juan, Feb. 10, Luquillo, Feb. 11 and Añasco, March 1. All these localities are at or near sea level and specimens were from beach grass or similar association." (Osborn.)

Deltocephalus maculellus Osborn

1926. *Deltocephalus maculellus* Osborn, Ann. Ent. Soc., xix, p. 345.
1929. *Deltocephalus maculellus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 96.

"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.

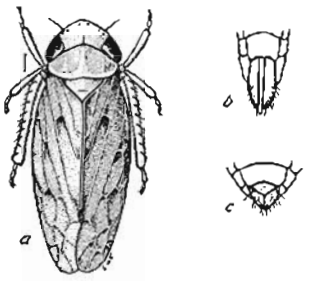

FIG. 22.—*Deltocephalus maculellus* Osb. *a*, dorsal view, *b*, female, *c*, male genitalia (Original)

"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 lorae 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." (Osborn.)

"Specimens of this species which was described originally from the eastern part of Cuba were taken at Guayama, Jan. 12, Coamo, Jan. 13, and Fortuna, March 15. They agree perfectly with the type specimens and it is probable the species will be found in Santo Domingo and Haiti. The species of grass is not known." (Osborn.)

Deltocephalus nigripennis DeLong

1923. *Deltocephalus nigripennis* DeLong, Jour. Dept. Agr. P. R., vii, p. 203, Pl. 1, fig. 3.

1929. *Deltocephalus nigripennis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 96.

"In general appearance somewhat resembling the *nigrifrons* group, but with coloration and genitalia distinct. Length: 4 mm.

"Vertex roundingly produced, more than one-fourth wider between eyes than length at middle. Pronotum one-fourth longer than vertex and almost twice as wide as long. Elytra with central anteapical cell produced anteriorly and posteriorly beyond inner and outer anteapicals, and very much longer than outer cell.

"Color: Vertex, pronotum and scutellum bright green tinged with yellow, a small black area on lateral margins on pronotum. Elytra, whitish,

subhyaline, almost covered with black; a broad stripe along claval and commissural line to tip of clavus and a transverse band just before tip of clavus whitish, remainder black. Face black with only a few traces of pale arcs. Venter black, lateral margins yellow.

"Genitalia: *Male* valve two-thirds as long as preceding segment, rather broad, convexly rounded. Plates together at base one-fourth wider than long, gradually sloping to blunt, rather broadly rounded apices. Tips with tufts of whitish pubescence.

"Described from one male swept from grass at Boquerón (98-Feb. 21, 1923 GNW)." (DeLong.)

"DeLong described this species from 'one male swept from grass at Boquerón.' I have not taken any specimens that answer his description or agree with his type but the species is evidently quite closely related to one I described as *D. flaveolus* from Cuba, differing in the picture of elytra." (Osborn.)

Deltocephalus flavicosta (Stål)

1862. *Jassus* (*Deltocephalus*) *flavicosta* Stål, Rio Janeiro Hem., ii, p. 53.
1892. *Deltocephalus flavicostatus* Van Duzee, Can. Ent., xxiv, p. 116.
1895. *Deltocephalus retrorsus* Uhler, Proc. Zool. Soc. London, p. 78.
1917. *Deltocephalus flavicosta* Van Duzee, Cat. Hem., p. 645.
1923. *Deltocephalus flavicosta* Wolcott, Jour. Dept. Agr. P. R., vii, p. 281.
1926. *Deltocephalus flavicosta* DeLong, North American Deltocephalus, O. S. U. Studies, ii, No. 13, p. 90.
1929. *Deltocephalus flavicosta* Osborn, Jour. Dept. Agr. P. R., xiii, p. 96.

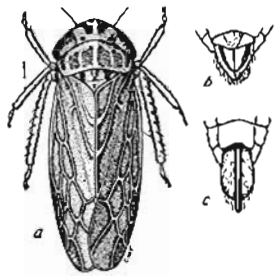

FIG. 23.—*Deltocephalus flavicosta* (Stål)
a, dorsal view, *b*, male, *c*, female genitalia
(Original)

"Fuscus, fronte et sæpe vertice nigricantibus, maculis hujus pluribus minutis basalibus et 6 apicalibus, quarum quatuor mediæ ita ⋄ dispositæ, illius maculis minutissimis vel lineolis transversis nec non limbo genarum, angulis basalibus vittisque duabus irregularibus scutelli angustis, pedi-

busque pallide subsordide flavis, costa ultra medium purius flava, venis tegminum maculaque media areolarum pallidis. ♂. ♀. Long. 3½, Lat. 1¼ Millim.—(Mus. Holm. et Stål).

"Species pulchra. Vertex obtuse rotundato-productus, medio quam ad oculos paullulum longior, oculo singulo vix latior, thorace parum brevior." (Stål.)

This species is usually quite dark but varieties much paler in color will be noted, although the form and color pattern usually persist in the lighter forms. Female: last ventral segment twice as long as preceding, the lateral margins concavely produced to a sinuate hind margin, making four fairly distinct lobes, the median pair narrower. Male: valve large, obtusely angular, plates one and one-half times longer than the valve, narrowed uniformly to obtusely rounded tips.

Color varies from dark brown to black; vertex marked with white spots on dark ground; pronotum with five whitish, narrow longitudinal stripes; veins of elytra whitish or paler than areoles, the costal border distinctly yellow; face dark with a few pale arcs; legs yellow.

Length: 3-3.5 mm.

This species is abundant throughout a long range of tropical and subtropical America and it is an abundant species in Porto Rico. It was collected at practically all points where I collected from grasses of all kinds. It is common to pasture lands and occurs on Guinea grass. It seems well established and was taken at Mayagüez on Guatemala grass. It may be counted as an economic species, although apparently not a serious pest at the time of my visit, which was soon after the hurricane.

Deltocephalus sonorus Ball

1900. *Deltocephalus sonorus* Ball, Can. Ent., xxxii, p. 344.
1923. *Deltocephalus sonorus* Wolcott, Jour. Dept. Agr. P. R., vii, p. 263.
1926. *Deltocephalus sonorus* DeLong, North American Deltocephalus, O. S. U. Studies, ii, No. 13, p. 93.
1929. *Deltocephalus sonorus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 95.

This is a small species with distinctly marked dusky bordered veins and with the anterior border of vertex with two large spots, one near each eye and a minute spot or dot each side of apex. Length: 3.25 mm.

Our specimens were taken on grass at Aguirre, and Wolcott recorded the species from Malojillo grass at Pt. Cangrejos. It was not abundant while I was on the island and certainly not of economic importance at that time.

Exitianus Ball

1929. *Exitianus* Ball, Trans. Am. Ent. Soc., lv, p. 5.

Genotype, *J. obscurinervis* Stål.

Exitianus (Euscelis) obscurinervis (Stål)

1858. *Jassus* (*Thamnotettix*) *obscurinervis* Stål, Eugenies resa. Ins. Hemipt., p. 293.
1880. *Cicadula exilliosa* Uhler, Am. Entom., iii, p. 72.
1892. *Limotettix exilliosa* Van Duzee, Psyche, v, p. 306.
1895. *Eutettix exilliosa* Gillette and Baker, Hemip. Colorado, p. 100.
1902. *Athysanus exilliosa* Osborn and Ball, Ohio Naturalist, ii, p. 234.
1917. *Euscelis exilliosa* Van Duzee, Catalog. Hemip. North of Mexico, p. 655.
1923. *Athysanus exilliosa* Wolcott and DeLong, Jour. Dept. Agr. P. R., vii, p. 264.
1924. *Euscelis obscurinervis* Osborn, Ann. Carnegie Mus., xv, p. 412.
1929. *Euscelis obscurinervis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 96.
1929. *Exitianus obscurinervis* Ball, Trans. Am. Ent. Soc., lv, p. 5.

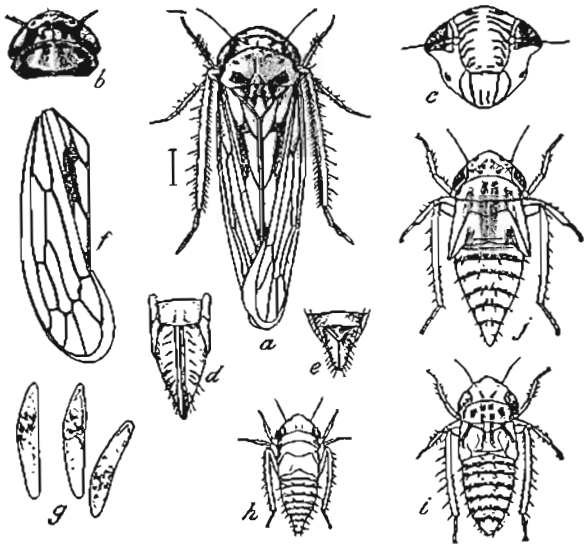

FIG. 24.—*Exitianus* (*Euscelis*) *obscurinervis* (Stål)

a, dorsal view, *b*, head and pronotum, *c*, face, *d*, female, *e*, male genitalia, *f*, elytron, *g*, eggs, *h*, *i*, *j*, nymphs (Author's illustration Bul. 103, Bur. Ent., U. S. D. A.)

"Head wider than pronotum; vertex broad, three times as wide as length at middle, scarcely longer at middle than next the eye, faintly subangulate; front broad, slightly longer than width; lorœ short, not reaching margin of cheek; margin of cheek sinuate. Pronotum twice as wide as long and twice the length of the vertex, anterior border much curved, hind border slightly concave; scutellum nearly as long as pronotum; elytra mostly hyaline, with conspicuous venation. *Genitalia: female,* last ventral segment truncate; *male,* valve short, rounded behind; plates elongate, rather slender, tapering to acute upturned tips.

"Light gray; the vertex with a transverse fuscous band, with two oblique dark fuscous spots, the inner ends nearly touching the hind border; base of front with two large roundish, blackish spots, almost touching the ocelli; the arcs and a central line in the apical portion brownish fuscous; face otherwise whitish. Pronotum with a series of four black dots near the anterior border; the scutellum with two black triangles on the base; elytra with dark fuscous or blackish veins; the apex smoky.

"Length: male, 4 to 4.5 mm.; female, 5 mm." (Osborn.)

"This common and very abundant species throughout the tropics has an extension in the United States to its northern border and is common on a great number of grasses, but in the tropical regions or within the range of distribution of Bermuda grass seems to be particularly plentiful on this species. In Porto Rico it was taken everywhere that suitable grasses were available and in some localities, in considerable numbers. Nymphs were found during most of the season and at practically all localities. It is of distinct economic importance on forage grasses except perhaps for Guinea grass where I did not find it present in any numbers. (Osborn.)

"In the United States *E. obscurinervis* is especially destructive to grasses and cereal crops. It is probably a native of South or Central America and has migrated to the West Indies, the United States, and northward. *Euscelis capicola* Stål of South Africa suggests a common origin for these two species, with a separation of the African and South American forms at some remote time, possibly dating back to the supposed period of continental connexion between Africa and South America." (Osborn.)

Acinopterus Van Duzee

1892. *Acinopterus* Van Duzee, Psyche, v, p. 307.

Genotype, *A. acuminatus* Van Duzee.

Easily recognized by the narrowed, usually acutely pointed elytra.

Acinopterus angulatus Lawson

1922. *Acinopterus angulatus* Lawson, Kans. Uni. Sci. Bul., xiv, p. 119.

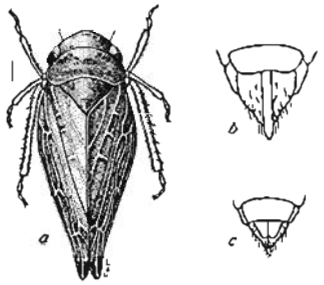

FIG. 25.—*Acinopterus angulatus* Lawson
a, dorsal, *b*, female, *c*, male genitalia
(Original)

Head nearly as wide as pronotum; vertex scarcely longer at middle than next to the eyes; pronotum faintly concave behind; elytra with prominent veins, the apex moderately acute. Female, last ventral segment twice as long as preceding with slight median notch. Male, valve hidden; plates short and narrowed to blunt tips; pygofer with rounded margins and rather strong setæ. Length female, 5 mm.; male, 4.5 mm.

Guyama, Jan. 12, 1929; Sabinas, Mar. 12, 1929 (H. O.). Also a specimen, "San Juan, P. R., July 9–12, 1914," from the American Museum of Natural History.

Thamnotettix Zett.

1840. *Thamnotettix* Zetterstedt, Ins. Lapponica Col., p. 292.

Genotype, *Cicada prasina* Fall.

Thamnotettix cubana Osborn

1928. *Thamnotettix cubanus* Osborn, Ann. Ent. Soc. Am., xix, p. 350.
1929. *Thamnotettix cubana* Osborn, Jour. Dept. Agr. P. R., xiii, p. 97.

"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

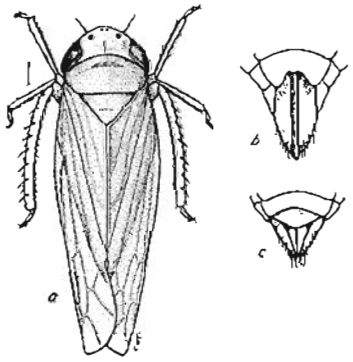

FIG. 26.—*Thamnotettix cubana* Osb. a, dorsal view, b, female, c, male genitalia (Original)

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." (Osborn.)

"This species was described from Cuba and has been taken most commonly on Guinea grass but sometimes in mixed areas of grass land. Records for Porto Rico including Guayama, Jan. 12, Aguirre, Jan. So far as present season observations go, the species does not appear to be abundant enough to have special economic importance." (Osborn.)

Thamnotettix rubicundula Van Duzee

1907. *Thamnotettix rubicundula* Van Duzee. Hem. Jamaica, Bull. Buf. Soc. Nat. Sci., viii, p. 70.

1929. *Thamnotettix rubicundula* Osborn, Jour. Dept. Agr. P. R., xiii, p. 93.

"Head subangulate, wider than pronotum; vertex longer at middle than at eye. Pronotum longer than vertex. Elytra with conspicuous venation. Female last ventral segment about twice as long as preceding, slightly concave, deeply and rather broadly incised at middle half way to base, incision bordered with dusky or black, with crescentric sub-margin at inner end—pygofer borders in some cases darkened. Male valve broad, as long as preceding segment broadly rounded behind, plates short, almost

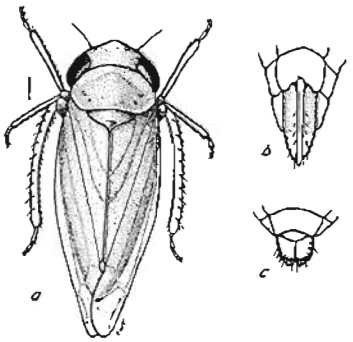

FIG. 27.—*Thamnotettix rubicundula* Van Duzee

a, dorsal view, b, female, c, male genitalia (Original)

truncate, hind margin with short spines or hairs about equalling pygofer in length; styles exposed and black tipped.

"Color uniformly rosy, fading to yellowish both above and below; the elytra subhyaline but suffused with rose color. The veins conspicuously red and, especially in males, a slight tendency to smoky on the apical part; legs a little paler and the tibial spines more or less blackish.

"Length: female, 3.5; male, 3.25 mm.

"Described from a large series of both sexes. Collected on *Sesuvium portulacastrum* at Aguirre, Feb. 20 and at Coquí, Feb. 22 and Ensenada, March 11. This is evidently the restricted host plant [at least in Porto Rico], as the species has not been taken from any other plant and nymphs of all stages or sizes have been taken with the adult.

"The nymphs of different instars are like the adults and the color agrees with the abundant reddish patches of the host plant which occur in extensive mats often with no other form of plant on the salt flat adjacent to the sea shore." (Osborn.)

Thamnotettix colonus (Uhler)

1895. *Deltocephalus colonus* Uhler, Proc. Zool. Soc. London, p. 80.
1915. *Athysanus villicus* Crumb, Ann. Ent. Soc. Am., viii, p. 194.
1917. *Thamnotettix colonus* Van Duzee, Cat. Hem., p. 634.
1923. *Thamnotettix colonus* Wolcott, Jour. Dept. Agr. P. R., vii, p. 284.
1924. *Thamnotettix colonus* Osborn, Ann. Carn. Mus., xv, p. 420.
1929. *Thamnotettix colonus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 97.

"Head slightly wider than pronotum, subangulate; vertex about as long as width between the eyes, more than half longer at middle than next the

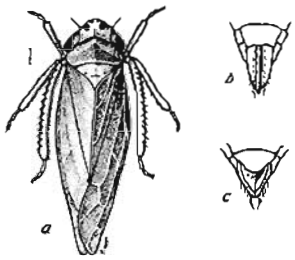

FIG. 28.—*Thamnotettix colonus* (Uhl.)
a, dorsal view, b, female, c, male genitalia. (Original)

eye; front narrowing to clypeus, with which it is apparently fused, and continued with nearly straight margins to tip; clypeus narrow, slightly widening toward tip; cheeks sinuate. Pronotum about as long as vertex, strongly arched in front; margin nearly straight behind; elytra without second cross-vein. *Genitalia:* female, last ventral segment half longer than preceding, truncate; *male,* valve triangular; plates broad at base, tapering to narrow tips.

"Light yellow; vertex with two large round black spots; face yellow, front and clypeus having brown borders, a blackish spot beneath antennæ, and two black dots bordering the eye. Pronotum yellow, with a brownish band near the hind border; scutellum yellow, with brownish triangles on the basal angles; elytra with brownish and yellow stripes, and a yellow corium and apex transparent, or slightly smoky.

"Length: 3.25 mm." (Osborn.)

This is a very abundant species over a large part of the Neotropics and may often be counted of economic importance. It was taken at practically all points where collections were made.

Thamnotettix comatus (Ball)

1900. *Deltocephalus comatus* Ball, Canad. Entomologist, xxxii, p. 343.
1917. *Thamnotettix comatus* Van Duzee, Cat. Hem., p. 084.
1929. *Thamnotettix comatus* Osborn, Ann. Carn. Mus., xv, p. 421.
1929. *Thamnotettix comatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 98.

"Closely resembling *T. colonus* (Uhler). Head wider than pronotum, subangulate; vertex a little wider than length at middle; one-fourth longer at middle than next the eye; front narrowed, scarcely separated from clypeus; clypeus with sides nearly parallel. Pronotum strongly arched in front, hind border nearly straight; elytral veins as in *T. colonus*. *Genitalia: female,* last ventral segment nearly twice as long as preceding,

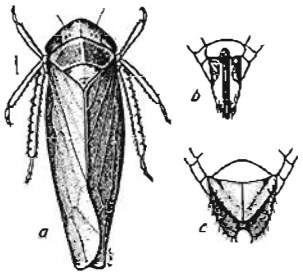

FIG. 29.—*Thamnotettix comatus* (Ball)
a, dorsal view, b, female, c, male genitalia (Original)

truncate or slightly concave; *male,* valve large, subangulate behind; plates short, triangular, tips bluntly angular.

"Greenish yellow; vertex pale yellow, two large round black spots nearer the eye than to the center; two minute dots at apex of center, and in strongly marked specimens a pair of dots near the eye and a short oblique line on the disk, black. Pronotum olive-green, paler in front, with a pair of brownish spots on the front border, and in strongly marked specimens black dots on the disk and an oblique dash at the side, black; scutellum pale yellow, with black triangles on base; elytra pale green, nervures lighter yellowish; face light yellow with brownish borders on front and clypeus, a black spot under antennæ and two black dots next the eye; thorax and abdomen mostly black. *Genitalia: female* pygofers yellowish, marked with black; *male,* valve and plates pale, the latter with an oblique fuscous mark near the border." (Osborn.)

"The record in Wolcott's catalogue for specimens occurring on carrots appears to be based on specimens which agree with *T. cubanus.* Specimens collected at Río Piedras agree very well with what I have as *T. comatus* from Central and South America, including specimens from the type material from Orizabo, Mexico, used by Dr. Ball [in his description], and on these I have based the record of the species for Porto Rico." (Osborn.)

Thamnotettix nigrifrons (Forbes)

1885. *Cicadula nigrifrons* Forbes, 14th Rept. Ill. St. Entom., p. 67, Pl. v, fig. 3.
1917. *Thamnotettix nigrifrons* Van Duzee, Catalogue Hemiptera, p. 694.

This is a pale species with usually a distinctly black front or with heavy black arcs that give the face a blackish appearance. A row of six small dots are located close to border of vertex and bend downward each side

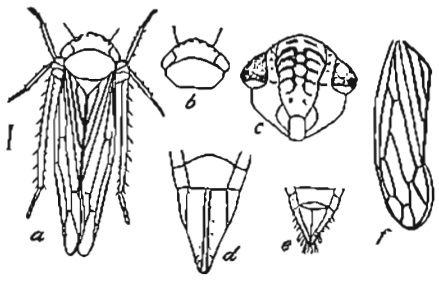

FIG. 30.—*Thamnotettix nigrifrons* Van Duzee

a, dorsal, *b*, vertex and pronotum, *c*, face, *d*, female, *e*, male, *f*, elytra (Author's illustration)

so the outer dots are on a level with the middle of the eye. Length: 3.5 mm.

It was taken at Loquillo, Santa Rita and Loiza (old).

Chlorotettix Van Duzee

1892. *Chlorotettix* Van Duzee, Psyche, vi, p. 300.

Genotype, *Bythoscopus unicolor* (Fitch).

Chlorotettix viridius Van Duzee

1892. *Chlorotettix viridius* Van Duzee, Psyche, vi, p. 300.
1924. *Chlorotettix viridius* Osborn, Jour. Dep. Ag. P. R., xiii, p. 99.

Light green, the head short; vertex borders nearly parallel, broadly rounded. Female segment with a distinct black tooth on the emarginate hind border. Male plates broad and very short. Length: 6–7 mm.

Apparently scarce in Porto Rico, although a very abundant species in southern United States and common in Cuba. "I took one example of this species at Loquillo, Feb. 11 and Wolcott lists it 'at light at Pt. Cangrejos'." (Osborn.)

Chlorotettix minimus Baker

1898. *Chlorotettix minimus* Baker, Canad. Entomologist, xxx, p. 220.
1923. *Chlorotettix minimus* Osborn, Ann. Carnegie Mus., xv, p. 74.
1920. *Chlorotettix minimus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 90.

"Head wider than pronotum, sub-angulate; vertex a little longer at middle than next the eye; front longer than wide, narrowing uniformly to clypeus; clypeus one-half longer than wide; lorae long, reaching nearly

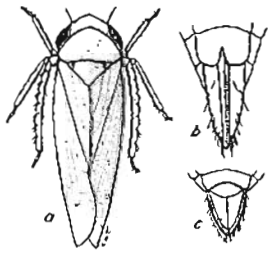

FIG. 31.—*Chlorotettix minimus* Baker
a, dorsal view, *b*, female, *c*, male genitalia
(Original)

to the border of cheek; cheeks slightly sinuate; pronotum twice as long as vertex, faintly concave behind. *Genitalia: female*, last ventral segment slightly longer than the preceding, hind border concave; a deep incision at the center; *male*, valve broad, sub-angulate behind; plates broad at base, tapering uniformly to acute tips.

"Pale straw-color; elytra hyaline, veins whitish.

"Length: female, 4.5 mm.

"In general small, pale, elytra transparent." (Osborn.)

"This species has a wide distribution in the tropical Americas from Brazil to Florida, but was not found in abundance at any point during my stay in Porto Rico. Ordinarily it may have considerable economic importance. Taken at Patillas, Jan. 22, Arecibo, Feb. 13, Espinoza, Feb. 6, Guayama, Jan. 12, Feb. 27, Añasco, Mar. 1, Fortuna, Mar. 15, Rio Piedras, Feb. 8, Feb. 14, Aguirre, Jan. 18, Ponce, Jan. 21 and Mar. 15." (Osborn.)

Chlorotettix tethys Van Duzee

1907. *Chlorotettix tethys* Van Duzee, Bul. Buffalo Soc. Nat. Sci., v, p. 71.
1923. *Chlorotettix bidentatus* DeLong, Jour. Dept. Agr. P. R., vii, p. 204.
1929. *Chlorotettix tethys* Osborn, Jour. Dept. Agr. P. R., xiii, p. 99.

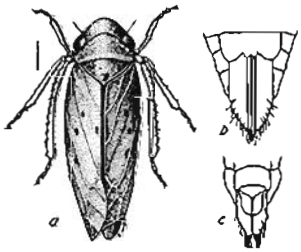

FIG. 32.—*Chlorotettix tethys* Van Duzee
a, dorsal view, *b*, female, *c*, male genitalia
(Original)

"Light green with no dark markings on head, pronotum or scutellum but with more or less distinct fuscous or blackish spots on the elytra; a faint dash next apex of inner cell of clavus, two distinct roundish spots, one on the base of the outer claval cell and one in base of discal cell and two oval or quadrate fainter blotches beyond the middle with smoky tint in apical areoles. Elytra greenish hyaline with faint iridescence. De Long says of color "Dull greenish yellow, unmarked" and in his type specimen the dusky spots of elytra are scarcely visible, possibly due in part to fading.

"Nymphs taken with adults Jan. 23, '29 at Salinas valley on mountain side, bright green, no marking with short scattered blackish hairs on abdomen." (Osborn.)

Common in many localities in grass land.

Chlorotettix nigromaculatus DeLong and Wolcott

1923. *Chlorotettix nigromaculatus* DeLong and Wolcott, Jour. Dept. Agr. P. R., vii, p. 265, Pl. I, fig. 5.
1929. *Chlorotettix nigromaculatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 99.

"One of the round-headed species, yellowish-green with brown markings. Length: 4.5 mm.

"Vertex well rounded in front, slightly longer on middle than next eyes and almost twice as wide between eyes as length at middle. Pronotum twice as long as vertex and almost twice as broad as long. Elytra rather long, appearing wedge-shaped when folded.

"Color: Vertex yellowish-green, ocelli large, reddish, a transverse brown band just above them not reaching eyes. A pair of large round black spots on rounded margin just below ocelli. Face yellowish with slight traces of arcs. Pronotum yellowish, unmarked. Scutellum with a large subtriangular dark brown spot in each basal angle extending under the pronotum. Elytra whitish, hyaline, nervules milky white, two oblique brown stripes on inner clavus between veins and a broader one between claval vein and corium. Some of the cells of corium yellowish.

"Genitalia: *Female* last ventral segment one-half longer than preceding, lateral angles produced, posterior margin shallowly concavely rounded and slightly notched at middle. A median brown stripe extends to base of segment.

"Described from a single female at light at Río Piedras (326-Oct. 10, 1922, GNW)." (DeLong and Wolcott.)

"No specimens of this species were taken during my stay on the island and as the species was described 'From a single female at light at Río

Piedras' nothing is known as to its food plant. There are two females from Gualan, Guatemala in the Ohio State University collection which agree with the type specimen from Porto Rico and which indicate a considerable range for the species. It may be expected to show up in Haiti, Cuba and probably other tropical localities." (Osborn.)

Jassus (Fabricius)

1803. *Jassus* Fabricius, *Syst. Rhyng.* p. 85.

Genotype, *J. nevosus* Fabricius.

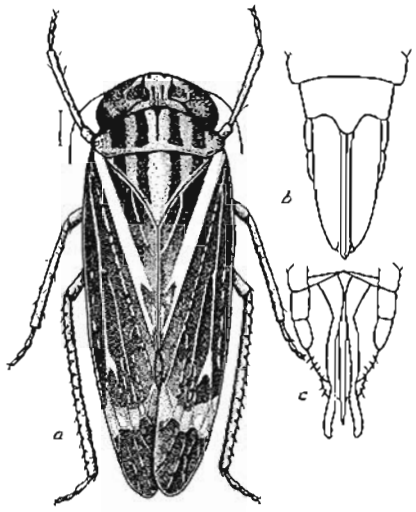

FIG. 33.—*Jassus obligatus*, n. sp.
a, dorsal view (male); b, female, c, male genitalia (Original)

Jassus obligatus, new species

1923. *Jassus obligatus* Wolcott, Jour. Dept. Agr. P. R., vii, p. 264. [Uhler, MS name.]

1929. *Jassus obligatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

Head nearly as wide as pronotum, vertex longer than wide, widening apically; front rather narrow, narrowed uniformly to base of clypeus, clypeus with sides nearly parallel, apex broadly rounded, lorae elongate, margin of cheek

abrupte. Pronotum scarcely as long as vertex, slightly excavate behind, pronotum and scutellum sparsely punctate, elytra extending a little beyond tip of abdomen, veins prominent, apical cells short. Female: last ventral segment produced on the middle nearly twice as long as preceding segment at the center, with a distinct carina, ovipositor slightly exceeding pygofer. Male: plates elongate, widening toward the tip; inner style thread-like, aedeagus slender.

Color brown; vertex disc with two narrow, fuscous, longitudinal lines behind transverse paler bar; base of front brown with two fuscous spots, disc of front yellowish with fuscous transverse bars and lateral margins below the eye, cheeks and clypeus yellowish somewhat tinged with brown; pro- and mesosternum blackish; legs light brown to yellow; venter yellowish; pygofers tinged with brown; elytra black, a prominent yellow stripe bordering clavai suture, divided near the apex, and the veins of corium bright yellow, the inner sector and inner branch of first sector with broken line of dots, a yellow patch at the end of the outer anteapical cell, apical cells fuscous, preceded by a subhyaline band crossing the apex of the anteapical cells. Male differs from female in coloration in that the pronotum, vertex and base of front and facial sutures are darker and the pronotum and inner part of clavus and corium pitchy black, the prominent yellow stripe on the sutural border of clavus scarcely broken at tip and the yellow stripe on the corium appearing only on the outer branch of first sector, the transverse hyaline band is occupied almost entirely by a yellow crossband, the apical cells being entirely fuscous except the narrow subhyaline margin; legs somewhat more yellowish.

Length of female 6 mm., male 4.5 mm.

Described from one female (holotype) Quebradillas, P. R., acc. 221, Aug. 21, 1921, G. W. Wolcott, coll., and two males (allotype and paratype) labelled "Woodford Est. leeward side, Granada, W. I., H. H. Smith," the allotype specimen with Uhler's name *obligatus* attached. All were kindly loaned for the description by the U. S. National Museum and their type number is 50582.

The species recorded by Wolcott under this name has, so far as I can learn, never been described and it is not mentioned by Henshaw in the list of species described by Uhler, nor can I find it mentioned in any way in Uhler's writings, most of which I have been able to consult repeatedly. I am using what appears to be a manuscript name of Uhler's and therefore no confusion need follow if it should turn out that a published description is extant. The entry in Wolcott's list gives "det. McAtee" and evidently this determination was based on a comparison with the specimen in the Uhler collection in the National Museum, which bears a label in Uhler's handwriting.

The host plant has been given as *Ficus laevigatus*.

Cicadula Zetterstedt

1840. *Cicadula* Zetterstedt, Ins. Lapp. Col., p. 296.

Genotype, *Cicada sexnotata* Fallen.

Cicadula sexnotata (Fall.)

1806. *Cicada sexnotata* Fallen, Acta Holm., xxvii, p. 34 (see Van Duzee's Catalogue for further bibliography).
1923. *Cicadula sexnotata* Wolcott, Jour. Dept. Ag. P. R., vii, p. 265.
1929. *Cicadula sexnotata* Osborn, Jour. Dept. Ag. P. R., xiii, p. 100.

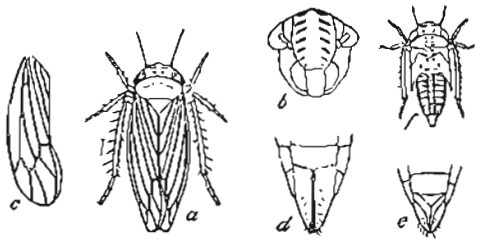

FIG. 34.—*Cicadula sexnotata* Fall.

a, dorsal view, *b*, face, *c*, elytron, *d*, female, *e*, male genitalia, *f*, nymph (Author's illustration, Bul. 108, Bur. Ent. U. S. D. A.)

Light yellow, the vertex with six spots, the two basal ones round, the others more or less rectangular, the anterior one being on the border between vertex and front and including the ocelli; the face with about five pairs of arcs. Female: last ventral segment truncate. Male, valve triangular; plates broad at base, narrowed to middle and extending in pointed tips to near end of pygofer. Length: 3.5–4 mm.

Cicadula sexnotata var.?

1929. *Cicadula sexnotata* var.? Osborn, Jour. Dept. Ag. P. R., xiii, p. 100.

"Taken on the Cayey Road at near 2,000 ft. elevation. This is larger than typical 6-notata and the black dots on the vertex are broader more squarish and the elytra are clouded more or less with fuscous, forming a fairly definite yellowish white saddle back of the scutellum." (Osborn.)

Cicadula maldis DeLong and Wolcott

1923. *Cicadula maldis* DeLong and Wolcott, Jour. Dept. Agr. P. R., vii, p. 265.
1929. *Cicadula maldis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 100.

"In coloration resembling a very pale *variata* Fallen, elytra long, resembling *Thamnotettix fitchii* Van Duzee, but with typical *Cicadula* venation. Length: 3.5–4 mm.

"Vertex roundingly produced, thick, about one-third wider between eyes than length at middle; pronotum one-half longer than vertex, very strongly convexly rounded anteriorly; elytra long, greatly exceeding abdomen in both sexes.

"Color: Straw yellow, vertex with a pair of large round black spots, one just behind each ocellus; frequently a small spot at tip of vertex, median impressed line and four spots at base a darker yellow. Pronotum with an indication of longitudinal vittæ. Basal angles of scutellum a darker yellow. Elytra yellowish, subhyaline, veins lighter.

"Genitalia: *Female* last ventral segment longer than preceding, posterior margin slightly produced on either side of a broad, rather shallow, median V-shaped notch, which is slightly embrowned. *Male* valve as long as preceding segment, convexly rounded. Plates exceeding valve by more than twice its length, broad at base, concavely narrowed at half their length to form narrow, rather sharp-pointed apices. A brown mark near outer margin of either plate at base. Pygofers exceeding plates.

"Adults and nymphs abundant on corn (448-17 TYPE) at San Sebastián (102-21) (at Haina, Santo Domingo, August 1920, GNW); on sugar cane (645-12); on carrots (540-17). Corn the normal and common host." (DeLong and Wolcott.)

"This is a distinctly marked species, nearly pure white with two conspicuous round black spots on the vertex close to the anterior border. Specimens were taken in a garden at Ciales, Feb. 9, where a few hills of corn were growing among beans, but not taken where corn was absent. At Río Piedras several small specimens were taken on a vacant lot with mixed weeds and grass but no corn, and specimens were also taken one evening at light at Dr. Cook's residence. Also at Arecibo, Feb. 13, Mayagüez, Mar. 2, Guayama, Feb. 27. Corn is no doubt its ordinary host as nymphs occur with adults on this plant. Outside of Porto Rico where it was first discovered it had been taken in Cuba." (Osborn.)

Balclutha Kirkaldy

1900. *Balclutha* Kirkaldy, Entomologist, xxxiii, p. 243.

Genotype, *Cicada punctatus* Thun.

Balclutha hyalina Osborn

1928. *Balclutha hyalina* Osborn, Ann. Ent. Soc. Am., xix, p. 352.
1929. *Balclutha hyalina* Osborn, Jour. Dept. Ag. P. R., xiii, p. 101.

"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." (Osborn.)

"This species was described by the author (1926) from specimens collected on a sedge at Jaronú, Cuba, and specimens agreeing with the type material were collected in Porto Rico on Cayey Road near Cayey at about 2,000 ft. elevation." (Osborn.)

Nesosteles Kirkaldy[1]

1906. *Nesosteles* Kirkaldy, Bull. No. 1, Pt. 9, Exp. Sta. H. S. P. A., p. 343.
1903. *Eugnathodus* Baker, Invertebrata Pacifica, 1, p. 1.
1933. *Egellus* DeLong and Davidson, Ohio Jour. Sci., xxxiii, p. 210.
1934. *Nesosteles* Osborn, B. P. Bishop Museum, Bull. 114, p. 263.

Genotype, *Nesosteles hebe* Kirkaldy.

Key to Porto Rican Species of Nesosteles

1. Clear green or greenish hyaline, elytra greenish hyaline ..... *virescens*
   Color mostly gray or ashy or suffused with rose or pink 2
2. Color green, strongly suffused with rose ..... *roseocus*
   Color varied but not definitely green 3
3. With pink or fulvous lines on the pronotum 4
   Without pink or fulvous lines on the pronotum 6
4. Vertex subangulate, longer at middle than at eye ..... *bisinuata*
   Vertex broadly rounded 5
5. Larger, female segment cleft at tip, male plates short ..... *guajana*
   Smaller, female segment simple, male plates short ..... *neglectus*
6. Larger, 3 to 3.25 mm., pale, vertex longer ..... *pallidus*
   Smaller, 2.25 to 2.50 mm., ashy, vertex short ..... *minutus*

Nesosteles bisinuatus (DeLong)

1923. *Eugnathodus bisinuatus* DeLong, Jour. Dept. Agr., vii, p. 286.
1929. *Eugnathodus bisinuatus* Osborn, Jour. Dept. Agr., xiii, p. 102.

[1] The genus *Eugnathodus* was based on specimens erroneously determined and the species name used for the type belongs in *Balclutha*, consequently *Nesosteles*, although described later, has been adopted for a group of species that seem certainly congeneric. For fuller discussion see Osborn (1934) on Cicadellidæ of Marquesas Islands.

"In coloration resembling *Baldutha osborni* Van Duzee, but with vertex as wide or wider than pronotum and with distinct genitalia. Length: 3–3.5 mm.

"Vertex broadly rounded, almost parallel margined, three and one-half times as wide between eyes as length at middle. Pronotum more than three times as long as vertex. Elytra long, greatly exceeding abdomen.

"Color: Bright green without definite markings. Eyes dark; elytra greenish, subhyaline. Beneath yellow to bright green.

"Genitalia: *Female* last ventral segment about as long as preceding, posterior margin bisinuate, forming three rather distinct lobes. A brown line indicates a more distinct trilobate condition, which is apparently covered posteriorly by a thin membranous portion. *Male* valve triangular, tip blunt or truncate. Plates exceeding valve by one and one-half times its length, short and broad, broadly rounded at apex. A rather long narrow process extends dorsally from the dorsal surface of each plate.

"Described from a large series of specimens from seed heads of malojillo grass, *Panicum barbinode*, at Río Piedras, March 2, 1923 (GNW)." (DeLong.)

"Recorded by Wolcott for several localities and described as from seed heads of malojillo grass, *Panicum barbinode*. Also mentioned as occurring on sugar cane, sweet potato, carrots, sedge and bermuda grass. I collected it at Vega Alta Feb. 6 and Río Piedras Feb. 8, etc." (Osborn.)

Nesosteles guajana (DeLong)

1923. *Eugnathodus guajana* DeLong, Jour. Dept. Agr. P. R., vii, p. 267.
1929. *Eugnathodus guajana* Osborn, Jour. Dept. Agr. P. R., xiii, p. 102.

"Resembling *E. abdominalis* Van Duzee in form and coloration, but with distinct genitalia. Length: 3.5–4 mm.

"Vertex broadly rounded, almost parallel margined, about four times as wide between eyes as length at middle. Pronotum three and one-half times as long as vertex. Abdomen extending only slightly beyond apex of clavus.

"Color: Yellow to pale brownish, often tinged with pink. In well marked specimens, the brownish or pink longitudinal vittæ are distinct and cross vertex and pronotum. Elytra milky white, subhyaline, often tinged with pink. Beneath yellowish.

"Genitalia: *Female* last ventral segment about twice as long as preceding, posterior margin rather deeply and narrowly notched at middle, forming two broadly-rounded lobes. *Male* valve triangular, apex blunt.

Plates convexly rounded, apices narrowed, up-turned tips often visible from beneath. Pygofers exceeding plates in length.

"Described from a series from arrows of sugar cane or 'guajanas' at Rio Piedras (377-22).

"(As 'Cane Seed-Head Leafhopper' [*Balclutha* sp.] in part) Smyth 19-107: 'In December and January it occurred in the greatest abundance in the seed tassels of such cane plants as bore seed, and is believed to have been a principal cause of the low fertility of the seed. For this reason it may be a serious retarding factor in production of new cane varieties. The nymphs, which are dark in color with lighter dorsal stripe, could be shaken by thousands from a single cane seed tassel. They are heavily preyed upon by larvae of a Syrphid fly' (*Allograpta limbata* Fabr.).

"On sugar cane at Aguadilla (31-22) at Vega Alta (Jan. 21, 1920 GNW) and from Vieques Island (Dec. 20, 1919 GNW)." (DeLong.)

"The arrow leaf hopper, *Eugnathodus guajanæ*, described as occurring in "arrows" of cane was taken in small numbers from cane "arrows" on the few occasions when I had opportunity to examine them and then only by vigorous beating, never on cane not in bloom. It was taken frequently in sweeping grass even when far distant from cane and it seems evident that it is a general grass feeder and occurs on cane only when it is in bloom. As its presence in the arrows can have very little economic importance unless it is shown to be a carrier of some plant disease its relation to cane may be considered negligible. On grass it may be of some consequence although in collections that I made it has never appeared in great abundance but most commonly on native grass which has possible forage value on the hillsides.

"Like many other species its importance depends on abundance on a crop of agricultural value and it may have been much less abundant the past winter on account of storm." (Osborn.)

Nesosteles minutus (Osborn)

1920. *Eugnathodus minutus* Osborn, Jour. Dept. Agr., P. R., xiii, p. 101.

"Small, slender, head distinctly wider than pronotum, slightly tumid; eyes prominent; vertex a little longer at middle than next the eye; pronotum short, longer than vertex; elytra narrow, costa only slightly curved. Female last ventral segment truncate, one half longer than preceding. Male valve hidden or wanting; plates small, triangular, reaching tip of pygofer.

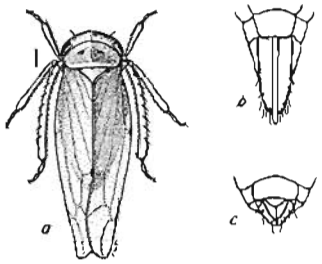

FIG. 35.—*Nesosteles minutus* (Osb.)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

"Color pale ash gray, almost white, face and pronotum faintly tinged with yellow or buff; pectus blackish, legs white; abdomen tinged with greenish.

"Length, female 2.75, male 2.50 mm.

"Described from a series of five specimens, female (type) male (allotype) and paratypes collected from matted grass at sea level, salt flat association. Aguirre, Feb. 18 and 23, 1929. This is the smallest species known to me; smaller than *pallidus* or *abdominalis* [*neglectus*] which it resembles in form, but there are no traces of the stripes on head and pronotum, usually conspicuous on the latter." (Osborn.)

Nesosteles pallidus (Osborn)

1926. *Eugnathodus pallidus* Osborn, Ann. Ent. Soc. Am., xix, p. 352.
1929. *Eugnathodus pallidus* Osborn, Jour. Dep. Ag., P. R., xiii, p. 101.

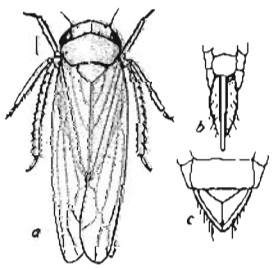

FIG. 36.—*Nesosteles pallidus* (Osb.)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

"Similar to *abdominalis* [*neglectus*], 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 infuscate 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." (Osborn.)

"Taken at Río Piedras, Feb. 14. Heretofore known from Cuba only." (Osborn.)

Nesosteles virescens (Osborn)

1926. *Eugnathodus virescens* Osborn, Ann. Ent. Soc. Am., xix, p. 351.
1929. *Eugnathodus virescens* Osborn, Jour. Dept. Ag., P. R., xiii, p. 101.

"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. (Osborn.)

"Examples of this species originally described from Cuba were taken at Río Piedras, Feb. 14, from grass on Insular Experiment Station grounds." (Osborn.)

Nesosteles rosaceus Osborn

1929. *Eugnathodus rosaceus* Osborn, Jour. Dept. Agr., P. R., xiii, p. 102.

"Head slightly wider than pronotum; vertex short, rounded anteriorly, faintly angulate, two thirds as long as the pronotum; female last ventral segment as long as preceding and broadly rounded on posterior border. It is quite distinctly polished as are other segments of the abdomen in most specimens.

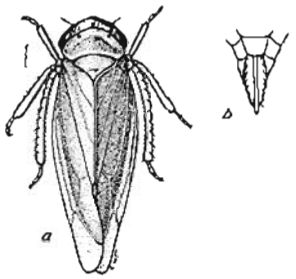

FIG. 37.—*Nesosteles rosaceus* (Osb.)
a, dorsal view, *b*, female genitalia (Original)

The color is a bright pink or reddish rose color, specimens varying from bright pink to reddish or rose red, the whole body above and beneath as well as elytra being suffused with the color in varying intensity.

"Length 3.5 mm.

"Described from a series of twenty females collected from seed heads of a sedge *Fimbristylis spadicea* at Aguirre Feb. 18 and 23." (Osborn.)

Nesosteles neglectus (DeLong and Davidson)

1903. *Eugnathodus abdominalis* Baker, Invertebrata Pacifica, I, p. 1.
1929. *Eugnathodus abdominalis* Osborn, Jour. Dep. Ag. P. R., xiii, p. 101.
1933. *Eugnathodus neglectus* Delong and Davidson, Ohio Jour. Sci., xxxiii, p. 55.

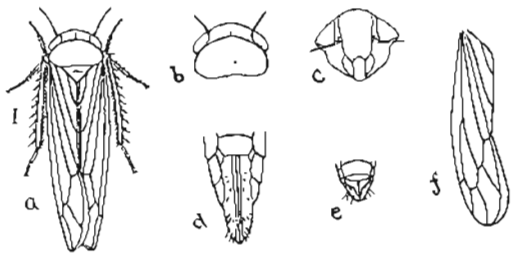

FIG. 38.—*Nesosteles neglectus* (DeL. & D.)
a, dorsal view, *b*, head and pronotum, *c*, face, *d*, female, *e*, male genitalia, *f*, elytron (Author's Illustration)

Head slightly wider than pronotum, vertex with nearly parallel margins. Elytra narrow, the body as a whole with nearly parallel sides. Female: last ventral segment truncate. Male: valve small, plates short,

narrowed abruptly to middle, the apices acute, upturned, reaching nearly to tip of pygofer.

Light gray, the vertex and pronotum with narrow parallel stripes, often obscure.

Length: 3 mm.

This species has stood under the name *abdominalis* since its reference by Baker, but study of Van Duzee's description and comparison of type specimens show the true *abdominalis* to be a *Balclutha*.

In a recent article DeLong and Davidson (1933) have described the species under the name used here.

The Porto Rican specimens were taken at Aguirre, Jan. 18, 1929, Arecibo, Feb. 13, Fortuna, March 15.

Typhlocybinæ

These are all delicate and small insects, usually of light whitish or green color, ocelli inconspicuous though present in some genera, the elytral veins run without forking to the crossveins, and the clavus may or may not be followed by an appendix. Porto Rican genera may be separated as follows:

Key to the Porto Rican Genera

1. Elytra with a narrow appendix beyond the clavus.....*Protalebra*
   Elytra without appendix beyond clavus..... 2
2. Wings with crossvein on disk, submarginal vein ending in first sector.... 3
   Wings with the submarginal vein continued in first sector to or near costa.. 4
3. Wings with one closed apical cell.....*Empoasca*
   Wings with one closed and one open apical cell.....*Jorma*
4. Body not depressed..... 5
   Body and the head much flattened..... 6
5. Submarginal vein of wing joining costa.....*Typhlocybella*
   Submarginal vein of wing not united to costa.....*Dikraneura*
6. Crossvein present on disk of wing.....*Dikrancura* (*Hyloidea*)
   Crossvein not present in disk of wing.....*Hybla*

Protalebra Baker

1899. *Protalebra* Baker, Psyche, viii, p. 405.

Genotype, *Protalebra curvilinea* Baker.

Key to the Porto Rican Species of Protalebra

1. Elytra with conspicuous transverse curved or zigzag lines..... 2
   Elytra with longitudinal stripes.....*aureovittata*
2. White with black lines or bars..... 3
   Yellow or yellowish white or orange with dark lines or bars..... 5

3. Elytral picture with curved lines 4
   Elytral picture with white saddle ..... *lenticula*
4. Tip of scutellum black ..... *cordia*
   Tip of scutellum infuscate ..... *tabebuia*
5. Vertex infuscate ..... *brasiliensis*
   Vertex orange or fulvous 6
6. Cross bands on elytra straight or slightly curved ..... *similis*
   Cross bands on elytra zigzag ..... *zicsac*

Protalebra aureovittatus (DeLong)

1923. *Alebra aureovittatus* DeLong, Jour. Dept. Agr. P. R., vii, p. 287.
1929. *Protalebra aureovittatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 105.

"Size and form of *curvilinea* with distinct coloration. Length 3 mm.

"Vertex rather long and conical, very narrow between the eyes, almost one-half longer on middle than width between the eyes. Pronotum wider than head, twice as wide as long, longer than vertex, posterior margin strongly concave, humeral angles prominent; scutellum proportionately large. Elytra much longer than abdomen.

"Color: Vertex, pronotum and scutellum white, disc of pronotum bright yellow. Elytra white, a broad commisural line reaching to apex of clavus, outer claval vein and apex usually marked with yellow; a smoky spot on tip of clavus, one usually on costal area two-thirds the distance to apex and a round, dark brown spot on basal portion of central apical cell.

"Genitalia: *Female* last ventral segment longer than preceding, lateral margins rounded to posterior margin, which is gradually produced to a central, angular, toothed portion. *Male* valve very short, longest at sides, concavely rounded. Plates rather narrow, extremely long, concavely rounded and produced about five times length of last ventral segment, set with numerous white hairs and each armed with two large black spines at about its middle.

"Described from a series of three females and four males, from underside of leaves of shoots of undetermined tree at Ciales (221—Aug. 22, 1922, GNW)." (DeLong.)

Specimens were taken at Yabucoa Jan. 19 and on the Cayey Road near Cayey at about 2,000 ft. elevation on Jan. 28.

The specimens I described as *pallida* from San Sebastián have the yellowish stripes very faint but I believe they should be placed with the other under one specific name, though additional material may warrant a varietal name." (Osborn.)

Protalebra cordia Osborn

1920. *Protalebra cordia* Osborn, Jour. Dept. Agr. P. R., xiii, p. 102.

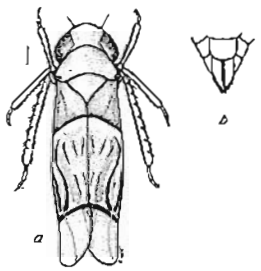

FIG. 89.—*Protalebra cordia*, Osb.
a, dorsal view, b, female genitalia (Original)

"Head scarcely as wide as base of pronotum; vertex subangular, rounded to front; elytral appendix narrow. Female last ventral segment elongate, twice as long as preceding segment and narrowed, produced on hind border with a median black tip. Pygofer with pale bristles; ovipositor yellowish. Male plates narrow, elongate, tapering to acute tips, extended to tip of pygofer. Under and seen through the subhyaline plates near the base, two points are visible, probably tips of male claspers.

"Color white, the head with disk of vertex, a band between eyes and lower part of face yellow; propleura and base of elytra orange, tip of scutellum black. Elytra tinged with greenish, crossed by an oblique black line at middle of clavus, bordered behind with white; four black longitudinal lines or dashes, one, short, on clavus, two sinuate or arcuate on disk of corium and one strongly arcuate near costa reaching to crossveins where they merge with a black line before the crossveins; crossveins white, bordered behind with black which extends along costa to apical cell; the membrane clouded with smoky on the disk; tibial spines and tarsal claws black.

"Length 2.5 to 3 mm.

"Taken in numbers from *Cordia* sp. at Aguirre, males, females and nymphs occurring on the under side of leaves, Jan. 17 and 18. Also at Coama, Jan. 13, 1929.

"The nymphs associated with the adults and quite certainly of this species, though not bred, are white, faintly tinged with yellow and in fresh specimens the eyes are greenish white as in the adults. The head thorax, wing pads and abdomen are set with scattered, stiff, black hairs.

"The species is somewhat similar to *P. curvilinea* but the picture is different. It has been taken only on the *Cordia*, which may be considered a normal if not an exclusive host." (Osborn.)

Protalebra tabebuiæ Dozier

1927. *Protalebra tabebuiæ* Dozier, Jour. Dept. Agr. P. R., x, p. 280, fig. 2.
1928. *Protalebra bicincta* Osborn, Ann. Car. Mus., xviii, p. 259.
1929. *Protalebra tabebuiæ* Osborn, Jour. Dept. Agr. P. R., xiii, p. 104.

"Head scarcely as wide as pronotum, somewhat produced, scarcely angulate; vertex one-half longer at middle than at eye. Pronotum nearly twice as long as vertex. Last ventral segment of female nearly twice as long as preceding, faintly sinuate.

"Ivory-white; eyes tinged with red; proootum in type specimen with a glistening fulvous spot on disk, faint in paratype; a reddish brown spot on lateral margin. Pronotum with a narrow dark margin; elytra subhyaline, basal and middle third whitish, suffused with yellow; a double band across middle of clavus and a single band of fuscous at tip of clavus, dark fuscous; scutellum, border of clavus, and apical veins, infuscate. Two large anteapical spaces milky hyaline. Beneath ivory-white, ovipositor tinged with reddish. Length, 3 mm." (Osborn.)

"I took this species in considerable numbers from "robles" on the Station grounds at Río Piedras. One small tree was so much infested as to have the leaves whitened. Apparently restricted to this tree as a host plant as no other occurrences have been noted. I described the species from specimens sent me by Dr. Dozier but publication was delayed and his description, appearing a few months before mine was printed, had failed to come to my notice. In my note with the description the word "robles" has been translated for me as "oaks" but the name roble is applied in Porto Rico to trees of the genera *Tabebuia* and *Bourreira* according to Cook and Gleason." (Osborn.)

Protalebra lenticula Osborn

1929. *Protalebra lenticula* Osborn, Jour. Dept. Agr. P. R., xiii, p. 103.

"Head as wide as pronotum, vertex produced, subangulate, rounded at tip, as long as pronotum; pronotum narrowed anteriorly, strongly curved, hind border scarcely concave; scutellum small, tip acute; elytra with costa distinctly convex, appendix narrow. Female last ventral segment elongate, angular; male, valve minute or hidden, plates elongate triangular, with acute tip, borders with white cilia.

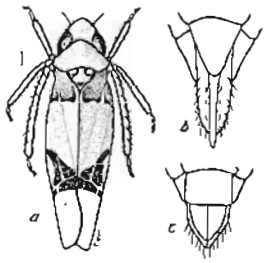

FIG. 40.—*Protalebra texticula* Osb.
a, dorsal view, *b*, female, *c*, male genitalia
(Original)

"Ivory or milky white, the anterior part of pronotum banded or suffused with pale orange, scutellum with black dots in the angles, the apical one larger; elytra milky hyaline, a distinct curved narrow blackish band just back of the scutellum, preceded by an orange brownish area, central part forming a broad white saddle or band with two faint longitudinal golden yellow stripes reaching to a broad blackish band with angular anterior projections on cross nerveures, and faint smoky patches on the membrane.

"Length 2.5 mm." (Osborn.)

A number of specimens were taken at Cosmo on Jan. 13, 1929. Type and paratypes in author's collection, Ohio State Univ.

Protalebra brazilicnsis Baker

1899. *Protalebra brazilicnsis* Baker, Psyche, viii, p. 405.
1917. *Protalebra brazilicnsis* Van Duzee, Catalog Hemipt., p. 698.
1928. *Protalebra brazilicnsis* Osborn, Ann. Car. Mus., xviii, pp. 201-202.

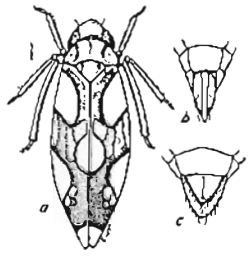

FIG. 41.—*Protalebra brazilicnsis* Bak.
a, dorsal view, *b*, female, *c*, male genitalia
(Original)

"Head as wide as pronotum, somewhat produced, sub-angulate, face narrow. Pronotum slightly wider than vertex; scutellum large; elytra

broad at the middle, costa distinctly curved. Last ventral segment of female as long as preceding, truncate. Last visible segment of male equal to preceding, valve hidden, plates wide at base, separate at middle, narrowing to acute tips, as long as pygofer.

"Light yellow with hind border of vertex, most of pronotum, scutellum, inner border at base of clavus, a broad band across middle of corium and apex beyond transverse veins, dark fuscous; base and a broad area beyond the middle band and apex of clavus, yellow, or yellowish white, sometimes nearly clear; spots near tip of clavus and in the anteapical areoles hyaline; beneath bright yellow, tips of tarsi dusky. Length, 3 mm." (Osborn.)

I have seen numerous specimens from Guatemala, Panama, Cuba, Barbados, Florida and other tropical localities. This is one of the commonest and most abundant species of tropical and sub-tropical America. Porto Rico specimens from Catano, Feb. 7, 1929.

Protalebra zigzac Osborn

1929. *Protalebra zigzac* Osborn, Jour. Dept. Agr., P. R., xiii, p. 104.

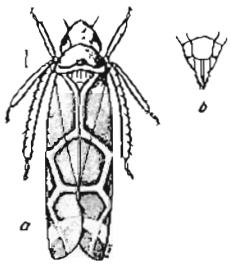

FIG. 42.—*Protalebra zigzac* Osb.
a, dorsal view, b, female genitalia (Original)

"Head produced, vertex angular, as long as pronotum, a trifle longer than width between the eyes; elytra long, appendix narrow at base, widening to apex. Female last ventral segment long, twice as long as preceding, hind border nearly truncate.

"Pale yellow, vertex and pronotum tinged with orange, base of vertex and three diffuse spots on disk, base of pronotum except for a narrow black line, inner border of clavus and zigzag lines on the elytra whitish, bordered with black; base and apex of clavus and discal area on corium greenish orange; cross veins in part yellow; apical veins white bordered with blackish; beneath pale yellow or whitish, base of apical tarsal joint dusky.

"Length, 2.75 mm.

"Described from one female (type) swept from mixed grass and weeds near Mayagüez in the Añasco valley March 1, 1929.

"This has the general appearance of *similis* but the white markings on the elytra have a distinctly different angular picture." (Osborn.)

Protalebra similis Baker

1899. *Protalebra similis* Baker, Psyche, viii, p. 403.
1928. *Protalebra similis* Baker, Annals Carnegie Mus., xviii, pp. 263-264.
1929. *Protalebra similis* Osborn, Jour. Dept. Agr., P. R., xiii, p. 104.

"Head scarcely as wide as pronotum. Vertex rather flat, produced, subangulate, as long as width between the eyes, margin obtusely angulate; face polished; lorœ and cheeks elongate, narrow. Pronotum slightly longer than vertex. Last ventral segment of male scarcely as long as preceding, hind border faintly sinuate; valve wanting; plates convex, elongate, triangular, tips blunt, slightly upturned.

"Vertex dark orange, with a white sub-margin, and a black band on the border between the eyes, below which is a white band; the rest of the face, except tip of clypeus, jet-black. Pronotum dull orange, with a conspicuous submarginal black band; scutellum brown; elytra olive-green with black stripes on basal part; a black lunate band at middle of clavus and black stripes followed by a transparent band, beyond which the clavus is black. Corium with two black stripes; a black costal patch; apical cells with a large hyaline patch on the submargin; beneath black. Last ventral segment and apical cells of plates tawny; legs white, the hind pair with fuscous patches on femur and tibia. Length, 2.5 mm." (Osborn.)

"A specimen collected at Espinoza in low ground mixture of weeds adjacent to tomatoes. A previous record by the writer in Annals Carnegie Museum (1928, p. 264) is based on a specimen from Vega Baja which is, rather curiously, not distant from the point where I took the specimen here recorded. I have also a specimen from Mayagüez collected by Mr. W. V. Tower." (Osborn.)

Protalebra bifasciata (Gillette)

1898. *Alebra bifasciata* Gillette, Proc. U. S. Natl. Mus., xx, p. 711.
1927. *Protalebra bifasciata* Dozier, Jour. Dep. Ag. P. R., x, p. 200.
1929. *Protalebra bifasciata* Osborn, Jour. Dep. Ag. P. R., xiii, p. 105.

"Color yellow, with two broad transverse bands of black on the elytra. Length, 3 mm.

"Face light yellow, unicolorous; clypeus long and considerably exceeding the genæ, entire length of face exceeding the breadth by about one-

third of the latter. Head small, distinctly narrower than the pronotum; vertex yellow, without markings, strongly produced, eyes large and black. Pronotum entirely yellow and but little longer than the vertex. Scutellum entirely black, except the extreme apex, which, in three examples, is whitish. Elytra yellowish, with a broad black or smoky band at their base and another at the cross-veins; extreme tips hyaline or nearly so. . . . Abdomen entirely yellow, or with the terminal segments of the tergum black. Last ventral segment of female moderately produced and entire. Legs entirely pale yellow.

"In two of the males the dark basal band of the elytra does not quite reach the costal margins.

"Described from four males and one female taken by Mr. H. H. Smith at Chapada, Brazil." (Gillette.)

Dozier records a specimen taken by beating a thorny leguminous bush at Juana Diaz, Feb. 11, 1925. I have no further record of occurrence in Porto Rico.

Empoasca Walsh

1864. *Empoasca* Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 315.

Genotype, *E. viridescens* Walsh (= *Tettigonia fabæ* Harris.)

1. Very small, length 2 mm., color pale yellow or golden.....*minuenda*
   Larger, length more than 2.5 mm. 2
2. Elytra without spots. Green .....*fabæ, gossypii, fabalis*
   Elytra with brown spots.....*sex-maculata*

Empoasca fabæ (Harris)

1841. *Tettigonia fabæ* Harris, Rept. on the Insects of Massachusetts Injurious to Vegetation, p. 180.
1853. *Empoasca mali* LeBaron, Observations upon two Species of Insects Injurious to Fruit Trees, Prairie Farmer, xiii, p. 330.
1924 *Empoasca fabæ* Ball, Jour. Econ. Ent., xvii, p. 508.
1929. *Empoasca fabæ* Osborn, Jour. Dep. Ag. P. R., xiii p. 105 (part).
1931. *Empoasca fabæ* DeLong, Tech. Bull. U. S. Dep. Ag. (Bur. Ent.) 231, p. 47.

"Vertex bluntly angled, a little longer on middle than next eye and about one-third wider between eyes than length at middle. Length, 3.5 mm.

"Color: Yellowish to pale green, markings variable; vertex frequently with pale or dark green spots along anterior margin which are sometimes missing or indistinct; elytra greenish subhyaline.

"Female genitalia: Last ventral segment moderately produced and roundedly truncated.

"Male genitalia: Valve produced and rounded or bluntly angled; plates triangularly tapered to pointed apices which are frequently upturned. Of the male genital pieces, the lateral processes of the pygofers are rounded on inner margins and broadened on apical half, then concavely rounded to narrow attenuated tips which are slightly curved inward; the spines of the tenth segment are broad with tips narrowed and directed downward. This combination of characters will distinguish it from the closely related species." (DeLong.)

The records given previously for Porto Rico have no doubt included both this species and *fabalis*, as specimens referred to Dr. DeLong have been found to represent both species. The species are separated positively by characters of the male genitalia. My specimens, identified by Dr. DeLong, are from Lares, Feb. 12, 1929, and Catano, Feb. 7, 1929.

Empoasca faballs DeLong

1923. *Empoasca mali* Le Baron, (= *E. flavescens* Fabricius by DeLong), Wolcott, Journal Ag. P. R., vii, p. 209.
1929. *Empoasca faba* Osborn, Jour. Dep. Ag. P. R., xiii, p. 105 (in part).
1930. *Empoasca fabalis* DeLong, Can. Ent., LXII, p. 92.
1932. *Empoasca fabalis* DeLong, Jour. Dep. Ag. P. R., xiv, p. 113.

"Resembling *faba* in size, form and appearance, but with distinct genital characters. Size, 3 mm.

"Vertex strongly produced about one third its length before anterior margins of eyes. One-third wider between eyes than length at middle. Pronotum one-third longer than vertex.

"Color pale green without distinct markings. Usually with irregular mottling and varying longitudinal stripes, white. A pair of oblique dark green spots either side of and back of apex.

"Genitalia: Female last ventral segment roundingly produced and entire. Male valve twice as long as preceding segment, posterior margin almost truncate. Plates long and narrow, gradually tapered to rather acute tips; more than twice as long as valve.

"Male internal genital structures: In ventral view styles short, slender, very narrow at apices which are bent outwardly. Lateral process of pygofers long and tapered. Apical fifth very narrow and slightly bent inwardly (in ventral view). Dorsal spines of pygofers heavy at base but rapidly narrowed to ventrally directed and slightly anteriorly hooked processes.

"*Holotype.*—Male labeled Port-au-Prince, Haiti, June 18, 1929." (DeLong.)

Most specimens taken in Porto Rico should quite certainly be referred to *fabalis*. The species is abundant and injurious to sweet potato, beans, morning glory, etc. Specimens definitely identified by Dr. DeLong were taken at Río Piedras, Feb. 8, 1929.

Empoasca gossypii DeLong

1932. *Empoasca gossypii* DeLong, Jour. Dep. Ag. P. R., xvi, p. 154.

"Appearance and general form of *fabæ* but smaller and with distinct male genitalia. Length: 2.8 mm.

"Vertex almost one-third wider between eyes than length at middle. Pronotum two-fifths wider than long. Humeral angles prominent, posterior margin strongly concave.

"Color greenish marked with white and yellow. Vertex yellowish green mottled with white. Pronotum yellowish, subhyaline. Anterior and lateral margins marked with white. Scutellum mostly white. Elytra greenish, subhyaline with yellowish green longitudinal striping sometimes very faintly colored.

"Genitalia: Female last ventral segment as long as basal width. Posterior margin with lateral angles rounded and slightly indented either side of a median slightly produced broadly angled lobe which is about half the width of the segment. Male plates more than two and one-half times as long as combined width at base rapidly narrowed to compressed, flaring, and upturned apices. Ventrally set with long brownish spines.

"Male internal genital structures: Styles strongly curved outward apically in ventral view. Lateral processes of pygofers short and rather stout, gently curved dorsally. Dorsal spines of pygofers wide at base curved ventrally, bifurcate apically.

"This is the only species of *Empoasca* except *bifurcata*, a common species in the Eastern United States, which is known to have a bifurcate dorsal spine. It can easily be distinguished from the other described species in Haiti by this character.

"Described from 35 female and male specimens collected from cotton at Hinche, Haiti, September 12, 1931, by Dr. H. L. Dozier.

"Holotype male labeled Hinche, Haiti, September 12, 1931." (DeLong.)

My Porto Rican specimens, kindly identified by Dr. DeLong, were taken at Añasco, March 1, 1929.

Empoasca sexmaculata DeLong

1923. *Empoasca sexmaculata* DeLong, Jour. Dept. Agr. P. R., vii, p. 270.
1929. *Empoasca sexmaculata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 105.

"Resembling *mali*, but with vertex more angulate and with brown spots on elytra. Length: 3.3 mm.

"Vertex bluntly, angularly produced, almost as long as width between eyes. Pronotum with prominent humeral angles. Elytra greatly exceeding abdomen. No cross vein in wing forming a short closed cell as in typical *Empoasca* species.

"Color: Pale white to yellow, slightly tinged with green. A pale orange area close to base on costa, a large round spot on clavus just back of scutellum, a paler one just back of apex of clavus and a third one, pale, on inner margin of inner apical cell, brown. Face and beneath white, tinted with yellow.

"Genitalia: *Female* last ventral segment rather long, roundingly produced, posterior margin rather broadly embrowned. *Male* valve roundingly produced, longer than last ventral segment. Plates rather narrow and greatly elongated, their inner margins turned in, to form tubular structures which are produced upwards.

"Described from a pair, on "emajagua," *Parlium tiliaceum*, at Pt. Cangrejos, (Jan. 13, and May 29, 1920 GNW), causing yellowing of the leaves. Large and small nymphs present.

"The male genitalia are very distinct from other Empoascas." (DeLong.)

No specimens were encountered in my collecting.

Empoasca minuenda Ball

1921. *Empoasca minuenda* Ball., Proc. Biol. Soc. Wash., xxxiv, p. 23.
1926. *Empoasca minuenda* Dozier, Jour. Dep. Ag. P. R., x, p. 261.
1929. *Empoasca minuenda* Osborn, Jour. Dep. Ag. P. R., xiii, p. 105.

"Golden or pale yellow, minute, with a roundingly right-angled vertex. Length, 2 mm.

"Vertex distinctly produced, roundingly right-angled, shorter than its basal width, broadly rounding to the front. Pronotum slightly longer than the vertex. Elytra longer than in *typhlocyboides*, resembling *mali* in form. Venation of hind wing typical; elytron with the first apical cell very broad and extending nearly one-third its length beyond the base of the second cell which is parallel margined; the third cell very variable, usually small and triangular but varying to long and parallel depending

on whether the second and third nervures arise as a single nerve and fork later or as separate nervures which in extreme cases are parallel.

"Color.—Varying from a pale lemon to golden yellow with the scutellum touched with orange and white. Eyes fuscous, tip of ovipositor often brown above. The more golden specimens often show a pruinose white area midway on the costa.

"Genitalia.—Female segment moderately rounding posteriorly, the margin entire. Male plates long, triangular, the attenuate tip curved upward and slightly individually rounded at the apices.

"Described from eight examples from G. F. Moznette, taken on avocado at Miami, Florida. Type ♀ and allotype ♂ in the author's collection, paratypes in the author's and Mr. Moznette's collection." (Ball.)

This was described as occurring on avocado leaves in Florida and Dozier records it from the same host in Porto Rico.

Joruma McAtee

1924. *Joruma* McAtee, Fla. Entomologist, viii, p. 34.

Genotype, *J. pisca* McAtee.

Joruma pisca McAtee

1924. *Joruma pisca* McAtee, Fla. Entomologist, viii, p. 34.
1926. *Joruma pisca* Dozier, Jour. Dept. Agr. P. R., x, p. 202.
1929. *Joruma pisca* Osborn, Jour. Dept. Agr. P. R., xiii, p. 105.

"Head and thorax dark brown above appearing as if underlaid by reddish; teguina uniformly fumose with dark greenish reflections; most of face and legs pale yellow, the upper part of front and anterior part of vertex, more or less reddish, sometimes paler just around ocelli; abdomen chiefly brown above and pale yellow below with edgings of the alternate color; pleural regions more or less reddish. Length: 3 mm." (McAtee.)

This species did not appear in any of the collections I made while in Porto Rico. Dozier took a single specimen at Aguirre.

Joruma brevidens (DeLong)

1923. *Empoasca brevidens* DeLong, Jour. Dept. Agr. P. R., vii, p. 269.
1929. *Joruma brevidens* Osborn, Jour. Dept. Agr. P. R., xiii, p. 105.

"Vertex roundingly, almost conically, produced, as long as width at middle, ocelli large and readily seen from above. Pronotum longer than

vertex and more than twice as wide as long. Elytra rather long, greatly exceeding the abdomen. Venation of underwings rather unique: although there is only one closed cell, there is one open cell on the costal apical portion.

"Color: Vertex, eyes, pronotum, scutellum and dorsum of body are shining black. Elytra smoky green at base, tips smoky, subhyaline. Face dull reddish above, yellow below. Ventral portion of thorax yellow, of abdomen shining black, last two segments milky white.

"Genitalia: *Female* last ventral segment rather long, lateral angles prominent, posterior margin slightly excavated and produced at middle.

"Described from a single female from mountains north of Yauco on young coffee leaves (244—Aug. 24, 1922 GNW). This species is quite distinct from other *Empoasca*, especially in wing venation and structure of the head." (DeLong.)

"A specimen referred to this species was taken near Loiza (old) sweeping a rank weed at margin of river, close to wild cane.

"Described as *Empoasca brevidens* but DeLong (3) remarks that the venation differs from that of typical *Empoasca*—and it evidently belongs to the group later characterized as *Jorma* by McAtee (5)." (Osborn.)

Dikraneura Hardy

1850. *Dikraneura* Hardy, Trans. Tyneside Nat. Field Club, i, p. 423.

Genotype, *Dikraneura variata* Hardy.

Dikraneura marginella Baker

1924. *Dikraneura marginata* DeLong, Jour. N. Y. Ent. Soc., xxxii, p. 68.
1925. *Dikraneura marginella* (nom. nov.) Baker, Philippine Jour. Sci, xxvii, p. 160.
1928. *Dikraneura marginella* Osborn, Ann. Carnegie Mus., xviii, p. 267.
1923. *Dikraneura marginella* Osborn, Jour. Dept. Agr. P. R., xiii, p. 106.

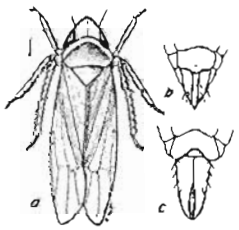

FIG 43.—*Dikraneura marginella* Baker
a, dorsal view, *b*, female, *c*, male genitalia
(Original)

"Small, head distinctly angular, scarcely as wide as pronotum. Vertex broad, width between eyes equal to length at middle, length at middle twice as long as at the eye, border obtusely angular. Pronotum slightly concave behind. Last ventral segment of female slightly produced, obtusely angulate.

"Pale olive; vertex slightly paler, with ivory-white anterior border, below which is a black line, followed by a whitish line, extending from eye to eye; a small yellowish spot just above base of antennæ; anterior border of pronotum and the scutellum dull yellowish; elytra uniformly olive, except apical cells, which are sub-hyaline. Length, 2.25 mm.

* * * * * * * *

"This very small species is to be recognized by the distinctly olivaceous color and the conspicuous markings of the vertex." (Osborn.)

A specimen was taken from Experiment Station, Río Piedras. This species was not recorded by Wolcott but it is common to the West Indies and to Central America south to the Canal Zone.

Dikraneura sub-genus Hyloidea McAtee

1926 *Dikraneura* (*Hyloidea*) McAtee, Jour. N. Y. Ent. Soc., xxxiv, p. 162.

Type of sub-genus, *H. depressa* McAtee.

Dikraneura (Hyloidea) delicata, new species

Head scarcely as wide as pronotum, disc triangular, tip obtusely rounded; vertex flattish; front convex but depressed beneath as with flattened body; pronotum as long as vertex, rounded in front, widening slightly toward hind border, which is slightly concave; scutellum large, triangular; elytra long, narrow, apical areoles short. Female: last ventral segment truncate, pygofer rather long. Male, valve minute or covered by the truncate terminal segment, plates narrowing to near the middle, and then widening to curved rounded tips with delicate setæ.

Pale yellow to ivory white, elytra tinged with honey-yellow, three rather obscure, black dots and an oblique, black dash on apical areoles; elytra milky hyaline margined especially on the costa and commissure with honey-yellow. Ovipositor tipped with black. Length 2 mm.

Described from a series of nine specimens, four females and five males, the female (holotype), Cayey, Jan. 28, 1929, and three females (paratypes), one Cayey, P. R., two Yabucoa, P. R., Jan. 29, 1929, and male (allotype), Cayey Rd., P. R., 2000 ft., Mar. 10, 1929, four males paratypes), Cayey, Jan. 28, 1929, H. Osborn, collector. Types in author's collection.

Similar in size and general appearance to *Empoasca minuenda* Ball, but aside from structural difference in wing venation, the vertex is much longer and the head more depressed. The smooth, shining, waxy white appearance, without dots or spots except faint flecks at tip of elytra in apical cells, is characteristic. The food plant was not recognized.

Dikraneura (Hyloidea) depressa McAtee

1926. *Dikraneura (Hyloidea) depressa* McAtee, Jour. N. Y. Ent. Soc., xxxiv, p. 102.

1929. *Dikraneura (Hyloidea) depressa* Osborn, Jour. Dept. Agr. P. R., xiii, p. 100.

"Female: Head and thorax yellowish in ground color with a percurrent russet to dusky marking covering all but narrow anterior margin of vertex, disk of pronotum, and all but extreme lateral angles of scutellum; apical third of scutellum jet black. Tegmen lemon-yellow, a dusky blotch on middle of clavus, a dusky band over inner crossveins, and a jet black spot on first crossvein; tegminal apex sometimes touched with dusky. Underside stramineous throughout except for the black apex of ovipositor; bristles on ovipositor sheath white. Eighth sternite convex medianly, slightly concave laterally. Male similar to female, marking of head and thorax more or less tinged with reddish laterally; tegmen anterior to fourth crossvein also with a pinkish cast. . . . Length: 2.25–2.75 mm.

"Holotype male, allotype, and another female, Vega Alta, Porto Rico, Jan. 21, 1920, G. N. Wolcott (U. S. N. M.)." (McAtee.)

This did not appear in any of the collections I made while on the island. Dozier (1926) describes nymphs on "Maga".

Hybla McAtee

1932. *Hybla* McAtee, Jour. Dep. Ag. P. R., xvi, p. 119.

Genotype, *H. maculata* McAtee.

Hybla maculata McAtee

1932. *Hybla maculata* McAtee, Jour. Dep. Ag. P. R., xvi, p. 119.

"Form distinctly depressed; vertex subangulate anteriorly, about equal in length to pronotum; head across eyes wider than pronotum. . . .

"General color pale lemon yellow above, whitish below. The dorsal surface is ornamented by a number of black spots of which pairs on the vertex, pronotum, and clavi are conspicuous. There is a small spot near base of each corium, another on corium near middle of claval suture, a

spot at each end of costal plaque, of which the hinder about equals in size that near base of clavus, these being the largest of all. There is a small spot near apex of clavus, one in vicinity of junction of third sector and the corresponding apical vein. All of these spots are discrete, dense, and more or less elliptical in shape. The apex of tegmen is somewhat fumose, with denser blackish cloudings or even dense spots in both the (hypothetical) first and in the fourth apical cells. The eyes are greenish black, and there is a black spot on each mesopleuron. The spots vary somewhat in size and intensity, the pair on vertex being reduced in several specimens and entirely lacking in a few. Length 2.2–2.3 mm.

"Described from a number of specimens of both sexes, including therefore both the holotype and allotype, labelled Barceloneta, Puerto Rico, May 3, 1932, on mamey, R. Faxon and A. C. Mills; and others from the same locality and food plant, March 22, 1932, A. S. Mills and C. G. Anderson; Pt. Cangrejos, Puerto Rico, Jan. 13, 1920, G. N. Wolcott; and Santo Domingo, G. N. Wolcott. (All material in the United States National Museum.)" (McAtee.)

Typhlocybella Baker

1903. *Typhlocybella* Baker, Invertebrata Pacifica, 1, p. 3.

Genotype, *T. minima* Baker.

Typhlocybella minima Baker

1903. *Typhlocybella minima* Baker, Invertebrata Pacifica, 1, p. 3
1929. *Typhlocybella minima* Osborn, Jour. Dept. Agr. P. R., xiii, p. 106.

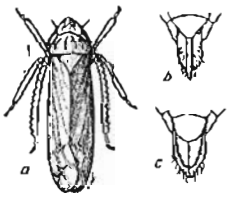

FIG. 41.—*Typhlocybella minima* Baker
a, dorsal view, *b*, female, *c*, male genitalia (Original)

"Length 2.25 mm. Color sordid white with fine olive markings. Face darker, with a transverse line above. An irregular line runs around apical and lateral margins of vertex within the border. The pronotum bears four more or less distinct longitudinal olive lines. Elytron transparent, the veins margined with smoky and the apical cells suffused with smoky.

A golden cloud occurs near base of corium. Tergum and venter mostly black.

"Collected at Managua, Nicaragua, by the author." (Baker.)

I have taken this species commonly in Cuba and the Canal Zone, and it occurs probably on a variety of grasses of which Guinea grass is definitely one. It has been taken in Porto Rico at Yabucoa, Jan. 29, Río Piedras, Feb. 8, Arecibo, Feb. 13, on grasses, at Aguirre on Guinea grass, Feb. 20 and 29. The species may have minor economic importance as it occurs quite commonly on pasture grasses and sometimes in considerable abundance.

FULGORIDÆ

This is a large family with many distinct subfamilies sometimes ranked as families, of world-wide distribution but with relatively few species in Porto Rico. It will serve our purpose here to consider the groups as subfamilies and to indicate the basis of separation in the accompanying key. All the species have the antennæ located below the eyes and the lateral ocelli are also below the eyes, while a median ocellus, when present, is located at the lower end of the frons at the base of the clypeus.

KEY TO PORTO RICAN SUBFAMILIES

1. Hind tibiæ with a movable spur (calcar) ..... Delphacinæ
   Hind tibiæ without a movable spur 2
2. Costa dilated and with numerous crossveins; clavus granulated at base ..... Flatinæ
   Costa, if widened, without crossveins or with clavus devoid of granulation. 3
3. Veins of clavus not attaining apex but joined to commissural margin before the apex 4
   Veins of clavus attaining apex or joined to clavul suture 5
4. Apex of front without ocellus; elytra reticulate toward apex. . Dictyopharinæ
   Apex of front with ocellus; elytra not reticulate toward apex ..... Cixiinæ
5. Elytra broad, often truncate or broadly rounded apically, and held vertically, closely reticulate ..... Acanaloniinæ
   Elytra much longer than broad, usually held flat or slightly sloping, costæ not meeting, not closely reticulate over entire surface 6
6. Head broad, with eyes nearly or quite as broad as mesonotum 7
   Head narrower than mesonotum, vertex narrow 8
7. Pronotum truncate or angulate or broadly emarginate on hind border, elytra not overlapped ..... Issinæ
   Pronotum angularly emarginate behind ..... (Ricaniinæ)*
8. Elytra with broad membrane overlapping ..... Achilinæ
   Elytra with narrow membrane 9

* Not known in Porto Rico.

9. Elytral membrane distinct from corium and with minute venation ..... Tropiduchinæ
Elytral membrane simple, not densely veined; pronotum very short, deeply emarginate ..... Derbinæ

Dictyopharinæ

Only one genus represented in Porto Rico.

Parahydriena Muir

1924. *Parahydriena* Muir, Proc. Haw. Ent. Soc., v, p. 464.

Genotype, *P. hyalina* Muir.

Parahydriena hyalina Muir

1924. *Parahydriena hyalina* Muir, Proc. Haw. Ent. Soc., v, p. 464.
1929. *Parahydriena hyalina* Osborn, Jour. Dept. Agr. P. R., xiii, p. 107.
1931. *Parahydriena hyalina* Dozier, Am. Mus. Novitates, No. 510, p. 14.

"Female. Length, 4.2 mm.; tegmen, 5.7 mm.

"Yellow or light straminecus; carinæ of head, sides of clypeus, lateral portion of cephalic projection and sides of head below it dark, also dark over carinæ of thorax, a thin line in middle of lateral portions of pronotum, a dark mark over coxæ and pleura of thorax; the apical half of abdominal tergites and fifth, sixth, and seventh sternites dark. Tegmina and wings clear hyaline, veins light brown.

"Anal segment longer than broad, in outline basal half slightly concave, apical half slightly convex, apex slightly arcuately emarginate; anus in apical half. Posterior genital styles laterally flattened, triangular, excavate in middle, apex with a number of spines curved inward; median and anterior styles covered by posterior styles.

"One female specimen from Lares, Porto Rico (*G. N. Wolcott*, June 14, 1921, Acc. No. 130, 1921).

"Type in U. S. National Museum, Washington." (Muir.)

Dozier says, "One specimen collected at Arecibo, P. R., Mar. 14, 1914, and one from Mayagüez, June 21, 1915, F 3937B."

Achilinæ

Catonia Uhler

1895. *Catonia* Uhler, Proc. Zool. Soc. London for 1895, p. 81.

Genotype, *Flata nava* Say.

Catonia intricata Uhler

1895. *Catonia intricata* Uhler, Proc. Zool. Soc. London, p. 61.

"Fuscous, somewhat shaded with paler colour. Face a little paler than the body, minutely and closely speckled with fuscous, the carinated margin interrupted with fuscous; front a little longer than wide, slightly tapering at apex, prominently carinated on the lateral margins, and there more distinctly marked with pale dots; cheeks and pleural pieces marbled and speckled with fuscous and testaceous. Pronotum testaceous, dotted with fuscous. Legs smoke-brown, the anterior and middle tibiæ with a yellow band on the middle, besides others at base and tip, and on posterior tarsi. Mesonotum minutely dotted with testaceous. Hemelytra covered with minute pale granules, the costal area varied with testaceous, and sometimes tinged with rufous at tip, longitudinal veins interruptedly testaceous; the membrane paler, margined with fuscous, also with two arcuated brown clouds, the longitudinal veins brown and white at intervals, white at tip, the transverse veins white. Venter dull fuscous, with patches of white on the middle and sides.

"Length to tip of abdomen 4 mm.; to end of hemelytra 5½ mm." (Uhler.)

Uhler's type material was from St. Vincent.

A specimen in collection from Dr. W. T. M. Forbes agrees very perfectly with Uhler's description and is different in color pattern and larger in size than the specimen which I referred doubtfully to this species in my previous paper. It is labeled "El Yunque, P. R., Luquillo Mts., Apr. 27, 1930, Cornell Univ., Lot 795, sub. 38, 1500-2000 ft." The specimen mentioned under this name in my previous paper is apparently an undescribed species.

Catonia cinerea, new species

Similar to *intricata* Uhler but smaller and the color pattern less distinct. Pale cinereous, dotted and sparsely, rather inconspicuously, maculate with fuscous. Face pale, scarcely mottled. Vertex, pronotum and mesonotum pale yellowish gray. Elytra light gray, the costa faintly yellowish, border of costa and the discal nervures with blackish and white alternating dots; membrane gray, maculate with smoky, veins white. Venter fuscous, paler toward tip.

Length to tip of elytra 4 mm.

Two specimens, females: holotype, Yabucoa, Jan. 29, 1929, and paratype, Lares, Feb. 12, 1929.

This is the species which I placed tentatively under *intricata* Uhler in my previous paper.

I also place here a specimen received from Cornell University labelled "Coamo Springs, P. R., April 10, 1930, Cornell University, Lot 795, Sub. 26," which is slightly smaller than the typical examples and has the abdominal segments margined with red but otherwise appears identical.

Also specimens received from the American Museum of Natural History from "Cayey, P. R., May 30–31, 1915; Manati, P. R., June 27–29, 1915, and St. Croix, V. I., March 21 and Feb. 27, 1925."

Cixiinæ

These are usually slender insects with elytra and wings hyaline or slightly clouded and with a median ocellus at apex of front just above the base of the clypeus.

Key to Porto Rican Genera

1. Antennæ situated in pits and with a subantennal process.....*Bothriocera*
   Antennæ not in pits and no subantennal process..... 2
2. Mesonotum 5-carinate .....*Oliarus*
   Mesonotum 3-carinate 3
3. Apex of vertex not emarginate, base of vertex angularly or deeply, roundly emarginate .....*Cubana*
   Base of vertex not deeply emarginate, broader at base than at apex..*Pintalia*

Bothriocera Burmeister

1835. *Bothriocera* Burmeister, Handb. Ent., II, p. 156.

Genotype, *B. lineatis* Burmeister.

Bothriocera venosa Fowler

1904. *Bothriocera venosa* Fowler, Biol. Cent.-Am., Homop. i, p. 83.
1923. *Bothriocera venosa* Wolcott, Jour. Dep. Ag. P. R., vii, p. 270.
1929. *Bothriocera venosa* Osborn, Jour. Dep. Ag. P. R., xiii, p. 106.

"Head yellow; scutellum ferruginous, with three keels; tegmina enlarged behind, hyaline, with the veins well-marked, dark, with a brown band before the middle, black marginal spot about the middle, and the posterior transverse veins marked with fuscous, the apical areas long and regular; abdomen black, underside of front-parts light yellow; legs testaceous.

"Long. cum tegm. 5 millim.; lat. ad hum. 2 millim. (♀)." (Fowler.)

Fowler described the species from Guatemala but it appears to have an extended distribution in the Neotropics including the West Indies. Myers (1928) has reported that the nymphs of certain species of this genus are underground in habit and this is probably the case with most if not all

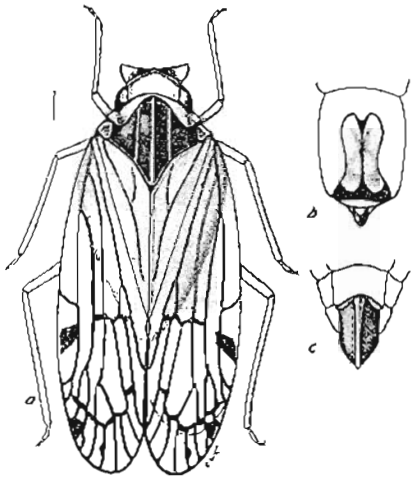

FIG. 45.—*Bothriocera venosa* Fowler
a, dorsal view, b, male, c, female genitalia (Original)

the species. It certainly agrees with our experience in collecting in Florida and the West Indies as only the adults have been met with in collecting from plants above ground.

Ollarus Stål

1862. *Ollarus* Stål, Berl. Ent. Zeit, vi, p. 306

Genotype, *O. walkeri* Stål.

Ollarus franciscanus (Stål)

1859. *Cixius franciscanus* Stål, Eugen. Res., Ins. Hem., p. 273.
1862. *Oliarus franciscanus* Stål, Berl. Ent. Zeit., vi, p. 306.
1902. *Ollarus complectus* Ball, Canad. Ent., xxxiv, p. 152.
1917. *Oliarus franciscanus* Van Duzee, Catalogue Hem., p. 732.
1921. *Ollarus cinereus* Wolcott, Jour. Dep. Ag. P. R., v, p. 18, fig 4.
1923. *Ollarus cinereus* Wolcott, Jour. Dep. Ag. P. R., vii, p. 271.
1926. *Ollarus franciscanus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 106.

"Nigricans, carinis capitis tibiis tarsique pallide flavo-testaceis; carinis intralateralibus scutelli obsoletioribus; tegminibus subvitreis, nervis pal-

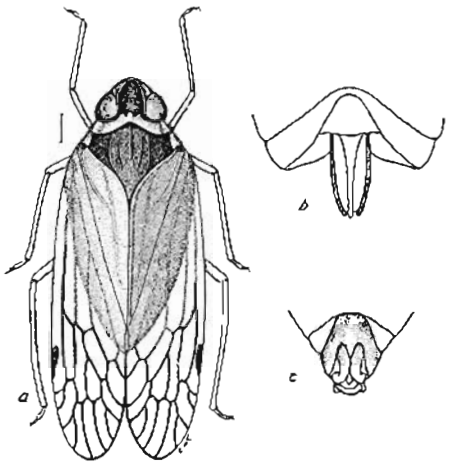

FIG. 46.—*Oliarus franciscanus* (Stål)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

lide flavescentibus, apicem versus cum stigmate fuscis. ♂. Long. 3, lat. 1¼ millim.

"Patria: California (Sct Francisco)." (Stål.)

Small, black, the intermediate carinæ of the mesonotum weak. Elytra hyaline throughout. The male genitalia, shown in figure, have the last ventral segment long, the sides produced, an acute median tooth and the styles with expanded rounded divergent tips.

It is one of the most widely distributed species occurring throughout the American tropics and over a large part of the United States in a great variety of habitats. Adults occur on a great variety of plants, probably not as regular feeders. The nymphs most likely live on plant roots as Mr. Selin (1929) has found them on the roots of sugar cane and "Malojillo" grass.

Pintalia Stål

1862. *Pintalia* Stål, Svensk. Akad. Handbl., II, no 6), p. 4. Rio. Jan. Hem., II, p. 4.

Genotype, *P. lateralis* Stål. Synonyms: *Cotyleceps* Uhl., *Melabrixia* Fowler, *Ciocirius* Met. (*vide* Muir).

Pintalia infuscata, new species

Head narrow; vertex depressed without median carina, marginal carinæ elevated; prominent transverse carinæ separating vertex and front; front narrow, widening at the middle, lateral carinæ prominent, quite, but not distinctly, foliaceous, central carina sharp, dividing at tip, with a conspicuous ocellus; clypeus elongate, strongly tricarinate; pronotum tricarinate, lateral carinæ strong, middle carina faint; elytra widening to apex, veins punctate with minute hairs. Female: last ventral segment deeply excavate; ovipositor elongate. Male: last ventral segment excavated behind; plates approximate at base, divergent, the narrow apices incurved and meeting the produced tips of anal plate; anal plate with spur acute.

Dark fuscous, head, pronotum, mesonotum uniformly light fuscous or dark brown; elytra smoky hyaline, veins infuscate and numerously dotted with whitish, the minute hairs infuscate; wings smoky with fuscous veins; abdomen dark fuscous; legs smoky with tarsi infuscate.

Female, length of body 6 mm., to tip of elytra 7.5 mm.; male, length of body 4 mm., to tip of elytra 7 mm.

Described from a series of five specimens, two females (holotype and paratype) and three males (allotype and paratype) from "El Yunque, P. R., Luquillo Mts., Apr. 23, 1930, Cornell University Lot 795, sub. 40, 1500–2000 ft.," received from Cornell University from the collection of W. T. M. Forbes. Types and paratypes in Cornell University collection, paratype in author's collection.

Pintalia maculata, new species

Head narrow; hind border of vertex deeply angulate, lateral carinæ of vertex elevated, median carina obsolete; transverse carinæ between vertex and front depressed, lateral carinæ of front expanded, foliaceous, median carina weak, not much elevated but sharp; median ocellus prominent; lateral carinæ of clypeus prominent, median carina scarcely elevated; lateral ocelli large, comparatively close to the eyes; antennæ, second segment scarcely longer than first, bristle short. Pronotum very short, deeply angularly emarginate behind, the hind border approximate to the eye; mesonotum distinctly tricarinate, the lateral carinæ converging to the tip; elytra widening to rounded tips, veins conspicuous, in part pustulate, distinctly setose. Female: genitalia with terminal segment truncate, ovipositor sheath broad at base narrowed to tip. Male: genital segment elongate, hind border deeply notched, with a prominent central tooth; plates short, separated at base, divergent apices broad, rounded, not reaching tip of anal plates.

Pale brown; disc of vertex and of frons somewhat infuscate; mesonotum between the carinæ paler; elytra hyaline with fuscous patches, four on the costa, the two central ones more conspicuous, an irregular band of fuscous

patches from anterior part of costa to center of clavus, another obscure band from the blackish spot to tip of costa, a fuscous patch crossing base of apical cells, veins whitish alternating with fuscous dots, marginal veins whitish, submarginal dots and apical cells partly infuscate. Female: Length of body 5 mm., to tip of elytra 8 mm. Male: length of body 4.5, to tip of elytra 7.5 mm.

Described from two specimens, female (holotype), male (allotype), El Yunque, P. R., 2800 ft., Feb. 25–27, C. W. Richmond collector, received from U. S. National Museum, where types are placed. Type No. 50583. This species apparently approaches Uhler's *Cotylaceps decorata* but differs distinctly from the type in the National Museum with which it has been compared.

Pintalia insularis, new species

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

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

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

This species would seem certainly to be a West Indian form and the description is presented in order to have it recognized.

Pintalia alta, new species

Head narrower than thorax; vertex broad at base, narrowing to apex with lateral carinae elevated and median carina less elevated, continued over on to front and extending to tip of clypeus, the transverse carina separating vertex and frons weak, lateral carinae of front considerably expanded; median ocellus small, lateral ocelli close to the eyes; antennae short, second joint subglobular, the arista minute. Pronotum very short, widening to lateral posterior region; mesonotum with three prominent carinae and a faint one anteriorly between median and lateral; lateral carinae converging to apex; elytra widening to broadly rounded apex, venation prominent, apical veins forked. Female: last

ventral segment truncate, ovipositor sheath narrow and short. Male: genital segment elongate, deeply excavate on hind border, with a small median tooth; styles short, curved divergent from base, converging toward rounded apex.

Color dark brown, front infuscate between carinæ, the elytra with fuscous patches at base of clavus and four or five triangular patches on costa, the anteapical crossveins and subapical band and patch at base of apical cells deeply infuscate. Length, female 5.25 mm., male 5 mm.

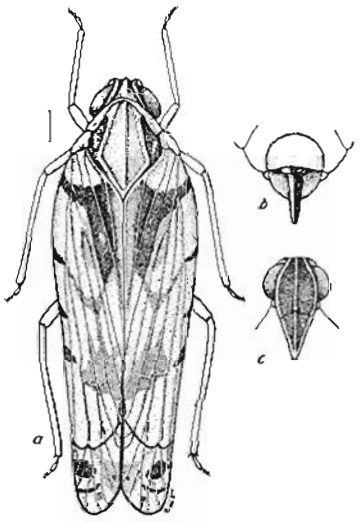

FIG. 47.—*Pintalia alia*, n. sp.
a, dorsal view, *b*, female genitalia, *c*, face (Original)

This species was referred tentatively in an earlier paper to *decorata* Uhler but by comparison with type in the National Museum it appears to be distinct. One specimen, female (holotype) Lares, P. R., Feb. 12, 1929 (Osborn) in author's collection. One female (paratype) Coamo Springs, P. R., Apr. 10, 1930, Cornell University Lot 795, sub. 9; two males (allotype and paratype), El Yunque, Luquillo Mts., 1500–2000 ft., Mar. 29, 1930, Cornell University, Lot 795, sub. 9, and Apr. 23, 1930, Lot 795, sub. 361, and one male (paratype) "Lares, P. R., Dec. 1930, Fr. Sein, Jr."

Also three specimens from the American Museum of Natural History, "Aibonito, P. R., July 14–17, 1914."

Pintalia (Cotyleceps) decorata Uhler

1895. *Cotyleceps decorata* Uhler, Proc. Zool. Soc. London, p. 64.
1925. *Pintalia* Muir, Pan Pacific Entomologist, I, p. 103 (*Cotyleceps* Syn.).
1929. *Pintalia* (*Cotyleceps*) *decorata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 168

"Dull fulvous brown, paler beneath. The cheeks, sides and summit of the front and middle of the vertex dark piceous. Eyes dark brown. Antennæ pale fulvo-testaceous, the basal joint longer than wide. Pronotum and sides and shield of mesonotum fulvous, darker on the sutures and across the base; the scutellum paler. Rostrum and legs pale testaceous. Wing-covers whitish testaceous, extensively marked with pale smoke-brown; border of the membrane broadly smoke-brown, connected on the lower border with a large interrupted spot which connects on its inner end with broken spots continued across the disk, the apical veins being white break the continuity of the apical border; field of both corium and membrane sparsely flecked, the three transverse veins of the costal area broadly marked, the inner one connected with a ragged band which nearly crosses the corium; nodal spot long and darker than the uneven series which forms a sort of loop behind it; the membrane beyond this point has three united spots anteriorly and a roundish one adjoining the posterior end of the loop next the margin; wings smoky, with the veins darker. Tergum paler at tip and along the lateral submargin.

"Length of tip of abdomen 4 mm.; expanse of wing-covers 13 mm." (Uhler.)

The specimen taken at Lares on Feb. 12 (see Osborn, 1929) and doubtfully referred to this species does not agree with the type specimen in the U. S. National Museum, but a specimen received from Cornell University is placed here and so the species may still be counted in the Porto Rican fauna.

Cubana Uhler

1895. *Cubana* Uhler, Proc. Zool. Soc. London, p. 62.

Genotype, *C. tortrix* Uhler.

Cubana tortriciformis Muir

1924. *Cubana tortriciformis* Muir, Proc. Haw. Ent. Soc., v, p. 161.
1929. *Cubana tortriciformis* Osb., Jour. Dept. Agr. P. R., xiii, p. 166.

"Female. Length, 5 mm.; tegmen, 8 mm.

"The base of the vertex not quite so angularly emarginate as in the type. Brown, the carinæ of head and thorax lighter brown or yellow, legs light brown, abdomen light brown, slightly infuscate. Tegmen light

brown or strammeous, with lighter and darker markings; the darker brown markings are, one from base of costa over first claval vein, a large, irregular V-shaped mark with its apex near Mf, and one arm touching the mark over the first claval vein and the other reaching the middle of costa; a small mark across costal cell slightly more distad, a fainter one at base of stigma and continued in curve to apex of clavus, another subparallel to last starting distad of stigma, where it is broadest, a broader dark mark over apical Sc and R reaching to M, a thin line slightly apical to that; at apex between M3 and 4 a black round mark. The veins dark in dark area and lighter in light area; the middle of the subapical cells semi-hyaline, wings slightly fuscous and opaque, veins brown." (Muir.)

"Described by Dr. Muir from one female from Mameyes. 3,000 ft. elevation. I have not recognized it in any of my collections." (Osborn.)

Tropiducrinæ

The members of this subfamily are delicate, clear-winged species, the elytra and wings lying more flatly above the body than in the *Cixiidæ* from which group they are also distinguished by the absence of the median ocellus at the apex of the frons. The elytra have numerous crossveins on the apical third and the longitudinal veins are branched, so that the apical part of the elytra appear densely reticulate.

Myers (1928) and Metcalf and Bruner (1930) have discussed the generic synonomies in this group, especially with reference to *Neurotmeta* and their papers may be consulted by those interested in the complexities of nomenclature. The species known to me as actually occurring in Porto Rico fall in the two genera *Ladella* and *Neurotmeta*, the former having crossveins in the costal areole and the latter not having them.

Ladella Stål

1859. *Ladella* Stål, Berliner Ent. Zeit., iv, p. 310.

Genotype, *Monopsis pallida* Walker.

Ladella pallida (Walker)

1851. *Monopsis pallida* Walker, List Homopt. Brit. Mus., ii, p. 325
1859. *Ladella pallida* Stål, Berliner Ent. Zeit., iii, p. 319.
1931. *Ladella pallida* Dozier, Am. Mus. Novitates, No 510, p. 14

"Pallide testaceo- vel subvirescente-flavescens; vertice transverso, longitudine fere dimidio latiore, ante oculos prominente, apice late rotundato; fronte latitudine medio fere duplo longiore, infra medium utrimque nonnihil ampliata.—Long. 6½-7½, Long. cum tegm. 9½-11 Millim.

"Patria: Porto Rico, Mus. Berol." (Stål.)

Of *Ladella pallida* Dozier says: "Three specimens from Aibonita, Porto Rico, July 14–17, 1914 (3708), one from Maricao, July 27, 1914 (3724), one from Coamo Springs, Porto Rico, July 17, 1914 (3712) and one from Mayagüez, July 24, 1914 (3725). The species was originally described from Porto Rico." But Walker in the original description says "Jamaica."

Two specimens, "Aibonita, P. R., July 14–17, 1914," in collection of the American Museum of Natural History.

Ladella acuta Metcalf and Bruner

1930. *Ladella acuta* Metcalf and Bruner, Psyche, xxxvii, p. 405.

Vertex twice as broad as length at middle; costal area with numerous crossveins.

Length 8.40 mm. to tip of elytra.

Coamo Springs, Porto Rico, April 7, 1930, Cornell University Lot. 795, sub. 28.

Neurotmeta Guérin

1856. *Neurotmeta* Guérin, in La Sagra's Hist. de Cuba Ins., p. 180.
1859. *Tangia* Stål, Berliner Ent. Zeit. iii, p. 317.

Genotype, *N. sponsa* Guér.

Neurotmeta viridis (Walker)

1851. *Monopsis viridis* Walker, List. Homopt. Br. Mus., ii, p. 325.
1859. *Tangia viridis* Stål, Berl. Ent. Zeit., iii, p. 318.

"Pallide subvirescente-flavescens; vertice latitudine sublongiore, apice semi-circulariter rotundato, ante oculos sat longe prominente; fronte latitudine medii plus duplo longiore, supra medium parallela, infra medium utrimque nonnihil ampliata.—Long. 5½, Long. cum tegm. 8 Millim.

"Patria; St. Thomas, Mus. Berol." (Stål.)

Specimens which I have compared with the Walker type in the British Museum of Natural History and figured here agree very perfectly, and there seems no question that the Porto Rican species belongs here. Whether the references to *Tangia angustata* Uhler should all be included here seems doubtful.

This species has the vertex with sides parallel to the bluntly angulate apex, the front has a strong median carina, the costal areole is without crossveins and the color is pale green, sometimes fading to pale yellowish. Length, female 8 mm., male 7 mm.

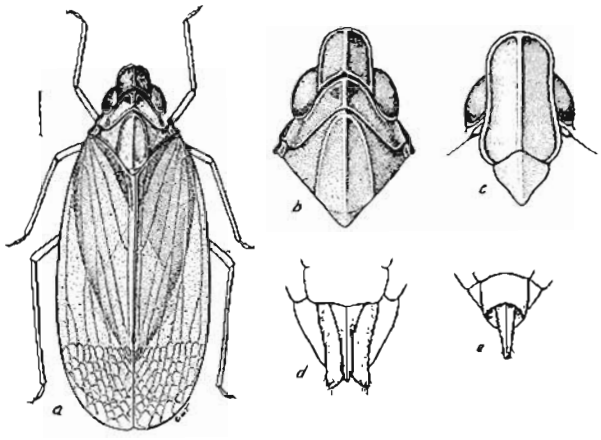

FIG. 48.—*Neurotmeta viridis* (Walk.)
a, dorsal view, *b*, vertex, *c*, face; *d*, female, *e*, male genitalia (Original)

Two "Aguirre, P. R., Feb. 18, 1929," male and female (figured). Two "Salinas, P. R., Mar. 12, 1929."

I have not seen any specimens from Porto Rico that agree in shape of vertex with the figures of *sponsa* given by Metcalf (1930).

Two specimens from St. Croix, V. I., collected, respectively, Feb. 27, 1925, and March 5, 1925, received from the American Museum of Natural History.

Neurotmeta (Tangia) angustata (Uhler)

1895. *Tangia angustata* Uhler, Proc. Zool. Soc. London, p. 59.
1923. *Tangia angustata* Wolcott, Insecta Portoricensis, Jour. Dept. Agr. P. R., vii, p. 271.
1929. *Tangia angustata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 107.

"Pale green, narrower than usual, the wing-covers slightly curving towards the base, with the costa almost straight from thence to the membrane. Head a little longer than wide, with the tip rounded, but hardly narrowed, the margins prominently reflexed, the middle line carinated, with its basal half triangularly divaricating; front long, the sides feebly sinuated and expanding somewhat triangularly before the tip, the middle

line with a thick carina throughout; epistoma also carinate; rostrum reaching to the middle coxæ. Pronotum about half as long as the head, almost of the form of a horse-shoe, the ends tapering posteriorly, the middle line acutely carinate. Mesonotum long, distinctly carinate on the middle line, the apex subovate, and the base triangularly narrowed with the end truncate. Hemelytra with simple straight veins, the inner discoidal vein only forking beyond the middle; no transverse veins on the corium, the longitudinal veins all forked at tip to form the boundary of the membrane, the membrane tapering a little on the inner apical border; the veins and cross-veins numerous and rather close-set, more or less dusky in the matured individuals. Posterior femora with three spines besides the pair on the tip.

"Length to end of venter 5½ mm.; width of pronotum 1½ mm.: length to tip of wing-covers 7 mm.

"Two specimens were taken in St. Vincent, one of them on the windward side. They are precisely like others which were secured on the island of Grenada." (Uhler.)

"Recorded by Wolcott from several food plants. Not recognized in my collections unless specimens from *Guilandina crista*, near San Juan, may possibly be referred here." (Osborn.)

This presumably should be included in *Neurotmela* as now defined.

Issinæ

Stout bodied insects with pronotum truncate or slightly emarginate behind. Elytra usually with humeral elevation or inflation and coarsely veined. Clavus and base of corium not granulate or pustulate (except in *Rhyncopteryx*).

Key to Porto Rican Genera

1. Elytra short, not contracted or greatly narrowed before apex.....*Thionia*
   Elytra long, narrowed apically 2
2. Elytra distinctly contracted before apex, costa inflated at base....*Colpoptera*
   Elytra but slightly contracted before the apex..... 3
3. Elytra with apex rounded, clavus not granulate.....*Neocolpoptera*
   Elytra with apex long, acute, clavus granulate.....*Rhyncopteryx*

Thionia Stål

1859. *Thionia* Stål, Berl. Ent. Zeit., III, p. 321.

Genotype, *Issus longipennis* Spin.

Thionia borinquensis Dozier

1931. *Thionia borinquensis* Dozier, Am. Mus. Novitates, No. 510, p. 18.

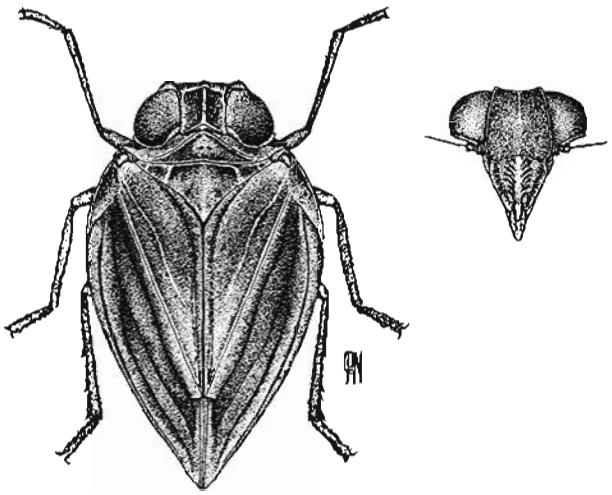

FIG. 43.—*Thlonia bormyacaxis* Dozier
Dorsal view and frons. (After Dozier)

"A very broad, compact species.

"General color light yellowish-brown, the elytra with venation and certain clouding dark brown. Vertex slightly longer than wide, the margins and median carina distinctly elevated; anterior margin produced, slightly angulate at middle; posterior margin decidedly incised or emarginate. Frons nearly twice as long as wide, widened below, being distinctly wider at apex than between the eyes, a median carina present, very pronounced for a third of its length from base, becoming less distinct toward apex; surface of frons somewhat rugulose or uneven, yellowish brown without definite markings; the clypeus with partial, short, lateral, oblique dark brown stripes that appear characteristic of the species, although in some examples more mixed and indistinct. Pronotum short, strongly produced forward, with two small depressions on disk. Scutellum with a weak oblique lateral carina on each side, lacking a distinct median carina. Elytra almost twice as long as broad, presenting a very much broader appearance at base when viewed dorsally; the elytra slope obliquely downward at apex; venation very simple, the longitudinal

veins very distinctly elevated, distinct cross-veins lacking; yellowish brown in color, the venation dark brown, a more or less distinct longitudinal pitch-brown clouding present, especially dark on corium. Wings light smoky brown, the venation distinctly darker.

"Length of body, 5.5 mm.; length to tip of elytra, 6.25 mm.; greatest width, 3 mm.

"Described from a series of six specimens collected at Arbonito, Porto Rico, July 14-17, 1914, in the collection of the American Museum of Natural History (Nos. 3708 and 3710)." (Dozier.) Dozier figures female but not genitalia. Two specimens received from the American Museum of Natural History bearing same locality and date are probably the males of this species.

Colpoptera Burmeister

1835. *Colpoptera* Burmeister, Handb. der Entom., II, p. 155.
Genotype, *C. sinuata* Burmeister.

Key to Porto Rican Species

1. Face light yellow except narrow dark border at base.....*flavifrons*
Face more or less infuscate.....2
2. Face with radiating fuscous lines and distinct whitish dots along lateral margin of front.....*maculifrons*
Face without radiating lines.....3
3. Face dark brown or blackish with lighter spots on disk.....*brunneus*
Face clouded with fuscous on basal half, apical half whitish.....*maculata*

Colpoptera brunneus Muir

1924. *Colpoptera brunneus* Muir, Proc. Haw. Ent. Soc., v, p. 465.
1929 *Colpoptera brunneus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 108.

"Male. Length, 3.7 mm.; tegmen, 4.6 mm.

"Dark brown, lighter over gena, lighter spots in middle of frons, over carina of head and thorax, legs lighter. Tegmina dark brown, light brown over costal area and cell, and a few small, light marks in clavus; veins same color as membrane except apical veins which are light, a light mark at stigma and at apex of clavus. Wings fuscous, slightly lighter at base, veins dark. The tegmina are generally covered with a light powdery secretion.

"In lateral view lateral margins of pygofer straight or slightly concave, anal angle rounded, not produced. Anal segment fairly large, anus in middle, apex rounded. Genital styles large, subtriangular, two ridges running across apical half, outer margin irregularly sinuate. Peri-

andrium forming a tube, deeply and narrowly emarginate, or cleft, on ventro-apical margin, with a long, thin process arising from the bottom of the emargination . . . and from each side of the emargination arises a bifuricate, spine-like process; the penis is large, membranous or but slightly chitinized, with a pair of curved spines about middle of ventral aspect.

"Female. Similar in size and color to the male. The tegmina of this species has the costal vein leaving the costal margin one-fourth from the base and forming a narrow costal area without cross-veins; the Sc and R simple, and forming a short stalk; M bifurcate about middle, M3+4 joining R for a short distance; Cu forking near apex. In the hind wings there is an emargination at the apex of Cu, as well as one in middle of anal area; no granules on the clavus. Vertex much wider than long, truncate at apex, slightly concave at base. Basal margin of pronotum widely angularly emarginate, lateral carinae following hind margin of eyes.

"Described from three males and two females from Utuado, P. R. (*G. N. Wolcott*, Nov., 1921, Acc. No. 175), one male and two females (type locality), one male from Toa Alta (*G. N. Wolcott*, April 21, 1921, Acc. No. 105, 1921), and one male from Cicales, P. R. (*G. N. Wolcott*, March 24, 1920, Acc. No. 65, 1921).

"Type in H. S. P. A. Experiment Station, Honolulu; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection" (Muir).

"Dr. Muir lists Utuado, Toa Alta, 'Cicales' (*sic*) Ciales (?) as localities from which type material was used. This is probably one of the forms included under *Cyarda* in Wolcott's 'Insectæ' as he mentions 'Ciales' as one of the localities under that name." (Osborn.)

A paratype in the U. S. National Museum which I have examined has the face mostly black.

Specimens from the American Museum of Natural History represent the following localities: "Aibonito, P. R., July 14–17, 1914," and "Tallaboa, near Ponce, P. R., July 23, 1914," received after this paper had gone to press.

Colpoptera maculata Doxler

1931. *Colpoptera maculata* Doxler, Am. Mus. Novitates, No. 510, p. 21.

"Distinguished from the other described species of the genus by its maculated elytra and distinct male genitalia.

"General color pale testaceous-brown with very characteristic fuscous clouding and maculations; eyes pale; vertex pale with fuscous stripe along lateral margins; frons pale, the upper third unevenly clouded with

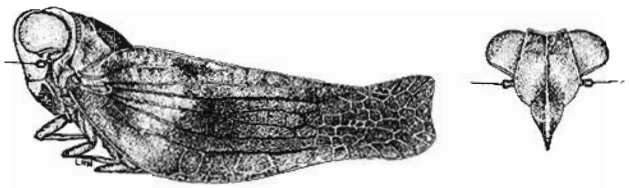

FIG. 50.—*Colpoptera maculata* Dozier
Lateral view of female and frons. (After Dozier)

fuscous; pronotum mottled, the mesonotum distinctly fuscous on disk between the lateral carinæ, elytra pale testaceous with a fuscous area on clavus and corium near base, a small spot near middle of clavus, and a more or less distinct fuscous clouding covering most of apical two-thirds of the elytra; venation concolorous with the areas except near apex where they appear very pale contrasted with the dark coloration.

"Vertex transverse, about one-third as long as wide; frons narrow at base, enlarging gradually to below eyes and then rounding to the clypeus, tricarinate; pronotum produced obtusely forward, slightly longer than the vertex, with very characteristic pitlike depressions along the sides; mesonotum over three times as long as the pronotum, tricarinate; elytra nearly three times as long as greatest width, narrowing gradually to just before the apex where it enlarges, terminating distinctly wedge-shaped.

"Male genitalia: periandrium forming a tube. Genital styles large, produced into slender process at apex, the upper margin with distinct hairs or setæ.

"Length to tip of elytra, 6 mm.

"This appears to be the most abundant species of *Colpoptera* in Porto Rico." (Dozier.)

Specimens referred to *maculifrons* in my former paper but now considered this species were taken at many points, but occurred in large numbers, both as adult and probably nymphs, on "fiddle wood" (*Peluda*?) at Salinas, March 1. The insect was taken on sea grape as adult at Cataño and Salinas and in sweeping from *Lantana* at Yauco, and on *Barita* at Tallaboa, March 11. What appear to be nymphs were swept from shrubs and bunches of grass at Salinas in February. *C. maculata* appears to differ from *maculifrons* slightly in the frons and the outline of pronotum as pictured (see figures) but it seems possible that *maculifrons* and *maculata* may prove to be varieties of one species.

Also a specimen from Ponce, P. R., July 20–22, 1914, and one from Ensenada, P. R., Feb. 13, 1925, are placed here, and one from St. Croix, V. I., March 5, 1923, all received from the American Museum of Natural History.

Colpoptera maculifrons Muir

1924. *Colpoptera macnifrons* Muir, Proc. Haw. Ent. Soc., v, p. 400.
1929. *Colpoptera maculifrons* Osborn, Jour. Dept. Agr. P. R., xiii, p. 108.

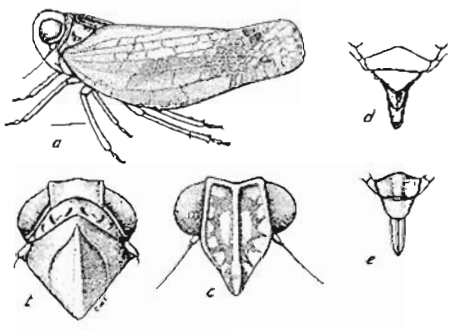

FIG. 51.—*Colpoptera maculifrons* Muir
a, lateral view, *b*, vertex, *c*, frons, *d*, female, *e*, male genitalia (Original)

"Male. Length, 3.8 mm.; tegmen, 5.4 mm.

"Light brown; slightly darker at base on lateral portion of frons, a series of seven or eight lighter spots curving from the outer angles of base to near apex in the darker portion of frons; pronotum slightly mottled with darker marks; mesonotum considerably darker. Tegmina light brown, slightly darker in middle, veins same color as membrane except in middle, where the Sc, R, M, and Cu from one-third from base to near nodal line are dark brown or black. Wings brown with darker veins.

"Anal segment long, narrow, anus at base where it is broadest, gradually narrowing to acute apex. Genital styles somewhat similar to former species, but the apex is produced into a spine with its apex bifurcate and pick-shape.

"Vertex considerably wider than long, apex very slightly arcuate, base slightly, roundly emarginate. In this species there is a very slight sign of transverse veins in the costal area." (Muir.)

"Muir's description is based on one male collected in Río Piedras by R. T. Cotton, Jan. 10, 1917." (Osborn.)

The type in the U. S. National Museum has been examined and agrees with my specimens from Lares, Feb. 12, 1920, figured herewith.

Colpoptera flavifrons, new species

Brown with the face yellow except at extreme base, where it is margined with fuscous. Vertex short, twice as wide as long, apex scarcely convex, front widening to near apex, contracting sharply to clypeus, a distinct median carina; lateral carina slightly elevated, bordered by a series of obscure pustules; median carina of clypeus obtuse. Pronotum short, rounded in front, obtusely angulate-emarginate behind, narrowed to a mere ridge behind the eye; mesonotum with a strong median carina, the lateral carinæ diverging from front border and becoming obsolete a little behind the middle; elytra perceptibly narrowed before apex, veins strong and numerous, forming square reticulations on corium and irregular ones on apical area. Female segment obtusely angulate, the hind border ciliate. Pygofer short, apex bluntly rounded. Male last ventral segment long and narrowed to truncate apex, plates long, tapering.

Brown, carinæ of vertex, pronotum and mesonotum a little paler. Apical margin of vertex and base of front fuscous, face pale yellow, elytra and legs brown, veins of corium and most of the apical areoles darker. The male has fuscous markings in posterior facets of the vertex, central part of pronotum and mesonotum and a dusky patch on corium.

Length, female 6 mm., male 5.5 mm.

Described from a female (holotype) labelled "Spring Cut, St. Croix, Virgin Islands, June 14, 1917 (198), Harold Morrison," from the U. S. National Museum (type No. 50385), one male (allotype) "Antigua, W. Indies, June 1918, D. Stoner," and two females and two males (paratypes) of same locality in author's collection.

This species is similar to *maculifrons* Muir and, if longer series should show intermediate form, it may have to be referred to that species, as possibly also the *maculata* of Dozier.

Neocolpoptera Dozier

1931. *Neocolpoptera* Dozier, Am. Mus. Novitate, No. 510, p. 22.

Genotype, *N. portoricensis* Dozier.

Neocolpoptera portoricensis Dozier

1931. *Neocolpoptera portoricensis* Dozier, Am. Mus. Novitates, No. 510, p. 22.

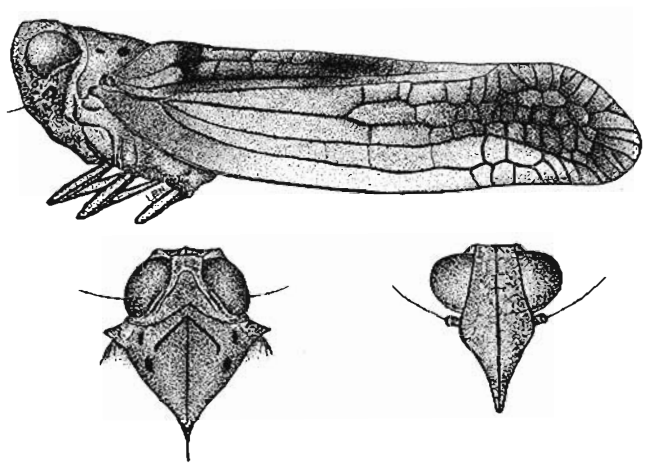

FIG. 52.—*Neocolpoptera portoricensis* Dozier

Lateral view of female, dorsal view of head and thorax, and frons (After Dozier)

"A large, robust species, easily recognized by its markings. In life there is a sulphur-yellow spot or area on the upper middle of the elytra, all signs of which fade after death.

"General color a pale testaceous, the carinæ of the vertex, thorax, and frons, fuscous; frons pale except the fuscous carinæ; eyes light brown; venation of elytra distinctly fuscous; a short cross-band near base of clavus, a clouded area covering tip of clavus, and an extended clouding on apical portion of elytra, fuscous; legs with lineate fuscous markings.

"Vertex extending well beyond the eyes, very short, the hind margin deeply emarginate, into which fits closely the obtusely angled, produced pronotum; from dorsal view the base of the frons and the flared upper sides of the genæ can be plainly seen. The disks of both the vertex and the pronotum are depressed, accentuated by the fuscous carinated lateral margins. Frons twice as long as its greatest width, starts narrow, gradually enlarges to well below the eyes and then roundly narrows to the clypeus: tricarinate. Mesonotum slightly roundingly elevated, with very prominent carinæ; the lateral carinæ, joined together at an acute right angle near the anterior margin, run obliquely in an almost straight line

and then are cut short by a downward dash; the median carina anteriorly joins or bisects the right angle made by the lateral carinæ and extends almost the entire length of the mesonotum; on the sides of the mesonotum are two short fuscous elevations.

"Length to tip of elytra, 8.25 mm.

"Described from five specimens collected at Aibonito, Porto Rico, July 14–17, 1914 (Amer. Mus. Nat. Hist. Nos. 3707–9 and 3523B)." (Dozier.)

Neocolpoptera monticolens Dozier

1931. *Neocolpoptera monticolens* Dozier, Am. Mus. Novitates, No. 510, p. 21.

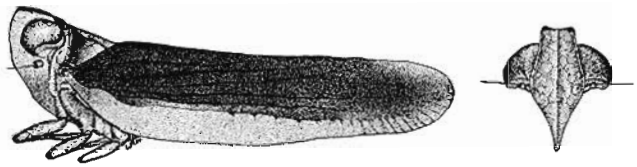

FIG. 53.—*Neocolpoptera monticolens* Dozier
Lateral view of female and frons (After Dozier)

"Apparently congeneric with *N. portoricensis* but a much more slender and delicate species. It appears to be confined to the high mountains of Porto Rico.

"General color pale testaceous yellowish, including the eyes; the upper two-thirds of the elytra for its entire length dark fuscous, leaving the costal region a clear transparent. This striking coloration immediately identifies the species. The marginal carinæ of vertex, the pronotum, and the sides of the mesonotum a distinct fuscous. Frons pale, without markings except the fuscous basal margin joining the vertex.

"Vertex distinctly produced beyond the eyes, the margins elevated, the disk depressed, less than one-third as long as the mesonotum; pronotum very short, produced forward at the middle at an acute angle, fitting into the emarginate hind border of vertex. Mesonotum about as long as wide, with only the faintest indication of a possible median carina; the lateral carinæ are joined forward at the middle near anterior margin, continue downward obliquely, then straighten out, terminating about halfway down; the somewhat flattened disk is outlined by the lateral carinæ. Frons nearly twice as long as wide, starting narrow and then enlarging gradually to its widest part on a line with the lower margin of the eyes, then

again narrowing to the clypeus; the margins elevated and a median longitudinal carina is present.

"Length to tip of elytra, 7.5 mm.

"Described from a series of seven adults collected at Aibonito, Porto Rico, July 14–17, 1914 (Amer. Mus. of Nat. Hist. No. 3709); one specimen from Cayey, Porto Rico, May 30, 1914 (Amer. Mus. of Nat. Hist. F3931): and several adults taken by the writer beating shrubbery in tropical rain forest on El Yunque, Porto Rico, February, 1925." (Dozier.)

Rhynrioptery x Van Duzee

1914. *Rhyncopteryx* Van Duzee, Tr. San Diego Soc. Nat. Hist., II, p. 43.

Genotype, *R. caudata* Van Duzee.

Rhyncopteryx salina Dozier

1927. *Rhynocopteryx salina* Dozier, Jour. N. Y. Ent. Soc., XXXV, p. 53.

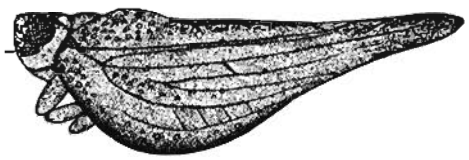

FIG. 54.—*Rhyncopteryx salina* Dozier
Lateral view (After Dozier)

"Head short, distinctly shorter than that of *R. caudatum*. Vertex almost twice as wide as long, flat but with the disk very much depressed, carinate. Frons slightly longer than wide, sides narrowly foliaceous carinate, the disk towards apical end slightly longitudinally depressed. Pronotum distinctly longer than the vertex, carinate, produced anteriorly in obtusely rounded manner and extending to half the length of the eyes, posterior margin roundingly emarginate. Mesonotum twice as long as the pronotum, weakly tricarinate, the disk very much flattened and outlined by the lateral carinæ which are sharply rounded anteriorly to meet the median carina before touching the pronotum. Elytra distinctly longer than broad, very much inflated and meeting below from near the middle to the apex; clavus very long, gibbous towards the base, distinctly granulate, especially for the basal half; commissural margin of clavus smooth and decidedly depressed; costa granulate, a few scattered granules towards base of longitudinal nerves.

"General color varies from a testaceous brown to a darker fuscous, without any definite markings, the veins distinctly outlined by their darker color. The clypeus in many specimens with faint oblique lateral brown stripes.

"Male genitalia: penis rather heavily chitinized, viewed laterally with anvil-like projections towards base in upper margin; apex produced with much curved spine-like processes at tips.

FIG. 55.—*Rhyncopteryx salina* Dozier
Male genitalia (After Dozier)

"Described from a large series of specimens collected by the writer sweeping a pure stand of 'Lirio de Mar,' *Batis maritima*, near edge of salt lake in the extremely dry arid region west of Guanica, Porto Rico, February 12, 1925, and also a number sweeping the shrub, *Lantana odorata*, on the nearby rocky slopes; two males in the collection of the American Museum of Natural History from Ponce, Porto Rico, July 20, 1914 (3716); a large series in the U. S. National Museum collected at Arroyo, Porto Rico.

"Holotype, female, and allotype, male, from Guanica, P. R., February 12, 1925, deposited in U. S. National Museum (Cat. No. 40177)." (Dozier.)

I have seen the type specimen in the U. S. National Museum but I do not know of any other specimens. Since the above went to press I have received from the American Museum of Natural History specimens labeled, "St. John, V. I., March 5, 1925, Mameyes, P. R., Feb. 17, 1925; Ensenada, P. R., Feb. 10, 1925."

ACANALONIINÆ

Acanalonia Spinola

1839. *Acanalonia* Spinola, Ann. Ent. Soc. Fr., xviii, p. 441

Genotype, *A. servillei* Spinola.

Acanaloniа brevifrons Muir

1924. *Acanalonia brevifrons* Muir, Proc. Haw. Ent. Soc., v. p. 467.
1929. *Acanalonia brevifrons* Osborn, Jour. Dept Agr. P. R., xiii. p. 108.

"Female. Length, 6.9 mm.; tegmen, 8.6 mm.

"Vertex wider than the length in middle, apex widely angular or subangular; frons much wider than long. No costal area; Sc and R arising from the same spot on basal cell, Mf near base, fork of M3+4 very near to Mf, Cu without a fork. Anal segment sublanceolate, anus in middle; posterior genital styles large, triangular, the apex swollen and roughened, but not bearing teeth.

"Green; slightly brownish over vertex, more so on legs; costa light; apical margin from the apex of Sc to apex of clavus reddish brown with small light marks, slightly reddish along second claval and hind margin. Wings slightly greenish with green veins, slightly brownish over anal area.

"Described from one male from Pt. Cangrojos, P. R (G. N. Wolcott, June 24, 1920, Acc. No. 234).

"Type in U. S. National Museum, Washington." (Muir.)

I have seen the type in the U. S. National Museum and it does not agree at all with specimens I collected at various points and described as *coniceps*.

Acanaloniа viriditerminata (Lethierry)

1881. *Carthea viriditerminata* Lethierry, Ann. Soc. Ent. Belgique, xxv, p. 14.
1931. *Acanalonia viriditerminata* Dozier, Am. Mus. Novitates, No. 510, p. 13.

Dozier reports a "specimen taken on El Yunque in Porto Rico, February, 1925, by the writer is placed as this species. Four specimens collected at Aibonito, Porto Rico, July 14, 1924 (Amer. Mus. Nat. Hist. No. 3710)." (Dozier.)

Melichar credits the species to Guadeloupe and Martinique and gives *similima* Lethierry as a synonym.

A specimen from St. Thomas, V. I., Feb. 24, 1925 in the American Museum of Natural History, is placed here.

Acanaloniа coniceps Osborn

1929. *Acanalonia coniceps* Osborn, Jour. Dep. Agr. P. R., viii. p. 108.

"Head narrower than pronotum, acutely conic; vertex flattened margins converging to acute tip; front as wide as long, somewhat tumid, widening below, margins elevated; elytra broad, costa strongly convex; neuration conspicuous, reticulate, concolorous except costa and mid-vein

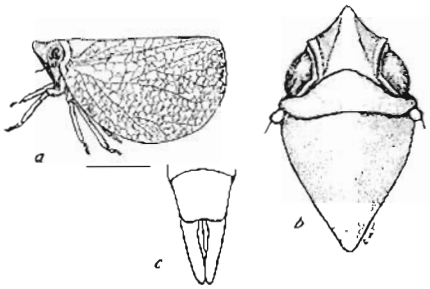

FIG. 56.—*Acanaloniu conicepa* Osb
a, lateral view, *b*, vertex, *c*, genitalia (Original)

which are narrowly pale yellow. Color bright green; a pale green or yellowish green median stripe from vertex to scutellum. Face and below paler, tibia pale brown.

"Length to tip of elytra, 9 mm.

"Described from a series of six specimens collected at Salinas, January 21 and March 12 on bushes and rank grass." (Osborn.)

A specimen from "Tallaboa, near Ponce, P. R., July 23, 1914," in the American Museum of Natural History.

Philatis Stål

1866. *Philatis* Stål, Rio Janeiro Hemiptera, p. 68.

Genotype, *Mycterodus productus* Stål.

Philatis agilis (Melichar)

1901. *Batusa agilis* Melichar, Annalen des K. K. Naturhistorischen Hofmuseums, xvi, p. 192.

"Der *B. producta* und *conata* sehr ähnlich und von diesen dadurch verschieden, dass der Costalrand nicht so stark gerundet ist, die Deckflügel somit mehr länglich erscheinen. Die konisch vorgezogene Scheitelspitze ist rostbraun, der gewölbte Scheitel blass rostbraun gefärbt. Körper und Deckflügel grün. Der Apical- und Suturalrand mit kräftigen rostbraunen Flecken besetzt. In der Nähe der Wurzel der Deckflügel ein kleiner rostbraun gefärbter Callus. Die übrigen Merkmale wie bei *conata* und *producta*.

"Länge 9½ mm.

"Portorico (ein Exemplar im Museum in Berlin)."

This species would seem to be near the one I have described as *Acanalonia conicops* but the characters as given differ in the color, the distinct colored callous on elytra and the red brown flecks on the elytral borders.

Two specimens from Dr. W. T. M. Forbes. "El Yunque, P. R., Luquillo Mts., 2000–3500 ft., March 29, 1930—Cornell University, Lot 795, Sub. 8."

These are green, with the vertex tinged with reddish brown, the inner and apical border of elytra with alternating dark fuscous and light spots, and a callous on the disk of elytra infuscate.

Length, 9.5 mm.

A specimen from "Naguabo, P. R., March 1–9, 1914." in the American Museum of Natural History.

Chlorochara Stål

1869. *Chlorochara* Stål, Hemipt. Fabriciana, II, p. 107.

Genotype, *Cicada vivida* Fabricius.

Chlorochara vivida (Fabricius)

1775. *Cicada vivida* Fabricius, Syst. Ent., p. 683.
1798. *Flata vivida* Fabricius, Ent. Syst. Suppl., p. 519.
1803. *Fulgara vivida* Fabricius, Syst. Rhyng., p. 5.
1869. *Chlorochara vivida* Stål, Hemiptera Fabriciana, II, p. 107.
1923. *Chlorochara vicida* Melichar, Genera Insectorum, Fasc. 182, p. 8.

"Viridi-flavescens; tegminibus virescentibus, duplo longioribus quam apice latioribus, angulis apicalibus rotundatis, interiore recto, exteriore obtuso, margine imo costali flavescente, capite thorace duplo longiore, vertice pone medium carina obtusa obsoleta instructo; fronte prope apicem utrimque rotundata, sursum sensim leviter angustata; alis albidis. ♂ Long. corp. 8, Exp. tegm. 23 mill.

"*Insulæ Americæ*" (Stål).

Melichar says, "La seule espèce du genre habite l'île de Porto Rico." A specimen bearing the label "El Yunque, 2800 ft., C. W. Rechendall," is in the U. S. National Museum.

A specimen from "Mameyes, P. R., Feb. 19, 1925," in the American Museum of Natural History.

Flatinæ

Ormenis Stål

1862. *Ormenis* Stål, Rio Janeiro Hemipt., pp. 68, 69.

Genotype, *P. rufo-terminata* Stål.

KEY TO SPECIES OF ORMENIS

1. Light green or greenish white ..... *pygmæa*
   Gray or brown 2
2. With white submargin to elytra ..... *marginata*
   Costal margin whitish or concolorous 3
3. Without dark spots on elytra 4
   With four dark spots on elytra ..... *quadri-punctata*
4. Costal margin broadly whitish, covering costal area ..... *infuscata*
   Costal margin narrowly whitish, not covering costal area .. *pseudo-marginata*

Ormenis (Petrusa) pygmæa (Fabricius)

1794. *Cicada pygmæa* Fabricius, Ent. Syst., iv, p. 30.
1869. *Petrusa pygmæa*, Stål, Hemipt. Fabriciana, ii, p. 112.
1902. *Ormenis pygmæa* Melichar, Ann. Nat. Mus. Wien, xvii, p. 96.
1914. *Petrusa pygmæa* Melichar, Genera Insectorum, fasc. 162, p. 75.
1923. *Ormenis pygmæa* Wolcott, Ins. Port. Jour. Dept. Agr. P. R., xvii, p. 271.
1929. *Ormenis pygmæa* Osborn, Jour. Dept. Agr. P. R., xiii, p. 169.

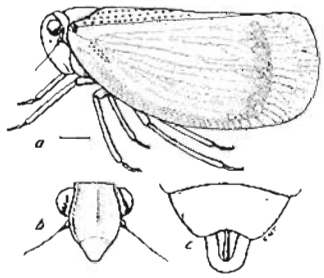

FIG. 37.—*Ormenis pygmæa* (*Fab.*)
a, lateral view, *b*, face, *c*, female (Original)

Light green, immaculate, often densely pruinose, the apical border of elytra tinged with fulvous.

Length to tip of elytra, 8 mm.

"Very abundant on a variety of plants and taken in nearly every locality where collections were made, so that it must be considered a very general feeder. Wolcott's extended list of host plants is representative of its very general food habits." (Osborn.)

Ormenis (Petrusina) marginata (Brunnich)

1767. *Cicada marginata* Brunnich, in Linné Syst. Nat., 1(2), p. 710.
1902. *Ormenis (Petrusa) marginata* Melichar, Ann. Natur. Mus. Wien, xvii, p. 96.

1914. *Petrusina marginata* Melichar, Gen. Ins., Fasc. 182, p. 75.
1923. *Ormenis marginata* Wolcott, Ins. Port., Jour. Dept. Agr. P. R., vii, p. 271.
1929. *Ormenis marginata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

Distinguished most readily by the conspicuous white submargin of elytra.

This was taken in numbers on a variety of plants in my collecting in 1929, especially on *Lantana* and *Cordia*, at Ensenada, Aguirre and other points throughout the island.

Since this was written, I have learned from Mr. Oman that he finds *marginata* and *pygmaea* merge in coloration and that the males have similar genitalia. I find some specimens like *marginata* with whitish submargin but also specimens that appear to be fully colored and that agree with my specimens identified as *pygmaea*. Since the two forms occur on the same plant, there may be a distinct dimorphic coloration and it seems best to retain the nomenclature adopted above. Future observations on the relations of the forms in nature are desirable.

Ormenis quadripunctata Fabricius

1794. *Ormenis quadripunctata* Fabricius, Ent. Syst., iv, p. 30.
1869. *Ormenis quadripunctata*, Stål, Hemipt. Fabriciana, p. 110.
1923. *Ormenis quadripunctata*, Wolcott, Insectæ Portoricensis, Jour. Dept. Agr. P. R., vii, p. 272.
1929. *Ormenis quadripunctata*, Osborn, Jour. Dept. Ag. P. R., xiii, p. 109.

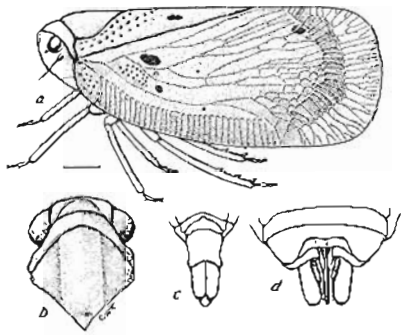

FIG. 58.—*Ormenis quadripunctata* Fab.

a, lateral view, *b*, dorsal view of head and thorax, *c*, male, *d*, female genitalia (Original)

This species is blue gray in color and is distinguished by the dark dots on elytra as shown in the figure. It was taken very commonly in many places throughout the island. It evidently has a wide variety of host plants, as Wolcott records it "in all stages on sugar cane as well as *Cordia*, *Lantana* and other host plants" and I found it very plentiful on fiddle wood (*Pedula* sp.?) trees near Salinas.

Ormenis infuscata Stål

1864. *Ormenis infuscata* Stål, Stet. Ent. Zeit., xxv, p. 55.
1900. *Ormenis infuscata* Fowler, Biol. Cent. Am., Hom., p. 56.
1923. *Ormenis infuscata* Wolcott, Insectæ Portoricensis, Jour. Dept. Agr. P. R., vii, p. 271.
1929. *Ormenis infuscata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

In this species the body above is deeply infuscate except for the narrow whitish margin on the elytra; the face, legs and abdomen beneath pale brownish.

Aside from specimens referred to this species by Wolcott and recorded in my previous paper, I have two specimens referred here labelled "Amasco. P. R., 11-5-30, A. D. Harley, from grapefruit, San Juan No. 1218" received from the U. S. National Museum and one specimen from "Arecibo, P. R., 1-26-32, Guava No. 1783.

Also one specimen, "Aibonito, P. R., July 14–17, 1914," in the American Museum of Natural History.

This species is the size of *marginata* and similar in general appearance but the costal margin is white or grayish white instead of dark with a white submargin.

Ormenis pseudomarginata Muir

1924. *Ormenis pseudomarginata* Muir, Proc. Haw. Ent. Soc., v, p. 460.
1929. *Ormenis pseudomarginata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

"Male. Length, 2.7 mm.; tegmen, 4 mm.

"Frons broader than long (1.3 to 1), median carina distinct on basal half, absent from apical half, lateral carinæ only indicated at base, lateral margins carinate; no carinæ on clypeus; vertex very short, mostly covered by pronotum; width of head equal to, or wider than, width of thorax, no carinæ on mesonotum or only a slight indication at the base of median carina. Hind tibia with only one spine. Costal area distinct with transverse veins, and slightly granulate. Sc very strong, simple to apex; R arising from M near its base and forking about one-third from base of tegmen; Mf level with Rf, Cuf slightly basad of former two; granula-

tions over the base of R and M obscure their junction. Nodal line slightly arcuate and formed by some irregular cross-veins and a slight depressed line across tegmen from node to apex of clavus; apical line fairly even and distinct; claval vein forking near apex, clavus strongly granulate.

"Pronotum and mesonotum black or very dark fuscous brown, frons lighter brown, shading out to nearly yellow on sides, clypeus light fuscous; genæ, antennæ and eyes yellow; front and middle legs yellow, hind legs light brown, yellowish over apical half of tibiæ and tarsi. Abdomen pygofer and styles dark brown. Tegmina black or very dark fuscous brown, a white line along costal margin, narrowest at base where it only covers about one-third of the width of costal area, broadening to apex where it covers the whole costal area; veins slightly lighter along nodal line. Wings fuscous with dark veins.

"The periandrium is tubular with a pair of chitinous, bifurcate spines at apex; the penis is tubular with a chitinous rim at apex, but no process. That apex of anal segment is cleft for some little distance. The details of the genitalia are best understood by the figures.

"Described from one male from Porto Rico (R. T. Cotton, January, 1917, Acc. No. 127–17) and one male from Lares P. R. (J. More, December, 1920, Acc. No. 150-20).

"Type in U. S. P. A. Experiment Station, Honolulu, T. H., No. 1140; paratype in U. S. National Museum, Washington." (Muir.)

This species was described by Muir (1924), but I have not seen specimens that could be placed here and no indication is given as to habitat.

Ormenis roseida Germ.

A single specimen labeled, "Arbonito, P. R., July 14–17, 1914," received from the American Museum of Natural History, is referred to this species.

Flatoides Guérin

1808. *Flatoides* Guér., Règne Anim., Ins., p. 362.

Genotype, *F. lortrix* Guérin.

Flatoides punctata (Walker)

1887. *Eludiptera punctata* Walker, List Hom. Brit. Mus., II, p. 332.
1901. *Cyarda acuta* Ubler, Proc. Ent. Soc. Wash., iv, p. 514.
1914. *Flatoides punctata* Melichar, Genera Insectorum, fasc. 162, p. 114.

1917. *Flatoides punctata* Van Duzee, Cat. Hem., p. 756.
1923. *Flatoides* sps. Wolcott, Insectæ Portoricensis, Jour. Dept. Agr. P. R., vii, p. 272.
1929. *Flatoides* sps. Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

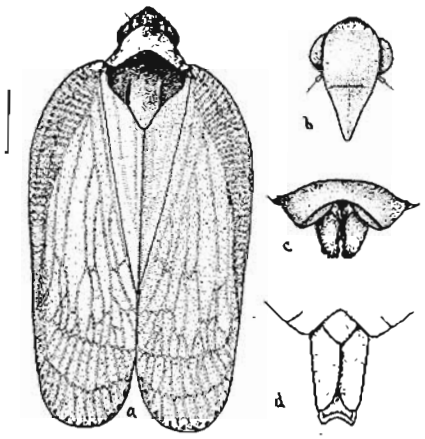

FIG. 59.—*Flatoides punctata* (Walk.)
a, dorsal view, *b*, face; *c*, female, *d*, male genitalia (Original)

This species, which is common to Florida and the West Indian region, has suffered a great variety of synonyms.

The head is nearly as wide as the prothorax, more than two times wider than long, somewhat produced, obtusely angulate at tip of vertex; the front slightly longer than broad, depressed at tip; clypous slightly tumid, antennæ with second joint twice as long as first, cylindric. Pronotum as long as vertex and deeply, convexly emarginate behind, projecting on to base of vertex anteriorly; mesonotum tricarinate; elytra broad at base, narrowing somewhat from the middle to apex, the costal inflation narrowed to middle of margin with numerous transverse veinlets, some of them forked. Female: last ventra segment deeply, broadly notched; pygofers short and truncate; ovipositor short. Male: last ventral segment long, slightly sinuate on hind border; plates a little longer than the last ventral segment, sides nearly parallel, slightly narrowing toward the rounded, obliquely truncate tip.

Gray or suffused with greenish, the mesonotum fulvous or light brown; vertex, pronotum and mesonotum with fuscous dots, the apex of vertex and base of front usually somewhat infuscate; elytra sprinkled with fuscous flecks, usually with a fuscous patch on the inner sector near the end of the clavus.

Length: Female, 10 mm.; male, 9.5 mm.

Description written from specimens taken at Salinas, Porto Rico, Jan. 21, 1929. The specimens collected in numbers on Fiddlewood (*Citharexylum fruticosum?*) seem to agree with *punctata* in all important characters and, while variable, the differences appear to be no greater than in other localities where *punctata* is known to occur. The species is common to the West Indies and Florida. Our specimens run to the species *lichenasus* in Melichar's key (1902) but I am not sure that this species is a synonym.

Flatoides angulifera, new species

Similar in general appearance to *punctata* but with a shorter head, with a more distinct angle and with very distinct male genitalia.

Head narrower than pronotum; vertex three times as wide as length at middle, with very distinct but obtuse angles before the eyes and at tip of apex; front subquadrate, slightly tumid, depressed at base of clypeus, margined with a fairly distinct carina. Pronotum longer than vertex, apparently projecting over base of vertex, narrowed behind the eyes, deeply emarginate on hind border; mesonotal carinæ obscure; elytra with broad costal expanse before the middle, including numerous irregular cross-veins, apical border broadly rounded. Male, last ventral segment subcylindric, broader than long, truncate behind, plates broad at base, diverging from about one-third of distance from the base, narrowed and incurved, the acute tips touching at the ventral border of the anal plate.

Gray, probably greenish in life; vertex tip blackish to black points in front of the eyes; six black or fuscous spots on mesonotum, the lateral ones the larger; a black spot on basal cell of elytra and smoky or fuscous dots scattered over the elytra, about eight, and the expanded costal border and apical cells with obscure fuscous patches, more distinct along apical margin; apical veins whitish, wings milky white with fuscous veins.

Length, male, 9.25 mm.

Described from one specimen (holotype) male, "Aibonito, P. R., May 16, 1916, R. T. Cotton." This specimen resembles *punctata* in form but is lighter in color than Porto Rican specimens of *punctata,* lacks the numerous fuscous flakes of that species and is most certainly separated from it by the different form, more sharply angulate vertex and the very different male genitalia.

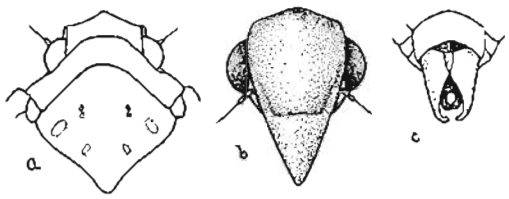

FIG. 80.—*Platoides angulifera*, n. sp.
a, dorsal view head, pronotum and mesonotum, *b*, face, *c*, male genitalia (Original)

DERBINÆ

These are delicate insects, some of them resembling Microlepidoptera, the head usually compressed, the antennæ in some genera greatly modified, branched, flattened or of various shapes, and the body and elytra pruinose.

KEY TO PORTO RICAN GENERA

1. Antennæ not branched, head usually narrow but not greatly elongate.. 2
   Antennæ with second joint branched, head elongate.....*Otiocerus*
2. Antennæ long, more or less flattened.. 3
   Antennæ of moderate length, second joint not specially modified..... 4
3. Antennæ very long, second joint flattened, parallel-sided.....*Potara*
   Antennæ shorter, not more than twice as long as broad.....*Cyklokara*
4. Antennæ with appendage beneath.....*Phaciocephala*
   Antennæ without appendage underneath..... 5
5. Front broad, pronotum not deeply emarginate.....*Cedusa*
   Front narrow, pronotum deeply, angularly emarginate behind..... 6
6. Elytra narrow, much longer than broad.....*Dawnarioides*
   Elytra broad, about half as broad as long.....*Dysimia*

Cedusa Fowler

1904. *Cedusa* Fowler, Biol. Cent. Am., Homop., I, p. 112.

Genotype, *C. funesta* Fowler.

Cedusa wolcotti Muir

1924. *Cedusa wolcotti* Muir, Proc. Haw. Ent. Soc., v, p. 462.
1929. *Cedusa wolcotti* Osborn, Jour. Dept. Agr. P. R., xiii, p. 107.

"Male. Length, 2 mm.; legmen, 3.3 mm.

"Vertex slightly longer than in type species, a faint carina dividing it from frons; lateral margins of frons straight, subparallel sided or frons slightly broader at apex than at base, a faint median frontal carina; sub-

antennal plate large, typical; shoulder keels distinct, but small. Tegmina slightly narrower than type species, apex more rounded, venation with one apical M (M 1c) missing, apical cells shorter.

"The anal angle of pygofer produced into a long, narrow process, lateral margins ventrad of process concave; anal segment long, narrow, anus slightly basad of middle, broadest at base gradually narrowed to truncate apex, the apex has the appearance of being cleft in middle and afterwards joined together, in some specimens there is a little hole through the middle near apex; genital styles large, broad, the apex broadly rounded with a small process on outer margin near base, and a broad longitudinal median ridge from base to the inner margin near apex, inner margin slightly convex, entire; the apex of the left style is cleft nearly across and produced into a small spine, the right style being entire at apex and without spine.

"Stramineous, slightly darker over apical portion of mesonotum. Tegmina hyaline, slightly opaquely white; clavus, apical cells and Cu area slightly fuscous, a black mark at apex of Cu, smaller one at apices of apical cells; veins same color as membrane. Wings opaquely white, M and A veins brown, others white.

"Female. Similar to male. The pregenital plate (seventh sternite) produced from side to middle, sides of produced portion sinuous, apex rounded.

"Described from twenty-three males and five females from Yauco, Porto Rico (*G. N. Wolcott,* August 24, 1923; Acc. No. 236), feeding on a palm. Type No. 1135, in Hawaiian Sugar Planters' Experiment Station collection; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection." (Muir.)

"Dr. Muir described this species from material collected at Yauco, August 24, 1923 and said to be feeding on Palm. In my own experience I found the palms very free from any of these insects, but they may have a seasonal occurrence. None of my specimens seem to agree with the description of this species." (Osborn.)

Cedusa santaclara Myers

1928. *Cedusa santaclara* Myers, Harvard Biol. Lab. and Bot. Garden in Cuba, i, No. 3, p. 13.

1929. *Cedusa inflata* Ball ? Osborn, Jour. Dept. Agr. P. R., xiii, p. 106.

"Vertex considerably wider than long, with sides and anterior margin somewhat elevated; base barely emarginate—very widely and angularly so—wider than apex, so that shape is roughly trapezoidal. Frons dumb-

bell shaped, the sides greatly raised, making the narrow middle portion trough-like; a medium longitudinal ridge distinct, continuing on to clypeus, apical third widest and parallel-sided. Clypeus triangular, narrower than widest part of frons. Genal ridge low, depressed between antennal trough and lateral carina of frons. Transverse carina between vertex and frons evident.

"Pronotum nearly as long as vertex, with three longitudinal carinæ. Mesonotum with disc raised and apex depressed, with three longitudinal carinæ, the outer ones diverging slightly at their extremities.

"Tegmina shining, the veins elevated. Last ventral segment long, truncate, its apical margin sinuate, slightly produced in middle. Genital styles long, wide and flat, evenly paddle-shaped with unusually long inwardly directed tooth. . . .

"Color: Eyes pale magenta; vertex and pronotum unicolorous shining stramineous, mesonotum shining fuscous. Beneath, pale brownish, legs and styles paler. Tegmina uniform smoky fuscous.

"Length: Male, 2.3 mm., tegmen, 3.3 mm., length to tip of closed tegmen, 4 mm.

"Described from two males:

"Holotype: Mina Carlota, Trinidad Mts., Cuba, 19, iii, 1925. No. 635.

"Paratype: Mountains east of Soledad, Cuba, 10, ii, 1925. No. 618.

"Holotype in Museum of Comparative Zoology, Cambridge, Mass., No. 15966; paratype in my collection.

"This species runs in McAtee's key (1924, p. 180) to the *californica-cadusa* group, but differs in the male genitalia, which are nearest to those of *præcox* (Van Duzee)." (Myers.)

Specimens listed under *inflata* Ball in my previous paper are now referred to this species, the description of which was not accessible when my paper was published. The male genitalia agree very perfectly and the other features particularly well for the males. The females have the last ventral segment very short and the hind border broadly sinuate. Some individuals have the vertex and face somewhat clouded but others seem to agree perfectly in color with the description by Myers. A number of specimens both male and female from Añasco, March 1st.

Phaciocephalus Kirkaldy

1906. *Phaciocephalus* Kirkaldy, Bul. Haw. Exp. Sta. Div. Ent., 1, p. 423.

Genotype, *P. viliensis* Kirkaldy.

Phaclocephalus cubanus Myers

1926. *Phaclocephalus cubanus* Myers, Harvard Inst. Trop. Biol. & Med., Bl, p. 103, figs. *a* and *b*.

"A small tawny species closely related to *P. uhleri* (Ball) 1902.

"Male, length 2.3 mm., tegmen 3.3 mm., total length to tip of tegmen, 4 mm.

"Vertex wider at base than long, with elevated sides and coarse granulations; apex narrower than base; base angularly emarginate. Face very narrow, frons with highly raised edges making it trough-like in appearance save at apex, where it expands and slightly flattens to join the generally wider clypeus.

"Pronotum with distinct median longitudinal ridge, and two mediolateral ones. The three mesonotal carinæ very distinct.

"Tegmina with about twelve large and conspicuous granules on basal half of 2nd Anal (Tillyard modification of the Comstock-Needham system) vein, nearly as many similar granules more widely spaced along subcosta, commencing some distance from base. Last ventral segment produced in a triangular point with sweeping, incurved sides and a wide base. Genital styles on their inner ventral sides, each with an inwardly directed slightly curved spine near base; distal of this spine the inner ventral edge is nearly straight. The two spines almost meet in mid-ventral line. One recurved spine at tip of each style. (See figs. *a*, *b*.)

"Head and body reddish-brown, brighter on mesonotum. Beneath light brownish, the genitalia tinged with fuscous. Tegmina brownish amber, with the granules of subcosta and 2nd A fuscous, as well as commissural margin. Apical margin of tegmen with thickened slightly serrate actual edge crimson. Stigmatic region whitish; hind-wings, infuscated, the veins darker.

"Female, length 2.8 mm., tegmen 3.9 mm., total length to tip of tegmen, 4.5 mm. Rather more fuscous in color than the male. Pregenital plate as viewed from below almost square.

"Holotype, male, from sugar-cane, Soledad, Cuba, Feb. 13, 1925.

"Allotype, female, sugar-cane, Soledad, Cuba, Feb. 13, 1925.

"Both are deposited in the Museum of Comparative Zoology, Cambridge, Mass.

"Described from a large series collected on cane and other hosts at Soledad, from February to April.

"Both sexes are often covered in life with grayish pruinosity, giving, in combination with the reddish body color, a purplish tinge.

"The species is nearest to *P. uhleri*, to which it runs in Metcalf's (1923) and in McAtee's keys (1924), and to which it is very closely related but differing in shape of male styles, in shape of female pregenital plate, in size, markings, and general coloration. In pronotal structure it is practically identical with *P. uhleri*." (Myers.)

Collected at Añasco, P. R., March 1, 1929. (H. O.)

Dawnarioides Dozier

1929. *Dawnarioides* Dozier, Am. Mus. Novitates, No. 371, pp. 1-2. "Closely allied to the genus *Dawnaria* Distant. . . . Head (including eyes) distinctly narrower than the pronotum; vertex projecting beyond the eyes with medium depression. . . ."

Genotype, *Dawnarioides musæ* Dozier.

Dawnarioides musæ Dozier

1929. *Dawnarioides musæ* Dozier, Am. Mus. Novitates, No. 371, pp. 1-2, fig. 1.

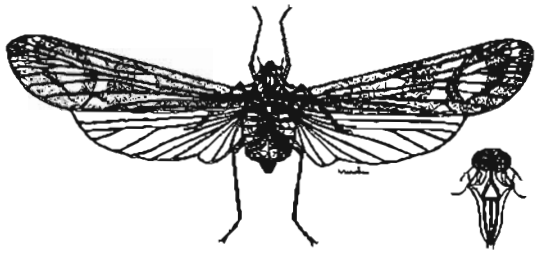

FIG. 61.—*Dawnarioides musæ* Dozier (after Dozier)

"Body and legs pale testaceous, the last three abdominal segments marked with orange-red on dorsum, the ovipositor slightly fuscous. Abdomen short and broad, medianly ridged on dorsum. Tegmina distinctly longer than the wings, grayish hyaline with four whitish transverse fasciæ, the one nearest the apex being the most narrow.

"Length, exclusive of tegmina, 2.25 mm.; with tegmina expanded, 11 mm.

"Described from a large series of adults collected by the writer from under surface of banana leaves, in a shaded nook near Comerio, Porto Rico, May 10, 1925." (Dozier.)

This species was not encountered in my collecting but I had little opportunity to examine banana plants.

Patara Westwood

1842. *Patara* Westwood, Trans. Linnean Soc., xix, p. 13, figs. 6a-6d.

Genotype, *P. guttata* Westwood.

Patara albida Westwood

1842. *Patara albida* Westwood, Trans. Linn. Soc. Lond., xix, p. 14, Pl. II, fig. 7.

"Luteo-albida; antennis nigricantibus, alis anticis albis farinosis apicem versus fuscescenti tinctis guttis albis sanguineisque ornatis.

"Long. corp. lin. 1. Expans. alar. lin. 2¾.

"*Habitat* in Insulâ Sti. Vincentii, Dom. Guilding. In Mus. Dom. F. W. Hope.

"Pallidè luteo-albida. *Caput* angustum; oculi magni, nigro-purpurei. *Antennæ* nigricantes, compressissimæ. *Thorax* totus concolor pallidus. *Pedes* albidi. *Abdomen* paullò obscurius, appendiculis duabus (♂ genitalibus) albidis. *Alæ* anticæ albæ, farinosæ, versus apicem pallidè fuscescenti tinctæ, venis tamen ad margines apicemque alarum guttis albis terminatis, punctis sex parvis marginalibus purpureis (scil. 2 apicali-costalibus majoribus et 4 apicalibus), venis duabus transversis discoidalibus fuscis, reliquis multò pallidioribus; cellulis 3 discoidalibus subquadratis, albis, nitidis, iridescentibus; venâ primâ transversâ rectâ obscuriore; cellulâ inter venam analem marginemque internum serie duplici tuberculorum fuscorum. *Alæ* posticæ albæ, venis paullò obscurioribus."

Two specimens collected by Dr. H. L. Dozier, Bayamon, Porto Rico, Nov. 17, 1924, and one record from a specimen in the U. S. National Museum labelled "Patara albida, Barcelonita, P. R." Our specimens agree very perfectly with Westwood's description. The antennæ are compressed, the second segment bordered with blackish. The specimen in the U. S. National Museum was referred to this species by Mr. Oman.

Cyklokara Muir

1912. *Cyklokara* Muir, Haw. S. P. A. Exp. Sta. Bull. 12, p. 32.

Genotype, *C. girdlestoni* Muir.

Cyklokara sordidulum Muir

1918. *Cyklokara sordidulum* Muir, Proc. Haw. Ent. Soc., iii, p. 416.

"♂ In neuration, shape of head and antennæ this species is typical of the genus. Head, thorax and abdominal sternites sordid pale orange yellow, carinæ of face between eyes slightly infuscate, abdominal tergites

cadmium orange. Tegmina sordid yellow, opaque with waxy secretion, slightly fuscous over apical cells, veins brownish in places; wings white opaque with waxy secretion, veins brown.

"Edges of pygophor straight, entire, with a small, sharp point projecting on each side of the anal segment; anal segment small, about as long as wide; styles large, broad, apex roundly truncate, ventral edge slightly convexly curved, roundly produced in middle, dorsal edge very slightly and concavely curved, with a quadrate projection on basal half.

"Length, 2.1 mm.; tegmen, 4.5 mm.

"♀ Similar to male. Anal segment very small, as long as broad; pregenital ventral plate short, posterior edge widely angularly produced, the apex of the projection turned slightly dorsad.

"Length, 2.2 mm.; tegmen, 5.5 mm.

"Hab. Porto Rico, Aibonito, Mayaguez, July, 1914. Described from five males and five females. Type in the American Mus. of Nat. Hist., New York." (Muir.)

Dysimia Muir

1924. *Dysimia* Muir, Pr. Haw. Ent. Soc., v, p. 462.

Genotype, *D. maculata* Muir.

Dysimia maculata Muir

1924. *Dysimia maculata* Muir, Proc. Haw. Ent. Soc., v, p. 462.
1929. *Dysimia maculata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 107.

"Male. Length, 1.5 mm.; tegmen, 3.6 mm.

"Stramineous; genæ in front of eyes, the middle of mesonotum and basal portion of abdominal tergites fuscous, fuscous over lateral portions of pronotum, a small dark mark on tegula sometimes forming a distinct spot. Tegmina hyaline, slightly opaque with waxy secretion and very slightly fuscous, especially over apical cross-veins and in apical cells, veins stramineous with fuscous marks; four black spots on tegmen, the largest on Cu 1a, a smaller one at base of Cu 1, another in costal cell at base of Sc+R fork and a very small one on M basal of first sector. Wings hyaline, veins stramineous with fuscous markings, a round black spot between Cu and A.

"Anal segment small, anus near base, lateral edges curved ventrad. Inner margins of genital styles slightly concave on basal half and convex on apical half, outer margin produced angularly in middle, the apex of the angle produced into a thin, curved process.

"Female. Length, 1.9 mm.; tegmen, 4 mm.

"In color similar to male, the fuscous on tegmen a little darker, and the abdominal tergites lighter. Hind margin of pregenital plate turbinate or angular with curved sides, reaching nearly to apex of styles.

"Described from thirty-five males and twelve females, feeding on two species of *Inga: I. vera* and *I. laurina* (*G. N. Wolcott,* August 1922, Acc. No. 279-23).

"Type in H. S. P. A. Experiment Station collection. Honolulu, No. 1136; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection." (Muir.)

Otiocerus Kirby

1819. *Otioccrus* Kirby, Linnean Soc. London, xiii, p. 13.

Genotype, *O. stolli* Kirby.

Otiocerus schönherri Stål

1859. *Otioccrus schönherri* Stål, Berliner Ent. Zeit., iii, p. 327.
1918. *Otiocerus schonherri* (?) Muir, Proc. Haw. Ent. Soc., iii, p. 420.

"I have not seen the original description of this species. The specimen before me is a little smaller but somewhat similar in color to *O. degeerii* Kirby. The head in profile is more slender and the apex turned slightly dorsad, the antenna has two long processes, one reaching to apex of head and the other a little shorter. Medio-ventral edge of pygophor roundly produced into a small plate, a depression runs across the base of this plate which gives the margin the impression of being entire, lateral edges roundly produced; anal segment long, narrow, apex curved slightly ventrad and rounded, anus near apex, lateral edges turned ventrad, the basal half subangularly produced; genital styles widely apart at bases, ventral edge sinuous, apex produced into a point and turned dorsad, dorsal edge entire, straight."

"Hab. One male specimen from Aibonito, Porto Rico, July, 1914." (Muir.)

Stål gives the locality as "Patria, Puerto Rico, Mus. Berol." His original description reads "O. Schönherri. Fusco-testaceus; clypeo, pectore, pedibusque pallidis; abdomine fusco-roseo; tegminibus glauco-fuscescentibus, dilute sanguineo-venosis, apice minute albo-maculatis, ante medium costæ maculis nonnullis minutis verticeque albo-mucoreis. Long. 5½. Long. cum tegm. 10½ Millim."

This reference was overlooked in my previous paper, as also the doubtful reference by Muir. I have not seen specimens but the above descrip-

tions quoted from Stål and Muir should make identification of the species possible.

Delphacinæ

This subfamily, which is often given family rank, is set off from all other Fulgoridæ by the presence of an articulated spur (calcar) at the apex of the hind tibia. The Delphacinæ are all small insects and mostly occur on low herbage, grasses, sedges and plants of meadow or bog associations.

Key to Porto Rican Genera

1. Spur subulate, sometimes long and spine-like, cross section circular or angular, apex acute, without teeth on side 2
   Spur not subulate, cultrate, subcultrate or thin with or without teeth on the side 4
2. Three mesonotal carinæ, antennæ long with both segments foliaceous. *Copicerus*
   Four or five mesonotal carinæ, antennæ shorter, not foliaceous 3
3. Face with two median carinæ ..... *Ugyops*
   Face with one median carina sometimes forked, vertex not longer than wide ..... *Punana*
4. Median carina of front forking about one-third from base ..... *Peregrinus*
   Median carina of front simple or forking at base 6
5. Median carina of vertex with a small areolet at middle or midway from base to apex ..... *Liburniella*
   Median carina of vertex without areolet at middle, usually with a triangular areolet at apex 6
6. Lateral carinæ of pronotum straight, reaching or nearly reaching hind border 7
   Lateral carinæ of pronotum curved behind eyes, not reaching hind border 13
7. Antennæ with basal segment triangular or sagittate ..... *Stobera*
   Antennæ with basal segment not sagittate 8
8. Antennæ with one or both segments flattened 9
   Antennæ with segments rounded or cylindrical 10
9. Frons much widened below the eyes ..... *Prokelisia* *
   Frons not widened, sides nearly parallel ..... *Megamelanus*
10. Vertex long, narrow, produced before the eyes 11
    Vertex shorter, scarcely produced before the eyes 12
11. Median carina of vertex arising at base and forking before the middle. *Saccharosydne*
    Median carina of vertex obsolete at base, Y-shaped beyond middle. *Neomalaxa*
12. Vertex longer than broad, apex scarcely narrower than base ..... *Sogata*
    Vertex not longer than broad, sometimes broader than long ..... *Pissonotus*
13. Without spines on basitarsus ..... *Delphacodes*
    With spines on basitarsus ..... *Nilaparvata*

* Not yet taken in Porto Rico.

Copicerus Schwarz

1802. *Copicerus* Schwarz, Kong. Vet. Akad. Nya. Handl., xxiii, p. 180.

Genotype, *C. irroratus* Schwarz.

Copicerus irroratus Schwarz

1802. *Copicerus irroratus* Schwarz, Kong. Vet. Akad. Nya. Handl., xxiii, p. 181.
1923. *Copicerus irroratus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 110.

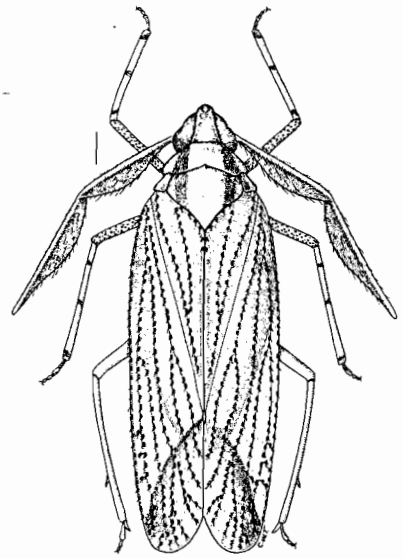

FIG. 62.—*Copicerus irroratus* Schwarz
Dorsal view (Original)

This striking species is at once recognized by the greatly elongated and foliaceous antennæ as shown in the figure. It is a widely distributed species in tropical and subtropical America. A single specimen was taken at Añasco, March 1, 1929, so the species must have been rare at that time.

Ugyops[1] Guérin

1834. *Ugyops* Guérin, Voyag. Belanger, p. 477.

Genotype, *U. percheronii* Guér.

1843. *Hygiops* Amyot et Serville, Hemiptères, p. 511.

[1] I have followed Muir in using this generic name and include a species described as new, although it would seem to fit nearly as well in *Epididis* Fowler, which Muir suggests may have to be placed in *Ugyops* along with *Canyra*.

Ugyops occidentalis Muir

1918. *Ugyops occidentalis* Muir, Proc. Haw. Ent. Soc., iii, p. 425.
1931. *Ugyops occidentalis* Dozier, Am. Mus. Novitates, No. 510, p. 15.

"This species is congeneric with *U. lituri frons* (Walk.), the tegmina are broadly tectiform, the median frontal carina double to near apex and the first joint of antennæ slightly shorter than the second.

"Ochraceous-buff with brown markings as follows: carinæ of head and thorax, small spots alongside of median carinæ of face, spreading across to sides at apex, two rings on apical antennal joint, bands on front and middle femora and tibiæ, a longitudinal mark on hind femora, lateral areas of pro- and mesonotum, on the apical abdominal segment, base of pygophor and the anal segment. Tegmina hyaline, veins dark, broken with light patches, granules minute, bearing small hairs concolorous with vein.

"Genitalia of the *Ugyops* type; anal segment dome-shape with anus at top, apical edge slightly emarginate, ventral edge of pygophor quadrately emarginate, a small angular emargination in the medio-ventral line; styles sub-cylindrical, the curve of apical two-thirds slight.

"Length, 4.5 mm.; tegmen, 5.5 mm.

"Similar to male. Anal segment small, about as long as broad; ovipositor with more than one-third extending beyond pygophor; lateral plates reaching beyond middle of pygophor.

"Length, 5 mm.; tegmen, 5.7 mm.

"Hab. Aibonito, Porto Rico, July, 1914. Described from one pair in the American Mus. of Nat. Hist., New York." (Muir.)

Dozier records "three specimens taken at Naranjito, Porto Rico, July 6, 1915 (P 4007) and one specimen from Aibonito, Porto Rico, July 14, 1914 (3708)."

This species was not included in my earlier paper on Porto Rican Homoptera.

Ugyops granulata, new species

Head narrow; vertex twice as long as width between the eyes, lateral carinæ elevated, two inner carinæ converging toward the tip but not meeting and continued as two distinct carinæ on the front almost to the apex; lateral carinæ of the front elevated about the same as the median carina; clypeus tricarinate; antennæ long, first joint scarcely as long as second, distinctly furrowed, second joint slightly enlarged toward tip, distinctly pustulate, seta long, more than twice as long as second joint. Pronotum shorter than vertex, scarcely emarginate behind, with the lateral carinæ paralleling the eye; mesonotum with five carinæ; elytra long, apex rounded, venation strong, elevated curved crossvein from nodal cell to tip of clavus; legs slender, calcar slender

and spine-like with acute tip. Male: genital segment long, hind border sinuate at sides, rather deeply excavated at the middle; styles short, slightly divergent at base, rounded tips converging and almost meeting; anal tube long, pointed, exceeding the superior margin of pygofer.

Light brown; the margins of carinæ infuscate: eyes fuscous; antennæ barred with fuscous; pronotal keel fuscous; basal patch and two oblique fuscous dashes, outer border of the crossveins and dusky patches on the second and seventh apical veins; discal and apical veins mostly whitish, with white granulations and rather thickly setose. Length, 7 mm.

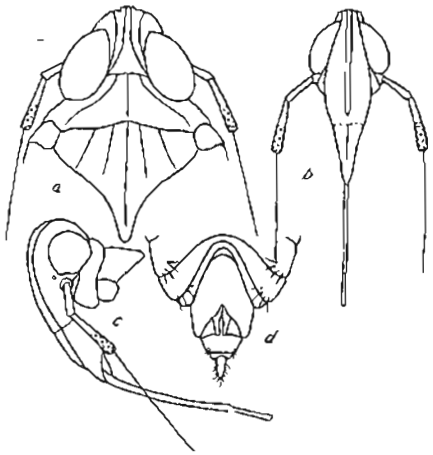

FIG. 63.—*Oyyops granulata*, n. sp. *a*, dorsal, *b*, face, *c*, lateral view, *d*, genitalia, male (Original)

Described from a single male specimen (holotype) labelled "El Yunque, P. R., Feb. 25, 1927, C. W. Richmond, Collector," received from the United States National Museum, where the type is placed. (No. 50586.)

This species appears to approach very closely Fowler's (*Epibidis*) *godmani* from Central America, but differs somewhat in the markings and especially in the form of the genital segment. It is much larger than Muir's *occidentalis*, described from Porto Rico, and does not agree otherwise with his description. It might be placed in *Epibidis*, but that genus is characterized as having four or five spines on hind tibiæ while this species has only two.

Punana Muir

Punana puertoricensis Muir

1918. *Punana puertoricensis* Muir, Proc. Haw. Ent. Soc., III, p. 425.

"♂ Width of vertex more than double the length along the middle line, projecting very slightly beyond eyes, base concave, apex convex, the Y-shaped carina obscure, the fork forming a small areola at apex; face slightly broader than long, subcircular except at apex, face and clypeus medially and laterally carinate, carinæ obscure; antennæ not reaching to middle of clypeus, second joint 2.5 times the length of first, first subsagittate, second subovate, considerably flattened, with large sense organs on dorso-apical portion, both joints with stout hairs, arista apical. Pronotum slightly longer than vertex, hind margin shallowly and roundly emarginate, tricarinate, the lateral carinæ curving parallel with hind margin of eyes and do not reach the hind margin. Tegmina broad, slightly decumbent beyond apex of abdomen, radius not touching media, cubitus and media touching at base of first median sector. Hind tibiæ with one basal, one median, one subapical and five apical spines, hind tarsus two-thirds the length of tibia, first joint slightly longer than the other two together, spur subulate with circular cross section, about half the length of first tarsal joint.

"I have described the generic characters of this species as it differs in some points from the type of the genus and approaches *Onkelos* Distant in others; unfortunately the shape of the antennæ and of the spur of the latter genus are not stated.

"Ochraceous-buff, face between eyes and the clypeus slightly darker, antennæ brown, carinæ of pronotum, median portion of mesonotum and carinæ lighter; a slight brown band on front coxæ, and fainter ones on first and second tibiæ. Tegmina pale, veins concolorous or lighter, thickly studded with brown granules bearing dark brown hairs.

"Genitalia of the same type as *Asiraca*. Anal segment large, lateral edges turned ventrad so as to form a convexity on ventral surface, the apical edge not turned ventrad and, together with the square emargination of the ventral edge of the pygophor, forming a five-sided ventral opening; styles subulate, widest and slightly flattened at base, curved, bases and apices approximate.

"Length, 3.3 mm.; tegmen, 3.9 mm.

"♀ Similar to the male. Lateral plates small, reaching less than one-third from base, styles (ovipositor sheath) narrow, projecting well beyond pygophor, and slightly beyond anal segment, anal segment as long as wide in ventral view, styles dark brown.

"Length, 4.3 mm.; tegmen, 4.4 mm.

"Hab. Aibonito, Coamo Springs and Mayagüez, Porto Rico, July, 1914. Described from five males and five females in good condition, and one broken female in the American Museum of Nat. Hist., New York." (Muir.)

Stobæra Stål

1859. *Stobæra* Stål, Berl. Ent. Zeit., iii, p. 327.

Genotype, *S. concima* Stål.

Stobæra tricarinata (Say)

1825. *Delphax tricarinata* Say, Jour. Acad. Nat. Sci. Phila., iv, p. 237.
1897. *Stobæra tricarinata* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 245.
1914. *Stobæra tricarinata* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 572.

Pale yellowish white, the front with an infuscate band across apex, extending across cheeks. Elytra hyaline, somewhat milky, with an oblique fuscous band before middle and another on base of apical areoles.

Length, 4 mm.

A single specimen which agrees well with examples taken in the United States was collected at Aguirre, February 18, 1929.

Neomalaxa Muir

1918. *Neomalaxa* Muir, Proc. Haw. Ent. Soc., iii, p. 426.

Genotype, *N. flava* Muir.

Neomalaxa flava Muir

1918. *Neomalaxa flava* Muir, Proc. Haw. Ent. Soc., iii, p. 426.
1923. *Neomalaxa flava* Wolcott, Jour. Dept. Agr. P. R., vii, p. 273.
1924. *Neomalaxa flava* Muir and Giffard, Bull. Haw. Exp. Sta., Ent. Ser., No. 15, p. 9.
1929. *Neomalaxa flava* Osborn, Jour. Dept. Agr. Porto Rico, xiii, p. 110.

"Pale yellow-orange, eyes light brown, ocelli black, a longitudinal brown mark down antennæ not quite reaching the base of each joint. Tegmina hyaline, milky white with waxy secretion, veins basad of cross-veins concolorous, cross-veins and veins apical of cross-veins brown.

"Styles broad at base, gradually narrowing to apex, reaching to apex of pygophor and covering the greater portion thereof.

"Length, 2.4 mm.; tegmen, 3.6 mm.

"Hab. Mayagüez, Porto Rico, July, 1914. Described from two females, one in bad condition, in the American Mus. Nat. Hist., New York." (Muir.)

Peregrinus Kirkaldy

1904. *Peregrinus* Kirkaldy, Entomologist, xxxvii, p. 175.

Genotype, *D. maidis* Ashmead.

Peregrinus maidis (Ashmead)

1890. *Delphax maidis* Ashmead, Psyche, v, p. 323.
1897. *Dicranotropis maidis* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 240.
1923. *Peregrinus maidis* Wolcott, Jour. Dept. Agr. P. R., vii, p. 273.
1929. *Peregrinus maidis* Osborn, Jour. Dept. Agr. P. R., xiii, p 110.

"♂ Length, 2 mm.; wing expanse, 6⅜ mm. Pale greenish-yellow, in death pale brownish yellow; apex of 1st and the apical half of 2nd antennal joints, lower part of frons, spots on pleuræ, most of the abdomen, except the 1st ventral segment and the lateral edges of the dorsal segments, smoky black.

"Legs pale, the femora more or less embrowned; apex of posterior tibiæ with several black tipped spines and a large movable spur; tarsi 3-jointed, the basal joint longer than the other two together, all with black tipped spines or teeth at apex; the anterior and middle tarsi shorter, the terminal joint the longest, longer than the first two together. Face with three keels, the middle one forked on the frons above; clypeus also tricarinated, the middle carina delicate; beak, apparently, but two-jointed, reaching far beyond the middle coxæ, the first joint being slightly the longer. Prothorax and mesothorax tricarinate, those of the last being delicate or subobsolete. Front wings pale greenish-brown, sub-hyaline, the apex of the clavus and veins of apical cells more or less distinctly surrounded by fuliginous clods. . . .

"♀ Length, 2⅝ mm.; wing expanse, 7 mm. This sex agrees with the male, except its slightly larger size, the clypeus as well as the frons and all the coxæ are more or less distinctly embrowned or blackish, while the apical edges of the abdominal segments, as well as the lateral edges and a broad dorsal stripe, are yellow.

"The brachypterous form measures 3 mm. in length, the abdomen being much broader and more depressed than in the fully winged form."

"The aborted wings, . . . are less than 3 mm. in length, with a spot at apex of clavus and two on the apical margin. . . ." (Ashmead.)

"Taken on corn at Ensenada, Tallaboa and Ciales and doubtless occurs generally where corn is grown. The species is known for many different countries including Cuba, Southern United States, Hawaii, Ceylon and South Africa. It is of special interest in connection with possible transmission of mosaic disease, but it does not appear to breed on sugar cane.

Occurrence of adults on this plant might, however, serve as a means of transmission for plant diseases occurring on grasses or corn." (Osborn.)

Megamelanus Ball

1902. *Megamelanus* Ball, Can. Ent., xxxiv, p. 265.

Genotype, *M. bicolor* Ball.

Megamelanus elongatus Ball

1905. *Megamelanus elongatus* Ball, Proc. Biol. Soc. Wash., xviii, p. 118.
1929. *Megamelanus elongatus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 110.

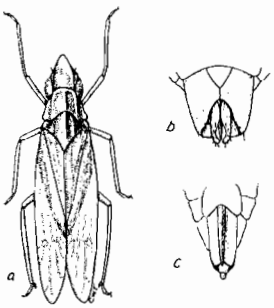

FIG. 64.—*Megamelanus elongatus* Ball *a*, dorsal view; *b*, female, *c*, male genitalia (Original)

"Vertex rather broad at base, portion between eyes about square, face and vertex extending in front of eyes as an acutely pointed pyramid longer than the diameter of the eye; all carinæ sharp and distinct, a trace of a single median carina on posterior half of vertex. Pronotum long, tricarinate, the outer carinæ parallel and continuing to posterior margin. Scutellum tricarinate, the carinæ parallel and closer together than on the pronotum. Elytra long, narrow, venation simple regular.

"Color dirty straw, face smoky, the lateral carinæ often margined internally with fuscous. Apex of elytra often margined with fuscous. All veins thickly studded with curved dark hairs." (Ball.)

Length 3.7 mm.

"Specimens taken on beach grass near San Juan, Feb. 10th, are slightly smaller than specimens I have from New Orleans, La., but agree so closely in other respects that I believe them to be one species. They are evidently confined to beach grass as food plant." (Osborn.)

Saccharosydne Kirkaldy

1907. *Saccharosydne* Kirkaldy, Bull. Exp. Sta. Hawaiian Sugar Planters Asso., iii, p. 139.

Genotype, *D. Saccharivora* Westwood.

Saccharosydne saccharivora (Westwood)

1833. *Delphax saccharivora* Westwood, Mag. Nat. Hist., vi, p. 413.
1923. *Saccharosydne saccharivora* Wolcott, Jour. Dept. Agr. P. R., vii, p. 273.
1929. *Saccharosydne saccharivora* Osborn, Jour. Dept. Agr. P. R., xiii, p. 110.

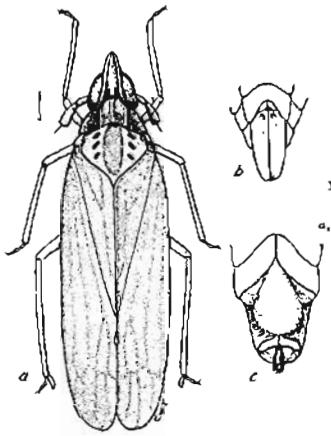

FIG. 65.—*Saccharosydne saccharivora* (Westwd.)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

In this species the head is long, the vertex projecting beyond the eyes and narrowing to apex. The body slender, elytra narrow. The color is pale greenish, fading to yellowish, and there are no fuscous or black markings on elytra.

This is a common and very widely distributed species, occurring abundantly on sugar cane. Specimens were taken at many points in cane fields and Wolcott gives a number of localities and says "throughout the island but rare on the south side."

Sogata Distant

1906. *Sogata* Distant, Fauna British India, Rhynchota, iii, p. 471.

Genotype, *Sogata doherlyi* Distant.

Sogata cubana (Crawford)

1914. *Dicranotropis cubanus* Crawford, Proc. U. S. Natl. Museum, xlvi, p. 595.
1920. *Megamelus flavolineatus* Muir, Bull. Ent. Res., x, 2, p. 143.
1924. *Sogata cubanus* Muir, Exp. Sta. Hawaiian Sugar Planters Asso., Ent. Ser. 15, p. 12.
1929. *Sogata cubanus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

Similar to *furcifer* but the elytra are hyaline except for a curved spot extending from the tip of clavus to end of costal cell.

"One male from Patillas, one female and one without abdomen from Quanallilla, Porto Rico (C. N. Wolcott, March, 1920) on sugar cane." (Muir.)

I took it at several points on the island during the winter of 1929 and specimens were noted in the collection at the Experiment Station.

Río Piedras, Feb. 14; Cayey Rd., Jan. 28, 1929.

Sogata cubana var. **pallida**, new variety

The color pattern, while very obscure and lacking the smoky border of apical cells, agrees so well with *cubana* that I believe this is a varietal form and, as only female specimens are in the lot before me, it seems best to include it here.

Ten females collected from a rank grass in a back yard of a residence at Fortuna on the south side of the island.

Sogata furcifer (Horvath)

1899. *Delphax furcifer* Horvath, Termés. Füzetek, xxii, p. 372.
1905. *Liburnia albolineosa* Fowler, Biol. Cent.-Am., Homop., i, p. 135, Pl. xiii, fig. 14.
1907. *Delphax colophon* Kirkaldy, Exp. Sta. Haw. Sugar Pl. Assoc., Bull., iii, p. 157.
1912. *Sogata distincta* Distant, Annals and Mag. Nat. Hist. (8), ix, p. 191.
1912. *Sogata pallescens* Distant, Annals and Mag. Nat. Hist. (8), ix, p. 192.
1929. *Delphacodes albolineosa* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

This is a dark species with a conspicuous yellowish white stripe from the head to tip of mesonotum and with the elytra smoky, except for a somewhat variable hyaline area covering the disk at the end of the clavus.

Length, 2 mm.

Specimens collected at Río Piedras were referred to *albolineosa* in my previous paper.

Muir and Giffard (1924) have given an extended synonymy of this species and part of this is repeated above. Our previous entry followed the reference to *albolineosa*. Muir speaks of *furcifer* as a nearly cosmopolitan species and cites many Oriental as well as Neotropic localities.

Sogata aurantii (Crawford)

1914. *Megamelus aurantii* Crawford, Proc. U. S. Natl. Mus., xlvi, p. 628, pl. xlviii, figs. c, g.
1922. *Stenocranus hinei* Dozier, Ohio Jour. Sci., xxiv, p. 78, Pl. i, figs. 6 a, b, c.
1924. *Sogata aurantii* Muir and Giffard, Bull. Exp. Sta. Hawaiian Sugar Planters' Asso., Entom. Series No. 15, 16, Pl. iv, fig. 50.
1926. *Sogata aurantii* Osborn, Ann. Ent. Soc. Am., xix, p. 359.

"Average length, 2.4 mm.; width of vertex 0.16; width of frons, 0.19; antennæ, I, 0.09, II, 0.20. General color orange yellow throughout, pronotum lighter; ocelli black; elytra flavous with tips of membrane veins brown. Body rather slender.

"Head almost as broad as prothorax, carinæ rather pronounced; vertex slightly broader at base than beyond; frons rather narrow, constricted between eyes, sides subparallel, about twice as long as broad; antennæ reaching about to clypeus, I scarcely half as long as II, latter somewhat pubescent. Lateral carinæ of pronotum straight, usually extending nearly to hind margin. Legs moderately slender, hind tibiæ longer than femora; calcar rather long, thin, margin black, finely dentate. Elytra slender, typical in venation.

"Male pygofers rather long, aperture elliptical, with a long, acute, spiniform process on each side a little basal of midpoint and curved inward over aperture; styles long, slender, enlarged at apex, not strongly divergent; anal tube prominent, protruding caudad, with one process on ventral margin." (Crawford.)

Two specimens, male and female, Rio Piedras, P. R., Feb. 1, 1912 (T. H. Jones, collector).

Sogata parvula Osborn

1926. *Sogata parvula* Osborn, Ann. Ent. Soc. Am., xix, p. 359.

"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

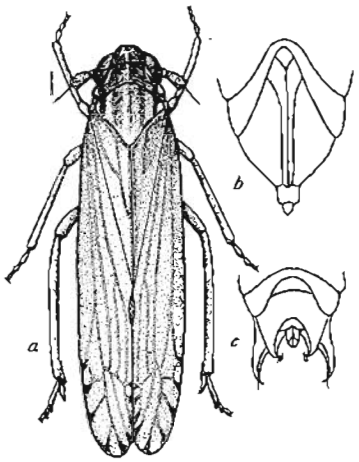

FIG. 66.—*Sogata parvula* Osb. *a*, dorsal view, *b*, female, *c*, male genitalia (Original)

pale brownish, legs whitish; tips of tarsal claws brownish. Length: female 3.5 mm." (Osborn.)

Male, genital segment concave with a produced acute margin; claspers short, widening and outwardly curved toward the tip; anal plate with a median angle; plates divergent, incurved with rounded tips, short and with short setæ.

Originally described from a female taken in Cuba. Four specimens taken at Arecibo, Porto Rico, Feb. 15, 1929, (H. O.) enable me to give description covering both sexes.

Sogata approximata (Crawford)

1914. *Megamelus approximatus* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 622, Pl. xlix, fig. F.
1923. *Sogata approximata* Wolcott, Jour. Dept. Agr. P. R., vii, p. 273.
1929. *Sogata approximata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

"Size and general proportions very similar to *M. teapæ*. General color black, with a broad white vitta on dorsum between lateral carinæ from vertex to tip of scutellum and continued on to clavus; extreme lateral portion of pronotum also white; legs and antennæ yellow; frons black; elytra as in *teapæ*

"All variations from *teapæ* are slight, except male genitalia. Styles longer, simple, slightly arched and a little divergent, apices close." (Crawford.)

"Reported as occurring on malojillo grass at Pt. Cangrejos and on grasses in cane fields by Wolcott." (Osborn.) I did not encounter specimens in my collecting.

Liburniella Crawford

1914. *Liburniella* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 585.

Genotype, *Liburniella ornata* Stål.

Liburniella fasciatella, new species

Small, delicate; head as wide as pronotum; vertex longer than broad, carinæ of vertex weak, the minute areolæ before the middle, lateral areolæ divided to front; front scarcely widened before the eyes, carinæ prominent. Pronotum as long as vertex, outer carinæ nearly straight, merging into hind border; mesonotum with three fairly distinct carinæ; elytral veins conspicuous, scarcely punctate; hind tibiæ with a spine, calcar acutely pointed. Female: pygofer elongate, slightly exceeded by the ovipositor. Male: genital segment about as long as wide, hind border slightly concave; styles divergent, apex obtuse, anal spur short.

Pale gray, a distinct whitish stripe from vertex to tip of mesonotum bordered by narrow fuscous stripes; the anterior part of vertex and front fuscous; carinæ whitish; elytra hyaline with apical veinlets and the spot at base of middle apical cell fuscous; beneath gray, hind border of last ventral segment of female and the middle patch and genital segment of male infuscate. Length, female 3 mm., male 2.75 mm.

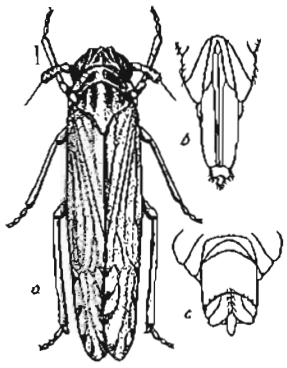

FIG. 67.—*Liburniella fasciatella*, n. sp.
a, dorsal view, b, female, c, male genitalia (Original)

Described from two specimens, female (holotype) Cayey Rd., Porto Rico, 2000 ft., March 16, 1929, from native grass, and male (allotype), San Juan, Porto Rico, Feb. 10, 1929, beach grass (H. O.), in author's collection.

Pissonotus VanDuzee

1894. *Pissonotus* VanDuzee, Bull. Buf. Soc. Nat. Sci., v, p. 236.

Genotype, *P. marginatus* VanDuzee.

Pissonotus striolus, new species

Head scarcely as wide as pronotum; vertex quadrate, carinæ distinct; front, sides nearly parallel, slightly narrowed between the eyes, median carina forked near the base; antennæ with second joint a little longer than the first and distinctly punctate. Pronotum as long as vertex, carinæ distinct, lateral carinæ scarcely attaining hind border; mesonotum short with prominent carinæ; elytra short, veins distinct. Female: last ventral segment deeply emarginate, pygofer broad, as long as ovipositor.

Dark brown to fuscous, with pale yellowish stripe covering the carinæ of the pronotum and mesonotum and forming a central line, and two lateral stripes on dorsum of abdomen; beneath pale fuscous; elytra with areoles fuscous and veins broadly yellowish. Length, 2.5 mm.

Described from one micropterous female (holotype) collected at Ciales, Porto Rico, Feb. 9, 1929. (H. Osborn.)

While only the female is in hand, the species seems so distinct as to merit description and gives the island a second representative of this genus.

Pissonotus albovenosus, new species

Robust, vertex longer than pronotum with prominent carinæ and deep fovæ; three carinæ of pronotum and scutellum strong; elytra reaching on to basal abdominal segment, apical border broadly rounded; frontal carinæ strong; clypeus somewhat tumid, polished. Genitalia: female with broad pygofer reaching nearly to tip of ovipositor, male pygofer opening circular, open below, with margin and processes of anal segment paralleling the inner margin; diaphragm broad emarginate; armature concealed; styles short, blunt, polished; aedagus slender, tapering

Dark fuscous, with carinæ of vertex and front, carinæ of pronotum and scutellum, postero-lateral border of mesonotum, veins and hind margin of elytra, a median series and some short lines on fourth segment and fifth segment of abdomen and border of last segment of abdomen whitish. A black bar across clypeus and cheek.

Length: female, 2.75 mm.; male, 1.75 mm.

Described from fourteen specimens. Thirteen females (holotype and paratypes) and one male from Cameron, La., Aug. 14-28 and June 20-30, 1905 (J. S. Hine, collector) and one male (paratype) collected at Río

"Macropterous males: Color black; carinæ of the head broadly white; pronotum white clouded anteriorly between the carinæ, or the surface may be more or less obscured with blackish; scutellum shining black edged with fulvous; antennæ pale; connexivum and narrow margin of the ventral segments and pleural pieces whitish. Elytra fuliginous; forks of the first and second sectors nearly equal; nervures sparingly punctuate; pale at base. Legs pale, femora and outer face of the tibiæ more or less embrowned. Pygofers broad, aperture transverse, narrowed dorsally, ventral notch broad, moderately deep; stiles rather slender, acute, very widely divergent, almost horizontal; the pygofers edged with white." (Van Duzee.)

This species has a very general distribution in Europe and North America. The specimens referred here were taken at Río Piedras in February and March, 1929.

Delphacodes propinqua (Fieber)

1866. *Delphax (Delphax) propinqua* Fieber, Verh. d. k. k. Zool. Bot. Ges., Wien., xvi. p. 525.
1907. *Liburnia terminalis* Van Duzee, Bull. Buf. Soc. Nat. Sci., viii. p. 49.
1912. *Liburnia tuckeri* Van Duzee, Bull. Buf. Soc. Nat. Sci., x. p. 366.
1923. *Delphacodes propinqua* Wolcott, Jour. Dept. Agr. P. R., vii. p. 274.
1924. *Delphacodes propinqua* Muir, Bull. Haw. Exp. Sta., No. 15, p. 31.
1929. *Delphacodes propinqua* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

"Macropterous form; pale fulvo-testaceous; carinæ of the head, pronotum and scutellum pale, the median conspicuously whitish; cheeks, clypeus and frontal foveæ fuscous bordered with black next the pale carinæ, or their entire surface may become blackish. Apex of the first antennal joint and sometimes the base of the second conspicuously black; abdominal segments edged with black. Elytra somewhat narrower than in *pellucida*; hyaline, the punctured nervures pale becoming fuscous toward the apex. Head broad; vertex short, apical fovæ small; front wall narrowed between the eyes, sides subparallel below; first antennal joint slender, about three-fourths the length of the second. Length to tip of the elytra 3 mm.

"Brachypterous male; similar to the macropterous but with the front a little wider and paler and the lateral carinæ of the scutellum more oblique. Length 2 mm.

"Pygofers of the male roundedly excavated below, the sides scarcely sinuated; plates rather short, ligulate, almost parallel or feebly divergent, somewhat incurved at apex against the margin of the anal tube." (Van Duzee.)

Our records were for Río Piedras, Aguirre, Mayaguez and Fortuna.

"Macropterous males: Color black; carinæ of the head broadly white; pronotum white clouded anteriorly between the carinæ, or the surface may be more or less obscured with blackish; scutellum shining black edged with fulvous; antennæ pale; connexivum and narrow margin of the ventral segments and pleural pieces whitish. Elytra fuliginous; forks of the first and second sectors nearly equal; nervures sparingly punctuate; pale at base. Legs pale, femora and outer face of the tibiæ more or less embrowned. Pygofers broad, aperture transverse, narrowed dorsally, ventral notch broad, moderately deep; stiles rather slender, acute, very widely divergent, almost horizontal; the pygofers edged with white." (Van Duzee.)

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1912. *Liburnia tuckeri* Van Duzee, Bull. Buf. Soc. Nat. Sci., x, p. 506.
1923. *Delphacodes propinqua* Wolcott, Jour. Dept. Agr. P. R., vii, p. 274.
1924. *Delphacodes propinqua* Muir, Bull. Haw. Exp. Sta., No. 15, p. 31.
1929. *Delphacodes propinqua* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

"Macropterous form; pale fulvo-testaceous; carinæ of the head, pronotum and scutellum pale, the median conspicuously whitish; cheeks, clypeus and frontal fovæ fuscous bordered with black next the pale carinæ, or their entire surface may become blackish. Apex of the first antennal joint and sometimes the base of the second conspicuously black; abdominal segments edged with black. Elytra somewhat narrower than in *pellucida;* hyaline, the punctured nervures pale becoming fuscous toward the apex. Head broad; vertex short, apical fova small; front well narrowed between the eyes, sides subparallel below; first antennal joint slender, about three-fourths the length of the second. Length to tip of the elytra 3 mm.

"Brachypterous male; similar to the macropterous but with the front a little wider and paler and the lateral carinæ of the scutellum more oblique. Length 2 mm.

"Pygofers of the male roundedly excavated below, the sides scarcely sinuated; plates rather short, ligulate, almost parallel or feebly divergent, somewhat incurved at apex against the margin of the anal tube." (Van Duzee.)

Our records were for Río Piedras, Aguirre, Mayagüez and Fortuna.

Delphacodes puella (Van Duzee)

1894. *Liburnia puella* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 191.
1897. *Liburnia puella* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 250.
1924. *Delphacodes puella* Muir, Bull. Haw. Exp. Sta., Ent. Ser. 15, p. 32.
1929. *Delphacodes puella* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

"Aspect of the male of *L. pellucida* but smaller with a double piceous mark at the tip of the clavus.

"Macropterous form. Male: Black; carinæ of the head and the posterior half of the pronotum white; tip of the scutellum, broad margins of the propleuræ, antennæ, legs, connexivum and narrow margins of the ventral segments, yellowish testaceous, the latter sometimes white. Elytra pellucid white, tip of the clavus and the marginal nervure of the membrane blackish; discal nervures pale brown, finely granulated.

"Vertex longer and narrower than in *pellucida;* front narrower, the side parallel below the eyes where the width is hardly greater than at the center of the eye. Aperture of the pygofers almost circular, a little arcuated below; stilcs widened and converging above, the outer angles extended upward and backward toward the anal aperture. Length 2½ mm.

"In the female the yellowish markings are more extended, the front is slightly widened toward the clypeus with its carinæ yellowish instead of white; the pronotum is black with the carinæ and narrow posterior margin pale yellow, otherwise like the male. Pygofers long and narrow, parallel; plates narrow, arcuated within, covering the pygofers to the base of the broad oviduct. Length 3 mm." (Van Duzee.)

"Taken only rarely and in small numbers. Aguirre Jan. 18; Añasco March 1." (Osborn.)

Delphacodes teapæ (Fowler)

1905. *Liburnia teapæ* Fowler, Biol. Cent.-Am., Homoptera, i, p. 185.
1923. *Delphacodes teapæ* Wolcott, Jour. Dept. Agr. P. R., vii, p. 274.
1929. *Delphacodes teapæ* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

"A very small species, with the front-parts black, more or less shining, the tegmina black, with the veins granulose, and the exterior margin towards the apex vitreous; forehead about twice as long as broad, with a strong central carina; antennæ rather long, yellow; pronotum short, with the side-keels not reaching the base; scutellum about three times as long as the pronotum; abdomen piceous; legs yellow.

"Male with the pygofer broader below than above, with the anal tube large and the anal style large and fuscous; styles broad, approximate, stalked, with a dilated head which is broadly furcate.

"Long. cum tegm. 2½ millim.; lat. ad hum. 1 millim. (♂ ♀)
"Hab. Mexico, Teapa in Tabasco and Vera Cruz (H. H. Smith).
"Several males and one imperfect female." (Fowler).

Wolcott records the species from a variety of locations and food plants and I took it at nearly all points where collections were made, but most abundantly on grasses.

Delphacodes humilis (Van Duzee)

1907. *Liburnia humilis* Van Duzee, Bull. Buf. Soc. Nat. Sci., viii, p. 48.
1929. *Delphacodes humilis* Muir, Bull Haw. Exp. Sta., Entom. Ser. 15, p. 32.
1929. *Delphacodes humilis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

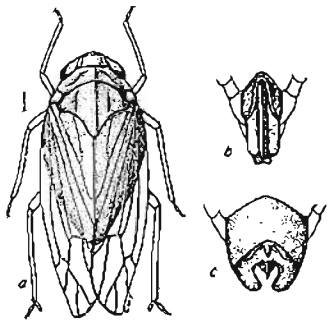

FIG. 69.—*Delphacodes humilis* (Van D.)
a, dorsal view; *b*, female, *c*, male genitalia (Original)

"Macropterous form: Pale brownish testaceous. Eyes, tarsal claws, oviduct of the female and abdomen of the male in large part black; elytra subhyaline, nervures testaceous becoming fuscous toward the apex. Vertex subquadrate deflected before, basal foveæ hardly distinguished, apical very small. Front moderately wide, a very little broader toward the apex which is feebly angularly emarginate at the clypeus. Antennæ rather long; second joint much longer and broader than the first, distinctly crenulated on the edges, apex of the first joint slightly embrowned. Pronotum short with the hind margin strongly, angularly concave, lateral carinæ strongly curved. Scutellum large, deeply sinuated on the sides, lateral carinæ nearly parallel, placed near together, tip broad and obtuse. Elytra as in *pellucida*. Length to tip of the elytra 3 mm.

"Brachypterous form; similar to the macropterous but with the front somewhat broader toward its apex and the lateral carinæ as usual more strongly divergent. Length 2 to 2½ mm.

"Pygofers of the male quite deeply excavated below, the sides sinuated; plates broad, strongly arched and almost meeting above near the anal tube.

"Described from five macropterous examples representing both sexes taken at Mandeville, and seven brachyterous specimens from Rock Fort. This plainly colored little species may be distinguished by the large tibial spur, the broad straight uncolored front and the large second antennal joint." (Van Duzee.)

I collected the species at numerous points on the island.

Delphacodes havanensis (Crawford)

1914. *Megamelus albidens havanensis* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 622.

1924. *Delphacodes havanensis* Muir and Giffard, Bull. Hawaiian Sugar Planters Asso., Ent. Ser. 15, p. 28.

1929. *Delphacodes havanensis* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

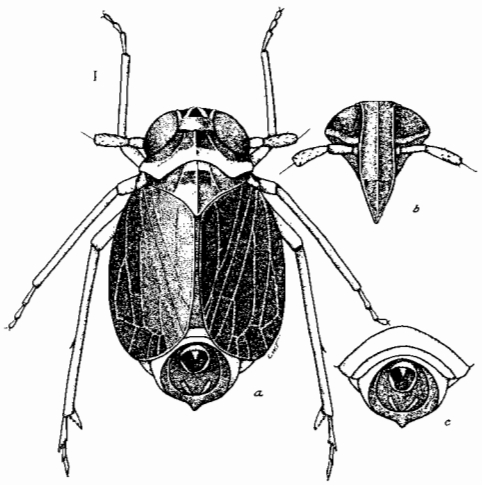

FIG. 70.—*Delphacodes nigripennis* (Crawf.)
a, dorsal view, *b*, face, *c*, male genitalia

General color light brown. Elytra hyaline, apical veins infuscate; lateral projections of pygofer spatulate, anal segment without spines. Length of body 2 mm.

"Reported by Wolcott as occurring on malojillo grass at Pt. Cangrejos."

Delphacodes detecta (Van Duzee)

1897. *Liburnia detecta* Van Duzee, Bull. Buffalo Soc. Nat. Sci., v, p. 298.
1909. *Liburnia circumcincta* Van Duzee, Bull. Buffalo Soc. Nat. Sci., ix, p. 203.
1914. *Megamelus vanduzee* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 622.
1924. *Delphacodes detecta* Muir and Giffard, Bull. Exp. Sta., Hawaiian Sugar Planters Asso., Ent. Ser. No. 15, p. 26.

Soiled whitish, face black, a line in the middle of each compartment fulvous; carinæ white, elytra whitish, nervures concolorous, inner apical areoles with a faint, longitudinal fuscous cloud. Length, female 4, male 3.5 mm.

Specimens placed here from Lares, Feb. 12, 1929, Río Piedras, Feb. 1929.

Delphacodes nigripennis (Crawford)

1914. *Megamelus erectus nigripennis* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 625.
1924. *Delphacodes nigripennis* Muir and Giffard, Bull. H. S. P. A. Ent. Ser. No. 15, p. 31.
1929. *Delphacodes erectus* (var. *nigripennis*) Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

Elytra shining black, reaching to tip of abdomen, pale at extreme base. Thorax yellowish. Length, 2 mm.

Specimens referred here were collected March 12, 1929, at Salinas and at elevation of about 2000 feet, on the Cayey Road, March 16, and Añasco, Mar. 1, 1929. (H. Osborn.)

Delphacodes lutulenta (Van Duzee)

1894. *Liburnia lutulenta* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 191.
1897. *Liburnia lutulenta* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 252.
1929. *Delphacodes lutulenta* Osborn, Jour. Dept. Agr. P. R., xiii, p. 112.

"Brachypterous form; dull testaceous brown, more or less obscured on the pro- and mesonotum, elytra, and edges of the pectoral pieces, especially in the male; postpectus with a large fuscous spot; facial carinæ brown-margined; abdomen darker, in the male tinged with rufous, the segments edged with fuscous; femora obscurely lineated with brown; tip of the tarsi and rostrum blackish; antennal setæ black.

"Vertex quadrate, feebly rounded before, carinæ obtuse, evanescent on the forehead, fovæ each with a round impressed dot. Front rather broad, narrowed between the eyes and more feebly toward the truncated apex. Pronotum shorter than in *lineatipes* and rounded anteriorly, not apparently twice the length of that of the inner. Pygofers of the male short, aperture subtriangular, the sides rounded, hardly notched above, ventral notch feeble; stiles narrow, claw-like, approximate at base, slightly divergent above and acute at apex. In the female the genital pieces differ from those of *lineatipes* only in being proportionately a little narrower throughout.

"Length 2 mm." (Van Duzee.)

"Specimens agreeing closely with specimen taken in the States were taken at Río Piedras, Mayagüez, Cayey Road and Aguirre." (Osborn.)

Delphacodes andromeda (Van Duzee)

1907. *Liburnia andromeda* Van Duzee, Bull. Buf. Soc. Nat. Sci., viii, p. 40.
1924. *Delphacodes andromeda* Muir, Bul. Exp. Sta. Hawaiian Sugar Planters Asso., Ent. Ser. 15, p. 30.
1929. *Delphacodes andromeda* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

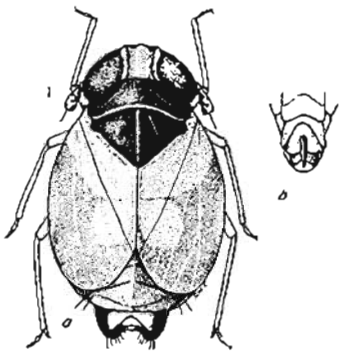

FIG. 71.—*Delphacodes andromeda* (Van D.)
a, dorsal view, male, b, male genitalia (Original)

Very small, occuring in two distinct forms; the long winged female form being mostly hyaline with hind border of pronotum and tip of scutellum whitish, abdomen mostly black, elytra milky hyaline, margin black; the short winged males have the head, pronotum, most of scutellum, third and fourth and terminal segments of abdomen black, mesothorax, base of

abdomen a dark orange, fifth and sixth segments of abdomen fulvous, elytra orange yellow at base, hyaline apically. Female 1.5 mm. to tip of abdomen, 2 mm. to tip of elytra. Males 1.25 mm.

"Taken at Patillas Jan. 22 and Lares Feb. 12, (1929)." (Osborn.)

This handsome little species occurs in enormous numbers in moist locations throughout the southern states and in tropical America and has been taken at Columbus and Marietta in Ohio.

Delphacodes species

In addition to the above species I have several specimens which I have not been able to place in any of the described species. As these are females and in view of the importance of the male genitalia in recognition of species, it seems best not to attempt descriptions at this time.

Nilaparvata Distant

1906. *Nilaparvata* Distant, Fauna Brit. Ind. Rhyn., iii, p. 473.

Genotype, *N. greeni* Distant.

Similar to *Delphacodes* but with one or more spines on the hind basitarsus.

Nilaparvata wolcotti Muir and Giffard

1924. *Nilaparvata wolcotti* Muir and Giffard, Bull. Ex. Sta. Hawaiian Sugar Planters Asso., Ent. Series, No. 15, p. 17.

Male: Macropterous; length 2.4 mm.; tegmen 3.3 mm. Length of vertex about equal to width at base, apex narrower than base, projecting beyond eyes, base well in front of middle of eyes; length of face 2.5 times the width, narrowed between eyes, median carina simple. Antennæ reaching beyond base of clypeus, first segment much longer than wide, second segment 1.6 times the length of first. Lateral pronotal carinæ divergingly curved, not reaching hind margin. Hind basitarsus equal to the two others together, with two small spines, one near base and the other slightly beyond middle. Spur large, thin, with many small teeth on hind margin.

"Head dark brown, carinæ and antennæ lighter brown; pronotum dark brown on sides, lighter in middle and along basal margin; mesonotum brown, lighter over carinæ and basal angle; abdomen dark brown, yellow along pleura and margins of pygofer; legs light brown, front and middle coxæ dark brown. Tegmina hyaline, veins brown, tubercles small, sparse, a small dark mark at apex of clavus. Wings hyaline, veins brown.

"Female. Length 2.5 mm.; tegmen 3.6 mm. Much lighter in color than the male, nearly all yellow or light brown. This female has only one spine on hind basitarsus near the base.

"Described from one male and one female (types) from Pt. Congrejos, Porto Rico (G. N. Wolcott, February, 1920) and one male from Barceloneta, Porto Rico (G. N. Wolcott, April, 1920), on sugar cane." (Muir and Giffard).

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