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SCIENTIFIC SURVEY

OF

Porto Rico and the Virgin Islands

VOLUME XIV—Part 1

Insects of Porto Rico and the Virgin Islands

Odonata or Dragon Flies—*Elsie Broughton Klots*



NEW YORK:
PUBLISHED BY THE ACADEMY
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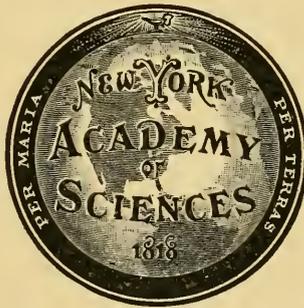
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INSECTS OF PORTO RICO AND THE VIRGIN ISLANDS

ODONATA OR DRAGON FLIES

BY ELSIE BROUGHTON KLOTS

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INTRODUCTION

The dragonfly material accumulated in the course of the Scientific Survey of Porto Rico and the Virgin Islands, and deposited in the American Museum of Natural History, has served as a basis for the present study. Additional material to which I have had access has been, altogether, of sufficient amount and geographical extent to warrant undertaking a preliminary review of what is known of the Odonate fauna of Porto Rico and its relation to that of the West Indies as a whole.

MATERIAL STUDIED

Some 900 specimens belonging to the American Museum (abbreviated A. M. N. H. in the distribution records given in this paper) have been examined. They represent collections made in practically all sections of Porto Rico, ten different points in Cuba, five in Jamaica, eight in Haiti, four in the Dominican Republic, and at least one each in St. Croix, St. Thomas, St. John, Martinique and Guadeloupe; they include thirty-one genera and forty-five species. In these expeditions of the American Museum the following individuals participated: F. E. Lutz, H. E. Cramp-

ton, J. H. Grossbeck, F. E. Watson, C. W. Leng, L. B. Woodruff, A. J. Mutchler and H. G. Barber.

At Cornell University (abbreviated C. U. in the distribution records given in this paper) there is material collected by James G. Needham in Cuba, Haiti and Porto Rico; by W. T. M. Forbes in Porto Rico, Vieques Island, and St. Lucia; by J. Chester Bradley and by P. P. Babi in St. Lucia; and a few specimens by Mel T. Cook in Cuba, and G. Garb in Porto Rico. Since the present work was begun, valuable material has been received from Julio Garcia-Diaz and M. D. Leonard in Porto Rico; L. D. Stores in Martinique; and H. L. Dozier in Haiti. A collection made by O. Querci in Cuba was loaned by The Academy of Natural Sciences, Philadelphia. Professor Needham collected a large number of nymphs during his short stay on the islands in the spring of 1929. These have furnished some valuable additions to our knowledge of the immature stages.

HISTORICAL

The first work on the West Indies which included descriptions of Odonata¹ was that of Sir Hans Sloane, Bart., in 1725, in which he noted five species of Libellula: *Rufa Major*, *Rufa Minor*, *Maxima caerulea* aut *viridis*, *purpurea*, and *minor caerulea*. The first of these is described as having "2 large Hemispherical eyes . . . a thorax . . . large and covered all over with a reddish rusty colored hair or wool . . ." The last is described as having an abdomen "not much bigger than two or three Hog Bristles joined together, all of a blue color." So one is inclined to credit Sir Hans with the first description of *Orthemis ferruginea* and the first *Enallagma* from the West Indies.

¹ Early works including reference to Odonata in the West Indies are in part:

1590. Acosta, Jose de, Hist. Nat., iv.
 1654. Terre, J. B. du, Hist. generals . . . de S. Cristopher, de la Guadeloupe, de la Martinique . . . Paris.
 1681. Rochefort, C. de, Hist. nat. . . . aux iles Antilles . . . Rotterdam.
 1722. Labat, P., Nouv. Voyage aux iles d'Amerique . . . Paris.
 1725. Sloane, Sir Hans, Bart., Voyage to the islands of Madeira, Barbados, Nieves, St. Cristopher, and Jamaica, ii. London.
 1750. Hughes, G., Nat. Hist. of Barbados. London.
 1809. DesCourtilz, M. E., Voyage d'un naturaliste . . . Cuba et a St. Dom. . . . Paris.
 1810. Ledru, A. P., Voyage aux iles . . . St. Thomas . . . Paris.
 1848. Schomburgh, Sir R. H., A hist. of Barbados . . . London.
 1851. Poey y Aloy, Felipe, Memorias sobre la hist. nat. . . .
 1861. Poey y Aloy, Felipe, Conspectus.
 1878. Marshall, T. A., Notes on the entomology of the Windward Islands. Proc. Ent. Soc. London, pp. xxvii-xxxviii.
 1882. Stahl, A., Fauna Puerto Rico. San Juan.

In 1857, Ramon Sagra's *Historia fisica politica y natural de la Isla de Cuba* included a section on Odonata contributed by the Baron Edmonde de Selys Longchamps, who listed from the island thirty-five species, of which four were described as new.

In 1866, Scudder reported to the Boston Society of Natural History on a collection of Odonata from the Isle of Pines. His account was followed by one by Hagen in 1867 on a collection from Cuba, and one by Uhler the same year on Haiti. In 1889, Kirby described a collection, in the British Museum, from Jamaica, and in 1894, one from St. Vincent and Grenada.

Other papers which deal exclusively with the dragonflies of the West Indies are included in the Bibliography. Special attention should be drawn, however, to that of Kolbe in 1888, in which note is made of the distribution of dragonflies in the West Indies, with special references to those from Porto Rico; also to that of Gundlach in 1893 on the fauna of Porto Rico.

Three catalogues have been published: Carpenter's (1893) for Jamaica, showing the island to have exclusive neotropical affinities, with a preponderance of South American species, and giving some biological notes; Walcott's (1923) for all the insects of Porto Rico, listing twenty-one species of Odonata as reported by Kolbe, Gundlach, and Stahl; and Gowdy's (1926) for Jamaica. References to the last two have not been included in the synopsis of each species, except in a few rare instances when the reference stands as the sole record for the locality.

ACKNOWLEDGMENTS

A report on the Odonata collected by the Scientific Survey of Porto Rico was undertaken by the late Mr. Lewis B. Woodruff, but had proceeded at the time of his death only to a partial sorting of material. The writer is indebted to the authorities of the American Museum for the opportunity to study this material; to the authorities of Cornell University for the use of material contained in the collection of that institution; and to all those who have loaned or given specimens.

The figure of the nymph of *Brachymesia* was drawn by Mr. Gideon Ting-wei Lew.

The preceding table shows the following groups of species:

1. Endemic genera:

Scapanea *Hypolestes*
Microneura

Scapanea, a monotypic genus, has hitherto been known from the Greater Antilles only. If the nymph which I have described as *Scapanea* in the following pages is correctly associated with this genus, the range is extended to Trinidad. It belongs to a generalized group of the Libellulinae: a group which is somewhat Corduline in appearance, with rather abundant venation, but with a few very specialized features. *Hypolestes*, with two closely related species, is marked as a genus of archaic relationship by the presence of lateral gills on the abdomen of the nymph. *Microneura*, with one species, recorded from Cuba only, is apparently not common. It is unknown to me.

2. Endemic species of non-endemic genera:

<i>Gomphoides integer</i>	<i>Lestes scalaris</i>
<i>Gomphoides serenus</i>	<i>Lestes spumarius</i>
<i>Acanthagyna ereagris</i>	<i>Protoneura capillaris</i>
<i>Brechmorhoga grenadensis</i>	<i>Telebasis vulnerata</i>
<i>Macrothemis celeno</i>	<i>Telebasis macrogaster</i>
<i>Perithemis mooma</i>	<i>Euallagma truncatum</i>

Lestes and *Acanthagyna* are widely distributed genera; the former is found in all regions of the world and the latter in all but Nearctic and Palearctic. The others are more restricted. The original description of *B. grenadensis* is the only record for the genus in the West Indies, and that is for Grenada only; it is strongly South American in its affinities. Both *Brechmorhoga* and *Macrothemis* are closely related to *Scapanea*. *Perithemis* is unlike the others in that it is probably of more recent origin; the species intergrade and are extremely variable. The identity of *mooma* as a species is still uncertain; it may be but one of the many varieties of the females of a more widely distributed species.

3. Endemic subspecies of non-endemic species:

<i>Aphylla producta caraiba</i>	<i>Erythrodiplax connata</i>
<i>Aeshna cornigera dominicana</i>	<i>fraterna</i>
<i>Cannaphila insularis insularis</i>	<i>Erythrodiplax connata</i>
<i>Ephidatia longipes cubensis</i>	<i>justiniana</i>

I have not seen the first two. Both *A. producta* and *A. caraiba* are from Cuba; the Cuban records may all be *caraiba*. *E. cubensis* is the

Cuban form of *E. longipes*, and is found nowhere else in the West Indies except the Isle of Pines. *Erythrodiplax* is a genus of many species and one which shows considerable variation in characters usually regarded as generic. The species, too, are variable and plastic; they are probably of recent development.

4. Non-endemic species:

These number seventy. Of these, *Dythemis rufinervis* and *Enallagma doubledayi* are known only from the eastern U. S. (although Florida has twenty-seven species in common with the West Indies), and *Telebasis dominicanum* exclusively from South America. All the others are recorded from Central America with the exception of *Macrodiplax balteata*, which is from Florida and Texas.

From this it would appear that our characteristic Antillean fauna is most nearly allied to that of Central America, and that it arrived probably at the time of the late Tertiary connection with Central America, when all our present families of Odonata were in existence. Several species are common to Jamaica and Haiti and are not found on the other islands, and four have been reported only from Jamaica; one of these is *Uracis imbuta*, a primitive genus in which the female possesses a long ovipositor. Such localization is not inconsistent with the belief in the secondary land bridge via the east-west mountain chain from Haiti through Jamaica to Honduras, in addition to the Yucatan-Cuba connection.

But it must be borne in mind that dragonflies are strong fliers (thirty-five of these herein discussed are dispersed over all of Central America, and widely in South America); they are known to migrate² in large numbers; they are easily carried by the wind; and coursing up and down the streams as they do, might well become attached to some carrier and be borne across considerable distances. Furthermore, the distribution of

² For information regarding the flight and migration of dragonflies see:

- 1919-1921. Allison, V. C., Dragonflies of southeastern Kansas. Trans. Kans. Acad. Sci., xxx, pp. 45-58.
1916. Osburne, Raymond C., A migratory flight of Dragonflies. Journ. N. Y. Ent. Soc., xxiv, pp. 90-92.
1879. Schaupp, F. G., Flight of Lepidoptera in mid-ocean. Bull. Brooklyn Ent. Soc., ii, p. 73.
1926. Shannon, Howard J., Journal N. Y. Ent. Soc., xxxiv, p. 199, 1926.
1917. Tillyard, R. J., A study of the Odonata of Tasmania. Proc. Linn. Soc. N. H. Sidney, xxxvii, pp. 404-479.—(in his Biology of Dragonflies. Cambridge, 1917, p. 333.)
1880. Torrey, Bradford, Migration of Dragonflies. American Naturalist, xiv, pp. 132-133.
1929. Williamson, C. B., Some records of dragonfly migration. The Entomologist, lxii, pp. 145-148.

dragonflies is restricted by the presence or absence of permanent waters, and the existing species by the type of water, whether lotic or static, whether with sandy or rocky bottom; it is not affected by geologic strata or soil conditions. Cuba, with its lakes and ponds, and its abundance of rivers and their many small tributaries, is naturally rich in Odonata. In Porto Rico, breeding places are scarce and the species are fewer. The fact of Cuba's longer association with the continental land mass and of Porto Rico's earlier isolation, has comparatively little to do with this abundance or scarcity. Many of the small islands are completely void of Odonate life, whereas others offering some opportunity for development are inhabited by species of greatest vitality. Such species, once established, maintain their dominance by their superior vigor (as is the case with the currently evolving species of *Erythrodiplax* and *Micrathyria*), or by continual repopulation made possible by their stronger powers of flight (as in *Lepthemis*, *Orthemis*, *Tramea*, and *Pantala*).

PLAN OF PAPER

The purpose of this paper has been to prepare a survey of the regional material by means of which the reader may quickly and easily determine what is known from Porto Rico, what he has, and what type of collecting is most needed.

In the systematic account which follows, keys have been given to all genera reported from the West Indies, and to all species of genera reported from Porto Rico and the Virgin Islands. The genera and species which are not regional are included in brackets. Descriptions have been given for all regional species; these have been taken from Porto Rican specimens unless otherwise stated or unless the distributional list for the species shows that no material has been at hand. In the subfamily *Libellulinae*, keys to both genera and tribes have been included. Under each tribe is another key to the genera, in which, so far as possible, different characters have been employed.

In the bibliographic accounts of each species, references have been made: to the original descriptions, to records of distribution within the islands, to records of specimens actually collected in the West Indies, and to the entry of the species in the Catalogue of the Odonata of North America by Richard A. Muttkowski, (Bull. of the Public Museum of the City of Milwaukee, May, 1910, i, art. I) or, in the case of the subfamily *Libellulinae*, in *Libellulinen* by F. Ris (Cat. Coll. Selys, Fasc. ix-xvi, 1909-1913), which has a more nearly complete bibliography. Additional references of importance have occasionally been included. Additional syn-

onyms are sometimes mentioned but complete synonymy of the species has not been deemed necessary.

Previous volumes of this series should be referred to for discussions of the geology or geography of the islands.

The venational nomenclature used is that of the Comstock-Needham system. The terminology of the anal area of the Libellulinae follows Needham and Broughton ('27); as: *gaff.* Cu_2-A_1 from the hind angle of the triangle to their forking; *sole*, A_1 from its separation from Cu_2 to its conjunction with the midrib of the loop at the toe; *a: b*, proportions of distances from base of A_2 to midrib of loop and from the midrib to the hind angle of the triangle. Measurements are given in millimeters and represent the extremes when the variation is great, and the mean when it is small.

DESIDERATA

The two principal needs are: the preservation of Zygopteran pairs taken *in copula*, and the rearing of nymphs. Females of the genera *Lestes* and *Enallagma* are virtually indeterminable. The finding and rearing of nymphs will, aside from completing our knowledge of their life histories, throw valuable light on the correct position in our system of classification of several genera. Of the 89 species here listed, the nymphs of 11 genera and about 50 species remain unknown. Of the 7 genera and 9 species described here for the first time only one, *Leptemis vesiculosa*, has been reared.

SYSTEMATIC ACCOUNT OF THE SPECIES

Order ODONATA

Suborder ANISOPTERA

The adults of this suborder are usually rather large, stout-bodied insects. Eyes large, never separated by a distance greater than their own diameter, often meeting on the top of the head. Males with two superior anal appendages and one inferior. Females with superior appendages but no inferior, and with or without an ovipositor. Wings held horizontally or depressed when in repose. Hind wing broader at the base than the fore wing. Discoidal cell differentiated into triangle and supertriangle. Radius branched: its sector commonly considered as crossing over two branches of media.

The nymphs are robust and variable in form. Gills internal. Anus closed by three spine-like appendages.

KEY TO FAMILIES

Adults

1. Triangles equidistant from the arculus in fore and hind wings and similarly shaped; antenodal crossveins of the first and second series not continuous with one another, except the first one and one other.....Æschnidæ
 Triangle nearer the arculus in the hind wing than in the fore wing and the two dissimilar in shape, that of the fore wing transversely elongated and that of the hind wing longitudinally elongated; antenodal crossveins of the first and second series continuous with one another....Libellulidæ

Nymphs

1. Labium flat, or nearly so.....Æschnidæ
 Labium spoon-shaped, covering the face up to the base of the antennæ.....
 Libellulidæ

ÆSCHNIDÆ

Triangles of fore and hind wings similar in shape and equidistant from the arculus. Antenodals of the first and second series not continuous across vein Sc except the first one and usually one other; these two are thickened. Stigma with brace vein at proximal end. Anal loop, when present, rounded. Auricles nearly always present on the 2nd abdominal segment of the male and sometimes of the female. Labium with well developed median lobe; lateral lobes with movable hook and end hook.

Nymphs usually somewhat elongated, but of various shapes. Labium flat, never spoon-shaped.

KEY TO THE SUBFAMILIES IN THE WEST INDIES

Adults

1. Eyes widely separated on the top of the head.....[Gomphinæ]
 Eyes meeting on the top of the head.....Æschninæ

Nymphs

1. Antennæ of four segments; tarsi 2-2-3³ segmented; burrowers...[Gomphinæ]
 Antennæ of seven segments; tarsi 3-3-3 segmented; climbers.....Æschninæ

ÆSCHNINÆ

These are large, strong-flying dragonflies. The eyes meet in a line on the top of the head. Median lobe of labium incised or notched. Abdominal segments with longitudinal lateral carinæ. Triangles of both

³ Tarsus of first leg consisting of two segments; that of second leg, of two segments; that of third leg, of three segments.

wings elongated in the axis of the wing and subequal. All triangles with many crossveins. Anal loop compact.

The *nymphs* are climbers on submerged vegetation. Body elongate. Legs slender, placed well forward on the body; tarsi three-segmented. Antennæ seven-segmented, the segments of about equal size and length. Labium flat; setæ usually absent; lateral lobes narrow; long movable hook present; median lobe cleft.

KEY TO WEST INDIAN GENERA

Adults

- 1. Sectors of the arculus springing from above the middle of the arculus. *Anax*
- Sectors of the arculus springing from the arculus at or below its middle 2
- 2. Radial sector forking below the middle of the stigma; outer end of radial planate gently curved forward.....*Coryphæschua*
- Radial sector forking before the stigma; outer end of radial planate bent forward abruptly 3
- 3. Hind wing with two rows of cells between Cu_1 and Cu_2 beyond the anal loop; supplementary loop usually present; fore wing with 2-3 crossveins under the stigma; 10th sternite of the female rounded, with two very small spines*Æschua*
- Hind wing usually with one row of cells between Cu_1 and Cu_2 beyond the anal loop; usually four crossveins under stigma of fore wing; 10th sternite of female usually forked into two or three long slender branches 4
- 4. Two rows of cells between M_1 and M_2 beginning under the stigma; 10th sternite of the female with three prongs.....*Gynacantha*
- Two rows of cells between M_1 and M_2 beginning at, or proximal to, the stigma, at least in the hind wing; 10th sternite of the female with two prongs*Acanthagyma*

Nymphs

- 1. Lateral lobes of labium with strong raptorial setæ....*Acanthagyma* (?)
- Lateral lobes of labium without raptorial setæ..... 2
- 2. Hind angles of head strongly rounded..... 3
- Hind angles of head angulate.....*Coryphæschua*
- 3. Lateral spines on segments 7-9.....*Anax*
- Lateral spines on segments 6-9.....*Æschua*

Anax Leach

Type.—*imperator* Leach.

Distribution.—Cosmopolitan.

Diagnosis.—This genus is at once distinguished from all other genera in the New World by the shortness of the upper piece of the arculus, the upper sector rising much nearer vein R than the lower sector does to Cu .

Fore wing: median basal space without crossveins; several cubito-anals present; triangle very elongate, the anterior side slightly longer than the outer side and three times as long as the inner; stigma long and slender, strongly braced at its inner end and surmounting 2-4 crossveins; apical sector not distinct, rising half way between the stigma and the apex of the wing; Rs not distinctly forked but bearing 4-6 sectors; radial planate subtending 5-7 (rarely 4) rows at the widest point and bearing usually about 4-7 sectors; median planate subtending 4-6 rows at the widest point; two rows of cells between Cu_1 and the outer side of the triangle; two rows of cells for a short distance between Cu_1 and Cu_2 . Hind wing: anal border rounded, with no anal triangle; membranule not quite reaching the anal angle; anal loop large, truncate posteriorly, followed by a supplementary loop; Cu_2 beyond this loop with 2-4 sectors.

Eyes contiguous for a distance twice as great as the length of the occiput; frons with a distinct ridge separating the anterior surface from the top and sides. Legs stout and long, 3rd femora reaching to the middle of the 2nd abdominal segment. Hind femora with no long spines but with two rows of very short stout spinules. Abdomen without auricles but with supplementary transverse carinae on segments 7-10 at least. Inferior appendage of male short, not divided.

Nymphs.—Hind angles of head rounded. Lateral lobe of labium truncate or rounded and with the inner margin finely crenulate; cleft of median lobe open or closed. No dorsal hooks; lateral spines on segments 7-9.

KEY TO WEST INDIAN SPECIES

Adults

- 1. Frons with no dark markings.....[*longipes*]
- Frons with dark markings above..... 2
- 2. Frons above with a circular spot of brown surrounded by a ring of yellow and then a ring of blue.....*junius*
- 3. Frons above with a triangular spot of brown not wholly surrounded by blue*amazili*

Nymphs (After Byers '27)

- 1. Lateral lobes of the labium tapering to a hooked point. Basal projection of the superior appendage of the ♂ half as long as the inferiors; no teeth on the mentum on either side of the median cleft..... 2
- Lateral lobes of the labium squarely truncate, a little rounded on the superior angle; small teeth on the mentum on either side of the median cleft; basal projection of the superior abdominal appendage of the male one third as long as the inferiors.....*amazili*



2. Lateral abdominal appendages half as long as the superior; superior margin of the superior appendage very convex.....[*longipes*]
 Lateral appendages less than half as long as the superior; superior margin of the superior appendage not extremely convex.....*junius*

Anax junius (Drury)

1773. *Eshna junia* Drury, Ill. Exot. Ins., i, p. 116, Pl. xlvii, fig. 5.
 1857. *Anax junius* Selys, in Sagra, Hist. nat., vii, p. 194.
 1867. *Anax junius* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 291.
 1888. *Anax junius* Kolbe, Archiv. für Naturg., liv, p. 157.
 1888. *Anax junius* Gumlach, Contrib. Cuba, p. 235.
 1890. *Anax junius* Hagen, Psyche, v, p. 305.
 1910. *Anax junius* Muttkowski, Cat. Odon. N. Am., p. 105.
 1919. *Anax junius* Calvert, Trans. Am. Ent. Soc., xlv, p. 357.
 1931. *Anax junius* Dow, Proc. Biol. Soc. Wash., xlv, p. 57.

Synonym.—*spiniferus* Rambur.

Diagnosis.—*Male.* Face and lips yellow. Top of frons with a median basal brown spot surrounded at a distance by a ring of blue. Vertex dark brown with a transverse streak of yellow on the top. Thorax green, hairy. Legs long, black beyond the reddish femora. Wings hyaline, often tinged with amber; costa and stigma yellow. Basal segments of the abdomen greatly swollen; segment 1 green, with white hair which is especially thick in a mat on each side of the dorsum; 2 as far as the first transverse carina green; rest bright blue; remainder of abdomen brown, apex of dorsum of 10 paler. Rear margin of 10 with a median notch. Appendages almost as long as 9 + 10.

Female. Like the male. Wings more often amber-colored.

Size.—Abdomen 47-50 + 8-9 mm.; hind wing 46-56 mm.

Type locality.—New York.

Distribution.—Cosmopolitan. *West Indies:* Cuba, Jamaica, St. Thomas, Martinique. *Porto Rico:* Aibonito, July 14-17; Adjuntas, Aug. 13; (A. M. N. H.). Northern coast, flying to light, Oct. 27 (Garcia-Diaz). Río Piedras, July 19, *in coitu*, (Garcia-Diaz). *St. Thomas:* Nov. 28 (A. M. N. H.).

Nymph.—(Cabot, Mem. M. C. Z., 1881, viii, p. 38. Calvert, Univ. Iowa Studies, 1928, xii, p. 12.) Length 50-64; hind femur 11-12; width of abdomen 8; of head 7. Top of head flat; eyes large; hind angles rounded and setose. Median lobe of labium with a median open cleft; lateral lobes rounded to an incurved hook; movable hook long and strong, finely hairy. Abdomen with no dorsal hooks but with a group of small middorsal black dots on 4-9. Lateral spines on segments 7-9. Superior appendage nearly

as long as the inferior; its end truncate and produced into a long spine on each side; laterals less than one-half the length of the superior.

Anax amazili (Burmeister)

1839. *Æschna amazili* Burmeister, Handb. Ent., ii, p. 841.
 1867. *Anax amazili* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 291.
 1867. *Anax amazili* Hagen, Verh. Zool.-bot. Ges. Wien., xvii, p. 38.
 1890. *Anax amazili* Hagen, Psyche, v, p. 307.
 1905. *Anax amazili* Calvert, B. C. A., p. 177.
 1910. *Anax amazili* Muttkowski, Cat. Odon. N. Am., p. 105.

Diagnosis.—*Male.* Face yellowish, labrum margined with black; top of frons with a triangular black spot surrounded by yellow and with a triangular blue spot each side. Thorax bright green. Feet dark brown, anterior femora paler beneath. Membranule brownish black with white base. Antenodals 16-18. Costa yellowish green, stigma brown, long and slender. Base of abdomen swollen. Segments 1-2 blue-green; 3-10 brown with a broad black dorsal band, narrower at the middle of each segment; 3-7 with a pair of blue or green spots each side; 9-10 obscure. Appendages blackish.

Size.—Abdomen, 70-74 mm., hind wing 48-52 mm.

Type locality.—South America.

Distribution.—Mexico to Brazil; Galapagos. *West Indies:* Cuba, Martinique. *Porto Rico:* (Garcia-Diaz, nymph).

Nymph.—(Garcia-Diaz in unpublished thesis in C. U., 1927; Byers, Journ. N. Y. Ent. Soc., 1927, xxxv, 67; Calvert, Univ. Iowa Studies, 1928, xii, p. 14.) Length 53; hind femur 9; width of abdomen 10.5. Antennæ with segment 3 longest and about equal in length to the three succeeding ones. Median lobe of labium slightly elevated and with a small median cleft; lateral lobes cut squarely and with a strong, well developed hook, distal border of lateral lobe serrated; movable hook strong, well developed, with hairs on its upper surface. Abdomen widest on segment 7.

Æshna Fabricius

Type.—*juncea* (L.).

Distribution.—Cosmopolitan.

Diagnosis.—Fore wing: median basal space without crossveins; several cubito-anal crossveins present; triangle elongate, the anterior side usually longer than the outer and two or more times as long as the inner; stigma braced, surmounting 2-4 crossveins; apical sector weak, rising usually beyond the stigma; fork of Rs unsymmetrical, rising before the stigma or

under its proximal end; radial planate subtending 3-4 cell rows; trigonal planate present and often forked. Hind wing: anal angle of male excavated, with an anal triangle of 2-3 cells; supplementary anal loop usually present; usually two cell rows between Cu_1 and Cu_2 . Tenth sternite of male rounded, with two very small spines.

Nymphs.—Hind angles of head broadly rounded. Lateral lobe of labium usually squarely truncate and with the inner margin finely crenulate; terminal hook minute or wanting. Dorsal hooks wanting; lateral spines usually present on 6-9; superior appendage deeply excavated.

***Æshna cornigera* Brauer**

1865. *Æshna cornigera* Brauer, Verh. Zool.-bot. Ges. Wien., xv, p. 906.

1910. *Æshna cornigera* Muttkowski, Cat. Odon. N. Am., p. 110.

Diagnosis.—Face blue-green with the lower border of the labrum reddish brown, and with a suggestion of yellow on the front-clypeal suture and on the anterior margin of the postclypeus; anteclypeus with a median spot of blackish. Top of frons with a median brownish stripe, not reaching the eyes; T-spot clearly defined with a clear yellow spot on either side of the stem. Vertex black; occipital triangle yellow. Front of thorax brown with an antehumeral green stripe on each side, wide, distinct, slightly constricted just below the upper end and narrowly separated from large, transversely elongate, double pale spot in the interalar sinus. Sides of thorax brown with a slightly sinuate, wide yellow band on the mesepimeron, widened above. There are evidences of an indistinct second band under the hind wing. Wings hyaline; costa yellow; anal triangle of three cells. Abdomen slender, swollen on 2, constricted on 3; brown, marked as follows: 2 with basal green touches and a dorsal green line; 3-8 with two basal blue spots, median black touches and apical yellow spots; a black dorsal line on all the segments, widened on 8-10; sutures black. Segment 10 bears a small black dorsal tubercle.

Size.—Abdomen, 46-48 mm., hind wing, 39-45 mm.

Distribution.—Mexico, Lower Calif., to Uruguay. *West Indies*: Cuba. *Porto Rico*: Adjuntas, June 8-13 (A. M. N. H.).

Remarks.—The tips of the appendages of the specimen which I have from Porto Rico have been broken off and, although they seem to differ somewhat from the figure in Martin (1909, p. 44), other characters agree so well with Martin's characterization and that of Dr. Calvert in the B. C. A. that I have determined it as this species. The color on the abdomen was too indistinct to discern at all. The above description was taken from Martin.

Coryphaeschua Williamson

Type.—*ingens* Rambur.

Distribution.—Neotropical into Gulf strip.

Diagnosis.—Fore wing: antenodals 20-21; median basal, space without crossveins; 4-6 cubito-anals; inner side of triangle less than half as long as the outer side; stigma surmounting three crossveins as well as a strong brace-vein; apical sector originating far beyond the stigma; Rs forking under the middle of the stigma (exceptions rare) and with two or three, rarely four, rows of cells between the fork; radial planate subtending 4-8 rows of cells; median planate subtending 3-4 rows; one row of cells between the outer side of the triangle and Cu_1 except at the level of the extreme tip of the triangle. Hind wing: anal angle angulate and excavated, with an anal triangle of two cells; anal loop usually of three vertical rows and supplementary loop of two rows or wanting; one row of cells between Cu_1 and Cu_2 , occasionally two rows for the proximal half.

Eyes contiguous for a distance about equal to or a little less than the combined anterior-posterior dimensions of the frons and vertex; anterior surface of the frons separated from the flat upper surface by a carina which does not quite reach the fronto-clypeal suture on the sides. Legs stout; third femora not reaching the apex of the 1st abdominal segment. Abdomen of the male with auricles on the 2nd segment. No supplementary transverse carinae. Superior appendages long and narrow, without teeth or hooks and with only low keels. Segment 10 of the male without dorsal teeth. Appendages of the female long.

Nymph.—(*C. ingens* desc. by Kennedy, Ent. News, 1919, xxx, p. 105, and Byers, 1930). Head flat; eyes narrow and linear; rear of head square cut. Labium reaching well beyond the metacoxae; its anterior margin with a wide open, shallow, median cleft with a long sharp spine on either side; lateral lobes sloping abruptly to a sharp, incurved, internal hook; movable hooks long. Abdomen with lateral spines on 6-9 but with no dorsal hooks. Appendages of nearly equal length, the superior square-cut, not bifid.

KEY TO WEST INDIAN SPECIES

Adults

- | | | |
|--|-------------------|---|
| 1. Hind wing 40-43 mm..... | <i>adnexa</i> | |
| Hind wing 50 mm. or more..... | | 2 |
| 2. Dorsum of thorax mainly brown; inferior appendage of male one-half as long as the superiors..... | [<i>ingens</i>] | |
| Dorsum of thorax mainly green; inferior appendage of the male three-fifths as long as the superiors..... | [<i>virens</i>] | |

Coryphæschna adnexa (Hagen)

1861. *Æschna adnexa* Hagen, Syn. Neur. N. Am., p. 127.
 1888. *Æschna adnexa* Gundlach, Contrib. Cuba, p. 237.
 1903. *Coryphæschna adnexa* Calvert, Ent. News, xiv, p. 9.
 1905. *Æshna adnexa* Calvert, B. C. A., p. 188.
 1908. *Æshna adnexa* Martin, Cat. Coll. Selys, xviii, p. 75.
 1910. *Coryphæschna adnexa* Muttkowski, Cat. Odon. N. Am., p. 115.
 1916. *Coryphæschna adnexa* Kahl, Ann. Carn. Mus., x, p. 523.
 1919. *Coryphæschna adnexa* Calvert, Trans. Am. Ent. Soc., xlv, p. 357.

Synonym.—*macromia* Brauer.

Diagnosis.—Face bright blue, anterior margin of labrum slightly concave with a brownish border and fringed with hair; anteclypeus with a median apical spot of blackish; lower lateral margins of postclypeus paler; fronto-clypeal suture with a narrow greenish band. Lower part of the vertical portion of the frons blue; across the superior transverse groove or crest a brown band connected medianly across the green top of the frons with the blackish brown band at the base, this connecting piece widening anteriorly. Vertex and occiput dark brown, the latter with a triangular pale spot on the rear border. Thorax green, marked with brown as follows: a narrow band along the middorsal suture (the carina remaining green) and crest, connected above with a narrow band on the humeral and 3rd lateral sutures and below with the brown of the venter. All very hairy. Legs black, paler basally. Fore wing slightly suffused with fuscous medianly. Abdomen dark brown marked with green as follows: segment 1 except the carinæ; 2 with a narrow middorsal longitudinal band and an apical transverse band widened laterally to include three-fourths of the segment; 3-5 with the middorsal line dilated at the middle and at apex to form a wedge-shaped streak each side, the apical one bordered with yellow on the inside. Rest of abdomen brown. Seven with a narrow apical ring and ventral margins yellow. Appendages brown. Inferior appendage reaching to two-fifths the length of the superiors.

Remarks.—Another male (flying to lights in a train on the northern coast, Oct. 27, and collected by Julio Garcia-Diaz) shows no differences as to appendages but differs in color as follows: pale areas of face greater; frons with more brown; thorax entirely reddish brown marked with green, a band on the middle of the mesepisternum, indistinct below but terminating above in a distinct spot within the crest, a large superior spot behind the humeral suture, narrowly separated from a smaller one before the 3rd lateral suture, a band abbreviated above and below just back of the 3rd lateral suture, and a yellow spot on the anterior ventral portion of

the metepimeron. Legs black, paler basally. Wings fuscous. Abdomen $47 + 5.5$, hind wing 41. This would seem to be a different species, but I have too little material to be sure.

Size.—Abdomen, $46 + 6.5$ mm., hind wing, 42 mm.

Type locality.—Cuba.

Distribution.—Mexico to Brazil. *West Indies*: Cuba, Isle of Pines, Haiti, San Domingo. *Porto Rico*: Río Piedras, south of aqueduct hill, March 24 (Garcia-Diaz).

Nymph.—Unknown.

Acanthagyna Kirby

Type.—(Not designated.)

Distribution.—Cosmopolitan except Nearctic and Palearctic.

Diagnosis.—Fore wing: antenodal crossveins variable, 16-39, though in species in this fauna seldom over 30; median basal space with no crossveins; cubito-anals 5-10; triangle with its superior side two and a half times as long as the proximal side; arculus with its sectors rising at or below the middle; stigma thick, sometimes quite long, surmounting 4-8 crossveins; apical sector rising before or under the proximal end of the stigma; Rs forked, the fork beginning more than halfway out from the nodus to the stigma; radial planate subtending 3-7 cell rows; median planate subtending 3-7 cell rows; 2-3 rows of cells between outer side of triangle and Cu_1 . Hind wing: anal margin angulate in the male, excavated, with an anal triangle of three cells; anal loop large, sometimes with a supplementary loop or loops on its outer side posterior to Cu_2 ; 1-2 cell rows between Cu_1 and Cu_2 .

Eyes contiguous for a distance greater than the anterior-posterior dimension of the frons and vertex combined, and three or four times the length of the occiput. Frons with no distinct ridge separating the flattened upper surface from the anterior. Hind femora not reaching the apex of the first abdominal segment. Auricles present on the 2nd abdominal segment of the male. Tenth segment of the male with no dorsal tuft or well developed carina. Posterior part of hamule high and vertical or subvertical, divided by a deep sulcus. Apical expansion of superior appendage of male about one-half the length of the appendage. Tenth sternite of the female with two long spines on the ventral process.

Remarks.—As far as I can ascertain, no type has been set for this genus. I am unwilling to set one, for I have not been able to study all the species of the genus. Rambur (1842) described the genus *Gynacantha* with seven species; de Selys (1873) set aside three of those species as a new genus

Triacanthagyna with *trifida* as the genotype; but Kirby (1890) set *trifida* as the type of *Gynacantha* Rambur. He thereby made *Triacanthagyna* a synonym of *Gynacantha* and gave himself the opportunity of applying a new name, *Acanthagyna*, to those not congeneric with the *Triacanthagyna* group. Muttkowski, following Karsch (Ent. Nach. 1891, x, p. 281) and others, did not recognize generic differences and thus rightly grouped them all as *Gynacantha*. Williamson (1923), however, has seemed to give sufficient evidence for their separation. If we are to consider them as two separate genera they must be termed according to Kirby, for when de Selys (1873) said of *Gynacantha* Rambur: "Types: *G. T. nigrum* Selys, *-nervosa*, R. *-gracilis*, R. *-subinterrupta*, R. *-bispina*, R.," he was not setting the type, and Kirby's action, though to be regretted, was quite legal (Opinion 62, Int. Rules Zoö. Nomen.).

Nymph.—(As *Gynacantha*, Garcia-Diaz in unpublished thesis in C. U., 1927.) Length 19; hind femur 3; width of abdomen 4; of head 4.5. Eyes large; 2nd joint of antennæ longer than the 1st, the 3rd the longest of all. Hind margin of head rounded. Median lobe of labium elevated and with a median cleft which has thickened, approximated margins with a rounded tooth on either side at a distance about equal to the width of the base of the tooth; margin of median lobe fringed. Lateral lobes squarely truncate, with a strong well-developed tooth and with the inner margin serrate; lateral setæ 6; movable hook well developed, two times the length of the outer margin of the lobe and with 4-5 spines on its mid-dorsal line. Lateral spines present on abdominal segments 6-9, small on 9 and increasing in size posteriorly, that of 9 two-thirds as long as segment 10. Superior appendage about equal to the inferiors; laterals two-thirds the inferiors.

This nymph has not been reared. It may, of course, be *Gynacantha*. The nymph of *A. rosenbergi* has been described by Tillyard (Journ. Linn. Soc. of London, Zoölogy, 1916, xxxiii, p. 71,) from Australia.

KEY TO WEST INDIAN SPECIES

Adults

1. Legs pale above, darker beneath.....[*tibiata*]
 Legs uniformly pale..... 2
2. Segment 3 of the abdomen greatly constricted as seen in the dorsal
 view [*crecagris*]
 Segment 3 slightly or not at all constricted.....*nervosa*

Acanthagyna nervosa (Rambur)

1842. *Gynacantha nervosa* Rambur, Ins. Neur., p. 213.
 1888. *Gynacantha nervosa* Kolbe, Archiv für Naturg., liv, p. 168.
 1888. *Gynacantha gracilis* Gundlach, Contrib. Cuba, p. 242.
 1893. *Gynacantha nervosa* Gundlach, Ann. Soc. Esp. Hist. Nat., XXII, ii, p. 269.
 1893. *Gynacantha nervosa* Cockerell, Journ. Inst. Jamaica, i, p. 258.
 1910. *Gynacantha nervosa* Muttkowski, Cat. Odon. N. Am., p. 107.
 1916. *Gynacantha nervosa* Kahl, Ann. Carn. Mus. x:522.
 1919. *Gynacantha nervosa* Calvert, Trans. Am. Ent. Soc., xlv, p. 359.
 1931. *Gynacantha nervosa* Dow, Proc. Biol. Soc. Wash., xlv, p. 57.

Diagnosis.—Face yellowish brown; top of frons greenish with a black T-spot; occiput pale green; vertex black with a pair of small green spots. Thorax greenish, more brownish on the side, darker just before the humeral suture. Legs yellowish. Wings slightly tinged and margined with yellowish brown, deeper between C and Sc; antenodals 25, the 1st and the 8th usually thickened; two supplementary anal loops. Abdomen brown marked with paler as follows: small, dorsal, apical transverse stripe on 1; middorsal longitudinal green line on 2, with three transverse stripes interrupted on the midline; 3-8 similar but without the longitudinal stripe and with the transverse ones reduced posteriorly; 9-10 indistinct. Superior appendages longer than 9 + 20. The pale color on 1-2 is bluish; on 3-8 yellow or greenish.

Size.—Abdomen, 50+6 mm., hind wing, 48 mm.

Type locality.—Bolivia.

Distribution.—Southern U. S. to Brazil. *West Indies:* Cuba, Isle of Pines, Jamaica, Haiti. *Porto Rico:* (Kolbe, Gundlach, 1893).

Nymph.—Unknown.

Gynacantha Rambur

Type.—*trifida*, Rambur.

Distribution.—Neotropical.

Diagnosis.—Differs from *Acanthagyna* as follows: two rows of cells between M_1 and M_2 beginning under the stigma; fork of Rs near the proximal end of the stigma (except in *trifida*); hamular process low, more or less horizontal, with no deep sulcus dividing it from the anterior part; ventral process on 10th sternite of the female with three prongs; apical expansion of superior appendage of the male two-thirds the length of the appendage.

Nymph.—See *Acanthagyna*.

KEY TO WEST INDIAN SPECIES

Adults

1. Top of frons with a dark T-spot.....*septima*
 Top of frons with no distinct T-spot.....*trifida*

***Gynacantha trifida* Rambur**

1842. *Gynacantha trifida* Rambur, Ins. Neur., p. 210 (and part of *satyrus*).
 1857. *Gynacantha trifida* Selys, in Sagra, Hist. nat, vii, p. 194.
 1861. *Gynacantha trifida* Hagen, Syn. Neur. N. Am., ix, p. 131; after Selys.
 1867. *Gynacantha trifida* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 291.
 1882. *Gynacantha trifida* Stahl, Fauna Puerto Rico, p. 207.
 1888. *Gynacantha trifida* Kolbe, Archiv für Naturg., liv, pp. 160, 168.
 1893. *Gynacantha trifida* Gundlach, Ann. Soc. Esp. Hist. Nat., xxii, ii, p. 269.
 1896. *Gynacantha trifida* Carpenter, Journ. Inst. Jam., ii, 3, p. 261.
 1905. *Gynacantha trifida* Calvert, B. C. A., p. 191.
 1908. *Triacanthagyna trifida* Martin, Cat. Coll. Selys, xix, p. 148.
 1910. *Gynacantha trifida* Muttkowski, Cat. Odon. N. A., p. 108.
 1919. *Gynacantha trifida* Calvert, Trans. Am. Ent. Soc., xlv, p. 358.
 1923. *Triacanthagyna trifida* Williamson, Univ. Mich., Misc. Publ., Mus. Zoo.,
 No. 9, pp. 10, 24.

Diagnosis.—*Male.* Face green, sometimes more yellowish in the middle, becoming brownish on top and appearing suffused with the T-spot on the top of the frons; labium yellow. Occiput green. Thorax green marked with brown as follows: a middorsal triangle, more or less parallel-sided for its upper half, then strongly widened; a broad band on the humeral suture, parallel-sided except for a rectangular widening to rearward above; a narrow band on the 2nd lateral suture and a short spur on the upper end of the 3rd. Legs brown; black at the knees. Wings tinged with brownish. Abdomen brown, constricted on segment 3; sides of 1 and 2 mainly green, with the usual median dorsal band and median and apical transverse spots; 3-7 with the median and apical spots; 8-10 with only the apical ones discernible.

Female.—Top of frons pale brownish with only the crosspiece of the T-spot present.

Size.—*Male.* Abdomen, 42-45 mm., hind wing, 41-43 mm. *Female.* Abdomen, 47-50, hind wing, 44-47.

Type locality.—Cuba.

Distribution.—Southern U. S. to Bolivia. *West Indies:* Cuba, Jamaica, Haiti, San Domingo. *Porto Rico:* (Stahl, Kolbe, Gundlach).

LIBELLULIDÆ

Triangles of the fore and hind wings dissimilar, that of the fore wing transversely elongated and somewhat distal from the arculus, that of

the hind wing longitudinally elongated and close to the arculus. Antenodals of the first and second series continuous across Sc. Subtriangle of the fore wing well developed and often reticulate, that of the hind wing wanting. Anal loop present. Eyes united on the top of the head, crowding the occiput back into a small area. The vertex is a vesicle with the ocelli grouped around it. Labium with a small triangular median lobe closed in by large lateral lobes which have no movable hook. Ovipositor of the female reduced to a pair of simple valvular vulvæ or a single scale (except in *Uracis*).

Nymphs have a rather broad oval body. Antennæ 7-segmented. Labium spoon shaped, covering the face up to the base of the antennæ; lateral lobes greatly enlarged and meeting on the mid-line in a series of teeth.

SUBFAMILY LIBELLULINÆ

Fore wing triangle usually rather narrow. Anal border of hind wing rounded in both sexes. Anal loop present, usually elongated and boot shaped. Humeral suture with a distinct double curve just below the middle.

KEY TO TRIBES IN THE WEST INDIES

- 1. Anal loop with midrib bent at ankle more than 30°..... 2
 Anal loop with midrib bent at ankle less than 30°; reverse vein strong*Oclithemini*
- 2. Stigma with ends parallel..... 3
 Stigma trapezoidal; ends divergent forward.....*Trameini*
- 3. Last antenodal of the fore wing continuous across Sc....*Libellulini*⁴
 Last antenodal of the fore wing incomplete..... 4
- 4. Anal loop bent at ankle from 30°-50°.....*Sympettrini*
 Anal loop bent at ankle from 50°-60°.....*Macrothemini*^{5a}

ARTIFICIAL KEY TO WEST INDIAN GENERA

Adults

- 1. Extra bridge crossveins present (i. e., more than one)..... 2
 No extra bridge crossveins..... 4
- 2. Fore wing subtriangle of one cell.....[*Ephidatia*]
 Fore wing subtriangle of more than one cell..... 3

⁴ Does not apply to all exotic genera.

^{5a} The genus *Uracis* runs to this point in the key but is not a Macrothemine. Needham and Broughton ('27) have placed it in the *Orchithemini* on the strong outward bend of the discoidal triangle of the fore wing. Although the anal loop is well developed, many primitive features have been retained, such as: the position of the arculus beyond the second or third antenodal, the inward position of the anal crossing with extra cubito-anal cross veins beyond, and the possession of a long ovipositor. The nymph, as yet unknown, should bring out its affinities.

3.	Hind wing triangle of 2 or 3 cells.....	[<i>Libellula</i>]	
	Hind wing triangle of one cell.....	<i>Micrathyria</i>	
4.	Last antenodal crossvein continuous across Sc.....		5
	Last antenodal crossvein incomplete (not continuous).....		8
5.	Hind wing with 2 cubito-anal crossveins; Cu_1 rising from outer side of triangle	[<i>Camaphila</i>]	
	Hind wing with one cubito-anal; Cu_1 rising from hind angle of triangle		6
6.	Radial planate subtending one cell row.....		7
	Radial planate subtending 2 cell rows.....	<i>Orthemis</i>	
7.	Hind wing 20 mm. or less.....	<i>Perithemis</i>	
	Hind wing 30 mm. or more.....	[<i>Macrodiplax</i>]	
8.	Fore wing triangle of one cell.....		9
	Fore wing triangle of 2 cells.....		10
9.	Fore wing subtriangle of one cell.....	<i>Miathyria</i>	
	Fore wing subtriangle of 2 cells.....	<i>Macrothemis</i>	
10.	Hind wing Cu_1 rising from outer side of triangle.....		11
	Hind wing Cu_1 rising from hind angle of triangle.....		12
11.	Radial planate subtending one cell row.....	<i>Erythemis</i>	
	Radial planate subtending 2 cell rows.....	<i>Lepthemis</i>	
12.	Hind wing with more than one cubito-anal crossvein.....		13
	Hind wing with only one cubito-anal.....		14
13.	Arculus beyond the second antenodal; anal crossing before origin of A_2	[<i>Uracis</i>]	
	Arculus before the second antenodal; anal crossing not before origin of A_2	<i>Pantala</i>	
14.	Ends of stigma parallel.....		15
	Ends of stigma convergent, making it a trapezoid.....		20
15.	Anal crossing before the origin of A_2	<i>Erythrodiplax</i>	
	Anal crossing opposite, not before, A_2		16
16.	Wings golden; midrib of anal loop nearly straight.....	[<i>Celithemis</i>]	
	Wings not golden; midrib of anal loop strongly bent at ankle.....		17
17.	Discoidal field of fore wing of two cell rows; radial planate subtending one cell row	[<i>Brechmorhoga</i>]	
	Discoidal field of fore wing of three cell rows; radial planate subtending two cell rows		18
18.	Third femora of the male with a row of fine saw-like teeth; caudal appendages of the female shorter than segment 10.....		19
	Third femora of the male with no row of fine saw-like teeth; caudal appendages of the female longer than segment 10....	<i>Brachymesia</i>	
19.	Teeth of third femora of the male directed distally; M_2 distinctly undulate	<i>Dythemis</i>	
	Teeth of the third femora of the male directed proximally; M_2 only slightly undulate; abdomen clubbed, especially in the male.	<i>Scapanca</i>	
20.	Vein M_2 sharply bent in a double curve.....		21
	Vein M_2 smoothly curved or with a slight undulation.....	[<i>Tholymis</i>]	
21.	Radial and median planates subtending one cell row.....	<i>Tramca</i>	
	Radial and median planates subtending two cell rows....	[<i>Tauriphila</i>]	

Nymphs

1. Inferior abdominal appendages decurved.....	2
Inferior abdominal appendages straight.....	3
2. Lateral setæ 8 or 9.....	<i>Erythemis</i>
Lateral setæ 11 or 12.....	<i>Lepthemis</i>
3. Eyes more lateral than frontal.....	4
Eyes more frontal than lateral.....	6
4. Median lobe of labium crenulate.....	<i>Orthemis</i>
Median lobe of labium evenly contoured.....	5
5. Dorsal hooks present	[<i>Libellula auripennis</i>]
Dorsal hooks wanting ..	<i>Brachymesia</i>
6. Dorsal hooks present	7
Dorsal hooks wanting	12
7. No dorsal hook on segment 9.....	[<i>Celithemis</i>]
Dorsal hook present on segment 9.....	8
8. Dorsal hooks long and cultriform.....	9
Dorsal hooks shorter and straight.....	10
9. Lateral setæ 5; appendages short.....	<i>Perithemis</i>
Lateral setæ 8; appendages long.....	<i>Miathyria</i>
10. Lateral setæ 6, mentals 8; crenulations of lateral lobe high.....	
.....	<i>Macrothemis</i>
Lateral setæ 7, mentals 9-10.....	11
11. Mental setæ 10; crenulations of lateral lobe shallow.....	<i>Dythemis</i>
Mental setæ 9; crenulations of lateral lobe high.....	<i>Scapanca</i>
12. Spines of 8 and 9 long and similar.....	13
Spines of 8 and 9 not longer than appendages.....	
.....	<i>Erythrodiplax and Micrathyria</i>
13. Crenulations of lateral lobe obsolete.....	<i>Tramea</i>
Crenulations of lateral lobe higher than wide.....	<i>Pantala</i>
Unknown [<i>Brechmorhoga</i>], [<i>Ephidatia</i>], [<i>Macrodiplax</i>], [<i>Tauwiphila</i>], [<i>Uracis</i>]	

LIBELLULINI

The genera of this tribe are characterized by the possession of a very elongate anal loop, of antenodals in excess of 12, the last one continuous across Sc, and of a very long stigma, surmounting three or more crossveins. Vein M_2 is usually undulate. The sole line of the anal loop is directly perpendicularly to the long axis of the wing, or outward.

KEY TO WEST INDIAN GENERA

Adults

1. Fore wing with extra bridge crossveins; hind wing triangle of two or three cells	[<i>Libellula</i>]
Fore wing with no extra bridge crossveins; hind wing triangle of one cell	2

2. Hind wing with Cu_1 rising from the hind angle of the triangle.. *Orthemis*
 Hind wing with Cu_1 rising from the outer side of the triangle.....
 [*Cannaphila*]⁵

Orthemis Hagen

(Pl. I, Fig. 1)

Type.—*ferruginea* (Fabricius).

Distribution.—Neotropic and Nearctic.

Diagnosis.—Wings long and relatively narrow. Fore wings: arculus usually at the 2nd antenodal or between the 2nd and 3rd; sectors of the arculus on a long stalk; antenodals 15-26, the last complete; stigma very large and swollen, surmounting 5 or more cells; triangle crossed, its anterior margin less than one half the proximal side; subtriangle of 3-5 cells; discoidal field of 3-4 cell rows, narrowed at the wing margin; Cu_1 rising from the anal angle of the triangle; vein M_2 undulate, usually separated from Rs at the margin by 2-4 cell rows; apical sector rising under the basal third of the stigma; radial planate bent forward towards Rs enclosing 2-3 cell rows; median planate weak, subtending one cell row; reverse vein scarcely discernible; no extra bridge crossveins. Hind wing: triangle retracted to or not quite to arculus, without crossveins and with Cu_1 rising from its hind angle; one cubito-anal which is at or a little distal to A_2 ; 3-4 cell rows between A_2 and the hind margin of the wing; anal loop long, surpassing the end of the triangle by 3-4 cells; a : b as 1 : 3 or a little less; gaff longer than the sole and the sole about perpendicular to the long axis of the wing. Frons rounded, flattened on its upper surface; frontal carina distinct in the male, less so in the female. Vertex variable, usually notched. Lobe of the prothorax very small, lying in a flat arc. Genital plate of female small.

Nymph.—See *O. ferruginea*.

Orthemis ferruginea (Fabricius)

(Plate II, Fig 3)

1775. *Libellula ferruginea* Fabricius, Syst. Ent., p. 423.
 1842. *Libellula maerostigma* Rambur, Ins. Neur., p. 57.
 1857. *Libellula discolor* Selys, in Sagra, Hist. nat. vii, p. 188.
 1861. *Orthemis discolor* Hagen, Syn. Neur. N. Am., p. 160.

⁵ *Cannaphila* is considerably more primitive than other members of this tribe. It has two cubito-anal crossveins; the anal crossing is before the origin of A_2 instead of opposite; the distance between the origin of A_2 and the midrib of the loop is equal to that between the midrib and the hind angle of the triangle, whereas it is one-half or less in others of the tribe; the median planate is wanting; the frons lacks a carina. Needham and Broughton (1927) place it in the primitive tribe Orchithemini on the outward bend of the fore wing triangle. Its position will be uncertain until its nymph can be studied.

1867. *Orthemis discolor* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
1867. *Libellula discolor* Hagen, Stett. ent. Ztg. xxviii, p. 99.
1867. *Orthemis discolor* Uhler, Proc. Boston Soc. Nat. Hist., xi, p. 297.
1868. *Orthemis discolor* Hagen, *ibid.*, xxix, p. 279.
1888. *Orthemis discolor* Kolbe, Archiv für Naturg., liv, pp. 161, 168.
1889. *Orthemis discolor* Gundlach, Contrib. Cuba, p. 262.
1889. *Orthemis ferruginea* Kirby, Trans. Zoo. Soc. London, xii, p. 286.
1894. *Orthemis ferruginea* Kirby, Ann. Mag. Nat. Hist. (6) xiv, p. 264.
1896. *Orthemis ferruginea* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
1906. *Orthemis ferruginea* Calvert, B. C. A., p. 234.
1910. *Orthemis ferruginea* Ris, Cat. Coll. Selys, xi, p. 282.
1911. *Orthemis ferruginea* Wilson, Johns Hopkins Univ. Circ. 2, no. 232, p. 50.
1916. *Orthemis ferruginea* Kahl, Ann. Carn. Mus., x, p. 523.
1919. *Orthemis ferruginea* Calvert, Trans. Amer. Ent. Soc., xlv, p. 366; on Gundlach.
1931. *Orthemis ferruginea* Dow, Proc. Biol. Soc. Wash., xlv, p. 58.

Diagnosis.—*Male.* Face tawny except the anterior margin of the labrum which is black. Frons flattened on the top and bilobed, with the lobes rounded and flat. Vertex olivaceous with a cone on each prominence of the lobes. Prothorax pale yellow. Collar of the synthorax black with a pale yellow spot on the middorsum at the top. Rest of synthorax tawny, very hairy, with pale yellow markings as follows: a band on the lower half of the humeral suture, a band on the 2nd lateral suture, incomplete above, and an elongate wedge-shaped spot just back of the 3rd lateral suture, and a band on the rear margin of the metepimeron. Spiracle black. Venter pale. Legs pale brown, darker on the tibiae and black on the tarsi. Wings hyaline, sometimes with brownish tips, and with brown veins and stigma; antenodals 19-20; 6-7 crossveins under the stigma; radial planate subtends 2 cell rows; 2 cells between the midrib of the anal loop and the hind angle of the triangle. Abdomen yellow, lateral margins finely black. Superior appendages dark brown, paler basally. Mature specimens become wholly plumbeous.

Female. The lateral margins of the 8th abdominal segment are expanded into rounded leaf-like lobes.

Size.—Abdomen, 31-33 mm., hind wing, 38-40 mm.

Type locality.—America.

Distribution.—Florida to Arizona to Chile. *West Indies:* practically all. *Porto Rico:* (Kolbe, Gundlach); Aibonito, July 16; Adjuntas, July 23-27; Cayey, May 30-31 (Lutz and Mutchler); Barros, June 4 (Lutz and Mutchler); Arecibo, June 25 (Lutz and Mutchler); Juana Diaz, Feb. 11 (Lewis B. Woodruff, in A. M. N. H.). Rio Piedras Jan. 26; July 19, resting on electric light wires; Lake Tortuguera

swamp, March 22; Fajardo, Las Cabezas, Jan. 26; Pueblo Viejo Cataño, April 2 (W. T. M. Forbes). *St. John*: March 4-8 (L. B. Woodruff, in A. M. N. H.). *St. Croix*: Feb. 27, March 1-7 (F. E. Lutz, in A. M. N. H.). April 6-7 (L. B. Woodruff, in A. M. N. H.). Aug. 25 (N. Y. Zoological Soc., in A. M. N. H.). *St. Thomas*: Feb. 24 (F. E. Lutz, in A. M. N. H.). Feb. 25-28, March 13 (L. B. Woodruff, in A. M. N. H.).

Nymph.—(Needham, Proc. U. S. Nat. Mus., xxvii, p. 702; Calvert, Univ. Iowa Studies Nat. Hist., 1928, xii, 2, p. 19.) Total length 21-25.5; of hind femur 5.5; width of head 4.8-5.5; of abdomen about 7. Hind margin of the head slightly concave; bulging hind angles rounded. Lateral lobes of labium with 9 crenulations on the distal margin; lateral setæ 8-10; mental setæ 11-16. Wing pads reaching to the 5th or 6th abdominal segment. Divided setæ are present on the tibia of the first leg and on all three tarsi. Lateral spines of 8 and 9 about .3 mm. long. Superior appendage about as long as the inferiors; laterals about one-third as long as inferiors. (Pl. IV, Fig. 3.)

Dr. Calvert (1928) has described this nymph in great detail. Specimens which I have agree except in the number of lateral setæ which in all cases save one are 8 in number; one exuvia from Porto Rico has 9 on the right side.

Collected by Professor Needham and in the C. U. collection: several mature nymphs, Coamo Springs Reservoir, April 4, and many exuvia, April 5; two small nymphs, Las Cruces, April 4; two exuvia, Damien, Haiti, April 2.

CELITHEMINI

The genera of this group have in common the straightness of the midrib of the anal loop. This midrib is bent less than 30° at the ankle. The wings are often highly colored and have a rather dense reticulation. The wings of *Ephidatia*, *Macrodiplox* and *Miathyria*, however, are conspicuous in the openness of their venation and the development of rather strong sweeping sectors, and are less extensively colored, often with only a basal spot. The reverse vein is well developed, extraordinarily so in *Macrodiplox* and *Ephidatia*, less so in *Miathyria*.

KEY TO WEST INDIAN GENERA

Adults

- | | | |
|---|-------------------|---|
| 1. Fore wing triangle about as wide as long..... | <i>Perithemis</i> | |
| Fore wing triangle twice as long as wide..... | | 2 |
| 2. Hind wing gaff shorter than sole; fore wing subtriangle of three or more cells | | 3 |

- Hind wing gaff longer than sole; fore wing subtriangle of one cell.... 4
 3. Fore wing triangle of two or more cells.....[*Celithemis*]
 Fore wing triangle of one cell.....[*Macrodiplax*]
 4. Ends of stigma parallel; apical planate wanting.....[*Ephidatia*]
 Stigma trapezoidal; apical planate well developed.....*Miathyria*

Perithemis Hagen

Type.—*domitia* (Drury).

Distribution.—Nearctic and Neotropic.

Diagnosis.—Wings short and rather broad, usually highly colored with gold or brown. Fore wings; arculus strongly aslant, between the 1st and 2nd antenodals, its sectors separate at origin (stalked in the hind wing): antenodals 7-8, the last one incomplete and the first two more widely separated than the others; stigma large, surmounting 3 crossveins; triangle with its anterior side longer than the proximal side, placed almost at right angles to the longitudinal axis of the wing, crossed or open; subtriangle crossed or free; Cu_1 rising from the anal angle of the triangle; discoidal field of 2 cell rows increasing to 3, but the area itself narrowing gradually toward the margin; vein M_2 smoothly curved; apical planate rising under the basal third of the stigma; radial planate with its origin more or less indistinct, subtending one cell row; median planate present as a more or less straight vein running out to the margin; several extra bridge crossveins usually present. Hind wing: triangle retracted to or beyond the arculus, crossed or open, with Cu_1 rising from its hind angle; anal crossing directly opposite the origin of A_2 ; two cell rows behind A_2 at its base; anal loop long, its toe almost resting on the wing margin, its midrib very straight; a : b as 1 : 2, anal field large. Head small; eye seam short; frons moderately rounded with no distinct frontal carina; fork deep. Lobe of prothorax large, erect, notched in the middle and clothed with long hairs. Legs long and slender. Abdomen short, depressed, the segment with a supplementary transverse carina. Hamules of the male very small; genital plate of female long and rounded at the end.

Nymph.—Clean, smooth and quite active. Head widest across the eyes and slightly concave on the rear margin; posterior angles rounded. Eyes rounded, their hind margins reaching three-fourths of the way from the antennæ to the rear of the head. Abdomen broad, depressed, widest across segment 7. Dorsal hooks on 3-9, forming a regularly descending curve; seen laterally, like a section of a circular saw. Lateral spines on 8-9 short, of 8 less than segment 9, of 9 rudimentary or almost wanting.

KEY TO WEST INDIAN SPECIES

Adults

1. All triangles and subtriangles free.....[*mooma*]
 At least one of the triangles and subtriangles crossed.....*domitia*

Perithemis domitia (Drury)

(Pl. II, Fig. 1)

1773. *Libellula domitia* Drury, Ill. exot. Ins., ii, p. 93.
 1839. *Libellula domitia* Burmeister, Handb. Ent., ii, p. 855.
 1857. *Libellula metella* Selys, in Sagra, Hist. Nat., xii, p. 190.
 1861. *Perithemis domitia* Hagen, Syn. Neur. N. Am., pp. 185, 319.
 1861. *Perithemis domitia* var. *iris* (?) Hagen, *ibid.*, p. 185.
 1866. *Perithemis domitia* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 198.
 1867. *Perithemis metella* Hagan, Stett. Ent. Ztg., xxviii, p. 98.
 1867. *Perithemis domitia metella* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 293.
 1873. *Perithemis metella* Hagen, *ibid.*, xv, p. 375.
 1888. *Perithemis domitia* Kolbe Archiv. für Naturg, liv, p. 168.
 1888. *Perithemis domitia* Gundlach, Contrib. Cuba, p. 200.
 1889. *Perithemis domitia* Kirby, Ann. Mag. Nat. Hist. (6), iv, pp. 232, 233.
 1889. *Perithemis domitia* var. *pocahontas* Kirby, *ibid.*, p. 233.
 1889. *Perithemis domitia* Kirby, Trans. Zoo. Soc. London, xii, p. 325.
 1896. *Perithemis domitia* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
 1896. *Perithemis domitia* var. *pocahontas* Carpenter, *ibid.*, p. 260.
 1898. *Perithemis domitia* Calvert, Trans. Am. Ent. Soc., xxv, p. 75.
 1907. *Perithemis domitia* Calvert, B. C. A., pp. 310, 312.
 1907. *Perithemis domitia* var. *iris* Calvert, *ibid.*, pp. 310, 313.
 1910. *Perithemis domitia* Ris, Cat. Coll. Selys, xi, p. 333; pars *mooma*.
 1910. *Perithemis domitia* var. *iris* Ris, *ibid.*, p. 335.
 1910. *Perithemis domitia* var. *pocahontas* Ris, *ibid.*, p. 337.
 1916. *Perithemis domitia* Kahl, Ann. Carn. Mus., x, p. 523.
 1919. *Perithemis domitia domitia* Calvert, Trans. Am. Ent. Soc., xlv, p. 372
 1930. *Perithemis domitia* Ris, Misc. Publ. no. 21, Univ. Mus. Zoo., p. 36.
 1931. *Perithemis domitia* Dow, Proc. Biol. Soc. Wash., xlv, p. 59.

Diagnosis.—*Male.* Labium dull yellowish brown; labrum dull yellow; clypeus light greenish gray; frons light orange anteriorly, greenish gray above and on the sides; vertex yellowish green, darker at the base. Thorax dark reddish brown on the dorsum, this color sometimes purplish. Antehumeral bands dull olive green, narrowed and abbreviated above, about one-third as wide as the mesepisternum and nearer the middorsal than the humeral suture. Sides dull olivaceous, the purplish of the dorsum extending slightly over the humeral line; a diffuse narrow band, incomplete above, passing through the spiracle; another one on the 3rd

lateral suture, abbreviated below. Legs dark brown or black, the outer side of the tibiae yellow. Wings yellow, deeper along the costa and in the cubital space of the hind wing. Venation darker; stigma long, deep red. Abdomen dull yellowish brown with carinae narrowly black. Sides of 3-8 with a blackish brown longitudinal band. Segment 10 and appendages blackish.

Female. Paler in color. Wings variable.

Remarks.—I have seen no females from Porto Rico. Dr. Ris ('30) describes four main types of wing color.

1. Hyaline, with yellow rays on C and Sc to 1-4 cells beyond the nodus, cubital and anal fields diffusely yellow to the triangle and hind margin in the forewing and to the triangle and A_3 in the hind. Apex of fore wing narrowly and diffusely yellow; of the hind wing more deeply brown.

2. Wing bases yellow to the triangle. Apex of hind wing narrowly brown.

3. Like (1) with a diffuse transverse band, distal to the nodus, 3-4 cells wide.

4. Wing bases rich golden yellow to two cells distal of the triangle in the fore wing and to the nodus in the hind wing. Brownish bands at the triangle and in the hind wing at the nodus also.

He also states that the Antillean specimens are somewhat smaller and paler than the continental forms, and "In Cuban females a form is predominant with yellow color to the nodus or one or two cells distal in the fore wing, and two to four cells distal in the hind wing, and to the pterostigma or nearly so in the costal space of both wings; apex brown only in the hind wing, maximally to basad of pterostigma . . . None of the Antillean females show the dark markings of the form (4)."

One female which I have seen from Sierra Maestra, Cuba (June 9, O. Quercia coll. in Phil. Acad. Sci.), is like the above Cuban form described by Dr. Ris, but the yellow color extends to half way between the nodus and the stigma and along the hind margin as well.

Dr. Ris found that the females from San Domingo had the yellow in the forewing reaching to the stigma or one to two cells beyond, in the hind wing the same or to the apex. Apex of hind wing brown, sometimes also narrowly on the fore wing.

Size.—Abdomen, 12.5-15 mm., hind wing, 16-19 mm.

Type locality.—Jamaica.

Distribution.—Mexico to Venezuela and Colombia, Trinidad. *West Indies:* Cuba, Isle of Pines, Jamaica, San Domingo, Haiti, St. Croix.

Porto Rico: (Kolbe, Gundlach, 1893); Río Piedras, Jan. 4, east of University Farm (Garcia-Diaz, in C. U.).

Nymph.—(Needham, Bull. 47, N. Y. State Mus., p. 513.) Length 15, hind femur 5.5, width of abdomen 6, of head 4.5. Lateral setæ 5-6, mentals 9-11, the fifth from the outside the longest. Crenulations of the lateral lobe of the labium 9, with 2-3 spinules on each. Superior appendage as long as segment 9, shorter than the inferiors; laterals one-half as long as the inferiors. (Pl. V, Fig. 1).

Several nymphs of this species were collected at Río Piedras, April 4, by Professor Needham, and are now in the C. U. collection.

Miathyria Kirby

(Pl. I, Fig. 4)

Type.—*simplex* (Rambur).

Distribution.—Neotropic.

Diagnosis.—Wings broad. Fore wing: areculus moderately aslant, between the 1st and 2nd antenodals, its sectors stalked; antenodals 7-8, the last one incomplete, the first two more widely separated than the others; stigma small, surmounting one or two crossveins; triangle without crossveins, its anterior side less than half the length of the proximal; subtriangle without crossveins; Cu_1 rising from the anal angle of the triangle which is anterior to the posterior angle of the subtriangle; discoidal field of two cell rows, the area narrowing toward the margin; M_2 smoothly curved; radial planate subtending one cell row, its outer end turned forward to join Rs enclosing about 3-7 cells; median planate wanting (present in the hind wing); reverse vein moderate; no extra bridge crossveins. Hind wing: triangle retracted to the areculus, without crossveins, and with Cu_1 rising from its anal angle; anal crossing opposite origin of A_2 ; 3 cell rows behind A_2 , increasing; a:b as 1:4. Head large, eyes contiguous for a distance a little greater than the length of the occipital triangle. Frons rounded moderately, divided, with indications of a frontal carina; vertex with its superior margin bilobed. Lobe of the prothorax very small, lying in a low arc. Legs quite long and stout; 3rd femora with many very small spines varying in position. Abdomen rather short and slender. Genital plate of the female small.

Nymph.—See *M. marcella*.

Miathyria marcella (Selys)

(Pl. I, Fig. 4)

1857. *Libellula marcella* Selys, in Sagra, Hist. Nat., p. 452.

1861. *Tramea simplex* Hagen, Syn. Neur. N. Am., p. 146; teste Hagen '67.

1861. *Tramea marcella* Hagen, *ibid.*, p. 316.
1867. *Tramea marcella* Hagen, *Stett. Ent. Ztg.*, xxviii, p. 227.
1867. *Tramea marcella* Hagen, *Proc. Boston Soc. Nat. Hist.*, xi, p. 292.
1875. *Tramea marcella* Hagen, *ibid.*, xviii, p. 66.
1889. *Tramea marcella* Gundlach, *Contrib. Cuba.*, p. 252.
1896. *Miathyria marcella* Carpenter, *Journ. Inst. Jamaica*, ii, 3, p. 260.
1906. *Miathyria marcella* Calvert, *B. C. A.*, p. 294.
1911. *Miathyria marcella* Wilson, *Johns Hopkins Univ.*, *Circ.* 2, p. 50.
1913. *Miathyria marcella* Ris, *Cat. Coll. Selys* xvi, p. 1009.
1919. *Miathyria marcella* Calvert, *Trans. Amer. Ent. Soc.*, xlv, p. 363.
1931. *Miathyria marcella* Dow, *Proc. Biol. Soc. Wash.*, xliv, p. 58.

Diagnosis.—*Male.* Labium brownish, lateral lobes paler; labrum yellowish, darker on the anterior margin. Face, frons and vertex olivaceous. When mature, the face is reddish brown and the top of the frons and vertex violet metallic, darker at the base of the frons. Thorax brown. A broad yellow longitudinal band beginning just anterior to the lower end of the humeral suture and ending at the upper end of the 3rd lateral suture; posterior to this a similar but wider blackish band, diffuse to rearward and overspreading the 3rd lateral suture for its entire length; two clear yellow spots just back of the spiracle, one slightly above and but little separated from the other which continues down the side, bordered in front by the 2nd suture; a yellowish band covering the rear of the metepimeron. Legs black, femora paler basally. Wings with golden venation and brown stigma; membrane slightly tinged with yellowish. In the fore wing there is a faint basal spot of yellow; in the hind wing a diffuse golden spot reaching to the first antenodal, almost to the triangle and back to the hind margin. This spot becomes brown back of vein Cu from the membranule almost out to the midrib of the loop and along some of the cross veins distalward; it does not reach the hind margin of the wing, and on the margin at the end of the membranule shows a cleared-out hyaline spot 5-6 cell rows wide. Radial planate subtending 5-7 cells in the fore wing, 6-7 in the hind; postnodals of the fore wing 7-8. Abdomen golden brown; segment 5-10 with a broad dorsal band of black, on 10 covering nearly the entire dorsum. Appendages black.

Size.—Abdomen, 24 mm., hind wing, 33 mm.

Type locality.—Cuba.

Distribution.—Mexico to Argentina. *West Indies:* Cuba. Jamaica. *Porto Rico:* Manatí, June 27-29 (A. M. N. H.).

Nymph.—(Supposition.) I have a single nymph collected at Coamo Springs, April 4, by Professor Needham and several from Georgetown, April 17, which I believe to be of this species. It is allied to those of

Perithemis and *Celithemis* by the presence of rather long lateral spines and the row of long dorsal hooks, for which reason I have grouped this genus with the *Celithemini* rather than the *Trameini* (Needham and Broughton, 1927) with each of which tribes the adults have much in common.

Length 21, hind femur 7.3, width of abdomen 7.1, of head 5.3 (largest specimen almost full grown). This is a rather clean nymph with very little vestiture. Head widest across the rear margin of the eyes; rear angles rounded and setose. Eyes projecting slightly to rearward, their hind margins reaching back more than half the distance from the antennæ to the rear of the head. Length of antennal segments 1 : 1 : 2 : 1.5 : 1.3 : 1.3 : 1.2. Anterior margin of the median lobe of labium obtuse angulate in the middle and sparsely spinulose; lateral lobes deeply crenulate on the distal margin into 10 lobes, each of which bears one long and one short seta; lateral setæ 8; mental setæ 9. Labium reaching to one-third the length of the mesothorax. Legs hairy, femora twice-banded; length of tarsal segments as 1 : 2.5 : 3; divided setæ are present on all tarsi and the 1st and 2nd tibiæ. Abdomen widest on segment 7. Dorsal hooks on 2-9, strong; of 8 reaching to one-half of the length of segment 9; of 9 reaching to the end of segment 10. Lateral spines on 8-9; of 8 half as long as segment 8; of 9 two-thirds as long as segment 9. Terminal appendages long, hairy; appendages plus segment 10 equal in length to segments 8 + 9. Superior appendage a little shorter than the inferiors; laterals a little less than one-fourth as long as the superiors. (Pl. III, Fig. 1; Pl. V, Fig. 2.)

SYMPETRINI

(Pl. I, Fig. 2)

Vein M_2 smoothly curved or with a very slight undulation; less than 12 antenodals usually, the last one incomplete; less than 3 crossveins under the stigma. The anal loop is well developed but of moderate length, with extra cells at the heel and with its sole line usually directed inward. Planates well developed.

KEY TO WEST INDIAN GENERA

Adults

- | | |
|--|----------------------|
| 1. Hind wing with anal crossing before the origin of A_2 | 2 |
| Hind wing with anal crossing opposite origin of A_2 | 3 |
| 2. Fore wing with extra bridge crossveins..... | <i>Micrathyria</i> |
| Fore wing with no extra bridge crossveins..... | <i>Erythrodiplax</i> |

- 3. Hind wing with vein Cu, rising from the outer side of the triangle. 4
 Hind wing with vein Cu, rising from hind angle of triangle. *Brachymesia*
- 4. Forewing radial planate subtending one cell row. *Erythemis*
 Forewing radial planate subtending two cell rows. *Leptemis*

Micrathyria Kirby

(Pl. I, Fig. 2)

Type.—*didyma* (Selys).

Distribution.—Neotropic into Nearctic.

Diagnosis.—Wings moderate. Fore wing: arculus variable, between the 2nd and 3rd antenodals, under the 2nd or between the 1st and 2nd, its sectors on a long stalk; antenodals 7-12, the last one incomplete; stigma moderately large, surmounting 2 crossveins; triangle moderately wide, with or without crossveins; subtriangle variable; discoidal field of 2 cell rows, occasionally 3 next the triangle, increasing to 3 at or before the level of the nodus; M_2 in a smooth low arch or a convex curve; apical sector rising under the basal third of the stigma; radial planate subtending one cell row; median planate wanting; reverse vein scarcely distinct; extra bridge crossveins present. Hind wing: triangle retracted to the arculus, without crossveins and with Cu_1 rising from its outer side; one cubito-anal which is the anal crossing and is basad of the origin of A_2 ; 1-3 cell rows between A_3 and the border; anal loop variable, usually rather broad, gaff longer than sole, sole pointing inward; a : b as 1 : 1 or 1 : 2, with or without the extra cell between the midrib and the anal angle of the triangle. Head rather large; eye seam short; frons small, rounded, with frontal carina; furrow moderately deep; vertex rounded. Lobe of prothorax large, erect, with a notch in the middle and fringed with long hairs. Legs long; 3rd femora of male with a row of many small teeth increasing in size distally and terminating in a long spine. Abdomen slender in the male, segments 6-8 often considerably expanded laterally; genital lobe of female usually erect.

Nymph.—See *M. dissocians*.

KEY TO WEST INDIAN SPECIES

Adults

- 1. Hind wing, 18 mm.; thorax with four lateral stripes (obscured by pruinosity in very mature specimens); subtriangle of one cell.
 Hind wing, 25 mm. or over; thorax with three lateral stripes; subtriangle of 2 or more cells. *[debilis]* 2

2. Sides of thorax with 3 unforked lateral black stripes; discoidal field of the hind wing with no cells running through from M_1 to Cu_1 . *didyma*
Sides of thorax with 3 lateral dark stripes, at least one of which is forked; discoidal field of the hind wing with at least one cell running through from M_1 to Cu_1 3
3. One cell between hind angle of triangle and midrib of loop... [*aqualis*]
Two cells between hind angle of triangle and midrib of loop..... 4
4. Male superior appendages with points converging; abdominal segment 6 with some yellow..... *hageni*
Male superior appendages with points diverging; abdominal segment 6 all black *dissocians*

***Micrathyria didyma*^{5a}**

(Pl. II, Fig. 19.)

Three forms of this species are usually recognized. One only is known from the West Indies and differs from the others in having the fore wing triangle crossed, and a subtriangle of 3 cells.

***Micrathyria didyma didyma* (Selys)**

1842. *Libellula phyne* Rambur, Ins. Neur., p. 121.
1857. *Libellula didyma* Selys, in Sagra, Hist. Nat., vii, p. 191.
1861. *Dythemis dicota* Hagen, Syn. Neur. N. Am., p. 166.
1866. *Mesothemis payi* Scudder., Proc. Boston Soc. Nat. Hist., x, p. 194.
1867. *Dythemis dicota* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
1867. *Dythemis dicota* Hagen, Stett. Ent. Ztg., xxviii, p. 98.
1867. *Dythemis dicota* Scudder, Proc. Boston Soc. Nat. Hist., xi, p. 300.
1873. *Dythemis dicota* Hagen, Proc. Boston Soc. Nat. Hist., xv, p. 374.
1875. *Dythemis didyma* Hagen, ibid., xviii, p. 75.
1889. *Dythemis dicota* Gundlach, Contrib. Cuba, p. 269.
1889. *Micrathyria didyma* Kirby, Trans. Zoo. Soc. London, xii, p. 304.
1894. *Micrathyria pruinosa* Kirby, Ann. Mag. Nat. Hist. (6), xiv, p. 267.
1896. *Micrathyria didyma* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 261.
1906. *Micrathyria didyma* Calvert, B. C. A., pp. 221, 223.
1911. *Micrathyria didyma didyma* Ris, Cat. Coll. Selys, xii, p. 430.
1911. *Micrathyria didyma* Wilson, Johns Hopkins Univ., Circ. 2 (232) p. 50.
1916. *Micrathyria didyma* Kahl, Ann. Carn. Mus., x, p. 524.
1919. *Micrathyria didyma* Calvert, Trans. Am. Ent. Soc., xlv, p. 369.
1931. *Micrathyria didyma didyma* Dow, Proc. Biol. Soc. Wash., xlv, p. 57.

Diagnosis.—*Male*. Lips and face yellowish white; labium with a median longitudinal streak across the median lobe and extending along the inner margins of the two lateral lobes. Top of frons with a quadrate metallic green blue spot, not reaching the sides. Vertex and occiput metallic blue green, the latter with a pair of yellow triangular spots on the rear border. Prothorax black, the rear margin with a fringe of very

^{5a} If *L. phyne* is a synonym of this species (Hagen '75) the name has priority over *didyma*.

long yellowish hairs. Front of synthorax metallic green marked with pale yellowish green as follows: a median spot on the collar; the mid-dorsal carina; within the lateral arms of the crest; a very narrow antehumeral band divergent below and incomplete above; and a very narrow band bordering the humeral suture and continuing at right angles across the front of the sinus to the level of the antehumeral, slightly constricted at the angles. Sides greenish with three metallic bands, one on each of the three sutures and all connected above and below and with the black of the venter, isolating a roundish spot on the mesinfraepisternum. Legs black. Wings hyaline; fore wing triangle of 2 cells, subtriangle of 3; hind wing triangle of one cell and with 2 rows of cells in the discoidal field; 2 cells between the hind angle of the triangle and the midrib of the anal loop, and 3 rows of cells behind the loop; 9-11 antenodals in the fore wing; radial planate subtending one cell row. Abdomen black marked with pale greenish as follows: a spot on the sides of segment 1 and 2, and pair of basal spots on 3; 7 with the double spot three-fifths of the segment length.

Female. Resembles the male. Basal paired spot on abdominal segments 3-7, on 3 almost the entire length, on 4 three-fourths of the segment, on 5 one-half, on 6 one-third, on 7 wider and three-fifths the length of the segment. Ventral plate of the 8th segment reaching not quite to one half of 9, V-shaped in the center.

Remarks.—In a male from Guadeloupe a narrow projection of the 2nd stripe on the side of the thorax at the level of the spiracle meets the 3rd lateral stripe. The humeral band is, in this case, almost obliterated. A few Cuban specimens have but one cell between the hind angle of the triangle and the origin of the midrib of the loop.

Distribution.—Mexico to Ecuador; *West Indies*: Cuba, Isle of Pines, Jamaica, San Domingo, Guadeloupe. *Porto Rico* (Gundlach).

***Micrathyrta dissocians* Calvert**

(Pl. II, Fig. 18)

1906. *Micrathyrta dissocians* Calvert, B. C. A., pp. 222, 226.

1911. *Micrathyrta dissocians* Ris, Cat. Coll. Selys, xii, p. 540.

1916. *Micrathyrta dissocians* Kahl, Ann. Carn. Mus., x, p. 524.

1931. *Micrathyrta dissocians* Dow, Proc. Biol. Soc. Wash., xlii, p. 57.

Diagnosis.—*Male.* Lips and face whitish; base of frons brownish, becoming blue green metallic, and forming a large roundish spot on the middle of the top of the frons; vertex brown, becoming metallic like the frons; occiput dark brown to blackish. Prothorax black. Front of syn-

thorax brown becoming green metallic, marked with yellowish green as follows: the basal three-fourths of the dorsal carina; a pair of antehumeral stripes, divergent and narrowed below, incomplete above; a band bordered by the humeral suture to rearward and continued forward in a fine line beneath the wing sinus at right angles to the dorsal carina, but not reaching it. Sides yellowish green with a dark band on the humeral suture and one on the 2nd lateral suture, both forked above and anastomosing; a third band on the 3rd lateral suture, forked at the upper two-thirds, the rear spur traversing the metepimeron. Legs black with a streak of green on the inside of the first femora. Wings slightly suffused with yellowish, especially on the costal border as far as the nodus, and with a small basal spot of orange. Eight to nine antenodals; fore wing triangle without crossveins; hind wing triangle with one crossvein; sub-triangle of 3 cells; 2-3 cell rows in the discoidal field of the fore wing; usually 2 cells between the midrib of the anal loop and the hind angle of the triangle. Abdomen brownish black; sides of segment 1 greenish; segment 2 with a pair of large basal spots one on each side of the dorsum, and a small lateral spot; 3 with the paired longitudinal dorsal spots three-fourths of the segment length, widely separated on the middorsum and each in turn divided by the transverse carina; these spots decreasing on 4 and 5; entirely wanting on 6; on 7 three-fourths of the segment length and extending almost to the lateral margins; 8-10 and appendages black. Adult specimens with the bases of the wings, the area between, and most of segments 1-3, pruinose.

Female. Resembles the male. Abdomen with the following parts yellow: all of 1-2 except the carinae, a median transverse band on 1 and a longitudinal dorsal one on 2; lateral spots of 3 almost full length; on 4 four-fifths of the segment length; on 5 three-fifths; on 6 very small; on 7 as in the male. Ventral plate of 8th segment deeply lobed and extending one-fourth or less of the length of segment 9.

Remarks.—There is some variation in the band on the 3rd lateral suture of the thorax. It is distinctly forked, the rear spur quite distinct, in the males from Porto Rico and in one from Cuba; the rear spur is not present in 4 other Cuban specimens and in 3 from San Domingo. The female shows even more variation. One from Porto Rico and two from Cuba have only the 2nd lateral stripe forked above; another from Cuba has the humeral and the 2nd stripes forked, but not the 3rd.

Size.—Abdomen, 25 mm., hind wing, 25-26.5 mm.

Type locality.—Vera Cruz, Mexico, and Mayagüez, P. R.

Distribution.—Mexico. *West Indies:* Cuba, Isle of Pines, San Domingo.

Porto Rico (Calvert, Ris); Manatí, July 27-28; Caguas, May 28-29 (A. M. N. H.). Panzardi's Place, Río Piedras, July 19 (Garcia-Diaz).

Nymph.—(Supposition). Length 16, hind femur 5.2, width of abdomen 6, width of head 4.8. Body smooth; a few setæ on the rounded hind angles of the head and a few minute ones on the antero-lateral angles of the prothorax. Head widest across the eyes and narrowed behind them. Eyes lateral, their hind margins reaching two-thirds of the way from the antennæ to the rear of the head. Rear margin of the head more or less straight. Antennæ pale except the 6th segment, which is brown; proportionate length of segments as 2 : 2 : 4.4 : 2.6 : 3.6 : 3.6 : 5. Median lobe of labium with 13-14 mental setæ. Distal margin of lateral lobes with 12 crenulations, each bearing one long seta and 1-2 minute setæ; lateral setæ 10-11. Prothorax with a longitudinal brown band narrowly divided on the mid-line. Sides of synthorax mainly brown below and light above with a brown pattern. Abdominal segment 1-5 mainly yellow with a band of brown dots, on each side, which continues down to 9; a broad band of brown on either side of the middorsum of 6-9, the two separated narrowly on 6 and increasingly wider on 7-9; sometimes this brown broken up into dots; lateral margins with or without a brown spotted band. Lateral spine of 8 equal to about one-fourth of the segment length; that of 9 one-third of 9. Appendages as long as 8 + 9 on the dorsum; superior not so long as the inferiors; laterals a little longer than half the superior; superior hairy on the sides, inferiors spinulose within. (Pl. III, Fig. 4, Pl. V, Fig. 5.)

A large number of these nymphs was collected by Professor Needham at Coamo Springs, April 4, and at El Caney, Cuba, April 20, and are now in the C. U. collection.

I mistook this species for *Erythrodiplax umbrata*, so closely does it resemble that genus in general appearance and that species in mental and lateral setæ; but several nymphs show the venation of the wings so clearly that its association with *M. dissocians* is evident. One extra bridge cross-vein is present in all cases where the venation is at all developed; the following characters indicate the species: radial planate subtending one cell row; two cells between midrib of loop and hind angle of triangle; one cell running through from M_4 to Cu_1 in the discoidal field of the hind wing.

***Micrathyria hageni* Kirby**

1861. *Dythemis didyma* Hagen, Syn. Neur., p. 165.

1867. *Dythemis didyma* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.

1875. *Dythemis dicrota* Hagen, Proc. Boston Soc. Nat. Hist., xviii, p. 75.

1896. *Macrathyria hageni* Carpenter, Journ. Inst. Jamaica, ii, p. 261.
 1906. *Macrathyria hageni* Calvert, B. C. A., p. 222.
 1911. *Macrathyria hageni* Ris, Cat. Coll. Selys, xii, p. 438.
 1931. *Macrathyria hageni* Dow, Proc. Bio. Soc. Wash., xlv, p. 57.

Diagnosis.—Lips whitish. Face yellowish. Frons with a basal metallic blue spot on the top. Vertex also blue metallic. Front of thorax brown with blue metallic reflections, with a broad, oval, yellow antehumeral band, incomplete above. Sides greenish with a dark band on the humeral suture, another one through the spiracle which forks above, one branch fusing with the humeral band and the other with the broad band on the 3rd lateral suture. Wings diffusely yellowish; hind wings with a golden brown basal spot reaching barely halfway to the anal crossing; 8 antenodals in the fore wing, 6 in the hind.

Size.—Abdomen, 22 mm., hind wing, 28 mm.

Type locality.—Cuba; Mexico.

Distribution.—Texas, Central America. *West Indies*: Cuba, Jamaica, San Domingo. *Porto Rico* (Kolbe).

Erythrodiplax Brauer

Type.—*fusca* (Rambur).

Distribution.—Neotropic into Nearctic.

Diagnosis.—Wings relatively broad. Fore wing: arculus between the 1st and 2nd antenodals, its sectors stalked; 8-11 antenodals in the fore-wing, the last incomplete; stigma rather large, surmounting 2 crossveins; triangle more or less at right angles to the long axis of the wing, moderately wide, crossed; subtriangle of 1-3 cells, discoidal field of 2-3 cell rows, slightly narrowed toward the middle and wider at the margin; M_2 variable; apical planate rising under the basal third of the stigma; radial planate subtending 1-2 cell rows; median planate subtending one row or lacking; reverse vein distinct; no extra bridge crossveins. Hind wing: triangle retracted to the arculus without crossveins; origin of Cu_1 variable; anal crossing basad to origin of A_2 ; anal loop of moderate size, gaff not much longer than sole, sole pointing inward, often very concave; a : b as 1 : 2 or 1 : 3. Head moderately small; eye seam short; frons rounded, variable, with or without a frontal carina; vertex small, variable. Lobe of prothorax variable. Legs long and moderately slender.

Nymph.—Body rather smooth except for the long hairs on the sides of the prothorax. Head widest across the eyes; eyes reaching back of the middle of the head; hind angles of head rounded off. Mandibles with four teeth in the apical series and 2-3 proximal teeth, with or without the

intermediate denticle (Calvert, '28). Labium with anterior margin of mentum crenulate, obtuse angulate in the middle. Lateral lobes with 11-15 crenulations on the distal margin, each crenulation further divided and setigerous; posterior margin finely crenulate and setigerous. Legs hairy; all tibiæ and tarsi with some divided setæ. Abdomen widest at the 6th segment. No dorsal hooks but sometimes with middorsal tubercles bearing dense tufts of hair. Lateral spines on 8-9, that of 9 less than the length of the segment. Appendages slightly curved ventrally.

KEY TO WEST INDIAN SPECIES

Adults

- 1. Radial planate subtending 2 rows of cells.....*umbrata*
 Radial planate subtending a single row of cells..... 2
- 2. Hind wing with but one cell between hind angle of triangle and midrib
 of loop*minuscula*
 Hind wing with 2 cells between hind angle of triangle and midrib of loop 3
- 3. Wings wholly hyaline*berenice*
 Wings with some yellow or brown..... 4
- 4. Male genital lobe expanded at the end; female genital plate half or
 two-thirds as long as segment 9..... 5
 Male genital lobe not expanded at end; female genital plate as long as
 or longer than segment 9.....*connata*
- 5. Frons metallic blue above.....[*animaculata*]
 Frons not metallic above.....[*ochracea*]

Nymphs

- 1. Lateral setæ 8; mental setæ 12.....*minuscula*
 Lateral setæ 9-10; mental setæ less than 12 or more than 13..... 2
- 2. Lateral setæ 9-10; mental setæ 10-11..... 3
 Lateral setæ 10-11; mental setæ 13-14.....*umbrata*
- 3. Crenulations of lateral lobes with 3-4 setæ each.....*berenice*
 Crenulations of lateral lobe with one seta each (sometimes a second
 minute one)*c. justiniana*

Erythrodiplax umbrata (Linnaeus)

1758. *Libellula umbrata* Linn., Syst. nat., p. 545.
 1839. *Libellula tripartita* Burmeiste, Hanb. Ent., ii, p. 856.
 1839. *Libellula ruralis* Burmeister, *ibid.*, p. 856.
 1842. *Libellula umbrata* Rambur, Ins. Neur., p. 73.
 1842. *Libellula flavicens* Rambur, *ibid.*, p. 87.
 1857. *Libellula umbrata* Selys, in Sagra, Hist. nat. vii, p. 189.
 1861. *Libellula umbrata* Hagen, Syn. Neur. N. Am., p. 158.
 1867. *Libellula umbrata* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1867. *Libellula umbrata* Hagen, Stett. Ent. Ztg., xxviii, p. 99.
 1867. *Libellula umbrata* Uhler, Proc. Boston Soc. Nat. Hist., xi, p. 297.
 1868. *Libellula umbrata* Hagen, Stett. Ent. Ztg., xxix, p. 274.

1868. *Erythrodiplax umbrata* Brauer, Zool. Bot. Wien., xviii, p. 723.
 1888. *Libellula umbrata* Kolbe, Archiv für Naturg., liv, pp. 160, 167.
 1893. *Trithemis umbrata* Cockerell, Journ. Inst. Jamaica, i, p. 257.
 1894. *Trithemis umbrata* Kirby, Ann. Mag. Nat. Hist. (6), xiv, p. 263.
 1896. *Thithemis umbrata* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
 1906. *Erythrodiplax umbrata* Calvert, B. C. A., pp. 248, 251.
 1911. *Erythrodiplax umbrata* Ris, Cat. Coll. Selys, xii, p. 484.
 1911. *Erythrodiplax umbrata* Wilson, Johns Hopkins Univ. Circ. 232, ii, p. 50.
 1916. *Erythrodiplax umbrata* Kahl, Ann. Carn. Mus., x, p. 525.
 1919. *Erythrodiplax umbrata* Calvert, Trans. Am. Ent. Soc., xlv, p. 364.
 1928. *Erythrodiplax umbrata* Calvert, Univ. Iowa Stud. Nat. Hist., xii, 2, p. 3.
 1931. *Erythrodiplax umbrata* Dow, Proc. Biol. Soc. Wash., xlv, p. 58.

Diagnosis.—*Male.* Face in very young specimens wholly reddish, in older ones washed with shining brown or black as follows: the labrum, except the anterior border, which is yellow; a spot on either side of the midline of the anteclypeus; the central portion of the postclypeus; the frons except the lateral margins; and the vertex. The color on the labrum and the frons is the first to appear. Prothorax pale brownish, yellow across the center. Rest of thorax dull olivaceous; lips of spiracle black and a spot on the suture just above it also black. Legs brown, paler at the base and on the inside of the femora. Wings with a diffuse yellowish spot at the base, larger on the hind wing, and with a broad brown cross-band extending from the nodus to the base of the stigma, rarely to the middle. This band varies from a faint yellowish wash in very young specimens to a deep brownish black in mature ones. Stigma brownish, swollen in the middle, paler apically, large, surmounting 2 crossveins. Radial planate subtending 2 cell rows. Abdomen dull yellowish brown, black on the venter; segments 2-3 with supplementary transverse carinæ; all carinæ black. Four to seven with a large black apical spot on the lateral margins, on 5-7 confluent broadly above on the apical border with a broad middorsal band. This band is scarcely discernible on 4, slightly so on 5, distinct on 6, narrower on 7, on 8-9 confluent with the black of the sides, thereby covering the entire segment, except for two small basal longitudinal dashes, the dorsal one of which on 9 is round. Segment 10 short, yellowish, except for a black basal and apical border and a diffuse blackish region of the dorsum. Appendages pale, extreme tips darker.

The *mature* male has the face entirely black except a narrow border on the front margin of the labrum. Body entirely blue black, slightly pruinose; only the appendages pale. Stigma dark brown; wing markings black.

The *homochromatic* female resembles the male except that it is generally lighter in color and the wing markings are more diffuse.

The *heterochromatic* female differs only in the color of the wings. The basal yellowish spot of the hind wings is slightly larger. The cross-band is not present. In both wings the basal yellow continues along Sc and R to the stigma; the apex of the wings is slightly brownish to the stigma.

Size.—Abdomen, 25-30 mm., hind wing, 25-31 mm.

Type locality.—America.

Distribution.—Ga. and Fla. to Texas to Argentine. *West Indies*: all islands. *Porto Rico*: (Kolbe, Calvert 1906, Ris); from nearly all parts in all seasons. *St. Thomas*: (Burmeister, Selys 1857, Calvert 1906, Ris); series (A. M. N. H.). *St. John*: series (A. M. N. H.). *St. Croix*: series (A. M. N. H.).

Nymph.—(Calvert, Univ. Iowa Studies Nat. Hist., 1928, xii, 2, p. 25.) Length 14, hind femur 3.9, width of abdomen 5.5, width of head 4.8. Labium reaching to base of second legs. Lateral lobes dotted with brown; mentum with sides largely brown and dotted on the anterior margin. Lateral seta 10-11; distal margin of lateral lobe with about 11-12 crenulations each with 2 setae (and sometimes a minute 3rd one), one long and one short. Femora twice banded and 1st and 2nd tibiae three times banded with brown; hind femur reaching to the end of the 6th segment. Wing pads reaching across segment 6. Abdomen pale basally, increasingly dark apically; a pale yellow middorsal longitudinal band on 6-10 and extending across the superior appendage; a small brown dot near the mid length of 4-9 about two-fifths of the way from the midline to the lateral margins; on 7-9 this dot bordered externally by a pale yellow spot, small on 7. Lateral spine of 8 and 9 about one-half their segment lengths. Appendages dark except for the apical third of the inferiors, apical two-thirds of laterals and apical third and the middorsal band of the superior. (Pl. V, Fig. 3.)

One nymph collected by Professor Needham at Camagüey, Cuba, April 13, and now in the C. U. collection.

***Erythrodiplax minuscula* (Rambur)**

1842. *Libellula minuscula* Rambur, Ins. Neur., p. 115.
 1888. ?*Diplax portoricana* Kolbe, Archiv für Naturg., liv, p. 168.
 1896. ?*Diplax portoricana* Carter, Journ. Inst. Jamaica, ii, p. 261.
 1906. *Erythrodiplax minuscula* Calvert, B. C. A., pp. 249, 267.
 1911. *Erythrodiplax minuscula* Ris, Cat. Coll. Selys, xii, p. 524.
 1916. *Erythrodiplax minuscula* Kahl, Ann. Carn. Mus., x, p. 524.

Synonym.—*paraguayensis* Förster. Also as *Diplacodes*, *Trithemis*, and *Sympetrum*.

Diagnosis.—*Male.* Lips and face brownish; clypeus paler. Top of frons and vertex metallic greenish black. Occiput brownish black. Thorax and abdomen all dark pruinose blue. Legs blackish. Base of hind wings with a small yellow or brown spot reaching to the anal crossing and 2-3 cells beyond the membranule. Radial planate subtending one cell row; subtriangle of fore wing of one cell; Cu_1 of the hind wing usually rising from the outer side of the triangle.

Female. Lips and face whitish. Base of frons and the vortex coppery green. Dorsum of thorax brown with a diffuse yellow band on the mid-dorsal suture and another on the humeral; sides of thorax yellow with indistinct dark lines. Abdominal segments 1-6 yellow; 3-6 with black dorsal markings; lateral margins with a blackish spot on the posterior half; 7-10 black. Appendages whitish. Genital plate as long as segment 9, erect.

Size.—Abdomen, 13-17 mm., hind wing, 15.5-21 mm.

Type locality.—North America.

Distribution.—W. Va., Ky. to Fla. and Tex. to Argentine. *West Indies:* Cuba, Jamaica, Isle of Pines. *Porto Rico:* (Kolbe).

Nymph.—(Needham, 1904, Proc. U. S. Nat. Mus., xxvii, pp. 7-9.) Length 12; hind femur, 3.5; width of abdomen, 4; Lateral setæ, 8; mental setæ about 12, the fifth from the outside the longest. Abdomen oval; lateral appendages three-fourths the length of the superior.

Erythrodiplax berenice

Dr. Calvert (1906) and Shortess (1929) have done extensive statistical work on this species in regard to color and venational variations in relation to geographic distribution, and have found that there is a southward tendency towards decreased wing venation. On the basis of this, Dr. Calvert has distinguished 2 subspecies: *nava*, having 25 or fewer marginal cells between the stigma and M_2 of the fore wing, and the typical *berenice*, having 35 or more. Only the former is known from the West Indies.

Erythrodiplax berenice nava (Hagen)

(Pl. I, Fig. 6)

1861. *Dythemis nava* Hagen, Syn. Neur. N. Am., p. 167.
 1867. *Dythemis nava* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 293.
 1889. *Dythemis nava* Gundlach, Contrib. Cuba, p. 271.
 1893. *Micrathyria berenice* Calvert, Trans. Am. Ent. Soc., xx, p. 261.
 1906. *Erythrodiplax berenice nava* Calvert, B. C. A., pp. 249, 270.
 1911. *Erythrodiplax berenice nava* Ris, Cat. Coll. Selys, xii, p. 523.

1916. *Erythrodiplax berenice nava* Kahl, Ann. Carn. Mus., x, p. 524.

1919. *Erythrodiplax berenice nava* Calvert, Trans. Am. Ent. Soc., xlv, p. 369.

Diagnosis.—*Male.* Face and head mostly shining metallic blue; in young specimens, marked with yellow as follows: lateral lobes of labium except along the median margins, the labrum except for the anterior border and a basal median indentation; postclypeus (anteclypeus is more brownish); a spot on the rounded prominence of the frons narrowly separated on the median line, and two spots on the lateral margins next the eyes, one confluent with the pale of the postclypeus and the other more or less confluent with the spot on the top of the frons; a spot on the middle of the prominent vertex and a small spot at the rear base of each side of the vertex. Rear of head black, sometimes spotted with yellow. Thorax yellow striped with black as shown (Pl. I, Fig. 6). This pattern may be, at times, much less extensive. Legs black except the inside of the 1st femora. Wings wholly hyaline. Antenodals 7-8; radial planate subtending one cell row; often 2 cells between the midrib of the anal loop and the hind angle of the triangle; Cu_1 rising from the outer side of the triangle in the hind wing. Abdominal segments 1-2 yellow with black carinæ; 3-6 yellow with lateral margins broadly black, an apical ring as well as a narrow middorsal line black; on 7 the lateral band is absent but the apical one covers two-thirds of the segment length. In well colored specimens segments 3-7 appear black with a triangular yellow spot on each side of the midline, reaching not quite to the apex on 3-6 and one-third of the way on 7 where it also extends down to the lateral margins. Eight to nine have a touch of basal yellow on each side. Ten and appendages pale. Adult males become wholly pruinose blue, the thorax and base of abdomen whitish.

Female. Like the young male but lighter and the pale color more extensive. Wings with a minute yellow fleck in the fore wing and a slightly larger one in the hind wing which reaches to the 1st antenodal and the anal crossing. Genital plate of the 8th segment large, erect, standing at right angles to the abdomen, longer than segment 9.

Remarks.—Dr. Calvert (1906) notes homo- and hetero-chromatic females for this species. The material that is before me shows but the one.

Size.—Abdomen, 20-23 mm., hind wing, 23-25 mm.

Type locality.—Cuba.

Distribution.—Florida, Bahamas, Panama; *West Indies:* Cuba, Isle of Pines, Jamaica. *Porto Rico:* Santurce, Aug. 3, and San Juan, July 1-5 (A. M. N. H.). *St. Croix:* March 5, April 5 (A. M. N. H.).

Nymph.—(Calvert, 1904, Ent. News, xv, p. 174.) Total length 14. Distal margin of lateral lobe of labium with 11-12 shallow crenulations each bearing 3-4 setæ. Lateral setæ 9-10; mental setæ 10-11, the fourth to fifth from the outside the longest. Abdomen elongate, hairy; dorsal hooks replaced by tufts of hair. Lateral spines on 8-9, short, about one-half the length of the segments, incurved. Lateral appendages about two-thirds the length of the superior.

Erythrodiplax connata

Dr. Ris (1911) includes under this species 7 subspecies, 3 of which are from the West Indies.

KEY TO WEST INDIAN SUBSPECIES

1. Face and frons of adult male red.....[*fusca*]
Face and frons of adult male black..... 2
2. Basal spot of the hind wing extending but a little beyond the anal cross-
ing[*fraterna*]
Basal spot of the hind wing larger, extending to the 2nd antenodal, to
the triangle and back to the anal angle of the wing.....*justiniana*

Erythrodiplax connata justiniana Selys

(Pl. 2, fig. 12.)

1842. *Libellula minuscula* Rambur, Ins. Neur., p. 115; in pars (*teste* Selys).
1857. *Libellula justiniana* Selys, in Sagra, Hist. Nat., vii, p. 190.
1861. *Diplax justiniana* Hagen, Syn. Neur. N. Am., p. 181.
1866. *Diplax justiniana* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 197.
1867. *Diplax justiniana* and *ambusta* Hagen, Proc. Boston Soc. Nat. Hist., xi,
p. 293.
1867. *Diplax justiniana* Hagen, Stett. Ent. Ztg., xxxiii, p. 98.
1873. *Diplax justiniana* Hagen, Proc. Soc. Nat. Hist., xv, p. 375.
1875. *Diplax justiniana* and *ambusta* Hagen, Proc. Boston Soc. Nat. Hist.,
xviii, p. 81.
1888. *Diplax ambusta* Kolbe, Archiv für Naturg., liv, p. 168.
1889. *Diplax ambusta* and *justiniana* Gundlach, Contrib. Cuba, p. 279.
1890. *Trithemis justiniana* and *ambusta* Kirby, Cat. Odon., pp. 19, 20.
1896. *Trithemis justiniana* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
1906. *Erythrodiplax connata* form *f'* Calvert, B. C. A., p. 266.
1911. *Erythrodiplax connata justiniana* Ris, Cat. Coll. Selys, xii, p. 509.
1911. *Erythrodiplax connata justiniana* Wilson, Johns Hopkins Univ. Circ.
(232), ii, p. 50.
1916. *Erythrodiplax connata justiniana* Kahl, Ann. Carn. Mus., x, p. 524.
1919. *Erythrodiplax connata justiniana* Calvert, Trans. Am. Ent. Soc., xlv, p.
372.
1931. *Erythrodiplax connata justiniana* Dow, Proc. Biol. Soc. Wash., xlv, p. 58.

Diagnosis.—*Male.* Face ochraceous; labrum brighter, vertex darker. Thorax ochraceous. Legs brownish with femora pale on the inside. Wings with a golden brownish spot in the hind wing extending to or a little beyond the 1st antenodal, to the arculus and the inside of the triangle. Abdomen ochraceous, segments 1-3 with black carinæ and an indistinct brown line on each side; 4-10 with a black triangular spot on the posterior-lateral margins and an indistinct brownish area along the middorsal carina. Appendages pale.

Mature males have the face black, except for a narrow yellow border along the labrum; frons and vertex with metallic blue reflections; thorax and legs black; abdominal segments 1-7 pruinose, 8-10 and appendages black.

Female. Similar to the young male but lighter in color.

Remarks.—There is some variation in the depth and extent of color of the wing color. A male from St. Croix has the minimum, the color extending only half way to the first antenodal, three-quarters of the way to the arculus and barely reaching the triangle. Specimens from Jamaica and Haiti have, as a rule, more than those from Porto Rico; whereas one male from Cuba has the brown extending beyond the 2nd antenodal, well beyond the arculus and over the triangle. The male from St. Croix is the largest: abdomen 19, hind wing 22; the one from Cuba is the smallest: abdomen 15, hind wing 18.

Size.—Abdomen, 16.5-18.5 mm.; hind wing, 18-22 mm.

Type locality.—Cuba.

Distribution.—Greater Antilles. *Porto Rico:* (Hagen, 1875); Martin Piña, Jan. 14; Aibonito, June 1-3; Coamo Springs, June 5-7; Barros, June 4; Adjuntas, June 8-13; Caguas, May 28; San Juan, July 9-12; Guayanilla, July 22 (A. M. N. H.). Río Piedras, April 13 (Forbes). *St. Thomas:* (Calvert); March 13 (A. M. N. H.).

Nymph.—(Supposition). Length 10.5, hind femur 3.8, width of abdomen 3.2, width of head 4.3. Rear margin of head rather straight and with rounded angles, setose. Lateral setæ 7-8; distal margin of lateral lobes with 10 obsolete crenulations, each with one long and sometimes one short seta; median lobe sparsely spinulose; mental setæ 9-10. Prothorax with setæ on the anterior-lateral angles and in a middorsal clump; synthorax with minute ones on the extreme dorsal surface. Wings reaching to the 6th segment. Spines on 8 and 9 about one-third their segment length. Superior appendage almost as long as the inferiors; laterals three-fourths of the superior; superior with a few hairs each side. (Pl. V, Fig. 4.)

One nymph collected in Camagiüay, April 13, by Professor Needham. The only reason I have for considering it this species is its small size, and the fact that adults were collected in the same place.

Brachymesia Kirby

Type.—*furcata* (Hagen).

Distribution.—Neotropical.

Diagnosis.—Fore wing: arculus between the first and second antenodal crossveins, its sectors rising from a single point, scarcely stalked; antenodals 9-11, the last one incomplete; stigma moderate, surmounting two crossveins; triangle elongate, crossed, directed inward; subtriangle of three cells; discoidal field of three cell rows, narrowed at the margin; radial planate subtending 1-2 cell rows; median planate subtending two cell rows; no extra bridge crossveins. Hind wing: triangle retracted to the arculus, without crossveins and with Cu_1 rising from its hind angle; anal crossing opposite the origin of A_2 ; three cell rows between A_2 and the hind margin with the peculiar arrangement shown in Pl. I, Fig. 14; gaff longer than sole; sole line directed slightly inwards; a : b as 1 : 2 or 1 : 3. Eyes contiguous for a distance equal only to the posterior anterior dimension of the vertex; vertex high, globose; frons swollen, deeply lobed, with no frontal carina. Lobe of prothorax emarginate in the middle, erect and fringed with long hairs. Anal appendages of male longer than segment 10.

Remarks.—Professor Needham, in his Handbook (1928), placed *B. furcata* in the genus *Sympetrum* and thus restored the name *Cannacria* for *herbida* and *gravida*, and in a later paper (Ent. News, 1930, li, p. 254) gave his reasons for so doing. The peculiar little character noted above⁶ in the anal area of the hind wing of the three species indicates, after all, a possible closer connection. This arching of the crossvein is not significant in itself—it might easily happen by the chance dropping out of a crossvein—but its constant presence in both wings of all the specimens I have examined (five of *furcata*, sixteen of *herbida*, and four of *gravida*), is, I think, significant. The unusual length of the anal appendages of the female is another peculiarity which these species have in common. The finding and rearing of the nymphs should help considerably in determining their true relationship.

Nymph.—In the Cornell University collection there is a partly grown nymph collected by Dr. M. D. Leonard, Río Piedras, April 4, and several collected by C. F. Baker in Cuba, which, if my other attributions are cor-

⁶ Present also in many genera of the Celithemini. In *Crocothemis* the arrangement is almost identical with that found here.

rect, must belong to this genus. I have, however, no other means of determining them; they are not fully grown and the venation of the wing pads is not developed. They are most easily recognized by the hairy body and the peculiar eyes (Pl. IV, Fig. 1.).

Length 14, hind femur 4.2; width of head 4.7, of abdomen 4.4. Body uniform reddish brown, very hairy. Head widest across the front of the eyes; hind angles rounded; hind margin convex. Eyes small and on the superior surface of the head; anterior margin of head with a long fringe of hairs beneath the antennæ. Labium reaching only to the fore coxæ; 5 lateral setæ; 3 mental setæ on the outer margin each side and 8-10 very short ones clustered each side of the median line. Rear of head hairy, the hair continuing up in distinct areas to the eyes; frons and vertex hairy. Prothorax with long tufts on the prominent lateral angles. Legs apparently held close to the body, short, stout and very hairy. Wing pads reaching to the 7th segment. No dorsal hooks, but with median tufts of short hairs. Lateral spines on 8-9 sharp, short, that of 9 slightly inturned. Appendages as long as 8 + 9 on the mid line; superiors shorter than the inferiors; laterals one-fourth shorter than the superiors.

Brachymesia herbida (Gundlach)

1867. *Libellula herbida* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292; nomen nudum.
 1875. *Libellula herbida* Hagen, *ibid.*, xviii, p. 74.
 1889. *Libellula herbida* Gundlach, Contrib. Cuba, p. 261.
 1889. *Cannacria batesi* Kirby, Trans. Zoo. Soc. London, xii, p. 341.
 1907. *Cannacria batesi* Calvert, B. C. A., p. 326.
 1910. *Brachymesia batesi* Muttkowski, Cat. Odon. N. Am., p. 169.
 1912. *Brachymesia batesi* Ris, Cat. Coll. Selys, xiv, p. 736.
 1916. *Brachymesia batesi* Kahl, Ann. Carn. Mus., x, p. 525.
 1919. *Brachymesia herbida* Calvert, Trans. Am. Ent. Soc., xlv, p. 365; on Gundlach.
 1931. *Brachymesia herbida* Dow, Proc. Biol. Soc. Wash., xlv, p. 59.

Synonym.—*fumipennis* Currie.

Diagnosis.—*Male.* Labium yellow; labrum pale orange with a narrow black front border; clypeus yellow; frons and vertex olivaceous, blackish in the depths of the suture between. Rear of eyes spotted with yellow. Prothorax dark brown, the rear margin with a long fringe of tawny hair. Synthorax yellow, turning to olivaceous; the crest black. Legs blackish, hairy, paler basally and on the inside of the first femora. Wings slightly suffused with yellowish especially between Sc and R and between the sectors of the arculus in the fore wing; in the hind wing deeper between Cu and A, over the triangle and supertriangle and extending slightly beyond

the latter. Abdomen yellow marked with black as follows: a pair of small anteapical transverse dashes on 2, one on either side of the middorsal line; a longitudinal band on the middorsal on 4-9, widening apically on each segment to 9 where it covers nearly the entire dorsum. Ten yellow except for a narrow basal line and a small middorsal band. Appendages olivaceous to blackish.

Female. Similar to the male. Wings with a varying amount of color but usually considerably more than in the male.

Remarks.—In some females, notably those from Jamaica, the wings are almost entirely golden brown, deeper in the anterior half between the triangle and nodus. All those from Porto Rico are more normal.

Size.—Abdomen, 31-33 mm., hind wing, 34-35 mm.

Type locality.—Cuba.

Distribution.—Central America to Brazil; *West Indies*: Cuba, Jamaica, Haiti, Barbados. *Porto Rico*: Arecibo, July 30-Aug. 1 (A. M. N. H.); Toa-Baja, April 15 (G. Garb, in C. U.); Dessengaño, Dec. 23 (C. U.); flying to lights in train, northern coast, Oct. 27 (Garcia-Diaz, in C. U.).

Erythemis Hagen

Type.—*peruviana* (Rambur).

Distribution.—Nearctic and Neotropical.

Diagnosis.—Wings long, rather broad. Fore wing: arculus between the 1st and 2nd antenodals, its sectors on a long stalk; antenodals 11-15, the last one incomplete; stigma large, surmounting 2 crossveins; triangle very slender, crossed, directed inward; subtriangle of 3 cells; discoidal field of 2-3 cell rows, widened at the margin; M_2 smoothly curved; apical sector rising under the basal third of the stigma; radial and median planates subtending one cell row; reverse vein distinct, moderately aslant; no extra bridge crossveins. Hind wing: triangle retracted almost to the arculus, without crossveins and with Cu_1 rising from its outer side; anal crossing distal to the origin of A_2 ; 3 cell rows between A_2 and the hind margin of the wing; anal loop large; gaff but little longer than the sole; sole pointing inward; a:b as 1:3. Head small, eye seam very short; frons swollen, rounded, with no frontal carina; fork quite deep; vertex high with its upper border undulate. Lobe of prothorax large, erect, fringed with long hairs; with a very small concavity in the middle. Legs stout; 3rd femora of male with 16-20 small spines and with 3-4 large ones at the distal end. Abdomen with the genitalia of the male small and the genital plate of the female erect.

Nymph.—The nymphs (Pl. IV, Fig. 4) of this genus are rather smooth, short and somewhat stocky, with short decurved appendages. The eyes are prominent and bulging. The mandibles with 3-4 teeth in the apical series and 2-3 in the proximal, with 1-2 intermediate deticles (Calvert '28). Abdomen widest across the 6th segment. Dorsal hooks wanting; on the transverse apical carina there are coarse hairs and on the apical ventral margin of the 9th segment a long brush of them. Lateral spines present on 9 only and then usually very small. Appendages decurved, the inferiors the most strongly.

KEY TO WEST INDIAN SPECIES

Adults (After Ris '11)

- 1. Discoidal field of the fore wing with two cell rows, except next to the triangle; discoidal field of the hind wing with at least one cell running through from M_4 to Cu_1*credula*
 Discoidal field of the fore wing with three cell rows; of the hind wing with no cells running through from M_4 to Cu_1 2
- 2. Abdomen slender; segment 4-6 as long as wide; basal segments swollen 3
 Abdomen stout; segment 4-6 twice or less than twice as long as wide.. 4
- 3. Darkish antehumeral stripe present.....*plebeja*
 No darkish antehumeral stripe present; abdomen bright red when mature[*hamatogaster*]
- 4. Base of hind wing hyaline.....[*simplicicollis*]
 Base of hind wing colored..... 5
- 5. Basal spot of hind wing reaching but half way to the cubito-anal cross-vein, and but a few cells beyond the membrangle.....[*peruviana*]
 Basal spot of hind wing reaching beyond the cubito-anal crossvein and extending to the hind margin of the wing..... 6
- 6. Thorax and abdomen red.....[*mithroides*]
 Thorax and abdomen brown or black, or with yellow markings..[*attala*]

Nymphs (After Calvert '28)

- 1. Lateral setæ 11; setæ of the anterior row of second and third segment of the mid-tarsus divided.....*credula* ?
 Lateral setæ 8; setæ of second and third segments of mid-tarsus simple 2
- 2. Lateral spine on 9 sharply decurved..... 3
 Lateral spines on 9 wanting or nearly straight.....[*simplicicollis*]
- 3. Lateral spine of 9 measuring .16-.30 mm.....*plebeja*
 Lateral spine of 9 measuring .45-.50 mm. 4
- 4. Total length 14.5-15 mu.....[*attala* ?]
 Total length .13-.13.5 mm.....[*peruviana* ?]

Erythemis credula (Hagen)

1861. *Diplax credula* Hagen, Syn. Neur. N. Am., pp. 184, 318.
 1907. *Erythemis credula* Calvert, B. C. A., p. 339.
 1911. *Erythemis credula* Ris, Cat. Coll. Seyls, xiii, p. 597.

Diagnosis.—*Male.* Labium yellow, brown in the middle; labrum black; clypeus and frons olivaceous, the latter with a greenish yellow band across the top. Thorax yellowish brown, indistinctly marked with dark brown and with pale greenish middorsal band bordered with brown. Legs black. Hind wing with a small yellowish basal spot reaching only to the cubito-anal crossvein and a little beyond the membranule. Abdominal segments 1-2 swollen, olivaceous; 3-7 with a diffuse middorsal longitudinal brown band and with black carinæ.

Female. Resembles the male, but paler in color. Middorsal band on abdominal segments 4-10. Genital plate very small.

Mature specimens become pruinose blue.

Size.—Abdomen, 24-28 mm., hind wing, 27-30 mm.

Distribution.—Brazil. *West Indies:* Barbados, Antigua. *St. Thomas:* (Hagen).

Nymph.—(Supposition. Calvert, Univ. Iowa Studies Nat. Hist., 1928, p. 34). Length 11.5-12.5, hind femur 4.3-4.8, width of abdomen 4.5-5.18, width of head 4.09-4.44. Proportionate length of antennal segments about as 2.6 : 3 : 7 : 4.4 : 4.5 : 6 : 6. Distal margin of the lateral lobes of the labium with 13 weak crenulations, the larger ones bearing 1-5 setæ and with 5-6 minute crenulations. Abdomen with pale yellowish middorsal longitudinal stripe on 6-9. Superior and inferior appendages of about the same length; laterals about one-third. Long marginal setæ on segments 8-9.

Erythemis plebeja (Burmeister)

(Pl. II, Fig. 9.)

1839. *Libellula plebeja* Burmeister, Handb. Ent., ii, p. 856.
 1861. *Lepthemis verbenata* Hagen, Syn. Neur. N. Am., pp. 162, 316.
 1875. *Lepthemis attala* pars Hagen, Proc. Boston Soc. Nat. Hist., xvii, p. 74.
 1889. *Lepthemis attala* Gundlach, Contrib. Cuba, p. 265.
 1899. *Lepthemis verbenata* Calvert, Proc. Calif. Acad. Sci. (3), i, p. 406.
 1907. *Erythemis verbenata* Calvert, B. C. A., p. 336.
 1911. *Erythemis verbenata* Wilson, Johns Hopkins Univ. Circ. 2, no. 232, p. 50.
 1911. *Erythemis plebeja* Ris, Cat. Coll. Selys, xiii, p. 604.
 1916. *Erythemis verbenata* Kahl, Ann. Carn. Mus., x, p. 525.
 1919. *Erythemis verbenata* Calvert, Trans. Am. Ent. Soc., xlv, p. 367.
 1931. *Erythemis verbenata* Dow, Proc. Biol. Soc. Washington., xlv, p. 59.

Diagnosis.—*Male.* Lower lip pale brown, darker on the sides. Upper lip brown with anterior border and median cross-band black. Clypeus brownish. Frons pale yellow with a black band across its anterior surface, vertex yellow. Dorsum of thorax pale olivaceous, the pale color contiguous with the brown antehumeral band. Sides olivaceous. Legs brown, darker on the insides, toward the knees, and on the tarsi. Abdominal

segments 1-3 brown; 4-7 with small basal rings and with the apical half black; 8 dark brown with lateral pale streaks; 9-10 dark brown. Appendages pale. Hind wing with brown basal spot reaching half way to the 1st antenodal and to, or a little beyond, the anal crossing, and two or three cells over the membranule.

Female. Colored like the male. Genital plate large, nearly as large as segment 9; erect.

Mature specimens are almost wholly black.

Size.—Abdomen, 35-36 mm.; hind wing, 32-36 mm.

Type locality.—South America.

Distribution.—Texas, Mexico to Paraguay. *West Indies:* Cuba, Jamaica, San Domingo, Haiti. *Porto Rico:* Ponce, July 20-22, and Arecibo, July 30-Aug. 1 (A. M. N. H.).

Nymph.—(Calvert, Univ. Iowa Studies Nat. Hist., 1928, xii, 2, p. 34.) Length 14.5-15. Lateral setae 8. Lateral spine on segment 9, 16-30 mm. long, and strongly decurved.

Lepthemis Hagen

Type.—*vesiculosa* Fabricius.

Distribution.—Neotropical.

Diagnosis.—Wings moderately long but narrow. Fore wing: arcus between the 1st and 2nd antenodals, its sectors on a long stalk; 14-16 antenodals, the last one incomplete; stigma large, surmounting 2 crossveins; triangle very narrow, directed inward, crossed; subtriangle of 3 cells; discoidal field of 3 cell rows, widened at the margin; vein M_2 rather smoothly curved; apical sector rising under the basal third of the stigma; radial planate subtending 2 cell rows; median planate subtending one; reverse vein moderately aslant; no extra bridge crossveins. Hind wing: triangle retracted to the arcus, without crossveins and with Cu_1 rising from its outer side; one cubito-anal, the anal crossing, placed opposite the base of A_2 ; 3 cell rows between A_2 and the hind margin of the wing; anal loop large, gaff longer than sole, sole pointing inward; a:b as 1:4. Head quite large, eye seam very short; frons greatly swollen, flattened in front and with a frontal carina, furrow deep; vertex high, divided into two lobes terminating in a little hooklet. Lobe of prothorax large, erect, fringed with long hair, with a slight concavity in the center. Legs very long and stout; 3rd femora with a row of about 32 very small, distally directed teeth, with 3-5 long spines at the distal end. Abdomen with basal segments greatly swollen and slightly compressed; constricted on segment 3; the rest long and slender.

Nymph.—See *L. vesiculosa*.

Lepthemis vesiculosa (Fabricius)

(Pl. II, Fig. 6.)

1775. *Libellula vesiculosa* Fabricius, Syst. Ent., p. 421.
 1857. *Libellula vesiculosa* Selys, in Sagra, Hist. Nat., p. 187.
 1861. *Lepthemis vesiculosa* Hagen, Syn. Neur. N. Am., p. 161.
 1867. *Lepthemis vesiculosa* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1867. *Lepthemis vesiculosa* Uhler, *ibid.*, p. 297.
 1875. *Lepthemis vesiculosa* Hagen, Proc. Boston Soc. Nat. Hist., xviii, p. 73.
 1888. *Lepthemis vesiculosa* Kolbe, Archiv für Naturg., liv, p. 168.
 1889. *Lepthemis vesiculosa* Gundlach, Contrib. Cuba, p. 264.
 1894. *Lepthemis vesiculosa* Kirby, Ann. Mag. Nat. Hist. (6), xiv, p. 268.
 1896. *Lepthemis vesiculosa* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 260.
 1907. *Lepthemis vesiculosa* Calvert, B. C. A., p. 339.
 1911. *Lepthemis vesiculosa* Ris, Cat. Coll. Selys, xiii, p. 607.
 1911. *Lepthemis vesiculosa* Wilson, Johns Hopkins Univ. Circ. (232), ii, p. 50.
 1916. *Lepthemis vesiculosa* Kahl, Ann. Carn. Mus., x, p. 525.
 1919. *Lepthemis vesiculosa* Calvert, Trans. Am. Ent. Soc., xlv, p. 366.
 1931. *Lepthemis vesiculosa* Dow, Proc. Biol. Soc. Wash., xlv, p. 59.

Diagnosis.—*Male.* Lips yellow; face, vertex and occiput clear, translucent green, the last covered with brownish hairs. Rear of eyes pale, with brown mottlings. Prothorax pale, greenish yellow, its fore and median lobes mottled with brown; rear lobe rather straight across the top, with a slight depression in the center, and with long, erect pale hairs, longer than the depth of the lobe. Synthorax light, bright green throughout, the lateral margins with very long pale hairs and the dorsum clothed with pale brownish hairs. The underneath parts tend to become brownish. Legs long, femora black on the anterior surface, and tibiæ and tarsi black. Tibiæ with 5-6 very strong, black spines. Wings hyaline with the merest touch of yellow at the extreme base of the fore wing, and a spot on the hind wing between Cu and A extending as far as the anal crossing, then tapering to the end of the membranule; membranule smoky brown. Abdomen large and swollen on segments 1-3, suddenly constricted on the base of 4, then parallel-sided. Color green, the dorsal and apical carinæ of segment 3 black, and a middorsal apical spot brownish; remainder marked as follows: the apical fifth of 4, half of 5-6, fifth of 7; all of 8-10, diffusely; a narrow band along the middorsal and lateral carinæ of 4-10, and the supplementary carinæ of 4; a lateral streak on 5-6, wider on 7 and fused laterally with the base which is narrowly black on all segments. Appendages white.

Size.—Abdomen, 38-43 mm., hind wing, 35-41 mm.

Type locality.—America.

Distribution.—Florida and Texas to Paraguay; *West Indies*: all the islands. *Porto Rico*: (Kolbe, Gundlach); large series from Mayagüez, Caguas, Ponce, Santurce (A. M. N. H.); series from Río Piedras, Coamo Springs, Fajardo, Las Cabezas, and flying to lights in train, northern coast (Garcia-Diaz). *St. Thomas*: (Hagen, 1861). March 1 (A. M. N. H.). *St. John*: March 9 (A. M. N. H.). *St. Croix*: (A. M. N. H.).

Nymph.—Length 18.5, hind femur 7, width of head 5.2, width of abdomen 6. Body stout and thick; rather smooth, except when young. Head widest across the front, but little narrowed behind the eyes. Eyes capping the antero-lateral angles, rather more frontal than lateral, though larger and more prominent than in the Libellulini group; their hind margins reaching scarcely beyond the middle of the head. Region of the ocelli paler, with a black spot at the anterior end of each lateral ocellus, continued diffusely to the base of the antennæ. Proportionate lengths of the antennal segments as 2 : 2 : 4 : 2.5 : 2.7 : 3.2 : 2. Rear of head with 8 paler bands continuing up from the rear to the paler area of the top of the head covered with bristles as they round the hind margin of the head. Labium with 15-16 mental setæ on each side, with a few scattered ones in the middle, the 6th to the 7th from the outside the longest. Lateral setæ 12 (occasionally 11) with several scattered small ones near the hinge of the lateral lobe. Distal margin of lateral lobe without crenulations, the setæ in about 12 tufts of 3-5 each. Prothoracic spiracles prominent and high. Wing pads reaching on to the 8th segment. Fore and middle femur with two indistinct brown bands, posterior surface and whole of tibiæ dotted with brown; tarsi with an apical ring. Legs hairy, 3rd pair with many small spines. All setæ of second and third segments of 1st and 2nd tarsi divided; 1st and 2nd tibiæ with divided setæ on the apex. Abdomen paler on the middorsum and with a dot on each segment, either side of the dorsum, and with a wide, basal pale spot and a narrow, apical black spot on the lateral margin. Anterior margin of the venter of the mesothorax, and lateral margins of the venter of the metathorax, blackish. Venter of abdomen spotted. Dorsal hooks wanting, but with medium dorsal tuft of long hair on the apex of 7-9. Lateral spines on segment 9 one-fourth the length of 9 or rudimentary, downcurved. Appendages, especially the inferior, downcurved; superior as long as the inferiors; laterals about one-half the inferiors (Pl. IV, Fig. 2.).

Reared by Professor Julio Garcia-Diaz, Río Piedras, April and May. Series collected by Professor Needham at Coamo Springs Reservoir and Coamo town, April 4; Damien, Haiti, April 3; and El Cano, Cuba, April 20.

MACROTHEMINI

(Pl. I, Fig. 3)

Anal loop usually rather long and well developed; its midrib bent strongly at the ankle at an angle of 50° or more. Antenodal crossveins variable but usually more than 10. Crossveins under the stigma fewer than 3. Hind femora of male with a row of small, fine saw-like teeth.

KEY TO WEST INDIAN GENERA

Adults

- | | |
|---|-------------------------|
| 1. Discoidal field of the fore wing of two cell rows; radial planate subtending one cell row..... | 2 |
| Discoidal field of the fore wing of three cell rows; radial planate subtending two cell rows..... | 3 |
| 2. Fore wing triangle crossed; subtriangle usually of three cells..... | |
| | [<i>Brechmorhoga</i>] |
| Forewing triangle open; subtriangle usually of two cells.. | <i>Macrothemis</i> |
| 3. Spines of the 3rd femora of the male directed distally; M_2 distinctly undulate | <i>Dythemis</i> |
| Spines of the 3rd femora of the male directed proximally; M_2 only slightly undulate; abdomen clubbed, especially in the male.. | <i>Scapanea</i> |

Macrothemis Hagen

Type.—*celeno* (Selys).

Distribution.—Neotropical.

Diagnosis.—Wings broad; nodus considerably nearer the apex than the base. Fore wing: position of the arculus variable, often between the 2nd and 3rd antenodals, or under the 2nd, its sectors stalked; antenodals 11-16, the last one incomplete; stigma short, surmounting 2 crossveins; triangle directed inwards, without crossveins and with 2 cell rows in the discoidal field; subtriangle of 2 cells; M_2 smoothly curved; apical sector rising under the basal third of the stigma; radial planate subtending one cell row; median planate not differentiated; reverse vein present; no extra bridge crossveins. Hind wing: about 8 antenodals; triangle retracted to or beyond the arculus, without crossveins, and with Cu_1 rising from its hind angle; anal crossing opposite the origin of A_2 ; 3 cell rows behind A_2 ; anal loop long with midrib sharply bent at the ankle and sole line directed inwards a: b as 1:3 or 4. Frons rounded with no frontal carinae; furrow broad, quite deep; vertex slightly arched. Rear margin of prothorax in a low arc. Legs variable; 3rd femora of male with a row of many 3-4 angled teeth directed proximally. Abdomen variable, usually slender, and in the male with a slight widening on the basal segments and on 7-9. Genital plate of the female not distinct; 9th ventral plate keeled

in the basal third, with 2 short hooklets, the apical part deeply keeled, bent ventrally and surpassing the 10th segment.

Nymph.—See *M. celeno*.

Macrothemis celeno (Selys)

(Pl. II, Fig. 22)

1857. *Libellula celeno* Selys, in Sagra, Hist. Nat., vii, p. 192.
 1861. *Dythemis pleurosticta* Hagen, Syn. Neur. N. Am., p. 165.
 1866. *Dythemis pleurosticta* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 194.
 1867. *Dythemis pleurosticta* Hagen, Stett. Ent. Ztg., xxviii, p. 98.
 1867. *Dythemis pleurosticta* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1867. *Dythemis pleurosticta* Uhler, *ibid.*, xi, p. 294.
 1868. *Macrothemis celeno* Hagen, Stett. Ent. Ztg., xxix, p. 283.
 1873. *Dythemis pleurosticta* Hagen, Proc. Boston Soc. Nat. Hist., xv, p. 375.
 1888. *Macrothemis celeno* Kolbe, Archiv für Naturg., liv, p. 168.
 1889. *Macrothemis celeno* Gundlach, Contrib. Cuba, p. 273.
 1896. *Macrothemis celeno* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
 1898. *Macrothemis celeno* Calvert, Proc. Boston Soc. Nat. Hist., xxviii, p. 325.
 1911. *Macrothemis celeno* Wilson, Johns Hopkins Univ. Circ. 2, no. 232, p. 50.
 1913. *Macrothemis celeno* Ris, Cat. Coll. Selys, xv, p. 879.
 1916. *Macrothemis celeno* Kahl, Ann. Carn. Mus., x, p. 526.
 1919. *Macrothemis celeno* Calvert, Trans. Am. Ent. Soc., xlv, p. 370.
 1931. *Macrothemis celeno* Dow, Proc. Biol. Soc. Wash., xlv, p. 57.

Diagnosis.—*Male*. Face variable. Labrum usually black with two basal pale spots which are sometimes confluent; anteclypeus pale brown, rarely black; postclypeus white, or greenish brown, sometimes with lateral pale spots. Frons brilliant metallic greenish blue with a broad white stripe across the base. Vertex metallic; occiput dark brown, paler in the center. Thorax dark brown, marked with pale greenish as follows: a pair of opposed 7-marks, the cross pieces of which are about as wide as the stem and do not reach the carina; on the sides a large oval spot between the humeral and the 2nd suture below, another larger one on the third suture above the spiracle, expanded anteriorly; and on the metepimeron a constricted one above and an oval one below. A small spot is sometimes discernible beneath the spiracle. First pair of legs brown, second and third black; all paler basally. Wings hyaline with usually a small golden brown fleck at the base of the hind pair. Subtriangle rarely of 3 cells. Antenodals 12-15. Abdomen slender, brown, marked with yellow as follows: a small basal pair of dorsal spots on one; these spots larger on 2-3 and divided by the middorsal carina; reduced on 4-7; larger on 8; very small on 9 and indistinct on 10. Sides of 2-9 with a pair of pale spots which are sometimes obscured. Appendages brown.

Female. Like the male. Apex of the fore wing brownish.

Remarks.—In specimens from St. Croix, St. Thomas and St. John the pale spots on the base of the labrum are so large and confluent as to cover all but the front border. Most of the Porto Rican specimens have the postclypeus wholly white. The basal golden spot of the hind wings extends in some of the Cuban specimens as far as the anal crossing. The extent of the brown on the apices of the fore wings of the female reaches a maximum in the Porto Rican females, in which it is sometimes as far as half way from the stigma to the nodus.

Size.—Abdomen, 30-32 mm., hind wing, 30-32 mm.

Type locality.—Cuba.

Distribution.—Greater Antilles and Virgin Islands. *Porto Rico:* (Kolbe); Juana Diaz, Feb. 11; Maneyes, Feb. 19; Caguas, May 28; Cayey, May 30; Barros, June 4; Ensenada, June 14-19; Adjuntas, June 8-13; Tallaboa, near Ponce, July 23; Aibonito, July 13; Coamo Springs, Dec. 28 (A. M. N. H.). Coamo Springs Reservoir, April 4 (Needham in C. U.). *St. Thomas:* (Hagen 1868, Calvert 1898, Ris 1913); Feb. 28 (A. M. N. H.). *St. John:* March 4-9 (A. M. N. H.). *St. Croix:* Christiansted, June 4; April 2-6 (A. M. N. H.).

Nymph.—(Supposition) There are nymphs in the C. U. collection, taken by Professor Needham in El Cano, Cuba, on the 30th of April, in Camagüey, Cuba, on the 18th, in Damien, Haiti, on the 3rd, and in Coamo Springs, P. R., on the 4th, and one from Las Cruces collected on the same day. I believe them to be of this species, for the venation of the Las Cruces specimen shows all the characteristics of this genus.

Total length 14.5, hind femur 4, width of head 4.6, width of antennæ 5.6. Head marked with brown and yellow; antennæ ringed with black and with black tip. Labium reaching to rear of middle coxæ, marked with brown spots; lateral setæ 6; mental setæ 8; crenulations of distal margin of lateral lobe rather deep, 8 in number, and each bearing usually 3 setæ, one of which is very long. Prothorax pale with a median band of brown, forking at the beginning of the pronotum to form two bands, one on either side of the dorsum. Mesothoracic spiracle black. Legs conspicuously banded with brown; hind femora reaching not quite to the end of segment 6; all tibiæ and the third tarsus with about one divided seta. Abdomen depressed, widest on segment 6; dorsal hooks on 3-9, small, decreasing in size posteriorly, on 9 minute; lateral spines on 8-9 short. Color mottled brown with two rows of small black dots on segments 1-8, a pair just beyond the middle of each segment, as far apart as the innermost one is from the mid-line. Lateral spines on 8-9, on 8 about one-

third the segment length, on 9 reaching just beyond the lateral, terminal appendages. Appendages shorter than segments 8-9; superiors almost as long as the laterals. Appendages and spines black tipped. Venter of abdomen with a basal and subapical pale spot on each side beyond the lateral impressions of the segments 2-8; a pair of black dashes, one on each side of the middle of 2-7; an apical marginal pale spot on 2-9. (Pl. III, Fig. 2; Pl. V, Fig. 8.)

Dythemis Hagen

Type.—*rufinervis* Burmeister.

Distribution.—Nearctic and Neotropic.

Diagnosis.—Wings long. Fore wing: arculus at the 2nd antenodal or more distal, its sectors stalked; antenodals 11-19; the last one incomplete; stigma large, surmounting 3 crossveins; triangle directed inward, crossed, with 3 cell rows in the discoidal field and with Cu_1 rising from the hind angle; subtriangle of 3 cells; M_2 undulate; radial planate subtending, usually, 2 cell rows; median planate rather poorly developed at times; reverse vein present; no extra bridge crossveins. Hind wing: about 11 antenodals; triangle retracted to the arculus, without crossveins, and with Cu_1 rising from its hind angle; anal crossing opposite origin of A_2 ; 3-5 cell rows between A_2 and the wing margin; anal loop with mid-rib bent sharply at ankle and sole line pointing in; $a : b$ as 1 : 2 or 1 : 3. Frons rather small, slightly rounded, with no frontal carina; furrow deep; vertex a little rounded. Rear margin of the prothorax small, slightly erect, in a low arch with a slight depression in the center. Legs long; 3rd femora with a row of many small teeth directed distally with several long spines at the end. Abdomen variable. Genital plate of the female scarcely discernible; 9th ventral plate keeled, with 2 very small hooklets.

Nymph.—Professor Needham (1904, Proc. U. S. Nat. Mus., xxvii, p. 699) has described two species of this genus: *D. velox* and *D. fugax*. They are smooth-bodied with depressed head and abdomen. Head sloping forward to the antennæ; strongly narrowed behind the eyes to the nearly straight hind margins. Labium large, reaching to the middle of the mesothorax; crenulations of the distal margin of the lateral lobe more or less obsolete. Dorsal hooks on 3-9 in a regular even series, thin, flat and sharp; that of 9 bent downward at tip. Lateral spines on 8-9, thin and flat. Appendages slightly longer than segment 9; laterals a little longer than half the length of the others.

KEY TO WEST INDIAN SPECIES

Adults

1. Venation red; abdomen red; hind wing with 4-5 cell rows between A_2 and the border *rufinervis*
 Venation black; abdomen black; hind wing with 3-4 cells between A_2 and the border [*velox*]

Dythemis rufinervis (Burmeister)

(Pl. II, Fig. 21)

1839. *Libellula rufinervis* Burmeister, Handb. Ent., ii, p. 850.
 1842. *Libellula conjuncta* Rambur, Ins. Neur., p. 91.
 1857. *Libellula rufinervis* Selys, in Sagra, Hist. Nat., vii, p. 187.
 1857. *Libellula conjuncta* Selys, in Sagra, ibid, p. 187.
 1861. *Dythemis rufinervis* Hagen, Syn. Neur. N. Am., p. 162.
 1866. *Libellula vinosa* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 192.
 1867. *Dythemis rufinervis* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1867. *Dythemis rufinervis* Hagen, Stett. Ent. Ztg., xxviii, pp. 98, 99.
 1867. *Dythemis rufinervis* Uhler, Proc. Boston Soc. Nat. Hist., xi, p. 297.
 1873. *Dythemis rufinervis* Hagen, Proc. Boston Soc. Nat. Hist., xv, p. 374.
 1875. *Dythemis rufinervis* Hagen, ibid, xviii, p. 74.
 1888. *Dythemis rufinervis* Kolbe, Archiv für Naturg., liv, p. 168.
 1889. *Dythemis rufinervis* Gundlach, Contrib. Cuba, p. 266.
 1895. *Dythemis rufinervis* Calvert, Proc. Calif. Acad. Sci. (2), iv, p. 523.
 1896. *Dythemis rufinervis* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
 1898. *Dythemis rufinervis* Calvert, Proc. Boston Soc. Nat. Hist., xxviii, p. 310.
 1898. *Dythemis rufinervis* Calvert, Trans. Am. Ent. Soc., xxv, p. 67.
 1911. *Dythemis rufinervis* Wilson, Johns Hopkins Univ. Circ. 2, no. 232, p. 50.
 1912. *Dythemis rufinervis* Ris, Cat. Coll. Selys, xiv, p. 840.
 1916. *Dythemis rufinervis* Kahl, Ann. Carn. Mus., x, p. 525.
 1919. *Dythemis rufinervis* Calvert, Trans. Am. Ent. Soc., xlv, p. 368.
 1931. *Dythemis rufinervis* Dow, Proc. Biol. Soc. Wash., xliv, p. 58.

Diagnosis.—*Male.* Face, frons and vertex yellow to reddish; labium with median lobe and mesal margins of lateral lobes black; corners of labrum black; frons clothed with long black hairs. Prothorax dark brownish with a median dorsal pale band. Front of synthorax clothed with long pale hairs; color yellowish, marked with metallic red brown bands as follows: a pair on the dorsum separated by the pale middorsal carina; an antehumeral band more or less parallel-sided, slightly narrowed and abbreviated above; a wide band, the sinuate front border of which is margined by the humeral suture; a short midlateral one not reaching the wing sinus above, and extending down only to the spiracle; and a third lateral stripe lying behind the 3rd lateral suture, widened and forked above to include a yellow spot, and continued below, across the metin-

fraepisternum onto the hind coxa. Legs beyond the trochanters black; inside of 1st femora paler. Wings with a faint yellowish or golden tinge; veined with red. The basal yellow spot of the fore wing reaching to the 1st antenodal and extending to the anal border, with a dark streak between Sc and R reaching two-thirds of the way to the 1st antenodal. The full width golden spot of the hind wing reaches the 2nd antenodal and into the triangle, with the dark streak filling the space between Sc and R to the 2nd antenodal, and the space between C and A to half-way between the anal crossing and the triangle. Membranule pearly gray. Abdomen reddish yellow with black band on the sides of 8-10, and the middorsal carinae black. There is also a blackish brown band on the sides of the basal segments as far as the median transverse carina of 3; on ♀ this is confluent, by means of a streak on the transverse carina with a spot just above the hamules.

Female. Labrum and labium yellow, with the median lobe of the latter black; face, frons and vertex olivaceous. Old specimens become dark reddish brown with two complete yellow bands on the sides, one on the 2nd suture and the other in the posterior border on the metepimeron.

Size.—Abdomen, 25-30 mm., hind wings, 29-33 mm.

Type locality.—St. Domingo.

Distribution.—*West Indies:* all islands south to St. Croix and St. John. *Porto Rico:* Cayez, May 30-31; Mameyes, Feb. 19; Aibonito, June 1-3; San Juan, July 1-3; Coamo Springs, July 11-19 (A. M. N. H.). Juan Mendez Creek, east of Univ. Farm, Río Piedras, April 1 (Garcia-Diaz); Río Piedras, April 1 (Forbes). *St. John:* (Hagen, 1867) March 7-9 (A. M. N. H.). *St. Croix:* April 6 (A. M. N. H.).

Nymph.—(Supposition) Total length 15.5; or hind femur 4.5; width of head 4.5; of abdomen 6. Head large; labium reaching to middle of mesothorax, spotted on its ventral surface; mental setae 10; lateral setae 7; crenulations of the distal margin of the lateral lobes shallow, 9 in number, each bearing 4 spines. Antennae ringed with black. Prothorax with a brown band on either side of the middorsum and another one on each side extending across the meso- and metathorax. Tibiae and tarsi, except the 1st tarsus, with divided setae. Abdomen brownish with a row of pale spots on each side of the middorsum of 4-9, each spot margined with black on the posterior margin; lateral margins mottled. Wing pads reaching to segment 7. Venter with a small black dash on either side of the mid-line on 1-7, paler around them; pale areas on the outer sides of the lateral depressions, followed by a darker region on each margin. Dorsal hooks sharp and slender on segments 3-9, decreasing in size pos-

teriorly, small on 9. Lateral spines on 8-9, short, on 9 slightly incurved. Superior appendage shorter than inferiors; lateral ones three-fourths of the superior. (Pl. V, Fig. 7.)

In the C. U. collection there are two nymphs of this species from Las Cruces and several from Coamo Springs collected by Professor Needham on the 4th of April, and others collected in Camaguey, April 18. They differ from the other described species of this genus in having shorter spines and hooks and in having only 7 lateral setæ instead of 9-10, but the venation leads me to attribute them to this genus.

Scapanea Kirby

(Pl. I, Fig. 3.)

Type.—*frontalis* Burmeister.

Distribution.—West Indies.

Diagnosis.—Wings long and of moderate breadth. Fore wing: arculus usually between the 2nd and the 3rd antenodal, occasionally between the 1st and 2nd, its sectors stalked; antenodals 15-16, the last one incomplete; stigma small, surmounting 2-3 crossveins; triangle crossed, directed inwards, with 3 cell rows in the discoidal field; discoidal field narrowed at the border; Cu_1 rising from the hind angle of the triangle; subtriangle of 3 cells; vein M_2 undulate; apical planate rising under the median third of the stigma; radial planate subtending 2 cell rows; median planate subtending 1 cell row; reverse vein discernible; no extra bridge crossveins. Hind wing: about 11 antenodals; triangle retracted to or beyond the arculus, of one cell only, and with Cu_1 rising from its hind angle; anal crossing opposite the origin of A_2 ; 3 cell rows between A_2 and the wing margin; anal loop rather large with its midrib bent sharply at the ankle and the sole line pointing in; a:b as 1:3. Frons rounded, with no frontal carina; furrow quite deep; vertex rather small and truncate; face and frons very hairy. Rear margin of the prothorax small, low, with a shallow depression in the center. Legs long, stout; 3rd femora with 10-12 triangular teeth directed proximally, with a long spine on the end. Abdomen slightly wider on the basal segments; segment 4-6 slender and cylindrical; 7-9 widened to form a flat oval club.

Nymph.—See *S. frontalis*.

Scapanea frontalis (Burmeister)

(Pl. II, Fig. 23.)

1839. *Libellula frontalis* Burmeister, Handb. Ent., p. 857.

1857. *Libellula frontalis* Selys, in Sagra, Hist. Nat., vii, p. 191.

1861. *Libellula frontalis* Hagen, Syn. Neur. N. Am., p. 154.

1866. *Libellula frontalis* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 193.
1867. *Libellula frontalis* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
1867. *Libellula frontalis* Uhler, *ibid.*, xi, p. 298.
1889. *Dythemis frontalis* Gundlach, Contrib. Cuba, p. 267.
1911. *Scapanca frontalis* Wilson, Journ. Inst. Jamaica, ii, 3, p. 50.
1913. *Scapanca frontalis* Ris, Cat. Coll. Selys, xv, p. 848.
1919. *Scapanca frontalis* Calvert, Trans. Am. Ent. Soc., xlv, p. 368.
1931. *Scapanca frontalis* Dow, Proc. Biol. Soc. Wash., xlv, p. 58.

Diagnosis.—*Male.* Labium black; clypeus white; frons metallic blue fading to pale brown on the fronto-clypeal suture and to yellow on the sides before the eyes. Vertex bifid; metallic blue. Occipital triangle black. Thorax brown, hairy, marked with greenish yellow as follows: a pair of opposed 7 marks which approach but do not reach the middorsal carina; a stripe on the mesepimeron, separated from a spot above; a narrower sinuate stripe on the metepisternum separate from a spot above; and on the metepimeron a wider strip expanded superiorly, the rear portion of this expansion sometimes constricted or entirely cut off. Legs black except the 1st femora, which are yellow externally. Wings hyaline. Abdomen slender, cylindric as far as 7, where the last four segments become suddenly widened and depressed, nearly oval in outline. Color dark brown to black, marked with greenish as follows: a pair of dorsal spots on 1, larger on 2 and divided by the carina on 2-3, seldom visible on 4-6, but when present appearing as a pair of narrow longitudinal stripes, one on each side of the middorsal carina and divided by the supplementary transverse carina, shorter on 6, distinct again on 7 but small, slightly larger on 8; 7 and 8 with suggestions of paler areas on the sides of the expansion. Sides of 1-3 variously spotted, 4-6 with narrow basal rings. Appendages black. Accessory appendages and genital lobe of 2nd segment lighter.

Female. Color lighter. All femora paler basally. Abdomen slightly more robust and with the apical expansion less noticeable. Wings each with a golden basal fleck, which in the fore wing reaches nearly to the arculus. Sometimes the entire wing membrane is suffused with brownish.

Remarks.—The males which I have seen from Cuba and Jamaica show an opalescent band across each wing just before the stigma. Dr. Ris ('09) has likewise noted it in his Cuban male. It is present in none of the Porto Rican or Haitian specimens which I have seen. It may be that we have two races.

Wilson (1911) found this species in Jamaica: "Common along the rivers in the Blue Mountains, even at considerable elevation (4500) above the sea; also found along the dead water at sea level."

Size.—Abdomen, 31-33 mm., hind wing, 32-35 mm.

Type locality.—San Domingo.

Distribution.—*West Indies*: Cuba, Jamaica, Haiti. *Porto Rico*: Caguas, May 28-29; Cayey, May 30-31; Adjuntas, June 8-29; Aibonito, June 1-3; Mayagüez, June 21-28 (A. M. N. H.).

Nymph.—(Supposition.) I have a rather large number of nymphs collected by Professor Needham in a creek near Port-au-Spain, Trinidad, which I believe to be this species, although *Scapanea* has never been reported from there and no nymphs resembling these were collected in regions where *Scapanea* adults were flying. It resembles *Dythemis* and *Macrothemis* in the general form of dorsal hooks, lateral spines and terminal appendages, but differs strongly from them in the stoutness of the body; the head is not narrowed behind the eyes and the prothorax is wide and deep. One nearly full-grown nymph shows the venation clearly: the anal loop is elongate and strongly bent at the ankle; antenodals 14-15 in the fore wing and 11 in the hind; postnodals 12 in the fore wing; triangle elongate, bent inward, crossed once; subtriangle of 3 cells; rows in the discoidal field 3; the area slightly narrowed toward the margin; M_2 slightly undulate; radial planate subtending two cell rows; median planate subtending one.

Total length 26.3; hind femur 4; width of abdomen 6.1; of head 5.3. This is a stout-bodied clean nymph with a conspicuous color pattern. Head large, not narrowed behind the eyes; hind margin slightly concave. Eyes large, their outer hind angles reaching to two-thirds the distance from the antennæ to the rear of the head; the inner hind angle to one-half the same distance. Labium reaching to the middle of the hind coxæ. Median lobe of mentum prominent, with 9 setæ; lateral lobes with 7 lateral setæ; 8 deep crenulations on the distal margin, each bearing 3-4 spinules; movable hook short. Antennæ short; proportionate lengths of segments as .9 : 1.3 : 2 : 1 : 1.2 : 1 : 1. Prothorax covered more or less uniformly with minute brown dots, and a transverse elongate spot across the fore border on the mid line. Thorax spotted and mottled. Femora thrice banded and tibiæ twice; tarsi with the apex of each segment brown, the brown on the 3rd segment covering one-half of its length; claws long, brown tipped; setæ of tibiæ and tarsi few, stout and not divided. Wing pads reaching to segment 7; hind femur reaching to segment 6. Abdomen spotted and blotched with brown as in figure (Pl. III, Fig. 3). Dorsal hooks on 2-9, largest on 5-6; all rising from a ridge on the elevated median line of the abdomen. Lateral spines on 8-9 short, about one-fourth of the

segment length. Superior appendage a little shorter than the inferiors; laterals equal to one-third of the superior. (Pl. III, Fig. 3; Pl. V, Fig. 6.)

TRAMEINI

(Pl. I, Fig. 5.)

This tribe includes some of our largest and strongest-flying dragonflies. They are extremely specialized in the expansion of the anal angle of the hind wing and the narrowing of the apex. The strengthening of the sectors is accompanied by a marked reduction in venation. The stigma is small, with sides converging anteriorly, thereby becoming trapezoidal in shape. The base of vein A_2 is straight for some distance and the patella may include 2 or more cells.

Three of the four genera reported from the West Indies are cosmopolitan: *Tramea*, a large genus known the world over; *Tholymis*, an equatorial genus of 2 species, one from the New World and one from the Old; *Pantala* with two species, one of which is itself circum-equatorial; *Tauriphila*, more restricted and known only from the New World tropics.

KEY TO WEST INDIA GENERA

Adults

- 1. Vein M_2 sharply bent in a double curve..... 2
 Vein M_2 smoothly curved or with a slight double curve..... 3
- 2. Fore wing: cells in row surrounding subtriangle 1-2..... [*Tauriphila*]
 Fore wing: cells in row surrounding subtriangle 1-4..... *Tramea*
- 3. Hind wing with only one cubito-anal crossvein..... [*Tholymis*]
 Hind wing with more than one cubito-anal..... *Pantala*

Nymphs ⁷

- 1. Crenulations of lateral lobe of labium shallow..... *Tramea*
 Crenulations higher than wide..... *Pantala*

Tramea Hagen

Type.—*carolina* (Linnaeus).

Distribution.—Cosmopolitan.

Diagnosis.—Wings long and broad, the hind wing with a basal brown spot. Fore wing: arculus between the 1st and 2nd antenodals, its sectors stalked; antenodals 11-12, the last one incomplete and the 1st and 2nd more widely separated; stigma surmounting two crossveins; triangle pointing inward, elongate, usually with two crossveins; Cu_1 rising from its hind angle; discoidal field with 4 cell rows, this area widening toward the margin; subtriangle of many cells, its proximal border usually indistinct; apical sector rising from under the basal third of the stigma;

⁷ Fraser, (1919, Rec. Ind. Mus., xvi, p. 460.) has described the nymph of *Tholymis tilarga* from India.

radial planate subtending 2 cell rows and then bent forward to join Rs; M_2 straight, then curved down to the margin; median planate with its origin indistinct, subtending 2 cell rows and then bent forward to join M_4 ; reverse vein moderate; no extra bridge crossveins. Hind wing: antenodals 7; triangle retracted to the arculus, without crossveins; Cu_1 rising from the hind angle; one cubito-anal crossvein; anal crossing opposite the origin of A_2 ; toe of anal loop very long; a : b as 1 : 3-4; patella long and well developed, usually of two cells.

Frons broad, rounded, usually with a distinct frontal carina; vertex large, posterior lobe of the prothorax small, rounded, slightly erect. Legs long and slender; 2nd and 3rd femora with many fine spines; tibial spines long and slender. Abdomen long, its base slightly widened. Anal appendages long; 8th sternite of the female with an elongate genital plate.

Nymph.—Smooth-bodied with large head and exceedingly prominent eyes and immense labium. Eyes more lateral than frontal. Mandibles with 4 teeth in each of the two groups and denticle on the posterior margin (Calvert, 1928). Divided setæ present on all tibæ and tarsi except the 3rd tarsal segment on the 3rd leg. Abdomen depressed; without dorsal hooks. Lateral spines on 8-9, long; that of 8 longer than that of 9 and extending beyond the caudal margin of segment 9. Superior appendage suddenly contracted beyond the basal third.

KEY TO WEST INDIAN SPECIES

Adults

- | | | |
|--|----------------------------|---|
| 1. Thorax with two broad lateral pale bands..... | [<i>cophysa</i>] | |
| Thorax with no broad lateral pale bands..... | | 2 |
| 2. Basal spot of hind wing not reaching to the triangle..... | | 3 |
| Basal spot of hind wing reaching to or beyond the triangle..... | <i>onusta</i> ⁸ | |
| 3. Frons of adult male metallic, of female with a broad basal black band | <i>binotata</i> | |
| Frons of adult male and female red..... | <i>abdominalis</i> | |

Nymphs⁹

- | | | |
|---|--------------------|---|
| 1. Lateral setæ 9; crenulations on lateral lobe 11..... | [<i>cophysa</i>] | |
| Lateral setæ 10-11..... | | 2 |
| 2. Lateral setæ 10; crenulations 13; superior appendage as long as the laterals | <i>abdominalis</i> | |
| Lateral setæ 11; superior appendage shorter than the laterals.. | <i>onusta</i> | |

⁸ Distinguished from *lacerata* by having the basal spot of the hind wing brown instead of black, and from *carolina* in having the hamule of the male higher than the genital lobe instead of equal to it. These two species, *lacerata* and *carolina*, have not been reported from the West Indies, though both are present in Florida.

⁹ From Calvert ('28). Dr. Calvert has shown, however, that it is quite impossible to distinguish the species of this genus.

Tramea onusta Hagen

1857. *Libellula carolina* Selys, in Sagra, Hist. Nat., vii, p. 185; pars.
 1861. *Tramea carolina* Hagen, Syn. Neur. N. Am., p. 144.
 1867. *Tramea onusta* Hagen, Stett. Ent. Ztg., xxviii, p. 222.
 1867. *Tramea onusta* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1875. *Tramea onusta* Hagen, *ibid.*, xviii, p. 65.
 1906. *Tramea onusta* Calvert, B. C. A., p. 305.
 1913. *Tramea onusta* Ris, Cat. Coll. Selys, xvi, p. 996.

Diagnosis.—*Male.* Lips and face yellow; labrum with a median black spot on the anterior margin. Top of frons reddish with a brown basal band. Vertex brownish, paler across the top. Thorax olivaceous. Legs dark brown, paler basally. Fore wing with 12 antenodals. Hind wing with basal brown spot reaching to or beyond the 2nd antenodal, to the distal end of the triangle, but between Cu_1 and Cu_2 extending two cells farther and in A_2 to the midrib back to within a cell of the margin of the wing. On the anal angle back of the membranule a hyaline spot which is as wide or wider than the brown beside it. The space between R and the upper sector of the arculus also hyaline. One row of cells between Cu_1 and Cu_2 in the hind wing. Abdomen yellow; 8-10 with a middorsal black spot; lateral margins of 5-10 brownish beneath. Superior appendages pale, darker apically; inferiors brown with a yellow streak on top.

Female. Like the male.

Remarks.—I have seen no specimens from the West Indies. Dr. Ris (1913) has noted a specimen from St. Thomas, which has the basal spot of the hind wing reaching to the 3rd antenodal and one to one and a half cells beyond the triangle.

Size.—Abdomen, 29-31 mm., hind wing, 36-38 mm.

Type locality.—Cuba.

Distribution.—South and mid-west. U. S. to Panama. *West Indies:* Cuba, Guadeloupe. *St. Thomas:* (Hagen 1861, 1875, Ris). *St. John:* March 4-10 (L. B. Woodruff, in A. M. N. H.).

Nymph.—(Byers, 1927, Journ. N. Y. Ent. Soc., xxxv, p. 72). Length 24, length of abdomen 15; width of abdomen 9, of head 8. Fourth segment of antennæ two-thirds as long as the third. Lateral setæ 11; mental setæ 14-16, the sixth the longest. Superior abdominal appendage one-sixth shorter than inferiors; laterals one-third shorter than superior and one-fifth shorter than inferiors.

Tramea abdominalis Rambur

1839. *Libellula basalis* Burmeister, Handb. Ent., ii, p. 852.
 1842. *Libellula abdominalis* Rambur, Ins. Neur., p. 37.

1857. *Libellula basalis* Selys, in Sagra, Hist. Nat., vii, p. 185.
 1861. *Tramea abdominalis* Hagen, Syn. Neur. N. Am., p. 145.
 1866. *Tramea insularis* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 191: (pars. female.)
 1867. *Tramea abdominalis* Hagen, Stett. Ent. Ztg., xxviii, p. 223; pars.
 1867. *Tramea abdominalis* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 292.
 1875. *Tramea abdominalis* Hagen, *ibid.*, xviii, p. 65.
 1888. *Tramea abdominalis* Kolbe, Archiv für Naturg., liv, p. 167.
 1894. *Tramea abdominalis* Kirby, Ann. Mag. Nat. Hist. (6), xiv, p. 262.
 1896. *Tramea abdominalis* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 259.
 1897. *Tramea abdominalis* Kirby, Ann. Mag. Nat. Hist. (6), xix, p. 599.
 1906. *Tramea abdominalis* Calvert, B. C. A., pp. 300, 304.
 1911. *Tramea abdominalis* Wilson, Johns Hopkins Univ. Circ., ii, p. 50.
 1913. *Tramea abdominalis* Ris, Cat. Coll. Selys, xvi, p. 994.

Diagnosis.—*Male.* Labium yellow; labrum orange with a line of black on the middle of the anterior margin. Face red, yellowish on the sides. Frons and vertex deep red. Thorax golden brown. Legs brown, paler basally. Hind wing with a basal brown spot reaching to or a little beyond the anal crossing and back along A_2 to the rear margin. Just below the membranule on the anal margin is a narrow paler area. Antenodals 12-15; radial planate subtending 2 cell rows. Abdomen red with a mid-dorsal black spot on 8-10. Appendages brown, as long as $9 + 10$; red basally.

Female. Body olivaceous to brown. Genital plate as long as segment 9; divided into two oval lobes which are closely approximated.

Size.—Abdomen, 30-32 mm., hind wing, 38-42 mm.

Type locality.—Brazil.

Distribution.—Tenn. to Florida. *West Indies:* generally. *Porto Rico:* (Kolbe). Desengaño, Dec. 23 (Cornell University). Ensenada, Feb. 12 (L. B. Woodruff, in A. M. N. H.). Manatí, June 27-29 (Lutz and Mutchler, in A. M. N. H.). San Juan, July 10 (F. E. Watson, in A. M. N. H.). Coamo Springs, July 17-19 (F. E. Watson, in A. M. N. H.). Aibonito, July 14 (A. M. N. H.). *St. Thomas:* (Ris). Feb. 26 (Lewis B. Woodruff, in A. M. N. H.). *St. Croix:* March 25, Fredericksted, (C. U.). Feb. 27 (F. E. Lutz, in A. M. N. H.). April 6 and 10 (L. B. Woodruff, in A. M. N. H.).

Nymph.—(Cabot, 1890, Mem. M. C. Z., iii, p. 45, Colo. Univ., Iowa Studies, 1928, xii, p. 26). Differs from the preceding species by the characters in the key.

***Tramea binotata* (Rambur)**

1842. *Libellula binotata* Rambur, Ins. Neur., p. 36.
 1861. *Tramea insularis* Hagen, Syn. Neur. N. Am., p. 146.

1866. *Tramea insularis* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 191.
 1867. *Tramea insularis* Scudder, *ibid.*, xi, p. 299.
 1867. *Tramea insularis* Uhler, *ibid.*, xi, p. 296.
 1867. *Tramea insularis* Hagen, Stett. Ent. Ztg., xxviii, pp. 98, 224.
 1875. *Tramea insularis* Hagen, Proc. Boston Soc. Nat. Hist., xviii, p. 65.
 1896. *Tramea brasiliiana* Carpenter, Journ. Inst. Jamaica, ii, p. 260.
 1906. *Tramea insularis* Calvert, B. C. A., p. 303.
 1913. *Tramea binotata* Ris, Cat. Coll. Selys, xvi, p. 991.
 1916. *Tramea insularis* Kahl, Ann. Carn. Mus., x, p. 526.
 1919. *Tramea insularis* Calvert, Trans. Am. Ent. Soc., xlv, p. 362.
 1931. *Tramea binotata* Dow, Proc. Biol. Soc. Wash., xlv, p. 59.

Other synonyms.—*subbinotata* Brauer, *longicauda* Brauer, *paulina* Förster.

Diagnosis.—*Male.* Labium yellow with the median lobe black; labrum black with diffuse yellow corners. Face olivaceous; postclypeus blackish in the middle. Frons violet metallic, vertex blue metallic. Thorax reddish brown, darker on the dorsum and covered with long gray hairs; sides with a dark metallic band through the spiracle, connected below with one back of the humeral suture and with one on the front part of the metepimeron; not visible in the darker color of mature specimens. Hind wing with a basal spot extending to or not quite to the anal crossing and backward to the hind margin or to the end of the membranule; this spot blackish brown sometimes more or less hyaline in the middle. Abdomen reddish brown; 8-10 black on the dorsum.

Female. Labrum orange with a black border. Face olivaceous. Frons orange with a blue black basal band. Vertex brown. Appendages about as long as segments 9-10. Genital plate divided into two broadly oval lobes not quite so long as segment 9.

Size.—Abdomen, 31-34 mm., hind wing, 38-43 mm.

Type locality.—Brazil.

Distribution.—Fla., Mexico to Brazil. *West Indies:* Greater Antilles. *Porto Rico:* Manatí, June 27 (Lutz and Mutchler, in A. M. N. H., det. by Dr. Ris.).

Nymph.—Unknown.

Pantala Hagen

(Pl. I, Fig. 5.)

Type.—*flavescens* (Fabricius).

Distribution.—Cosmopolitan.

Diagnosis.—Wings long and broad. Fore wing: arculus between the 1st and 2nd antenodals, its sectors stalked for a considerable distance; about 14 antenodals, the last one incomplete, the first two slightly further

apart than the others; crossveins under the stigma two; stigma small, trapezoidal; triangle of medium length, with but one crossvein, and very slightly directed inward, almost perpendicular to the long axis of the wing; discoidal field of 3 cell rows, increasing to 4, narrowed toward the margin; Cu_1 rising from the anal angle of the triangle; subtriangle not always distinct, usually of 4 cells; M_2 with a distinct double curve; apical sector rising under the basal third of the stigma; radial planate turned forward to join Rs, subtending 2 cell rows; median planate rather weakly developed, subtending one cell row; no extra bridge crossveins. Hind wing: triangle retracted to or beyond the arculus; Cu_1 from the anal angle of the triangle; 2 cubito-anal crossveins. Hind wing; triangle retracted to or beyond the arculus; Cu_1 from the anal angle of the triangle; 2 cubito-anal crossveins, the anal crossing basad of the origin of A_2 ; A_2 very straight at the base, with a patella of 2 cells; anal loop long, usually of 2 cell rows, with a long toe reaching to within a cell row of the wing margin, and pointing outwards; a : b as 1 : 3; M_4 with a sharp bend toward M_3 just beyond the end of the median planate. Frons broad and swollen, bilobed; vertex broad, rounded. Lobe of prothorax very small and low. Legs long and slender; 3rd femora of the male with about 24 small spines, those on the distal third longer and farther apart; 2nd femora with 10-12 spines, gradually increasing in length; tibial spines long and stout. Abdomen stout, wider at the base; supplementary transverse carinae on 2-5. Genitalia of 2nd segment of the male and the genital plate of the female small.

Nymph.—The nymphs of this genus are smooth and depressed, with large heads and wide labial masks. Labium with distal border of lateral lobe deeply cut into prominent teeth which are as high as wide; lateral setae 12-15; mental setae 15-16; movable hooks short. Mandibles with 4 teeth in the apical row and 2-3 in the posterior, with or without the marginal denticle (Calvert, 1928). Dorsal hooks wanting or very minute; needlelike on 3-4. Lateral spines on 8-9. Superior appendage as long as inferiors.

KEY TO WEST INDIAN SPECIES

Adults

1. Anal field of the hind wing with a pale yellow spot..... *flavescens*
 Anal field of the hind wing with a dark brown spot..... [*hymeneae*]

Nymphs

1. Lateral setae 12-14..... *flavescens*
 Lateral setae 15 or more..... [*hymeneae*]

Pantala flavescens (Fabricius)

1798. *Libellula flavescens* Fabricius, Suppl. Ent. Syst., p. 285.
 1857. *Libellula flavescens* Selys, in Sagra, Hist. Nat., p. 186.
 1861. *Pantala flavescens* Hagen, Syn. Neur. N. Am., p. 142.
 1867. *Pantala flavescens* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 291.
 1867. *Pantala flavescens* Hagen, Stett. Ent. Ztg., xxviii, p. 215.
 1875. *Pantala flavescens* Hagen, Proc. Boston Soc. Nat. Hist., xviii, p. 63.
 1888. *Pantala flavescens* Gundlach, Contrib. Cuba, p. 245.
 1888. *Pantala flavescens* Kolbe, Archiv für Naturg., liv, p. 167.
 1893. *Pantala flavescens* Gundlach, Ann. Soc. Esp. Nat. Hist., xxii, 2, p. 269.
 1894. *Pantala flavescens* Kirby, Ann. Mag. Nat. Hist. (6), xiv, p. 262.
 1896. *Pantala flavescens* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 259.
 1906. *Pantala flavescens* Calvert, B. C. A., p. 307.
 1911. *Pantala flavescens* Wilson, Johns Hopkins Univ. Circ., ii, p. 50.
 1913. *Pantala flavescens* Ris, Cat. Coll. Selys. xv, p. 917.
 1916. *Pantala flavescens* Kahl, Ann. Carn. Mus., x, p. 526.
 1919. *Pantala flavescens* Calvert, Trans. Am. Ent. Soc., xlv, p. 360.

Synonyms.—*viridula* Palisote de Beauvais; *analis* Burm., *terminalis* Burm.

Diagnosis.—*Male*. Face and head yellow, sometimes with a tinge of reddish on the middle of the face. Occiput greenish brown. Thorax greenish or yellowish brown, lighter and more bluish on the sides and with black spurs on the lower ends of the sutures. Legs black, femora paler basally. Wings usually hyaline with an apical spot of yellow on the inferior margin; costa, nodus and stigma orange, as are the antenodal crossveins of the first series, the cubito-anals, the arculus and some of the crossveins beyond the triangle. Wing membrane often suffused with pale yellow. Apices of one or both wings often with a small spot of pale brown. Abdomen yellowish to reddish brown, the carinæ distinctly darker; segment 3 with a reddish triangular spot expanded across the apical third; this spot is larger and darker on the succeeding segments, forming on 5-7 an indistinct dorsal band which on 8-10 becomes black and distinct. Sides of 4-7 with dark markings. Appendages as long as segments 9 + 10, yellow, darker apically.

Female. Resembles the male in color but is less reddish and the abdomen, as a rule, is darker. Eighth sternite keeled, scoop-shaped, but not projecting; one-third as long as segment 9; with a pair of stylets, each set in a deep notch on either side of the mid-line at about one-third of the segment length.

Nymph.—(Cabot, 1890, Mem. M. C. Z., iii, 43.) Length, 25 mm., abdomen 15, hind femur 7; width of abdomen 8, of head 7. Body clean and smooth. Lateral setæ 12-14, mental setæ about 15, the nine outer ones

the longest. Lateral spines of 8 and 9 a little incurved; that of 8 reaching to the apical border of the 9th segment; that of 9 reaching beyond the tips of the lateral appendages. Superior appendage equal to or a little longer than the inferiors; laterals one fifth shorter.

Suborder ZYGOPTERA

These are slender insects with the fore and hind wings of similar size and shape. When at rest they hold their wings together above the back or, as in most Lestines, obliquely upward. The head is transversely elongated with the eyes far apart and projecting laterally. The anal appendages of the male are in two pairs, superior and inferior. Between the bases of the superior pair there is a long, rudimentary protuberance which is homologous with the single inferior appendage of the Anisoptera. The female possesses a well-developed ovipositor. The bases of the wings are either narrowed or petiolate. The discoidal cell is known as the quadrangle; the anal vein terminates in Cu_2 at its angulation just back of its point of separation from Cu_1 .

The *nymphs* are long and slender with three caudal plate like gills, one median dorsal and two lateral ventral. The head is the widest part of the body.

KEY TO WEST INDIAN FAMILIES

Adults

1. Antenodal crossveins five or more.....[*Agrionidæ*]
 Antenodal crossveins two.....*Cænagrionidæ*

Nymphs

1. First antennal segment as long as the remaining ones together; lateral gills triquetral[*Agrionidæ*]
 First antennal segment not longer than the remaining ones together; lateral gills flat*Cænagrionidæ*

CÆNAGRIONIDÆ

Syn. Agrionidæ

Wings narrow and stalked at the base. Stigma present and usually with a well-developed brace vein at its inner end. Quadrangle trapezoidal, its anterior side shortened and its outer angle pointed; without crossveins.

The *nymphs* are usually slender with tapering bodies. Basal segment of the antennæ not longer than the succeeding ones; labium entire or, if cleft, the cleft closed.

KEY TO WEST INDIAN SUBFAMILIES

1. Vein M_3 rising nearer the arculus than the nodus; supplementary sectors present between R_s and M_3 and between M_3 and M_1*Lestinae* 2
 Vein M_3 rising nearer the nodus than the arculus.....
 2. Vein Cu_2 reduced to a crossvein ending in the margin of the wing.....*Protoneurinae* 3
 Vein Cu_2 not reduced to a crossvein one cell long.....
 3. Stigma wanting or, if present, of several cells, irregular in shape and unbraced*Pseudostigmatinae*
 Stigma present, small.....*Cænagrioninae*
- Nymphs
1. Gills strongly constricted.....*Protoneurinae*^{9a} 2
 Gills not constricted
 2. Gills with axial subsegmentation; labium with a median closed cleft..*Lestinae* 3
 Gills without axial subsegmentation; labium entire.....
 3. Gills simple with curved margins.....*Cænagrioninae*
 Gills stalked; distal portion foliaceous.....*Pseudostigmatinae*^{9a}

LESTINÆ

(Pl. I, Fig. 11)

Aside from the characters in the key this subfamily is distinguished by its large stigma which is well braced and surmounts two or more cells. The wings are distinctly petiolate. The arculus is from one-third to one-half the way from the base to the nodus.

The *nymphs* are very slender, with long slender legs. Median lobe of labium with a short closed cleft; lateral lobes trifold, with a large moveable hook bearing 2-3 setæ. Gills nearly parallel-sided, blunt-tipped and with indications of a segmentation along the axis.

KEY TO WEST INDIAN GENERA

Adults

1. Quadrangle widened distally with the anterior side more than one-half the length of the posterior.....[*Hypolestes*]^{9b}
 Quadrangle not widened distally, the anterior side scarcely one-half the length of the posterior.....*Lestes*

Nymphs

1. Gills lateral and terminal.....[*Hypolestes*]
 Gills terminal only.....*Lestes*

^{9a} Nymphs of West Indian species not known.^{9b} It is highly probable that a careful study of this genus and its close relatives will result in a change in its position in our system, removing it from the *Lestinae* and placing it closer to such genera as *Pseudophaea* or *Cora*.

Lestes Leach

(Pl. I, Fig. 11)

Type.—*sponsa* (Hansemann).*Distribution.*—Cosmopolitan except Australia.¹⁰

Diagnosis.—Quadrangle of fore and hind wings similar, narrowed distally, thereby becoming triangular. Sectors of the arculus rising near its upper end; one or more sectors between Rs and M_3 and between M_3 and M_4 ; one row of cells between M_4 and Cu_1 ; wings petioled to or nearly to the anal crossing; stigma surmounting two or three cells, usually three or more times as long as wide and with a good brace vein; M_2 rising several cells beyond the nodus. A transverse ridge on the level with the fore ocellus and just back of each antenna: back of the inner portion of this ridge and vertical to it a series of striations; between the ridge and the antennæ a small plate-like structure, usually elongated crosswise.

Remarks.—Considerable color variation is noted in all members of this genus and among individuals of the same species. As Dr. Calvert has stated (1928) this variation probably has no significance geographically but is due to postmortem changes, individual variation, and variations due to age and ontogenesis. I have found no dependable way for determining females. I have included figures of the pectoral markings and, although they show some variation within a species, they may serve as a help in identification.

Nymph.—Exceedingly long and slender. Head twice as wide as long; hind angles rounded; antennæ longer than width of head; labium very long and slender; the mentum reaching to or surpassing the hind coxæ, linear for a long distance at its base then dilated abruptly; medium lobe with a close medium cleft extending as far back as the level of the base of the lateral lobes; lateral lobes bent sharply at base, distal portion bilobed. Wing cases short, elevated. Legs very long and slender. Abdomen cylindrical, lateral margins keeled with minute apical spines on varying numbers of segments. Gills long, parallel-sided, abruptly rounded at the end; with axial subsegmentation and usually with irregular cross-bands of brown.

KEY TO WEST INDIAN SPECIES

Adults (Males)

1. Inferior appendages more than half as long as the superiors..... 2
 Inferior appendages half as long as the superiors..... [*tenuatus*]

¹⁰ Unless one regards it in the *sens lat.* and includes *Austrolestes*.

2. Abdomen 26 mm.; hind wing 17-18; superior appendages with no serrated margin after the basal tooth.....*scalaris*
 Abdomen 30-40 mm.; hind wing 21-24; superior appendages with a serrated margin..... 3
3. Abdomen 30 mm.; hind wing 21.....*forcicula*
 Abdomen 39 mm., hind wing 24 mm.....*spumarius*

Lestes forcicula Rambur

(Pl. VI, Fig. 1)

1842. *Lestes forcicula* Rambur, Ins. Neur., p. 247.
 1861. *Lestes forcicula* Hagen, Syn. Neur. N. Am., p. 68.
 1867. *Lestes forcicula* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 289.
 1862. *Lestes forcicula* Selys, Bull. Acad. Belg. (2), xiii, 4, p. 308.
 1888. *Lestes forcicula* Gundlach, Contrib. Cuba, p. 213.
 1901. *Lestes forcicula* Calvert, B. C. A., pp. 50, 352.
 1910. *Lestes forcicula* Muttkowski, Cat. Odon. N. Am., p. 38.
 1918. *Lestes forcicula* Ris, Archiv für Naturg., 82 A, ix, p. 62.
 1919. *Lestes forcicula* Calvert, Trans. Am. Ent. Soc., xlv, p. 346.
 1928. *Lestes forcicula* Calvert, Univ. Iowa Studies, Nat. Hist., xii, 2, p. 5.

Diagnosis.—*Male.* Labrum, genæ and anteclypeus pale green; rest of face and head dark blue or black except for a pale line around the outside of each ocellus. Rear of eyes powdery blue over dark brown, yellowish toward the roots. Prothorax brown with an elongate dark spot on either side of the mid-line of the median lobe. Synthorax chestnut brown with a pair of dark green metallic stripes bordered with black and separated by the brown middorsal carina. Sides and venter reddish brown with evidences of a narrow metallic green stripe after the humeral suture, abbreviated above and below. A third stripe, of black, lies on the forepart of the metepimeron. Legs pale; femora with two longitudinal dark lines, tibiæ with one. Spines long, those of the tibiæ, except the apical ones, twice as long as the intervening spaces. Claws of tarsi with 2 teeth. Wings with black stigma, at least one-half as wide as long. Abdomen almost wholly obscure brown or black, except in young specimens which are marked as follows: segment 1 pale, darker on either side of the mid-dorsal line; 2-6 dark metallic green dorsally, yellow on the sides, this yellow invading the color of the dorsum at the base and apex of each segment; on 6 this apical invasion is surrounded and cut off to form a paired spot; 7 metallic green above, the yellow of the sides very much reduced; 8-10 all dull green, slightly pruinose, 9 distinctly so; 10 with a small apical lateral spot on each side. Appendages black.

Female. Resembles the male although lighter in color.

Size.—Abdomen, 29-31 mm., hind wing, 19 mm.

Type locality.—Unknown; “perhaps North America.”

Distribution.—Texas, Mex., Brazil; *West Indies*: Cuba. Haiti, Martinique, Antigua. *Porto Rico*: Tortuguero Lake, Manatí, Feb. 20; Quebradillas, Jan. 3; Martin Piña, Dec. 31 (A. M. N. H.). Desengaño, Dec. 23. (C. U.). Panzardi's Place, Río Piedras, July 19, at 6 P. M. (Garcia-Diaz).

Remarks.—Mature specimens of this species are often hard to identify. Two mature males from Porto Rico and two from Cuba have the thorax entirely pruinose blue, except for the metallic green stripes on the dorsum and a trace of the posthumeral band. One from Porto Rico has the abdomen brilliant metallic green except for the powdery 9th segment. Two from Martinique are almost entirely black with only the dorsal thoracic stripes showing metallic green; these stripes are about one-third as wide as the metepisternum. The chestnut brown antehumeral area and a trace of the posthumeral green have remained visible. There seems to be no uniformity in the width of the stripes from any one place. The abdomen at times is wholly obscure brown or black with segment 1 pruinose. Selys described this species as somewhat larger than I have found it to be.

Nymph.—(Calvert, 1928, Univ. Iowa Studies Nat. Hist., xii, 2, p. 8.) The nymph of this species has been described in great detail by Dr. Calvert. I have a nymph collected by Dr. M. D. Leonard in Las Cruces, March 28. Length 16.5+8; length of hind femur 4.75. Labium with submentum reaching beyond the hind coxa; lateral setæ 3; mental setæ 5. Lateral spines on segments 6-9. Gills with the cross bands (as figured by Dr. Calvert) in evidence only along the margins, rather uniformly pale in color; axis and trachea pigmented. (Pl. VII, fig. 1.)

***Lestes spumarius* Selys**

(Pl. VI, Fig. 3)

1862. *Lestes spumaria* Selys, Bull. Acad. Belg. (2), xiii, p. 309.
 1863. *Lestes spumaria* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 289.
 1888. *Lestes spumaria* Gundlach, Contrib. Cuba, p. 215.
 1896. *Lestes spumaria* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 262.
 1901. *Lestes spumarius* Calvert, B. C. A., p. 50.
 1909. *Lestes spumarius* Calvert, Ann. Carn. Mus., vi, p. 97.
 1910. *Lestes spumarius* Muttkowski, Cat. Odon. N. Am., p. 39.
 1919. *Lestes spumarius* Calvert, Trans. Am. Ent. Soc., xlv, p. 346.

Diagnosis.—Genæ, postgenæ and eyes pale ashy yellow; labrum pale greenish blue with a fine black border on the front margin; anteclypeus pale in its anterior half, the black of the base running down in a point in the center and two rounded lobes on either side; rest of face dark brownish.

Vertex black, metallic green next to the eyes, lighter around the base of the antennæ. Rear of head pale. Prothorax pale with obscure brownish markings. Synthorax pale yellow; the metallic green stripe on the dorsum superimposed upon chestnut brown which is divided on the mid-line by the clear yellow carina; a second band of green covering nearly the whole of the mesepimeron, likewise bordered with brown though narrowly, the brown continuing down across the mesinfrapisternum and onto the prothorax; a brownish black area covering the extreme upper part of the metathorax and extending down a little onto the 3rd lateral suture. Legs pale, lined with black. Wings with stigma surmounting two cells; twice as long as wide. Abdomen ashy yellow beneath, dorsally dark brown with a pale basal ring on 3-7; 9-10 more metallic green than brown. Appendages black.

Female. Differs from the male (Selys, 1862) in having the prothorax lighter, a fine yellow carina on the 2nd abdominal segment, appendages brown, valvules medium, not visibly denticulate, and the last segments with no metallic band.

Size.—Abdomen, male, 39 mm., female, 34, hind wing, 24 mm.

Type locality.—Porto Rico.

Distribution.—*West Indies:* Cuba, Jamaica. *Porto Rico:* (Selys); Arecibo Aug. 30 (A. M. N. H.).

Nymph.—Unknown.

***Lestes scalaris* Gundlach**

(Pl. VI, Fig. 4)

1867. *Lestes scalaris* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 289; nomen nudum.
 1888. *Lestes scalaris* Gundlach, Contrib. Cuba, p. 216.
 1909. *Lestes scalaris* Calvert, Ann. Carn. Mus., VI, p. 93.
 1910. *Lestes scalaris* Muttkowski, Cat. Odon. N. Am., p. 39.
 1919. *Lestes scalaris* Calvert, Trans. Am. Ent. Soc., xlv, p. 347.

Diagnosis.—*Male.* Face and frons light brown; when mature the labrum becoming pale blue, its anterior margin yellow, and the genæ below the frons also blue. Vertex dark metallic green. Thorax yellowish brown; each mesepisternum with a metallic stripe; mesepimeron with an irregular stripe composed of two elongate spots, the upper the larger, connected by a line. These stripes are bluish brown in young specimens, becoming darker metallic green. Legs pale blue or yellow; femora with two black lines, tibiæ with one; tarsi black. Stigma brown. Eight to ten postnodals in the fore wing, 8-9 in the hind. Abdomen metallic blue or green on the

dorsum; sides paler ventrally; 3-7 with interrupted basal pale rings. Old specimens often becoming blackish.

Female. Unknown.

Size.—Abdomen, 26-27 mm., hind wing, 17-18 mm.

Type locality.—Zarabanda.

Distribution.—*West Indies:* Cuba. *Porto Rico:* (Calvert 1909 and 1919).

Remarks.—I have seen no example of this species. The above descriptive notes are from Calvert (1909).

Nymph.—Unknown.

PROTONEURINÆ

(Pl. I, Fig. 12)

These are small, delicate, slender insects with narrow wings. Stigma short, usually trapezoidal; nodus one-fourth to one-third of the way out on the wing length; Cu_2 represented by a crossvein only or lacking; anal vein greatly reduced; no intercalary sectors except the postnodal one.

The *nymphs*, so far as known, are rather short with short legs; labium flat without setæ, gills strongly constricted, lamellar or saccoid.

KEY TO WEST INDIAN GENERA

Adults

- | | |
|---|-----------------------|
| 1. Vein A reduced to the anal crossing, not extending beyond..... | 2 |
| Vein A not reduced to the anal crossing but extending beyond..... | |
| | [<i>Neoneura</i>] |
| 2. Nodus oblique so that Sc ends before the level of the base of M_3 ; legs short, femora not compressed..... | <i>Protoneura</i> |
| Nodus not very oblique, so that Sc ends beyond the level of the base of M_3 ; legs long, femora compressed..... | [<i>Microneura</i>] |

Protoneura Selys

(Pl. I, Fig. 12)

Type.—*capillaris* (Rambur).

Distribution.—Neotropical.

Diagnosis.—Vein Cu_2 wanting; Cu_1 ending at less than half the length of the wing; M_2 rising nearest the 5th or 6th postnodal in the fore wing, the 4th or 5th in the hind; M_{1a} usually rising 3 cells beyond M_2 ; 3 crossveins beyond the stigma; 9-14 postnodals in the fore and 7-12 in the hind. Anteclypeus very small and vertical. Median lobe of labium bifid in its apical half or two-fifths.

Nymph.—Unknown.

Protoneura capillaris (Rambur)

1842. *Agrion capillare* Rambur, Ins. Neur., p. 280.
 1857. *Protoneura capillaris* Selys, in Sagra, Hist. Nat., xii, p. 200.
 1860. *Protoneura capillaris* Selys, Bull. Acad. Belg. (2), x, p. 461.
 1861. *Protoneura capillaris* Hagen, Syn. Neur. N. Am., p. 73.
 1867. *Protoneura capillaris* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1886. *Protoneura capillaris* Selys, Mem. Cour., xxxviii, p. 212.
 1888. *Protoneura capillaris* Gundlach, Contrib. Cuba, p. 218.
 1888. *Protoneura capillaris* Kolbe, Archiv für Naturg., liv, p. 170.
 1893. *Protoneura capillaris* Gundlach, Ann. Soc. Esp. Hist. Nat., (2), xxii, 2, p. 266.
 1896. *Protoneura capillaris* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 261.
 1909. *Protoneura capillaris* Calvert, Ann. Carn. Mus., vi, p. 212.
 1910. *Protoneura capillaris* Muttkowski, Cat. Odon. N. Am., 73.
 1916. *Protoneura capillaris* Kahl, Ann. Carn. Mus., x, p. 521.
 1919. *Protoneura capillaris* Calvert, Trans. Am. Ent. Soc., xlv, p. 349.
 1931. *Protoneura capillaris* Dow, Proc. Biol. Soc. Wash., xlv, p. 56.

Diagnosis.—*Male.* Face yellowish white except the labrum and postclypeus and a small spot at the rear of the base of the antennæ, which are violet black; anterior border of labrum usually yellow. Vertex and occiput violet. Rear of eyes black metallic (sometimes greenish). Eyes whitish. Prothorax above, the mesepisternum and anterior two-thirds of the mesinfraepisternum, black metallic; rest of thorax and coxæ of legs white except for a narrow black line before the 3rd lateral suture and along the top of the mesepimeron. Legs white marked with black as follows: tarsi, apices of tibiæ, femora outside and tibiæ within. Abdominal segments 1-2 blue green metallic with a large pale yellow spot on the side margins; 3-7 dark blue or bronze with a basal light blue ring, on 3 two-fifths of the segment length, on 4-6 a narrow basal ring, on 7 covering the entire segment except for a narrow apical ring which extends up the inferior margins; 8-10 and appendages dark brown. Inferior appendages and apical plate of 8-9 yellow. Tenth segment with a medium apical notch.

Female. Similar to the male. Labrum metallic violet, postclypeus metallic blue, top of frons and vertex iridescent. Abdomen metallic green black, sides yellow; a narrow basal pale band on 3-4, connected with the pale of the venter; on 5 separated from the ventral pale color; on 6-7 reduced to a pair of dorsal blue spots; 9 with a kidney-shaped spot on each side. Prothorax black, extreme margins yellow; posterior lobe triangular.

Size.—25-26 mm., hind wing, 15-18 mm.

Type locality.—Cuba.

Distribution.—*West Indies:* Cuba. Isle of Pines, Jamaica, Martinique. *Porto Rico:* (Selys, 1886).

Remarks.—The abdomen of this species is remarkably long and slender; segment 3 is two and two-thirds as long as segment 1 + 2.

CÆNAGRIONINÆ

(Pl. I, Fig. 13)

These are mostly clear-winged damsel flies and are often rather small. Stigma short, surmounting usually one cell; M_3 rising nearer the nodus than the arculus; no supplementary sectors between R_s and M_3 or between M_3 and M_4 .

The *nymphs* are slender and usually greenish. Median lobe of labium entire; lateral lobes with one or two end hooks; lateral and mental setæ present; gills simple, usually lanceolate and pointed.

KEY TO WEST INDIAN GENERA

Adults

- | | |
|--|-------------------|
| 1. Tibial spines twice as long as intervening spaces..... | 2 |
| Tibial spines scarcely longer than intervening spaces..... | 3 |
| 2. Four or more crossveins beyond the stigma.....[<i>Argia</i>] | |
| One crossvein beyond the stigma.....[<i>Argiallagma</i>] | |
| 3. No postocular pale spots..... | 4 |
| Postocular pale spots present..... | 6 |
| 4. Cu_1 ending beyond the level of M_{1a}[<i>Amphiagrion</i>] | |
| Cu_1 ending before the level of M_{1a} | 5 |
| 5. Wings not petioled beyond the anal crossing; abdomen usually red.... | |
| <i>Telebasis</i> | |
| Wings, at least one of them, petioled beyond the anal crossing; abdomen not red, but very slender..... | <i>Leptobasis</i> |
| 6. Arculus rising as far beyond the 2nd antenodal as the upper section of the arculus is long | <i>Ceratura</i> |
| Arculus not rising so far beyond the 2nd antenodal..... | 7 |
| 7. Cu_1 ending beyond the level of M_{1a} ; three or more crossveins beyond the stigma | 8 |
| Cu_1 ending before the level of M_{1a} ; one or two crossveins beyond the stigma | 10 |
| 8. M_2 rising between the 3rd and 4th postnodal; Cu_2 ending beyond M_2 .. | 9 |
| M_2 rising between the 5th and 6th postnodal; Cu_2 ending before M_2 .. | <i>Enallagma</i> |
| 9. Stigma of male dissimilar in the two wings..... | <i>Ischnura</i> |
| Stigma of male similar in the two wings.....[<i>Cænagrion</i> ¹¹] | |

¹¹ West Indian record doubtful.

- 10. Postocular spots of male fused with the rear of the head; female valves longer than segment 10.....*Leptobasis*
 Postocular spots of male not fused with the rear of the head; female valves not longer than segment 10..... 11
- 11. Stigma of male in the fore wing not touching the costa..*Anomalagrion*
 Stigma of male in the fore wing touching costa.....[*Nehellenia*]

Nymphs

- 1. Gills half as broad as long; no mental setæ.....*Argia*
 Gills not more than one-third as broad as long; mental setæ present..... 2
- 2. Hind angles of head angulate.....*Amphiagrion*
 Hind angles of head broadly rounded..... 3
- 3. Gills tapering to a slender point..... 4
 Gills ending in an acute angle..... 6
- 4. Mental setæ 1.....*Nehellenia*
 Mental setæ 3 or more..... 5
- 5. Axis of gill with alternating dark and light areas.....*Ischnura*¹²
 Axis of gill uniformly colored.....*Anomalagrion*
- 6. Mental setæ 1; lateral setæ 3.....*Telebasis*¹³
 Mental setæ 2; lateral setæ 4.....*Cerature*¹³
 Mental setæ 3-4; lateral setæ 4-6.....*Enallagma*

Telebasis Selys

Type.—*salva* (Hagen).

Distribution.—Neotropical and Nearctic.

Diagnosis.—These are slender reddish damsel flies. Wings not petioled beyond the anal crossing. M_{1a} rising one or two cells before the stigma; M_2 rising at or near the 4th postnodal; Cu_2 ending before the level of the base of M_{1a} ; two crossveins beyond the stigma. Postocular pale spots wanting. Tarsal claws with a small inferior tooth. Eighth sternite of the female with no apical spine. No apical dorsal spine on segment 10.

Nymph.—The nymph of *T. salva* was described by Dr. Needham (Proc. U. S. Nat. Mus., xxvii, p. 716, 1904) from reared material. Head depressed, hind angles low; antennæ shorter than head is wide; labium short, hardly reaching mesothorax; *lateral setæ 4-5, mental setæ 3*. Abdomen cylindrical, 10th segment a little shorter than the others. Gills ob lanceolate, widest at three-fourths their length and suddenly narrowed to an obtusely rounded apex; marked with a few distant faint brown spots and with tracheæ more or less pigmented. In the same paper (p. 718) Dr. Needham described *Leptobasis sp.* from Cataño, Porto Rico. It answers in every way the description of a large number of nymphs which I have from Las Cruces and Coamo Springs, Porto Rico; Vento, Cuba.

¹² No good way has been found of distinguishing these two genera. The figures of the gills on Plate VII should help for the species known from the West Indies.

¹³ See discussion under genus.

and Damien, Haiti. Adults of *Telebasis dominicanum* were taken in abundance at the same time and place in Haiti and are also reported abundantly in Porto Rico and Cuba, whereas *Leptobasis* is apparently rather rare. I am of the opinion that the nymph described by Dr. Needham as *Leptobasis* sp. is that of *Telebasis dominicanum* and am describing it as such under that species. With the exception of the number of mental and lateral setæ it is not otherwise inconsistent with the nymph of *T. salva*. Adults of *Enallagma cæcum* were flying abundantly at the same place in Coamo Springs and at Damien, but Byer's description of *E. cardenium* is so different that I cannot believe the two are conspecific.

KEY TO WEST INDIAN SPECIES

Adults

- | | | |
|--|----------------------------------|---|
| 1. Abdomen bronze above..... | <i>macrogaster</i> ¹⁴ | |
| Abdomen mainly reddish above | | 2 |
| 2. Black stripe of 3rd lateral suture of thorax complete.... | <i>dominicanum</i> | |
| Black stripe of 3rd lateral suture of thorax incomplete..... | <i>vulnerata</i> | |

***Telebasis dominicanum* (Selys)**

(Pl. VI, Fig. 12.)

1857. *Agrion dominicanum* Selys, in Sagra, Hist. Nat., xii, p. 198.
 1861. *Agrion dominicanum* Hagen, Syn. Neur. N. Am., p. 86.
 1861. *Agrion vulneratum* var. ♀ Hagen, ibid., p. 86.
 1867. *Erythrigrion dominicanum* Hagen, Stett. Ent. Ztg., xxviii, p. 99.
 1867. *Erythrigrion dominicanum* Uhler, Proc. Boston Soc. Nat. Hist., xi, p. 295.
 1876. *Erythrigrion dominicanum* Selys, Bull. Acad. Belg., xlv, pp. 958, 961.
 1888. *Erythrigrion dominicanum* Kolbe, Archiv für Naturg., liv, p. 172.
 1888. *Agrion (Erythrigrion) dominicanum* Gundlach, Contrib. Cuba, p. 229.
 1896. *Telebasis dominicanum* Carpenter, Journ. Inst. Jam., ii, 3, p. 262.
 1910. *Telebasis dominicanum* Muttkowski, Cat. Odon. N. Am., p. 62.
 1911. *Telebasis dominicanum* Wilson, Johns Hopkins Univ., Circ. 2 (232), p. 49.
 1919. *Telebasis dominicanum* Calvert, Trans. Am. Ent. Soc., xlv, p. 354.
 1931. *Telebasis dominicanum* Dow, Proc. Biol. Soc. Wash., xlv, p. 56.

Diagnosis.—*Male.* Labrum red; postclypeus light brownish; remainder of face yellowish or reddish, including the first three segments of the antennæ, though the second is sometimes darker; vertex coppery black with

¹⁴ The species *T. macrogaster* differs from the other species of the genus in the color of the abdomen. This species was first described by Selys as *Agrion* but was later referred to his genus *Leptobasis*. Carpenter ('97) showed that *macrogaster* had small but distinct accessory claws on the tarsi and therefore could not be a *Leptobasis* and so transferred it to *Telebasis*. Subsequently ('02) Dr. Calvert has shown that *L. vacillans*, designated by Kirby as the genotype, also has a small inferior claw on the tarsus. It remains for someone who can obtain sufficient material to study the relationship of these species and determine the true characters of the genus.

a yellow dash extending from each lateral ocellus half way to the antennæ; rear of occiput yellow; rear of eyes black except for the region bordering the ventral anterior margin. Prothorax bronze black above, sides yellow as are also the elevated rear margin and most of the fore lobe except a median dorsal transverse spot. Rear border of prothorax smoothly curved, slightly depressed in the center. Synthorax bronze dorsally as far as the 2nd lateral suture, with a complete narrow yellow stripe on the humeral suture, the black of the mesepisternum extending down on to the mesinfraepisternum. Sides yellow, marked with bronze as follows: a band just back of the 2nd lateral suture ending just above the spiracle and fused for its upper half with the bronze of the dorsum; a narrow complete band on the 3rd lateral suture and usually another isolated band lying midway on the metepimeron; ventral posterior corner of the metepimeron with a small blackish spot. Legs all yellow except for a minute black spot at either end of the femora, a ring at the apex of the tarsus and the tips of the claws. When fully mature the outsides of the femora are black. Abdomen red on the dorsum, the yellow of the sides and venter forming a basal ring on 3-6; 8-9 sometimes with a pair of obscure blackish subbasal areas on either side of the mid-line; 10 less than half as long as 9 and with a slightly elevated triangular notch on its apical margin.

Female. Differs from the male as follows: base of labrum and anteclypeus obscure, deeper in color; postclypeus black; rest of face yellow except for a diffuse blackish spot on the middle of the frons. First two segments of the antennæ blackish within. Vertex black with a crescentic yellow transverse spot extending laterally just in front of each lateral ocellus. Occiput with a yellow wedge-shaped spot on each end of the margin. Prothorax blackish except the fore lobe; the margins of the depressions in the center of the rear lobe elevated and produced forward to form two contiguous yellowish erect projections at the point of division of the median lobes. The parallel antehumeral yellow stripes continuing along above the suture between the mesinfraepisternum and the mesepimeron, joining the yellow to rearward. Abdomen bronze black above with an interrupted basal pale ring on 3-7; apex of 8-9 pale brown, as is most of 10. Sides of 1-3 with a more or less distinct blackish longitudinal streak of black in the midst of the yellow. Appendages pale. The 8th sternite lacking the spine.

Size.—Abdomen, 25 mm., hind wing, 15 mm.

Type locality.—St. Domingo.

Distribution.—Guiana; *West Indies*: Cuba, Jamaica, Haiti, San Domingo. *Porto Rico*: (Kolbe); Caguas, May 28-29; Adjuntas, June 1-13 (A. M. N. H.). Río Piedras, April 13 (Forbes).

Remarks.—I have seen no females of this species from Porto Rico. The median spot on the metepimeron is lacking in the one I have from Cuba but is present in the one from Haiti.

Nymph.—(Supposition. Needham, Proc. U. S. N. M. 1904, xxvii, p. 718, as *Leptobasis* sp.). Length 10.5 + 4.3. Hind femur, 2.8; width of head, 2.7. Hind angles of head broadly rounded and slightly setose. Proportionate length of antennal segments 8 : 8 : 10 : 6 : 4 : 2 : 1. Labium reaching the middle of the 2nd coxæ; lateral setæ 3, mentals one (Pl. VII, Fig. 3A.). Abdomen cylindrical, sides slightly keeled with a small apical spine on 3-8. Wing pads reaching on to 5th segment. A narrow middorsal pale band lined with darker on each side; this darker color deepens into a spot at the apex, thereby giving each segment a pair of dorsal apical black spots; wanting on 10; on 8 the paired dark line is expanded and darkened and each of these dark spots encloses a small round pale spot at one-half the segment length. Gills as in Plate VII, Fig. 3B. Specimens of varying sizes (the above given measurements are from the largest one) from Las Cruces and Coamo Springs, Apr. 4; from Damien, Haiti, Apr. 3, and Vento, Cuba, Apr. 20.

***Telebasis vulnerata* (Hagen)**

(Pl. VI, Fig. 11.)

1861. *Agrion vulnerata* Hagen, Syn. Neur. N. Am., p. 86.
 1867. *Pyrrhosoma vulnerata* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1876. *Erythragrion vulnerata* Selys, Bull. Acad. Belg., p. 960.
 1888. *Agrion (Pyrrhosoma) vulnerata* Gundlach, Contrib. Cuba, p. 228.
 1893. *Erythragrion vulnerata* Gundlach, Ann. Soc. Esp. Nat. Hist., p. 268.
 1910. *Telebasis vulnerata* Muttkowski, Cat. Odon. N. Am., p. 63.
 1919. *Telebasis vulnerata* Calvert, Trans. Am. Ent. Soc., xlv, p. 354.

Diagnosis.—*Male.* Differs from *dominicanum* as follows: (1) Posterior lobe of prothorax cut off more obliquely on the sides, that is, the curve of the border is hollowed out, making the lobe more or less triangular. (2) The black stripe on the 3rd lateral suture incomplete, abbreviated below. (3) Inferior appendages pointed at the end, not truncate. (4) Segments 8-9, in general with some color differences. Unusually a pair of subbasal spots of black, on 8 often reduced, sometimes scarcely discernible, on 9 more distinct and often fused. Segment 10 with a basal black ring.

Female. Differs from *dominicanum* as follows: (1) Labrum, postclypeus and basal segment of antennæ reddish yellow. (2) Posterior lobe

of prothorax with the rear margin pale and the region of the median depression black. Margin elevated and produced forward to form two erect flaps which extend two-thirds across the median lobe. (3) Thorax and abdomen resemble the male.

Size.—Abdomen, 28-30 mm., hind wing, 18-20 mm.

Type locality.—Porto Rico, Cuba, Essequibo in Guiana.

Distribution.—*West Indies*: Cuba, Haiti. *Porto Rico*: (Hagen). Jayuya, Jan. 5; Coamo Springs, Jan. 7; San Juan, Feb. 1-14; Cayey, May 30-31; Aibonito, June 1-3; Barros, June 4; Adjuntas, June 5-26 (A. M. N. H.). Mayagüez (C. U.).

Remarks.—Variations in the color pattern of the last abdominal segments of *dominicanum* and *vulneratum* were hard to differentiate. They at length were arranged in four groups as follows: (1) 8 with two black spots, 9 with one distinct spot, 10 with a basal ring,—6, male *vulneratum*; (2) 9 with two spots, 10 with the basal ring,—4 male *vulneratum*; (3) 8-9 with very indistinct blackish areas—7 male *dominicanum*; (4) 8-10 almost entirely unmarked—6 male *dominicanum* and 1 male *vulneratum*.

Nymph.—Unknown.

Leptobasis (Selys)

Type.—*vacillans* Selys.

Distribution.—Neotropical.

Diagnosis.—One or both wings petioled to or beyond the anal crossing. M_2 rising nearest the 5th postnodal in the fore wing, the 4th in the hind; M_{1a} rising about two cells before the stigma; two crossveins beyond the stigma; Cu_2 ending beyond M_2 . Postocular spots usually absent, if present confluent with the rear of the head. Apical margin of 10th abdominal segment of the male with no dorsal process. Eighth sternite of the female with or without an apical spine; genital valves of the female very long, surpassing the tips of the abdominal appendages. Tarsal claw with a minute inferior tooth.

Nymph.—Unknown.¹⁵

Leptobasis vacillans Selys

(Pl. VI, Fig. 10)

1867. *Agrion vacillans* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 291, nomen nudum.

1877. *Leptobasis vacillans* Selys, Bull. Acad. Belg. (2), xliii, p. 101.

1888. *Leptobasis vacillans* Kolbe, Archiv für Naturg., liv, p. 172.

¹⁵ See discussion of nymph of *Telebasis*.

1888. *Agrion (Leptobasis) vacillans* Gundlach, Contrib. Cuba, p. 231.
 1893. *Agrion (Leptobasis) vacillans* Gundlach, Ann. Soc. Esp. Nat. Hist. (2),
 xxii, 2, p. 268.
 1902. *Leptobasis vacillans* Calvert, B. C. A., p. 120.
 1902. *Leptobasis vacillans* var. *atrodorsum* Calvert, B. C. A., p. 121.
 1909. *Leptobasis vacillans* Calvert, Ann. Carn. Mus., vi. p. 200.
 1910. *Leptobasis vacillans* Muttkowski, Cat. Odon. N. Am., p. 64.
 1919. *Leptobasis vacillans* Calvert, Trans. Am. Ent. Soc., xlv, p. 355.
 1931. *Leptobasis vacillans* var. *atrodorsum* Dow, Proc. Bio. Soc. Wash., xlv,
 p. 56.

Remarks.—The representatives of this species which I have seen have the vertex blackish with a pale postocular spot each side confluent with the pale of the rear of the head, thereby answering the description of var. *atrodorsum* Calvert.

Diagnosis.—var. *atrodorsum*. *Male*. Face yellowish; labrum orange with a midbasal impressed spot of brownish; anteclypeus brownish; postclypeus brown with a narrow black spot and a basal band; superior half of the frons black; vertex black; first segment and basal part of second segment of antennæ black; rear of eyes greenish white. Postocular spots present but broadly fused with the rear of the head. Thorax and legs yellow, the former with a black middorsal band and a black humeral band; the antehumeral pale stripe between them one half the width of the humeral black. Tarsal claw with an exceedingly minute, scarcely discernible inferior tooth. Abdominal segment 1 and basal part of 2 yellow with a middorsal blackish band extending full length on 1 and most of 2, though diffuse apically. Rest of abdomen reddish orange, yellow ventrally, with narrow apical and basal black rings on 3-6; a dorsal band, black and diffuse on the apical fifth of 5 and basal fifth of 6, then bronzy green; interrupted at the suture between 6 and 7 and becoming diffuse on the apical half of 7; 8-10 and appendages red.

Female. Resembles the male. Valves longer than segment 10, extending as far beyond 10 as 10 is long. Segment 8 with no ventral spine, only a slight protrusion of the margins of the segment at that point.

Size.—*vacillans*, abdomen, 25-29 mm., hind wing, 15-17 mm.

atrodorsum, abdomen, 24 mm., hind wing, 14-15 mm.

Type locality.—*vacillans*, Cuba.

atrodorsum, Mexico.

Distribution.—*vacillans*, Mexico, Guatemala. *West Indies*: Cuba.

Porto Rico: (Kolbe, Gundlach, 1893).

atrodorsum, Mexico, Panama. *West Indies*: Cuba, San Domingo.

Ceratura Selys

(Pl. I, Fig. 13.)

Type.—*capreola* (Hagen).*Distribution.*—Neotropical.

Diagnosis.—Easily recognized by the position of the arculus which is as far beyond the 2nd antenodal as the upper limb of the arculus is long. M_2 rising at or near the 3rd postnodal; M_{1a} rising two cells beyond M_2 ; two crossveins beyond the stigma; Cu_1 ending in front of the level of the origin of M_{1a} ; Cu_2 rising as far in front of the submedian crossvein as this crossvein is long; Cu_2 ending before M_2 ; costal side of stigma greater than proximal or distal sides. Postocular spots present, those of the female often confluent with the rear of the head. Apical margin of the 10th abdominal segment with an elevated dorsal process. Eighth sternite of female with an apical spine.

Nymph.—Unknown. Dr. Needham has in his collection a nymph collected at Wismar, British Guiana, April 13, 1930, which he has referred to *Ceratura* because of its small size. Its total length is $7.5 + 1.75$ mm. Head flat, its hind angles spinulose and rounded. Mental setæ 2, laterals 4. Wing pads reaching to three-fourths of segment 5. Abdomen with lateral keel, bearing small spines at the apex of segments as far as the 8th. Gills nearly parallel-sided, about one-fifth as wide as long, but slightly narrowed at the base and abruptly rounded at the tips; color uniform brownish mottled.

Ceratura capreola (Hagen)

(Pl. VI, Fig. 8.)

1861. *Agrion capreolus* Hagen, Syn. Neur. N. Am., p. 78.
 1867. *Agrion capreolus* Hagen, Proc. Boston Soc. Nat. Hist., xl, p. 290.
 1876. *Ceratura capreola* Selys, Bull. Acad. Belg., xli, p. 252.
 1888. *Agrion (Ceratura) capreola* Gundlach, Contrib. Cuba, p. 233.
 1888. *Ceratura capreola* Kolbe, Archiv für Naturg., liv, pp. 160, 165.
 1896. *Ceratura capreola* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 261.
 1903. *Ceratura capreola* Calvert, B. C. A., p. 131.
 1910. *Ceratura capreola* Muttkowski, Cat. Odon. N. Am., p. 72.
 1911. *Ceratura capreola* Wilson, Johns Hopkins Univ. Circ. 2, No. 232, p. 49.
 1916. *Ceratura capreola* Kahl, Ann. Carn. Mus., x, p. 520.
 1918. *Ceratura capreola* Ris, Archiv für Naturg., 82 A, 9, p. 135.
 1919. *Ceratura capreola* Calvert, Trans. Am. Ent. Soc., xiv, p. 381.
 1931. *Ceratura capreola* Dow, Proc. Biol. Soc. Wash., xliv, p. 56.

Diagnosis.—*Male.* Labrum light bluish green, slightly metallic, with a black basal border projecting medianward; clypeus darker metallic green-

ish black; frons and genæ dull light green. Vertex metallic black. Postocular spots round and widely separated from the pale posterior border of the occiput. Rear of eyes light blue, black at the roots. Thorax pale green marked with black as follows: top of prothorax except a central spot on the fore lobe and a marginal spot on each side of the crest of the rear lobe; front of synthorax as far back as the 2nd lateral suture above, and halfway between it and the humeral below. A narrow complete antehumeral stripe remaining green; as well as a fine line on the crest above and a small spot just back of the humeral suture above. Top of the 3rd lateral suture with a black spot narrowly continuous with the black of the front; base of the suture with another smaller spot. Legs pale; outside of femora and a streak on the tibiæ towards the knees black as well as a touch on the apex of each tarsal segment. Stigma of wings pale, darker in the middle. Five to seven postnodals before the stigma and 2-3 beyond it. Abdomen dark dorsally (on basal segments black, on median bronze, and on apical bluish metallic), pale green ventrally, and pale on sides of 1-2 and base of 3; remainder of abdomen yellow, this yellow forming basal rings, interrupted dorsally, on 3-7; segment 8 bluish black above on the basal two-thirds, remainder (*a*) all light blue, or with (*b*) a median apical spot, or (*c*) with this spot expanded into a ring, or (*d*) with this ring fused broadly on the dorsum with the basal black (Pl. I, Fig. 7). Segment 9 is all light blue; 10 black above, bright blue beneath. Posterior border of 10 elevated dorsally to form a projecting fork, the branches of which are divaricate and inclined downward.

Female. The *typical* female differs from the male in having the bluish green labrum broadly bordered with yellow on the anterior margin. Prothorax light brownish, the median lobe elevated transversely into two prominent cones, and the rear lobe deeply notched. Sides of synthorax pale greenish or yellowish; antehumeral pale stripe broader than in the male and the black of the dorsum not extending to the 2nd lateral suture. Abdomen entirely bronze, dorsally, on 1-8 except for the usually pale basal rings; 9-10 light blue. Rear margin of 10 slightly elevated in the middle.

The *orange* female, in which all the pale color is light orange, differs from the typical female in having the face all pale (postclypeus somewhat darker) except for three black points at the base of the labrum and possibly a reduced basal line, and a black line on the fronto-clypeal suture. Prothorax normal. Thorax bright orange except the black middorsal band which covers a little more than one-half of each mesepisternum and continues uninterruptedly onto the prothorax except for a trace of orange

on the sides of the rear elevation. Humeral suture with a fine line of black visible in its depths. Femora and tibiae all pale. Black band of dorsum of abdomen very much reduced on segments 1-2. Segment 9 sometimes with a pair of black spots.

The *citrine* female differs from the typical female in having head and thorax all bright yellow except for three basal points on the labrum, all of the postclypeus, vertex and antennae except the basal segment of the last. Median dorsal suture of the thorax with a small black spot at its extreme base; inner borders of the antealar crest also with a spot of black. The abdomen differs in having segment 1 all yellow and 10 dark on the apex of the dorsum. Appendages black. Ovipositor reaching to the tip of the appendages.

Size.—Abdomen, 17-19 mm., hind wing, 10-11 mm.

Distribution.—Mexico to Brazil. *West Indies*: Cuba, Isle of Pines, Jamaica, St. Lucia, Martinique. *Porto Rico*: (Hagen, 1861).

Remarks.—The variation of color pattern on segment 8 of the males seems to have no correlation with the geographic distribution. I have specimens from Cuba representing all types. Dr. Hagen's Porto Rican material was like (*d*).

Nymph.—Unknown (see generic description).

Ischnura Charpentier

Type.—*pumilio* (Charpentier).

Distribution.—Cosmopolitan.

Diagnosis.—This genus is most easily recognized by the dissimilarity of the fore and hind wing stigma. Vein M_2 usually rising between the 3rd and 4th postnodal in the fore wing and the 2nd and 3rd in the hind; Cu_1 ending beyond M_{1a} ; Cu_2 ending beyond M_2 ; M_{1a} usually rising two cells before the stigma; four crossveins beyond the stigma; two vertical series of crossveins between the quadrangle and the level of the nodus. Postocular spots present, sometimes confluent with the rear of the head in the female; apical margin of 10 elevated dorsally into a bifid process. Eighth sternite of the female with or without an apical spine. Colors of the male characteristically black and blue or green; females with two color forms.

Nymph.—Lateral lobes of labium bifid, denticulate; movable hook without hairs, lateral setae 5-6. Median lobe entire. Gills narrow, not more than one-third as broad as long, lanceolate, tapering, without distinct color pattern generally.

Ischnura ramburii (Selys) ^{15a}

1850. *Agrion ramburii* Selys, Mem. Soc. Sci. Liège, vi, p. 186, nomen nudum.
 1857. *Agrion tuberculatum* Selys, in Sagra, Hist. Nat., vii, p. 198.
 1857. *Agrion ramburii* Selys, in Sagra, Hist. Nat., vii, p. 199.
 1861. *Agrion iners* Hagen, Syn. Neur. N. Am., p. 75.
 1861. *Agrion tuberculatum* Hagen, ibid, p. 76.
 1861. *Agrion credulum* Hagen, ibid, p. 80, [= var. *credula*, teste Calvert '02].
 1861. *Agrion defixum* Hagen, ibid, p. 80, [= var. *credula*, teste Calvert '02].
 1867. *Agrion iners* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1876. *Ischnura ramburii* Selys, Bull. Acad. Belg., xli, p. 272.
 1888. *Agrion (Ischnura) ramburii* Gundlach, Contrib. Cuba, p. 223.
 1888. *Ischnura ramburii* Kolbe, Archiv für Naturg., liv, pp. 161, 170.
 1893. *Ischnura ramburii* Calvert, Trans. Am. Ent. Soc., xx, p. 240.
 1895. *Ischnura ramburii* var. *credula* Calvert, Proc. Cal. Acad. Sci. (2) iv, p. 489.
 1896. *Ischnura ramburii* Carpenter, Journ. Inst. Jamaica, ii, 3, p. 261.
 1902. *Ischnura ramburi* and var. *credula* Calvert, B. C. A., p. 124.
 1907. *Ischnura ramburi* Calvert, B. C. A., p. 388.
 1910. *Ischnura ramburii* and subsp. *credula* Muttkowski, Cat. Odon. N. Am., p. 70.
 1911. *Micronympha ramburii* Wilson, Johns Hopkins Univ. Circ. 2, No. 232, p. 49.
 1919. *Ischnura ramburii* Calvert, Trans. Am. Ent. Soc., xlv, p. 356.
 1931. *Ischnura ramburii* Dow, Proc. Biol. Soc. Wash., xliv, p. 56.

Diagnosis.—*Male.* Face up to and including the anterior half of the first antennal segment beautiful pale green marked with black as follows: a basal band on the labrum, sometimes broad and sometimes narrow, with an irregular front border; the horizontal postclypeus which sometimes overhangs the vertical anteclypeus. Vertex black, sometimes metallic. Face clothed with long sparse hairs; occiput with a thin fringe. Postocular spots subcircular and near the eyes. Rear of head pale. Prothorax black marked with pale as follows: a spot on either side of the middorsal line of the fore lobe (sometimes connected across the middle); the lateral margins of the median lobe and a trace on the lateral and rear margins of the fore lobe. Front of synthorax metallic black to half way between the humeral and the 2nd lateral suture, with a narrow incomplete antehumeral green band. Sides green with a narrow spur of black on the top of the 2nd suture and a complete fine line on the 3rd, wider above, very narrow below, and continued along the anterior suture of the mesinfraepisternum. Rear margin of metepimeron sometimes with a fine line.

^{15a} The name *tuberculatum* has page priority over *ramburii*. Enough confusion has already been attached to this species to justify my dissenting to the revival of a name so little involved.

These all connected with each other above. Legs black, pale green on the inside of the femora, and with tarsi and base of tibiae paler. Wings with brown veins; stigma of fore wings black in the center, paler on the margins inside of the veins, especially on the costal and apical sides; that of the hind wing uniformly pale brown. Abdominal segment 1 black as far as the transverse carina and with a small median spot; 2-7 metallic black on the dorsum with a basal pale ring on 3-7 narrowly interrupted on the mid-line; the black of 7 extends farther down onto the sides. The pale color of 1-2 and the basal part of 3 green, the remainder of the pale color of 3-7 yellow. Segment 8 brilliant turquoise blue with a very narrow basal band of black across the dorsum, slightly projecting to rearward on the mid-line; 9-10 black dorsally, blue on the sides though less broadly on 10. Apical margins of 10 elevated into a projecting bifid dorsal process. Appendages brown, inferiors black apically and pale basally. The superiors from the dorsal view are short and broad, obliquely truncate, the longer side the outer; the inner side then projects ventrally a distance greater than the dorsal length of the main horizontal portion. The inferiors are curved at the tip and about three-fourths as long as the 10th segment.

Female. Typical female similar to the male. *Orange* female differing in having the blue or green replaced with orange. Small pale spots sometimes present anterior to each ocellus; postocular spots large and confluent with the rear of the head; rear border of the occiput pale; median lobe of prothorax more broadly yellow on the sides and with a fine line on the rear margin on either side of the mid-line. Synthorax orange yellow with a single mid-dorsal black band continued across the prothorax, extending not quite half way from the dorsal carina to the humeral suture. Third lateral suture with a faint trace of brown at the top. Legs paler than in the male. Stigma of both wings uniformly pale. Abdomen yellow marked with black or metallic green as follows: segment 2 with a large antepical spot broadly fused with the narrow apical ring and extending on the mid-line in a parallel-sided thin streak to the base of the segment¹⁶; dorsum of 3-9, the black of 3-7 constricted at the base and extending down on the sides at the apex; basal half of the dorsum of 10. Eighth ventral segment with an apical spine.

Remarks.—*I. ramburii credula* differs from the typical *ramburii* only in the color of the 9th abdominal segment which is blue with irregular black transverse bands, at least on the apex. Dr. Calvert (1902) has found that those from the West Indies were mostly of this variety. All that I have seen are blue with the bands of varying width, narrow or wanting at

¹⁶ For variations see Plate I, fig. 8.

the base, wider across the apex, but both enlarged on the mid-line, the apical one sometimes produced into a triangle, half or more of the segment length (Pl. I, Fig. 9). Of the four males which I have from Cuba three have these bands connected on the median line. Might they not then be the typical *ramburii*? One male does not, and yet it seems to have been caught with the others although there are no data accompanying them other than "Havana, coll. Baker." The one female which was with these males differs from the other orange females in having the black of the dorsum of 9 tending to be separated diffusely into an apical and a basal band, and in having 10 mostly yellow. The female from Porto Rico has 9 and 10 all black above.

Size.—Abdomen, 23-24 mm., hind wing, 14-18 mm.

Type locality.—Cuba.

Distribution.—*I. ramburii ramburii*.—Quebec to Florida, Texas, C. Am. to Chile and Paraguay; *West Indies*: Cuba.

I. ramburii credula.—Northern California to Lower California, Central Amer., Fla.; *West Indies*: (Cuba?), Jamaica, Haiti, Martinique, Barbados. *Porto Rico*: Arecibo, March 1-4; Caguas, May 28-29; Coamo Springs, June 5-7; San Juan, June 9-12; Mayagüez, Nov. 14; Martin Piña, Dec. 31 (A. M. N. H.). Fajardo, Las Cabezas, Jan. 26; Lake Tortuguero, swamp at west end, March 22; Panzardi's Place, Río Piedras, Nov. 18 (Garcia-Diaz in C. U.). *St. Thomas*: (Hagen 1861); Nov. 23-28 (A. M. N. H.). *St. John*: March 8 (A. M. N. H.). *St. Croix*, March 7-April 7 (A. M. N. H.).

Nymph.—(Calvert, Univ. Iowa Studies Nat. Hist., xii, no. 2, p. 11.) Length 15-17 + 4.5-5.5, maximum width of gills 1.5. Head oval, wider than long; setæ on hind angles short. Antennæ with 1st and 2nd segment and proximal third of the 3rd dark, the rest pale. Labium reaching slightly beyond the precoxæ, lateral setæ 6, mental setæ 4-5. Femora with preapical rings of brown. Gills with long tapering points; axis alternating brown and white. Ovipositor as long as segment 10. (Pl. VII, Fig. 4).

Specimens from Coamo Springs, April 4, and Damien, Haiti, April 3, collected by Professor Needham, and one from St. Domingo collected by K. P. Schmidt in 1916.

Enallagma Charpentier

Type.—*cyathigerum* (Charpentier).

Distribution.—Cosmopolitan.

Diagnosis.—Face pale, except the postclypeus which is sometimes black; a broad black band passing through the ocelli covering the vertex

and occiput; postocular spots present and often contiguous with the pale rear margin of the occiput. Prothorax usually black with a transverse pale spot on the fore lobe and a pale rear margin to the median lobe. Thorax pale with a black middorsal stripe, a humeral stripe of varying width, and often with reduced markings on the 2nd and 3rd lateral sutures. Tenth abdominal segment of the male slightly emarginate but not elevated into a tubercle. Eighth sternite of the female with a needle-like vulvar spine on its apical margin. Venationally resembling *Ischnura*; its chief difference being in the origin of M_2 which rises between the 4th and 6th postnodals in the fore wing. Stigma alike in both wings; usually four or more crossveins in the costal area beyond the stigma; Cu_1 ending on a level with the origin of M_{1a} ; petiolation not extending to the anal crossing.

Remarks.—These dragonflies are reported everywhere conspicuous by their number and by their brilliant colors of turquoise or azure blue and black, though some forms are yellowish and black.

Nymphs.—Body smooth; head wider than long, elliptical, widest across the eyes. Submentum of labium reaching the precoxæ; lateral setæ 4-6, mentals 3-4. Abdomen with well developed lateral keels with small apical spines. Gills variable but not with long tapering points as in *Ischnura*.

KEY TO WEST INDIAN SPECIES

Adults (Males)

- 1. Black stripe on 3rd lateral suture of thorax..... 2
 Never more than a superior spot on the 3rd suture..... 4
- 2. Postclypeus black [*truncatum*]
 Postclypeus pale; abdominal segment 2 with a horse-shoe shaped spot
 of black 3
- 3. Superior appendages not bifid; abdominal segment 3 more black dorsally
 than blue [*cultellatum*]
 Superior appendages bifid; segment 3 more blue than black..... *cæcum*
- 4. Black stripe on tibiæ incomplete..... *civile*
 Black stripe on tibiæ complete..... [*doubledayi*]

Nymphs

- 1. Gills with three irregular cross bands of brown..... *cæcum*
 Gills with no pigmented cross bands..... 2
- 2. Marginal spines on gills extending less than half the length of the gill;
 small trachea pigmented..... *civile*
 Marginal spines on gills extending more than half of the segment length;
 without pigmentation [*doubledayi*]

Enallagma cæcum (Hagen)

(Pl. VI, Figs. 5, 6.)

1861. *Agrion cæcum* Hagen, Syn. Neur. N. Am., p. 84.
 1866. *Ischnura cæcum* Scudder, Proc. Boston Soc. Nat. Hist., x, p. 189.
 1867. *Agrion cæcum* var. *cardenium* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1876. *Enallagma cæcum* Selys, Bull. Acad. Belg., xli, p. 528.
 1876. *Enallagma cæcum* race? *cardenium* Selys, *ibid.*, p. 530.
 1888. *Agrion* (*Enallagma*) *cæcum* Gundlach, Contrib. Cuba, p. 224.
 1888. *Enallagma cæcum* Kolbe, Archiv für Naturg., liv, pp. 165, 170, 172.
 1888. *Enallagma krugii* Kolbe, *ibid.*, p. 171.
 1893. *Enallagma krugii* Gundlach, Ann. Soc. Esp. Hist. Nat., (2) xxii, 2, p. 267.
 1893. *Enallagma cæcum* Gundlach, *ibid.*, p. 267.
 1893. *Enallagma cæcum* Cockerell, Journ. Inst. Jamaica, i, p. 256.
 1902. *Enallagma cæcum* Calvert, B. C. A., p. 112.
 1910. *Enallagma cæcum* Muttkowski, Cat. Odon. N. Am., p. 56.
 1910. *Enallagma cæcum* race *cardenium* Muttkowski, *ibid.*, p. 56.
 1911. *Enallagma cæcum* Wilson, Johns Hopkins Univ. Circ., No. 2, (232), p. 49.
 1916. *Enallagma cardenium* Kahl, Ann. Carn. Mus., x, p. 520.
 1919. *Enallagma cæcum* Calvert, Trans. Am. Ent. Soc., xlv, p. 350.
 1919. *Enallagma cæcum* race *cardenium*, Calvert, *ibid.*, p. 351.
 1931. *Enallagma cardenium* Dow, Proc. Biol. Soc. Wash., xlv, p. 56.

Diagnosis.—Face pale except for a small spot of black on the lateral hinges of the labrum and a narrow fronto-clypeal band slightly projecting on either side. Postocular spots large but not reaching the rear border and narrowly separated from the pale occipital border. Rear of eyes pale except at the roots and the narrow rear margin. Black humeral stripe of thorax slightly narrower than the pale antehumeral. Second lateral suture with a trace of black at its top, which is connected above with the humeral and with the line on the 3rd suture; this line on the 3rd suture reaches only to the level of the spiracle. Legs black; tibiæ pale externally and apically. Abdominal segments 1-3 as in Pl. I, Fig. 10; 4-7 black except for a narrow basal pale ring interrupted dorsally; 8-9 entirely blue dorsally except for the black preapical setæ and a very narrow basal ring. Sides broadly marked with black; 10 all black except for the pale latero-ventral margins. Entire venter pale; 8-9 with some traces of black. Superior appendages black, pale basally and ventrally; inferiors pale except their black tips.

Female. Labrum and postclypeus black. Stripe of 3rd lateral suture of thorax abbreviated below. Abdominal segments 1-2 like the male; ante-apical ring fused on the mid-line with the apical one. Dorsum of 3-7 metallic green black with interrupted pale basal rings; sides and venter

pale; 8 pale above, the black apical ring one-fourth to one-fifth the segment length and fused with the black of the sides. Nine to ten black above. Appendages black; ovipositor pale, about as long as segment 10, the tips of the hooklets reaching to the tip of the appendages; ventral spine on 8 present.

Remarks.—*Enallagma cardenium* as discussed by Williamson (1922) and Byers (1930) I treat here as a race of *cæcum*. The appendages of all my Cuban material shows the differences pointed out by Selys and Dr. Calvert. Other variations indicated by Dr. Calvert are also in agreement.

E. cæcum cardenium differs from the typical *cæcum* as follows: (1) The inferior branch of the superior appendages of the male is wider than that of *cæcum*. Its width is greater than and even two times as great as its length, thereby making the notch between it and the stalk less deep. (2) Smaller size. (3) Dorsal thoracic band is slightly wider.

The following table shows the results obtained by measurements of forty-five specimens,

Locality	Length in mm.			Width in mm.		Notch in app.
	abdomen	h. w.	stigma	post. oc. spots	dors. stripe	
P. R. (21) ¹⁷	26-28.5	17-19.5	.33-.38	.28-.45	.60-.88	deep
St. Thomas (1)	26	17	.38	.38	.69	deep
St. Croix (8)	25-28	16-18	.30-.38	.38-.44	.69	medium
Haiti (5)	25-27.5	17-18	.35-.46	.30-.40	.60-.73	medium
Cuba (10)	23-24.5	14.5-16.5	.26-.29	.32-.46	.44-.55	shallow

Due to the kindness of Herr Doktor Günther Enderlein of the Zoölogisches Museum der Universität, Berlin, I have been able to examine Kolbe's type of *Enallagma krugii*. It is a true *E. cæcum cæcum*, showing the characters of the other specimens that I have seen from Porto Rico.

Size.—*E. cæcum cæcum*: Abdomen, 25-28.5, hind wing, 17-19.5 mm.

E. cæcum cardenium: Abdomen, 23-24.5, hind wing, 14.5-16.5 mm.

Type locality.—*E. cæcum cæcum*: St. Thomas and Cuba. *E. cæcum cardenium*: Cuba.

Distribution.—*E. cæcum cæcum*: Calif., Central Amer. to Brazil. *West Indies*: Isle of Pines (?), Jamaica, Haiti. *Porto Rico*: (Selys 1876, Gundlach 1893, Kolbe); Mameyes, Feb. 19; Caguas, Feb. 10, and May 28; Jayuya, Jan. 5; Cayey, May 30-31; Barros, June 4; Ensenada, June 14-19; Adjuntas, June 8-26; Aibonito, July 14-17; Coamo Springs, June 5-7, July 18, and Dec. 27 (A. M. N. H.). Coamo Springs, April 4 (Needham, in C. U.); Cidra, March 28, 1300 ft. (M. D. Leonard in C. U.).

¹⁷ Number in parenthesis indicates number of specimens examined.



St. Croix: Christiansted, June 4-March 3 (A. M. N. H.). *St. Thomas*: (Hagen 1861), (Gundlach 1893), April 5 (A. M. N. H.).

E. cæcum cardenium: Florida, *West Indies*: Cuba.

Nymph.—(*cardenium* after Byers, 1930, Univ. Fla. Publications, I, 1, p. 194.) Total length 9 + 5. Lateral setæ 4, mental setæ 3. Lateral keels of abdomen well developed, bearing setæ in clumps. Gills broad, leaf-like, with pigment in the axis and tracheæ, and in three irregular cross bands.

Enallagma civile (Hagen)

(Pl. VI, Fig. 13.)

1861. *Agrion civile* Hagen, Syn. Neur. N. Am., p. 88.
 1867. *Agrion civile* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1876. *Enallagma civile* Selys, Bull. Acad. Belg., xli, p. 514.
 1888. *Agrion (Enallagma) civile* Gundlach, Contrib. Cuba, p. 226.
 1888. *Enallagma civile* Kolbe, Archiv für Naturg., liv, p. 170.
 1893. *Enallagma civile* Gundlach, Ann. Soc. Esp. Hist. Nat., (2) xxii, 2, p. 267.
 1902. *Enallagma civile* Calvert, B. C. A., p. 110.
 1909. *Enallagma civile* Calvert, Ann. Carn. Mus., vi, p. 158.
 1910. *Enallagma civile* Muttkowski, Cat. Odon. N. Am., p. 56.
 1911. *Enallagma civile* Wilson, Johns Hopkins Univ. Circ., 2, No. 232, p. 49.
 1919. *Enallagma civile* Calvert, Trans. Am. Ent. Soc., xlv, p. 354.

Diagnosis.—*Male*. Face pale blue except the postclypeus which is black with a blue border. Postocular spots wide, narrowly separated from the narrow occipital border. Eyes and rear of head pale blue. Dorsum of prothorax black except for the usual transverse spot on the fore lobe and the narrow elevated margin of the rear lobe and a pale spot on each side. Synthorax with the usual middorsal black stripe and the humeral stripe, both narrow. Third lateral suture with a spur of black at the top more or less connected with the humeral stripe. Postero-lateral margin with a black spot. Femora black streaked with pale on the outside; tibiæ pale, with an incomplete black line internally; tarsal segments black apically; claws long, black tipped. Abdomen conspicuous turquoise blue with black as follows: a small middorsal spot and a narrow apical ring on 1; segments 2-7 with an anteapical spot narrowly connected with an apical half ring, on 4-5 increasing in size and more broadly connected, on 6-7 broadly fused with the ring, on 6 three-fourths of the segment length, on 7 four-fifths. Eight to nine all pale with extremely minute basal rings; 10 black on the dorsum. Superior appendages black; inferiors black at tip only.

Female. Similar to the male. Differs in having the apical spots of the abdominal segments covering nearly all of the dorsum, leaving only a basal ring pale.

Remarks.—Mature specimens become pruinose on the ventral portions of the thorax and on the basal abdominal segments, and at the wing roots.

Size.—Abdomen, 24-26 mm., hind wing, 15.5-18.5 mm.

Type locality.—N. Y., Md., Wash., Tex., Pecos and Matamoras, Mexico.

Distribution.—Transition to Tropic, N. Am. south of 45° lat. *West Indies:* Cuba, Isle of Pines, Jamaica, Haiti. *Porto Rico:* Tortuguero Lake, Manatí, Feb. 20; Caguas, May 28-29; Coamo Springs, June 5-7; Aibonito, Oct. 11 (A. M. N. H.). Coamo Springs Reservoir, April 5 (Needham in C. U.).

Nymph.—(Needham and Cockerell, 1907, Psyche, x, 137.) Total length 20 + 6. Lateral setæ 5-6, mentals 4. Gills lanceolate, pigmented only in the smaller tracheæ.

Anomalagrion Selys

Type.—*hastatum* (Say).

Distribution.—Nearctic and Neotropic.

Diagnosis.—The male is easily recognized by the ovoid stigma of the fore wing which does not come in contact with the costa. M_2 rising between the 3rd and 4th postnodals; M_{1a} rising within a cell of the stigma; one crossvein beyond the stigma; Cu_1 ending beyond M_2 ; Cu_2 ending before M_{1a} . Postocular spots present in the male but tending to disappear in the female. Apical margin of the 10th abdominal segment of the male with an elevated process on the dorsum. Eighth sternite of the female with a very small apical spine. Tarsal claw with an inferior tooth. Female with two color forms.

Nymph.—Hind angles of the head rounded. Lateral setæ 4-5, mentals 4. Gills less than half as wide as long, with long tapering points and with little or no pigmentation.

Anomalagrion hastatum (Say)

(Pl. VI, Fig. 9.)

1839. *Agrion hastatum* Say, Journ. Acad. Nat. Sci., Phila., viii, p. 38.
 1842. *Agrion anomalum* Rambur, Ins. Neur., p. 281.
 1844. *Agrion veneriotatum* Haldemann, Proc. Acad. Nat. Sci., Phila., ii, p. 55.
 1857. *Trichocnemis minuta* Selys, in Sagra, Hist. Nat., vii, p. 197.
 1857. *Agrion hastatum* Selys, *ibid.*, p. 200.
 1861. *Agrion hastatum* Hagen, Syn. Neur. N. Am., p. 77.
 1867. *Anomalagrion hastatum* Hagen, Proc. Boston Soc. Nat. Hist., xi, p. 290.
 1867. *Anomalagrion hastatum* Uhler, *ibid.*, p. 295.

1876. *Anomalagrion hastatum* Selys, Bull. Acad. Belg., xli, p. 255.
 1888. *Agrion (Anomalagrion) hastatum* Gundlach, Contrib. Cuba, p. 232.
 1903. *Anomalagrion hastatum* Calvert, B. C. A., p. 130.
 1909. *Anomalagrion hastatum* Calvert, Ann. Carn. Mus., vi, p. 210.
 1910. *Anomalagrion hastatum* Muttkowski, Cat. Odon. N. Am., p. 71.
 1911. *Anomalagrion hastatum* Wilson, Johns Hopkins Univ. Circ., 2 (232), p. 49.
 1916. *Anomalagrion hastatum* Kahl, Ann. Carn. Mus., x, p. 520.
 1919. *Anomalagrion hastatum* Calvert, Trans. Am. Ent. Soc., xlv, p. 356.
 1931. *Anomalagrion hastatum* Dow, Proc. Biol. Soc. Wash., xlv, p. 56.

Diagnosis.—*Male.* Labrum yellow with a black basal border which slightly invades the center; genæ and face yellow up to and including the first segment of the antennæ and the anterior surface of the second segment; the postclypeus black. Vertex bronze green with a small yellow spot in front of the median ocellus and a pair of small, round, widely separated postocular spots. Occipital border yellow connecting with the yellow of the rear of the eyes. Black of the vertex extending down at the rear of the antennæ. Body pale yellow, the following parts metallic black: top of prothorax except a transverse band across the fore lobe and three dashes on the rear margin of the median lobe and an extension of the yellow of the sides up onto the lateral rear margins of the hind lobe; front of synthorax as far as the 2nd lateral suture except for a narrow complete antehumeral line each side; a small trace on the top of the 3rd suture. Legs yellow with a black line on the apical half of the femora outside, and a couple of streaks on the tibiæ towards the knees, and a narrow terminal ring on the apex of the tarsus; spines black. Stigma of fore and hind wing dissimilar, the former yellow and separated from the costa which is yellow and slightly bulging in the region over the stigma; that of the hind wing black and normal in position. Abdomen yellow marked with black as follows: segments 1 and 2 above; 3-6 with an apical spot connected with an apical ring and with a basal triangular spot pointed to rearward and connected by a stalk to a fine basal ring; on 3 this basal mark covering two-thirds of the segment length and narrowly connected with the apical spot; on 4-5 covering one-fifth to two-fifths, and on 6 narrowly connected with the apical spot; 7 ordinarily with the basal three-fourths black; 8-10 and appendages yellow. Segment 10 prolonged in the middle into a long narrow tongue, a little forked at the end.

Female. Differs from the male as follows: the black color more bronzy and on the thorax not quite reaching the 2nd lateral suture; outside of femora wholly black; abdomen black above, pale ventrally. Ventral spine on segment 8 minute and black tipped. Stigma of fore wing normal. The *orange* female: postclypeus pale except the basal and apical borders; postocular spots broadly confluent with the rear of the head and with the occip-

ital border. Thorax orange yellow as far as the 2nd lateral suture with a broad middorsal band of black covering one half of each mesepisternum, a very narrow black line on the humeral suture and a spot at the top of the 2nd lateral suture; rest of thorax pale yellow with a suggestion of a black line at the top of the 3rd lateral suture. Abdomen orange; segment 2-5 with a narrow black apical band and a minute basal middorsal spot; 4 with, in addition, a suggestion of an anteapical spot which on 5 is larger and distinct; 6-8 all black above; 9 with two basal spots extending half the segment length and indistinctly beyond, but reappearing diffusely on 10. Ventral spine on 8 scarcely visible.

Size.—Abdomen, 23-28 mm., hind wing, 8-13 mm.

Type locality.—Indiana.

Distribution.—Maine and N. Dakota south to Panama. *West Indies*: Cuba, Isle of Pines, Jamaica, Haiti. *Porto Rico*: (Calvert 1909). San Juan, Feb. 11-14; Mayagüez, Jan. (A. M. N. H.).

Remarks.—This species is easily recognized by the stigma of the fore wing of the male and the black and yellow markings of the abdomen, as well as by its small size. The black on abdominal segment 7 ranges in extent from one-fourth to seven-eighths of the segment length.

Nymph.—(Needham, 1903, N. Y. State Mus. Bull., 68, p. 263.) Length 8 + 4. Hind angles of head rounded, with but a few hairs. Lateral setæ of labium 5-6, mentals 4 (Pl. VII, Fig. 2A). Abdomen with lateral keels which are slightly spinulose. Gill as in Pl. VII, Fig 2B.

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1899. Odonata from Tepic Mexico with supplemental notes on those of Baja California. Proc. Calif. Acad. Sci., (3) i, pp. 376-418. 1 pl.
1903. Synopsis of Three Species of Coryphæshua. En. News, xiv, pp. 8-10. Pl. II.
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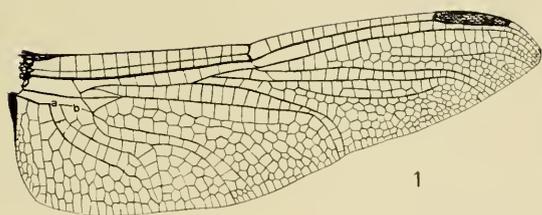
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PLATE I

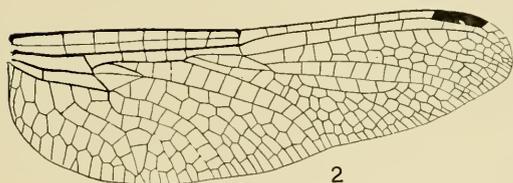
1. *Orthemis ferruginea*, hind wing.
2. *Micrathyria dissocians*, hind wing.
3. *Scapanea frontalis*, hind wing.
4. *Miathyria marcella*, hind wing.
5. *Pantala flavescens*, hind wing, (p) patella.
6. *Erythrodiplax berenice nava*, lateral view thorax to show color pattern.
7. *Ceratura capreola*, color variations abdominal segment 8 of ♂.
8. *Ischnura ramburii*, color variations abdominal segment 2 of ♀.
9. *Ischnura ramburii*, color variations abdominal segment 8 of ♂.
10. *Enallagma cœcum*, color pattern abdominal segments 1 to 3.
11. *Lestes tenuatus*, fore wing.
12. *Ceratura capreola*, fore wing.
13. *Protoneura capillaris*, fore wing.
14. Base of anal area of hind wing: a, *Brachymesia herbida*; b, *B. furcata*; c, *Sympetrum madidum*.



1



6



2



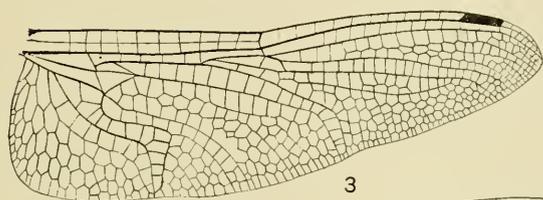
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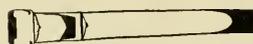
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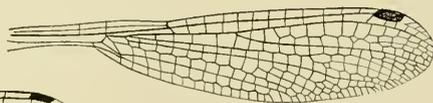
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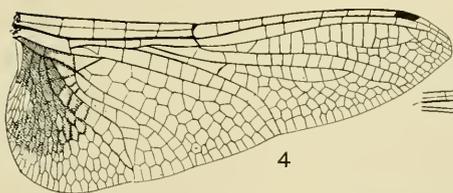
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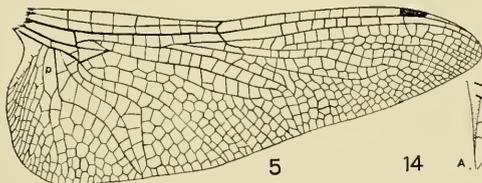
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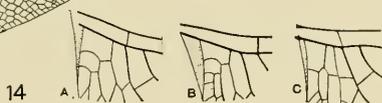
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14

A.

B.

C.

PLATE II

Genitalia of second segment of ♂

1. *Perithemis domitia*
2. *Miathyria marcella*
3. *Orthemis ferruginea*
4. *Brachymesia herbida*
5. *Brachymesia furcata*
6. *Lepthemis vesiculosa*
7. *Erythemis peruviana*
8. *Erythemis hæmatogastra*
9. *Erythemis plebeja*
10. *Macrodiplax balteata*
11. *Erythrodiplax ochracea*
12. *Erythrodiplax justiniana*
13. *Caunaphila insularis*
14. *Celithemis eponina*
15. *Uracis imbuta*
16. *Ephidatia longipes*
17. *Micrathyria aqualis*
18. *Micrathyria dissocians*
19. *Micrathyria didyma*
20. *Micrathyria debilis*
21. *Dythemis rufinervis*
22. *Macrothemis celeno*
23. *Scapanea frontalis*
24. *Libellula auripennis*

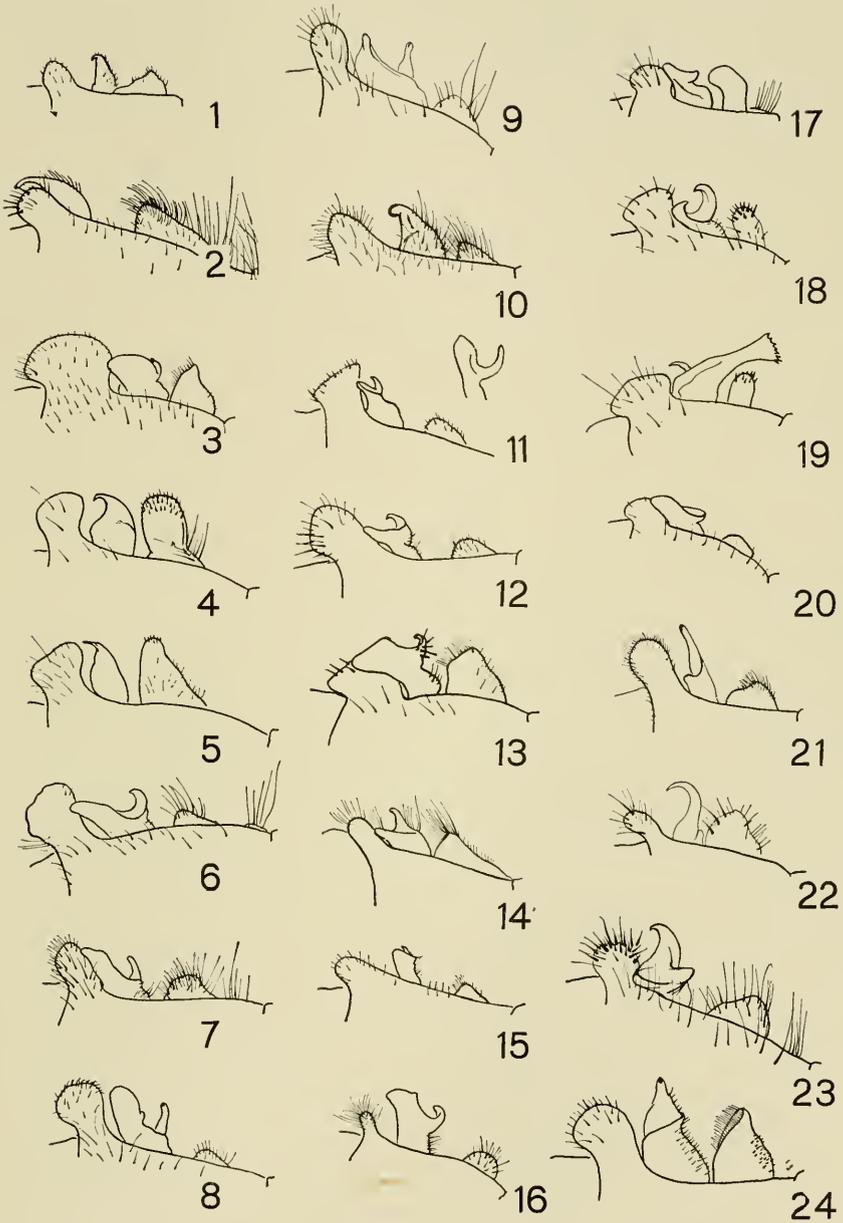


PLATE III

Nymph of:

1. *Miathyria*
2. *Macrothemis celenc*
3. *Scapanea frontalis*
4. *Micrathyria dissocians*

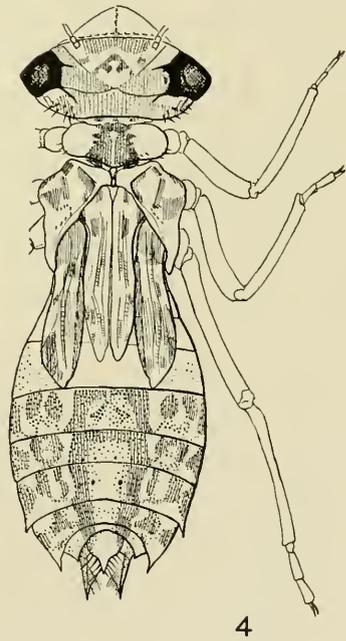
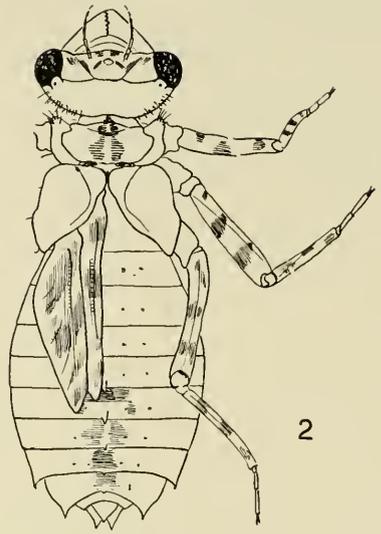
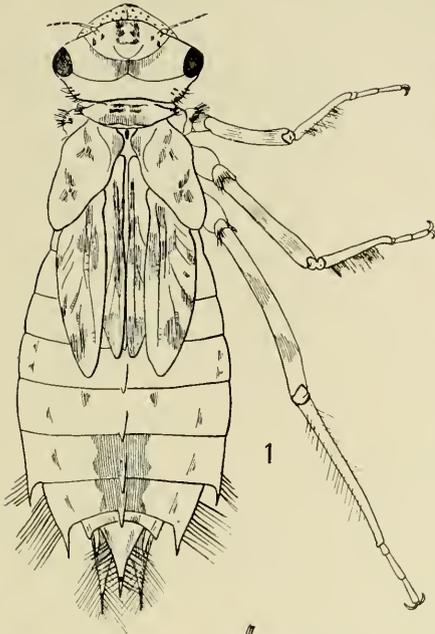


PLATE IV

1. *Brachymesia*; (a) nymph, (b) its labium, (c) lateral lobe of labium.
2. *Lepthemis vesiculosa*; (a) nymph, (b) its labium, (c) distal margin of lateral lobe.
3. *Orthemis ferruginea*; part of nymphal labium.
4. *Erythemis*; (a) nymphal labium, (b) lateral lobe of labium, (c) lateral view of caudal appendages.

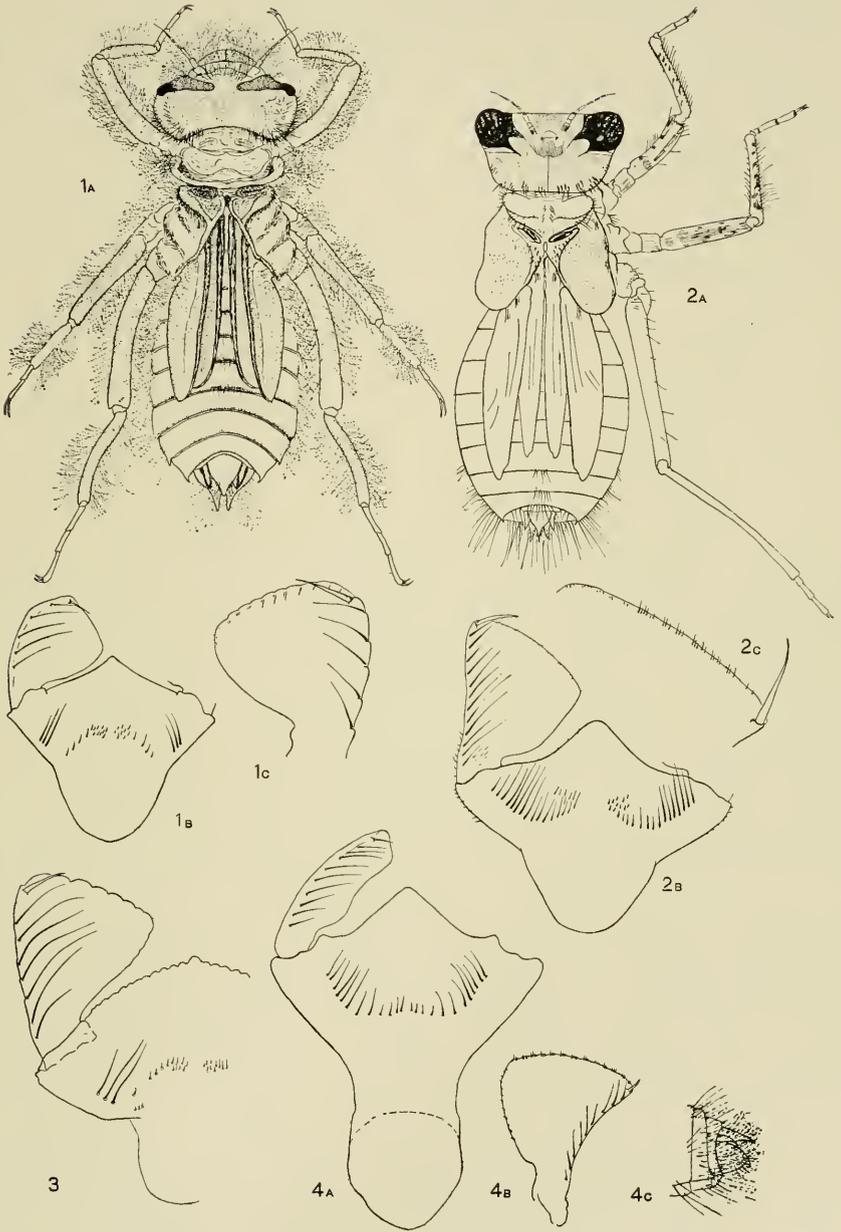


PLATE V

Labium and distal margin of lateral lobe enlarged :

1. *Perithemis domitia*
2. *Miathyria*
3. *Erythrodiplax umbrata*
4. *Erythrodiplax justiniana*
5. *Micrathyria dissocians*
6. *Scapanea frontalis*
7. *Dythemis rufinervis*
8. *Macrothemis celeno*

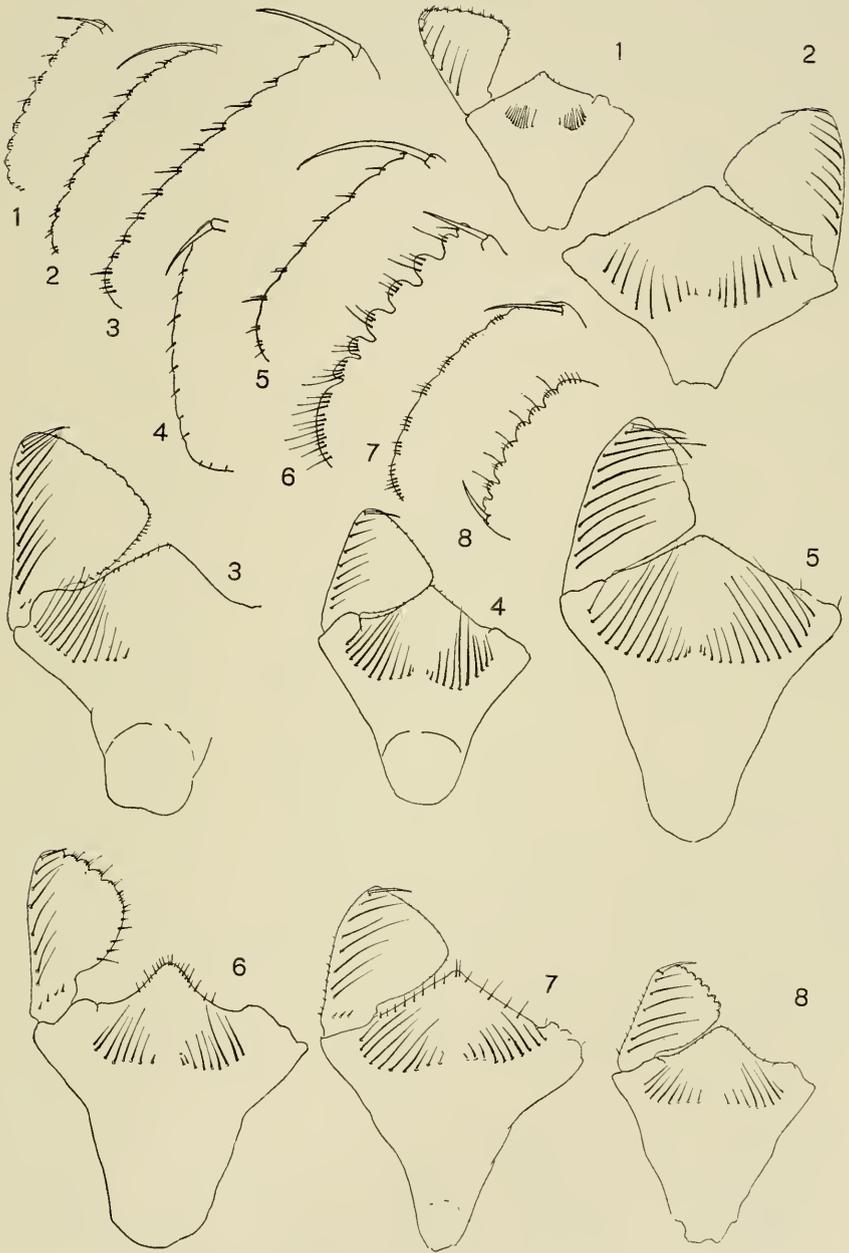


PLATE VI

1. *Lestes forficula* (a) ventral view thorax to show pectoral spots. ♀.
(b) superior oblique view anal appendages ♂.
2. *Lestes tenuatus*; (a) ventral view thorax to show pectoral spots, ♀,
(b) dorsal view one superior and inferior appendages, ♂, (c)
lateral view of same.
3. *Lestes spumarius*; (a) ventral view thorax to show pectoral spots, ♀.
(b) dorsal view anal appendages, ♂.
4. *Lestes scalaris* (after Calvert); (a) ventral view thorax, ♀, (b)
lateral view anal appendages ♂, (c) superior oblique view of
superior appendage of same.
5. *Enallagma cæcum cæcum*; lateral view appendages ♂, and superior
oblique view of one superior.
6. *Enallagma cæcum cardenium*; the same.
7. *Enallagma cultellatum*; dorsal view of superior appendage and su-
perior oblique view of same. ♂.
8. *Ceratura capreola*; lateral view anal appendages ♂.
9. *Anomalagrion hastatum*; the same.
10. *Leptobasis vacillans*; (a) lateral view anal appendages ♂, (b) dorsal
view of one pair.
11. *Telebasis vulnerata*; lateral view anal appendages ♂.
12. *Telebasis dominicanum*; the same.
13. *Enallagma civile*; (a) lateral view anal appendages ♂, (b) dorsal
view of one pair.
14. *Enallagma doubledayi*; the same.

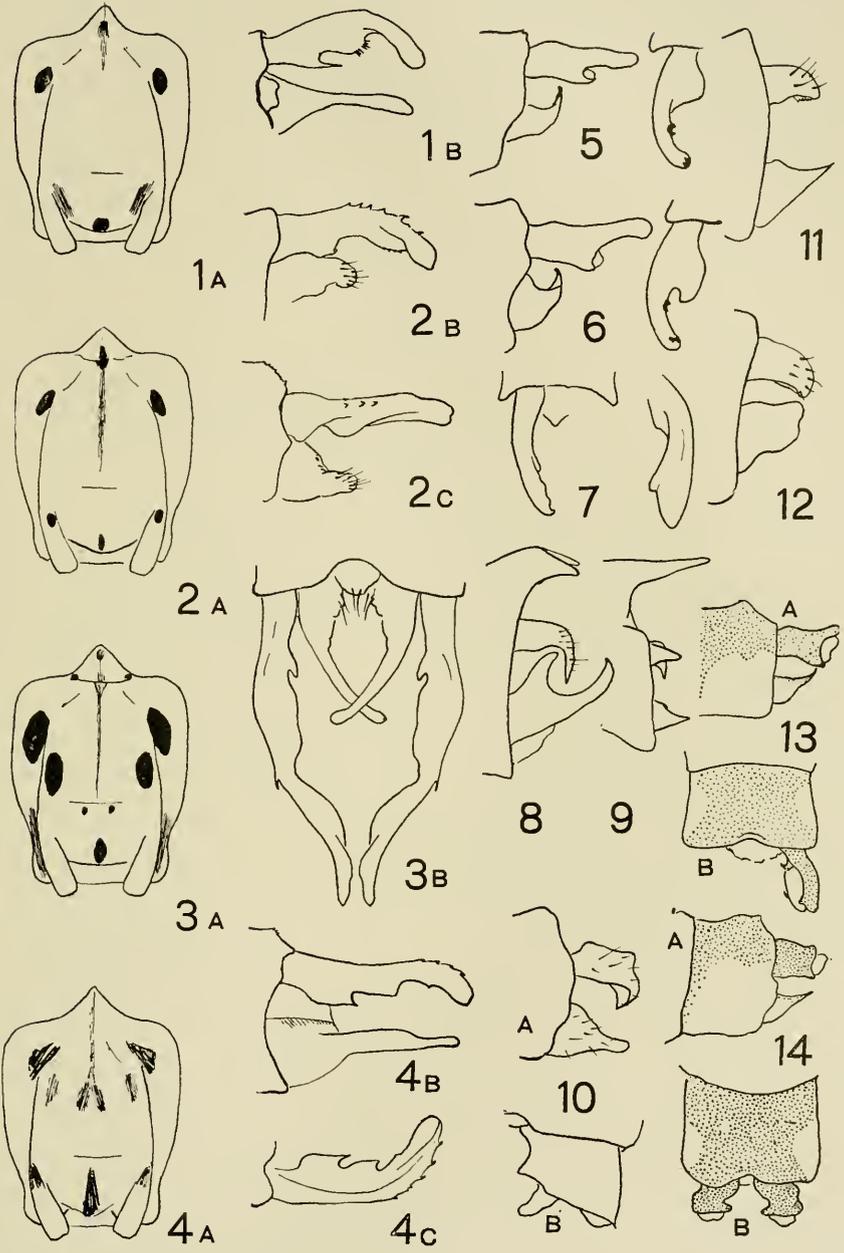
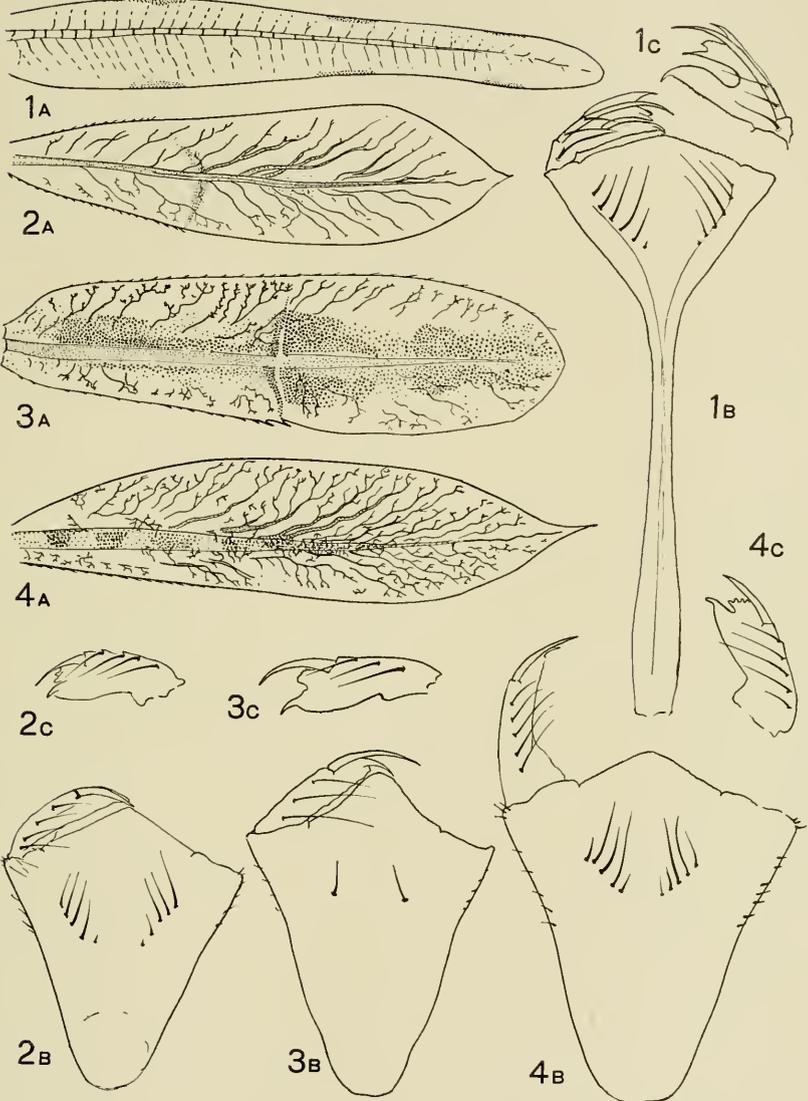


PLATE VII

(a) Nymphal gill, (b) labium, (c) lateral lobe of labium :

1. *Lestes forficula*
2. *Anomalagrion hastatum*
3. *Telebasis* sp.
4. *Ischnura ramburii*



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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 Cicadellidae 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*; *Carnecephala 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, Membraeidæ, 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 Neotropic 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 Typhlocybinae 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 pygmaea* 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 portulacastrum*, 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 *Oliurus franciscanus*, and two or three species of delphacids.

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

On the beach grass, *Sporobolus virginiana*, 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. cordia* 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 Auchenorrhynchos division in such manner as to enable students of the fauna to recognize the different forms. The Sternorrhynchi, 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 *Insecta 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 Neotropical 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 abdomenMembracidæ
 - aa. Hind tibiæ armed with a circlet of spines.....Cercopidæ
 - BB. Ocelli two, or wanting, hind tibiæ with a double series of spinesCicadellidæ
 - 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.

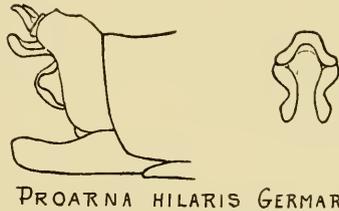
Proarna hilaris (Germar)

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.

Borenocona Davis

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

Genotype, *B. aguadilla* Davis.

Borenocona aguadilla Davis

1928. *Borenocona aguadilla* Davis, Jour. N. Y. Ent. Soc., xxxvi, pp. 31-33.

1929. *Borenocona aguadilla* Osborn, Jour. Dept. Agr. P. R., xiii, p. 90.

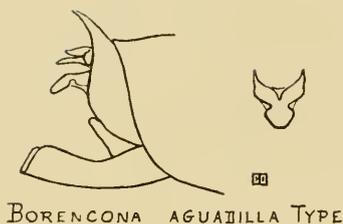


FIG. 2.—*Boreconca aguadilla* Davis
Male genitalia (After Davis)

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.

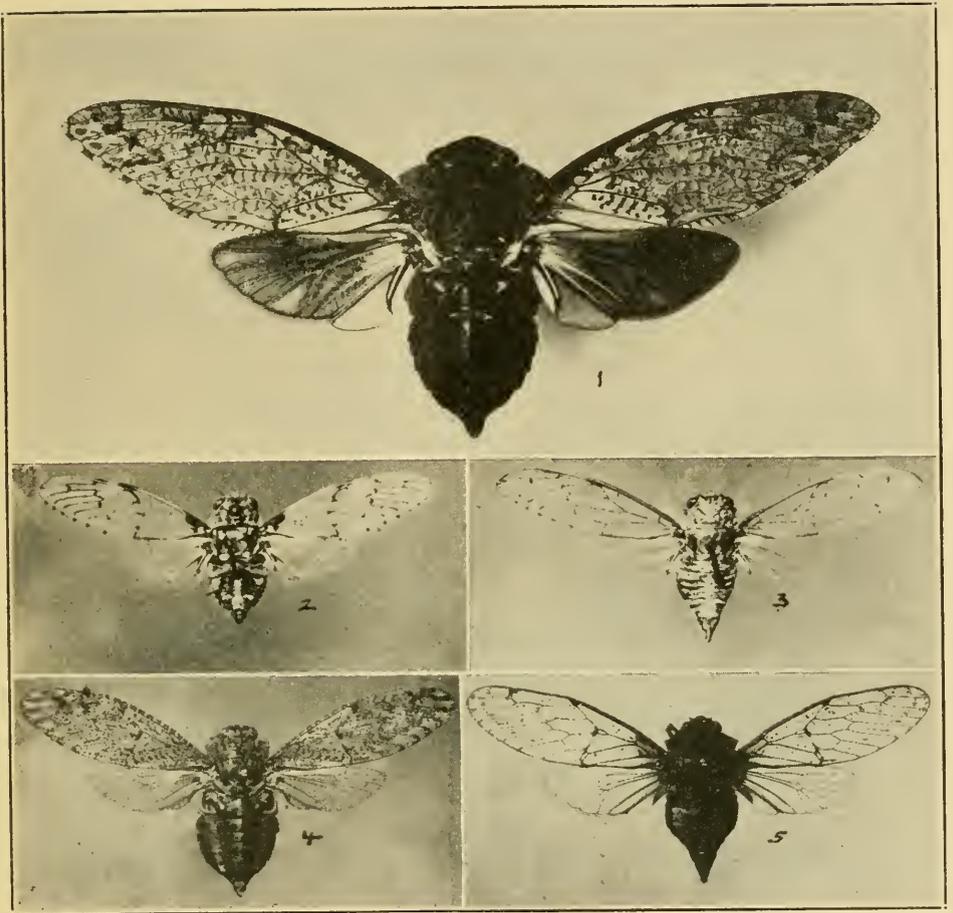


FIG. 3.—*Proarna hilaris* (2 & 3)

Boreoconca aguadilla (4 & 5) (After Davis)

The figure (1) of *Juanaria pocyi* 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.

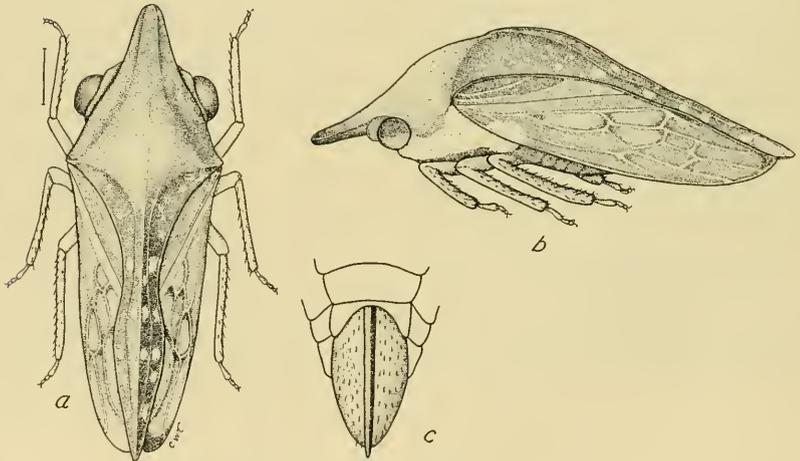


FIG. 4.—*Nessorhinus gibberulus* Stål

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. $2\frac{1}{2}$ 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.

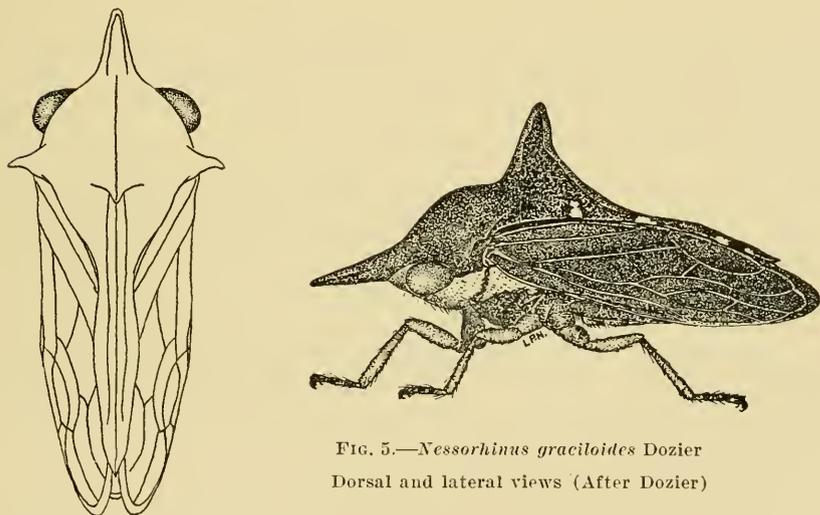


FIG. 5.—*Nessorhinus graciloides* Dozier
Dorsal and lateral views (After Dozier)

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, Hemptères, p. 542.

1929. *Nessorhinus vulpes* Osborn, Jour. Dept. Agr. P. R., xiii, p. 90.

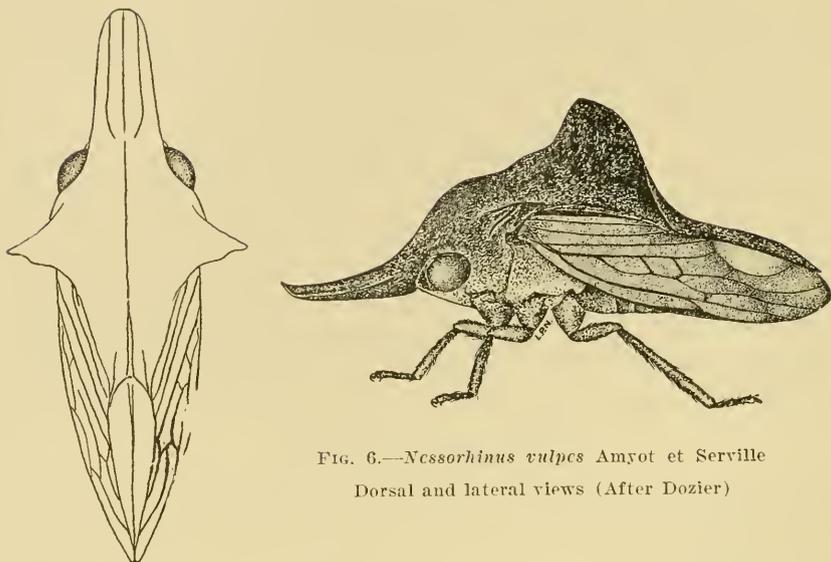


FIG. 6.—*Nessorhinus vulpex* Amyot et Serville
Dorsal and lateral views (After Dozier)

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 tibiae.

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 *Philænus* 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."

Philenus Stål

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

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

Philenus fusco-variis Stål

1864. *Philenus fusco-variis* Stål, Stet. Ent. Zeit., xxv, p. 66.
 1923. *Philenus fusco-variis* Wolcott, Jour. Dep. Ag. P. R., vii, p. 257.
 1929. *Philenus fusco-variis* 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 Germar1838. *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 tibiae, which are usually more or less prismatic, and have, especially in the case of the hind tibiae, 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. Bythoscopinae
 - bb. Ocelli located on the disk of the vertex.
 - c. Not depressed nor flattened.....Cicadellinae
 - cc. Bodies depressed, head more or less flattened, vertex margin thinGyponinae
 - bbb. Ocelli located on border between vertex and front, or, rarely, on vertex close to border.....Jassinae
- AA. Elytral nervures forking at base and running without crossveins nearly to apex. Ocelli usually wanting, or inconspicuous.....Typhlocybinae

Porto Rico has representatives of all these subfamilies but the Cicadellinae and Gyponinae 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..... | <i>sticticollis</i> |
| 2. Pronotum marked with orange..... | <i>pulchra</i> |
| Pronotum not marked with orange..... | 3 |
| 3. Smaller, dark gray..... | <i>pepino</i> |
| Larger, elytral veins and clavus whitish..... | <i>albidula</i> |

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).

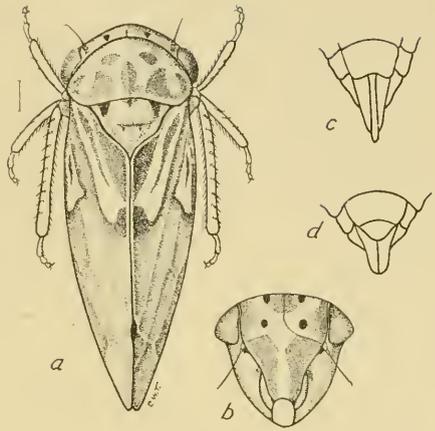
I took specimens at many different localities during January and February.

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 Gyponinae. 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.....*Carueoccephala*

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.

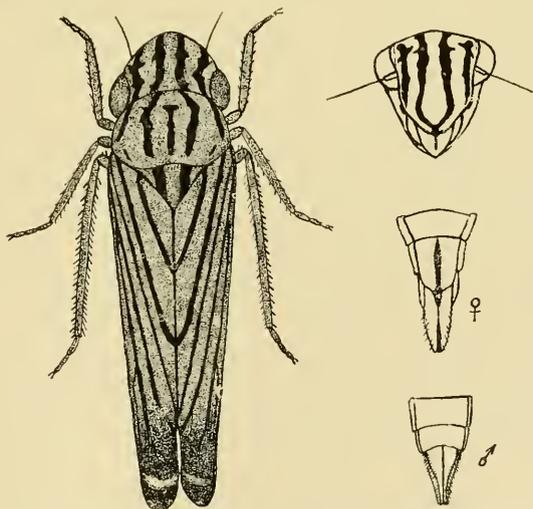


FIG. 8.—*Entogonia (Cicadella) coffeaphila* (Doz.)

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.

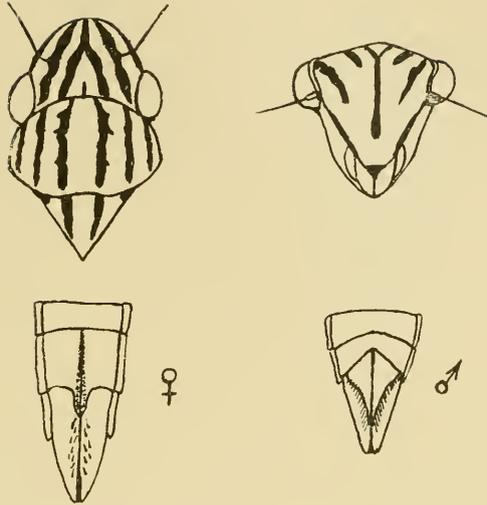
1929. *Cicadella coffeacola* Osborn, Jour. Dept. Agr. P. R., xiii, p. 92.

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.

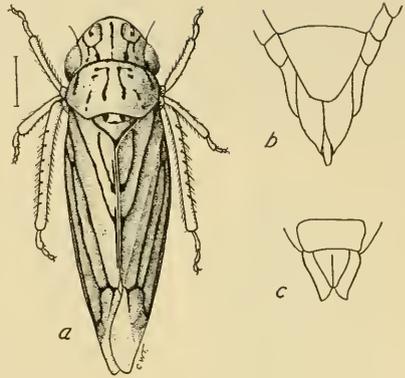
1899. *Tettigonia sirena* Fowler, Biol. Cent.-Am., Homopt., ii, p. 253.

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 longitudinal, 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 $5\frac{1}{2}$ 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 prolira* 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.

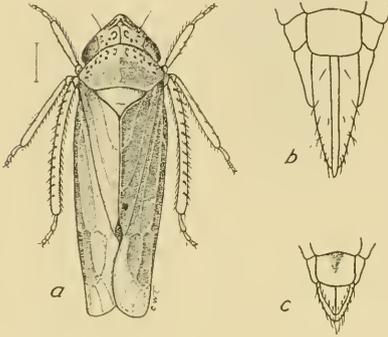


FIG. 11.—*Cicadella similis* (Walk)
 a, dorsal view, b, female, c, male genitalia
 (Original)

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 under-side, 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.

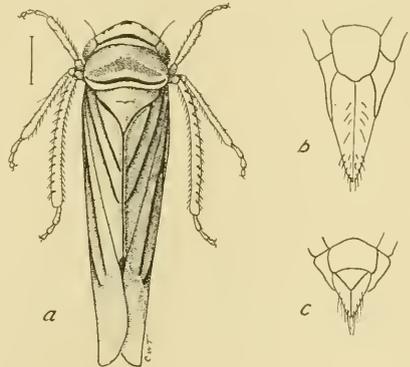
1917. *Kolla bifida* var. *fasciata* Van Duzee, Catalog, p. 599.

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 hill-sides." (Osborn).

Carnecephala Ball

1927. *Carnecephala* Ball, Florida Entom., xi, p. 29.

Genotype, *Draculacephala floridana* Ball.

Carnecephala (Draculacephala) sagittifera (Uhler)

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

1923. *Draculacephala sagittifera* Wolcott, Jour. Dept. Agr. P. R., vi, p. 260.

1927. *Carnecephala sagittifera* Ball, Florida Entom., xi, p. 40.

1929. *Draculacephala sagittifera* Osborn, Jour. Dept. Agr. P. R., xiii, p. 93.

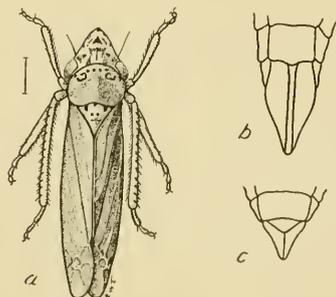


FIG. 13.—*Carnecephala (Draculacephala) sagittifera* (Uhl.)
a, dorsal, b, female, c, male genitalia (Original)

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 up-turned 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 $4\frac{1}{2}$ 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.

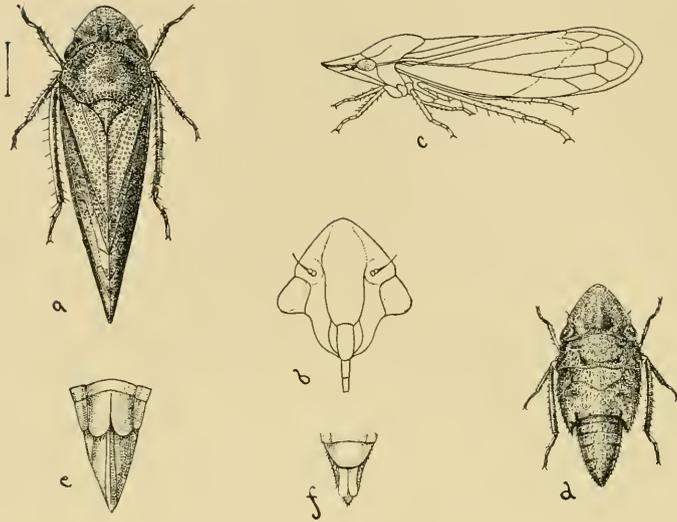


FIG. 14.—*Xerophytoca viridis* (Fab.)

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.

***Xerophleea 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.

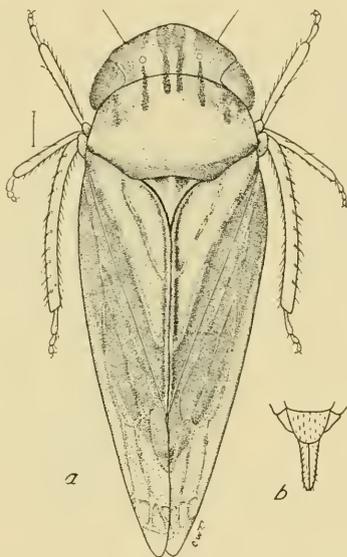


FIG. 15.—*Xerophleea breviceps* Osb.
a, dorsal, b, male genitalia (Original)

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. *Spaugbergiella*
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
Sauctanus (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. *Deltoccephalus*
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.

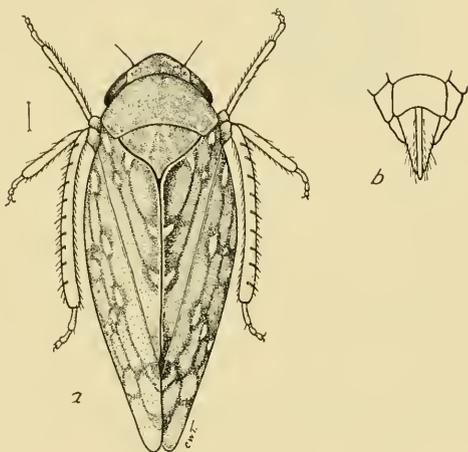


FIG. 16.—*Xestocephalus maculatus* Osb.

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 setae. 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 tibiae, 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.)

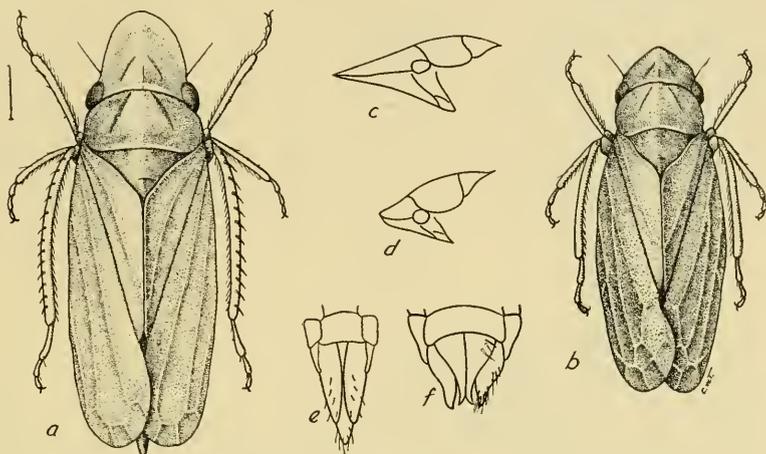


FIG. 17.—*Spangbergiella vulnerata* (Uhl.)

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, Rio 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. Cine. 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.

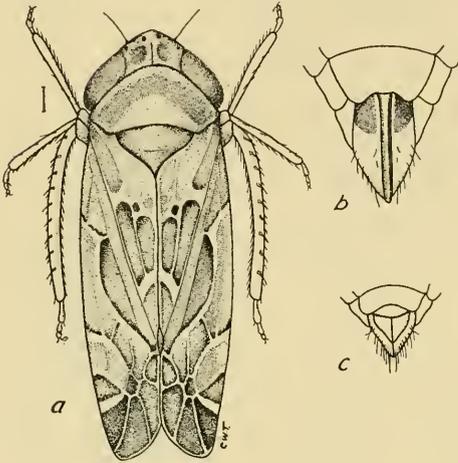


FIG. 18.—*Sanctanus (Scaphoideus) fasciatus* (Osb.)

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; loræ 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, loræ 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, Anasco, 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.

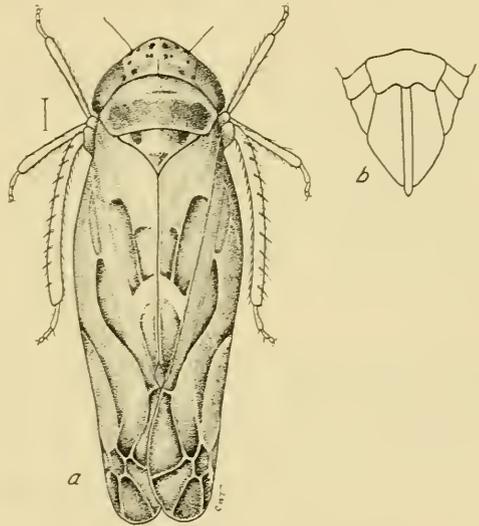


FIG. 19.—*Sanctanus fasciatus* var. *variabilis* Osb.

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 ares. 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 Quaedam Insectorum, sub. gen. 4.

Genotype, *P. undatus* (DeG.)

Platymetopius lorincatus Van Duzee

1894. *Platymetopius lorincatus* Van Duzee, Bull. Buffalo Soc. Nat. Sci., v, i, p. 205.

1923. *Platymetopius lorincatus* Osborn, Ann. Carn. Mus., xv, pp. 35-36.

1929. *Platymetopius lorincatus* 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; lore 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

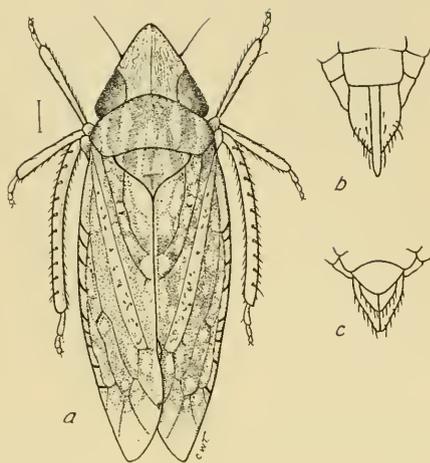


FIG. 20.—*Platymetopius loricatus* Van D.
a, dorsal, *b*, female, *c*, male genitalia
 (Original)

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 abdomen 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 Quaedam Insectorum, i, Pl. xiv, subgen. 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 antepical 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. Cangrejos, 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 persistent 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.)

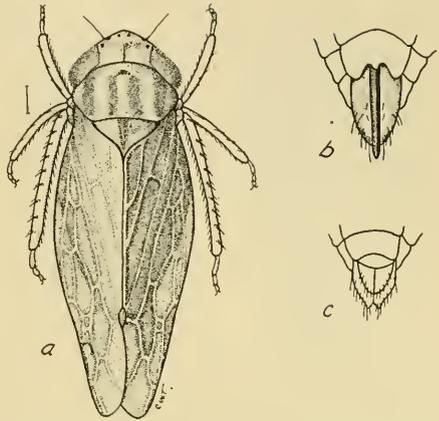
***Deltocephalus albivenosus* Osborn**

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

FIG. 21.—*Deltocephalus albivenosus*
Osborn.
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 antepical and two outer apical cells infusate. 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.

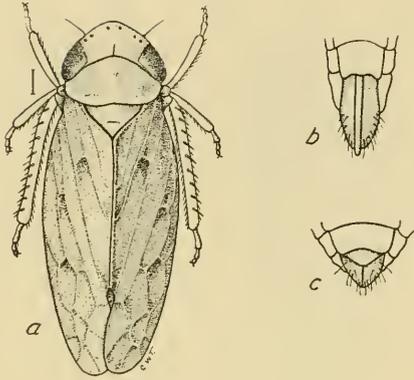


FIG. 22.—*Deltocephalus maculellus* Osb.
a, dorsal view, b, female, c, male
genitalia (Original)

“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 loræ and inner streak on cheek blackish; pronotum with five pale stripes; elytra subhyaline, the base of outer claval cell, discal cell, and apex of all claval cells, the inner anteapical and two outer anteapical cells more or less infuscate; veins whitish, middle of costa faintly yellowish. Beneath, venter yellowish, base of lateral margins and dots on tip of pygofer blackish. Length of female 3 mm. Male, 3 mm.” (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. 263, Pl. I, 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 roundly 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.

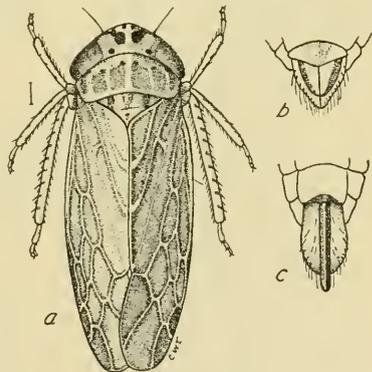
"Described from one male swept from grass at Boquerón (98-Feb. 21, 1923 GNW)." (DeLong.)

"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. 261.
 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. $3\frac{1}{2}$, Lat. $1\frac{1}{4}$ 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.

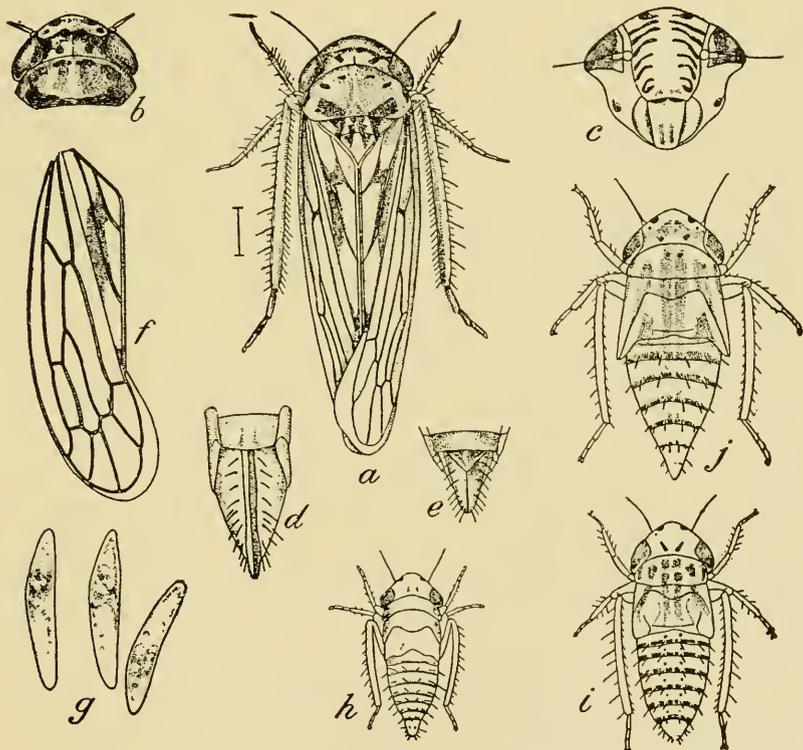
This is a small species with distinctly marked dusky bordered veins and with the anterior border of vertex with two large spots, one near each eye and a minute spot or dot each side of apex. Length: 3.25 mm.

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., iv, p. 5.Genotype, *J. obscurinervis* Stål.**Exitianus (Euscelis) obscurinervis (Stål)**

1858. *Jassus (Thamnotettix) obscurinervis* Stål, Eugenes resa. Ins. Hemipt., p. 293.
 1880. *Cicadula exitiosa* Uhler, Am. Entom., iii, p. 72.
 1892. *Limotettix exitiosa* Van Duzee, Psyche, v, p. 306.
 1895. *Eutettix exitiosa* Gillette and Baker, Hemip. Colorado, p. 100.
 1902. *Athysanus exitiosa* Osborn and Ball, Ohio Naturalist, ii, p. 234.
 1917. *Euscelis exitiosa* Van Duzee, Catalog. Hemip. North of Mexico, p. 655.
 1923. *Athysanus exitiosa* 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., iv, 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. 108, 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; loræ 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.

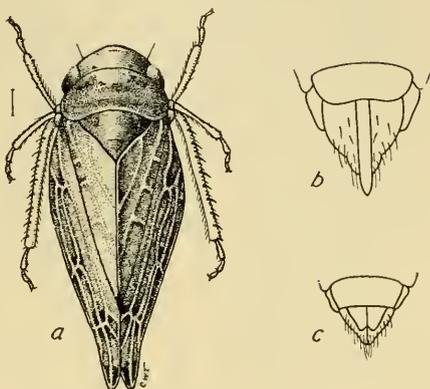
Genotype, *A. acuminatus* Van Duzee.

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**

1926. *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

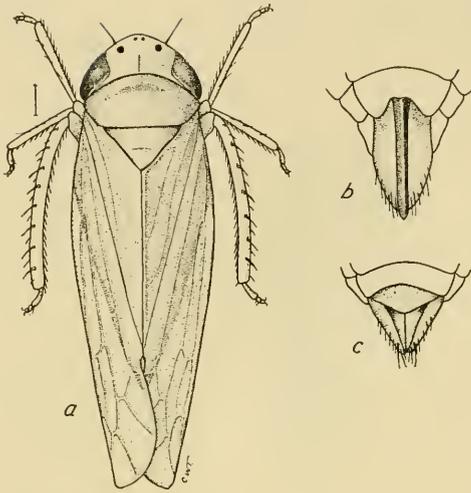


FIG. 26.—*Thamnotettix cubana* Osb.
a, dorsal view, *b*, female, *c*, male
 genitalia (Original)

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 infusate; 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**

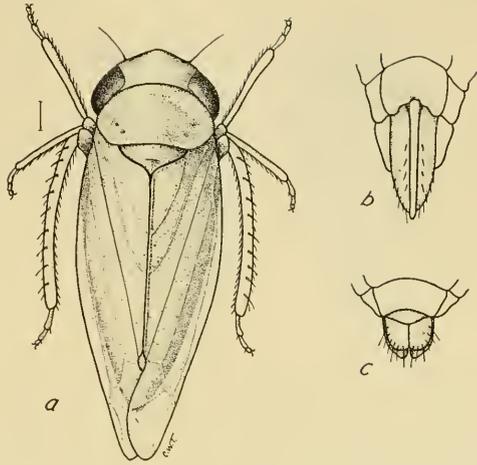
1907. *Thamnotettix rubicundula* Van Duzee, Hem. Jamaica, Bull. Buf. Soc. Nat. Sci., viii, p. 70.

1929. *Thamnotettix rubicundula* Osborn, Jour. Dept. Agr. P. R., xiii, p. 98.

“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 crescentic 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. *Deltoccephalus 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. 684.
 1923. *Thamnotettix colonus* Wolcott, Jour. Dept. Agr. P. R., vii, p. 264.
 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

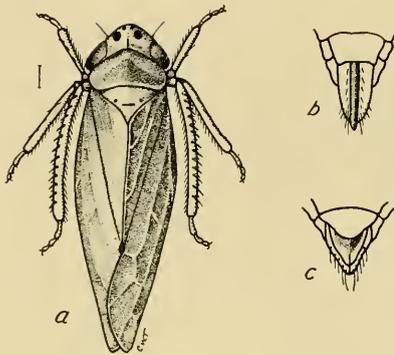


FIG. 28.—*Thamnotettix colonus* (Uhl.)
a, dorsal view, b, female, c, male genitalia
(Original)

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.

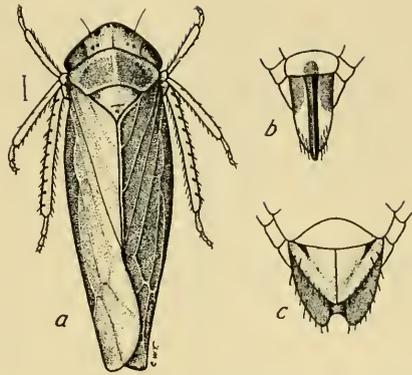
1917. *Thamnotettix comatus* Van Duzee, *Cat. Hem.*, p. 684.

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.

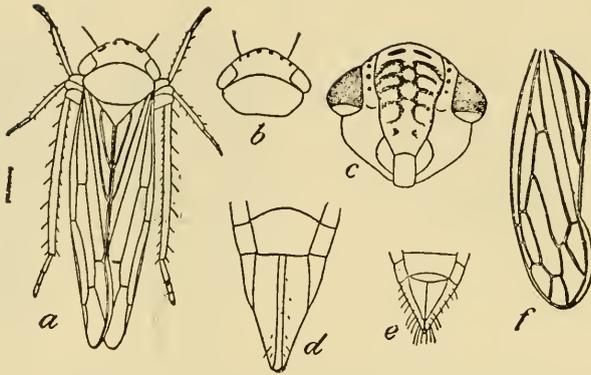
“Greenish yellow; vertex pale yellow, two large round black spots nearer the eye than to the center; two minute dots at apex of center, and in strongly marked specimens a pair of dots near the eye and a short oblique line on the disk, black. Pronotum olive-green, paler in front, with a pair of brownish 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. 684.

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.—*Thamnottetix 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. 306.

Genotype, *Bythoscopus unicolor* (Fitch).

Chlorotettix viridius Van Duzee

1892. *Chlorotettix viridius* Van Duzee, Psyche, vi, p. 309.

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. Canrejos'." (Osborn.)

Chlorotettix minimus Baker

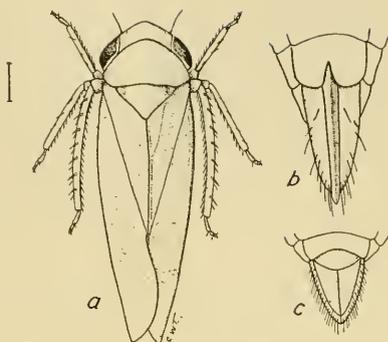
1898. *Chlorotettix minimus* Baker, Canad. Entomologist, xxx, p. 220.

1923. *Chlorotettix minimus* Osborn, Ann. Carnegie Mus., xv, p. 74.

1929. *Chlorotettix minimus* Osborn, Jour. Dept. Agr. P. R., xiii, p. 99.

"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; loræ 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, Río Piedras, Feb. 8, Feb. 14, Aguirre, Jan. 18, Ponce, Jan. 21 and Mar. 15.” (Osborn.)

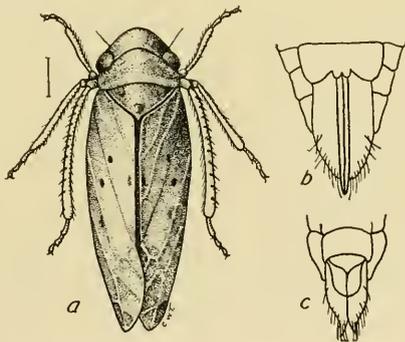
Chlorotettix tethys Van Duzee

1907. *Chlorotettix tethys* Van Duzee, Bul. Buffalo Soc. Nat. Sci., v, p. 71.

1923. *Chlorotettix bidentatus* DeLong, Jour. Dept. Agr. P. R., vii, p. 264.

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. Rhynq.* p. 85.

Genotype, *J. nevosus* Fabricius.

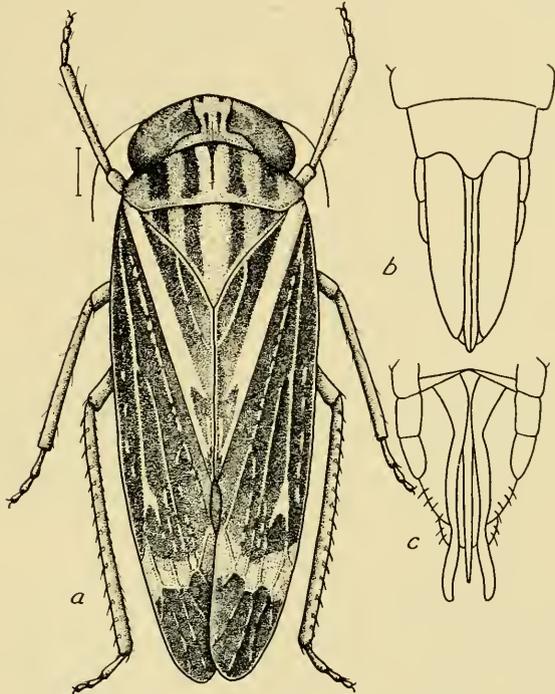


FIG. 33.—*Jassus obligatus*, n. sp.

a, dorsal view female; 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. 100.

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, lore elongate, margin of cheek

sinuate. 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; pygofer tinged with brown; elytra black, a prominent yellow stripe bordering claval 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 lavigatus*.

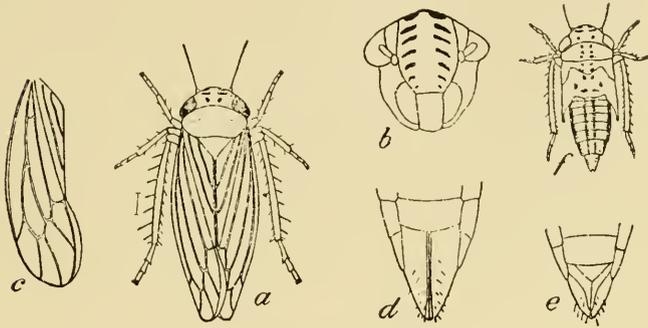
Cicadula Zetterstedt

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 maidis* DeLong and Wolcott**

1923. *Cicadula maidis* DeLong and Wolcott, Jour. Dept. Agr. P. R., vii, p. 265.
 1929. *Cicadula maidis* 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 roundly 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

1926. *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 Kirkaldy¹

1906. *Nesosteles* Kirkaldy, Bull. No. 1, Pt. 9, Exp. Sta. H. S. P. A., p. 343.
 1903. *Eugnathodus* Baker, Invertebrata Pacifica, i, 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..... | <i>virescens</i> |
| | Color mostly gray or ashy or suffused with rose or pink..... | 2 |
| 2. | Color green, strongly suffused with rose..... | <i>rosaceus</i> |
| | 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..... | <i>bisinuata</i> |
| | Vertex broadly rounded..... | 5 |
| 5. | Larger, female segment cleft at tip, male plates short..... | <i>guajanae</i> |
| | Smaller, female segment simple, male plates short..... | <i>neglectus</i> |
| 6. | Larger, 3 to 3.25 mm., pale, vertex longer..... | <i>pallidus</i> |
| | Smaller, 2.25 to 2.50 mm., ashy, vertex short..... | <i>minutus</i> |

Nesosteles bisinuatus (DeLong)

1923. *Eugnathodus bisinuatus* DeLong, Jour. Dept. Agr., vii, p. 266.
 1929. *Eugnathodus bisinuatus* Osborn, Jour. Dept. Agr., xiii, p. 102.

¹The 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 *Balclutha 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 guajanae* (DeLong)**

1923. *Eugnathodus guajanae* DeLong, Jour. Dept. Agr. P. R., vii, p. 267.

1929. *Eugnathodus guajanae* 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 'gujananas' at Río 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 guajanae*, 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)**

1929. *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.

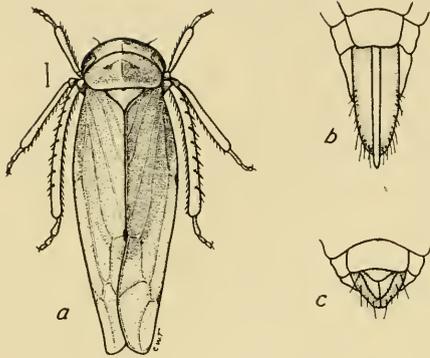


FIG. 35.—*Nesoteles minutus* (Osbn.)
a, dorsal view, b, female, c, male genitalia
(Original)

“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.)

Nesoteles 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.

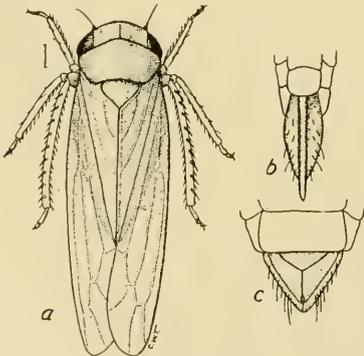


FIG. 36.—*Nesoteles pallidus* (Osbn.)
a, dorsal view, b, female, c, male genitalia
(Original)

“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.

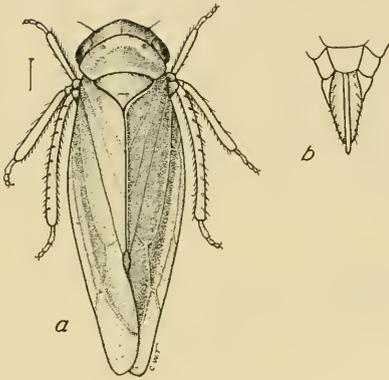


FIG. 37.—*Nesoteles rosaceus* (Osb.)
a, dorsal view, b, female genitalia (Original)

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.)

***Nesoteles 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.

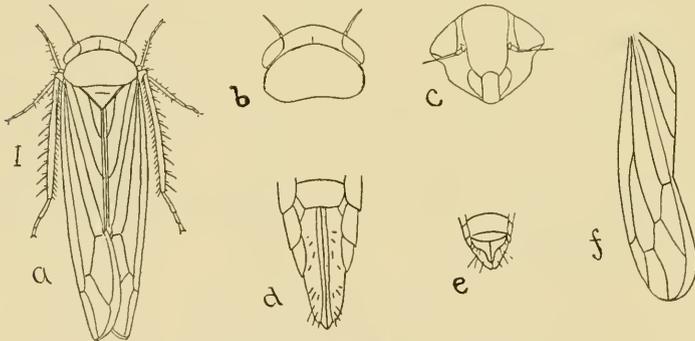


FIG. 38.—*Nesoteles neglectus* (DeL. & D.)

a, dorsal view, b, head and pronotum, c, face, d, male genitalia, 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.....*Joruma*
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.....*Dikraneura* (*Hylodea*)
Crossvein not present in disk of wing.....*Hylbla*

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.....*aurcovittata*
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..... | <i>lenticula</i> |
| 4. Tip of scutellum black..... | <i>cordia</i> |
| Tip of scutellum infusate..... | <i>tabebuia</i> |
| 5. Vertex infusate | <i>braziliensis</i> |
| Vertex orange or fulvous | 6 |
| 6. Cross bands on elytra straight or slightly curved..... | <i>similis</i> |
| Cross bands on elytra zigzag..... | <i>ziczac</i> |

Protalebra aureovittatus (DeLong)

1923. *Alebra aureovittatus* DeLong, Jour. Dept. Agr. P. R., vii, p. 267.

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.

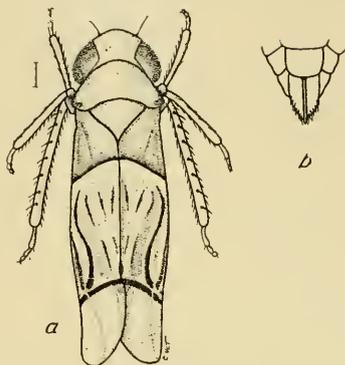
“Described from a series of three females and four males, from underside of leaves of shoots of undetermined tree at Ciales (221—Aug. 22, 1922, GNW).” (DeLong.)

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 Osborn1929. *Protalebra cordia* Osborn, Jour. Dept. Agr. P. R., xiii, p. 102.

FIG. 39.—*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 tabebuia Dozier

1927. *Protalebra tabebuia* Dozier, Jour. Dept. Agr. P. R., x, p. 260, fig. 2.

1928. *Protalebra bicincta* Osborn, Ann. Car. Mus., xviii, p. 259.

1929. *Protalebra tabebuia* 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; pronotum 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 antepical spaces milky hyaline. Beneath ivory-white, ovipositor tinged with reddish. Length, 3 mm." (Osborn.)

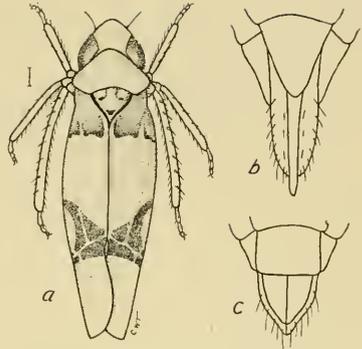
"I took this species in considerable numbers from "robles" on the Station grounds at Río Piedras. One small tree was so much infested as to have the leaves whitened. Apparently restricted to this tree as a host plant as no other occurrences have been noted. I described the species from specimens sent 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 lenticula* 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 Coamo on Jan. 13, 1929. Type and paratypes in author's collection, Ohio State Univ.

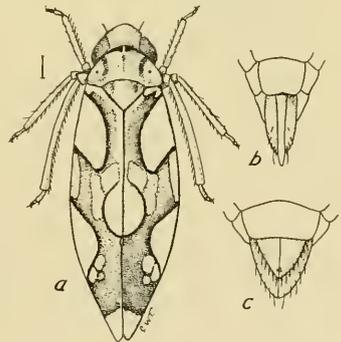
***Protalebra braziliensis* Baker**

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

1917. *Protalebra braziliensis* Van Duzee, Catalog Hemipt., p. 698.

1928. *Protalebra braziliensis* Osborn, Ann. Car. Mus., xviii, pp. 261-262.

FIG. 41.—*Protalebra braziliensis* 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 ziczac* Osborn**

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

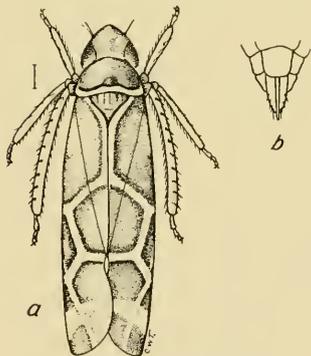


FIG. 42.—*Protalebra ziczac* Osb.
a, dorsal view, b, female genitalia (Original)

"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, sub-angulate, as long as width between the eyes, margin obtusely angulate; face polished; loræ 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. 260.

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. *scx-maculata*

Empoasca fabæ (Harris)

1841. *Tettigonia fabæ* Harris, Rept. on the Insects of Massachusetts Injurious to Vegetation, p. 186.
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. 598.
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 fabalis* DeLong**

1923. *Empoasca mali* Le Baron, (= *E. flavescens* Fabricius by DeLong), Wolcott, Journal Ag. P. R., vii, p. 269.
 1929. *Empoasca fabæ* 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 *fabæ* 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. 114.

"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 pygofer short and rather stout, gently curved dorsally. Dorsal spines of pygofer 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: 2.3 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, roundly produced, posterior margin rather broadly embrowned. *Male* valve roundly 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 “*enajagua*,” *Partium tiliaceum*, at Pt. Cangurejos, (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 roundly right-angled vertex. Length, 2 mm.

“Vertex distinctly produced, roundly 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. 262.

1929. *Joruma pisca* Osborn, Jour. Dept. Agr. P. R., xiii, p. 105.

"Head and thorax dark brown above appearing as if underlaid by reddish; tegmina 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 Loíza (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 *Joruma* 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.

1929. *Dikraneura marginella* Osborn, Jour. Dept. Agr. P. R., xiii, p. 106.

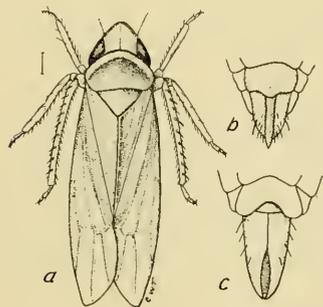


FIG. 43.—*Dikraneura marginella* Baker
a, dorsal view, b, female, c, male genitalia
(Original)

"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 aureoles 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 (Hyoidea) depressa McAtee

1926. *Dikraneura (Hyoidea) depressa* McAtee, Jour. N. Y. Ent. Soc., xxxiv, p. 162.
 1929. *Dikraneura (Hyoidea) depressa* Osborn, Jour. Dept. Agr. P. R., xiii, p. 106.

“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. Under-side 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*, i, p. 3.

Genotype, *T. minima* Baker.

Typhlocybella minima Baker

1903. *Typhlocybella minima* Baker, *Invertebrata Pacifica*, i, p. 3.

1929. *Typhlocybella minima* Osborn, *Jour. Dept. Agr. P. R.*, xiii, p. 106.

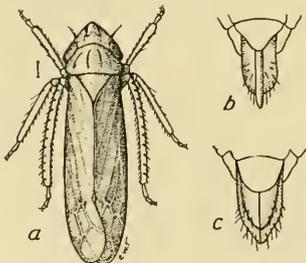


FIG. 44.—*Typhlocybella minima* Baker
a, dorsal view, b, female, c, male genitalia
(Original)

“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) Delphaciinæ
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 claval 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 [Ricaniniinæ]*
8. Elytra with broad membrane overlapping Achiliniæ
Elytra with narrow membrane 9

* Not known in Porto Rico.

9. Elytral membrane distinct from corium and with minute venationTropiduchinæ
 Elytral membrane simple, not densely veined; pronotum very short, deeply emarginateDerbinæ

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 stramineous; 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. 61.

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 tibiae 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 $5\frac{1}{2}$ 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. linealis* 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

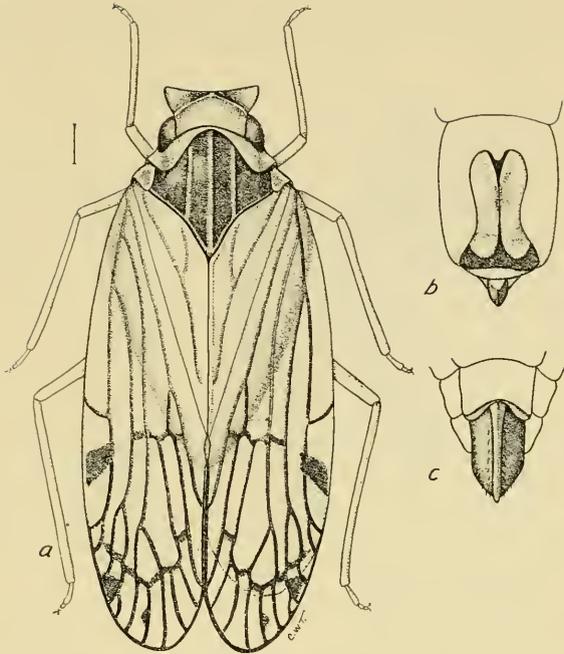


FIG. 45.—*Bothriocera venosa* Fowler
a, dorsal view, *b*, male, *c*, female genitalia (Original)

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.

Oliarus Stål

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

Genotype, *O. walkeri* Stål.

Oliarus franciscanus (Stål)

1859. *Cixius franciscanus* Stål, Eugen. Res., Ins. Hem., p. 273.

1862. *Oliarus franciscanus* Stål, Berl. Ent. Zeit., vi, p. 306.

1902. *Oliarus compectus* Ball, Canad. Ent., xxxiv, p. 152.

1917. *Oliarus franciscanus* Van Duzee, Catalogue Hem., p. 732.

1921. *Oliarus cinereus* Wolcott, Jour. Dep. Ag. P. R., v, p. 18, fig. 4.

1923. *Oliarus cinereus* Wolcott, Jour. Dep. Ag. P. R., vii, p. 271.

1929. *Oliarus franciscanus* Osborn, Jour. Dep. Ag. P. R., xiii, p. 106.

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

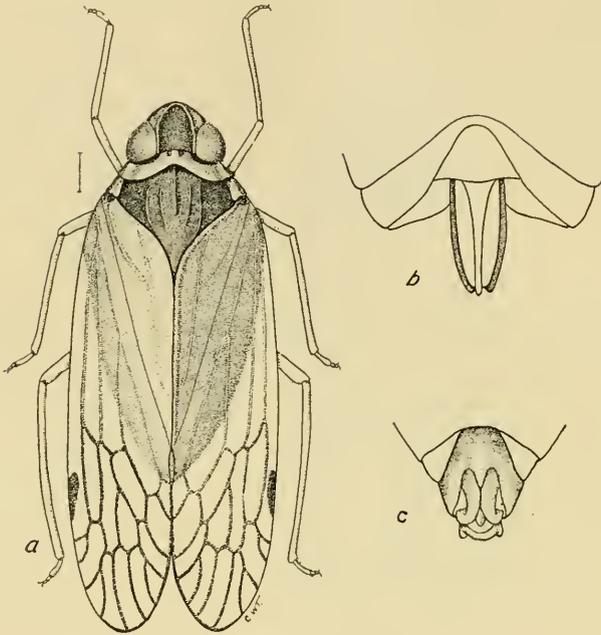


FIG. 46.—*Oliarus franciscanus* (Stål)
a, dorsal view, *b*, female, *c*, male genitalia (Original)

lide flavescentibus, apicem versus cum stigmatibus fuscis. ♂. Long. 3, lat. $1\frac{1}{4}$ millim.

“Patria: California (S:t 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. Seín (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., *Metabrixia* Fowler, *Ciocixius* Met. (*vide* Muir).

***Pintalia infuscata*, new species**

Head narrow; vertex depressed without median carina, marginal carinae elevated; prominent transverse carinae separating vertex and front; front narrow, widening at the middle, lateral carinae prominent, quite, but not distinctly, foliaceous, central carina sharp, dividing at tip, with a conspicuous ocellus; clypeus elongate, strongly tricarinate; pronotum tricarinate, lateral carinae strong, middle carina faint; elytra widening to apex, veins punctate with minute hairs. Female: last ventral segment deeply excavate; ovipositor elongate. Male: last central 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 numerous dotted with whitish, the minute hairs infuscate; wings smoky with fuscous veins; abdomen dark fuscous; legs smoky with tarsi infuscate.

Female, length of body 5 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 carinae of vertex elevated, median carina obsolete; transverse carinae between vertex and front depressed, lateral carinae of front expanded, foliaceous, median carina weak, not much elevated but sharp; median ocellus prominent; lateral carinae of clypeus prominent, median carina scarcely elevated; lateral ocelli large, comparatively close to the eyes; antennae, 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 carinae 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 carinae 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, sub-marginal 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 *Cotyleceps 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 carinae, the elytra with fuscous patches at base of clavus and four or five triangular patches on costa, the antepical crossveins and subapical band and patch at base of apical cells deeply infuscate. Length, female 5.25 mm., male 5 mm.

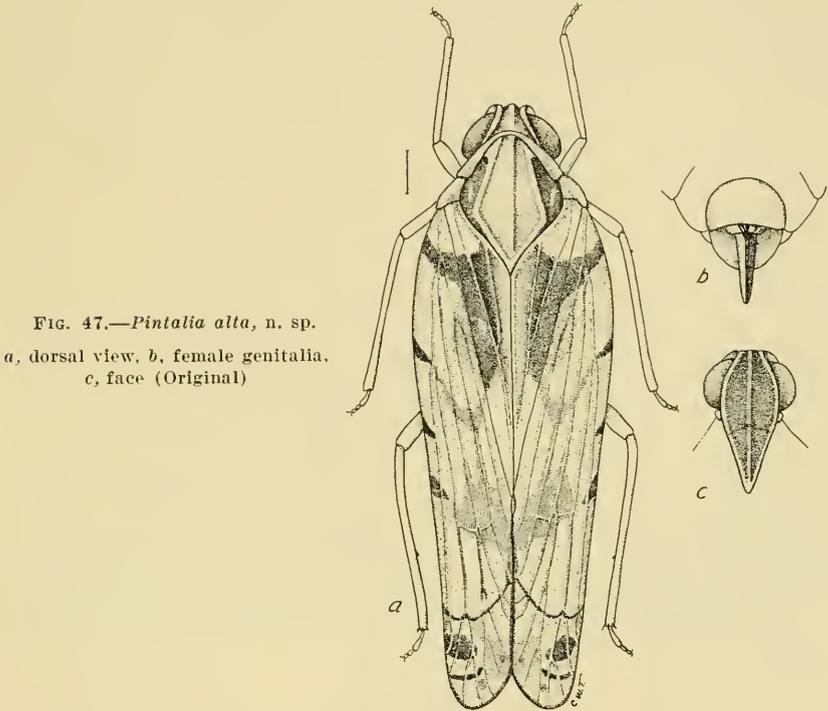


FIG. 47.—*Pintalia alta*, n. sp.

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. 22, 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, 1, p. 103 (*Cotyleceps* Syn.).
 1929. *Pintalia (Cotyleceps) decorata* Osborn, Jour. Dept. Agr. P. R., xiii, p. 108.

"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. 461.
 1929. *Cubana tortriciformis* Osb., Jour. Dept. Agr. P. R., xiii, p. 106.

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

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

brown or stramineous, 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.)

TROPIDUCHINÆ

The members of this subfamily are delicate, clear-winged species, the elytra and wings lying more flatly above the body than in the *Cixiida* 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 synonymies 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. 319.

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 media fere duplo longiore, infra medium utrimque nonnihil ampliata.—Long. $6\frac{1}{2}$ - $7\frac{1}{2}$, Long. cum tegm. $9\frac{1}{2}$ -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 Maricoa, 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 acunæ Metcalf and Bruner

1930. *Ladella acunæ* 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. 22.

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.

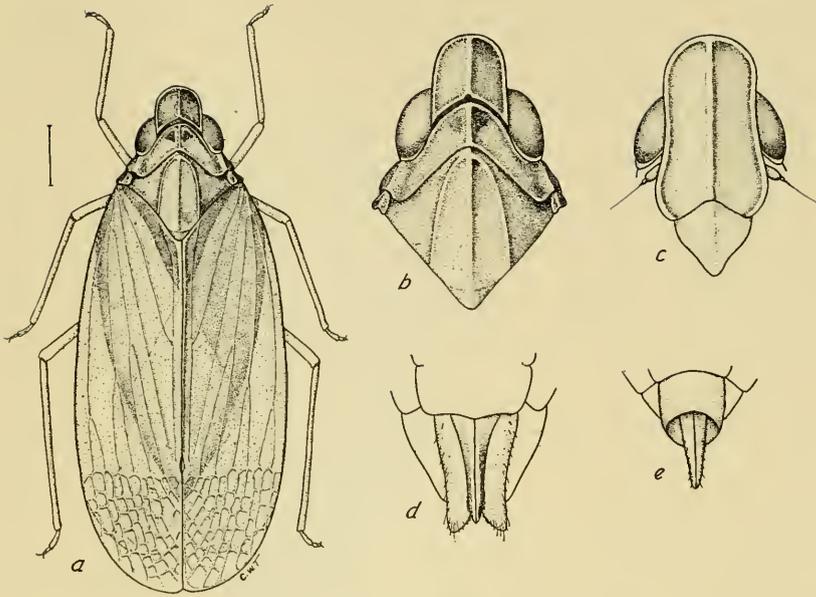
1859. *Tangia viridis* Stål, Berl. Ent. Zeit., iii, p. 318.

"Pallide subvirescente-flavescens; vertice latitudine sublongiore, apice semi-circulariter rotundato, ante oculos sat longe prominente; fronte latitudine media plus duplo longiore, supra medium parallela, infra medium utrinque 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.—*Neuroteta 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.

Neuroteta (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 $5\frac{1}{2}$ mm.; width of pronotum $1\frac{1}{2}$ 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 *Neurotmeta* 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.

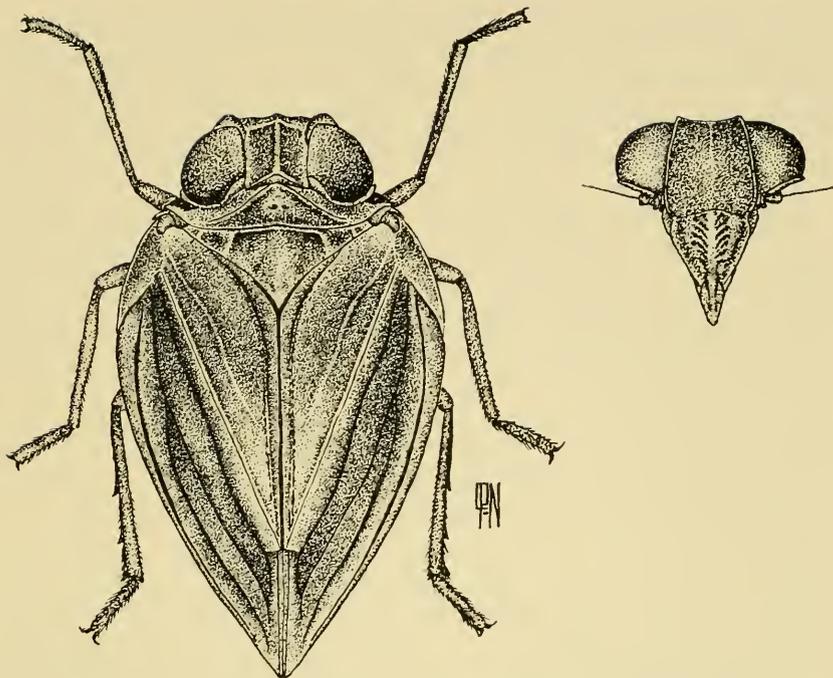


FIG. 49.—*Thionia borinquensis* Dozier
Dorsal view and frons (After Dozier)

“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, 6.75 mm.; greatest width, 3 mm.

"Described from a series of six specimens collected at Aibonito, 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 infusate..... 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 genæ, lighter spots in middle of frons, over carinæ 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 bifurcate, 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. 475), 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 "Talla-boa, near Ponce, P. R., July 23, 1914," received after this paper had gone to press.

***Colpoptera maculata* Dozier**

1931. *Colpoptera maculata* Dozier, 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

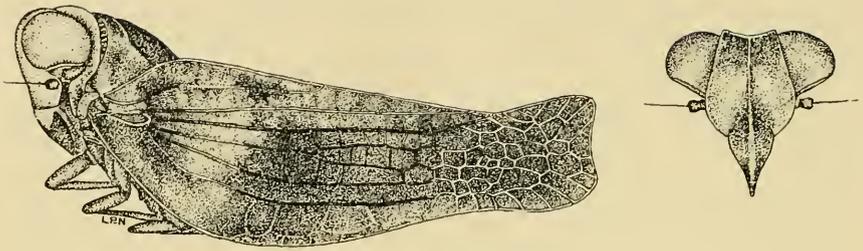


FIG. 50.—*Colpoptera maculata* Dozier
Lateral view of female and frons (After Dozier)

fuscous; pronotum mottled, the mesonotum distinctly fuscous on disk between the lateral carinae, 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 setae.

“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” (*Pedula?*) at Salinas, March 1. The insect was taken on sea grape as adult at Catano 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, 1925, all received from the American Museum of Natural History.

***Colpoptera maculifrons* Muir**

1924. *Colpoptera maculifrons* Muir, Proc. Haw. Ent. Soc., v, p. 466.

1929. *Colpoptera maculifrons* Osborn, Jour. Dept. Agr. P. R., xiii, p. 108.

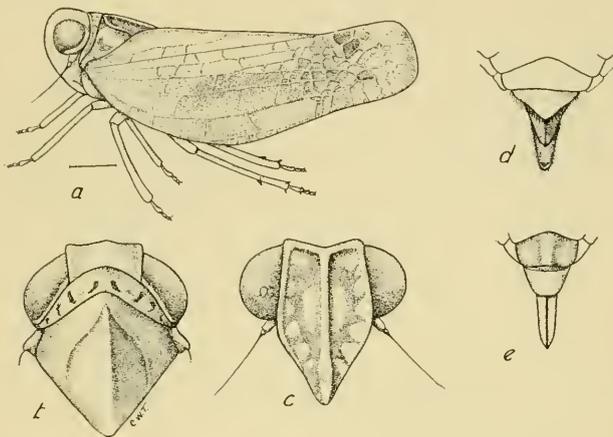


FIG. 51.—*Colpoptera maculifrons* Muir

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 Rio 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, 1929, 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 carinae 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, carinae 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. 50585), 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 *maculula* of Dozier.

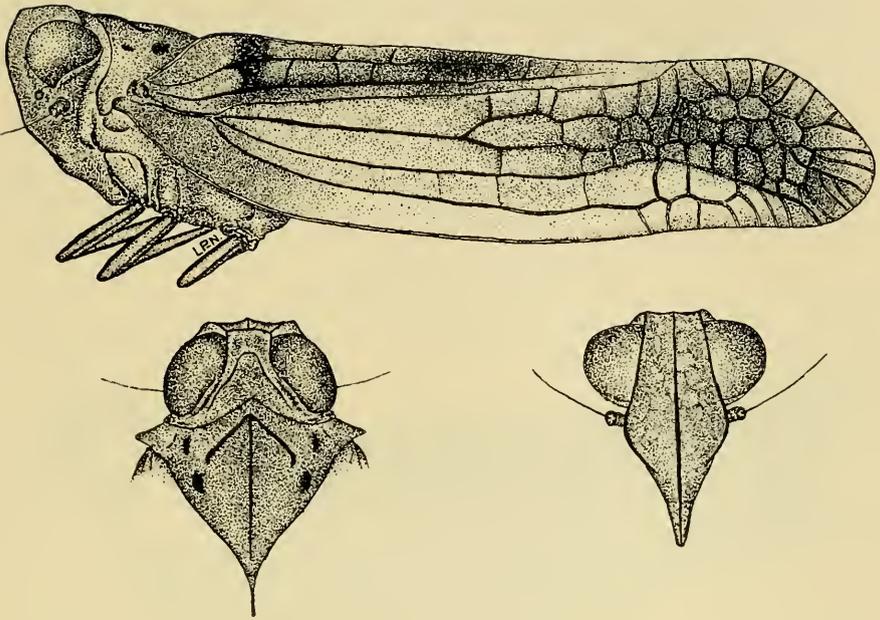
Neocolpoptera Dozier

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.—*Neocolopoptera 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 carinae of the vertex, thorax, and frons, fuscous; frons pale except the fuscous carinae; 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 genae 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 roundly elevated, with very prominent carinae; the lateral carinae, 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. 24.

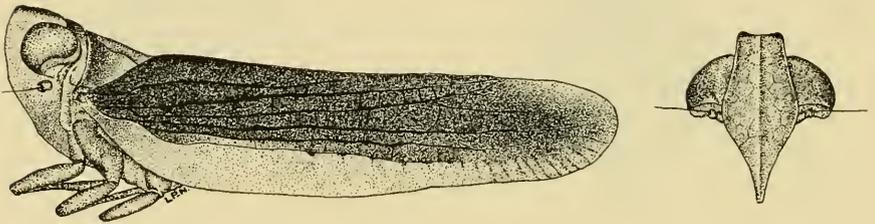


FIG. 53.—*Neocolpoptera monticolens* Dozier
Lateral view of female and frons (After Dozier)

"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.)

Rhyncopteryx Van Duzee

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

Genotype, *R. caudata* Van Duzee.

Rhyncopteryx salina Dozier

1927. *Rhyncopteryx salina* Dozier, Jour. N. Y. Ent. Soc., xxxv, p. 53.

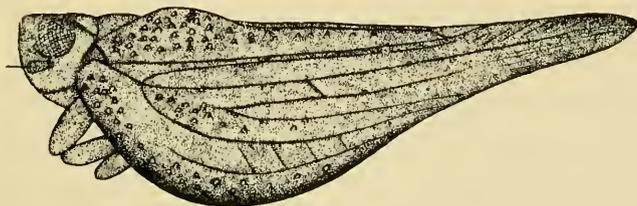


FIG. 54.—*Rhyncopteryx salina* Dozier
Lateral view (After Dozier)

"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 roundly emarginate. Mesonotum twice as long as the pronotum, weakly tricarinate, the disk very much flattened and outlined by the lateral carinae 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.

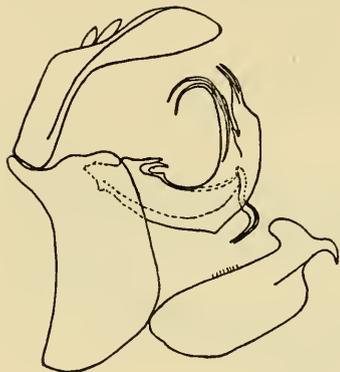


FIG. 55.—*Rhyncopteryx salina*
Dozier

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 Arroya, 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.

Acanalonia 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*.

Acanalonia 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 *simillima* Lethierry as a synonym.

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

Acanalonia 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

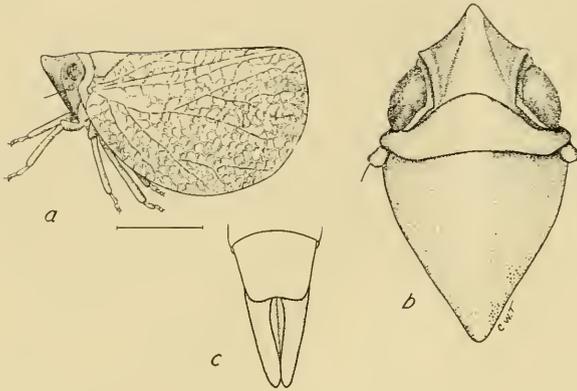


FIG. 56.—*Acanalonia coniceps* Osb.
a, lateral view, *b*, vertex,
c, genitalia (Original)

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**

1860. *Philatis* Stål, Rfo 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 $9\frac{1}{2}$ mm.

“Portorico (ein Exemplar im Museum in Berlin).”

This species would seem to be near the one I have described as *Acanalonia coniceps* 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 vivida* 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, Río Janeiro Hemipt., pp. 68, 69.

Genotype, *P. rufo-terminata* Stål.

KEY TO SPECIES OF ORMENIS

1. Light green or greenish white.....*pygmaea*
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) pygmaea (Fabricius)

1794. *Cicada pygmaea* Fabricius, Ent. Syst., iv, p. 30.
1869. *Petrusa pygmaea*, Stål, Hemipt. Fabriciana, ii, p. 112.
1902. *Ormenis pygmaea* Melichar, Ann. Nat. Mus. Wien, xvii, p. 96.
1914. *Petrusa pygmaea* Melichar, Genera Insectorum, fasc. 182, p. 75.
1923. *Ormenis pygmaea* Wolcott, Ins. Port. Jour. Dept. Agr. P. R., xvii, p. 271.
1929. *Ormenis pygmaea* Osborn, Jour. Dept. Agr. P. R., xiii, p. 109.

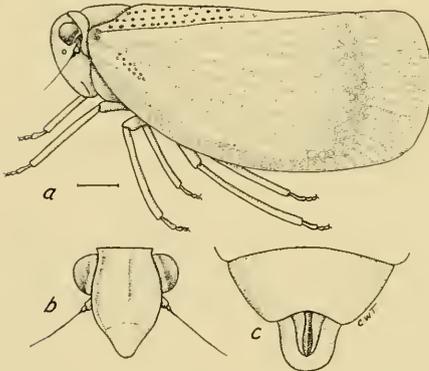


FIG. 57.—*Ormenis pygmaea* (Fab.)
a, lateral view, *b*, face, *c*, female
(Original)

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., i(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, Im. Pert., 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.

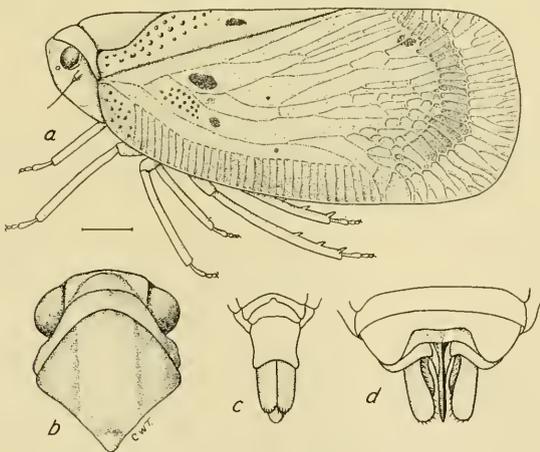


FIG. 5S.—*Ormenis quadripunctata* Fab.

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 infusate 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. 469.
 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 carinae only indicated at base, lateral margins carinate; no carinae on clypeus; vertex very short, mostly covered by pronotum; width of head equal to, or wider than, width of thorax, no carinae 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 H. 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 roscida* Germ.**

A single specimen labeled, “Aibonito, P. R., July 14-17, 1914,” received from the American Museum of Natural History, is referred to this species.

***Flatoides* Guérin**

1868. *Flatoides* Guér., Règne Anim., Ins., p. 362.

Genotype, *F. tortrix* Guérin.

***Flatoides punctata* (Walker)**

1887. *Elidiptera punctata* Walker, List Hom. Brit. Mus., ii, p. 332.

1901. *Cyarda acuta* Uhler, Proc. Ent. Soc. Wash., iv, p. 514.

1914. *Flatoides punctata* Melichar, Genera Insectorum, fasc. 182, 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.

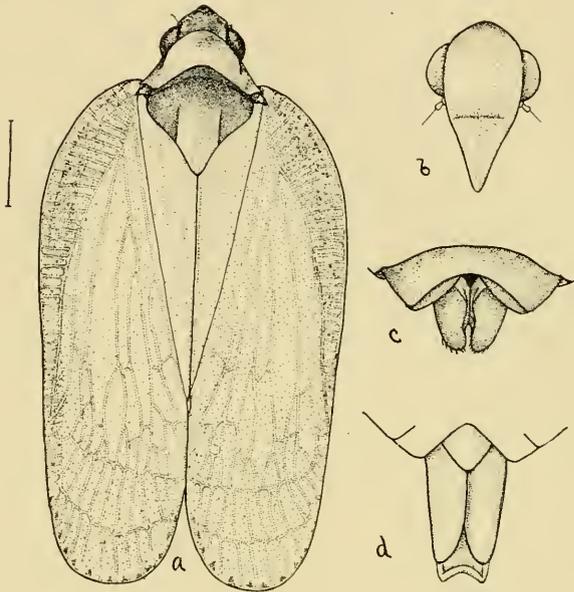


FIG. 59.—*Flatoides punctata* (Walk.)

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; clypeus 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 ventral 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 (*Cithræxylum 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

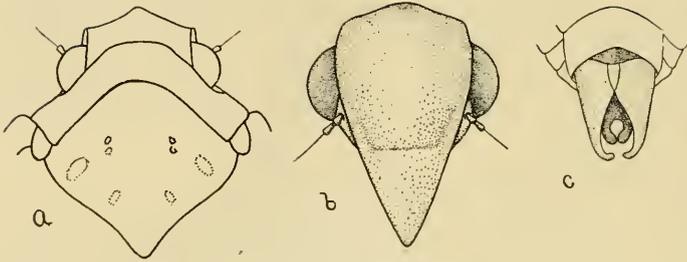
Similar in general appearance to *punctata* but with a shorter head, with a more distinct angle and with very distinct male genitalia.

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 carinae 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. 60.—*Flatoides 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. *Patara*
 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 wolcottii* Muir**

1924. *Cedusa wolcottii* Muir, Proc. Haw. Ent. Soc., v, p. 462.

1929. *Cedusa wolcottii* Osborn, Jour. Dept. Agr. P. R., xiii, p. 107.

“Male. Length, 2 mm.; tegmen, 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 median 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-cedusa* 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., i, p. 428.

Genotype, *P. vitiensis* Kirkaldy.

Phaciocephalus cubanus Myers

1926. *Phaciocephalus cubanus* Myers, Harvard Inst. Trop. Biol. & Med., iii, 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 medio-lateral ones. The three mesonotal carinae 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 median depression. . . ."

Genotype, *Dawnarioides musæ* Dozier.

Dawnarioides musæ Dozier

1929. *Dawnarioides musæ* Dozier, Am. Mus. Novitates, No. 371, pp. 1-2, fig. 1.

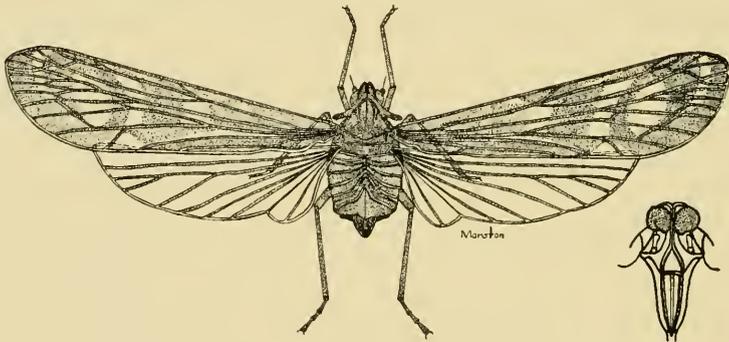


FIG. 61.—*Dawnarioides musæ* Dozier (after Dozier)

"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 fasciae, 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 fusciscenti tinctis guttis albis sanguineisque ornatis.

"Long. corp. lin. 1. Expans. alar. lin. $2\frac{3}{4}$.

"*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* albidii. *Abdomen* paullò obscurius, appendiculis duabus (δ genitalibus) albidis. *Alæ* anticæ albæ, farinosæ, versus apicem pallidè fusciscenti tinctæ, venis tamen ad margines apicemque alarum guttis albis terminatis, punctis sex parvis marginalibus purpureis (scil. 2 apicalicostalibus 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.

" δ 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; pre-genital 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 tegulæ 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 ia, a smaller one at base of Cu i, 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. *Otiocerus Kirby*, Linnean Soc. London, xiii, p. 13.

Genotype, *O. stollii* Kirby.

Otiocerus schönherri Stål

1859. *Otiocerus schönherri* Stål, Berliner Ent. Zeit., iii, p. 327.

1918. *Otiocerus schönherri* (?) 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 costae maculis nonnullis minutis verticeque albo-nucoreis. 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 Delphacinae 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 carinae, antennae long with both segments foliaceous. *Copiccerus*
 Four or five mesonotal carinae, antennae shorter, not foliaceous..... 3
3. Face with two median carinae..... *Ugypops*
 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..... 5
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 carinae of pronotum straight, reaching or nearly reaching hind border 7
 Lateral carinae of pronotum curved behind eyes, not reaching hind border 13
7. Antennae with basal segment triangular or sagittate..... *Stobara*
 Antennae with basal segment not sagittate..... 8
8. Antennae with one or both segments flattened..... 9
 Antennae 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. *Ncomalaxa*
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.

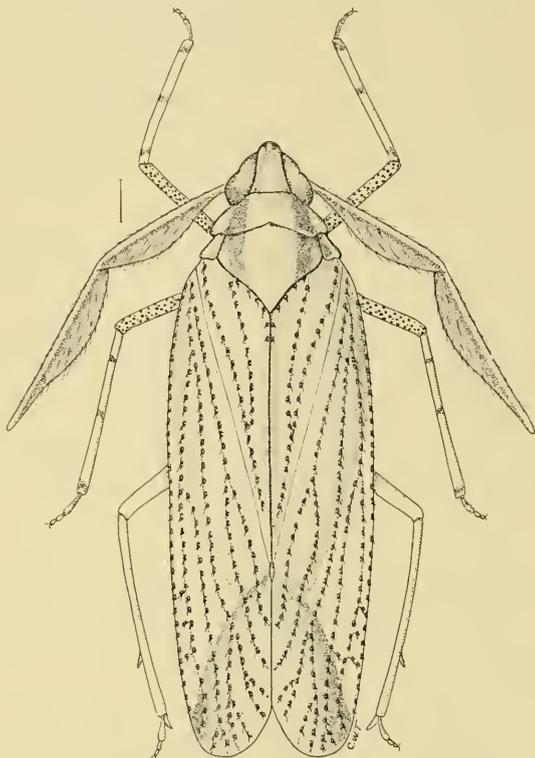
Genotype, *C. irroratus* Schwarz.

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.

Ugyops¹ 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. liturifrons* (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 Narajito, Porto Rico, July 6, 1915 (F 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 carinae infuscate; eyes fuscous; antennae 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.

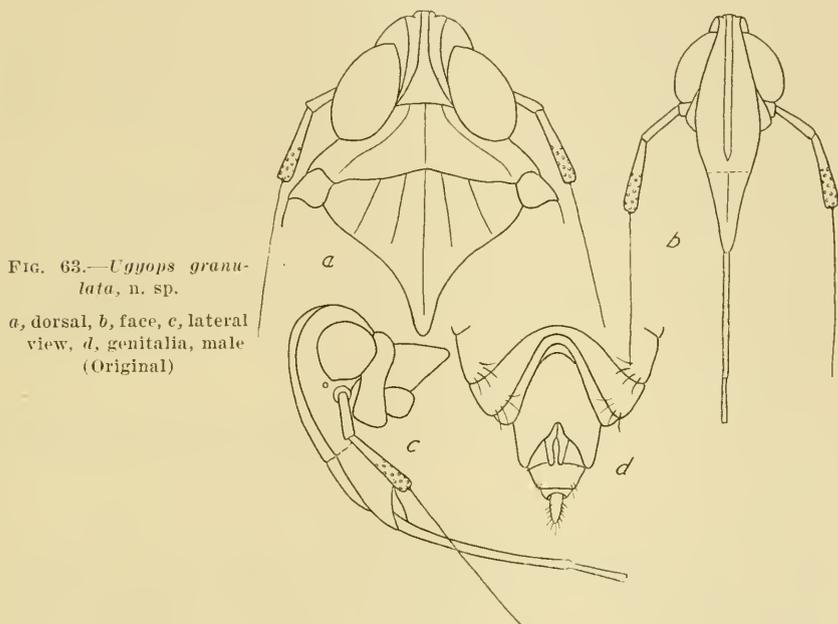


FIG. 63.—*Ugyops granulata*, n. sp.

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 tibiae 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, carinae obscure; antennae 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 carinae 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 tibiae 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 antennae and of the spur of the latter genus are not stated.

“Ochraceous-buff, face between eyes and the clypeus slightly darker, antennae brown, carinae of pronotum, median portion of mesonotum and carinae lighter; a slight brown band on front coxae, and fainter ones on first and second tibiae. 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.)

Stobara Stål

1859. *Stobara Stål*, Berl. Ent. Zeit., iii, p. 327.

Genotype, *S. concima* Stål.

Stobara tricarinata (Say)

1825. *Delphax tricarinata* Say, Jour. Acad. Nat. Sci. Phila., iv, p. 237.

1897. *Stobara tricarinata* Van Duzee, Bull. Buf. Soc. Nat. Sci., v, p. 245.

1914. *Stobara tricarinata* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 572.

Pale yellowish white, the front with an infusate 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, $6\frac{3}{5}$ 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, $2\frac{3}{5}$ 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.

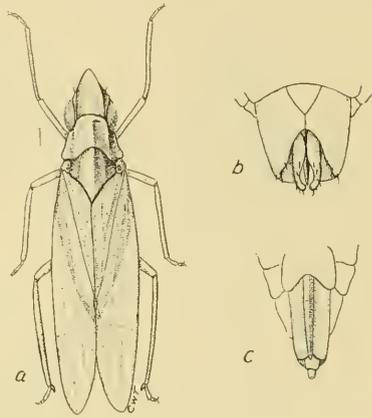
Genotype, *M. bicolor* Ball.

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 carinae sharp and distinct, a trace of a single median carina on posterior half of vertex. Pronotum long, tricarinate, the outer carinae parallel and continuing to posterior margin. Scutellum tricarinate, the carinae parallel and closer together than on the pronotum. Elytra long, narrow, venation simple regular.

"Color dirty straw, face smoky, the lateral carinae 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.

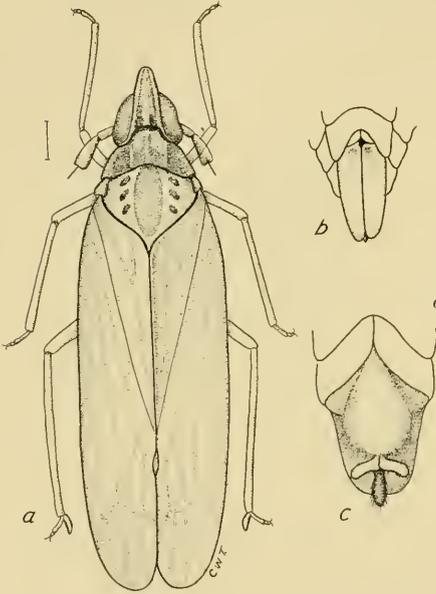


FIG. 65.—*Saccharosydne saccharivora* (Westwd.)
 a, dorsal view, b, female, c, male genitalia (Original)

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 dohertyi* Distant.

Sogata cubana (Crawford)

1914. *Dicranotropis cubanus* Crawford, Proc. U. S. Natl. Museum, xlvi, p. 595.
 1920. *Megamclius 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 albolinosa* 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. (S), ix, p. 191.
 1912. *Sogata pallescens* Distant, Annals and Mag. Nat. Hist. (S), ix, p. 192.
 1929. *Delphacodes albolinosa* 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 *albolinosa* 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 *albolinosa*. Muir speaks of *furcifer* as a nearly cosmopolitan species and cites many Oriental as well as Neotropical localities.

Sogata aurantii (Crawford)

1914. *Megamelus aurantii* Crawford, Proc. U. S. Natl. Mus., xlii, p. 628, pl. xviii, figs. c, g.
 1922. *Stenoecranus hinci* Dezier, 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, spini-form 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, Río Piedras, P. R., Feb. 1, 1912 (T. H. Jones, collector).

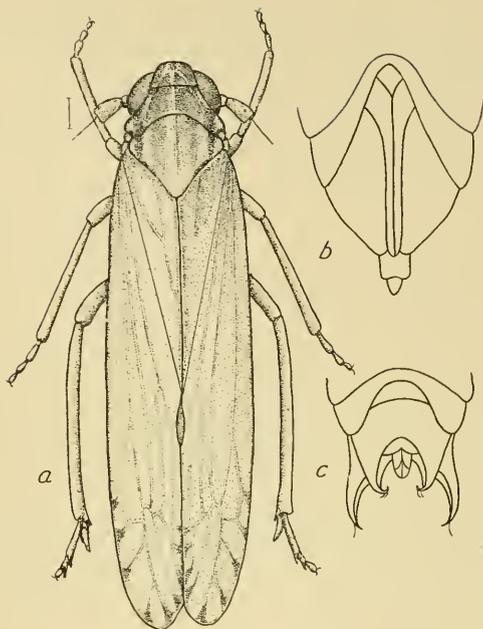
Sogata parvula Osborn

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 setae.

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., xlvii, 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. teapa*. General color black, with a broad white vitta on dorsum between lateral carinae from vertex to tip of scutellum and continued on to clavus; extreme lateral portion of pronotum also white; legs and antennae yellow; frons black; elytra as in *teapa*

"All variations from *teapa* 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., xlvii, p. 585.

Genotype, *Liburniella ornata* Stål.

Liburniella fasciatella, new species

Small, delicate; head as wide as pronotum; vertex longer than broad, carinae of vertex weak, the minute areole before the middle, lateral areoles divided to front; front scarcely widened before the eyes, carinae prominent, Pronotum as long as vertex, outer carinae nearly straight, merging into hind border; mesonotum with three fairly distinct carinae; elytral veins conspicuous, scarcely punctate; hind tibiae 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; carinae 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.

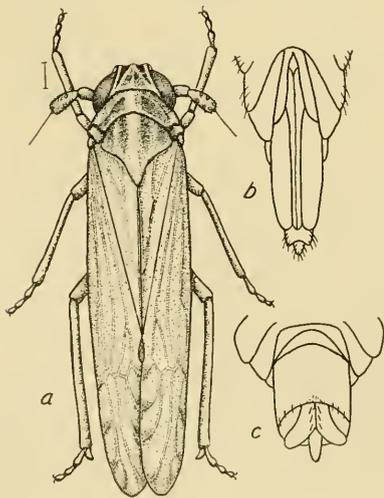


FIG. 67.—*Liburniella fasciatella*, n. sp.
a, dorsal view, b, female, c, male genitalia
(Original)

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, carinae distinct; front, sides nearly parallel, slightly narrowed between the eyes, median carina forked near the base; antennae with second joint a little longer than the first and distinctly punctate. Pronotum as long as vertex, carinae distinct, lateral carinae scarcely attaining hind border; mesonotum short with prominent carinae; 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 carinae 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.

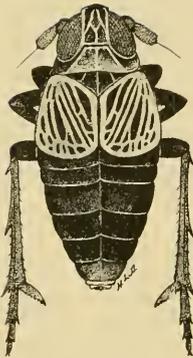
Pissonotus albovenosus, new species

Robust, vertex longer than pronotum with prominent carinae and deep foveae; three carinae of pronotum and scutellum strong; elytra reaching on to basal abdominal segment, apical border broadly rounded; frontal carinae 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 carinae of vertex and front, carinae 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

FIG. 68.—*Pissonotus alborenosus*, n. sp.

Piedras, P. R., Feb. 9, 1930 (H. Osborn). A specimen from "Jamaica, L. Id." seems also to belong here but lacks the short white bars on base of front.

The name *Pissonotus alborenosus* was used in my article on Porto Rican Homoptera under the impression that the description had been printed, but no reference to such description was found and Dr. Dozier informs me that his manuscript, including this species, has not been printed. The name *alborenosus* has been retained since it seems to involve less chance of confusion. I am indebted to Dr. Dozier for the privilege of using the figure he had prepared to illustrate the species.

Delphacodes Fieber

1866. *Delphacodes*, sub. gen. *Delphax*. Fieber, Verb. Z. b. Ges. Wien, xvi, p. 524.

Genotype, *D. mulsanti* Fieber.

The most evident character for the genus is presented by the lateral pronotal carinae, which curve outward, following the curve of the eye and not reaching the hind border. Muir and Giffard (1924) give a full discussion of the synonymy for the genus. They cite the absence of the spine on the spine on the hind basitarsus as separating *Delphacodes* from *Nilaparvata*. For the detailed descriptions of genitalia see Muir and Giffard, (1924).

Delphacodes pellucida (Fabr.)

1792. *Fulgoro pellucida* Fabricius, Ent. Syst., iv, p. 7.

1803. *Delphax pellucida* Fabricius, Syst. Ent., p. 84.

1871. *Liburnia pellucida* Fieber, Cat. der Cicad., p. 5.

1897. *Liburnia pellucida* Van Duzee, Bull. Buf. Soc. Nat. Sc., v, pp. 247-248.

1914. *Megamelus pellucida* Crawford, Proc. U. S. Nat. Mus., xlvi, p. 615.

1924. *Delphacodes pellucida*, Muir and Giffard, Bull. Hawaiian Sugar Planters Asso. Exp. Sta., Ent. Ser. 15, p. 20.

“Macropterous males: Color black; carinae of the head broadly white; pronotum white clouded anteriorly between the carinae, or the surface may be more or less obscured with blackish; scutellum shining black edged with fulvous; antennae 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 tibiae 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, Vehr. 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. 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; carinae of the head, pronotum and scutellum pale, the median conspicuously whitish; cheeks, clypeus and frontal foveae fuscous bordered with black next the pale carinae, 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 fovea 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 carinae 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; stiles widened and converging above, the outer angles extended upward and backward toward the anal aperture. Length $2\frac{1}{2}$ 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. Sent.-Am., Homoptera, i, p. 135.

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.

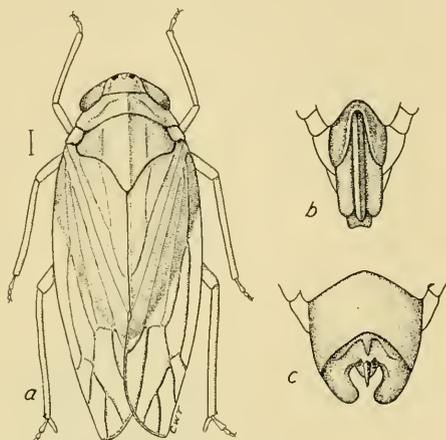
“Long. cum tegm. $2\frac{1}{2}$ millim. ; lat. ad hum. 1 millim. (♂ ♀)
 “Hab. Mexico, Teapa in Tabasco and Vera Cruz (H. H. Smith).
 “Several males and one imperfect female.” (Fowler).

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 fove 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 carinae 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 brachypterous 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., xlv, 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., xliii, p. 111.

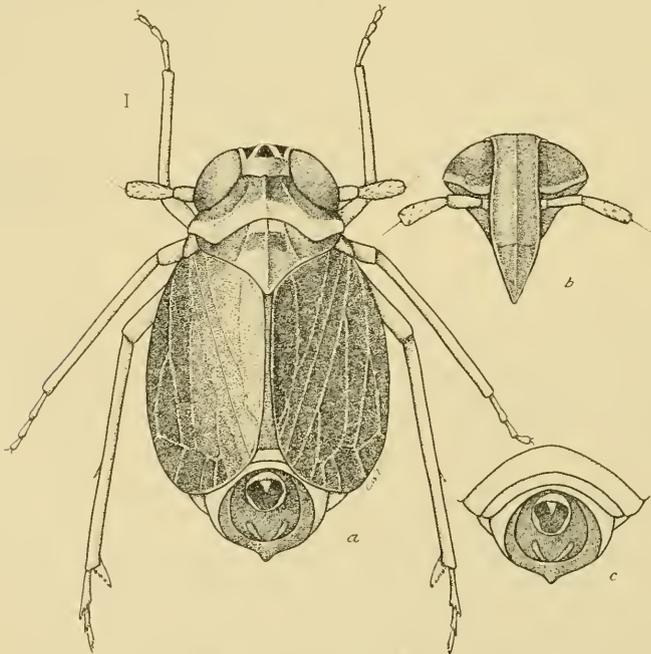


FIG. 70.—*Delphacodes nigripennis* (Crawf.)
 a, dorsal view, b, face, c, male genitalia

General color light brown. Elytra hyaline, apical veins infusate; 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., xlv, 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; carinae 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., xlv, 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 carinae brown-margined; abdomen darker, in the male tinged with rufous, the segments edged with fuscous; femora obscurely lined with brown; tip of the tarsi and rostrum blackish; antennal setae 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. 46.

1924. *Delphacodes andromeda* Muir, Bul. Exp. Sta. Hawaiian Sugar Planters Asso., Ent. Ser. 15, p. 36.

1929. *Delphacodes andromeda* Osborn, Jour. Dept. Agr. P. R., xiii, p. 111.

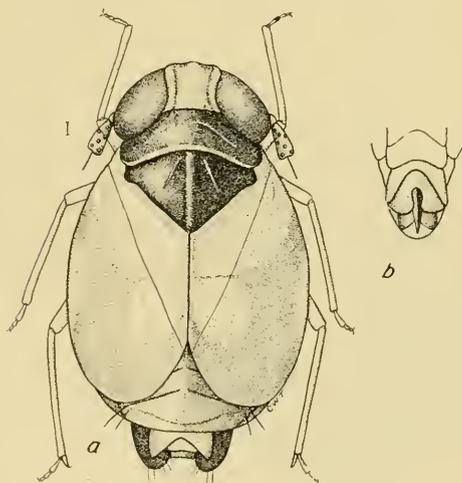


FIG. 71.—*Delphacodes andromeda*
(Van D.)
a, dorsal view, male, b, male genitalia
(Original)

Very small, occurring 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, clytra 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 wolcottii Muir and Giffard

1924. *Nilaparvata wolcottii* 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 divergently 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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SCIENTIFIC SURVEY

OF

PORTO RICO and the VIRGIN ISLANDS

VOLUME XIV—Part 3

Insects of Porto Rico and the Virgin Islands—Hemiptera-
Heteroptera (excepting the Miridæ and Corixidæ)

Harry Gardner Barber



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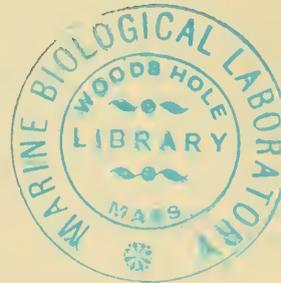
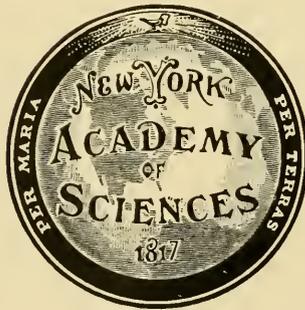
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INSECTS OF PORTO RICO AND THE
VIRGIN ISLANDS

HEMIPTERA-HETEROPTERA*

(Excepting the Miridæ and Corixidæ)

BY HARRY GARDNER BARBER

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INTRODUCTION

Among the earliest authors to describe Hemiptera from some part of the West Indies, with particular reference to Porto Rico and the Virgin Islands, were Linnæus and Fabricius. The former described a few species from the Virgin Islands. Fabricius, from his frequently mentioned "*Americæ Insulis*," must have had specimens from these islands. The next author of any importance to add to the knowledge of the fauna was Guérin-Mcneville, who in 1857 wrote the part dealing with Hemiptera in Sagra's "*Histoire de Cuba*." A few years later the eminent Swedish hemipterist, C. Stål, described a number of species from this region, chiefly in the "*Enumeratio Hemipterorum*," 1870-76. Among more modern contributors was A. Stahl, who in 1882 published a list of species in his "*Catalogo del Gabinete Zoologico*." Juan Gundlach added many species in his article published first in the *Anales de la Sociedad Española de Historia Natural*, vol. 22, 1894, and later as part of a series dealing with the fauna under the title "*Fauna Puerto-Riquena*." Several economic entomologists attached to the Insular Experiment Station or other institutions in Porto Rico have reported on various injurious species in numerous bulletins and reports. Among these mention should be made of the following: E. G. Smyth, R. T. Cotton, T. H. Jones, W. V. Tower, R. H. Van Zwaluwenberg, M. D. Leonard, and G. N. Wolcott. In 1923 the author published a list with the description of several new species in the *American Museum Novitates* no. 75. This article dealt with the Hemiptera-Heteroptera collected in the Islands by the various expeditions under the combined auspices of the New York Academy of Sciences and the American Museum of Natural History. G. N. Wolcott, in 1924, published in the *Journal of the Department of Agriculture of Porto Rico*, vol. 7, under the title "*Insectæ Portoricensis*," an extensive article dealing in part with the Hemiptera-Heteroptera. This is particularly important because of its reference to the food-plants of numerous economic species.

In the preparation of the present work the author has studied the large number of specimens in the collection of the American Museum of Natural History (A.M.N.H.) obtained by the various expeditions referred to above. Among those connected with these expeditions were H. E. Crampton, F. E. Lutz, F. E. Watson, A. J. Mutchler, L. B. Woodruff, and the author. The extensive collection of the United States National Museum (U.S.N.M.) added a great number of species and additional data. A number of smaller collections were

also examined, among which were those belonging to Cornell University, the University of Puerto Rico, H. L. Dozier, and the author.

The drawings for this article were made by Mary Foley Benson, of the Bureau of Entomology and Plant Quarantine.

Owing to the author's lack of knowledge of the Central American and South American forms in the families Miridæ and Corixidæ, it has been considered advisable to omit them from this report. All of the families occurring in Continental America are represented in the Islands with the exception of the following: Isometopidæ, Termatophylidæ, Hebridæ, Ochteridæ and Gelastocoridæ. From what is known of their distribution it is very probable that the Hebridæ and Gelastocoridæ will eventually be found to occur there.

As compared with other larger islands such as Cuba and Hispaniola, the Hemiptera-Heteroptera (exclusive of Miridæ and Corixidæ) with 195 species are much more poorly represented in Porto Rico and the Virgin Islands. This is probably due in large part to the much more extensively cultivated areas, particularly in Porto Rico.

From our rather incomplete knowledge of the hemipterous fauna of the other West Indian islands, it is not possible to determine exactly the percentage of endemic species. Some twenty-seven of those mentioned in this report are thus far known only from Porto Rico and the Virgin Islands. However, a number of these herein described as new are very probably more widely distributed. Nearly one-fourth of the recorded species are known elsewhere only from either the Greater or Lesser Antilles. The majority are widely ranging species, occurring in Mexico and Central America, some spreading southward into South America and others northward into the southern part of the United States. Nine species are either nearly world-wide in their distribution or are importations from the Eastern Hemisphere through commercial channels. In this latter category special mention should be made of *Nezara viridula* (Linnæus), *Corizus hyalinus* (Fabricius), *Nabis capsiformis* Germar, *Cimex hemipterus* (Fabricius), and *Cimex lectularius* Linnæus.

Since the manuscript of this article was completed before the receipt of the "Insectæ borinquenses" of George N. Wolcott, all references to the species and other items of interest in that treatise are omitted.



DIAGNOSIS OF THE HEMIPTERA-HETEROPTERAOrder **HEMIPTERA**Suborder **HETEROPTERA**

This suborder comprises those insects which have a sucking beak and, except in apterous forms, two dissimilar pairs of wings. The fore wings (hemelytra) are most commonly more or less thickened or coriaceous basally and membranous apically where they frequently overlap. In several groups, where the upper wings are concealed beneath the much expanded scutellum (such as Thyrecorinæ and Scutellerinæ), the corium and clavus are much reduced and in the exposed part coriaceous. In a few cases (such as Tingitidæ, Gerridæ, and Enicocephalidæ) there is very little if any differentiation in the texture of the two main parts of the fore wings, these being membranous throughout.

In most cases each hemelytron, when exposed, is divided into three main parts: a narrow piece—the clavus, lying along each side of the scutellum, the clavi most commonly meeting behind the scutellum to form a commissure; the corium, forming the greater part of the wing; the membrane, occupying the apical portion. The corium in some families (Miridæ and Anthocoridæ) is further subdivided into two parts: the embolium, a narrow strip lying along the costal margin, and the cuneus, occupying more or less of the apical angle of the corium from which it is separated by a transverse fracture. In most cases the veins of the corium are few and comparatively simple, but they are often difficult to homologize in the adult stage because of their tendency to fuse. The hind wings are membranous, and have several longitudinal and cross veins. The hind wings are wider than the fore wings and fold up under the latter when at rest.

The head exhibits considerable modification in shape and structure in the various families. Most commonly it shows anteriorly three divisions or lobes: a median lobe, the tylus (or anteclypeus) from which ventrally arises the rostrum, on either side of which are lateral lobes called juga. Frequently also a labrum is present before the tylus. Compound eyes are commonly present, but are entirely absent in such families as the Polyctenidæ and Termitaphidæ. The ocelli, never more than two in number, are frequently present but may be entirely absent in a number of families, including such large ones as the Miridæ and Pyrrhocoridæ. The antennæ are most commonly either 4- or 5-segmented and, although in the greater number of families simple

and free, they may be variously modified or in several aquatic families even reduced in size and concealed beneath the margins of the head.

The beak, adapted for sucking the juices of plants or animals, is attached at or near the front of the head and turned back along the under side of the body. It is called the rostrum, and is composed of the much modified, elongate, slender mandibles and maxillæ, concealed in a 3- or 4-segmented sheath (labium). In the strictly predatory forms this rostrum is shorter and stouter, while in the phytophagous forms it is commonly longer and more slender. Frequently there is present at the base of the rostrum a pair of variously shaped vertical plates or lamellæ, the bucculæ, which may extend posteriorly on the gular region of the head.

The pronotum is almost invariably enlarged, forming a conspicuous part of the dorsal aspect of the body and concealing the underlying sclerites. A scutellum is usually present, but in a few cases it is undeveloped (*Termitaphidæ*) or concealed beneath the expanded posterior margin of the pronotum (*Tingitidæ*).

The legs exhibit great variability according to the insect's particular method of locomotion or of feeding. The most common kind is the ambulatorial type in which all of the legs are of a simple, uniform character. There is often considerable correlation in the manner of the articulation of the head and of the fore legs in predatory forms, such as the *Reduviidæ*, to permit greater freedom of movement in catching and feeding upon living prey. The fore coxæ are globular, allowing a rotating movement, while the femora are often enlarged and frequently spined, the entire leg thus becoming raptorial. In the free-swimming, aquatic forms some of the legs are expanded (as in the *Corixidæ* and *Notonectidæ*), natatorial, or again equipped with a coating of hairs suitable for gliding over the surface film of water (as in the *Gerridæ* and *Veliidæ*). The number of tarsal segments is normally three, but many forms occur in which there are but two, and still others in which there is but a single segment. In most forms the tarsi end in a pair of claws between which there is often a pair of delicate appendages called *aroliæ*.

A pair of stink-glands is most commonly present in the terrestrial forms, the odoriferous orifices (*osteoles*) most commonly situated on the metapleura in adult forms and on the tergum in many nymphal stages. Connected with the orifices in many cases is a laterally extended canal or gutter. Often associated with these structures on the metapleura is a more or less evident evaporating area distinguished by its dull, roughened surface.

The number of abdominal segments varies within certain limits; the venter is very commonly composed of six visible segments. It should be borne in mind that this is not the actual number, as the first sternite is not developed and the terminal three segments are incomplete or modified to form the genital apparatus in both sexes.

The females in several families of this group possess an ovipositor, and imbed the eggs in plant-tissue, but in the greater number of cases the ovipositor is poorly developed and the eggs are deposited on the surface. In their development, Heteroptera are heterometabolous, undergoing an incomplete or direct metamorphosis. The nymphs gradually increase in size with each successive moult until they reach the adult stage, the last nymphal stage acquiring short wing-pads. The normal number of instars is four or five, the latter apparently being the more common.

Synoptic keys to the families of Hemiptera-Heteroptera may be found in any of the following:

Reuter (1912) Öfv. Finska Vet. Soc. Förh. **54**: 49-62.

Brues & Melander (1932) Classification of Insects 140-154.

Gulde (1933) Die Wanzen Mitteleuropas **2**: 5-13.

Börner (1935) Die Tierwelt Mitteleuropas iv. Insekten **1** (3): 1-14.

SYSTEMATIC ACCOUNT OF THE SPECIES

Superfamily PENTATOMOIDEA

This large group contains, for the most part, large robust forms having a broad, shieldlike head and 5-segmented antennæ inserted beneath the expanded, overhanging margins of the head. The rostrum is normally 4-segmented, the scutellum is relatively large and in a few subfamilies (Thyreocorinæ, Scutellerinæ and Graphosomatinae) is expanded in a U-shaped form, covering the greater part of the hemielytra. In those subfamilies with the hemielytra exposed, the two clavi, with rare exceptions (*Amnestus*), are narrowed toward the apices and do not meet behind the scutellum to form a commissure. Each ventral segment of the abdomen, near the spiracle, bears two sensory hairs (trichobothria), which are often rubbed off. Only the two following families occur in the Western Hemisphere.

KEY TO PORTO RICAN FAMILIES

Tibia with antero-dorsal surface not longitudinally sulcate, distinctly spinose or spinulose. Tergum with only five visible segments; first ventral segment of abdomen, at least laterally, entirely or almost entirely concealed by expanded margin of the metapleurum. Trichobothria arranged in a longitudinal line behind spiracles. CYDNIDÆ.

Tibia with antero-dorsal surface frequently longitudinally sulcate, at most provided with small setulæ. Tergum with more than five visible segments; first ventral segment of abdomen not normally concealed by posterior margin of metapleurum. Trichobothria of venter arranged in pairs in a transverse line behind spiracles (except GRAPHOSOMATINÆ).....PENTATOMIDÆ.

Family CYDNIDÆ

The West Indian forms of this family are shining black, ferruginous, or castaneous, sometimes with paler markings on the exposed part of the corium. Little is known of the food habits of most of the species, but they are probably all phytophagous. While the Thyreocorinæ are generally collected on vegetation, the Cydninæ are frequently found about the roots of plants or under stones and other objects on the ground.

KEY TO THE SUBFAMILIES

Scutellum strongly convex, much expanded, U-shaped, nearly covering abdomen. Frena very short, less than one-third as long as scutellum. Clavus very short and triangular; exposed chitinous part of corium usually narrow. Tibia provided with fine spinules or bristles.....THYREOCORINÆ.
 Scutellum nearly flat or slightly convex, triangular. Frena long. Hemielytra exposed, with clavus elongate. Commissure absent except in *Amnestus*. Tibia spinose.....CYDNINÆ.

Subfamily THYREOCORINÆ

The so-called "negro bugs," belonging to several genera, are usually shining black or castaneous, with or without pale markings on the exposed part of the corium. The much enlarged scutellum is strongly convex and almost covers the abdomen, concealing the membranous part of the hemielytra; both the clavus and frena are very short, not reaching the middle point of the scutellum. The tibiæ are usually less strongly spinose than in the Cydninæ. They are probably all phytophagous, one species having been reported as injurious to various plants. Only one genus, *Allocoris* McAtee & Malloch, with a single species, has thus far been found in Porto Rico.

ALLOCORIS McAtee & Malloch

Corimelana White (1839) Mag. Nat. Hist. II, 3: 539.

Thyreocoris Authors, not Schrank.

Eucoria Mulsant & Rey (1865) Hist. Nat. Pun. France Scutell. 12.—Horvath (1919) Ann. Mus. Nat. Hung. 17: 212.

Allocoris McAtee & Malloch (1933) Ann. Carn. Mus. 21: 358 (new name).

The above synonymy is that of McAtee and Malloch.

Allocoris minuta (Uhler)

Corimelana minuta Uhler (1863) Proc. Am. Ent. Soc. 2: 155.—Van Duzee (1904) Trans. Am. Ent. Soc. 30: 76.

Thyreocoris minutus Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 5.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 256.

Corimelana (Eucoria) minuta Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Allocoris minuta McAtee & Malloch (1933) Ann. Carn. Mus. 21: 375.

This is a small (1.80–2.25 mm.), densely punctate species with a conspicuous marginal orange-red band on the corium, slightly expanded anteriorly. Originally described from Cuba, and since reported from Jamaica and Hispaniola. In 1923 the author listed it from Porto Rico.

Aibonito, June 1–3, 1915, and Manatí, June 28, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, July 4, 1917 (Morrison); San Juan, July 9–12 and Ponce, July 20–22, 1914 (Barber); Pt. Cangrejos 1920 (Wolcott)—U.S.N.M.

Subfamily CYDNINÆ

They are shining black, castaneous, or in a few cases ferruginous. The somewhat triangular scutellum is moderately large and slightly convex, never expanded to cover the abdomen, leaving the hemielytra free; both the clavus and frena are long, reaching behind the middle of the scutellum; the tibiæ are strongly spinose or spinulose; the corium is subdivided into exocorium and mesocorium. The so-called "burrowing bugs" are found about the roots of certain plants but often occur under stones and logs lying upon the ground. This subfamily is world-wide in its distribution, but only three genera, comprising five species, have been recorded from Porto Rico.

KEY TO PORTO RICAN GENERA

1. Apex of scutellum acute. Clavi meeting behind apex of scutellum to form a commissure. Canal from metapleural orifice (osteole) long and narrow with elevated marginal rim, reaching at least three-fourths from orifice to lateral margin of the metapleurum.....*Amnestus*.
 Apex of scutellum not acute. Clavi not meeting behind the scutellum to form a commissure. Metapleural orifice set beneath an overhanging ridge, not terminating in a distinct canal..... 2
2. Margin of head armed with short, slender, acute spines intermixed with long setæ inserted in a distinct submarginal groove. Margins of pronotum and corium, at least anteriorly, with long setæ.....*Æthus*.
 Margin of head devoid of spines but often with long submarginal setæ. Olfactory orifice set preapically beneath a wide depressed ridge.....*Geocnethus*.

ÆTHUS Dallas

Cydnus Fabricius (1803) Syst. Rhyng. 184 (in part).

Æthus Dallas (1851) List. Hem. 100, 112.—Uhler (1877) Bull. Geol. Geogr. Survey 3: 378.—

Signoret (1882) Ann. Soc. Ent. Fr. 423.—Hart (1919) Bull. Nat. Hist. Surv. Ill. 13: 204.—

Blatchley (1926) Heteropt. E. N. Am. 83.

Members of this genus are shining black or castaneous. Submargin of the head distinctly grooved and beset with a row of erect, slender spines and long setæ; margins of pronotum and hemielytra with long setæ; anterior submargin of the pronotum without a transverse impression; apex of scutellum narrowly rounded; fore tibia fossorial, with numerous strong spines. This large genus is world-wide in its distribution. Two species occur in Porto Rico.

KEY TO PORTO RICAN SPECIES

- A. Black. Submargin of each lateral lobe of head with about 9 or 10 sharp spines and several intermixed setæ. Lateral margin of pronotum with 15 or 16 and costal margin of corium with about 6 long setæ. Second segment of antenna distinctly longer than third. Larger species, 6.00–7.50 mm.
 *A. communis*.
- AA. Castaneous. Submargin of each lateral lobe of head with about 6 or 7 short spines and 3 or 4 intermixed setæ. Lateral margin of pronotum with five long setæ and costal margin of corium with a single seta. Second segment of antenna shorter than third. Smaller species, 5.50–6.00 mm.
 *A. indentatus*.

Æthus communis Uhler

Æthus communis Uhler (1877) Bull. Geol. Geogr. Surv. 3: 379.—Signoret (1882) Ann. Soc. Ent. Fr. 35. pl. 2, fig. 83.—Blatchley (1926) Heteropt. E. N. Am. 84.

A shining, black species when mature. The obscurely punctate head is bluntly rounded, with the tylus extended to the front, with two long apical setæ; the deeply impressed submargin of the lateral lobe with about 9 or 10 acute spines and 3 or 4 long setæ; the vertex rather strongly elevated. The pale testaceous antenna has the second joint somewhat longer than third. Lateral margin of pronotum with 15 or 16 and costal margin of corium with about 6 long setæ. Length 6.00–7.50 mm.

Described from Cuba and Florida. A single specimen in the United States National Museum erroneously labeled by Uhler *Pangæus serripes* Westwood, was collected at Bayamón, Porto Rico, January 1899, by August Busck. It also occurs in Jamaica and Hispaniola.

Æthus indentatus (Uhler)

Rhytidoporus indentatus Uhler (1877) Bull. Geol. Geogr. Surv. 3: 380.
Æthus indentatus Signoret (1882) Ann. Soc. Ent. Fr. 38. pl. 2, fig. 80.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 256.—Blatchley (1926) Heteropt. E. N. Am. 85.

Dark castaneous when fully colored. The bluntly rounded head is impunctate; the surface of the lateral lobe obliquely wrinkled and its submargin with 6 or 7 short spines and 4 or 5 longer setæ; the tylus at apex with two short spines; the vertex is less convex and the ocelli

closer together than in the preceding species. Lateral margin of the pronotum provided with 3 or 4 long setæ; and the costal margin with a single seta near base. Length 5.50–6.00 mm.

Described by Uhler from Cuba and Florida. Signoret adds Hispaniola. Areibo, March 3, 1914 (Lutz); Utuado, March 16, 1906 (Wheeler); St. Croix, Virgin Islands, July 4, 1911—A.M.N.H. Mayagüez, September 15, 1930 (Suro) and Río Piedras (Cotton); Adjuntas, January 12, 1934 (Oakley)—U.S.N.M.

GEOCNETHUS Horvath

Geocnethus Horvath (1919) Ann. Mus. Nat. Hung. 17: 245.—Hussey (1925) Jour. N. Y. Ent. Soc. 33: 63.—Blatchley (1926) Heteropt. E. N. Am. 72, 80.

Head transverse, bluntly rounded; submargin neither deeply impressed nor furnished with spines but often with a few setæ there and on the disk; tylus extended to the front of head; eyes each with a horizontal spinule. Anterior submargin of pronotum not transversely grooved. Odoriferous orifice set in a preapical notch beneath an overhanging flattened ledge which outwardly is not expanded into a rounded lobe as in the closely related genus *Geotomus*. This genus is known to occur in the southeastern United States, Neotropical, Palearctic, Ethiopian and Indo-Malayan regions.

Geocnethus reversus Barber & Bruner

Geocnethus reversus Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 237.

Black, highly polished. Antennæ and rostrum embrowned; all tarsi pale testaceous. Head bluntly, semicircularly rounded, three-sevenths wider across eyes than long; tylus contracted apically; lateral lobe faintly wrinkled, very sparsely and faintly punctate, with 6 long setæ on each side, 4 of which are submarginal and 2 discal. Ocelli set rather close to the eyes. Third segment of antenna a little longer than second, fourth a little shorter than fifth. Rostrum reaching to middle coxæ, second segment a little longer than third. Submargin of pronotum with 5 long setæ; anterior submargin with an irregular semicircular series of punctures; disk nearly smooth except for a transverse row of punctures behind the middle and a profuse series laterally. Costal margin with 2 widely separated setæ. Length 4.00–5.00 mm.

Described from Porto Rico and Cuba. Mayagüez, September 10, 1930 (Martorell); Isabela, April 14, 1930 (Leonard); Río Piedras, December 21, 1911, and Cayamas, Cuba (Schwarz)—U.S.N.M.

AMNESTUS Dallas

Amnestus Dallas (1851) List Hem. 1: 110, 126.—Uhler (1877) Bull. Geol. Geogr. Surv. 3: 369.—Signoret (1883) Ann. Soc. Ent. Fr. 367.—Hart (1919) Bull. Nat. Hist. Surv. Ill. 13: 204.—Blatchley (1926) Heteropt. E. N. Am. 85.

Small ferruginous or castaneous cydnids which are restricted to the Nearctic and Neotropical realms. Besides the characters mentioned in the key, two should be added: the mesosternum is strongly carinate between the posterior coxæ and the posterior margin of the metapleurum is expanded to cover the first and second abdominal segments, at least outwardly. Three species, one of which is apparently new, occur in Porto Rico.

KEY TO PORTO RICAN SPECIES

1. Pale ferruginous-testaceous. Anterior lobe of pronotum either rather closely punctate or with scattered patches of punctures interspersed with small, smooth areas. Anterior femur of male below with an oblique, slightly bifid process and posterior femur below with an oblique, preapical spine, shorter than diameter of femur, 2.00–2.20 mm. *A. pusio*.
 Ferruginous-castaneous; corium in part testaceous. Disk of anterior lobe nearly impunctate or sparsely punctate. 2
2. Disk of anterior lobe of pronotum almost or quite impunctate; anterior submargin, normally, with a complete, single, arcuate row of coarse punctures. Anterior femur of male below with an oblique, slightly bifid process and posterior femur below with a rather long acute, preapical spine. Larger species, 2.30–2.80 mm. long. *A. subferrugineus*.
 Disk of anterior lobe of pronotum distinctly, but sparsely, punctate; anterior submargin provided with more than a single row of punctures. Anterior femur of male below with a slender, oblique, non-bifid, blunt process and posterior femur below with a very short, preapical spine. Small r species, 1.80–2.00 mm. long. *A. diminutus*.

***Amnestus subferrugineus* (Westwood)**

Cydnus subferrugineus Westwood (1837) Hope Cat. 5, 19.

Amnestus subferrugineus Signoret (1883) Ann. Soc. Ent. Fr. 373, fig. 198.—Barber (1923) Amer. Mus. Novit. 75: 12. (listed).—Blatchley (1926) Heteropt. E. N. Am. 86, 89.

Somewhat larger and differently colored than *A. pusio*. Head, pronotum, scutellum and ventral parts castaneous; corium testaceous, with median longitudinal stripe, apical and costal margin castaneous; antennæ ferruginous; legs testaceous. Tylus with 4 and each lateral lobe of the head with 5 spines as well as 2 widely separated setæ. Anterior submargin of pronotum with a row of large punctures; disk of anterior lobe smooth except sometimes for a few obscure punctures in the center; posterior lobe strongly punctate. Anterior femur of male below near base with a stout bifid spine, which is not so long as diameter of femur; posterior femur preapically with a long, gently curved spine, nearly as long as diameter of femur; posterior tibia with three or four rows of slender spines; inner face with a row of minute, setigerous tubercles. Length 2.40–2.60 mm.

Signoret examined and redescribed Westwood's type from St. Vincent. The author has seen specimens of this species from Cuba,

Republica Dominicana, Martinique, Grenada, and Guadeloupe. Adjuntas, June 8-13, and Cayey, May 30, 1915 (Lutz & Mutchler)—A.M.N.H.

***Amnestus pusio* (Stål)**

Mayoa pusio Stål (1858) Bidrag Rio Jan. Hem. 14.

Amnestus pusio Signoret (1883) Ann. Soc. Ent. Fr. 373. fig. 199.—Barber (1923) Am. Mus. Novit. 75: 12. (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 256. (listed as *pusillus* Uhler).—Blatchley (1926) Heteropt. E. N. Am. 86, 88.

Much smaller and paler than the preceding species, more ferruginotestaceous. Central lobe of head with 4 spines, the lateral lobes each with 4 shorter spines as well as 3 fine setæ. Anterior submargin of pronotum with 2 transverse rows of coarse punctures; disk either rather closely punctate, or with punctures more scattered, leaving small, irregular, smooth areas on either side of the middle; anterior margin more nearly straight than in *A. pusillus* Uhler. Scutellum rather closely, coarsely punctate. Anterior femur of male with a small, oblique spine, which is usually very slightly bifid; posterior femur below preapically with a short, oblique spine. Posterior tibia straight, provided with stiff bristles.

Described from Brazil. Manatí, June 29, 1915, at light (Lutz & Mutchler)—A.M.N.H. Isabela, July 29, 1931, at light, and Puerto Real, Vieques Island, September 25-27, 1931 (Leonard)—U.S.N.M.

Widely distributed through the West Indies (Cuba, Hispaniola, Grenada and St. Vincent). Often confused with *A. pusillus* Uhler. All of Uhler's so-called *pusillus* from Grenada in the collection of the United States National Museum belongs here.

***Amnestus diminuat*, NEW SPECIES**

FIGURE 1

Not of uniform color; similar to *A. subferrugineus*. Castaneous above and below, with the head and pronotum sometimes lighter; corium more or less ochraceous; clavus, in part, and middle region and apex of corium tinted with castaneous; tibiæ, tarsi, and antennæ paler.

Head across eyes one-third wider than long; margin of lateral lobe (juga) as well as the tylus each with 4 small teeth, interspersed with a few long hairs; surface about the ocelli and along inner margin of eyes provided with 13-15 distinct punctures; ocelli and eyes ruby-red. Antenna short for the genus, .64 mm. long with the respective segments measuring as follows: I-.08, III-.20, IV-.16, V-.20 mm.; second segment minute, third and fourth elongate-ovate. Rostrum stramineous, short, its apex just surpassing the anterior coxæ; third segment slightly longest, the other three segments about equal in length;

lengths of the segments as follows: I-.12, II-.12, III-.16, IV-.12 mm. Pronotum nearly one-third wider than long (.90 \times .58 mm.); anterior lobe .34 mm. long, not sharply set off from posterior lobe by a distinct transverse impression; anterior margin moderately concave for the reception of the head; anterior submargin provided with one regular row followed by an incomplete second row of punctures; disk of anterior lobe with scattered punctures, leaving much of the area smooth, impunctate; elsewhere, along the side and on the posterior lobe, punctures

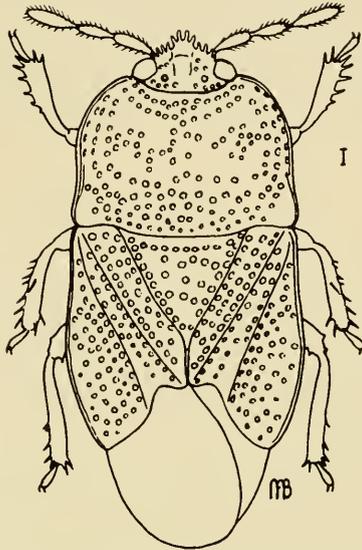


FIG. I *AMNESTUS DIMINUATUS* N. SP.

are more profuse but not close set; lateral margins very slightly converging anteriorly, more abruptly rounded in the anterior fourth. Surface with a few erect setæ or hairs. Longitudinal median carina of the meso- and metasternum sharp and rather strongly elevated posteriorly. Gutter or canal from the odoriferous orifice rather short and gradually attenuate, acute outwardly, the rim or margins outwardly calloused, somewhat lobate beyond apex of canal. Anterior femur of male below about the middle point with a rather stout, simple, oblique spine. Anterior tibia laterally with a row of spines, the three near base much shorter. Posterior femur below, before apex, with a short spine. Posterior tibia straight. Scutellum slightly wider than long, with a row of punctures along the lateral margin and on the transverse prebasal depression; disk sparsely punctate. Corium with a

row of punctures along the claval suture, paralleled by an incomplete row just outside of this, and rather closely punctate between the costal margin and the median vein. Membrane clear, transparent. Length 1.80-2.00 mm.

Type and paratype, males; U.S.N.M. Cat. no. 51580, Adjuntas, Porto Rico, April 21, 1933 (Faxon, Anderson, Mills, & Oakley).

This species is most nearly related to *A. subferrugineus*, with which it agrees rather closely in color. Besides being smaller, the punctuation is very different, and the odoriferous canal is quite distinctive. The antennæ and rostrum are much shorter. Its color, as well as its punctuation, is very unlike *A. pusio* (Stål) and *A. pusillus* Uhler. The author has not been able to identify this with any of Distant's several Central American species, which are very briefly described.

Family PENTATOMIDÆ

KEY TO PORTO RICAN SUBFAMILIES

1. Scutellum enlarged, U-shaped, nearly or quite covering abdomen; sclerotized part of corium exposed at base only or along narrow costal margin. Frena absent..... 2
 - Scutellum not greatly expanded, more or less triangular; corium broadly exposed. (Median and subcostal veins of hind wing set close together and parallel.) Frena well developed..... 3
2. Hemicytra very long, when expanded extended far behind apex of abdomen; sclerotized costal margin constricted and thinned at middle point (when exposed). Odoriferous orifice minute, devoid of a canal. Antenna with only four segments. All tarsi two-segmented. Dorsum polished, black or castaneous..... MEGARIDINÆ.
 - Hemicytra when expanded not much longer than abdomen; sclerotized costal margin not constricted. Odoriferous orifice distinct, the canal sometimes absent (*Diolcus*). Antenna usually five-segmented. All tarsi three-segmented. Median and subcostal veins of hind wings more or less distant and diverging, inclosing a wide median area..... SCUTELLERINÆ.
3. Venter of abdomen with six visible spiracles on each side, first not covered by expanded posterior margin of metapleurum. Rostrum short, usually not extended to intermediate coxæ. Mesosternum with very strongly elevated carina prolonged anteriorly from a flattened metasternal plate. Large species..... TESSARATOMINÆ.
 - Venter of abdomen with five visible spiracles on each side, first spiracle entirely or almost entirely covered by expanded posterior margin of metapleurum... 4
4. Buccuke nearly parallel or slightly diverging, not distinctly united posteriorly. Basal segment of rostrum usually not free but confined in rostral groove between buccuke; rostrum usually slender..... PENTATOMINÆ.
 - Buccuke converging and united posteriorly. Basal segment of rostrum enlarged and free from rostral groove, except at base; rostrum usually stout. ASOPINÆ.

Subfamily SCUTELLERINÆ

Members of this subfamily can be distinguished by the large dorsal shield-like or U-shaped scutellum covering all or most of the abdomen, and concealing all but a narrow costal or small basal portion of the corium. Only the exposed part of the corium coriaceous. The dorsum is most often strongly convex. Frena absent. In the venation of the hind wings, the median and subcostal veins are remote from each other and diverging, enclosing a wide median area. In the genera treated herein, all except *Augocoris* have a large strigulated area laterally, occupying a broad section of at least the fourth and fifth segments of the venter. The subfamily is world-wide in its distribution, but much better represented in the warmer parts of the world. Poorly represented in Porto Rico, where there are only nine species distributed in six genera.

KEY TO PORTO RICAN GENERA

1. Venter devoid of a strigulated area on each side of disk; ventral incisures gradually curved on central disk, abruptly arcuated before lateral margins. Antenna with four segments (second segment very long in *A. illustris*, much longer than first). Odoriferous canal long and distinct. Scutellum covering abdomen and most of corium except at base. *Augocoris*.
 Venter with a strigulated area on each side of disk traversing at least fourth and fifth segments. Antenna with five segments. 2
2. Odoriferous orifice with a distinct canal prolonged on metapleurum. Tibia with a wide, longitudinal furrow. 3
 Odoriferous orifice either devoid of a canal or gutter or with a very short one. . . . 4
3. Canal from odoriferous orifice gradually expanded outwardly and bent abruptly forward at a right angle before lateral margin of metapleurum. Sixth ventral segment of abdomen not twice as long through middle as along lateral margin. *Sphyrocoris*.
 Canal from odoriferous orifice fairly straight, nearly transverse, its margins parallel. Sixth ventral segment of abdomen about twice as long through middle as along lateral margin. *Symphylus*.
4. Face of tibia with a double longitudinal groove; odoriferous orifice placed nearer to posterior coxa than to lateral margin of metapleurum. *Diolcus*.
 Face of tibia with a single wide, longitudinal groove. Odoriferous orifice placed midway between posterior coxa and lateral margin of metapleurum or closer to latter than to coxa. 5
5. Scutellum not so wide as abdomen. Connexivum free. Head obliquely truncate anteriorly on each side. Pronotum and scutellum not spotted with red. *Tetyra*.
 Scutellum as wide, or very nearly as wide, as abdomen. Connexivum not entirely free. Head rounded anteriorly. Pronotum and scutellum spotted with red. *Pachycoris*.

AUGOCORIS Burmeister

Augocoris Burmeister (1835) Handb. Ent. 2: 396.

This genus is composed of only a few, rather large species confined to Central and South America, with one species in the West Indies.

Augocoris illustris (Fabricius)

Cimex 6-punctatus Fabricius (1781) Spec. Ins. 2: 339 (preoccupied).

Cimex illustris Fabricius (1781) Spec. Ins. 2: 340.

Augocoris sexpunctatus Gundlach (1894) Fauna Puerto-Riquena 589.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Augocoris pallidus Wolcott (1924) Jour. Dep. Agr. P. R. 7: 256.

Augocoris illustris Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 244.

Described from South America. Bayamón, August 3, 1913, on *Phyllanthus epiphyllanthus* (Wolcott); San German (J. M. Smith); St. Croix, Virgin Islands, June 1935, on Nespero tree (Beatty)—U.S.N.M. Mayagüez, March 25, 1927 (Danforth)—Univ. Puerto Rico.

Widely distributed through Mexico and Central and South America. In the West Indies it occurs at least in Cuba, Porto Rico, and Dominica.

Owing to its great variation in color, it has been described under a number of different names. These color variations are fully discussed in the last-named reference, above. For further synonymy see Lethierry & Severin, Cat. Gen., 1: 46. 1893 (exclude *rugulosus* Herrich-Schäffer).

SPHYROCORIS Mayr

Sphyrocoris Mayr (1864) Verh. Zool. Bot. Ges. Wien. 14: 904.

Sphyrocoris obliquus (Germar)

Pachycoris obliquus Germar (1839) Zeitschr. Ent. 1: 94.

Sphyrocoris obliquus Gundlach (1894) Fauna Puerto-Riquena 590.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 242.

Although this species is widely distributed throughout the West Indies, the author has seen no specimens from Porto Rico. It was recorded from that Island by Gundlach and certainly should occur there. The character of the gutter of the odoriferous orifice as indicated in the key will readily separate this species from the other scutellerids.

SYMPHYLUS Dallas

Symphylus Dallas (1851) List. Hem. 1: 37.

Symphylus caribbeanus Kirkaldy

Scutellera obliqua Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 362 (not Germar).

Symphylus deplanatus Uhler (1893) Proc. Zool. Soc. Lond. 1893: 705 (not Herrich-Schäffer).—Uhler (1894) Proc. Zool. Soc. Lond. 1894: 170.

Mesotrypa sinuosa Uhler (MS.) Gundlach (1894) Fauna Puerto-Riquena 589.

Symphylus caribbeanus Kirkaldy (1909) Cat. Cim. 280 (new name).—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 243.

Described from Cuba. Ponce, Porto Rico, August 10, 1933 (Oakley)—U.S.N.M. Other specimens in the United States National Museum collection are from Florida, Cuba, Haïti, and Grenada.

DIOLCUS Mayr

Diolcus Mayr (1864) Verh. Zool. Bot. Ges. Wien 14: 904.

Distinguished from the other West Indian scutellerids by the absence of a canal or gutter from the odoriferous orifice. The genus is apparently confined to the United States and the West Indies.

KEY TO PORTO RICAN SPECIES

1. Head long, very nearly as long as wide, and nearly or quite as long as pronotum; lateral margin, seen from above, anteriorly calloused. Lateral margin of pronotum carinate, lightly reflexed. Rostrum long, reaching to or just behind middle of third visible, ventral, abdominal segment. Sternal rostral groove shallow, margins slightly elevated. Devoid of greenish punctures *D. variegatus*.
 Head shorter, much wider than long and much shorter than pronotum; calloused margin of head not visible from above. Lateral margin of pronotum impressed or calloused, not plainly reflexed. 2
2. Sternal rostral groove deep, with margins strongly elevated throughout entire sternum. Venter deeply grooved anteriorly. Posterior margin of terminal ventral abdominal segment of male produced and convexly rounded. Rostrum long, reaching on to fourth visible, ventral, abdominal segment. In part, profusely punctate with green above and below *D. boscii*.
 Sternal rostral groove shallower, with margins much less elevated. Venter shallowly grooved anteriorly. Posterior margin of terminal ventral abdominal segment provided with a broad sinus. Apex of rostrum not extending beyond third ventral abdominal segment. 3
3. Lateral submargin of pronotum distinctly, broadly impressed, more evident before middle. Not punctate with green. Sinus of terminal ventral abdominal segment of male shallower and narrower at base (.20 x .80 mm.), not distinctly, transversely impressed behind minute tooth at outer apical angle. Transverse sclerites (valvifers) of female, following terminal ventral segment, distinctly lobate at outer apical angles. *D. irroratus*.
 Lateral submargin of pronotum not distinctly impressed. Dorsally punctate with green. Sinus of terminal ventral abdominal segment of male deeper and broader at base (.32 x 1.12 mm.), distinctly impressed behind tooth at outer apical angle. Outer apical angles of valvifers of female gently rounded, not lobate. *D. disjunctus*.

Diolcus variegatus (Herrich-Schäffer)

Pachycoris variegatus Herrich-Schäffer (1836) Wanz. Ins. 3: 106. fig. 332.

Diolcus variegatus Stål (1870) Sv. Vet.-Akad. Handl. II. 9(1): 10.—Schouteden (1904) Gen. Ins. Fasc. 24. pl. 4, fig. 3.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 242.

Reported from Cuba, to which should be added Jamaica and Hispaniola. Although this species has not yet been found in Porto Rico, the author believes it should occur there.

Diolcus boscii (Fabricius)

FIGURE 2

Cimex boscii Fabricius (1798) Ent. Syst. Suppl. 529.

Scutellera (Pachycoris) boscii Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 361.

Diolcus boscii Stål (1870) Sv. Vet.-Akad. Handl. 11. 9(1): 11.—Schouteden (1904) Gen. Ins. Fasc. 24: 57.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 241, 242.

Cuba, Hispaniola, and St. Vincent. Not yet discovered in Porto Rico, but probably should occur there. What the author reported as this species from Porto Rico (1923: 12) is described below as a new species.

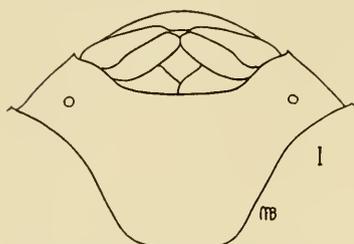


FIG. 2 *DIOLCUS BOSCI* FAB.
GENITAL SCLERITES ♀

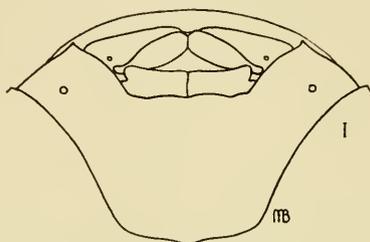


FIG. 3 *DIOLCUS IRRORATUS* FAB.
GENITAL SCLERITES ♀

Diolcus irroratus (Fabricius)

FIGURE 3

Cimex irroratus Fabricius (1775) Syst. Ent. 699.

Scutellera (Pachycoris) irrorata Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 362.

Diolcus irroratus Stål (1868) Hem. Fab. 1: 13.—Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 6.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 256.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 242.

Described from America. Ponce, November 5, 1932 and August 10, 1933 (Oakley); Aguirre, April 1925 (Box); Añasco District, July 3, 1917 (Morrison); Parguera, September 4, 1933 (Harley); Yauco, January 21, 1922 (Wolcott & Danforth); Culebra Island, February 1899 (Busck); San Juan, April 26, 1933 (Webb & Anderson); St. Croix, Virgin Islands, February 1, 1913 (Russell)—U.S.N.M. Santa Rita, April 23, 1914 (Smyth); Pt. Cangrejos, April 10, 1920 (Wolcott)—Ins. Exp. Sta. Guánica, Jan. 12, 1925—Dozier coll.

Further distributional records from the West Indies include Jamaica, Cuba, Hispaniola, and Antigua. Due to the variation in the character of maculation, this species has been described under a number of names which are not listed above.

Diolcus disjunctus, NEW SPECIES

FIGURES 4, 5

Above closely punctate with green, each puncture rimmed with brown, giving a brownish cast to the dorsum; dark brown patches occur laterally and posteriorly on the scutellum. Beneath yellow-testaceous, with head laterally and pleura punctate with green and red, the latter predominating. Venter on both sides profusely punctate with red; the strigose area of the fourth and fifth segments provided with a few circular brown spots, each much larger than the usual punctation. All femora and tibiae spotted with bright red. Antenna pale yellow-testaceous, embrowned apically.

Head rather short, nearly one-third wider across eyes than long (3.72×2.22 mm.); rather closely punctate with dark green punctures

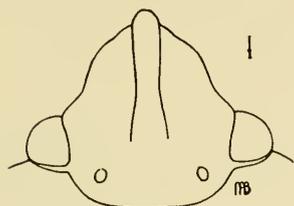


FIG 4 *DIOLCUS DISJUNCTUS* N. SP.
HEAD

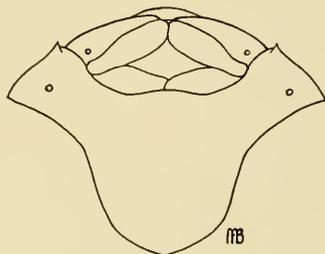


FIG 5 *DIOLCUS DISJUNCTUS* N. SP.
GENITAL SCLERITES ♀

to the extreme edge, the intervening spaces variegated with pale testaceous-yellow and small reddish patches; lateral margin slightly concavely sinuate a little before the eyes; extreme edge rounded, not at all compressed; beneath along margin with an evident, smooth, calloused line not visible from above; surface below this coarsely punctate with green and with a row of reddish punctures paralleling each buccula, continued to base of head. Antenna with the second and third segments equal, fourth and fifth subequal or the latter slightly the longest; lengths of the segments are I-.56, II-.60, III-.60, IV-1.00, V-1.12 mm. Rostrum reaching to about the middle of the second visible ventral segment of the abdomen; third and fourth segments subequal; lengths of segments are I-.60, II-1.28, III-.80, IV-.80 mm. Pronotum a little more than twice as wide as long (5.80×2.80 mm.); rather closely punctate with brown-rimmed, green punctures; lateral margin straight. Scutellum similarly punctate as the pronotum, sometimes with slight evidence of a median, pale, longitudinal streak, at least posteriorly. Connexivum, except along inner and outer

margins of segments, punctate with green and red, devoid of transverse, dark fasciæ. Beneath with closer set aggregation of red punctures anteriorly on the propleurum and outwardly on the mesopleurum, some of the punctures greenish. Rostral groove of the sternum shallower and with the margins less elevated than in *D. boscii*. Venter laterally rather closely spotted with red about the punctures, these sparser on the central disk. Sixth visible ventral segment of the male with median longitudinal length twice as long as the length of the margin to the small preapical tooth; margin just posterior to this tooth distinctly transversely impressed; posterior margin at base of broad sinus not truncate but gently convexly rounded. The sinus deeper and broader than in *D. irroratus*. In the female the two transverse sclerites (valvifers), following the sixth segment, not lobate postero-laterally. Length male 9.00 mm., female 9.00–9.50 mm.

Type, male:—Ponce, Porto Rico, July 20–22, 1914 (Barber). Paratypes, male: St. Croix, Virgin Islands, May 5, 1919; females: one with same data as type; Mameyes, November 17, 1925—A.M.N.H. Río Piedras, July 14, 1916 (Cotton)—U.S.N.M. Cat. no. 51581.

This is the species which the author reported from Porto Rico (1923: 12) as *Diolcus boscii* (Fabricius). It is, however, most closely related to *D. irroratus* (Fabricius), from which it can be distinguished by the relatively shorter head, green punctures above and differences in genital sclerites of the female.

TETYRA Fabricius

Tetyra Fabricius (1803) Syst. Rhyng. 128.

Tetyra antillarum Kirkaldy

Cimex arcuatus Fabricius (1794) Ent. Syst. 4: 83 (preoccupied).

Tetyra arcuata Van Duzee (1904) Trans. Ent. Soc. Am. 30: 11.

Tetyra antillarum Kirkaldy (1909) Cat. Cim. 284 (new name).—Blatchley (1926) Heteropt. E. N. Am. 38.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 241.

Described from "Americæ meridionalis Insulis." This, the only representative of the genus in Porto Rico, has been collected at Guánica, October 6, 1913, by E. G. Smyth—U.S.N.M. It occurs also in Cuba and Hispaniola.

PACHYCORIS Burmeister

Pachycoris Burmeister (1835) Handb. 2: 391.

Pachycoris fabricii (Linnaeus)

Cimex fabricii Linnaeus (1771) Mant. Plant. 2: 534.

Pachycoris nitens Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 360.

Pachycoris wilsoni Uhler (1863) Proc. Ent. Soc. Phila. 2: 159.

Scutellera nitens Stahl (1883) Cat. Cab. Zool. 210.

Pachycoris fabricii Gundlach (1894) Fauna Puerto-Riquena 589.—Barber (1923) Am. Mus. Novit. 75: 12.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 241.
Pachycoris torridus Wolcott (not Scopoli) (1924) Jour. Dep. Agr. P. R. 7: 255.

As there is only one species in Porto Rico, it may be readily distinguished by the characters given in the key to the genera.

Probably described from Haïti. Aibonito, July 14–17, 1914 (Barber)—A.M.N.H. Cayey, December 29, 1932 on Guava leaf (Oakley) and Caguas—U.S.N.M. Recorded as *Pachycoris torridus* by G. N. Wolcott on Croton and Lantana at Ponce, on Croton at Guánica, Moco, Aguacilla, and Hatillo—Ins. Exp. Sta. It is found also in Hispaniola and Cuba.

Subfamily MEGARIDINÆ

MEGARIS Stål

Cyraspis Stål (1860) Bidrag Rio Jan. Hem. 1: 9 (preoccupied).

Megar Stål (1862) Bidrag Rio Jan. Hem. 2: 57 (new name).—McAtee & Malloch (1928) Proc. U. S. Nat. Mus. 72(25): 4.

Megar puertoricensis, NEW SPECIES

FIGURES 6, 7

Fusco-castaneous. Antennae and legs black, apices of the terminal segments of the former, and apices of all femora and tibiæ, as well as all tarsi, testaceous. Viewed from the side, strongly arched, a little

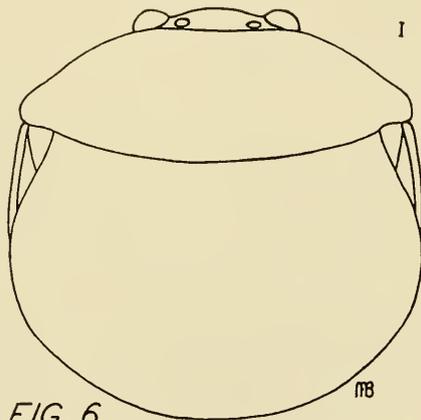


FIG. 6

MEGARIS PUERTORICENSIS N. SP.

flattened dorsally, not quite twice as long as its greatest height. Head twice as wide across eyes as long, smooth, impunctate, front slightly projected anteriorly before the anterior margin of the eyes, broadly rounded or almost truncate in front, tylus equal to the lateral lobe;

margin near the eye strongly concavely sinuate. Ocelli about twice as far apart as each is remote from the eye. Antenna with the fused second and third segments equal in length to the fourth, which is one-third longer than terminal segment, the latter narrowly obovate, being very attenuate towards base, bluntly rounded at apex; fused second and third segments towards base with five or six long hairs below and one above, some of which are nearly or quite as long as the segment, also one hair near the middle point; fourth segment with several moderately long hairs and numerous shorter hairs, which are but little shorter than the diameter of the segment; fifth segment strongly

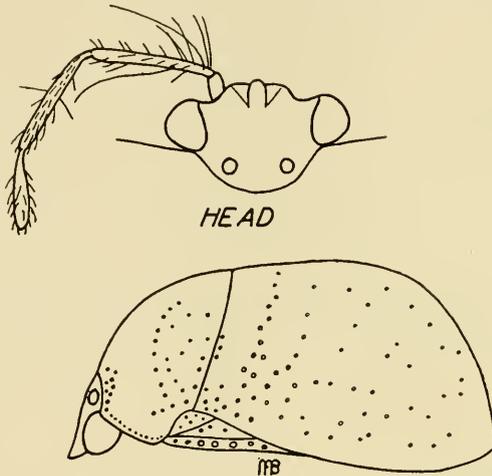


FIG. 7 *MEGARIS PUERTORICENSIS* N. SP.

pilose apically, the hairs inclined and shorter than the diameter of the segment. Pronotum with the lateral margin nearly straight, very slightly convexly arcuate; upper surface distinctly punctate as follows: a single row of ten or eleven just within the lateral margin, a series of about thirty on the anterior disk just behind the head, which are more closely clustered behind each ocellus, a scattered series across the central disk, this latter series preceded by a transverse, smooth area; posterior disk smooth except for a few scattered punctures laterally. Scutellum with the arrangement of punctures as follows: a short row at base on each side, interrupted in the middle, a complete transverse row a short distance from base, paralleling the posterior margin of the pronotum; behind which the surface is very sparsely and distinctly punctate. The very short clavus and corium each with a few fine punctures, the costal submargin with a single row of about seven

punctures. Pleura with numerous, not very closely set, fine punctures. Length male: 1.60 mm.; width 1.60 mm.

Type, male: U.S.N.M. Cat. no. 51582, Aibonito, Porto Rico, August 3, 1933, on *Eugenia* sp? (Oakley).

Most closely related to *M. semiamicta* McAtee & Malloch, from which its differs in its slightly smaller size, darker legs and antennæ and the character and arrangement of the hairs on the latter, and larger and more distinct punctures on the pronotum and scutellum.

Subfamily PENTATOMINÆ

KEY TO PORTO RICAN GENERA

1. Second visible ventral segment of abdomen with a spine or elevated in a more or less well developed tubercle.....2
 Second visible ventral segment of abdomen without a spine or tubercle.....10
2. Juga acute, lateral margin nearly straight, exceeding blunt apex of tylus. Humeral angle of pronotum spinose. Canal from odoriferous orifice short, not extending half way to margin of pleurum. All tibiæ sulcate....*Arvelius*.
 Head rounded in front; juga not acute. Humeral angle most often not spinose (except some species of *Edessa*).....3
3. Odoriferous orifice terminating in a long, acutely tapering canal extending well beyond middle of metapleurum.....4
 Odoriferous orifice with a short, abruptly terminating canal not reaching beyond middle point of metapleurum.....8
4. Second visible, ventral abdominal segment with long, compressed spine, attaining the intermediate coxæ. Humeral angle not prominent.....*Piezodorus*.
 Second visible, ventral abdominal segment with either a short spine or process, or elevated into well defined tubercle.....5
5. Juga much longer than tylus and contiguous before it. Metasternum with large, flat, several-lobed plate, which anteriorly and posteriorly is produced into two processes. Rostrum short, its apex usually fitting into anterior sinus of metasternal plate.....*Edessa*.
 Tylus as long as juga or very nearly so. Metasternum devoid of a plate. Rostrum longer.....6
6. Bucculæ strongly elevated, abruptly terminating before base of head. Rostrum long, extending behind third visible ventral abdominal segment; first segment extending to base of head. Venter impunctate.....*Pharypia*.
 Bucculæ moderately elevated, nearly or quite reaching base of head. First segment of rostrum scarcely longer than bucculæ. Venter, at least in part, punctate.....7
7. Second visible ventral abdominal segment devoid of a spine, but elevated into a tubercle, sometimes more or less flattened.....*Banasa*.
 Second visible ventral abdominal segment with a distinct spine directed anteriorly between posterior coxæ.....*Acrosternum*.
8. Tibia plainly longitudinally sulcate. Lateral margin of pronotum entire; humeral angle obtusely rounded, not prominent. Three lobes of the head equal. Buccula anteriorly edentate.....9

- Tibia not longitudinally sulcate. Lateral margin of pronotum with a few very small, scattered tubercle-like serrations; humeral angle somewhat prominent, more or less acute. Juga a little longer than tylus, nearly or quite contiguous before it. Buccula anteriorly with a ventrally directed tooth. Second visible ventral abdominal segment with well developed cylindrical spine directed between the posterior coxæ.....*Brepholoxa*.
9. Second visible ventral abdominal segment with prominent tubercle. First antennal segment not nearly attaining apex of head; antenniferous tubercle, outwardly, acutely spinose. Head closely punctate. Anterior submargin of pronotum not punctate-impressed. Species generally green....*Nezara*.
- Second visible ventral abdominal segment with a well developed, tapering, acute spine, projected between the posterior coxæ. First antennal segment produced beyond apex of head; antenniferous tubercle outwardly unarmed. Head smooth, almost impunctate. Anterior submargin of pronotum strongly punctate-impressed. Connexivum broadly exposed, banded with blue-black.....*Vulsirea*.
10. Femur above terminating in an apical spine. Juga acute or subacute apically. Humeral angle produced, acute or spinose. Tibia not at all or very lightly sulcate.....11
- Femur unarmed at apex. Three lobes of head equal or tylus exceeding juga and in that case acute.....12
11. Second and third visible ventral abdominal segments longitudinally sulcate. Posterior margin of corium broadly rounded. Juga very slightly, if at all, exceeding tylus.....*Fecelia*.
- Ventral segments of abdomen not sulcate. Posterior margin of corium concavely sinuate. Juga much exceeding tylus.....*Lora*.
12. Tylus much exceeding juga and very acute at apex. Head not immersed to eyes. Humeral angle of pronotum spinose; anterior angle acute; lateral margin rounded dorso-ventrally, entire.....*Proxys*.
- Juga and tylus subequal, the former bluntly rounded anteriorly. Head immersed to eyes. Humeral angle of pronotum variable; lateral margin of pronotum either calloused or carinate or impressed; usually crenulate but sometimes entire.....13
13. Odoriferous orifice with long, tapering canal usually reaching beyond middle of metapleurum.....*Thyanita*.
- Odoriferous orifice with a very short canal, abruptly terminating, not extending beyond middle of metapleurum.....14
14. First segment of antenna somewhat surpassing apex of head. Anterior and lateral margin of pronotum distinctly reflexed, the latter entire. Posterior lateral angles of segments of connexivum strongly projecting and either acute or subacute. First segment of rostrum longer than bucculæ.....*Rumibia*.
- First segment of antenna not surpassing apex of head. Anterior and lateral margin of pronotum not reflexed, sometimes crenulate. Posterior angles of connexival segments not evidently projecting. First segment of rostrum (except in *Mormidea*) not longer than bucculæ.....15
15. Tibia distinctly longitudinally sulcate, often setulose. Lateral margin of pronotum distinctly crenulate anteriorly. Spiracles closer to anterior than to lateral margins of ventral segments of abdomen. Head distinctly shorter than pronotum.....*Euschistus*.

- Tibia either devoid of longitudinal sulcus or with shallow, faint one. Lateral margin of pronotum either faintly (*Sotubea pugnax* (Fabricius)) or not at all crenulate. Spiracles equidistant from anterior and lateral margins of ventral segments of abdomen. Head nearly or quite as long as pronotum. . . . 16
16. First segment of rostrum not longer than bucculae. Tibia faintly and shallowly longitudinally sulcate. . . . *Solubea*.
 First segment of rostrum longer than bucculae. Tibia not sulcate. . . . *Mormidea*.

MORMIDEA Amyot & Serville

Mormidea Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 134.

Head anteriorly rounded; tylus not at all or very slightly exceeding the apices of the juga. Lateral margin of the pronotum entire or obsolete crenulate; humeral angle variable, obtuse or acute, sometimes spinose. First segment of the rostrum exceeding the bucculae and reaching base of head. Canal from the odoriferous orifice very short and terminating abruptly. Tibia not longitudinally sulcate.

Of this large genus, which reaches its maximum development in the Neotropical Region, only two species have been found in Porto Rico. It seems from the nature of its recorded distribution that *Mormidea pictiventris* Stål should also occur here.

KEY TO PORTO RICAN SPECIES

- Scutellum with a small, calloused, yellow spot in each basal angle, not extending posteriorly in a vitta. Humeral angle of pronotum obtusely rounded. Pleura devoid of round, black spots. Posterior lateral angle of 8th abdominal segment not drawn out into long, slender spine. . . . *M. cubrosa*.
- Scutellum on each side with a narrow, calloused yellow vitta extending from base to well behind middle. Humeral angle of pronotum variable, either a right angle or acute or spinose. Pleura each marked with a round, black spot. Posterior lateral angle of 8th abdominal segment drawn out into long, slender spine
M. angustata.

Mormidea cubrosa (Dallas)

Pentatoma cubrosa Dallas (1851) List. Hem. 1: 247.

Mormidea sordidula Stål (1872) Sv. Vet.-Akad. Handl. II, 10(4): 21.—Van Duzee (1904) Trans. Am. Ent. Soc. 30: 43.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Mormidea cubrosa Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 250.

Described from Jamaica. Coamo Springs, July 18–19, 1914 (Barber); San Juan, July 11, 1914 (Watson); Tallaboa, near Ponce, July 23, 1914 (Barber); St. Thomas, Virgin Islands, June 3, 1911 (Lutz)—A.M.N.H. Añaseo District, July 3, 1917 (Morrison); Bayamón, August 22, 1933 (Anderson); Ponce, on grass, May 13, 1932 (Oakley); Mayagüez, May 25, 1933 (Harley)—U.S.N.M. Coamo, October 16, 1924—Dozier coll. Known from the southern United States, Mexico, Cuba, Jamaica, and Hispaniola.

Mormidea angustata Stål

Mormidea angustata Stål (1862) Stett. Ent. Zeit. **23**: 102.—Distant (1880) Biol. Cent. Am. Rhynch. **2**: 55; *pl. 5, fig. 10*.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. **16**: 250.

Described from Mexico. Mona Island P. R., February 1914 (Lutz)—A.M.N.H. Río Piedras, October 18, 1917 (Cotton); Bayamón, December 2, 1932, on pea leaf, and Manatí, August 15, 1933 (Faxon, Mills & Anderson)—U.S.N.M. Mayagüez, November 21, 1928 (Danforth)—author's coll. Known from Mexico, and the Isle of Pines.

SOLUBEA Bergroth

Ēbalus Stål (1862) Stett. Ent. Zeit. **23**: 102 (name preoccupied).
Solubea Bergroth (1891) Rev. Ent. **10**: 235 (new name).

Most of the characters pertaining to this genus apply also to *Mormidea*. The basal segment of the rostrum, however, is relatively shorter, not extending behind the bucculæ, the anterior tibia is most often very slightly and narrowly sulcate. In addition, the anterior disk of the pronotum is devoid of two calloused yellow spots. Two species occur in Porto Rico.

KEY TO PORTO RICAN SPECIES

- Humeral angle of pronotum armed with a prominent, anteriorly directed spine.
Posterior margin of genital segment of male (hypopygium) in ventral view, broadly concave. Tenth segment of female (proctiger) much longer than wide
.....*S. pugnax*.
Humeral angle of pronotum either forming a right angle or acute, rarely subspinose.
Genital segment of male with a distinct, rounded, median lobe. Tenth segment of female not longer than wide.....*S. insularis*.

Solubea pugnax (Fabricius)

Cimex pugnax Fabricius (1775) Syst. Ent. 704.
Pentatoma (Mormidea) typhaeus Stål (1883) Cat. Cab. Zool. 210.
Ēbalus pugnax Gundlach (1894) Fauna Puerto-Riquena 591.
Solubea pugnax Barber (1923) Am. Mus. Novit. **75**: 12. (listed).—Blatchley (1926) Heteropt. E. N. Am. **126**, *fig. 26*.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. **16**: 253.

This species is somewhat larger than the following species, testaceous-yellow in color, with the humeral angle of the pronotum drawn out into a prominent spine which is directed anteriorly. As indicated in the key, the genital segment of the two species is quite distinctive.

Described from America. Coamo Springs, July 17, 1914 (Barber); St. Croix, Virgin Islands, June 3, 4, 1911 (Lutz)—A.M.N.H. Jayuya, May 14, 1932, on corn (Oakley)—U.S.N.M.

Widely distributed in the United States, Central America, Colombia, Brazil, and the West Indies.

Solubea insularis (Stål)

Pentatoma (*Mormidea*) *geographica* Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 369 (preoccupied).

Ebalus insularis Stål (1872) Sv. Vet.-Akad. Handl. II. 10(4): 22.

Mormidea guérini Lethierry & Severin (1893) Cat. Gen. Hem. 1: 123 (new name).—Barber (1914) Bull. Am. Mus. Nat. Hist. 33: 522.

Ebalus insularis var. *similis* Kuhlitz (1902) Berl. Ent. Zeit. 253.

Solubea insularis Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 252.

Described from Cuba. Mayagüez (Danforth)—Univ. Puerto Rico. An extremely variable species, occurring in several West Indian Islands as well as Florida, Mexico, Central America, and Colombia.

EUSCHISTUS Dallas

Euschistus Dallas (1851) List. Hem. 1: 201.

This large genus is confined to the Western Hemisphere, occurring in North, Central, and South America as well as the West Indies. Only two species have hitherto been reported from Porto Rico. A third species is herewith added.

KEY TO PORTO RICAN SPECIES

1. Species larger, 10.00 or more mm. long. Posterior disk of pronotum infuscated. Humeral angle very acute, black; cicatrices marked with black. Posterior margin of male hypopygium slightly concavely sinuate. *E. acuminatus*.
Species smaller, less than 10.00 mm. long. Disk of pronotum concolorous or with a transverse, pale streak posteriorly between humeral angles, the latter often acute. 2
2. Genital segment of male (hypopygium) nearly or quite twice as wide as long; posterior margin broadly and deeply excavated. Humeral angle prominent, produced, commonly spinose. *E. bifibulus*.
Genital segment of male narrower, not twice as wide as long; posterior margin narrowly and shallowly excavated. Humeral angle of pronotum acute, less produced. *E. crenator*.

Euschistus acuminatus Walker

FIGURE 8

Euschistus acuminatus Walker (1867) Cat. Hem. Het. 2: 246.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 254.

Considerably larger than the other two species recorded, with the humeral angle drawn out into a prominent, black, spinose process, which projects somewhat anteriorly and slightly upturned. The pronotum behind the middle is infuscated; the cicatrices with "black hook-shaped marks."

Described from Hispaniola; occurs also in Cuba. Ponce, August 10, 1933 (Oakley)—U.S.N.M.

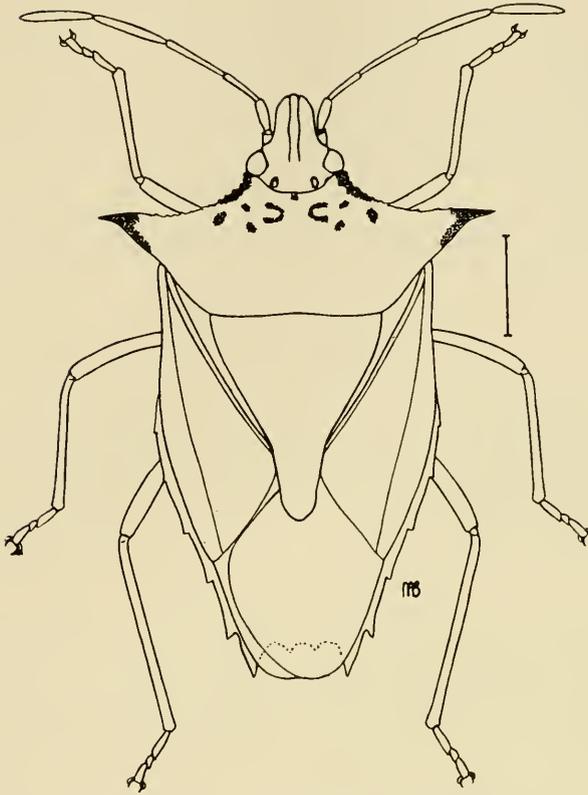


FIG. 8 *EUSCHISTUS ACUMINATUS* WALKER

***Euschistus bifibulus* (Palisot de Beauvois)**

Pentatoma bifibulus Palisot de Beauvois (1805) *Ins. Afr. Amer.* 148; *Hem. pl. 10, fig. 5.*

Euschistus pallipes Dallas (1851) *List. Hem.* 1: 204.

Euschistus bifibulus Stål (1872) *Sv. Vet.-Akad. Handl.* II, 10(4): 27.—Van Duzee (1907) *Bull. Buffalo Soc. Nat. Sci.* 8: 7.—Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 253.—Barber & Bruner (1932) *Jour. Dep. Agr. P. R.* 16: 254.

This has a strong resemblance to the next species, from which the male can be very readily distinguished by the difference in the shape of the hypopygium. The humeral angle of the pronotum is usually prominent, acute, with the marginal teeth pale; posterior disk of pronotum with a more or less conspicuous, pale transverse streak. The female has the apical angle of the 8th abdominal segment (7th visible) more acutely drawn out than in the next species; the two middle basal pieces (valvifers of the 8th segment) one-third wider across base than long.

Described from Hispaniola. Coamo Springs, July 17–19, 1914 (Barber), June 5–7, Aibonito, June 1–3, Caguas, May 28–29, Adjuntas, June 8–13, and Ensenada, June 14–19, 1915 (Lutz & Mutchler)—A.M.N.H. Rfo Piedras, May 8, June 5, 21, 23, 1916, attacking egg-plant (Smyth); Mayagüez, December 1, 1932, on *Solanum indicum* leaf (Harley); Bayamón, August 7, 1932, at light (Anderson & Lesesne), January 13, 1933, on lima-bean leaf (Anderson, Faxon, & Mills), March 3, 1933, on tomato (Lesesne & Anderson)—U.S.N.M. Rfo Piedras, April 1, 1930—Cornell Univ.

Widely distributed in the southern United States, Mexico, and the central and northern part of South America. It is a common species throughout most of the West Indies.

Euschistus crenator (Fabricius)

Cimex crenator Fabricius (1794) Ent. Syst. 4: 101.

Euschistus crenator Van Duzee (1904) Trans. Am. Ent. Soc. 30: 48.—Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 7.—Barber (1923) Am. Mus. Novit. 75: 12.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 254, 256.

The shape of the male genital segment, as indicated in the key, will differentiate this from the preceding species. In addition, the humeral angle of the pronotum is usually not so prominently extended and the marginal teeth are most frequently black. In the female the apical angle of the 8th abdominal segment (7th visible) is less acute, forming more of a right angle than in *E. bifibulus*, and the two middle basal pieces (valvifers of the 8th segment), are one-fourth wider across base than long.

Described from West Indies. Coamo Springs, July 17–19, Tallaboa, near Ponce, July 23, 1914 (Barber)—A.M.N.H. Culebra Island, Porto Rico, February 1899 (Busek); St Croix, Virgin Islands, June 14, 1917, on Guinea grass (Morrison)—U.S.N.M.

Its distribution is much the same as the preceding species. *Pentatomia obscurus* Palisot de Beauvois (male) and *pustulatus* by the same author are synonyms.

PROXYS Spinola

Proxys Spinola (1837) Essai Hem. 325.

Proxys victor (Fabricius)

Cimex victor Fabricius (1775) Syst. Ent. 705.

Proxys victor Distant (1880) Biol. Cent. Am. Rhynch. 1: 62; pl. 5, fig. 18.—Barber (1923) Am. Mus. Novit. 75: 12. (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 254.

?*Proxys punctulatus* Gundlach (1894) Fauna Puerto-Riquena 591.

Venter with a few scattered, yellow spots, the lateral margin more or less yellow. Bucculae frequently pale. Legs conspicuously spotted with black; apex of the hind femur only banded with black.

Described from the West Indies. Mayagüez, February 15, 1914 (Lutz); Aibonito, June 1, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, December 18, 1911 (Hooker); Arecibo, March 28, 1933 (Faxon, Mills, & Anderson); Veja Baja, March 24, 1933, on squash (Faxon & Anderson); Utuado, March 7, 1933 (Oakley)—U.S.N.M. Toa Baja, January 31, 1915 (Garb); Aguirre Centr., Guayama, May 22, 1930 (Leonard)—Cornell Univ.

Very widely distributed from Mexico through Central America to Brazil. Recorded from several islands of the West Indies: Hispaniola, Jamaica, Dominica, and Grenada. Wolcott, 1924, in adding a number of localities, records it as found on grapefruit and squash-vine. It seems very likely that Gundlach's record of *P. punctulatus* as quoted by Wolcott may be a misidentification.

THYANTA Stål

Thyanta Stål (1862) Rio Jan. Hemip. 2: 58.

KEY TO PORTO RICAN SPECIES

1. Humeral angle of pronotum spinose, anteriorly projected; pronotal cicatrices each with a round black spot. Basal and apical angles, at incisures of ventral abdominal segments, each with a black spot. Large species, 10.00 or more mm. long. *T. perditor*.
Humeral angle of pronotum not spinose, either obtusely rounded or forming a right angle; pronotal cicatrices devoid of black spots. Only apical angles, at incisures of ventral abdominal segments, with a black spot. Smaller species. 2
2. Humeral angle of pronotum not at all or scarcely projecting, obtusely rounded. Second segment of antenna as long or usually longer than third segment. Scutellum neither suddenly contracted nor narrow at apex. *T. antiguensis*.
Humeral angle of pronotum somewhat projecting, forming a right angle. Second segment of antenna shorter than third. Scutellum rather abruptly contracted, with narrow apical portion. *T. casta*.

Thyanta perditor (Fabricius)

Cimex perditor Fabricius (1794) Ent. Syst. 4: 102.

Thyanta perditor Gundlach (1894) Fauna Puerto-Riquena 590.—Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 9.—Barber (1923) Am. Mus. Novit. 75: 12. (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 255.

Described from the West Indies. Mayagüez, February 15–16, Mona Island, February 21–26, Arecibo, March 1–4, Manatí, March 5, 1914 (Lutz); San Juan, July 9–12, and Coamo Springs, July 17–19, 1914 (Barber); Caguas, May 28–29, Barros, June 4 and Adjuntas, June 8–13, 1915 (Lutz & Mutchler); Aibonito, November 10, St. Croix, Virgin Islands, March 6 and April 5, St. Thomas, Virgin Islands, February 27 and March 12, 1925 (Lutz & Woodruff)—A.M.N.H. Loiza, March 14, 1932, on lima-bean leaf, and Dorado, December

15, 1933, on grapefruit leaf (Mills & Anderson); Utuado, January, and Arroyo, February 1899 (Buseck); Corozal, February 6, 1931 (Anderson & Mills); Mayagüez, February 14, 1925, St. Croix, Virgin Islands, February 2, 1933, on tomato, St. Croix, Virgin Islands, June 11, 1917 (Morrison)—U.S.N.M.

A widely spread species from southern Florida south, and through Mexico, Central America, and northern South America. It is represented in most of the West Indian Islands. For further synonymy see Lethierry & Severin, *Cat. Gen.* 1: 148. 1893.

Thyanta antiguensis (Westwood)

Pentatoma antiguensis Westwood (1837) *Hope Cat.* 1: 36.

Pentatoma taeniola Dallas (1851) *List. Hem.* 1: 250.

Thyanta taeniola Distant (1880) *Biol. Cent. Am. Rlynch.* 2: 66, *pl. 7, fig. 4.*

Thyanta antiguensis Van Duzee (1904) *Trans. Am. Ent. Soc.* 30: 53, 54.—Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 254.—Barber & Bruner (1932) *Jour. Dep. Agr. P. R.* 16: 258, 259.

Described from Antigua. Coamo Springs, July 17–19, 1914 (Barber), June 5–7, 1915 (Lutz); Tallaboa, near Ponce, July 23, 1914 (Barber); Ensenada, June 14–19, 1915 (Lutz & Mutchler); St. Thomas, Virgin Islands, February 27, 1925 (Lutz & Woodruff)—A.M.N.H. St. Thomas, Virgin Islands, May 31, 1917 (Morrison); Río Piedras, June 18, 1916 (Smyth); Añasco, June 14, 1933 (A. G. Harley)—U.S.N.M. San German, April 16, 1930—Cornell Univ.

Occurs in the southern United States, Mexico, Central America, and the West Indies.

Thyanta casta Stål

Thyanta casta Stål (1862) *Stett. Ent. Zeit.* 23: 104.—Distant (1880) *Biol. Cent. Am. Rhynch.* 2: 66, *pl. 5, fig. 19.*—Van Duzee (1904) *Trans. Am. Ent. Soc.* 30: 54.—Malloch (1919) *Bull. Ill. State Lab. Nat. Hist.* 13: 217.—Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Blatchley (1926) *Heteropt. E. N. Am.* 113, 116.—Barber & Bruner (1932) *Jour. Dep. Agr. P. R.* 16: 256, 258.

As remarked on page 258 in the last-mentioned reference, this may very well be a synonym of *T. maculata* Fabricius. Its range includes the southern United States, Mexico, Central America, and several West Indian Islands.

Described from Mexico. Coamo Springs, January 10, June 5–7, and Ensenada, June 14–19, 1915 (Lutz), St. Thomas, Virgin Islands, February and March, Tortola, Virgin Islands, March 17–18, St. John, Virgin Islands, March 9, and St. Croix, Virgin Islands, March 3, 1925 (Lutz & Woodruff)—A.M.N.H. Vieques Island, February 1889 (Buseck), March 24, 1900 (Richmond); St. Thomas, Virgin Islands, May 31, 1917 (Morrison)—U.S.N.M. Puerto Real, Vieques Island, April 28, 1930—Cornell Univ. Aguirre, June 28–29, 1931 (Leonard)—author's coll.

LOXA Amyot & Serville

Loxa Amyot & Serville (1843) Hem. 137.

KEY TO PORTO RICAN SPECIES

- Head with longitudinal ridges, separated by linear series of punctures. Antenna reddish; segments frequently paler basally. Lateral margin of pronotum very nearly straight from anterior angle to apex of spine of humeral angle. Venter and legs profusely covered with long, erect hairs, those on legs much longer than diameter of tibiae. Color dark green, lateral margins of head, pronotum, and costa with reddish punctures. *L. pilipes*.
- Head devoid of longitudinal ridges. Antenna yellow-testaceous. Lateral margin of pronotum more concavely arcuate from anterior angle to apex of humeral spine. Legs sparsely covered with short, inclined hairs, not longer than diameter of tibiae. Color yellow-green; lateral margins of head and pronotum yellowish. *L. planifrons*.

***Loxa pilipes* Horvath**

(?) *Loxa flavicollis* Gundlach (1894) Fauna Puerto-Riquena 592.

Loxa flavicollis Barber (not Drury) (1923) Am. Mus. Novit. 75: 12 (listed).

Loxa pilipes Horvath (1925) Ann. Mus. Nat. Hung. 22: 318. pl. 5, fig. 5.

Described from Porto Rico. Coamo Springs, December 27, 1914 (Lutz)—A.M.N.H. El Yunque (Richmond)—U.S.N.M. Lares, July 28, 1930 (Leonard)—Cornell Univ.

***Loxa planifrons* Barber & Bruner**

Loxa planifrons Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 260; pl. 25, fig. 6, 7.

Described from Cuba and Puerto Rico. Mameyes, February 17, 1925 (Woodruff)—A.M.N.H. Bayamón, August 7, 1932 (Anderson & Lesesne), Santurce, August 1, 1925 (Cooley & Gay); Pt. Cangres, February 22, 1922 (Wolecott)—U.S.N.M.

FECELIA Stål

Fecelia Stål (1872) Sv. Vet.-Akad. Handl. II. 10(4): 37.

***Fecelia minor* (Vollenhoven)**

Loxa minor Vollenhoven (1868) Versl. Akad. Amst. Nat. II. 2: 179.

Fecelia minor Stål (1872) Sv. Vet.-Akad. Handl. II. 10(4): 37.

Although usually dark green in color, specimens occur in which the corium is reddish.

Described from Porto Rico. Mayagüez, July 26, 1914 (Barber)—A.M.N.H. Arecibo, January 5, 1932, on sour orange (Anderson & Mills); San Juan, January 11, 1929 (Whitlock); Ponce, January 25, on oranges, and Peñuelas, February 18, 1932, on oranges (Oakley); Corozal, November 29, 1932 (Sein); Espinosa, April 22, 1915, Arecibo, December 19, 1933, on orange (Anderson & Mills)—U.S.N.M. Mayagüez, October 5, 1930 (Martorell)—author's coll.

RUNIBIA Stål

Runibia Stål (1861) Stett. Ent. Zeit. 22: 140.

Runibia perspicua (Fabricius)

Cimex perspicuus Fabricius (1798) Ent. Syst. Supl. 533.—Herrich-Schäffer (1838) Wanz. Ins. 4: 91, fig. 429.

Strachia eucosma Walker (1867) Cat. Heter. 2: 319.

Runibia perspicua Stål (1872) Sv. Vet.-Akad. Handl. 11. 10(4): 39.

A South American species described from French Guiana. Herrich-Schäffer reported this species from St. Thomas, which probably refers to the Virgin Islands. A specimen from Bolivia in the collection of the United States National Museum is red, conspicuously marked with black as follows: Head with a longitudinal, median line, orbit of eye and lateral margin before eye; pronotum with a small triangular mark near anterior angle and posterior disk with two large subquadrate spots which do not quite reach posterior margin; scutellum with two large, triangular, basal spots extending at least to the middle point; corium, posteriorly, with two spots, an inner suborbicular and a much smaller subtriangular spot just inside of apical angle.

VULSIREA Spinola

Vulsirea Spinola (1837) Essai Hem. 350.

Vulsirea violacea (Fabricius)

Cimex violaceus Fabricius (1803) Syst. Rhyng. 167.—Herrich-Schäffer (1838) Wanz. Ins. 4: 89, fig. 425.

Vulsirea violacea Stål (1868) Hem. Fab. 1: 31.—Distant (1880) Biol. Cent. Am. Rhynch. 1: 76.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 261.

Described from South America. Ponce, August 24, 1933 (Oakley)—U.S.N.M.

A number of color varieties are recognized; this has given rise to a number of specific names now either relegated to synonymy or treated as varieties. The single specimen seen from Porto Rico corresponds to the purple or violaceous form described by Fabricius and figured by Herrich-Schäffer. For further synonymy see Lethierry and Severin, Cat. Gen. 1: 162. 1893.

Occurs in Florida, Mexico through Central America into the northern part of South America, and in a number of the West Indian Islands.

PHARYPIA Stål

Pharypia Stål (1861) Stett. Ent. Zeit. 22: 139.

Ptilarmus Stål (1861) Stett. Ent. Zeit. 22: 139.

Pharypia pulchella (Drury)

Cimex pulchellus Drury (1782) Ill. Nat. Hist. 3: Index, 67.

Pharypia pulchellus Stål (1872) Sv. Vet.-Akad. Handl. 11. 10(4): 40

A brilliant, bluish or greenish aeneous color, with basal segment of antenna (except apex), head, humeral angle of pronotum, prebasal arcuate band and apex of scutellum, and post-median transverse band of corium, red. For further synonymy see Lethierry and Severin, *Cat. Gen.* 1: 762. 1893.

Described from Honduras. Mayagüez, November 16, 1911 (Hooker & Tower)—U.S.N.M. Mayagüez, January 3, 1930 (Rosa)—author's coll.

NEZARA Amyot & Serville

Nezara Amyot & Serville (1843) *Hist. Nat. Ins. Hemip.* 133.

The difference in the character of the canal leading from the orifice of the stink-gland will at once separate this genus from the closely related *Acrosternum*, in which this canal is long and attenuate.

Nezara viridula (Linnæus)

Cimex viridulus Linnæus (1758) *Syst. Nat. ed.* 10. 444.

Nezara viridula Stål (1865) *Hem. Afr.* 1: 193.—Van Duzee (1904) *Trans. Am. Ent. Soc.* 30: 57.—Jones (1918) *Bull. U. S. Dep. Agr.* 689.—Drake (1920) *Quart. Bull. State Plant Bd. Fla.* 4(3): 41-94.—Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 253.—Barber & Bruner (1932) *Jour. Dep. Agr. P. R.* 16: 262.

Described from India. This, the only member of the genus occurring in the West Indies, is found pretty much throughout the warmer parts of the world, often doing considerable damage to various fruits and vegetables. As the bibliography of this species is very extensive, only the more recent references are mentioned above. Our numerous records show it as spread all over Porto Rico, the Virgin Islands, and practically every large West Indian Island. For further synonymy see Lethierry & Severin, *Cat. Gen.* 1: 167. 1893.

ACROSTERNUM Fieber

Nezara Amyot & Serville (1843) *Hist. Nat. Ins. Hemip.* 143 (in part).

Acrosternum Fieber (1860) *Europ. Hem.* 79.

Acrosternum marginatum (Palisot de Beauvois)

Pentatoma marginata Palisot de Beauvois (1805) *Ins. Afr. Amer.* 147. *Hem. pl.* 10, fig. 1.

Nezara marginata Gundlach (1894) *Fauna Puerto-Riquena* 590.—Van Duzee (1904) *Trans. Am. Ent. Soc.* 30: 58.

Acrosternum marginatum Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Barber & Bruner (1932) *Jour. Dep. Agr. P. R.* 16: 262.

Nezara (Acrosternum) marginata Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 253.

Described from Hispaniola. Ensenada, June 14-19, and Caguas, January 15, 1915 (Lutz & Mutehler); Tallaboa, near Ponce, July 23 and Mayagüez, July 24-29, 1914 (Barber); St. Croix, Virgin Islands, August 17, 1925 (Woodruff)—A.M.N.H. Mayagüez, January 1899 (Buseck); Bayamón, August 7, 1932 (Anderson & Lesesne)—U.S.N.M. Toa-Baja, April 7, 1915 (Garb)—Cornell Univ.

Widely spread through the warmer parts of the Americas and in most of the West Indian Islands. See Lethierry & Severin, Cat. Gen. 1: 166. 1893, for further references and synonymy.

BANASA Stål

Banasa Stål (1860) Bidrag Rio Jan. Hemip. 1: 24.

? **Banasa herbacea** (Stål)

Piezodorus herbaceus Stål (1872) Sv. Vet.-Akad. Handl II. 10(4): 44.

Described by Stål from St. Thomas, Virgin Islands. Ensenada, June 14, 1915 (Lutz & Mutehler)—A.M.N.H. Santuree, July 7, 1931, at light (Leonard)—U.S.N.M. Vieques Is., April 28, 1930 (Leonard)—Cornell Univ.

The author is not at all sure of the identity of this species. If he is not mistaken in his determination of the species, it should be transferred to *Banasa*. Stål's description is rather brief. The second ventral segment of the abdomen is armed with a more or less acute tubercle, as in the other members of the genus *Banasa*; besides which, the mesosternal carina is not strongly elevated and the tibia is not longitudinally sulcate. The coloration agrees very closely with Stål's description.

Banasa humeralis, NEW SPECIES

FIGURE 9

General color above shining, olive-green; pronotum and scutellum ferruginous-punctate; inner field of the corium punctate and blotched with reddish-brown, interspersed with irregular, calloused, yellow areas; costal area, beyond the subcostal vein, green. Head, before the eye and just above the antenniferous tubercle, with a short, fuscous line. Antenna pale green; third segment tinted with reddish (apical two segments missing). Ventral parts and legs yellowish-green. Membrane hyaline.

Head short, about one-third wider than long (2.60×2.00 mm.), symmetrically rounded in front; lateral margin lightly concavely arcuate a short distance before the eye; juga rather coarsely and closely punctate and faintly wrinkled; tylus almost impunctate. Ocelli relatively large. Antenna with the second segment slightly shorter than the third. Rostrum reaching at least to the middle of the posterior coxæ. Pronotum more than two and one-half times as wide as long (6.56×2.40 mm.); lateral margin straight; humeral angle prominently projected beyond the costal margin, narrowly rounded at apex; disk, before a line drawn across humeral angles, coarsely and rather more sparingly punctate, more closely and finely ferruginous-

punctate posteriorly. Scutellum slightly longer than wide, the apex narrowly rounded, concolorous, almost smooth; disk rather sparsely and evenly ferruginous-punctate. Corium coarsely and roughly punctate, interspersed with irregular, smooth, yellow areas. Venter smooth

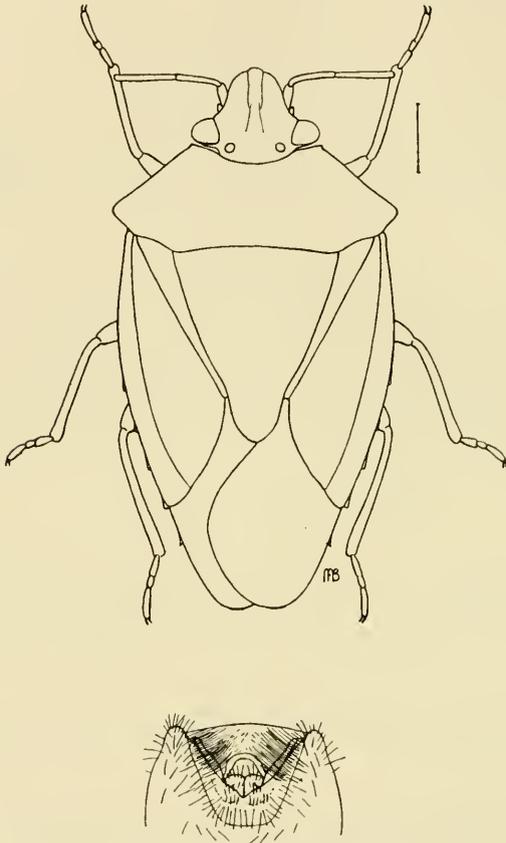


FIG. 9 *BANASA HUMERALIS* N. SP.
GENITAL SEGMENTS ♂

through the middle, laterally, coarsely, and roughly punctate; posterior margin of male hypopygium broadly and concavely sinuate, with a dense coating of long hairs. Length 12.00 mm.; humeral width 6.56 mm.

Type, male: San German, Porto Rico, April 1, 1930—Cornell Univ. Paratype, female: San Blas, Trinidad Mountains, Cuba, September to December 1931 (Rowe)—U.S.N.M. Cat. no. 51583.

The Cuban specimen is darker green and the inner field of the corium is more deeply colored with ferruginous-brown, on which the yellow maculations are more conspicuous than in the type. This differs from the other West Indian species, *B. lenticularis* Uhler, *B. subrufescens* Westwood, and *B. punctatissima* Barber & Bruner, besides color differences, in having the humeral angle of the pronotum more produced and narrowly rounded at apex, the lateral submargin not impressed, the venter laterally more coarsely punctate, etc.

PIEZODORUS Fieber

Piezodorus Fieber (1860) European Hem. 78, 329.

Piezodorus guildinii (Westwood)

Rhaphigaster guildinii Westwood (1837) Hope Cat. 1: 31.

Piezodorus guildingi Distant (1880) Biol. Cent. Am. Rhynch. 1: 81, pl. 7, fig. 6.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 254.

Described from St. Vincent Island, Arecibo; August 4, 1914 (Barber); Caguas, May 28 and Quebradillas, June 23, 1915 (Lutz & Mutchler); St. Croix, Virgin Islands, February to April, and St. Thomas, Virgin Islands, March 12, 1925 (Lutz & Woodruff)—A.M.N.H. Aguadilla, January and Vieques Island, February 1899 (Busek); St. Thomas, Virgin Islands, June 2, 1917 (Morrison); Río Piedras, June 15, 1916 (Smyth); Bayamón, January 13, 1933, on string beans (Anderson, Faxon, & Mills); Loiza, January 30, 1933, on pepper leaf (Anderson, Faxon, & Mills)—U.S.N.M. San Sebastian, October 17, 1924—Dozier coll. Pueblo Viejo, April 2, 1930 (Forbes)—Cornell Univ.

Very widely distributed through the southern United States, Mexico, Central and South America, and the West Indies.

Piezodorus tinctus Distant

Piezodorus tinctus Distant (1890) Biol. Cent. Am. Rhynch. 1: Suppl. 341, pl. 31, fig. 22.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 265.

Besides being differently colored, this species is relatively broader than the preceding one; posterior angles of the connexival segments acutely spinose, ventral spine much longer, extended to the middle of the mesosternum, spiracles concolorous, etc.

Described from Panama and the Antilles. Aibonito, Porto Rico, July 14, 1914 (Barber)—A.M.N.H.

ARVELIUS Spinola

Arvelius Spinola (1837) Essai Hem. 344.

Arvelius albopunctatus (Degeer)

Cimez albopunctatus Degeer (1773) Mem. 3: 331. pl. 34, fig. 6.

Arvelius albopunctatus Distant (1880) Biol. Cent. Am. Rhynch. 1: 82.—Gundlach (1894)

Fauna Puerto-Riquena 591.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 252.

Pentatoma albopunctata Stahl (1883) Cat. Cab. Zool. 210.

Described from South America. San Juan, February 15, 1914 (Lutz); Tallaboa, near Ponce, July 23, 1914 (Barber); Ensenada, June 14 and Mayagüez, June 20, 1915 (Lutz & Mutchler); St. Thomas, Virgin Islands, February 22, 1925 (Lutz & Woodruff)—A.M.N.H. Culebra Island, February 1899 (Busck); St. Croix, Virgin Islands, December 1922 (Wilson); San Juan, January 2, 1931, on pepper (Anderson); Adjuntas, August 15, 1933 (Oakley)—U.S.N.M. Wolcott (1924) records it on tomato and fruit of *Solanum torvum*. Ranges from the southern United States into South America and several islands of the West Indies. See Lethierry & Severin, Cat. Gen. 1: 185. 1893, for further references and synonymy.

BREPHOLOXA Van Duzee

Brepholoxa Van Duzee (1904) Trans. Am. Ent. Soc. 30: 78.

Brepholoxa rotundifrons, NEW SPECIES

FIGURE 10

Body above and below, antennæ, and legs uniformly pale testaceous-yellow; lateral margins of head and pronotum, at least anteriorly, ferruginous-tinted. Head across eyes slightly wider than long (2.20 to 1.84 mm.), bluntly rounded in front, the juga somewhat longer than the tylus and almost or quite in contact before it; lateral margins not parallel, slightly concave a short distance before the eyes, thence gradually converging anteriorly to the rounded apices of the juga. Antenniferous tubercle well exposed from above, outwardly armed with a stout, acute, incurved spine-like process; surface shallowly punctate. Ocelli very nearly three times as far apart as each is removed from the eye. Antenna with the second segment much longer than the third, the lengths of the five segments as follows: I-.48, II-1.40, III-.72, IV-.80 and V-.96 mm. Rostrum extending to middle of the hind coxæ; basal segment not quite reaching base of head; second segment longest; last two segments subequal; lengths of the segments as follows: I-.72, II-1.00, III-.80 and IV-.80 mm. Pronotum three times as wide as long, rather closely and shallowly punctate; humeral angle prominently projecting, forming nearly a right angle; lateral margin gently and concavely arcuate from anterior to humeral angle; edge neither carinate nor impressed, with a few minute, scattered

tubercles. Scutellum somewhat longer than wide, more profusely and coarsely punctate laterally and apically. Corium at base and along the costal margin rather closely and coarsely punctate; disk pellucid, very sparsely punctate. Membrane clear hyaline. Propleura and mesopleura anteriorly, coarsely and rather closely punctate; metapleurum laterally and posteriorly finely and sparsely punctate. Venter very finely punctate; ventral spine well developed, subacute. Length (female) 10.00 mm.; diameter of pronotum 6.40 mm.

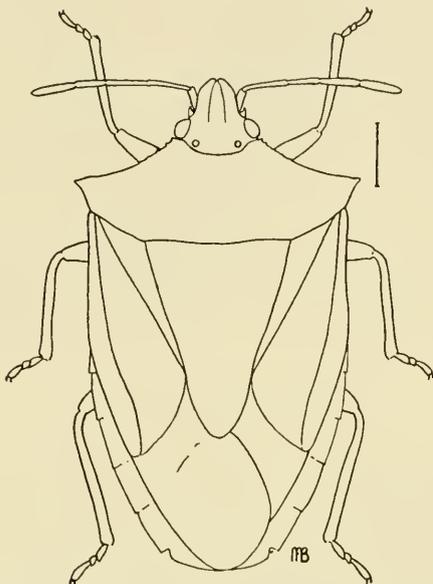


FIG. 10 BREPHOLOXA ROTUNDIFRONS N. SP.

Type, female: Port-au-Prince, Haïti, March 21-29, 1922 (Watson)—A.M.N.H. Paratypes, females: Ensenada, Puerto Rico, June 14-19, 1915 (Lutz & Mutehler); Anegada, Virgin Islands, March 31, 1925 (Woodruff)—A.M.N.H. St. Marc, Haïti, March 1, 1925 (Wolcott)—U.S.N.M. Cat. no. 51584.

This has much the appearance of *B. heidemanni* Van Duzee, described from Florida; the bluntly rounded front of the head will at once distinguish it. The specimen from Ensenada has the lateral margin of the head and pronotum as well as the costal margins of the hemelytra reddish.

EDESSA Fabricius

Edessa Fabricius (1803) Syst. Rhyng. 145.

Ascra Say (1832) Ins. La. 7: Compl. Writ. 1: 304.

Dorypleura Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 157.

Hypoxys Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 157.

Pygoda Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 159.

Aceratodes Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 160.

Edessa cornuta Burmeister

Edessa cornuta Burmeister (1835) Handb. 2: 356.—Distant (1881) Biol. Cent. Am. Rhynch.

2: 97, pl. 9, fig. 22.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 269.

Edessa bifida Gundlach (1894) Fauna Puerto-Riquena 592.—Barber (1923) Am. Mus. Novit.

75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 252.

Described from Mexico and Brazil. San Juan, February 13, 1914 (Lutz); Mayagüez, July 26, and Arecibo, July 30, 1914 (Barber); Cayey, May 30, and Manatí, June 28, 1915 (Lutz & Mutchler); Aibonito, February 10, 1925 (Lutz & Woodruff)—A.M.N.H. Mayagüez, January 1899 (Busck); Río Piedras, August 5, 1916 (Smyth); Palo Seco, November 15, 1926 (Gay); Barceloneta, January 19, 1932 (Faxon); Bayamón, May 15, on grapefruit, and August 19, 1932, on Malajillo grass (Anderson & Lesesne); Adjuntas, November 1, 1932, on Malvaceous leaf (Oakley)—U.S.N.M.

Widely distributed from Mexico, through Central America and the northern part of South America. Occurs also in Jamaica, Hispaniola, Cuba, and probably other islands of the West Indies.

Edessa paravinula Barber

FIGURE 11

Edessa affinis Wolcott (not Dallas) (1922) Circ. Ind. Exp. Sta. 60: 5, fig. 1.—Wolcott (1923) Ann. Rep. Ins. Exp. Sta. 46.

Edessa sp.? Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 253.

Edessa paravinula Barber (1935) Am. Mus. Novit. 786: 1-3, fig. 1.

Closely related to *E. vinula* Stål, which it resembles very closely in structure and coloration. Head, pronotum, and scutellum pale green, intermixed with some yellow; inner field of the corium, within the subcostal vein, yellow, ferruginous-punctate and with more or less of the disk castaneous. Humeral angle slightly prominent, subacute. Proctiger in the male genital cup expanded laterally, broadly T-shaped. In the female, the two basal plates or valvifers of the eighth abdominal segment much narrower than *E. vinula*.

Described from Porto Rico. Aibonito, July 14-17, 1914 (Barber) and June 1-3, 1915 (Lutz & Mutchler); Arecibo, July 30-August 1, 1914 (Barber); Cayey, May 30, 31, 1915 (Lutz & Mutchler); Jayuya, January 6, 1915—A.M.N.H. Lares, September 8, 1921 (Wolcott); Adjuntas, February 3, 1932, on orange (Oakley); Cidra, February 5, 1932, on potato leaves (Anderson & Mills); Yauco, July 12, 1932, on wild eggplant (Oakley)—U.S.N.M.

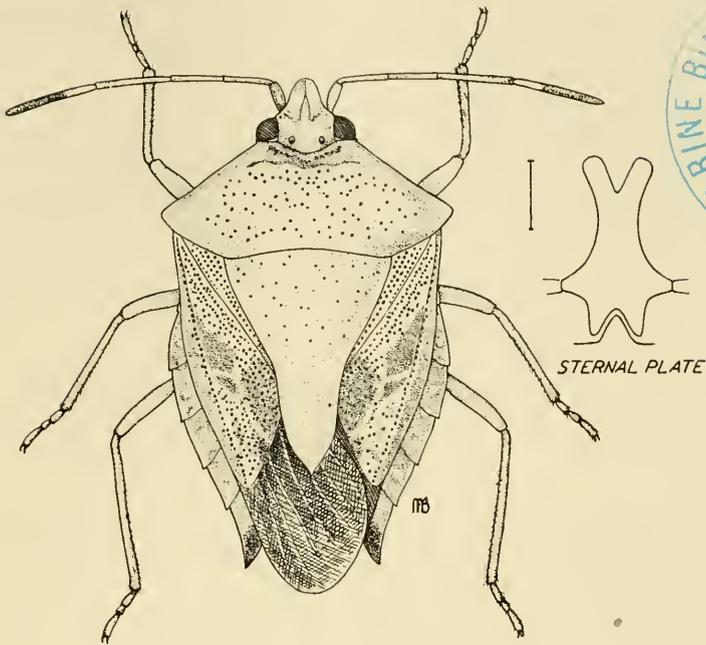


FIG. 11 EDESSA PARAVINULA BARBER

Subfamily ASOPINÆ

KEY TO PORTO RICAN GENERA

- Anterior femur beneath with a stout, preapical spine. Bucculae strongly elevated; lower margins rounded. Second visible ventral segment of abdomen with an elevated, flattened process, blunt or rounded anteriorly. Large species..... *Alcæorrhynchus*.
- Anterior femur beneath devoid of a preapical spine. Bucculae slightly elevated, gradually disappearing posteriorly. Second visible ventral segment of abdomen with an anteriorly projected spine. Smaller species..... *Podisus*.

ALCÆORRHYNCHUS Bergroth

Mutya Stål (1858) Bidrag Rfo Jan. Hemip. 2: 58 (name preoccupied).
Alcæorrhynchus Bergroth (1891) Rev. Ent. 10: 235 (new name).

Alcæorrhynchus phymatophorus (Palisot de Beauvois)

Pentatoma phymatophora Palisot de Beauvois (1812) Ins. Afr. Amer. 112. Hem. pl. 8, fig. 2.—Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 364.
Mutya phymatophora Distant (1880) Biol. Cent. Am. Rhynch. 2: 36.—Gundlach (1894) Fauna Puerto-Riquena 592.
Alcæorrhynchus phymatophora Barber (1923) Am. Mus. Novit. 75: 12 (listed).
Mutya grandis Wolcott (1924) Jour. Dep. Agr. P. R. 7: 255.

Described from Hispaniola. Cayey, May 30, and Adjuntas, June 8-13, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, July 2, 1914

(Van Zwaluwenburg & Tower)—U.S.N.M. Unlabeled specimen determined as *A. grandis*—Ins. Exp. Sta. Mayagüez, March 30, 1927 (Danforth)—author's coll.

Very similar in appearance and structure to *A. grandis* Dallas and often confused with it. In *A. phymatophorus* the secondary spine at the projected humeral angle is much reduced in size and more remote from the anterior spine, which is directed outwardly, not turned forward. It occurs in several West Indian Islands: Cuba, Hispaniola, Dominica.

PODISUS Herrich-Schaeffer

Podisus Herrich-Schaeffer (1851) Wanz. Ins. 9: 296.

Apateticus Dallas (1851) List. Hem. 1: 105.

This genus has been subdivided into a number of subgenera. For reference to these subgenera see Lethierry & Severin, Cat. Gen. 1: 217. 1893.

Podisus sagitta (Fabricius)

Cimex sagitta Fabricius (1794) Ent. Syst. 4: 99.

Podisus sagitta Distant (1880) Biol. Cent. Am. Rhynch. 1: 37, pl. 1, fig. 22.—Gundlach (1894)

Fauna Puerto-Riquena 592.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 255 (listed).

Described from the West Indies. Tallaboa, near Ponce, July 23, 1914 (Barber); Jayuya, January 6, 1915 (Lutz); Adjuntas, June 8–13, 1915 (Lutz & Mutchler); Loquillo National Forest, February 18, and Ensenada, February 12, 1925 (Woodruff); St. Croix, Virgin Islands, May 5, 1919—A.M.N.H. La Plata, January 4, and Aibonito, May 16, 1913, Bayamón, August 22, 1933 (Anderson)—U.S.N.M. Coamo, October 16, 1924—Dozier coll. Aguirre, June 28, 1931 (Leonard)—author's coll.

Occurs in most of the West Indian Islands as well as in Central America and the northern part of South America. The humeral angle is bifid, with the anterior prong longest and directed outwards.

Podisus mucronatus Uhler

Podisus mucronatus Uhler (1897) Trans. Maryland Acad. Sci. 1: 386.—Van Duzee (1904)

Trans. Am. Ent. Soc. 30: 69.—Barber & Bruner (1932) Jour. Dep. Agr. P. R. 16: 275.

A ferruginous species, normally with conspicuous, calloused, yellow spots as follows: two on the anterior disk of the pronotum, the basal angles, and the apex, and frequently smaller discal spots on the scutellum. The pronotum has the humeral angle drawn out into an acute, anteriorly directed spine; the lateral margin is calloused, pale yellow and with a few blunt teeth or serrations. The membrane is hyaline, sometimes slightly tinted, not vittate with brown. Immaculate beneath. Length 8.00–10.00 mm.

Described from Florida and Cuba. Guánica, February 12, 1925—Dozier coll.

Podisus borinquensis, NEW SPECIES

FIGURE 12

Pale yellow, rather densely and coarsely ferruginous-punctate. Narrow lateral margin of head and posterior disk of the pronotum, including the humeral spine, fusco-ferruginous. Following parts smooth, yellow: narrow lateral margin and a few scattered discal areas of the pronotum, basal angle, and entire apex, and a few scattered discal spots of the scutellum. Hemelytra with the clavus and corium

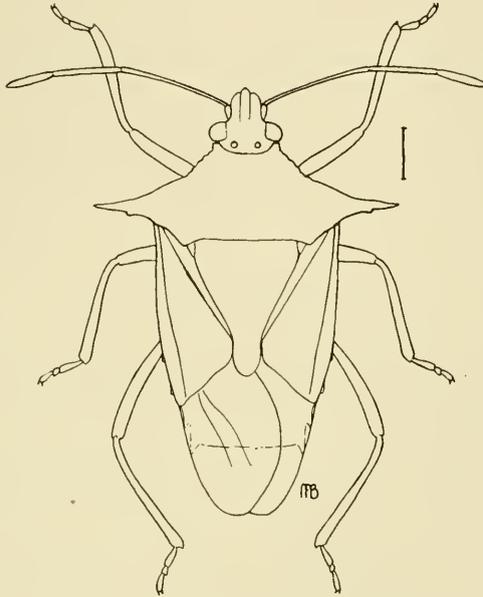


FIG. 12 *PODISUS BORINQUENSIS* N. SP.

within the subcostal vein, dark ferruginous. Legs and body beneath stramineous, the latter coarsely punctate with red on the pleura and on the venter, except through the middle. Membrane hyaline with a broad, brownish, longitudinal median stripe. Antenna testaceous-yellow; terminal two segments, except at their bases, slightly embrowned.

Head a little wider across eyes than long (1.75×1.68 mm.), lateral margins, for a short distance before the eyes, nearly parallel, gently rounded anteriorly towards apices of jugs; except for central line of tylus and region about eye rather closely and coarsely ferruginous-

punctate; entirely smooth ventrally except for several coarse punctures on either side of the middle line. Antenna a little longer than half the length of the body; lengths of the segments as follows: I-.28, II-1.40, III-.92, IV-1.20 and V-1.12 mm. Rostrum extended posteriorly to apices of posterior coxæ. Pronotum across humeral spines nearly three and one-half times wider than long (6.64×1.84 mm.); humeral spine long and very acute, extended 1.34 mm. beyond costal margin of the corium, turned slightly upwards from base, posteriorly, some distance from apex, with a slight, blunt tubercle; lateral margin of pronotum very nearly straight, calloused, somewhat crenulate; surface irregularly and coarsely punctate, interspersed with a few broken, transverse, smooth areas. Scutellum a little longer than wide (2.96×2.64 mm.); apical third, beyond frena, forming a narrow, almost parallel-sided tongue-like portion, semi-circularly rounded at apex; coarsely, irregularly ferruginous-punctate; basal angles and entire narrow apex, smooth, calloused. Frena extended two-thirds the length of the scutellum. Corium coarsely, irregularly punctate. Membrane extending beyond the apex of the abdomen, clear hyaline, with a broad, longitudinal, median brownish stripe. Connexivum immaculate, closely punctate. Pleura and the venter laterally coarsely punctate with ferruginous red. Ventral spine of the abdomen rather short, acute, projected anteriorly to middle point of the posterior coxæ. Posterior lateral angle of the sixth visible abdominal segment of male spinously produced. Length of male 9.00 mm.

Type, male: U.S.N.M. Cat. no. 51585, Ponce, Porto Rico, August 7, 1933 (Oakley). Paratype, male: Río Piedras, Porto Rico, November 2, 1917 (Cotton).

This is the species which Wolcott (1924) records in error as *Podisus sculptus* Distant. It resembles somewhat the Cuban species *P. gundlachii* Guérin-Méneville. From that species it differs in the character of the humeral process, the entire calloused apex of the scutellum, the absence of a fuscous discal spot on the corium, etc. The paratype is less deeply colored than the type.

Subfamily TESSARATOMINÆ

PIEZOSTERNUM Amyot & Serville

Piezosternum Amyot & Serville (1843) Mem. 161.
Salica Walker (1868) Cat. Heter. 3: 469.

Piezosternum subulatum (Thunberg)

Cimex subulatus Thunberg (1783) Nov. Ins. Sp. 2: 41. pl. 2, fig. 55.
Piezosternum subulatum Distant (1880) Biol. Cent. Am. Rhynch. 1: 346.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 254.

This is a large species, the female at least 20.00 mm. long. Color olive-green, often fading to yellowish. Lateral angle of the pronotum produced as a rounded prominence, or sometimes subacute; outer apical angles of the abdominal segments produced into acute points. Apex of scutellum produced into a long acute angle, with a prominent, median carina.

Described without locality. Naranjito, July 1915 (Lutz & Mutchler)—A.M.N.H. Pueblo Viejo, November 23, 1931, and Trujillo Alto, February 5, 1932, on pea plant (Anderson & Mills); Bayamón, June 12, 1932, on grape fruit (Lesesne, Faxon, & Anderson); Bayamón, May 14, 1933, on breadfruit tree (Lesesne & Anderson); Maricao, May 23, 1933 (Harley); Río Piedras, January 12, 1934, on tomato leaf (Mills & Anderson)—U.S.N.M. Porto Rico—Cornell Univ.

Wolcott (1924) gives a description of the nymph and records as food-plants *Passiflora* sp. and coffee.

It has been recorded from Mexico, Central America, the northern part of South America and several West Indian Islands. For further reference to the synonymy see Lethierry & Severin, Cat. Gen., 1: 225. 1893.

Family COREIDÆ

Head neither clypeate nor transversely impressed before eyes; antennæ four-segmented, inserted on the upper part of the head above a line drawn from the eye to the base of the rostrum. Rostrum 4-segmented. Scutellum small to medium, not reaching to middle of the abdomen nor inner basal margin of the membrane. Hemicytra most often complete, provided with clavus, corium, and membrane, the latter with several to many distinct veins, which sometimes anastomose. All tarsi 3-segmented.

KEY TO SUBFAMILIES

1. Posterior tibia shorter than femur, either flattened or expanded and with a distinct spine at inner apex. Posterior femur much swollen in both sexes and usually spined below. Head and rostrum short (Extralimital) ..MEROCORINÆ.
 Posterior tibia of variable length and shape but very rarely with an inner apical spine (*Hyalmenus*), in which case head is nearly or quite as wide as the pronotum posteriorly..... 2
2. Odoniferous orifice usually invisible, if visible it is situated between and on a line with intermediate and posterior acetabula. Apical margin of corium straight. Tibia devoid of longitudinal groove. Anterior and posterior (or only the latter) margins of fourth abdominal tergite sinuate in middle. Sixth visible (seventh) ventral segment of abdomen of female either more or less extended and concealing genital segments or truncate, not divided.....CORIZINÆ.

- Odoriferous orifice of metapleurum distinct, very rarely invisible. Posterior margins of third and fourth visible (fourth and fifth) abdominal tergites each convexly arcuated in middle. Sixth (seventh) visible ventral segment of female cleft or divided posteriorly, not extended posteriorly to conceal genital segments. 3
3. Veins of membrane arising from a transverse basal vein which is nearly or quite parallel to apical margin of corium from which it is separated for some distance. Apical margin of corium straight. Head subquadrate; juga and tylus filling up space between antenniferous tubercles. Posterior femur usually armed with spines (Extralimal). PSEUDOPHLEINÆ.
- Veins of membrane either arising from apical margin of corium or from a transverse basal vein which is most usually not parallel with this margin but gradually converges to outer apical margin. Apical margin of corium either straight or arcuate. Posterior femur either simple or often enlarged and armed with spines. 4
4. Bucculæ generally longer, extended posteriorly beyond bases of antennæ, sometimes completely or almost completely posterior to bases of antennæ or frequently placed before bases of antennæ; in latter case pronotum posteriorly twice or more broader than head. Scutellum usually wider than interocular space. Acetabula of posterior legs deeply excised. Hind tibia either longitudinally grooved or expanded. Spiracles in most genera remote from lateral margin of abdomen. Sixth visible (seventh) ventral segment of abdomen of female most often with a transverse or arcuated ridge before genital cleft COREINÆ.
- Bucculæ small and short, situated entirely before bases of antennæ. Pronotum posteriorly but little if any wider than head, very rarely twice or more than twice as wide as head. Body generally rather narrow and elongate. Scutellum most often narrower than interocular space. Acetabula less deeply excised. Spiracles usually situated very close to lateral margin of abdomen. Hind tibia usually devoid of longitudinal groove, never distinctly expanded, rarely compressed. First tarsal segment elongate. . . (ALYDINÆ) CORISCINÆ.

Subfamily COREINÆ

KEY TO TRIBES OF COREINÆ

1. Antenniferous tubercles not prominent, not occupying most of front of head, this more elongate and porrect, or if not porrect posterior tibia expanded; space between antenniferous tubercles filled by juga and tylus. Posterior coxæ usually placed much closer to each other than to side of the pleura. Rostrum elongate. Posterior femur most often armed with spines. 2
- Antenniferous tubercles most often prominent, usually elevated on a level with base of tylus and occupying much of front of head and either contiguous, or tylus only or tylus and juga together filling intervening space; tylus often depressed and juga also often depressed and situated below antenniferous tubercles. Head more often subquadrate. 4
2. Posterior tibia more or less expanded; head usually shorter than pronotum. ANISOSCELINI.
- Posterior tibia simple, cylindric or triquetrous. Head as long or nearly as long as pronotum. 3

3. Antenna with first and second and sometimes also third segment as well as posterior tibia triquetrous. Legs short and stout (Extralimal). .CHELINIDINI.
Antenna long and slender, cylindric. Legs long and rather slender. LEPTOSCELINI.
4. Tylus anteriorly projected in a compressed process between prominent antenniferous tubercles; these little separated and occupying most of front of head. Posterior femur spinose or tuberculate; among males most often strongly swollen. Posterior tibia often expanded or compressed (Extralimal) ACANTHOCEPHALINI.
Tylus not anteriorly produced in a prominent compressed process between antenniferous tubercles; these contiguous or nearly so or more widely separated, intervening space filled up by tylus only or tylus and juga; in any case head not elongate-oval but rather short and somewhat more quadrate 5
5. Third segment of antenna more or less expanded. Apex of antenniferous tubercle obliquely truncate and acute or armed with a spine within (except *Staluptus*); intervening space very narrow, filled up by depressed tylus. Body rather narrow-elongate, with hemielytra nearly or quite covering abdomen; legs rather long and slender; posterior femur armed within with one or more spines, sometimes minute. Spiracles nearer to anterior than to posterior margins of abdominal segments. CHARISTERINI.
Third segment of antenna most often simple, very rarely expanded and then antenniferous tubercle unarmed within. 6
6. All femora armed with spines at least toward apices; posterior femur of males usually much swollen; posterior tibia very often compressed or expanded and often armed with a spine within. Antenna usually simple or in a few genera more or less expanded. Abdomen most often expanded beyond lateral margins of corium. Spiracles usually placed nearer to anterior and lateral margins than to posterior margins of abdominal segments. Two antenniferous tubercles occupying most of front of head, as wide or often wider than tylus which is strongly deflexed, vertical. Rostrum short. Posterior coxæ usually widely separated (Extralimal). MICTINI.
All femora usually unarmed; posterior femur more rarely swollen and provided with spines, then spiracles nearly equidistant from anterior and posterior margins of abdominal segments. Antenna simple. Abdomen may be either expanded beyond lateral margins of corium or in some cases but little wider 7
7. Two antenniferous tubercles prominent, extended beyond strongly depressed vertical tylus, occupying most of front of head, sometimes contiguous; apex of antenniferous tubercle oblique. Rostrum short. Lateral margin of abdomen usually strongly expanded beyond costal margin. Coxæ widely separated. Spiracles set nearer to anterior than to posterior margin and usually nearer to anterior than to lateral margin of abdominal segments. SPARTOCERINI.
Two antenniferous tubercles usually not so prominently extended before tylus, intervening space filled up by deflexed or inclined tylus or by tylus and juga. Abdomen usually not so strongly expanded. Posterior femur most rarely incrassate and spined beneath and anterior and intermediate femora very rarely spined (*Namacus*). Posterior coxæ usually set closer to each other than to lateral margin of metapleura. 8
8. Spiracles of intermediate abdominal segments equidistant from anterior and posterior margins or at least not twice as remote from posterior as from anterior

- margin of segments and usually set nearer to lateral than to anterior margin. Rostrum usually longer. Posterior femur more rarely incrassate and spined beneath. Anterior and intermediate femora below in very few cases with one or more preapical spines. COREINI.
- Spiracles of intermediate abdominal segments at least twice as remote from posterior as from anterior margins and either more remote from lateral than from anterior margins of segments or subequally distant. Rostrum short. Posterior femur always unarmed and rather slender. Body usually elongate. Antenna usually long and slender (Extralimital). DISCOGASTRINI.

Tribe Anisoscelini

LEPTOGLOSSUS Guérin-Méneville

Leptoglossus Guéria-Méneville (1838) Voy. Coquille Zool. 2(2): 174.
Theognis Stål (1862) Stett. Ent. Zeit. 22: 294.

This is the only genus of the tribe Anisoscelini thus far recorded from Porto Rico or the Virgin Islands. Besides the expansion of the posterior tibia this genus is further characterized by the shape of the head which is porrect, ovate and nearly or quite as long as the pronotum; the basal segment of the slender antenna is sometimes as long as head or at least longer than the antecular part. It is quite probable that Stål's name will have to be adopted. (See Kiritschenko Konowia, 14: 191. 1935.)

KEY TO PORTO RICAN SPECIES

1. Corium devoid of transverse yellow band. Pronotum anteriorly with narrow transverse yellow band. Posterior tibial expansion not broad and leaf-like but elongate, lanceolate; outer expansion extended almost to apex of tibia and armed with two teeth. *L. gonagra*.
 Corium with distinct transverse yellow band. Pronotum anteriorly devoid of transverse arcuate yellow band. Expansions of posterior tibia broad and leaf-like. 2
2. Lateral and posterior margins of pronotum narrowly yellow, anterior face of pronotum with large yellow spot on each side, which is sometimes enlarged and fused. Tergum at least on disk yellowish. Tibial expansion narrower, posterior expansion usually with only 2 teeth on posterior oblique margin *L. balteatus*.
 Posterior margin and anterior face of pronotum concolorous. Tergum black. Posterior tibial expansion wider, usually provided with 3 teeth on posterior oblique margin. *L. stigma*.

Leptoglossus gonagra (Fabricius)

Cimex gonagra Fabricius (1775) Syst. Ent. 708.
Anisoscelis gonagra Stahl (1883) Cat. Cab. Zool. 211.
Leptoglossus gonagra Gundlach (1894) Fauna Puerto-Riquena 594.—Cotton (1918) Jour. Dep. Agr. P. R. 2: 307. fig. 61.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott & Sein (1924) Bull. Estac. Exp. Ins. P. R. 32: 121. fig. 61.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 250.

Described from the islands of America. San Juan, July 9–12, August 2–3, and Arecibo, July 30, 1914 (Barber); St. Croix, Virgin Islands,

March 24, August 25, 1917, and March 3, 1925—A.M.N.H. Pueblo Viejo, July 29, 1932, on orange (Anderson and Mills); Arecibo, August 12, 1930, on guava-leaf (Anderson, Faxon, & Mills); Peñuelas, August 16, 1932, on guava (Oakley); Mayagüez, August 6, 1931, on guava (Harley); St. Croix, Virgin Islands, February 1, 1913 (Russell)—U.S.N.M.

A common species in Porto Rico and widely distributed through the West Indies, South and Central America and Mexico; in the United States it occurs in Florida and Texas. Besides the food-plants mentioned above Cotton (1918) reports it as feeding on squash; Wolcott (1924) reports it on corn and *Cleome spinosa*.

Leptoglossus balteatus (Linnaeus)

Cimex balteatus Linnaeus (1771) Mant. Ins. Alt. 534.

Anisoscelis thoracicus Guérin-Méneville, in Stahl (1893) Cat. Cab. Zool. 211.

Leptoglossus balteatus Gundlach (1894) Fauna Puerto-Riquena 594.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Jamaica. Ensenada, June 14 to 19, 1915 (Lutz & Mutchler)—A.M.N.H. Guánica, February 13, 1925—Dozier coll.

More uncommon than the preceding species; it has been reported from Jamaica, Cuba, St. Vincent, and Grenada by Uhler. Specimens in the United States National Museum collection are from Cuba, Bahamas, Haïti, and Hispaniola.

Leptoglossus stigma (Herbst)

Cimex stigma Herbst (1784) Kurze Einleitung Kenntniss Ins., 258, pl. 39 B, fig. 1.

Anisoscelis serrulatus Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 386.—Stahl (1883) Cat. Cab. Zool. 211.

Leptoglossus stigma Gundlach (1894) Fauna Puerto-Riquena 593.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Surinam. Aibonito, June 1-3, 1915 (Lutz & Mutchler); Jayuya, January 6, 1915; St. Croix, Virgin Islands, February 27, March 2, 1925 (Woodruff)—A.M.N.H. Las Marias, December 4, 1926, on *Achiote* sp. (Danforth); Cidra, November 13, 1931, on guava-leaf (Anderson, Oakley, & Mills); Trujillo Alto, October 23, 1930, on guava; Ponce, October 7, 1932, on guava (Oakley); Arecibo, December 19, 1933, on *Achiote* sp.? (Anderson & Mills)—U.S.N.M.

Distributed through northern South America, Central America, Mexico, and some at least of the West Indian Islands, as specimens in the United States National Museum are labeled Cuba, St. Kitts (on guava), Dominican Republic, Haïti, and Guadeloupe. Its chief food-plant is apparently guava.

Tribe **Leptoscelini****PHTHIA** Stål

Phthia Stål (1862) Ent. Zeit. 23: 294.

This is the only genus of the tribe Leptocelini occurring within the faunal region under consideration. It is chiefly characterized by having the posterior tibia simple, the spiracles situated either equidistant from the anterior and posterior margins of the segments or a little nearer to the posterior than to the anterior margins; the outer apical angle of the corium is attenuated and extended beyond the middle of the membrane.

Phthia picta (Drury)

Cimex picta Drury (1770) Ill. Nat. Hist. 1: 107. pl. 45, fig. 1.

Phthia picta Gundlach (1894) Fauna Puerto-Ríquena 594.—Jones (1915) Bull. U. S. Dep. Agr. 192: 4. pl. 1. fig. 3.—Cotton (1918) Jour. Dep. Agr. P. R. 311. fig. 66.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Pithia picta Wolcott & Sein (1924) Bull. Estac. Exp. Ins. P. R. 32: 102. fig. 56.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 251.

An extremely variable species, the color-varieties of which have been discussed by W. L. McAtee (Bull. Brooklyn Ent. Soc. 14: 13–14. 1919). The lateral margin of the pronotum is very finely spinulose, with a more prominent spine at the anterior lateral angle. The dorsum is black, devoid of a transverse fascia on the disk of the corium; the narrow, lateral margin of the pronotum and frequently the disk posteriorly transversely banded with red, this transverse fascia sometimes absent. 15.00–18.00 mm. long.

Described from Antigua, West Indies. San Juan, July 9–12, and Tallaboa, near Ponce, July 23, 1914 (Barber); Aibonito, June 1–3, 1915 (Lutz & Mutehler)—A.M.N.H. Mayagüez (Tower); Culebra Island, February 1899 (Busck); Bayamón. August 7, 1932 (Anderson & Lesesne); Río Piedras, July 7, 1914 (Jones), June 26, 1916 (Smyth), December 19, 1930, on tomato (Mills); Bayamón, August 22, 1933, on tomato (Faxon and Mills); St. Croix, Virgin Islands—U.S.N.M. Utuado, August 5, 1930 (Danforth)—author's coll.

Widely distributed through most of South America, Central America, Mexico, and southern United States, and nearly all of the West Indian Islands.

It is a well recognized enemy of tomato and has also been reported as attacking *Solanum nigrum* var. *americanum* by Jones (1915), *Physalis* and squash by Wolcott. For synonymy and additional references see Lethierry & Severin, Cat. Gen. 2: 51, 52. 1894.

?Phthia rubropicta (Westwood)

Leptoscelis rubropicta Westwood (1842) Hope Cat. 2: 17.

Leptoscelis lunatus Stål (1883) Cat. Cab. Zool. 211.

Phthia lunata var. Distant (1901) Proc. Zool. Soc. Lond. 1901: 335 (synonymy of above). = *Phthia lunata* (authors not Fabricius), as from Cuba, Porto Rico, and other West Indian islands.

From the examination of eleven specimens of this species from Porto Rico and two from Cuba the author is convinced that it is distinct from *P. lunata* Fabricius, described from French Guiana, and is very probable what Westwood briefly described as *Leptocelis rubropicta* from St. Vincent, West Indies. Distant (1901) lists it as a var. of *P. lunata* Fabricius. If the above assumption is correct it is doubtful whether Fabricius' species occurs in the West Indies, the probability being that it is confined to South America, Central America, and Mexico.

P. rubropicta is smaller and differs from *lunata* in coloration as follows: the markings on the head, pronotum, corium and ventral parts are orange-red not pale yellow-white, as in *lunata*; the head and pronotum, anteriorly, are shining steel-blue, not black as is usually the case in *lunata*; the head has in place of a narrow longitudinal whitish line running from the inner margin of the eye to the collum, several distinct orange-red spots on the disk; in the ventral aspect, the orange-red maculations are more enlarged on the head, laterally, on the pleura and particularly on the venter where the wide transverse orange-red fasciæ are either continuous or broken on the disk; the posterior tarsus is black, not yellowish as in *lunata*.

Described from St. Vincent, West Indies. Aibonito, June 1-3, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, October 18, 1922 (Danforth)—U.S.N.M. Mayagüez, December 29, 1913 (Van Zwaluwenburg)—C. J. Drake coll. Cuba—U.S.N.M. As *P. lunata* it was reported from Cuba and Guadeloupe by Guérin-Méneville (1857), Martinique by Marshall (1878).

Tribe Spartocerini

KEY TO GENERA

- Veins of membrane distinctly anastomosing, enclosing numerous irregular cellules.
 Disk of pronotum not at all or slightly convex.....*Spartocera*.
 Veins of membrane numerous, not distinctly anastomosing nor enclosing numerous cellules. Disk of pronotum strongly convex.....*Sephinia*.

SPARTOCERA Laporte

- Spartocera* Laporte (1832) Essai Class. Syst. Hem. 42, 43.
Corecoris Hahn (1833) Wanz. Ins. 2: 14.

Spartocera fusca (Thunberg)

- Cimex fuscus* Thunberg (1783) Nov. Ins. Spec. 2: 44.
Spartocera fusca Gundlach (1894) Fauna Puerto-Riquena 593.
Corecoris fusca Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Lateral margin of the pronotum distinctly expanded, the humeral angle distinctly elevated and commonly truncate. Posterior margin of the male hypopygium distinctly and concavely sinuated. Widely expanded connexival margin, usually distinctly, alternately fuscous- and testaceous-banded.

Arecibo, March 1-4, 1914 (Lutz); Aibonito, June 1-3, and Adjuntas, June 8-13, 1915 (Lutz & Mutchler)—A.M.N.H. Arroyo, February 1899 (Busck); Adjuntas, April 13, 1900 (Stejneger); Río Piedras, May 8, June 15, 1916, on eggplant (Smyth); Bayamón, August 8, 1930; Ponce, July 22, 1932, on *Solanum* sp. (Oakley); Barceloneta, April 6, 1911 (Van Dine)—U.S.N.M. Fajardo, May 29, 1912 (Jones)—Drake coll.

Widely distributed in South America, Central America, and most of the West Indian Islands. It has been much confused in West Indian records owing to the misidentification of *S. batatas* (Fabricius) as *S. fusca* (Thunberg) by Uhler and others. For synonymy and additional references see Lethierry & Severin, Cat. Gen. 2: 55. 1894.

Spartocera batatas (Fabricius)

FIGURE 13

Lygæus batatas Fabricius (1798) Ent. Syst. Suppl. 540.

Coreus gigas Fabricius (1803) Syst. Rhyng. 191.

Spartocerus intermedia Herrich-Schæffer (1842) Wanz. Ins. 6: 90.

Spartocera batatas Jones (1915) Bull. U. S. Dep. Agr. 192: 4. pl. I, fig. 2.—Wolcott & Sein (1924) Bull. Estac. Exp. Ins. P. R. 32: 123, fig. 67.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 252.

Spartocera fusca Cotton (1918) Jour. Dep. Agr. P. R. 2: 310. fig. 64.

Coreoris batatas Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Lateral margin of the pronotum not expanded; humeral angle not elevated and generally bluntly rounded or obtuse. Posterior margin of the male hypopygium convexly rounded. Expanded lateral margin of the abdomen fuscous, unicolorous.

Described from Surinam by Fabricius. Utuado, March 16, 1906 (Wheeler); Naguabo, March 7, and Arecibo, March 4, 1914 (Lutz), June 24-26, 1915 (Lutz & Mutchler); San Juan, August 13, 1914 (Barber); Manatí, June 29, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, November 16, 1891, on sweet potato (Hooker); Bayamón, Mayagüez, Utuado, and Aguidilla, January, and Fajardo, Arroja, and Vieques Island, February 1899 (Busck); Luquillo, March 3, 1900 (Stejneger); Naguabo, March 7, 1914 (Jones); Vega Alta, December 29, 1931, on pepper-leaf (Faxon and Mills); Añasco, May 2, 1932, on grapefruit; Manatí, May 2, 1933, on grapefruit (Faxon, Mills, & Anderson); Bayamón, March 5, 1933, on tomato (Lesesné & Anderson)—U.S.N.M.

Other specimens in the United States National Museum collection are from Brazil, Peru, Colombia, and British Guiana in South America;

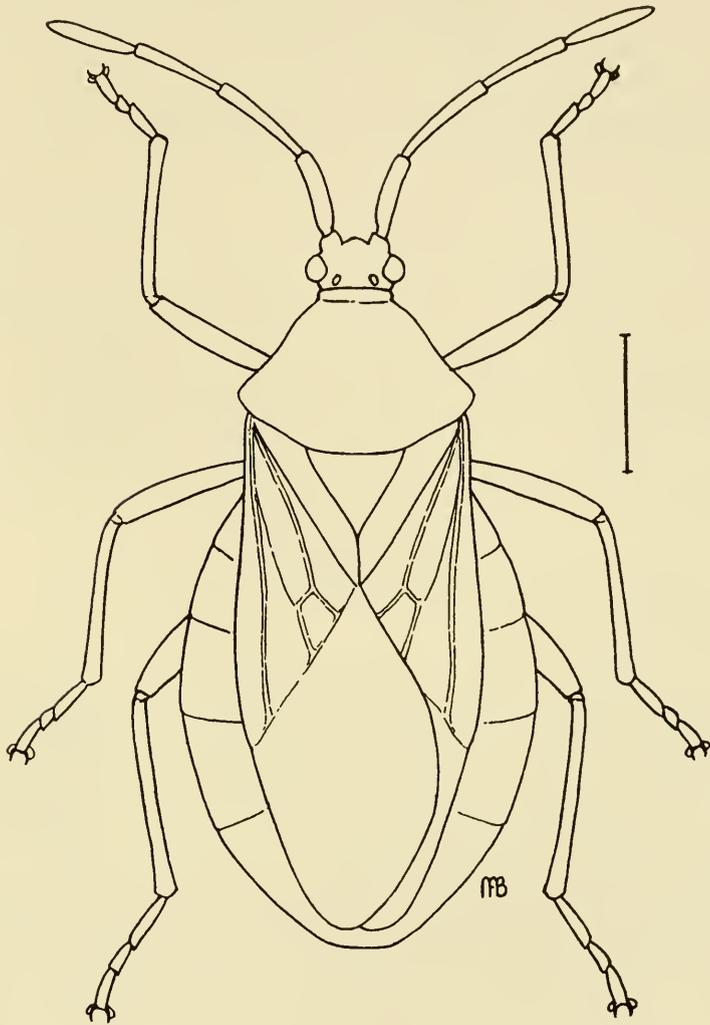


FIG. 13 SPARTOCERA BATATAS (FAB.)

Hispaniola, Dominica, and Grenada, determined by Uhler as *C. fusca*, in the West Indies.

It has been recorded as feeding on sweet potato, tomato, eggplant,

and occasionally on other plants, by several economic entomologists in Porto Rico (see Wolcott, Jour. Dep. Agr. P. R. 7: 252. 1924).

SEPHINA Amyot & Serville

Sephina Amyot & Serville (1843) Hist. Hemip. 185.

Sephina erythromelæna (White)

Spartocerus erythromelas White (1842) Trans. Ent. Soc. Lond. 3: 92.

Sephina erythromelæna Lethierry & Severin (1894) Cat. Gen. 2: 56 (misspelled).

Sephina indieri Wolcott (1924) Jour. Dep. Agr. P. R. 7: 251.

Variable in size and coloration. In the form described by Wolcott the pronotum has, besides a large discal black spot, the lateral margin narrowly black, somewhat enlarged on the humeral angle. Identical color-forms of *S. erythromelæna* from South America are in the collection of the United States National Museum. For synonymy and additional references see Lethierry & Severin, Cat. Gen. 2: 56. 1894.

Described from Brazil. "In the mountains North of Yauco, June 16, 1921, on *Metastelma* sp.?" (Sein and Wolcott)—U.S.N.M. and Ins. Exp. St. Other specimens in the United States National Museum collection are from Brazil, Peru, and British Guiana.

Tribe **Chariesterini**

CHARIESTERUS Laporte

Chariesterus Laporte (1832) Ess. Hem. 44.

Chariesterus gracilicornis Stål

Chariesterus gracilicornis Stål (1870) Sv. Vet.-Akad. Handl. I. 9(1): 178.—Gundlach (1894)

Fauna Puerto-Riquena 595.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Chariesterus mæstus Wolcott (not Burmeister) (1924) Jour. Dep. Agr. P. R. 7: 251.

Ferruginous-brown; expansion of third antennal segment narrow, ovate, occupying little more than the apical half of the segment; lateral margin of pronotum obsoletely, finely spinose. Readily distinguished from *C. mæstus* Burmeister, with which it has been sometimes confused, by the character of the expansion of the third antennal segment, which in Burmeister's species is much broader, occupying nearly the entire segment and with the inner apical margin concavely sinuated. Furthermore in *C. mæstus* the lateral margin of the pronotum is unarmed.

Described from Saint Eustatius, Dutch West Indies. San Juan, July 1914 (Barber); St. Croix, Virgin Islands, June 4, 1911 (Lutz), St. Croix, Virgin Islands, February 28, March 4, and April 9, 1925 (Lutz & Woodruff)—A.M.N.H. Guánica, September 23, 1913, and Río Piedras, June 18, 1916 (Smyth); Añaseo, July 3, and St. Croix, Virgin Islands, June 13, 1917 (Morrison); Barceloneta, December 6,

1932, on squash-leaf (Anderson, Mills, & Faxon); St. Croix, Virgin Islands, February 2, 1933, on tomato-leaf (Anderson & Faxon); Añasco, June 14, 1933 (Harley); Mayagüez (Tower)—U.S.N.M. Pueblo Viejo, April 2, 1930 (Forbes)—Cornell Univ.

Other specimens in the United States National Museum are from Cuba, Haiti, St. Lucia, and Jamaica. It is evidently confined to the West Indies. Wolcott (1924) records it as *C. mæstus* collected on curcubits and *Amaranthus*.

Tribe Coreini

KEY TO THE PORTO RICAN GENERA

1. Head with juga and tylus anteriorly projected before base of antenna and filling up space between two antenniferous tubercles, tylus porrect or very slightly inclined. Posterior margin of corium straight. Membrane with numerous irregularly anastomosing veins. Posterior femur neither swollen nor armed beneath with spines. First segment of antenna not at all or slightly longer than head. Head behind eye distinctly calloused. Anterior angle of pronotum usually with an anteriorly directed spine or acute process. *Althos*.
 Head subquadrate, tylus and juga usually not at all or slightly projected before base of antenna; tylus anteriorly strongly inclined or vertical. Membrane with numerous veins which are not at all or slightly anastomosing. Posterior femur either slender or enlarged and either with spines below or mutic. Anterior angle of pronotum most commonly devoid of an anteriorly directed spine or acute process. 2
2. Posterior femur distinctly enlarged and armed below with several spines. Pronotum anteriorly strongly declivous; posterior angle spinose. *Zicca*.
 Posterior femur slender or very slightly enlarged and most commonly unarmed or with a few small spines towards apex. 3
3. Head behind eye scarcely calloused. Posterior angle of metapleurum usually acute. Anterior disk of pronotum, behind collar, with distinct, transverse, smooth, calloused ridge which does not reach lateral margin on each side. Body unusually long and narrow. Colors bright, and more or less metallic. *Sphictyrtus*.
 Head behind eye distinctly calloused. Posterior angle of metapleurum either forming right angle or obtusely rounded. Anterior disk of pronotum, behind collar, most often devoid of transverse calloused ridge; if ridge is present, colors not metallic. 4
4. Head relatively broad, more than half as wide as pronotum posteriorly, embedded nearly to eyes, and behind these distinctly contracted. Basal segment of antenna usually shorter than head and somewhat enlarged. Body oblong, parallel sided. Smaller species. *Catorhintha*.
 Head not half as wide across eyes as pronotum posteriorly, not so evidently embedded in pronotum, and postocular margins not distinctly contracted. Basal segment of antenna most often distinctly longer than head, and moderately enlarged. Body usually broader, ovate. *Anasa*.

ALTHOS Kirkaldy

Margus Dallas (1852) List Hemip. 2: 523 (name preoccupied).

Althos Kirkaldy (1904) Entom. 280 (new name).

Althos obscurator (Fabricius)

Coreus obscurator Fabricius (1803) Syst. Rhyn. 200.

Margus impudens Stål (1860) Bidrag. Rio Jan. Hemip. 1: 37.

Margus obscurator Stål (1868) Hem. Fab. 1: 57.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Margus inornatus Uhler (not Stål) (1894) Proc. Zool. Soc. Lond. 1894: 179.

The terminal segment of antenna is a little longer than, or subequal to, basal segment. Antenniferous tubercle outwardly prominent or armed with a short spine. Lateral margin of the pronotum straight. Abdomen scarcely expanded laterally.

Described from South America. Aibonito, June 2, 1915 (Lutz & Mutchler). Other specimens from the West Indies in the collection of the United States National Museum are from Guadeloupe and Grenada (Uhler). Dominica, British West Indies—A.M.N.H.

CATORHINTHA Stål

Catorhintha Stål (1859) Öfv. Vet. Ak. Forh. 470.

Catorhintha guttula (Fabricius)

Lygæus guttula Fabricius (1794) Ent. Syst. 4: 162.

Gonocerus dorsigera Westwood (1842) Hope Cat. 2: 25.

Catorhintha guttula Stål (1868) Hem. Fab. 1: 58.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 250.

Catorhintha selector Uhler (not Stål) (1894) Proc. Zool. Soc. Lond. 1894: 179.

Outer apical angle of the antenniferous tubercle armed with a prominent spine. Tergum black, with two large yellow spots. Connexival margin of the abdomen either immaculate or alternately banded with black and yellow. In *C. selector* Stål, occurring in some of the islands of the West Indies, the antenniferous tubercle is unarmed, with the tergum entirely black.

Described from American islands. Aibonito, July 15, Arecibo, July 30, Guayanilla, July 22, San Juan, August 2, and Coamo Springs, July 18, 1914 (Barber), June 5, Adjuntas, June 8, and Ensenada, June 14, 1915 (Lutz & Mutchler); Mona Island, February 24, 1914 and St. Croix, Virgin Islands, August 25, 1917 (Lutz); St. Thomas, February 24, 25, Tortola, March 17, and St. John, Virgin Islands, March 9, 1925 (Lutz & Woodruff)—A.M.N.H. Añasco District, July 3, 1917 (Morrison); Ponce, June 8, 1932 and August 8, 1933 (Oakley); Dorado, July 15, 1932, on *Crotalaria* (Anderson, Faxon, & Mills); Vieques Island, February 1899 (Busck)—U.S.N.M. Aguirre, February 16, 1916 (Wolcott)—Drake coll. Coamo Springs, October 29, 1929 (Danforth)—author's coll.

Widely distributed in South America, Central America, Mexico, West Indies, and the United States. A food-plant mentioned by Wolcott (1924) is the sticky-capsule vine, *Commicarpus scandens*.

Catorhintha borinquensis Barber

FIGURE 14

Catorhintha borinquensis Barber (1923) Am. Mus. Novit. 75: 1.

Averaging a little larger than the preceding species; yellowish-gray in color, fuscous-punctate, the ventral parts ferruginous-punctate;

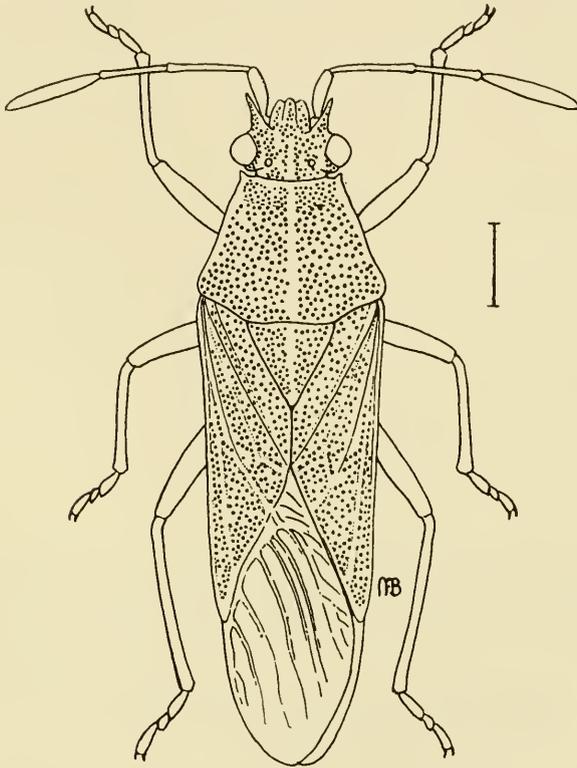


FIG. 14 *CATORHINTHA BORINQUENSIS* BARBER

legs rufous-tinted. The spine of the antenniferous tubercle is longer and more acutely attenuated than in *guttula*.

Described from Porto Rico. Coamo Springs, June 6, 1915 (Lutz & Mutchler)—A.M.N.H. I have also seen a specimen from Soledad, Cuba, June 5, 1918.

ANASA Amyot & Serville

- Oriterus* Hahn (1831) Wanz Ins. 1: 8 (*nomen nudum*).
Anasa Amyot & Serville (1843) Hist. Nat. Ins. Hem. 209.
Lagaria Dallas (1852) List Hemip. 2: 442.

Anasa scorbatica (Fabricius)

- Cimex scorbaticus* Fabricius (1775) Syst. Ent. 706.
Coreus mastus Dallas, Stahl (1883) Cat. Cab. Zool. 210.
Anasa scorbatica Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Closely related to *Anasa armigera* Say, from the United States, and as in that species each antenniferous tubercle is outwardly armed with a long spine, but the antenna is distinctly longer, and with the exception of the infuscated terminal segment, pale. The posterior femur is usually armed below towards apex with one or two small spines.

Described from the islands of America. Aibonito, June 2, 1915 (Lutz & Mutchler); St. Croix, Virgin Islands, April 10, 1925 (Woodruff)—A.M.N.H. Bayamón, August 7, 1932 (Anderson & Lesesne), at light; Vega Alta, November 24, 1931, on squash leaf (Oakley & Mills); Caguas, November 17, 1933, on cucumber (Anderson, Mills, & Faxon)—U.S.N.M. Mayagüez, October 18, 1929 (Danforth)—author's coll.

Also wide-spread in South America, Central America, Mexico, United States, and the West Indies. Often recorded as injurious to various Cucurbitaceæ. For synonymy and additional records see Lethierry & Severin, Cat. Gen. 2: 76. 1894.

ZICCA Amyot & Serville

- Zicca* Amyot & Serville (1843) Hist. Nat. Ins. Hem. 240.

Zicca tæniola (Dallas)

- Clavigralla tæniola* Dallas (1852) List. Hem., 2, 514.
Coreus (Zicca) delicatulus Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 384.
Zicca tæniola Gundlach (1894) Fauna Puerto-Riquena 593.—Barber (1923) Amer. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 250.

Head, pronotum anteriorly, and body ventrally sordid-yellow or yellow-testaceous; pronotum posteriorly and the hemelytra fusco-feruginous; the membrane embrowned and obscurely spotted with fuscous; pleura and venter laterally, with a row of small, black spots as well as a pair on the disk of the third ventral segment. The antenna is pale with the terminal segment sometimes infuscated; the basal segment is shorter than in most of the other species of *Zicca*, being but little longer than the head.

Described from Venezuela. Coamo Springs, July 19, 1914 (Barber); Coamo Springs, June 5-7, and Mayagüez, June 21, 1915 (Lutz & Mutchler)—A.M.N.H. Cidra, August 5, 1932, on cockscomb (Faxon, Anderson, & Mills); Utuado, October 21, 1932 (Oakley); Río Piedras, June 5, 1916 (Smyth); Mayagüez (Tower)—U.S.N.M.

Occurs in South America, Central America, Mexico, United States, and the West Indies. Wolcott (1924) reports it as having been taken on cucurbits at Añasco, and abundant on seed-heads of *Amaranthus* at Guánica.

SPHICTYRTUS Stål

Sphictyrtus Stål (1859) Oefv. Vet.-Akad. Forh. 462.—Stål (1867) Oefv. Vet.-Akad. Forh. 548.

***Sphictyrtus whitei* (Guérin-Méneville)**

FIGURE 15

Paryphes whitei Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 385.

Sphictyrtus whitei Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 250.

The following parts are shining, metallic-green: pronotum, with broad lateral margin to just behind humeral angle and the central disk; corium, with the exception of a broad, arcuate, longitudinal median fascia. The following parts are red: broad central region of head; pronotum with the anterior transverse calloused ridge and a broad longitudinal fascia on either side of the middle which unite with a posterior, transverse, marginal band; scutellum; corium, with a central, arcuate, longitudinal fascia, running from just before the middle almost to posterior margin. The following parts are black: a longitudinal line on either side of the head within the eyes and before the antenniferous tubercles; antennæ; rostrum; legs; membrane. Connexivum alternately banded with red or orange and black. Ventral parts testaceous, with the posterior lateral angles of the abdominal segments black. Length 14.00–15.00 mm.

Described from Cuba. Mona Island, February 21–26, 1914 (Lutz), September 10, 1919, March 10, 1926—A.M.N.H. Mona Island, December 20, 1913 (Van Zwaluwenburg)—Drake coll. A specimen in the United States National Museum collection is labeled San Salvador, Bahamas (Bartsch).

Subfamily **CORISCINÆ (= ALYDINÆ)**

KEY TO TRIBES

1. Posterior femur beneath with a series of spines, femur of males sometimes enlarged. Posterior angle of metapleurum not produced. **CORISCINI**.
 Posterior femur muticous, slender in both sexes. Posterior angle of metapleurum more or less produced, often acute. **2**
2. Third segment of rostrum very short, fourth segment at least twice as long as third; third and fourth segments conjoined, shorter than second segment (Extralimal). **MICRELYTRINI**.
 Third segment of rostrum nearly or quite as long as fourth; third and fourth segments conjoined, longer than second or subequal to it. Body narrow elongate **LEPTOCORISINI**.

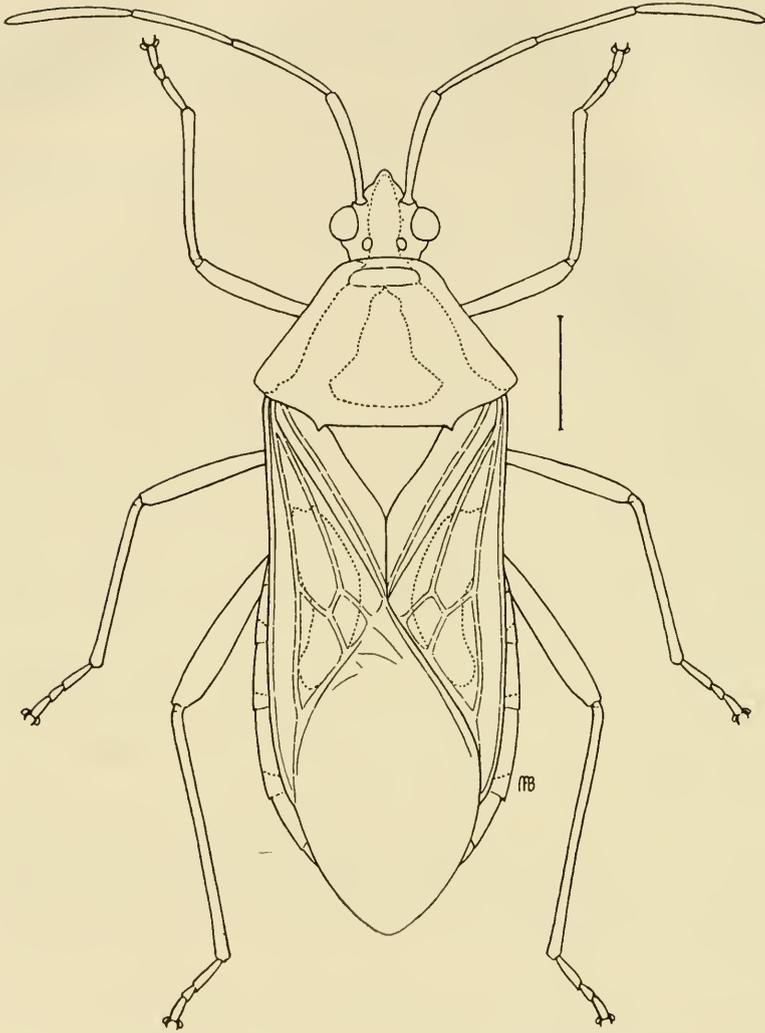


FIG. 15 SPICLYRTUS WHITEI (GUÉRIN-MÉNEVILLE)

Tribe **Coriscini**

KEY TO PORTO RICAN GENERA

- Posterior tibia compressed or flattened, particularly in male, often curved; at inner apex with distinct spine. Posterior femur, particularly in male, distinctly enlarged *Hyalmenus*.
- Posterior tibia most often straight and cylindric in both sexes, mucous at apex. Posterior femur very slightly enlarged. Humeral angle of pronotum acutely spinose *Megalotomus*.

HYALMENUS Amyot & Serville

Hyalmenus Amyot & Serville (1843) Hist. Nat. Ins. Hem. 224.
Tivarbus Stål (1859) Oefv. Vet.-Akad. Forh. 458.

Hyalmenus longispinus Stål

Hyalmenus longispinus Stål (1870) Sv. Vet.-Akad. Handl. 1. 9(1): 213.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).
Alydus (Campiopus) sinuatus Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 390.

Similar to *H. tarsatus* Fabricius. The humeral spine of the pronotum is longer and more upright than in *tarsatus*, the head being narrower across eyes than across the pronotum posteriorly, including spines. Also the posterior femur of the male is less enlarged, and with the premedian spine much reduced in size; the posterior tibia usually less expanded and less strongly curved.

Described from Cuba. Mona Island, February 24, 1914 (Lutz). Specimens in the United States National Museum collection are from Cuba, Jamaica, Bahamas, and Florida. Uhler recorded it from St. Vincent.

MEGALOTOMUS Fieber

Megalotomus Fieber (1860) Europ. Hem. 1: 58, 226.—Stål (1870) Sv. Vet.-Akad. Handl. 1. 9(1): 214.
Huphus Mulsant & Rey (1870) Pun. France 158.

Megalotomus rufipes (Westwood)

Alydus rufipes Westwood (1842) Ilope Cat. 2: 19.
Alydus pallescens Stål (1860) Hem. Rio Jan. 1: 34.—Gundlach (1894) Fauna Puerto-Riquena 594.
Megalotomus pallescens Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: (5) 12.
Megalotomus rufipes Barber (1923) Am. Mus. Novit. 75: 12. (Listed.)
Alydus (Megalotomus) pallescens Wolcott (1924) Jour. Dep. Agr. P. R. 7: 250.

Extremely variable in coloration. Often testaceous, sometimes more or less infuscated, and frequently with the broad anterior disk of the pronotum testaceous, and the remainder of the dorsum fuscous. (See Van Duzee, 1907: 12).

Described as "America aequinoctiali" (Westwood); Brazil (Stål). Coamo Springs, July 17, Arecibo, July 30, and Guayanilla, July 22, 1914 (Barber); San Juan, February 12, 1914 (Lutz); Manatí and Ensenada, June 1915 (Lutz & Mutchler); St. Croix, March 2, St. Thomas, Virgin Islands, February 27, March 12, 1925 (Woodruff)—A.M.N.H. Dorado, July 15, 1932 (Anderson, Faxon, & Mills); Añasco, June 14, 1933 (Harley)—U.S.N.M. Aguado, October 5, 7, 1927, and St. Thomas, December 27, 1930 (Danforth)—author's coll.

Widely distributed in South America, Central America, Mexico, and the West Indies. West Indian specimens in the United States National Museum collection are from Cuba, Isle of Pines, Jamaica,

Hispaniola, Martinique, Dominica, St. Lucia, St. Vincent, and Grenada.

Tribe **Leptocorisini**

KEY TO PORTO RICAN GENERA

Head long porrect; juga much longer than tylus and contiguous anteriorly.
 *Leptocorisa*.
 Head short; juga not longer than tylus. *Lyrnessus*.

LEPTOCORISA Latreille

Leptocorisa Latreille, in Cuvier (1829) Règn. Anim. ed. 2: 5: 197.

Leptocorisa filiformis (Fabricius)

Cimer filiformis Fabricius (1775) Syst. Ent. 727.

Leptocorisa filiformis Gundlach (1894) Fauna Puerto-Riquena 595.—Barber (1923) Am. Mus. Novit. 75: 12. (Listed.)

Differs from *L. tipuloides* in having the apical sinus of the male hypopygium much more deeply excavated and the angle on each side of the sinus acute. Second segment of antenna is a little shorter than third. Basal cell of the membrane not infuscated. For synonyms of the genus and species see Lethierry & Severin, Cat. Gen. 2: 102, 103. 1894.

Described from "America." Corozal, July 2, 1915 (Lutz & Mutchler)—A.M.N.H. Rincon, December 11, 1919 (Woleott); Mayagüez, February 25, 1928 (Danforth), May 25, 1933 (Harley); Aguirre, May 18, 1925 (Box)—U.S.N.M. Boqueron, March 7, 1929 (Danforth)—author's coll.

Its distribution includes South America, Central America, and the West Indies. Other West Indian specimens in the United States National Museum collection are from Cuba, Jamaica, Dominica, Hispaniola, Grenada, and St. Vincent.

LYRNESSUS Stål

Lyrnessus Stål (1862) Rio Jan. Hem. 2: 59.—Stål. (1867) Oefv. Vet.-Akad. Förh. 543.

Coristenia Costa (1863) Rend. Accad. Napoli. 2: 260.

Lyrnessus geniculatus (Guérin-Méneville)

Leptocorisa geniculata Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 392.—Stål (1882) Cat. Cab. Zool. 211.

Lyrnessus geniculatus Stål (1870) Sv. Vet.-Akad. Handl. 1. 9 (1): 217.

The juga not longer than the tylus. Antenna black, with the bases of the second, third, and fourth segments white. Disk of the pronotum either olive-green, margined with yellow or sometimes entirely yellowish. Corium black with veins and submarginal stripe yellowish. Apex of femur and tibia except prebasal whitish band, black. For synonyms see Lethierry & Severin Cat. Gen. 2: 102. 1894.

Described from Cuba. Porto Rico (Stahl). The author has not seen specimens from Porto Rico. Specimens in the United States National Museum collection are from Brazil, Paraguay, Colombia, Panama, Costa Rica, and Cuba.

Subfamily CORIZINÆ

KEY TO TRIBES

1. Posterior femur swollen, spinose beneath. Anterior angle of pronotum frequently with an anteriorly projected process.....HARMOSTINI.
Posterior femur muticous. Anterior angle of pronotum obtuse, devoid of a process..... 2
2. Anterior transverse impression of pronotum not reaching lateral margin, which is not at all or obtusely sinuate. Propleurum, anteriorly, destitute of transverse impression, continuous from lateral margin. Corium commonly hyaline, membranous between veins; apical cell of posterior margin of corium, quadrangular.....CORIZINI.
Anterior transverse impression of pronotum reaching lateral margin, which is there distinctly angularly sinuate. Propleurum, anteriorly, with transverse impression, continuous from lateral margin. Corium commonly coriaceous; apical cell of posterior margin of corium more or less triangular. LEPTOCORINI.

Tribe Harmostini

HARMOSTES Burmeister

Harmostes Burmeister (1835) Handb. Ent. 2: 307.

Harmostes serratus (Fabricius)

Acanthia serratus Fabricius (1794) Ent. Syst. 4: 75.

Harmostes serratus Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Lateral margin of the pronotum with distinct, nearly erect teeth. Antenniferous tubercle outwardly with a long acute spine, the preocular margin to apex of spine much longer than an eye. The tylus is anteriorly projected in a long acute process reaching nearly to the apex of the basal segment of the antenna. Head and basal segment of antenna more hispid than in *H. affinis* Dallas. For synonyms see Lethierry & Severin, Cat. Gen., 2: 115. 1894.

Described without locality. San Juan, February 11-14, 1914 (Lutz); Guayanilla, July 22, and Arecibo, July 30, 1914 (Barber); Jayuya, January 6, 1915 (Miner); Quebradillas, June 23, 1915 (Lutz & Mutchler)—A.M.N.H. Bayamón, January, and Arroyo, February, 1899 (Busek); Cidro, July 8, 1932 (Mills & Anderson)—U.S.N.M. Algarrobo, October 12, 1930 (Danforth)—author's coll.

Occurs in the northern part of South America, Mexico, Central America, United States, and the West Indies. Specimens in the

United States National Museum collection from the West Indies are labeled: Grenada, St. Lucia, Cuba, Hispaniola, and Jamaica.

Harmostes affinis Dallas

Harmostes affinis Dallas (1852) List Hem. 2: 522.—Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 13.

Closely related to the preceding; the lateral margin of the pronotum is finely serrate instead of being toothed, the spine of the antenniferous tubercle is shorter, so that the preocular margin of head to apex of spine is not longer than an eye; the tylus is not so strongly projected anteriorly.

Described from an unknown locality. Aguirre, April 1, 1925 (Box)—U.S.N.M.

From the evidence of specimens in the collection of the United States National Museum the distribution of this species is similar to that of the preceding. The only West Indian Islands represented besides Porto Rico are Cuba and Dominica.

EXOGENUS Berg

Exogenus Berg (1884) Hem. Arg. 45.—Distant (1893) Biol. Centr. Am. Rhynch. 2: App. 461 (May).

Darmistidus Uhler (1893) Proc. Zool. Soc. Lond. 1893: 706 (November).

Body elongate; lateral margin of pronotum neither strongly impressed nor reflexed, subcarinate; anterior angle of pronotum unarmed. Head longer than pronotum; antenniferous tubercle unarmed. Ocelli rather strongly elevated.

Exogenus extensum Distant

Exogenus extensum Distant (1893) Biol. Centr. Am. Rhynch. 2: App. 461; pl. 39, fig. 26.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Mexico, and possibly not distinct from *E. picturatus* Berg; described from Argentine and Uruguay. San Juan, August 2-3, 1914 (Barber); Guane, Cuba, September 24-26, 1913 (Lutz)—A.M.N.H. Dominica (Morrison); St. Vincent as *Darmistidus maculatus* Uhler—U.S.N.M.

Tribe **Corizini**

CORIZUS Fallen

Corizus Fallen (1814) Spec. Nov. Hemip. 1: 8.

First segment of antenna short, somewhat enlarged, not at all or very slightly exceeding apex of head. Antenniferous tubercle commonly prominent. Posterior margin of the metapleurum more or less obliquely truncate, and outer angle expanded. Corium most com-

monly hyaline between the veins. For subgenera and synonyms see Lethierry & Severin, *Cat. Gen.*, 2: 115. 1894.

Corizus (Liorhyssus) hyalinus (Fabricius)

Lygaeus hyalinus Fabricius (1794) *Ent. Syst.* 4: 168.

Corizus hyalinus Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 249 (listed).

Pronotum behind anterior margin provided with a distinct, transverse, smooth, calloused ridge. Second segment of antenna a little more than twice as long as basal. Body nearly parallel-sided. Dorsal parts and pleura rather finely punctate. For synonyms see Lethierry & Severin, *Cat. Gen.* 2: 117. 1894.

Described from islands of America. Mona Island, February 21, 1914 (Lutz); San Juan, July 10, 1914 (Barber); Coamo Springs, June 5, Ensenada, June 15, and Quebradillas, June 23, 1915 (Lutz & Mutchler)—A.M.N.H. Río Piedras, June 8, 1916 (Smyth); near Añasco, July 2, 1917 (Morrison); Vieques Island, February 1899 (Busck); Caguas, February 18, 1931, on eggplant (Faxon & Mills); Bayamón, April 18, 1933, on tomato (Mills & Anderson); Mayagüez, December 2, 1932, on *Solanum indicum* leaf (Harley); Añasco, June 14, 1933 (Mills)—U.S.N.M.

Occurs in many parts of the world. In the Western Hemisphere it is found in most of South America, Central America, Mexico, southern United States, and practically throughout the West Indies.

Corizus sidæ (Fabricius)

Lygaeus sidæ Fabricius (1794) *Ent. Syst.* 4: 169.

Rhopalus pictipes Stål (1859) *Freg. Eug. Resa Ins.* 239.

Corizus sidæ Gundlach (1894) *Fauna Puerto-Riquena* 593.—Barber (1923) *Am. Mus. Novit.* 75: 12 (listed).—Wolcott (1924) *Jour. Dep. Agr. P. R.* 7: 249.

Pronotum anteriorly devoid of a transverse, smooth, calloused ridge; punctate before the two cicatrices. Second segment of antenna about three times as long as basal. Body more ovate. Dorsal parts and pleura closely and coarsely punctate. For synonyms and additional references see Lethierry & Severin, *Cat. Gen.* 2: 119, 120. 1894.

Described from South America. Mona Island, February 21, and Desecheo Island, February 18, and Mayagüez, February 15, 1914 (Lutz); San Juan, July 9, August 2, Aibonito, July 14, and Coamo Springs, July 18, 1914 (Barber), January 10, 1915 (Lutz), June 5, 1915 (Lutz & Mutchler); Guayanilla, July 22, and Arecibo, July 30, 1914 (Barber), June 24, 1915 (Lutz & Mutchler); Corozal, January 18 (Lutz); Adjuntas, June 9, Manati, June 28, 1915 (Lutz & Mutchler); St. Thomas, Virgin Islands, February 22, St. Croix, Virgin Islands,

February 27, and St. John, Virgin Islands, March 9, 1925 (Lutz & Woodruff)—A.M.N.H. Vieques and Culebra Islands, February 1899 (Busck); Bayamon, June 26, and Añasco District, July 3, and St. Croix, Virgin Islands, June 13, 1917 (Morrison); Ponce, September 29, 1933 (Oakley)—U.S.N.M.

Common and widely spread: South America, Central America, Mexico, southern United States, and the West Indies. From the latter region specimens in the United States National Museum collection are from Cuba, Hispaniola, Haïti, Grenada, St. Vincent, Jamaica, Dominica, and Bahamas.

Tribe **Leptocorini**

JADERA Stål

Jadera Stål (1860) Rio Jan. Hem. 1: 50. (For synonyms see Lethierry & Severin (1894) Cat. Gen. 2: 124.

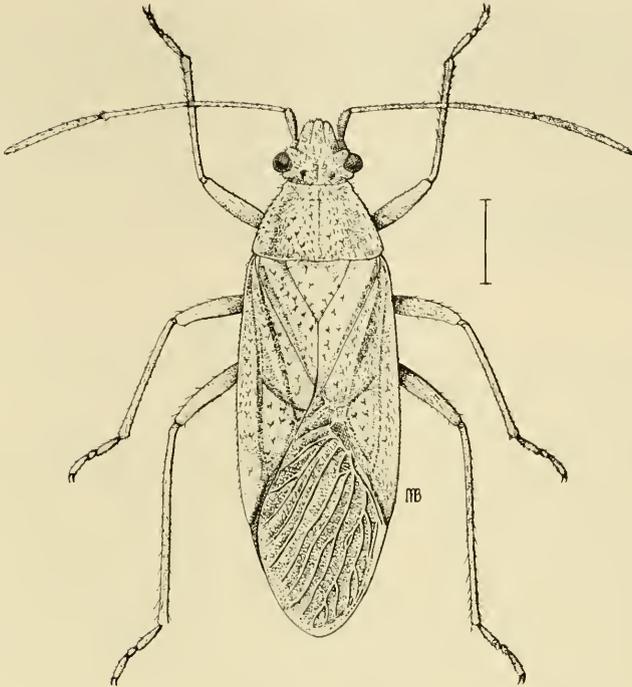
Jadera rufofusca Barber

FIGURE 16

Jadera rufofusca Barber (1923) Am. Mus. Novit. 75: 2.

Specimens of this species differ considerably from the fusco-cinereous specimens of *J. sanguinolenta* Fabricius in the United States National Museum collection from Mexico, Central America, and South America. In *J. rufofusca*, the dorsal parts, particularly the corium except for a narrow, pale, lateral margin, are rufo-fuscous, and the pronotum also is frequently broadly infuscated on either side of the middle. Besides which, the membrane and corium are almost or quite devoid of the fuscous spots so conspicuous in most specimens of *J. sanguinolenta*, and the antenna is noticeably shorter. A correction should be made in the original description in reference to the spacing of the ocelli, these being more nearly twice as far apart as each is removed from the eye. There seems to be some confusion in reference to the synonymy of *J. sanguinolenta* as stated by Stål. In fact, it seems very likely that there are at least two distinct species among the several listed as synonyms. Specimens of *J. rufofusca* from Porto Rico answer fairly well to Fabricius' description of *J. cruenta*, which was treated as a synonym by Stål, who records it "in insulis Americæ occidentalis." Until comparison can be made with the Fabrician specimens of *J. cruenta*, it seems preferable to consider the Porto Rican specimens as distinct.

Described from Porto Rico. Cayey, May 30, Aibonito, June 1-3, Adjuntas, June 8, Ensenada, June 15, and Manatí, June 29, 1915 (Lutz & Mutchler); St. Croix, March 1 and St. John, Virgin Islands, March

FIG. 16. *JADERA RUFOFUSCA* BARBER

5, 1925 (Lutz & Woodruff)—A.M.N.H. Bayamón, May 14, 1933, at light (Lesesne & Anderson); Ponce, August 17, 1933, on *Scirpus validus* (Oakley); Culebra, Virgin Islands, March 3, 1906 (Wheeler)—U.S.N.M. Coamo Springs, April 6, San German, April 16, Río Piedras, April 30, Catano, May 30, 1930—Cornell Univ.

Family ARADIDAE

This family is comprised of much-flattened insects, for the most part living beneath the bark of dead trees. The head is porrect, with the jugs and tylus generally produced; ocelli absent. Antenna and rostrum each four-segmented. Tarsus composed of two segments. So far as known, only two genera, each with a single species, occur in Porto Rico.

KEY TO PORTO RICAN GENERA

Scutellum triangular, more or less distinctly longitudinally carinate. Membrane with distinct veins. Antenniferous tubercle usually acutely produced. Pronotum with anterior lobe most often with four distinct, granulated, longitudinal elevations. Dorsal surface coarsely granulated. *Mezira*.

Scutellum broadly rounded at apex, ecarinate. Membrane devoid of veins. Antenniferous tubercle usually not so evidently or so acutely produced. Pronotum frequently with four slight elevations on anterior lobe. Dorsal surface finely granulated. *Aneurus*.

MEZIRA Amyot & Serville

Brachyrhynchus Laporte (1832) Essai 54 (name preoccupied).

Mezira Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 305.

Dusius Bergroth (1894) Ent. Tidskr. 15: 104.

Mezira abdominalis (Stål)

Brachyrhynchus abdominalis Stål (1873) Sv. Vet.-Akad. Handl. III. 11 (2): 144.—Bergroth (1886) Verhandl. Zool.-Bot. Ges. 36: 59 (listed).

A rather large, black form with ferruginous connexivum of the abdomen variegated with fuscous. Antenniferous tubercle stout, acutely produced, slightly divergent; apical process of the head, consisting of juga and tylus, distinctly narrowing from base, distinctly emarginate at apex. Basal segment of the antenna somewhat more enlarged than the terminal segment, extending to or a little beyond apex of head. Pronotum distinctly constricted between the two lobes, with a small yellow tubercle on either side, just before the constriction. Each basal angle of the scutellum provided with a tubercle similar to those on pronotum.

Described from Cuba. Porto Rico (Bergroth); Mayagüez, November 23, 1928 (Landron)—U.S.N.M. Also occurs in Hispaniola. Recorded from Mexico by Champion.

ANEURUS Curtis

Aneurus Curtis (1825) Brit. Ent. 2: 86.

Aneurus minutus Bergroth

Aneurus minutus Bergroth (1886) Verhandl. Zool.-Bot. Ges. 36: 58.—Champion (1898) Biol. Centr. Am. Rhynch. 2: 114. pl. 7, fig. 27.

Narrowly ovate; ferruginous or fusco-ferruginous. Antenna with the first and second segments elliptic, the latter a little narrower and distinctly shorter than the first; third and fourth segments cylindrical, the third a little longer than the second, the fourth a little longer than the two preceding segments conjoined. Antenniferous tubercle and postocular spine short, acute. All femora stout, clavate.

Described from Texas. Adjuntas, May 3, 1934—U.S.N.M. Champion adds Guatemala and Panama to the distribution.

Family **NEIDIDÆ**

Body, antennæ, and legs slender. The filiform antenna is elbowed at the end of the long basal segment; this segment as well as all femora clavate. Head with a transverse sulcus before the ocelli. Scutellum small, often armed with a spine. Hemelytra commonly translucent. Canal from the metathoracic odoriferous orifice terminating outwardly in an erect spine-like process. So far as recorded, all are phytophagous.

JALYSUS Stål

Jalysus Stål (1862) Bidrag Rio Jan. Hemip. 2: 59.

Vertex, anteriorly between bases of antennæ, with or without a process. Pronotum anteriorly provided with two distinct smooth transverse callosities; lateral margin and middle line of the disk lightly carinate or narrowly calloused; elsewhere closely and coarsely punctate; posterior margin concave before the base of scutellum. Scutellum with a slender, erect or inclined spine. Hemelytra devoid of spines, nearly impunctate. Metathoracic process of the odoriferous canal nearly straight with the canal on the outer side; the apical spine frequently elongate. Anterior coxæ distinctly separated by a longitudinally sulcate plate; meso- and metasternal sulcus carinate laterally.

Jalysus reductus NEW SPECIES

FIGURE 17

Jalysus spinosus Barber (not Say) (1923) Am. Mus. Novit. 75: 12 (listed).

Very similar in color and appearance to, but smaller than, *Jalysus spinosus* Say. Side of head, before and behind the eye, smooth, impunctate. Vertex anteriorly blunt, not produced in an apical process. Pronotum, seen dorsally, about twice as long as head from base to front of vertex; posteriorly, seen from the side, more abruptly declivous than in *J. spinosus*; lateral anterior margin more distinctly impressed opposite each cicatrix. Spine of scutellum longer and more erect, situated almost against posterior margin of pronotum, not preceded by a calloused area. Antenna very nearly one-third longer than body; basal segment about twice as long as the second, the third segment but little longer than the second, the fourth segment a little more than half as long as the third. Length of segments as follows: I-3.00, II-1.52, III-1.68, and IV-.88 mm. Genital clasper narrower and more abruptly bent than in *J. spinosus*. Length of male 5.20 mm.; female 6.50-7.00 mm.

Type, male: Mona Island, Porto Rico, February 21-26, 1914 (Lutz) —A.M.N.H. Paratype, U.S.N.M. Cat. no. 51586. Males: 1 San

Pedro de Macoris, Santo Domingo (Morrison); 1 Teapa, Tabasco, Mexico. (H. H. Smith); 1 Cordoba, Mexico (Knab); 5 La Ceiba, Honduras (Dyer); 1 Paraiso, Canal Zone, January 16, 1911, Corozal,

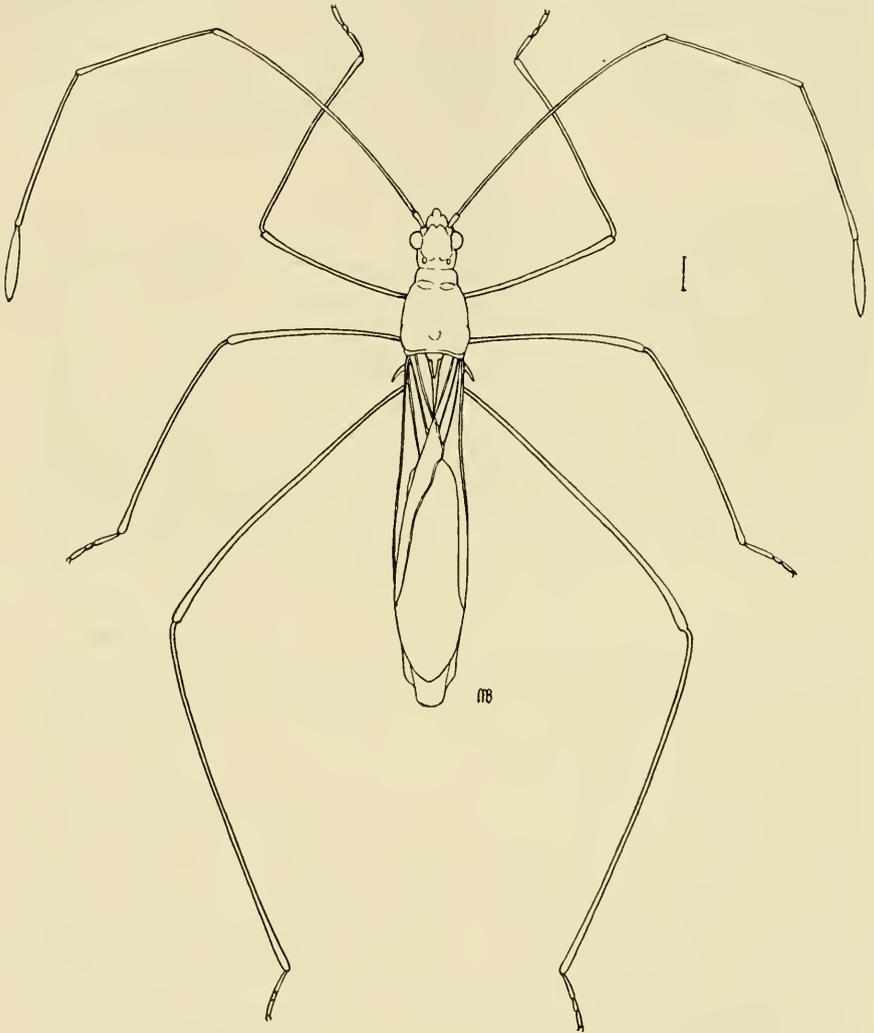


FIG.17 *JALYSUS REDUCTUS* N. SP

Canal Zone, March 1, 1 Tobago Island, Panama, February 14, 1912 (Busck); 1 Matias Hernandez, Panama, October 29, 1918 (Dietz & Zetek); Goleconda Estate, San Fernando, Trinidad, October 19, 1918

(Morrison). Females: 1 Haïti, July 3 (Hoffman); 3 San Pedro de Macoris, Hispaniola, July 15, and 1 San Cristobal, Hispaniola, July 26, 1917 (Morrison); 1 Cayamas, Cuba (Schwarz); 1 Tuxtepec, Oaxaca, Mexico, October 1933 (Fraire); 1 Teapa, Tabasco, Mexico (Smith); 1 Yucatan-Uhler coll. 2 Ceiba, Honduras (Dyer); 1 Aneon, Canal Zone, June 1, 1921 (Zetek); 3 Tobago Island, Panama, February 14, 1912, and 1 Paraiso, Canal Zone, January 15, 1911 (Busck); 1 Sabanas, Panama, April 19, 1923 (Shannon); 1 Golconda Estate, San Fernando, Trinidad, October 19, 1918 (Morrison). Male: Fond-des-Negres, Haïti, June 12, 1930—Dozier coll. Male and female: Soledad, Cuba, March 6 and 10, 1925 (Myers)—Mus. Comp. Zool.

This species is very closely related to *Jalysus spinosus* Say, and the type male specimen from Mona Island, Porto Rico, was so listed by the author in 1923. Besides being smaller, it can be distinguished from Say's species by the impunctate head, by the second and third antennal segments being more nearly equal, by the longer and more erect scutellar spine, and by the more slender and sharply bent male clasper. From *J. reversus* Van Duzee and *J. mollitus* Distant it can be easily distinguished by the immaculate antennæ and legs.

Family LYGÆIDÆ

Membrane furnished with a few simple veins, at most five. Antenna simple, consisting of four segments, inserted on or below the lateral margin of the head. Ocelli rarely absent. Rostrum consisting of 4 segments. Hemelytra most often coriaceous and consisting of clavus, corium, and membrane (except in some brachypterous forms); two clavi apically, with rare exceptions, forming a commissure. Coxæ trochalopodous. Tarsi 3-segmented; with arolia between the claws. Nymphs with two or three abdominal odoriferous orifices. Eggs deposited on the surface of plants.

KEY TO PORTO RICAN SUBFAMILIES

1. Suture between the third and fourth ventral segments of abdomen towards side, most often recurved and not attaining lateral margin (except *Plinthisus*). Head frequently with two setæ near each eye. Fore femur most often more or less enlarged and usually armed below with spines. (APHANINÆ) RHYPAROCHROMINÆ.
- Sutures of ventral segments of abdomen either straight and attaining lateral margin or with some anterior sutures obsolete or lost, and several segments connate. Head devoid of interocular setæ. Fore femur either slender or enlarged and either muticous or spined below. 2

2. All abdominal spiracles situated above on connexivum. Entire posterior margin of pronotum, or at least margin before scutellum, deflexed. Fore femur moderately or not at all enlarged and most often muticous. 3
 All abdominal spiracles not situated dorsally. Posterior margin of pronotum, at least before scutellum, most often not deflexed. Fore femur more or less shortened and most often somewhat enlarged, either spinose or muticous 4
3. Hemelytra impunctate. Posterior margin of pronotum between scutellum and humeral angle more or less distinctly impressed. Two inner veins of membrane usually united by cross vein near base. *LYGÆINÆ*.
 Hemelytra distinctly punctate, often hyaline or subhyaline. Posterior margin of pronotum between scutellum and humeral angle not at all or indistinctly impressed. Two inner veins of membrane not united by cross vein. *CYMINÆ*.
4. Abdominal spiracles of seventh (sixth visible) segment situated on venter, the first six pairs dorsally on connexivum. Head across eyes most often narrower than pronotum posteriorly. Hemelytra flat, impunctate or nearly so. Clavus parallel sided the two forming a distinct commissure apically (except in some brachypterous forms). Fore femur and frequently the intermediate and posterior also, enlarged, either muticous or spined. *BLASSINÆ*.
 Abdominal spiracles all, or at least last three pairs, situated on venter. 5
5. Abdominal spiracles of last three segments situated on venter, others placed dorsally on connexivum. Head broad, nearly or quite as wide across eyes as pronotum, posteriorly. Fore femur not at all or slightly enlarged, muticous. Eyes large, often substylate. *GEOCORINÆ*.
 Abdominal spiracles all situated ventrally. Head across eyes plainly narrower than pronotum, posteriorly. Fore femur greatly enlarged and distinctly spined beneath. Eyes moderately large. *PACHYGRONTHINÆ*.

Subfamily *LYGÆINÆ*

KEY TO PORTO RICAN TRIBES AND GENERA

1. Apical margin of corium straight, not concavely sinuate inwardly. Exterior apical angle of antenniferous tubercle obtuse or subobtuse. Last dorsal segment of male posteriorly truncate. Genital segment of male rarely foveate. Coloration usually red or ochraceous and black. *LYGÆINI*. 2
 Apical margin of corium inwardly more or less concavely sinuate. Exterior apical angle of antenniferous tubercle prominent, acute or subacute. Last dorsal segment of male posteriorly rounded. Genital segment of male foveate. Coloration not as above. *ORSILLINI*. 3
2. Pronotum with posterior margin, before scutellum, concavely sinuate; disk anteriorly longitudinally carinate. Scutellum more or less tumid, carinate apically. *Oncopeltus*.
 Pronotum with posterior margin, before scutellum, truncate; disk either devoid of longitudinal keel or with keel which does not reach anterior margin. Scutellum with transverse prebasal ridge followed by median longitudinal carina. *Lygæus*.
3. Costal margins of corium not at all expanded, parallel or converging posteriorly. Eyes prominent, not in contact with anterior angles of pronotum. Corium with veins not conspicuously elevated and apical margin slightly concavely arcuate within. *Ortholomus*.

Costal margins of hemielytra more or less distinctly expanded, usually straight and parallel at base only, if at all. Eyes usually not so prominent and often almost or quite in contact with anterior angles of pronotum. Corium with veins usually conspicuously elevated and apical margin more strongly concavely arcuate within.....*Nysius*.

Tribe Lygaeini

ONCOPELTUS Stål

Oncopeltus Stål (1868) Hem. Fab. 1: 70, 75.

KEY TO PORTO RICAN SPECIES

1. Membrane devoid of white premedial discal spot. Head black, with red Y-shaped mark. Pronotum with entire lateral margin red or ochraceous, broad central black area extended to anterior margin. Apex of scutellum red. Pleura for most part black, anterior and posterior margins of propleura and posterior margins of meso- and metapleura, narrowly, and rim of acetabula, red or ochraceous.....*O. fasciatus*.
 Membrane with premedial discal spot or streak which is sometimes continuous to basal margin. Head mostly red, with tylus and base transversely, black. Black discal area of posterior lobe of pronotum not extended to anterior margin or very narrowly so. Pleura banded alternately with red and black 2
2. Lateral margin of pronotum entire and apex of scutellum red. Premedian white discal mark of membrane reduced to narrow white line, usually continuous to basal margin; apical and outer margin of membrane narrowly white. Coxæ normally red. Narrower black fasciæ of posterior margins of pleura disconnected outwardly.....*O. ullicus*.
 Lateral margin of pronotum not entirely red; black area of disk of posterior lobe extended outwardly to cover entire humeral area. Scutellum entirely black. Premedian white discal spot of membrane most often ovate. Only apical margin of membrane very narrowly white. Coxæ normally black. Broader black fasciæ of posterior margins of pleura outwardly connected.....
*O. semilimbatus*.

Oncopeltus fasciatus (Dallas)

Lygaeus fasciatus Dallas (1852) List. Hem. 2: 538.—Stahl (1883) Cat. Cab. Zool. 211.—Gundlach (1894) Fauna Puerto-Riquena 596.
Oncopeltus fasciatus Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Florida, Mexico, Brazil, Colombia, and British Guiana. Ciales, February 10, 1914 (Crampton); San Juan, February 11–14, and Arecibo, March 1–4, 1914 (Lutz); Arecibo, July 30, and Aibonito, July 14–17, 1914 (Barber); Jayuya, January 6, 1915 (Lutz); Cayey, May 30–31, Barros, June 4, Coamo Springs, June 5–7, Comerio, July 6, Adjuntas, June 8–13, Mayagüez, June 21–23, Ensenada, June 14, and Manatí, June 27–29, 1915 (Lutz & Mutchler); St. Croix, Virgin Islands, March 2, 1925 (Lutz & Woodruff)—A.M.N.H. Utuado and Bayamón, January 1899 (Busck); Dorado, February 14, 1933

(Faxon, Mills, & Anderson); Arecibo, April 22, August 12, 1932, and December 19, 1933 (Anderson, Faxon, & Mills)—U.S.N.M. Coamo Springs, April 8, 1930 (Forbes) and Aguirre Central, April 2 and 3, 1931 (Leonard)—Cornell Univ.

A very widely distributed species in the United States, Mexico, Central America, South America, and throughout the West Indies. For additional references see Van Duzee, Cat. Hemip. 148. 1917.

Oncopeltus aulicus (Fabricius)

Cimex aulicus Fabricius (1775) Syst. Ent. 718.

Oncopeltus aulicus Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248.

Described from America. St. John, Virgin Islands, March 8–10, 1925 (Lutz & Woodruff); St. Croix, Virgin Islands, June 4, 1911—A.M.N.H. San Juan, July 22, 1929 (Hoffman); Culebra Island, Porto Rico, February 1899 (Busck)—U.S.N.M.

Also occurs in Bahamas, Jamaica, Cuba, and other West Indian Islands.

Oncopeltus semilimbatus Stål

Oncopeltus (Erythriscus) semilimbatus Stål (1874) Sv. Vet.-Akad. Handl. IV. 12 (1): 103.

Described from Brazil. Mona Island, Porto Rico, November 10, 1919.—A.M.N.H.

Other specimens in the collections of the American Museum of Natural History and United States National Museum are from Haïti, Jamaica, Cuba, Mexico, and Honduras. Recorded from Martinique by Lethierry in 1881.

This is certainly very closely related to the preceding species and distinguished only by the color-differences given in the key.

LYGÆUS Fabricius

Lygæus Fabricius (1794) Ent. Syst. 4: 133 (part). (For subgenera see Lethierry & Severin (1894) Cat. Gen. 2: 138.)

Lygæus pulchellus Fabricius

Lygæus pulchellus Fabricius (1794) Ent. Syst. 4: 159.—Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 395.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Lygæus bimarginatus Herrich-Schaeffer (1847) Wanz. Ins. 8: 105. fig. 877.

Head black with a pale spot at base; the following parts pale yellow: bucculae, all margins of the pronotum, corium, and membrane, anterior and posterior margins of the propleura, posterior margins of the mesopleura and metapleura, rims of the acetabula, and lateral margins of the venter. Antennae, rostrum, and legs black. Odoriferous orifice black. Lateral margin of pronotum and of corium frequently red.

Described by Fabricius from St. Croix. Mona Island, February 21–26, 1911; St. Croix, Virgin Islands, February 28 and April 5, 1925 (Lutz & Woodruff)—A.M.N.H. Mona Island, April 6, 1924 (Hoffman)—U.S.N.M. Añasco, June 1, 1917 (Van Zwaluwenburg)—C. J. Drake coll.

Distribution: Mexico, Panama, Cuba, Jamaica, Dominica, Bahamas, Haïti.

Stål was in error in placing this in his subgenus *Ochrostomus*, for the odoriferous orifices are black; this places it in his subgenus *Craspeduchus*. In fact, it is very closely related to *Lygæus* (*Craspeduchus*) *uhleri* Stål.

***Lygæus* (*Ochrimnus*) *collaris* Fabricius**

Lygæus collaris Fabricius (1803) Syst. Rhyng. 230.—Stål. (1883) Cat. Cab. Zool. 211.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Head black, with a pale spot at base. Pronotum normally with more than posterior half ochraceous red; the following parts yellow-white: bucculæ, basal segment of rostrum, anterior margin of pronotum, lateral margin of scutellum, posteriorly, lateral and posterior margins and ordinarily the veins of the corium, margin of the membrane, anterior margin of the prosternum, posterior margins of the propleura, mesopleura and metapleura, rim of acetabula, odoriferous orifice, lateral margin of venter, and bases of all legs. In a variety from Antigua the posterior disk of the pronotum is black, bordered with red laterally and posteriorly.

Described from the island of St. Thomas. Aibonito, June 1–3, and Manatí, June 27–29, 1915 (Lutz & Mutchler)—A.M.N.H. Mayagüez, November 17, 1926 (Danforth); Bayamón, September 25, 1932 (Lesesne, Anderson, & Mills)—U.S.N.M. Lares, November 30, 1930 (Séin); San Germán, April 16, 1930—Cornell Univ. Isabella, April 24, 1930 (Leonard)—Author's coll.

Distribution: Jamaica, St. Thomas, Porto Rico, Haïti, Antigua, Dominica, and St. Vincent.

Lygæus* (*Melanocoryphus*) *albonotatus* Barber

FIGURE 18

Lygæus albonotatus Barber (1923) Am. Mus. Novit. 75: 2.

Head and pronotum entirely black; corium with a triangular ochraceous mark at base and the apical margin in part white; membrane with an elongate white patch along the outer margin; beneath black

* *Lygæus albonotatus* Stål (Mem. Fab. 1: 75. 1868) is undoubtedly a *lapsus calami* for *L. albostillatus* Stål. According to the Code the name is therefore available.

with the bucculæ, anterior margin of the prosternum, and region of acetabula pale. Odoriferous orifice black. A small species, measuring 3.50 mm. Belongs to the subgenus *Melanocoryphus* Stål.

Described from Mona Island, Porto Rico. Mona Island, February 24, 1914—A.M.N.H. (unique).

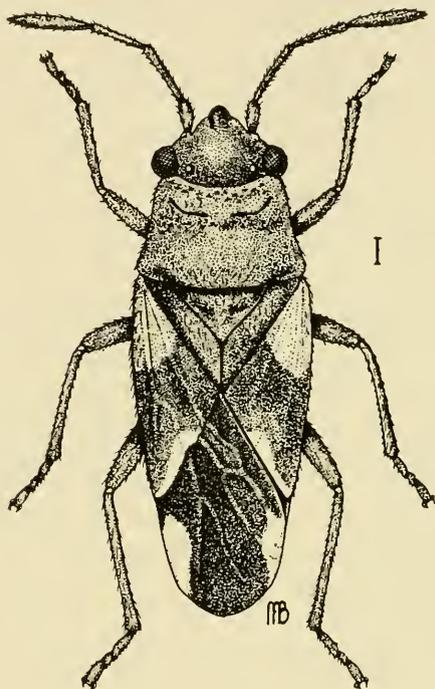


FIG 18 *LYGÆUS ALBNOTATUS BARBER*

Lygæus coccineus Barber

FIGURE 19

Lygæus (? *Melanostethus*) *coccineus* Barber (1923) Am. Mus. Novit. 75: 3.

A black species with the inner field of the corium next to the clavus, the tergum, except the connexivum, and sixth segment and most of the venter, except the disk posteriorly, and the anterior lateral angles of the segments, coccineous. Membrane, except for a slight, basal, fuscous mark, dilute lacteous. Base of the head with a red spot. Length 6.50–8.00 mm.

Described from Porto Rico. San Juan, February 11–14, 1914 (Lutz)—A.M.N.H.

The subgeneric allocation of this species is doubtful. On the basis of Stål's key to the subgenera, it seems to belong to his *Melanostethus*, which has for type *L. marginatus* Thunberg, described from South Africa.

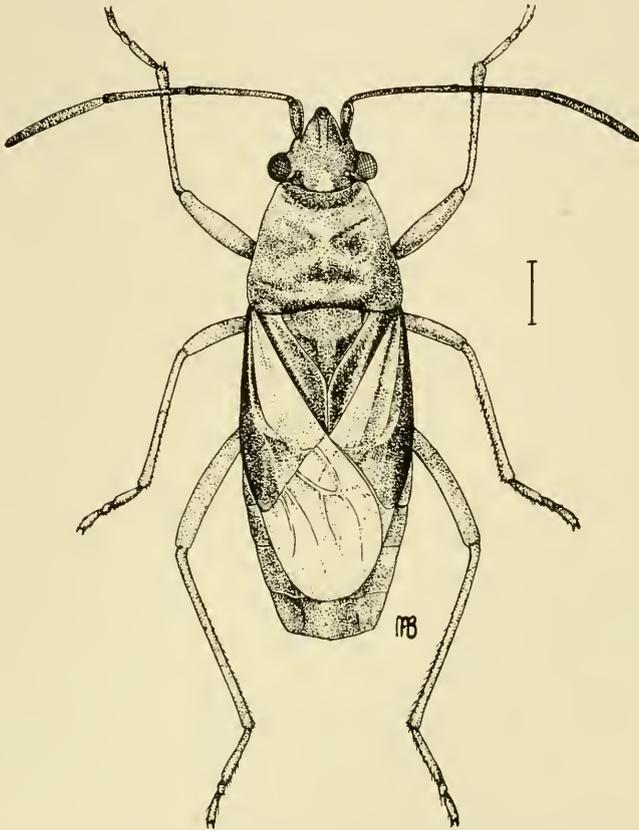


FIG. 19 *LYGAEUS COCCINEUS* BARBER

Tribe Orsillini

KEY TO GENERA AND SPECIES

1. Costal margins of corium not at all expanded, straight and parallel. Eyes prominent, projected beyond anterior angles of pronotum by more than half their width; postocular region more exposed. Corium more or less mottled with fuscous with apical angle often reddish and membrane streaked with fuscous. (Genus *Ortholomus*) *O. jamaicensis*.
- Costal margin of corium more or less expanded; if straight, towards the base only. Eyes not so prominent, projected beyond anterior angles of pro-

- notum by less than half their width; postocular region less exposed. (Genus *Nysius*)..... 2
2. Costal margin of corium not at all, or for a very short distance towards base slightly, straightened, gently rounded almost from base to apex. Bucculae not extended behind anterior margin of eye; basal segment of rostrum extended beyond bucculae by half its length. Pronotum somewhat calloused behind each cicatrix. Membrane longitudinally streaked with fuscous towards apex. Length 4.50–5.00 mm.....*N. inaequalis*.
 Costal margin of corium straight at base for distance nearly or quite equal to length of scutellum, thence gently curved to apex. Bucculae nearly or quite reaching base of head; basal segment of rostrum not longer than bucculae. Pronotum not calloused behind cicatrices. Membrane most often clear hyaline..... 3
3. Bucculae gradually disappearing posteriorly to terminate just before base of head. Costal margin of corium slightly expanded posteriorly. Pronotum anteriorly at middle and scutellum posteriorly, not longitudinally, marked with pale testaceous. Veins of corium often spotted with fuscous.....*N. ericae*.
 Bucculae abruptly terminating at base of head. Costal margin of corium more evidently expanded posteriorly. Pronotum anteriorly and scutellum posteriorly, conspicuously, longitudinally marked with pale testaceous. Veins on disk of corium immaculate..... *N. strigosus*.

ORTHOLOMUS Stål

Ortholomus Stål (1872) Öfv. Vet.-Akad. Forh. 43.—Stål (1874) Sv. Vet.-Akad. Handl. IV. 12 (1): 120.

Ortholomus jamaicensis (Dallas)

Nysius jamaicensis Dallas (1852) List. Hem. 2: 555.

Nysius providus Uhler (1894) Proc. Zool. Soc. Lond. 1894: 182 (part).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248.

Ortholomus jamaicensis Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 16.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Nysius spurcus Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248 (not Stål).

Color variable, most often gray with fuscous markings on either side of the middle of the head above and also broad middle area beneath, as well as each cicatrix, base of scutellum, mesosternum, and metasternum, and more or less of the central disk of venter. The corium finely pilose and frequently spotted with fuscous, the apical angle reddish. Ferruginous-marked beneath. The first three antennal segments pale testaceous, the fourth infuscated. All femora testaceous, much spotted with fuscous. The head is very nearly as long as wide. This species is unquestionably distinct from *Ortholomus longiceps* Stål from the United States, which is considered a synonym of *Ortholomus scolopax* (Say). *O. spurcus* Stål seems very close to, if not identical with, *O. jamaicensis*.

Described from Jamaica. San Juan, July 9–12, Tallaboa, near Ponce, July 22, and Coamo Springs, July 17–19, 1914 (Barber); Naguabo, March 7–9, Caguas, May 28–29, Cayey, May 30, Aibonito,

June 1-3, Coamo Springs, June 5-7, Adjuntas, June 8-13, Manatí, June 27-29, and Naranjito, July 6, 1915 (Lutz & Mutchler); St. Thomas, February 22, 25, and St. Croix, Virgin Islands, February 25-28, 1915 (Lutz & Woodruff)—A.M.N.H. Bayamón, January 1899 (Busck) and June 26, 1917 (Morrison); Vieques Island, Porto Rico, February 1899 (Busck); San Juan, March 30, 1900 (Richmond); Río Piedras, July 14, 1914 (Jones); Añasco Distr., July 3, and St. Thomas, Virgin Islands, May 31, 1917 (Morrison)—U.S.N.M.

Distribution: Jamaica, Cuba, Hispaniola, Grenada, Antigua, Barbados, Dominica in the West Indies, Mexico, and Central America south to northern Brazil.

NYSIUS Dallas

Nysius Dallas (1852) List. Hem. 2: 531, 551. (For synonyms see Lethierry & Severin (1894) Cat. Gen. 2: 153; exclude *Ortholomus*).

Nysius inæqualis Uhler

Nysius inæqualis Uhler (1894) Proc. Zool. Soc. Lond. 1894: 183.

Nysius basalis Barber (= ? *inæqualis* Uhler) (1923) Am. Mus. Novit. 75: 12 (listed).

Pale testaceous, punctate with brown; head infuscated on either side of the middle, with a longitudinal median pale streak, which is often continued through the pronotum and scutellum. Cicatrices either infuscated or concolorous with remainder of pronotum; pronotum often longitudinally streaked with brown on either side of the disk. Corium sordid-white, with faint trace of a longitudinal streak posteriorly near the middle, and more or less of the apical margin, brownish. Membrane clear hyaline, often with a brownish streak through the middle. Antenna pale testaceous with part of the basal and all of the terminal segment embrowned. Femora spotted with brown. 4.00-4.50 mm. long.

Described from Grenada, West Indies, and recorded by Uhler also from Cuba and Florida. Desecheo Island, Porto Rico, February 18, and Mona Island, February 22, 1914 (Crampton); St. Thomas, Virgin Islands, February 22, 1925 (Lutz & Woodruff)—A.M.N.H.

Distribution: Jamaica, Hispaniola, and Haïti—A.M.N.H. Antigua, Mexico, Guatemala, Costa Rica, and Honduras—U.S.N.M.

Somewhat smaller than *N. californicus* Stål and differently colored. The pronotum with a calloused rounded ridge extending posteriorly from each cicatrix and gradually disappearing. The costal margin of the corium is more convexly rounded. *N. californicus* also occurs in the West Indies, as Dr. Harold Morrison has collected many specimens in Dominica. (Quite possibly *N. californicus* may prove to be a synonym of *Nysius basalis* Dallas.) A specimen in the United States

National Museum collection from Zapote, Guatemala, from the Biologia Centrali-Americana material is labeled by Distant *Corizus punctatus* (Say).

Nysius ericæ (Schilling)

Heterogaster ericæ Schilling (1829) Beitr. Ent. 1: 86. pl. 7, fig. 10.

Nysius ericæ Barber (1923) Am. Mus. Novit. 75: 12 (listed).

? *Nysius scutellatus* Dallas; Barber (1923) Am. Mus. Novit. 75: 12.

A common species in several of the West Indian islands, agreeing with specimens from the United States and corresponding so closely to Dallas' description of *N. scutellatus* from Jamaica that it very probably will prove to be a synonym. *Nysius ericæ* was described from Europe. Occurs over most of the United States and is often injurious to various crops.

Mona Island, February 21–26, 1914 (Crampton); Caguas, May 28, and Adjuntas, June 8–13, 1915 (Lutz & Mutchler)—A.M.N.H. Charlotte Amalie, St. Thomas, Virgin Islands, May 31, and St. Croix, June 13, 1917 (Morrison)—U.S.N.M.

Distribution in the Western Hemisphere: Canada, United States, Mexico, Central America to Panama, Bermuda, Dominica, Antigua and Barbados. For synonyms see Lethierry & Severin, Cat. Gen. 2: 154. 1894.

Nysius strigosus Uhler

Nysius strigosus Uhler (1894) Proc. Calif. Acad. Sci. II. 4: 238.

Described from Lower California. Tallaboa near Ponce, July 23, 1914 (Barber); Mona Island, February 21–26, 1914 (Lutz). In western North America, it occurs from British Columbia south through all of the Rocky Mountain states and west to California; in the southern United States it occurs through Arizona, New Mexico, Florida; and south through Mexico, at least as far as Honduras. In the West Indies it is found at least in Haiti and Porto Rico.

Subfamily **CYMINÆ**

KEY TO PORTO RICAN GENERA

1. Head with curved longitudinal sulcus before each ocellus. Apical angle of antenniferous tubercle prominent, often acute. Fourth segment of antenna shorter than third. Scutellum broader than long. Clavus widened posteriorly; commissure much longer than scutellum. Corium not hyaline, strongly and densely punctate. (Tribe CYMINI)..... *Cymus*.
- Head devoid of curved longitudinal sulcus before each ocellus. Apical angle of antenniferous tubercle not prominent. Basal segment of antenna usually surpassing apex of tylus; fourth segment longer than third. Scutellum equilateral with commissure subequal to or shorter than scutellum. Corium hyaline, with few punctures. (Tribe ISCHNORHYNCHINI)..... 2

2. Head nearly porrect, slightly inclined. Eyes nearly in contact with anterior angles of pronotum. Width of head across eyes not much more than half the width of pronotum, posteriorly. Sides of clavus parallel, commissure shorter than scutellum. Costal margin of corium gently convexly rounded from base to apex and apical angle extended beyond apex of abdomen
 *Ischnorhynchus*.

Head deflexed in front, almost vertical. Eyes distant from anterior angles of pronotum. Width of head across eyes much wider than long and nearly as wide as pronotum, posteriorly. Clavus posteriorly slightly widened, with commissure but little longer than scutellum. Costal margin of corium straight at base for a distance equal to length of scutellum, thence distinctly expanded. *Cymoninus*.

CYMUS Hahn

Cymus Hahn (1832) Wanz. Ins. 1: 76.

Cymus virescens (Fabricius)

FIGURE 20

Acanthia virescens Fabricius (1794) Ent. Syst. 4: 70.
Cymodema virescens Stål (1868) Hem. Fab. 1: 77.
Cymus breviceps Stål (1874) Sv. Vet.-Akad. Handl. IV. 12 (1): 127.
Cymus virescens Stål (1874) Sv. Vet.-Akad. Handl. IV. 12 (1): 127.
Cymodema exiguum Horvath (1908) Ann. Mus. Nat. Hung. 59.
Cymus virescens (= *breviceps* Stål) Barber (1923) Am. Mus. Novit. 75: 12 (listed).

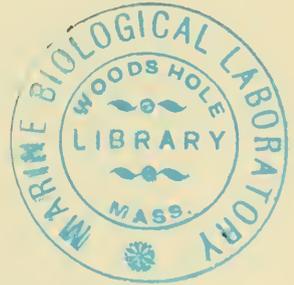
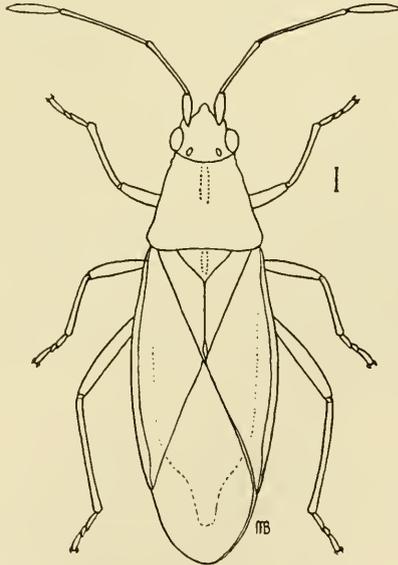


FIG. 20 CYMUS VIRESCENS FAB

Basal segment of the antenna much exceeding the apex of the tylus, shorter than the second segment. Head somewhat quadrate, with the tylus acutely prominent. A small fuscous spot at apex of the clavus and apex of the corium.

Described as "Insulæ Americæ Meridionalis." Añasco Distr., July 3, 1917 (Morrison); Ponce, September 8, 1933 (Oakley); Aguirre, June, 1925 (Box); Santurce, May 19, 1934 (Mills); St. Thomas, Virgin Islands, June 2, 1917 (Morrison)—U.S.N.M.

Distribution: southern United States, St. Vincent (Uhler), Trinidad, and British Guiana.

ISCHNORHYNCHUS Fieber

Ischnorhynchus Fieber (1860) Europ. Hem. 51, 199.

Ischnorhynchus championi Distant

Ischnorhynchus championi Distant (1882) Biol. Centr. Am. Rhynch. 2: 193. pl. 19, fig. 3.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Much smaller than *I. resedæ* Panz. The head less projected anteriorly, before the eyes. The rostrum extended well behind the posterior coxæ. Femur castaneous, paler at base and apex. Each of the pleurites provided with an oval, ocellate spot. Length 3.00 mm.

Described from Guatemala. Mayagüez, February 15 and Mona Island, February 21–26, and Naguabo, March 7–9, 1914 (Crampton); San Juan, July 17–19, and Aibonito, July 14–17, 1914 (Barber), June 1–3, 1915 (Lutz & Mutchler); Coamo Springs, July 17–19, Ponce, July 20–22, Maricao, July 27, and Arecibo, July 30, 1914 (Barber); Caguas, May 28–29, Barros, June 4, Ensenada, June 16, and Manatí, June 27–29, 1915 (Lutz & Mutchler); Loquillo National Forest, February 18, St. Thomas, February 22 and March 1, St. Croix, February 27, and St. John, Virgin Islands, March 10, 1925 (Lutz & Woodruff)—A.M.N.H. Aguadilla and Mayagüez, January 1899 (Busck); Bayamón, June 26, and Añasco District, July 3, 1917 (Morrison). Aibonito, August 9, 1932 on *Rubus rosæfolius* (Oakley)—U.S.N.M.

Distribution: Grenada and St. Vincent (Uhler), Cuba, Jamaica, and Antigua in the West Indies. From southern United States through Mexico and Central America to Panama.

CYMONINUS Breddin

Ninus Distant (1882) Biol. Centr. Amer. Rhynch. 1: 191 (not Stål).

Cymoninus Breddin (1907) Deutsch. Ent. Zeitschr. 38.—Bergroth (1918) Philippine Jour. Sci. 13: 64.

Cymoninus notabilis (Distant)

Ninus notabilis Distant (1882) Biol. Centr. Am. Rhynch. 2: 191. pl. 19, fig. 4.

Cymoninus notabilis Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Guatemala. Coamo Springs, July 18, 1914 (Barber); Caguas, May 28, 1915 (Lutz & Mutchler)—A.M.N.H. Añasco District, July 3, Río Piedras, July 11, 1917 and St. Thomas, Virgin Islands. (Morrison)—U.S.N.M.

Distribution: Central America through Panama, Bolivia, British Guiana, Trinidad, Jamaica, Cuba, Hispaniola, Dominica, Grenada, St. Vincent, and Florida.

Subfamily BLISSINÆ

BLISSUS Burmeister

Blissus Burmeister (1835) Handb. 2: 290.

Blissus leucopterus (Say)

Lygaeus leucopterus Say (1832) Heterop. N. Harm. 14.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Blissus leucopterus var. *insularis* Barber (1918) Bull. Brooklyn Ent. Soc. 13: 38.

Described from the "Eastern Shore of Virginia." Mona Island, February 22, 1914 (Crampton); Ponce, July 21, and San Juan, August 2-3, 1914 (Barber)—A.M.N.H. Bayamón, July 14, and St. Croix, Virgin Islands, June 13, 1917 (Morrison); Río Piedras, December 30, 1932 (Faxon, Mills, & Anderson); Mayagüez, August 28, 1933 (Harley)—U.S.N.M.

Distribution: United States, Mexico, Central America, Cuba, Jamaica, Dominica, Antigua, Martinique, Grenada, and St. Vincent. For additional references see Van Duzee, Cat. Hemip. 167. 1917.

ISCHNODEMUS Fieber

Ischnodemus Fieber (1836) Weit. Beitr. Nat. Heilk. 1: 337. (For synonyms see Van Duzee Cat. Hemip. 166. 1917).

Body elongate, head and thorax (seen dorsally) conjoined, often less than half the length of the remainder. Apical margin of the corium straight. Anterior coxal cavities enclosed behind by the posterior margin of the prosternum. Rostrum short, most often not reaching behind middle coxæ. Scutellum subequilateral.

Ischnodemus sallei (Signoret)

Micropus sallei Signoret (1857) Ann. Soc. Ent. France 25. pl. 11, fig. 2.

Head, pronotum, and scutellum black, more or less cinereous, and somewhat densely pale pilose; apex of the tylus ferruginous; posterior margin of the pronotum broadly castaneous or sometimes testaceous; corium with the central area devoid of veins, sordid-white suffused with brown, the claval margin and apical angle sometimes more

heavily infuscated; membrane brown, paler at base and apex, sometimes with a conspicuous pale spot at the outer basal angle, next to the often pale apical angle of the corium. Antenna either entirely fuscous or castaneous, with only the apical segment infuscated. Rostrum and legs testaceous-yellow. Venter fuscous or castaneous, with the connexival margin above and below broadly testaceous. Length 7.00–9.00 mm.

Barros, October 12, 30 (Salazar) and Barranquitas, December 1930 (Colón).—Author's coll., received from Professor Stuart T. Danforth.

Described from Mexico, and occurs through Central America to Panama.

Subfamily **GEOCORINÆ**

GEOCORIS Fallen

Geocoris Fallen (1814) Spec. Nov. Hemip. Disp. 10. (For synonyms see Lethierry & Severin, Cat. Gen. 2: 169. 1894.)

Geocoris thoracicus (Fieber)

Ophthalmicus thoracicus Fieber (1861) Wien. Ent. Monat. 5: 281.

Geocoris thoracicus Distant (1882) Biol. Centr. Am. Rhynch. 2: 198. pl. 18, fig. 15, 16.

Geocoris lividipennis Stål; Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Following parts black: head, except pale apex of tylus and anterior margin on either side of tylus, pronotum except pale central line and broad lateral margin posteriorly, scutellum and beneath except anterior margin of prosternum, posterior margins of metapleurum, rims of acetabula and venter except lateral margin which is pale. Corium grayish testaceous with the disk broadly infuscated posteriorly. Femur castaneous with pale apex.

Described from Venezuela. San Juan, July 9–12 and August 2–3, 1914 (Barber); Ensenada, June 14–19, 1915 (Lutz & Mutchler).—A.M.N.H.

Distribution: Mexico and Venezuela.

NINYAS Distant

Ninyas Distant (1882) Biol. Centr. Am. Rhynch. II, 194.

Ninyas deficiens (Lethierry)

Geocoris deficiens Lethierry (1881) Ann. Soc. Ent. Belg. 25: 9.

Ninyas strabo Distant; Montandon (1909) Ann. Soc. Ent. Belg. 43: 130 (as synonym).

Ninyas deficiens Montandon (1913) Bull. Sci. Acad. Roum. 2: 53 (distinct species).—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

This species may be distinguished from the very closely related *N. strabo* Distant by the following characters: lateral margins of the pronotum more nearly parallel, anteriorly behind the eyes more abruptly rounded; this margin, just below the delicate lateral carina, with a

regular row of fuscous punctures; transverse area calloused, less elevated, and distinctly wider in relation to the part of the pronotum behind it; longitudinal carina of scutellum smooth, calloused, extended anteriorly very nearly to base.

Described from Guadeloupe, in the Lesser Antilles. Aibonito, July 14-17, 1914 (Barber); Adjuntas, June 8-13, 1915 (Lutz & Mutehler)—A.M.N.H.

Distribution: Cuba, Hispaniola, Dominica, and Guadeloupe.

Montandon (1909) made it a synonym of *N. strabo* Distant; in 1913, having seen specimens from the West Indies, he decided it was distinct and gave a few distinguishing characters. Uhler's specimens from Grenada and Van Duzee's specimens from Jamaica are *N. strabo*.

Subfamily PACHYGRONTHINÆ

PACHYGRONTHA Germar

Pachygrontha Germar (1837) Silberman Revue Ent. 5: 152. (For synonyms, see Lethierry & Severin, Cat. Gen. 2: 180, 1894.)

Pachygrontha bimaculata Distant

Pachygrontha bimaculata Distant (1893) Biol. Centr. Am. Rhynch. 2: 393. pl. 34, fig. 23.

Head but little wider than long, the preocular lateral margin, to the outer angle of the antenniferous tubercle, distinctly shorter than the length of an eye; posteriorly with a median longitudinal pale line, which is continued midway on the pronotum. Antenna moderately stout, somewhat shorter than head, pronotum and scutellum conjoined; basal segment gradually enlarged towards apex from about the middle, almost as long as or at least but little longer than pronotum, much shorter than the second and third segments conjoined, the terminal segment a little shorter than the third. Pronotum about one-fourth wider than long and much less than half the length of the corium, with a median longitudinal pale line, the line disappearing posteriorly a little behind the middle point of pronotum. Scutellum very nearly as wide as long; prebasally, on each side, with a smooth pale area and either with a pale median line or more frequently castaneous along the middle. Corium with a ferrugineous spot at the middle of the apical margin; outer apical angle immaculate. Rostrum short, not extending behind anterior coxæ. Length 6.50 mm.

Described from Panama. Mayagüez, October 29, 1927 (Danforth)—author's coll.

Distribution: Central America, Cuba, Dominica, and Grenada.

Pachygrontha parvula Barber*Pachygrontha parvula* Barber (1923) Am. Mus. Novit. 75: 4.

Much smaller than the preceding species, but 4.50 mm. long. The basal segment of the antenna only a little shorter than the second and third conjoined, these latter unequal, with the second segment one-third longer than third. Pronotum nearly as long as wide. Scutellum with a conspicuous, longitudinal, median ridge, continuous with the carina of the pronotum. Apex of the corium as well as the middle posterior margin each with a ferruginous spot.

Described for a single male from Mona Island, collected February, 1914.—A.M.N.H.

Subfamily **RHYPAROCHROMINÆ** (**APHANINÆ**)

KEY TO TRIBES

1. Apex of second segment of rostrum not extending beyond base of head, or side of fourth ventral segment of abdomen anteriorly with two closely placed, opaque, glandular spots and sometimes with third spot near posterior margin of segment. All abdominal spiracles near lateral margin of venter. 5
 Apex of second segment of rostrum extending well beyond base of head; fourth ventral segment of abdomen with two remote, glandular, opaque spots, the posterior one situated near the posterior margin of the segment. All abdominal spiracles commonly not on venter. 2
2. Pronotum most often strongly constricted transversely to form two distinct lobes; anterior one usually subterete with lateral margin obtuse, neither calloused nor carinate nor longitudinally impressed within lateral margin of propleurum; most often anteriorly with distinct, ring-like collar; in absence of collar, head not at all or very slightly exerted. Body usually narrow, elongate. First three pairs of spiracles dorsal on connexivum, remaining three pairs ventral MYODOCHINI.
 Pronotum less often strongly constricted transversely to form two lobes; anterior one usually depressed with lateral margin either calloused or carinate or expanded, or with series of punctures within lateral margin, or longitudinally impressed within lateral margin of propleurum; rarely with a collar anteriorly; in presence of collar, head strongly exerted or sometimes with a depressed series of punctures within anterior margin. Body usually broad and most often with head immersed to eyes. 3
3. Pronotum with lateral margin not at all or slightly laminately expanded, most often either carinate or longitudinally impressed within lateral margin of propleurum; disk usually unicolorous, the posterior lobe rarely paler, with darker punctures (*Ozophora*). Head rarely strongly exerted; if exerted, pronotum anteriorly either with a collar or with a series of impressed punctures (*Ozophora*). Situation of abdominal spiracles variable, all ventrally placed in *Ozophora*. RHYPAROCHROMINI.
 Pronotum with lateral margin and usually also costal margin more or less laminately expanded and most often in part pale; margin of pronotum only rarely keeled, the basal segment of antenna then extended far beyond apex of head.

- Genital segment of male tuberculate. Posterior tibia with long rigid setæ or bristles. 4
4. Antenna nude or with short pubescence; basal segment sometimes with few shorter setæ. Lateral, rather narrowly expanded margin of pronotum not at all or, rarely, sparingly punctate. Anterior disk of pronotum usually smooth or sparingly punctate, more rarely densely punctate. Abdominal spiracles of second, fifth, sixth and seventh segments on venter, those of third and fourth dorsal (Extralimal) BEOSINI.
- Antenna with rigid setæ or bristles on three basal segments. Lateral, rather widely expanded margin of pronotum usually profusely punctate. Clavus irregularly punctate. All abdominal spiracles, with exception of fourth, on venter (Extralimal) GONIANOTINI.
5. Apex of second segment of rostrum not extending behind base of head. Fourth ventral abdominal segment laterally, with two remote, opaque, glandular spots, posterior one but little more remote from anterior one than from posterior margin of segment. Ocelli remote from each other, situated on post-ocular margins in *Clerada* CLERADINI.
- Apex of second segment of rostrum extending well behind base of head. Fourth ventral abdominal segment laterally, with two opaque, glandular spots, posterior one remote from posterior margin; sometimes also with an additional posteriorly placed spot. Ocelli often remote from each other and situated on vertex. LETHÆINI.

Tribe **Myodochini**

KEY TO PORTO RICAN GENERA

1. Head very strongly exserted, longer than pronotum, drawn out posteriorly into a long cylindric neck. Rostrum with basal segment less than half as long as gular region of head. Pronotum with two lobes subequally long. Basal segment of hind tarsus nearly three times as long as second and third segments conjoined. Body narrowly elongate (Extralimal) *Myodocha*.
- Head most often not strongly exserted; if so, not drawn out posteriorly into a long cylindric neck. Rostrum with basal segment at least half as long as gular region of head. Pronotum most often with anterior lobe longer than posterior lobe 2
2. Lunate strigose vitta on second and third (visible) ventral abdominal segments (true third and fourth), lateral. Postocular margins of head abruptly contracted; this margin but little shorter than proocular margin to base of antenna *Ligyrocoris*.
- Lunate strigose vitta absent from ventral segments of abdomen 3
3. Head strongly exserted; eyes situated midway on the head; postocular and preocular region nearly equal *Heræus*.
- Head but little or not at all exserted, sometimes immersed to eyes; preocular region distinctly longer than postocular 4
4. Head usually immersed to eyes. Pronotum anteriorly devoid of constricted ring-like collar, at most with anterior margin depressed, punctate. Scutellum apically distinctly carinate. Clavus with three regular rows of punctures. Posterior tarsus with basal segment scarcely longer than second and third conjoined. Body short *Exptchiomera*.

- Head not immersed to eyes, more or less contracted behind eyes. Pronotum anteriorly with distinct ring-like collar. Scutellum less distinctly if at all carinate. Clavus with punctures irregularly arranged. Posterior tarsus with basal segment much longer than second and third conjoined. 5
5. Head more gradually contracted behind eyes. Collar of pronotum usually wide. Body more narrowly elongate. Corium not fuscous-transfasciate. *Paromius*. Head strongly and abruptly contracted behind eyes. Collar of pronotum usually narrow. Body less narrowly elongate. Corium in West Indian species fuscous-transfasciate. *Pachybrachius*.

LIGYROCORIS Stål

Ligyrocoris Stål (1872) Oefv. Vet.-Akad. Forh. 29: 51.

KEY TO PORTO RICAN SPECIES

- Dorsal parts distinctly long-pilose. Body robust. Collar concolorous with pronotum. Fourth segment of antenna conspicuously pale at base. Posterior tibia strongly setose. *L. abdominalis*.
- Dorsal parts not at all or very sparsely long-pilose. Body narrow. Collar ferruginous. Fourth segment of antenna unicolorous, fuscous. Posterior tibia weakly setose. *L. litigiosa*.

Ligyrocoris abdominalis (Guérin-Méneville)

Lygæus abdominalis Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 397.

Plociomeria piliger Stål (1862) Stett. Ent. Zeit. 23: 312.

Ligyrocoris abdominalis Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Cuba. Tallaboa, near Ponce, July 23, 1914 (Barber)—A.M.N.H.

Distribution: southern United States, Mexico, Central America, Cuba, and Dominica.

Ligyrocoris litigiosa (Stål)

Plociomeria litigiosus Stål (1862) Stett. Ent. Zeit. 23: 313.

Described from Mexico. Bayamón, January 1899 (Busck)—U.S.N.M.

Distribution: southern United States, Mexico, Central America, Colombia, Venezuela, and Cuba.

PAROMIUS Fieber

Stenocoris Rambur (1842) Faun. Andal. 39 (name preoccupied).

Paromius Fieber (1860) Europ. Hemip. 45, 170.

Paromius longulus (Dallas)

Rhyparochromus longulus Dallas (1852) List. Hem. 2: 578.

Pamera longula Gundlach (1894) Fauna Puerto-Riquena 596.

Paromius longulus Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 249.

Form narrow, elongate. Head neither so abruptly nor so strongly contracted behind the eyes as in *Pachybrachius*. Pronotum with a rather wide collar. Corium pale testaceous, streaked with fuscous, not fuscous-transfasciate. Femur heavily infuscated, with the apex

pale; tibia and tarsus yellowish, with the base and apex of the former and apex of the latter infuscated.

Described from an unknown locality. Desecheo Island, Porto Rico, February 18–20, Mona Island, Porto Rico, February 21–26, and Naguabo, March 7–9, 1914 (Lutz); Coamo Springs, July 17–19, 1914 (Barber), June 5–7, 1915 (Lutz & Mutchler); Arecibo, July 30, and Tallaboa, near Ponce, July 23, 1914 (Barber); Adjuntas, June 8–13, Ensenada, June 14–19, and Corozal, July 2, 1915 (Lutz & Mutchler); St. Thomas, Virgin Islands, February 21–23, and St. Croix, Virgin Islands, February 27 and March 6, 1925 (Lutz & Woodruff)—A.M.N.H. Aguadilla, January and Arroyo, February 1899 (Busek); Río Piedras, June 6, 1916 (Smyth); Bayamón, June 26, and Añasco District, Porto Rico, July 3, 1917 (Morrison); St. Croix, Virgin Islands, June 11, 1917 (Morrison); Dorado, July 15, 1932 on *Crotolaria* (Faxon, Mills, & Anderson); Villalba, November 15, 1932, on grass (Faxon, Mills, & Anderson); Salinas, October 13, 1932 (Oakley)—U.S.N.M. Lajas, March 27, 1929 and Añasco, October 17, 1930 (Danforth)—author's coll.

Distribution: southern United States, Mexico, Central America, northern South America, most of the West Indian Islands, Cuba, Jamaica, Hispaniola, and Dominica.

Guérin-Ménéville, in Sagra (1857: 400), described *Lygæus (Plociomerus) dohrnii* from Cuba. Many specimens of what is very evidently Guérin-Ménéville's species from Cuba have been seen; they cannot be differentiated from *P. longulus* (Dallas). It therefore seems that Guérin-Ménéville's species will have to be treated as a synonym.

PACHYBRACHIUS Hahn

Pachybrachius Hahn (1826) Icon. Monog. Cim. pl. 18.

Pamera Say (1832) New Harm. Indiana; Compl. Writ. 1: 332 (part).

Plociomerus Amyot & Serville (1843) Hist. Nat. Ins. Hem. 255.

Orthæa Dallas (1852) List Hem. 2: 580 (part).

Gyndes Stål (1862) Stett. Ent. Zeit. 23: 314.

Diplonotus Stål (1872) Oefv. Vet.-Akad. Forh. 51.

KEY TO PORTO RICAN SPECIES

1. Anterior lobe of pronotum distinctly, sparsely punctate; posterior lobe profusely punctate. Posterior margin of pronotum nearly straight. Antennæ and dorsal parts distinctly pilose. Apices of first, second, third, and all of fourth segment of antenna ferruginous or infuscated. Scutellum not nearly twice as long as claval commissure. Postmedian costal fascia and apical angle of corium faintly embrowned. *P. intermedius*.
- Anterior lobe of pronotum impunctate; posterior lobe sparsely, finely punctate. Antennæ and dorsal parts nearly nude or less pilose; most often with only fourth segment of antenna either in part or entirely infuscated. 2

2. Species small not more than 4.00 mm. long. Costal margin devoid of postmedian fascia; apical margin of corium heavily infuscated; oval, pale spot at inner, apical angle conspicuous. Posterior margin of pronotum straight. Scutellum but little longer than claval commissure. *P. vinctus*.

Species larger, 5.00 mm. or more. Postmedian costal fascia and apical angle of corium ferruginous or fuscous. Posterior margin of pronotum more or less concave. Scutellum nearly or quite twice as long as claval commissure. . . 3

3. Fourth antennal segment entirely fuscous. Posterior margin of pronotum strongly concave. Postmedian transverse costal fascia infuscated, broad and usually continuous to apex of clavus. *P. bilobatus*.

Fourth antennal segment broadly pale at base. Posterior margin of pronotum very slightly concave. Postmedian costal fascia ferruginous, usually confined to costal margin. *P. servillei*.

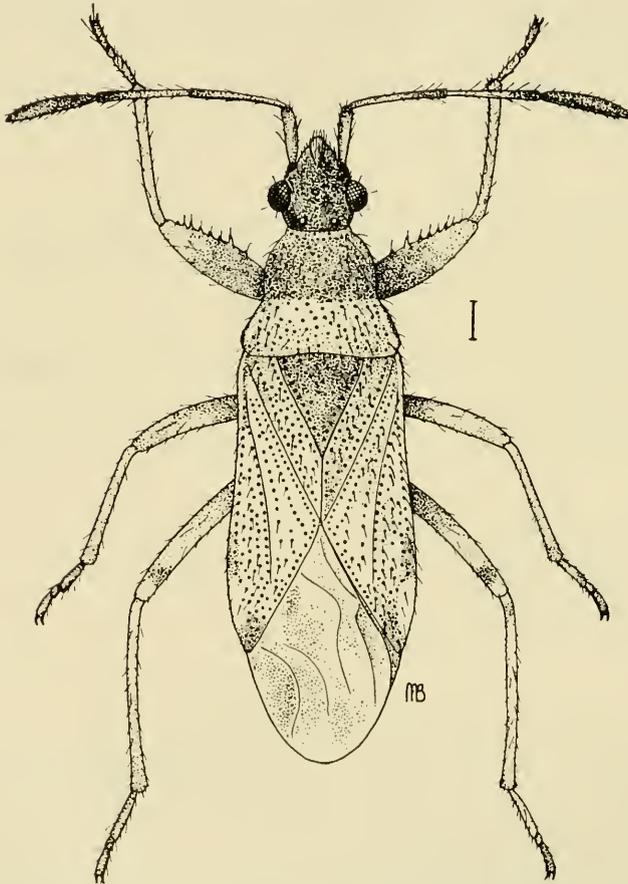


FIG. 21 PACHYBRACHIUS INTERMEDIUS BARBER

Pachybrachius intermedius (Barber)

FIGURE 21

Orthæa ferruginosa Barber (1923) Am. Mus. Novit. 75: 4 (preoccupied).

Orthæa intermedia Barber (1924) Jour. N. Y. Ent. Soc. 32: 136 (new name).

Type from Mayagüez, July 28, 1914. Maricao, July 27, 1914 (Barber); Adjuntas, June 26, 1915 (Lutz & Mutchler)—A.M.N.H. Cataño, May 30, 1930 (Leonard & Mills)—Cornell Univ. Isabela, April 24, 1930 (Leonard)—author's coll.

Distribution: Hispaniola and Cuba.

Pachybrachius vinctus (Say)

Pamera vincta Say (1832) Heterop. N. Harm. 16.—Gundlach (1894) Fauna Puerto-Riquena 596.

Orthæa vincta Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Florida. Mayagüez, February 15–16, and Mona Island, Porto Rico, February 21–26, 1914 (Lutz); San Juan, July 9–12, and Aibonito, July 14–17, 1914 (Barber), June 1–3, 1915 (Lutz & Mutchler); Coamo Springs, July 17–19, Tallaboa, near Ponce, July 23, Maricao, July 27, and Arecibo, July 30, 1914 (Barber), June 24–26, 1915 (Lutz & Mutchler); Jayuya, January 6, 1915 (Lutz); Ensenada, June 14–19, Quebradillas, June 23, and Manatí, June 27–29, 1915 (Lutz & Mutchler); Loquillo National Forest, February 18, 1925; St. Croix, Virgin Island, June 4, 1911; St. Thomas, Virgin Islands, February 24, 1925 (Lutz & Woodruff)—A.M.N.H. Bayamón, June 26, and Añaseo District, July 3, 1917 (Morrison); Dorado, July 15, 1932 (Faxon, Mills, & Anderson); Villalba, November 15, 1932 (Oakley); Mayagüez, October 20, 1933 (Harley); St. Thomas, June 2, and St. Croix, Virgin Islands, June 13–14, 1917 (Morrison)—U.S.N.M. Río Piedras, August 23, 1930 (Mills)—Cornell Univ. Puerto Real, Vieques Island, Porto Rico, September 25–27, 1913 (Leonard)—author's coll.

Common in the West Indies, southern United States, Mexico, Central America, and South America. In addition it is widely spread through the islands of the Pacific Ocean to Australia. Occurs in India, Ceylon, Indo-China, and South Africa. For synonyms and additional references see Van Duzee, Cat. Hemip. 183. 1917.

Pachybrachius bilobatus (Say)

Pamera bilobata Say (1832) Heterop. New Harm. 17.

Orthæa bilobata Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248.

Described from Louisiana and Mexico. San Juan, July 9–12, and Aibonito, July 14–17, 1914 (Barber), June 1–3, 1915 (Lutz & Mutch-

ler); Coamo Springs, July 17-19, 1914 (Barber), June 5-7, 1915 (Lutz & Mutchler); Tallaboa, near Ponce, July 23, and Arecibo, July 30, 1914 (Barber); Caguas, May 28-29, and Mayagüez, June 21-23, 1915 (Lutz & Mutchler); St. Croix, Virgin Islands, June 4, 1911, March 4-6, and St. Thomas, Virgin Islands, February 22, 1925 (Lutz & Woodruff)—A.M.N.H. Bayamón, June 26, Añasco District, July 3, and St. Croix, Virgin Islands, June 11, 1917 (Morrison); Arecibo, February 17, 1932 (Mills, Faxon, & Anderson); Dorado, July 15, 1932 on *Crotalaria* (Faxon, Mills, & Anderson); Salinas, October 13, 1932 (Oakley)—U.S.N.M. St. Thomas, Virgin Islands, August 11, 1930 (Leonard)—Cornell Univ. Vieques Island, Porto Rico, September 25-27, 1931 (Leonard), Coamo Springs, April 4, 1930, at light (Leonard); St. Thomas, Virgin Islands, June 12, 1930 (Danforth)—author's coll.

This species also is widely spread through the West Indies, southern United States, Mexico, Central America, and South America. There is considerable variation in the relative lengths of the two lobes of the pronotum, as well as in the intensity of the coloration. For synonyms see Lethierry & Severin, *Cat. Gen.*, 2: 192. 1894 (exclude *P. servillei* (Guérin-Méneville)).

***Pachybrachius servillei* (Guérin-Méneville)**

Lygæus (*Plociomerus*) *servillei* Guérin-Méneville, in Sagra (1857) *Hist. Cuba Ins.* 399.

Described from Cuba. Humacao, November 18, 1930 (Diaz)—author's coll.

Distribution: Hispaniola, Jamaica, Grenada, southern United States, Mexico, and Central America.

HERÆUS Stål

Heræus Stål (1862) *Stett. Ent. Zeit.* 23: 314.

***Heræus guttatus* (Dallas)**

Orthæa ? *guttata* Dallas (1852) *Cat. Hem.* 2: 580.

Described from Jamaica. Isabela, April 24, 1930, at light (Leonard)—author's coll.

Distribution: Guatemala (Distant). Panama (U.S.N.M.).

Only the single specimen referred to above has been seen from Porto Rico. It is considerably smaller than specimens from Panama, measuring only 5.00 mm. long, but it answers to Dallas' description and Distant's figure in "Biologia Centrali-Americana."

EXPTOCHIOMERA Barber

Plociomeræ Stål (1874) *Sv. Vet.-Akad. Handl.* IV. 12 (1): 152 (part).

Exptochiomera Barber (1928) *Jour. N. Y. Ent. Soc.* 36: 175.

Ptochiomera various authors (not Say).

Exptochiomera minima (Guérin-Méneville)

Lygæus (Beosus) minima Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 398.
Ptochiomera minima Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Described from Cuba. Eusenada, June 14–19, and Adjuntas, June 26, 1915 (Lutz & Mutchler)—A.M.N.H. San Germán, April 16, 1930 (Forbes)—Cornell Univ. Aguirre, June 28, 1931 (Leonard)—author's coll.

Distribution: Cuba, Haiti, Mexico, and southern United States.

Tribe **Rhyparochromini****OZOPHORA** Uhler

Ozophora Uhler (1871) Proc. Boston Soc. Nat. Hist. 14: 102.
Davila Distant (1893) Biol. Cent. Am. Rhynch. 1: 394.
Pegghichisme Kirkaldy (1904) Entom., 37: 280.

Anterior margin of pronotum provided with a distinct ring-like collar; pronotum usually wider than long; lateral margin of the anterior lobe either calloused or lightly carinate or, more rarely, slightly expanded and reflexed, distinctly separated into two lobes by an obtuse, transverse impression located just before the middle. Head exerted; postocular space subequal to space between eye and base of antenna. Basal segment of antenna rather stout, well extended beyond apex of head. Basal segment of rostrum reaching base of head. Anterior femur not strongly incrassate, with several spine-like setæ beneath. Posterior tibia with spine-like setæ. Basal segment of posterior tarsus fully twice as long as the second and third segments conjoined.

Ozophora burmeisterii (Guérin-Méneville)

Lygæus (Beosus) burmeisterii Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 397.
Ozophora burmeisteri Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Dorsal parts distinctly but sparsely long-pilose. Anterior femur beneath with six equidistant, spine-like setæ. Two lobes of pronotum subequal; anterior lobe with lateral margin obtusely calloused; posterior lobe commonly concolorous with anterior lobe. Costal margin of corium straight. Length 5.50 mm.–6.00 mm.

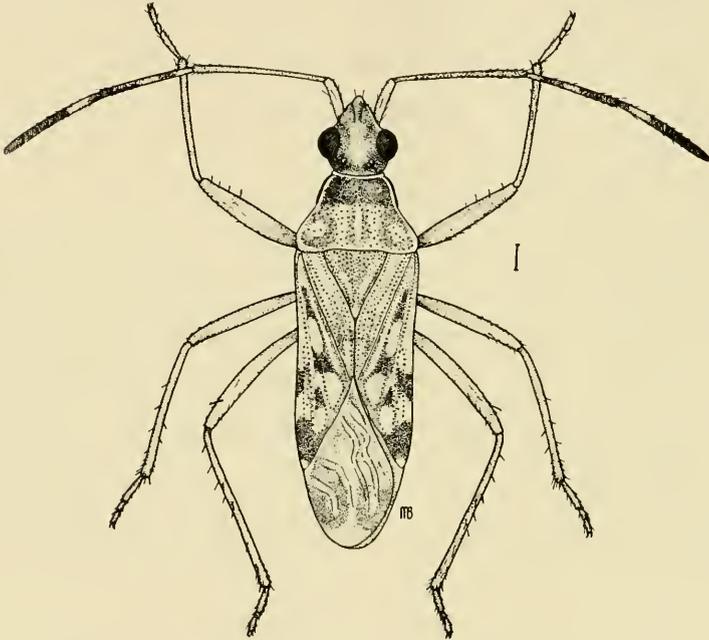
Described from Cuba. Aibonito, June 1–3, 1915 (Lutz & Mutchler)—A.M.N.H. Dorado, July 15, 1932 (Faxon, Mills, & Anderson)—U.S.N.M. San Germán, April 16, 1930—Cornell Univ. Aguirre, June 28–29, 1931 (Leonard)—author's coll.

Distribution: Florida, Cuba, Bahamas, Jamaica, Hispaniola, and Dominica.

Ozophora atropicta NEW SPECIES

FIGURE 22

Head, anterior lobe, and maculations of posterior lobe of pronotum, scutellum except lateral margin and apex, maculations of corium and ventral parts castaneous or fusco-castaneous; antenna with first, second and nearly basal half of third segment yellow-testaceous; apical part of the third and fourth segments infuscated; somewhat more than

FIG. 22 *OZOPHORA ATROPICTA* N. SP.

basal third of terminal segment white. Narrow lateral margin of pronotum most frequently and maculations of posterior lobe when present, lateral submargin of scutellum, and usually the background of the corium yellow-testaceous. Apex of scutellum white. Membrane fumose, variegated with hyaline spots. In the male the venter is more reddish-brown than in the female. Legs stramineous, the posterior femur with a faint preapical brownish band.

Head, pronotum, and scutellum subequally long, glabrous. Pronotum about one-third wider than long; posterior lobe almost twice as long as anterior one, excluding collar, the shallow transverse impression situated well before the middle; lateral margin distinctly but narrowly

calloused to the humeral angle and usually conspicuously pale; anterior lobe impunctate; posterior lobe irregularly but not closely punctate; posterior margin rather strongly concave before base of scutellum. Scutellum a little longer than wide, with a single row of close-set, marginal punctures, the lateral submargin within them smooth, pale, and calloused from base to well beyond the middle; with a narrow, median, longitudinal line, the disk either side of it rather closely punctate, at least anteriorly. Claval commissure distinctly shorter than scutellum. Clavus with about 4 irregular rows of ferruginous punctures. Corium with lateral margin lightly concavely arcuate opposite the commissure; surface yellow-testaceous, distinctly marked with fusco-castaneous as follows: two somewhat elongate spots in the median discal cell, one placed opposite the apical part of scutellum, the other remote, opposite the apical portion of the commissure; two spots on the costal margin, a subquadrate one behind the middle and a triangular one occupying most of the apex of the corium, leaving the extreme apex pale. All of these spots are sometimes fused, and the entire hemielytra heavily infuscated with little or no indication of the pale spots. Anterior femur between middle and apex with 3 or 4 equidistant spine-like setæ. Antenna with lengths of segments as follows: I-0.56, II-1.44, III-1.12, IV-1.24 mm. Rostrum long, reaching to or behind middle point of posterior coxæ; lengths of segments as follows: I-0.88, II-0.92, III-0.80, IV-0.36. Length 5.50 mm.

Type, male: Manatí, Porto Rico, June 27-29, 1915 (Lutz & Mutchler)—A.M.N.H. Paratypes males: 11 Manville, Haïti, February 18, 1922; 8 Mangrove Cay, Andros Island, Bahamas, May and June, 1917 (Mann); 4 Sanchez, Hispaniola, May and June, 1915; 8 San Lorenzo, Hispaniola, June 1915—A.M.N.H. 1 Bayamon, Porto Rico, April 29, 1934 (Lesesne & Anderson); 5 San Francisco Mountains, Hispaniola, September 1905; 1 Haïti (Ferris); 2 Mangrove Cay, Andros Island, Bahamas (Mann)—U.S.N.M. Cat. no. 51587. Paratypes, females: 2 Aibonito, Porto Rico, June 1-3, 1915 (Lutz & Mutchler); 1 Dorado, Porto Rico, May 23, 1930; 20 Manville, Haïti, February 18, 1922; 6 Mangrove Cay, Andros Island, Bahamas (Mann); 8 Sanchez, Hispaniola, June and November, 1915; 3 San Lorenzo, June 1915—A.M.N.H. 5 San Francisco Mountains, Hispaniola, September 1905; 2 Haïti (Ferris); 1 Port-au-Prince, Haïti, September 1915 (Hoffman); 1 Mangrove Cay, Andros Island, Bahamas (Mann)—U.S.N.M. 1 San Germán, Porto Rico, April 16, 1930—Cornell Univ. 1 Port-au-Prince, Haïti, February 15, 1930—Dozier coll. 1 Isabela, Porto Rico, April 24, 1930 (Leonard)—author's coll.

This is narrower than the preceding species and often becomes more or less melanic. Specimens occur in which both lobes of the pronotum as well as the scutellum and hemielytra are heavily infuscated, almost effacing the paler maculations of those parts.

***Ozophora subimpicta*, NEW SPECIES**

FIGURE 23

Narrow, glabrous. Head, anterior lobe of pronotum, and punctures of upper surface ferruginous. Collar, posterior lobe of pronotum, and scutellum testaceous-yellow. Corium yellow-testaceous, with a postmedian brownish costal spot, not continued inwardly, and apical angle embrowned, often suffused with red. Beneath ferruginous or

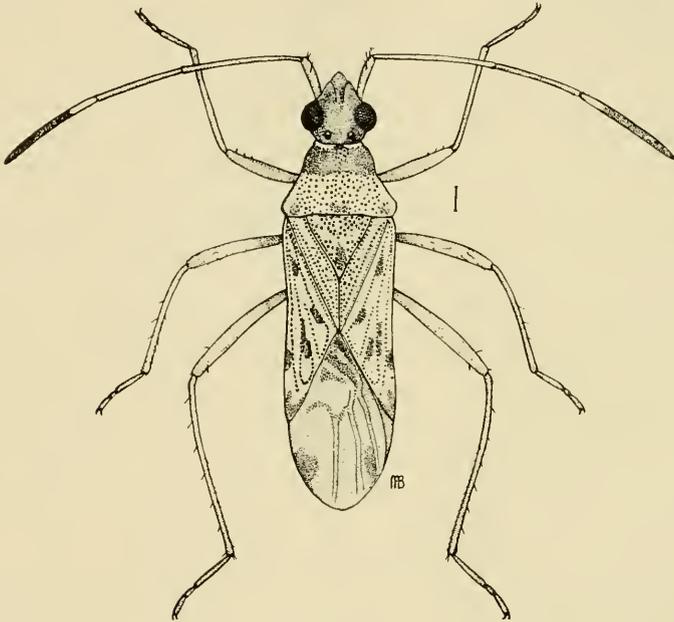


FIG. 23 *OZOPHORA SUBIMPICTA* N.SP.

fusco-ferruginous; posterior margin of metapleurum, the acetabula, legs, and rostrum stramineous. Antenna yellow-testaceous; apical segment infuscated, basal almost one-third white.

Head slightly wider than long (.84 × .80 mm.); interocular space a littler narrower and eyes somewhat smaller than in preceding species, with the postocular margins more abruptly contracted. Lengths of antennal segments as follows: I-.52, II-1.40, III-1.04, IV-1.36 mm.

Apex of rostrum not quite reaching to posterior eoxæ; lengths of segments as follows: I-.72, II-.68, III-.48, IV-.32 mm. Pronotum about as long as head, one-third wider than long; anterior lobe, excluding collar, one-half the length of posterior lobe, impunctate; lateral margin less distinctly impressed, more obtusely calloused than in preceding species; posterior lobe rather finely and closely ferruginous-punctate, almost or quite devoid of darker maculations; posterior margin very slightly concave. Scutellum distinctly shorter than pronotum, about as wide as long (.68 × .64 mm.), rather flat, the central disk not sunken as in *O. atropicta*; finely, closely punctate on basal one-third and along the margin, the lateral submargin not calloused, more sparsely punctate; often with a ferruginous spot posteriorly before the pale apex. Clavus with about 4 irregular rows of fine punctures. Commissure nearly as long as scutellum. Corium with much fainter brownish maculations than in preceding species; costal margin, well beyond the middle, with a spot which is not produced inwardly, and the apical angle embrowned, often also suffused with red. The two spots of the elongate median discal cell often absent. Membrane slightly smoky, variegated with hyaline spots; veins often pale. Anterior femur rather slender, with three spine-like setæ towards apex. Length 4.70–5.00 mm.

Type, male: Mayagüez, Porto Rico, July 24–29, 1914 (Barber)—A.M.N.H. Paratypes, males: 2 same data as type; 4 Adjuntas, Porto Rico, June 8–13, 1915 (Lutz & Mutchler); 2 Sanchez, Hispaniola, June 13–18, 1915—A.M.N.H. San Francisco Mountains, Hispaniola, August 29 and 4, September 14–15, 1905 (Busek)—U.S.N.M. El Yunque, elevation 1500–2000 ft., March 29, 1930 (Forbes)—Cornell Univ. Paratypes, females: 3 same data as type; 2 Aibonito, Porto Rico, July 14–17, 1914 (Barber); 3 Adjuntas, Porto Rico, June 8–13, 1915 (Lutz & Mutchler); 1 Sanchez, Hispaniola, June 13–18, 1915—A.M.N.H. 2 San Francisco Mountains, Hispaniola, August 29 and September 15, 1905 (Busek)—U.S.N.M. Cat. no. 51588.

Ozophora quinquemaculata NEW SPECIES

FIGURE 24

Glabrous. Head, except for ferruginous tylus, black. Anterior lobe of pronotum, most of the scutellum and ventral parts fusco-castaneous. Posterior lobe of the pronotum and corium yellow-testaceous, the former heavily marked with 5 dark brown fasciæ, these often wider than any of the 4 intervening paler marks and not extended quite to posterior margin, which is narrowly pale; lateral calloused margin and

collar on either side of middle, testaceous. Scutellum with a conspicuous, slightly elongate, pale, calloused spot at the middle point of the submargin, preceded by a more obscure narrow streak continued to the base; apex pale. Corium marked with distinct brown spots as follows: two widely separated in the elongate median discal cell; a postmedian costal spot, not continued inwardly, and one in the apical

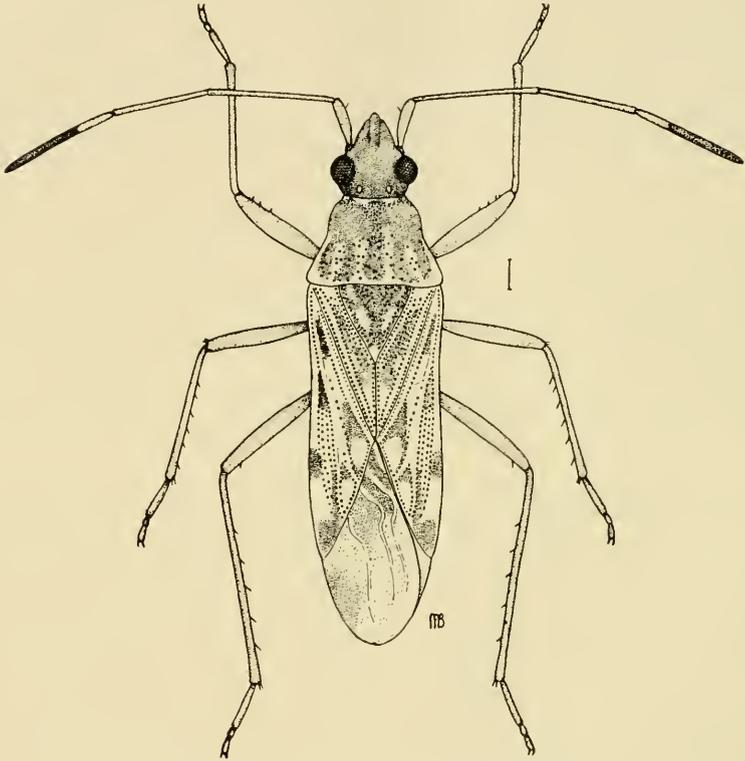


FIG. 24 *OZOPHORA QUINQUEMACULATA* N.SP

angle. Membrane lightly smoky-brown, with the veins and some irregular spots paler. Beneath fusco-castaneous, the posterior margin of the metapleurum and the acetabula testaceous; abdomen often paler than the pleura. Antenna, except for the brownish terminal segment, rostrum, and legs stramineous; the basal one-third of the terminal segment of the antenna white.

Head slightly wider than long (.96 × .92 mm.). Length of antennal segments as follows: I-.52, II-1.44, III-1.08, IV-1.40 mm.; basal one-third of terminal segment white. Rostrum longer than in *O. atropicta*,

reaching to apices of posterior coxæ; lengths of segments as follows: I-.23, II-.23, III-.92, IV-.40 mm. Pronotum almost one-third shorter than wide (1.00×1.56 mm.), the two lobes separated by a distinct transverse constriction; anterior lobe (exclusive of collar) one-third shorter than posterior lobe; disk of anterior lobe provided with a large smooth oval area on each side, separated by a median series of fine punctures; posterior lobe more sparsely punctate than in *O. atropicta*; lateral margin distinctly calloused as far as the middle of the posterior lobe; humeral angle smooth, pale. Scutellum a little longer than wide ($.92 \times .84$ mm.), distinctly shorter than the pronotum but longer than the commissure; basal disk depressed, sparingly punctate; lateral submargin closely punctate. Hemelytra distinctly wider than in *O. atropicta*; costal margin of the corium slightly concavely sinuate about one third way from base. Membrane lightly embrowned, with a conspicuous spot at the outer basal angle and the apex hyaline, the veins mostly pale. Anterior femur below with 4 spine-like setæ. Length 5.80 mm.; humeral diameter 1.56 mm.

Type, male: Vieques Island, Porto Rico, April 29, 1930 (Leonard). Paratype, male: Coamo Springs, June 5-7, 1915 (Lutz & Mutchler)—A.M.N.H. San Germán, April 16, 1930 (Forbes)—Cornell Univ. 5 Vieques Island, April 28, 1930 (Leonard)—author's coll. Paratype, females: Dorado, April 8, 1930; Cinchona, February 26, and Montego Bay, Jamaica, March 1, 1911 (Grosbeck)—A.M.N.H. Castries, St. Lucia, September 6, 1931, at light (Kisliuk & Cooley)—U.S.N.M. Cat. no. 51589. San Germán, April 16, 3 Puerto Real, Vieques Island, Porto Rico, April 28, and Villa Margarita, Cataño, April 21, 1930 (Forbes)—Cornell Univ. 5 Vieques Island, April 28, 1930 (Leonard); 1 Isabela, April 24, 1930, at light (Leonard)—author's coll.

This species is most closely related to *O. atropicta*, from which it can be distinguished chiefly by its broader form, longer rostrum, and difference in the markings of the posterior lobe of the pronotum. This is the species which the author erroneously reported (1923: 12) as *O. conava* Distant.

Ozophora pallescens (Distant)

Davila pallescens Distant (1893) Biol. Cent. Am. Rhynch 1: 395. pl. 35, fig. 3.
Ozophora pallescens Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248.

Smaller than the other species here discussed, measuring 3.65-4.50 mm. The two lobes of the pronotum distinctly demarked by a strong transverse constriction, the anterior lobe castaneous, much shorter than the posterior lobe, the latter most often with six longitudinal, brownish fasciæ on a yellow-testaceous surface. Scutellum along

submargin with a pale smooth streak reaching from base to near apex. Corium with a small postmedian brownish mark confined to the costal margin; apex conspicuously embrowned; elongate median discal cell with the two maculations common to most of the species. Membrane lightly embrowned, with the veins and several spots pale. Terminal segment of the antenna commonly pale at base.

Described from Panama. Dorado, May 23, 1930—A.M.N.H. San Juan, March 30, 1900 (Richmond)—U.S.N.M. Guayama, May 22, 1930 (Leonard); El Yunque, 1500–2000 ft., March 29, 1930 (Forbes)—Cornell Univ. Vicques, April 28, 1930 (Leonard)—author's coll.

Distribution: Mexico and Central America; Cuba, Hispaniola, Jamaica, Dominica, Grenada, and St. Vincent.

Tribe **Lethæini**

PARAGONATAS NEW GENUS

Gonatas typicus Distant and *G. divergens* (Distant) have very little in common. As *G. typicus* Distant (1882: 219, *pl. 20, fig. 6*) must be taken as the type of the genus *Gonatas*, it becomes necessary to erect a new genus to include *Gonatas divergens* and *G. costaricensis* Distant. *Gonatas* as represented by *G. typicus* is very closely related to the genus *Drymus*. It is shining, non-pilose, coarsely and closely punctate, except on the head and disk of the anterior lobe of the pronotum. The head is only slightly wider than long. The pronotum has the disk of the anterior lobe smooth, impunctate; the posterior lobe closely and coarsely punctate; the lateral margin distinctly laminately expanded; the posterior margin strongly concavely sinuate before base of scutellum; and the anterior angle devoid of a seta. The corium has the costal margin strongly laminately expanded and slightly upturned, and the surface strongly and rather closely punctate between the veins. The anterior femur below has 3 minute preapical teeth and several long spine-like setæ. All tibiæ have several spine-like setæ.

Paragonatas as represented by *G. divergens* (Distant) (*op. cit.* 219, 409, *pl. 20, fig. 10*) is more closely related to *Cistalia* Stål. It is finely pilose on the head, pronotum, scutellum, and corium. The head is distinctly wider than long. The pronotum has the lateral margin strongly impressed, not laminately expanded; the entire anterior lobe smooth, impunctate; the posterior lobe faintly, almost obsoletely punctate; the posterior margin truncate; and the anterior angle with a seta. The scutellum is finely punctate. The corium has the costal margin lightly expanded and is finely punctate between the veins.

The fore femur below has two or three minute preapical teeth and several long spine-like setæ. All tibiæ have several spine-like setæ.

Type, *Gonatas divergens* (Distant).

Paragonatas divergens (Distant)

Gonatas divergens Distant (1882) Biol. Cent. Am. Rhynch. 2: 19, pl. 20, fig. 10.

Head shining-castaneous; tylus ferruginous. Pronotum varying from castaneous to black; narrow anterior margin, lateral and posterior margin, and humeral angle testaceous. Scutellum black. Corium testaceous, heavily marked with dark brown between the pale veins; costal margin and a preapical crescentic mark pale testaceous-yellow. Beneath shining-castaneous. Antenna embrowned. All femora castaneous, with their apices, all tibiæ, tarsi, and rostrum pale yellow.

Described from Guatemala, Panama, and Mexico. Lares (Sein)—Cornell Univ.

Distribution: Cuba, Haïti, Dominica, Grenada, St. Vincent, and Trinidad.

Tribe **Cleradini**

CLERADA Signoret

Clerada Signoret, in Maillard (1862) Notes Ile Réunion Ins. 28.—Stål (1865) Hemip. Africana 2: 152, 155.

Body depressed. Head porrect, a little longer than the pronotum, not immersed to eyes; ocelli distant from each other, situated behind the eyes. Antenna with the basal segment shorter than the head, much extended beyond apex of head. Rostrum with the apex of second segment not extended beyond base of head. Pronotum wider than long, much narrowed anteriorly; lateral margin expanded and reflexed, slightly sinuate in the middle; posterior margin truncate. Scutellum triangular, nearly equilateral. Corium with the costal margin laminately expanded and reflexed. Anterior femur muticous. Tibia devoid of setæ. Basal tarsal segment slightly longer than the apical two united. Venter longitudinally carinate in the central line. Fourth ventral abdominal segment with two opaque glandular spots, the posterior one much more remote from the posterior than from the lateral margin of the segment.

Clerada apicornis Signoret

Clerada apicornis Signoret, in Maillard (1862) Notes Ile Réunion Ins. 28. pl. 20, fig. 8.—Gundlach (1894) Fauna Puerto-Riquena 596.

Color castaneous; lateral margins of the pronotum and the corium paler. Antenna dark castaneous; terminal segment white. Rostrum

and legs stramineous. Thorax, scutellum, and corium rather densely punctate. Length 6.00–7.00 mm.

Described from Réunion Island. Mayagüez, October 8, 1934 (Hardy)—U.S.N.M. Añasco, October 10, 1930 (Danforth)—author's coll.

Distribution: India, Ceylon, Samoa, Hawaii, Australia, Easter Island, Seychelles, Madagascar, Mexico, Venezuela, Cuba, and St. Thomas.

Family PYRRHOCORIDÆ

Antenniferous tubercles widely separated from each other, on the sides of the juga, which together with the tylus fill up the intervening space. Ocelli absent. Antenna and rostrum each 4-segmented. Scutellum triangular, small. Hemielytra composed of clavus, corium, and membrane; membrane usually with two large basal cells from which arise the veins, sometimes reticulate, but always more numerous than in the *Lygæidæ*. Odoriferous orifice situated between the coxæ or acetabula of the last two pairs of legs. Three tergal odoriferous orifices in the nymph, persisting in the adult. Tarsus 3-segmented.

KEY TO PORTO RICAN SUBFAMILIES

Lateral margin of pronotum most often not expanded or reflexed. Seventh ventral segment (sixth visible) of abdomen in female cleft to base. (*Largus*) . LARGINÆ.
Lateral margin of pronotum usually expanded, more or less reflexed. Seventh ventral segment of abdomen in female not cleft. (*Dysdercus*) . PYRRHOCORINÆ.

Subfamily LARGINÆ

LARGUS Hahn

Largus Hahn (1831) Wanz. Ins. 1: 13.

Euryophthalmus Laporte (1832) Essai class. 38.

Largus obovatus (Barber)

FIGURE 25

Euryophthalmus obovatus Barber (1923) Am. Mus. Novit. 75: 5.

Largus rufipennis Wolcott (not Castelnau) (1924) Jour. Dep. Agr. P. R. 7: 249.

Largus varians Wolcott (not Stål) (1924) Jour. Dep. Agr. P. R. 7: 249.

Robust. Narrowly obovate in the male, much broader in the female; widest across apex of commissure. Costal margin of corium more expanded and reflexed than in *E. varians* Stål. The red or ochraceous-red markings, above and along the lateral margin of the venter, broader and more conspicuous than in Stål's species. Head, pronotum, and central area of the venter with intermixed gray and black pile. Membrane varying in color, either entirely black or only

black at the base. Femora either entirely red or black with the apices broadly red.

Described from Hispaniola and Porto Rico. Utuado, April 16, 1906 (Wheeler)—A.M.N.H. Mayagüez, January 29, 1912 (Hooker),

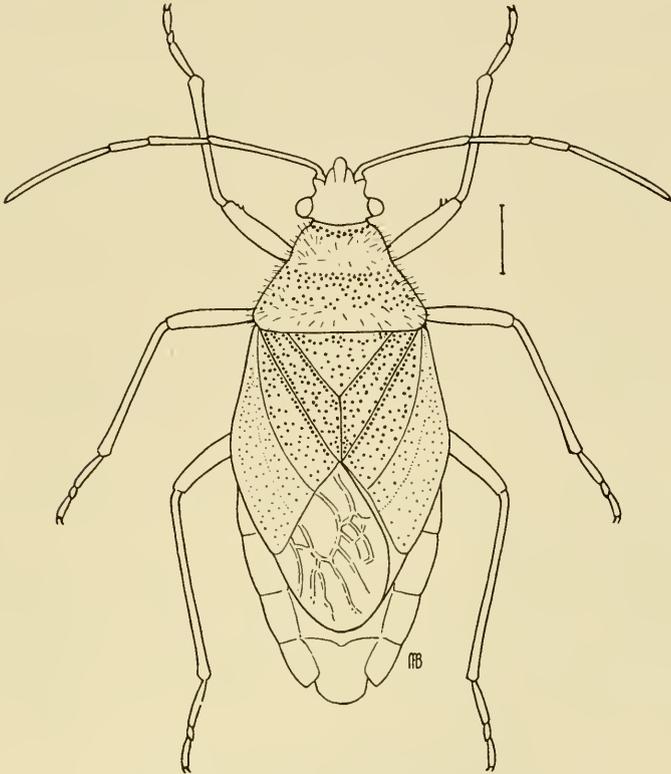


FIG. 25 *LARGUS OBOVATUS* (BARBER)

August 4, 1934 (Harley); Ciales, March 24, 1921, on coffee (Sein); Peñuelas, January 26, 1932, on orange (Bofill & Oakley)—U.S.N.M. Cayey, on coffee (Wolcott); Ciales, August 1922, on *Erythrina glauca* (Sein)—Ins. Exp. Sta. Maricao, December 1930 (Brunet)—author's coll.

Subfamily **PYRRHOCORINÆ**

DYSDERCUS Amyot & Serville

Dysdercus Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 272.

Astemma Laporte (1832) Essai 36.

Body oblong. Head immersed to eyes, which are not at all stylated. Basal segment of antenna longer than second. Pronotum with the

anterior transverse area distinctly calloused; lateral margin usually distinctly expanded and reflexed. Legs slender; anterior femur below on each side preapically armed with spines.

The members of this genus are most often conspicuously colored with red or ochraceous and black. All are plant feeders, often becoming serious pests on cotton and referred to as cotton stainers.

KEY TO PORTO RICAN SPECIES

1. Pronotum with only posterior margin narrowly pale. Hemelytra bright red, margins of clavus and corium concolorous, latter with transverse or ovate discal spot and extreme apex black; clavus with black mark of variable size. Ventral segments of abdomen unicolorous. *D. sanguinarius*.
 Pronotum with both anterior and posterior margins narrowly pale. At least outer margin of clavus and posterior margin of corium narrowly margined with white or pale yellow. Ventral segments of abdomen posteriorly conspicuously margined with white. 2
2. Hemelytra fuscous, inner and outer margins of clavus, costal and posterior margin of corium narrowly margined with pale yellow. *D. suturellus*.
 Hemelytra with the clavus infuscated, outer margin lineate with white; corium bright red, posterior margin narrowly white, disk commonly with a black spot. *D. andreae*.

Dysdercus sanguinarius Stål

Dysdercus sanguinarius Stål (1870) Sv. Vet.-Akad. Handl. I. 9 (1): 122.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).

Dysdercus neglectus Uhler, Wolcott (1924) Jour. Dep. Agr. P. R. 7: 249.

Described from Cuba. Porto Rico, July 1, 1922, on cotton; Vega Baja, July 1, 1922 (Wolcott)—U.S.N.M. Vega Baja, July 1, 1922 (Wolcott); Camuy (Ins. Exp. Sta.); San Germán, April 17, 1930 (Forbes)—Cornell Univ. Mayagüez, April 14, 1917—Drake coll. Isabela, April 24, 1930 (Leonard)—author's coll. Occurs also in Haïti.

Dysdercus suturellus (Herrich-Schaeffer)

Pyrrhocoris suturellus Herrich-Schaeffer (1842) Wanz. Ins. 6: 76, fig. 645.

Dysdercus suturellus Ballou (1906) West Ind. Bull. 7: 79-80 (reprint).

Described as probably from North America. The author has not seen specimens of this species from Porto Rico. H. A. Ballou reports it as occurring in Porto Rico as well as in the Bahamas, Cuba, and Bahia, Brazil. It is a common species in Florida and the neighboring states, where it becomes a pest on cotton.

Dysdercus andreae (Linnaeus)

Cimex andreae Linnaeus (1758) Syst. Nat. ed. 10. 1: 448.

Dysdercus andreae Ballou (1906) West Ind. Bull. 6: 125.—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 248.

Described from America. Culebra Island, Porto Rico, March 4-6, 1906 (Wheeler). Mona Island, Porto Rico, February 21-26, 1914

(Lutz); Coamo Springs, July 17, 1914 (Barber), June 5-7, 1915 (Lutz & Mutchler); Ponce, July 20, and Guayanilla, July 22, 1914 (Barber); Aibonito, June 1-3, and Ensenada, June 14-19, 1915 (Lutz & Mutchler); St. Thomas, February 21, and St. Croix, Virgin Islands, February 27, 1925 (Woodruff)—A.M.N.H. Mayagüez, January, and Culebra Island, Porto Rico, February 1899 (Busck); Isabela, January 20, 1920—on cotton; Ponce, March 13, 1931 (Faxon & Mills), October 21, 1932 (Oakley); St. Croix, Virgin Islands, July 6, 1931 (Loftin)—U.S.N.M. Guánica, Boquerón, and Guayanilla (Wolcott)—Ins. Exp. Sta. Coamo Springs, April 4-9, 1930 (Forbes)—Cornell Univ.

Distribution: Cuba, Jamaica, Haïti, Dominica, Antigua, Guadeloupe, St. Kitts, Montserrat in the West Indies and Florida in the United States.

Family TINGITIDÆ

The species comprising this family are small, with a much reticulated surface. Head generally small, devoid of ocelli and most often provided above with more or less conspicuous spines. Pronotum posteriorly extended in an angulate process covering the scutellum; the lateral margin (paranota) often expanded; disk with 1-3 longitudinal carinæ. The reticulate hemielytra with several well-marked regions or areas of much importance in classification: the discal or discoidal area, occupying the central portion, the costal, situated along the margins, and the subcostal, lying between the two before-mentioned parts. Bucculæ much expanded; sternal rostral groove limited on each side by a more or less elevated carina. All members of the family are phytophagous, quite a number being injurious to various plants.

KEY TO PORTO RICAN GENERA*

1. Pronotum anteriorly with large vesicula or hood, extended over head, separated from dorsum by distinct constriction. Paranota much expanded, either flat or somewhat reflexed. Antennæ rather short..... 2
 - Pronotum anteriorly either devoid of vesicula or with small vesicula not extended over head and usually not separated from the dorsum by distinct constriction; frequently only longitudinally carinate..... 3
2. Pronotal vesicula, at least posteriorly, more or less bulbous. Corium much expanded and costal region with several confused series of large areoles; lateral margins nearly parallel, abruptly contracted and reflexed at base; edge of much expanded, flattened paranota and costal margin of corium most often beset with fine spines. Discal area strongly inflated. Laminae of sternal sulcus rather strongly elevated, each with a single row of areole..... *Corythucha*.

* This key will not apply to some of the extra-limital species included by C. J. Drake in the various genera.

- Pronotal vesicula elongate, longitudinally carinate, anteriorly compressed, much extended before head. Margins of corium moderately expanded, neither parallel nor abruptly contracted at base; costal region with one or two rows of areolæ. Paranota more or less reflexed; margin of these as well as costal margin of corium unarmed. Discal area depressed. Laminae of sternal sulcus lightly elevated. *Corythucha*.
3. Pronotum anteriorly somewhat elevated; median longitudinal carina extended to anterior margin; lateral carina usually distinct, extended anteriorly to depressed cicatrix. Subcostal area of corium most often with two rows of areolæ. Basal segment of antenna at least twice as long as second. 4
- Pronotum anteriorly not elevated, most often only longitudinally carinate, very rarely with a small vesicula (a few species of *Telconemia*); lateral carina present or absent. 5
4. Paranota laminately expanded, with one or two rows of areolæ, somewhat reflexed but not folded over, in contact with dorsum of pronotum. Costal region of corium narrowly expanded, usually, at least anteriorly, with two rows of small areolæ. Sternal groove narrow, strongly constricted in middle of mesosternum. Lateral spines of head appressed. *Leptopharsa*.
- Paranota sharply folded over, in contact with dorsum of pronotum. Costal region of corium broadly expanded, with three or more confused series of large areolæ. Sternal groove rather wide, not constricted on mesosternum. Spines of head long, projecting; lateral ones not appressed. *Leptodictya*.
5. Posterior angle of pronotum not acute, either obtuse or truncate or slightly concave; dorsum with median percurrent carina; devoid of lateral carinae; paranota moderately expanded and slightly reflexed, with single row of large areolæ; margin strongly spinose. Corium strongly expanded; veins sparsely long-pilose; costal margin often spinose. Antenna finely setose. *Acanthocheila*.
- Posterior angle of pronotum acute; disk either with single percurrent median longitudinal carina or with three carinae, lateral ones extended anteriorly to depressed cicatrices; paranota usually not laterally expanded, most often strongly reflexed and in contact with pronotum; margin unarmed. Corium little expanded and most often with one or two rows of areolæ. 6
6. Pronotum tricarinate; paranota narrowly expanded, vertically reflexed, most often in contact with side of pronotum. Costal region of corium narrow, most often with one or two rows of areolæ; discal area acute at apex. Body elongate. Odiferous orifice distinct. *Telconemia*.
- Pronotum unicarinate; lateral carina poorly developed or visible only posteriorly. Paranota strongly reflexed, turned back and in contact with more or less of the dorsum of pronotum. Costal region of corium narrow, usually with a single row of areolæ; discal area obtuse or obtusely rounded at apex. Antennae short. Body short, oval. Odoriferous orifice indistinguishable. *Monanthia*.

CORYTHUCHA Stål

Corythucha Stål (1873) Sv. Vet.-Akad. Handl. III. 11 (2): 119, 122.

Corythucha gossypii (Fabricius)

Acanthia gossypii Fabricius (1794) Ent. Syst. 4: 78.

Corythucha gossypii Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 246.—Leonard & Mills (1931) Jour. Dep. Agr. P. R. 15: 309-321.

Lightly maculated with brown. Pronotal vesicula, viewed dorsally, rather small; viewed laterally, not much elevated above the strongly elevated median carina; dorsal outline almost semicircularly rounded. The following parts spinose: lateral margins and transverse median veins of the paranota, pronotal vesicula, lateral margin of the corium, discal elevation, and some of the veins of the costal region. Widely distributed through the southern United States, Mexico, Central America, and northern South America and the West Indies generally.

Described as "Americæ Meridionalis Insulis."

Occurs throughout Porto Rico, where it is injurious to a number of plants, as recorded by G. N. Wolcott, M. D. Leonard, and A. S. Mills. It is commonly called the Bean Lace-bug as it is particularly injurious to the leaves of several kinds of beans. Other food-plants recorded are easter-oil plant, sour-sop, papaya, cotton, yautía, lemon, orange, grapefruit, Congo pea, hibiscus, etc.

CORYTHAICA Stål

Corythaica Stål (1873) Sv. Vet.-Akad. Handl. III, 11 (2): 120, 128.

KEY TO PORTO RICAN SPECIES

- Vesicula of pronotum, seen from side, distinctly shorter than median carina, distinctly decurved before middle; median carina strongly elevated, with large areolæ; broadly and gently rounded above. Paranota with posterior lateral angle narrowly rounded. Abruptly flaring beyond anterior part, with three or four rows of areolæ. Costal region of corium in part with two rows of areolæ
.....*C. planaris*.
- Vesicula of pronotum, seen from side, subequal to length of median carina, abruptly decurved at apex; median carina with small areolæ, obtusely angled above. Paranota not posteriorly flaring beyond anterior part, with a single row of areolæ throughout. Costal region of corium with a single row of areolæ.....
.....*C. carinata*.

Corythaica planaris (Uhler)

Typonotus planaris Uhler (1893) Proc. Zool. Soc. Lond. 1893: 716.

Corythaica monacha Jones (not Stål) (1915) Bull. U. S. Dep. Agr. 192: 4.—Cotton (1917) Jour. Dep. Agr. P. R. 1: 170-173 (life-history).—Barber (1923) Am. Mus. Novit. 75: 12 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 246.

Described from the island of St. Vincent. Occurs all over Porto Rico, wherever its food-plants are found. Distributed from Panama southward through South America to Argentina. Throughout most of the West Indian Islands, including St. Thomas, this species is a serious pest to eggplant and occurs also on *Solanum torvum*. The common name applied to it is the eggplant lace-bug.

Corythaica carinata Uhler

Corythaica carinata Uhler (1894) Proc. Zool. Soc. Lond. 1894: 203.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 246 (listed).

Described from the island of Grenada. San Juan, July 9–12, Coamo Springs, July 17–19, Tallaboa, near Ponce, July 23, and Arecibo, July 30, 1914 (Barber)—A.M.N.H. Río Piedras, July 3, 1912 on eggplant (Jones)—U.S.N.M.

Widely distributed from Texas southward through Central America and in most, if not all, of the West Indian islands. Dozier has collected it on malvaceous plants in Haïti and a single specimen in the United States National Museum Collection was taken on eggplant, but whether it is as serious a pest on that plant as the preceding species the author has not been able to determine.

LEPTOPHARSA Stål

Leptopharsa Stål (1873) Sv. Vet.-Akad. Handl. III. 11 (2): 122–126.

Leptopharsa illudens Drake

Leptopharsa illudens, Drake (1922) Mem. Carnegie Mus. 9: 370.

Atheas pallidus Barber (1923) Am. Mus. Novit. 75: 6.

A narrow species, 3.00 mm. long. Usually pale-colored, with the disk of pronotum and sometimes the discal area of corium embrowned. Antennæ also brownish. The paranota and the costal and subcostal region of the corium biseriate. Lateral spines of the head appressed, the anterior spines small, often undeveloped.

Described from Jamaica and Porto Rico. Arecibo, July 30, 1914 (Barber)—A.M.N.H. Experiment Station, Porto Rico, July 23, 1902 (Bartlett)—U.S.N.M.

Also occurs in Hispaniola and Cuba. The food-plant is *Cassava*.

LEPTODICTYA Stål

Leptodictya Stål (1873) Sv. Vet.-Akad. Handl. III. 11 (3): 121, 127.

Leptodictya bambusæ Drake

Leptodictya bambusæ Drake (1918) Ohio Jour. Sci. 18: 175.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Body elongate, narrow. Head with five distinct spines. Paranota with two rows of areolæ, the outer margin straight. Costal area widest just behind the middle, with 3 or 4 rows of areolæ. Discal area extended a little beyond middle of corium.

Described from Mayagüez, Porto Rico, on bamboo. Mayagüez, July 24–29, 1914, on bamboo (Barber)—A.M.N.H. Also occurs in Haïti—Dozier coll.

ACANTHOICHEILA Stål

Acanthocheila Stål (1860) Bidr. Rio Jan. Hem. 1: 61.

Acanthocheila spinicosta Van Duzee

Acanthocheila spinicosta Van Duzee (1907) Bull. Buffalo Soc. Nat. Sci. 8: 20.

Lateral margin of the paranota and anterior two-thirds of the costal margin of the corium strongly spinose and finely pilose; spines longer than in *A. exquisita* Uhler. Subcostal area of the corium narrower than *A. armigera* Stål, with three rows of areolæ. Discal area distinctly shorter than half of corium.

Described from Jamaica. St. Thomas, Virgin Islands, February 23, 1925—A.M.N.H. Occurs also in Haïti on *Pisonia domingensis*—Dozier coll.

TELEONEMIA Costa

Teleonemia Costa (1864) Ann. Mus. Zool. 2: 144.

Teleonemia sacchari (Fabricius)

Acanthia sacchari Fabricius (1794) Ent. Syst. 4: 77.

Teleonemia prolixa Barber (not Stål) (1923) Am. Mus. Novit. 75: 12 (listed).

Teleonemia sacchari Wolcott (1924) Jour. Dep. Agr. P. R. 7: 247.

Very closely related to *T. prolixa* Stål but usually smaller and paler than that species. Antenna rather short, moderately stout; basal segment a little longer than the second, third segment somewhat variable but usually about three times as long as first and second conjoined; fourth segment a little less than one half as long as the third and slightly longer than the first and second conjoined. Paranota and the very narrow costal and subcostal area of corium uniseriate; the areolæ of the costal region longer than wide and separated by dark nervures; discal area longer than in *T. prolixa*, with the areolæ smaller and more numerous.

Described as "Americæ Meridionalis Insulis." San Juan, July 9–12, Aibonito, July 14–17, Coamo Springs, July 17–19, Tallaboa, near Ponce, July 23, Guayanilla, July 22, and Maricao, July 27, 1914 (Barber); Arecibo, March 1–4, 1914 (Lutz); St. Thomas and St. Croix, Virgin Islands, February 1925 (Lutz & Woodruff)—A.M.N.H. Maricao, July 2, and St. Thomas, Virgin Islands, July 1, 1917 (Morrison)—U.S.N.M. Algarrobo, February 1931 (Danforth)—author's coll. Distributed from Florida through Mexico, and Central America to northern Brazil. Occurs also, so far as known, in the following West Indian Islands: Cuba, Jamaica, St. Bartholomew, Antigua, St. Vincent, and Grenada.

MONANTHIA Lepeletier & Serville

Monanthia Lepeletier & Serville (1825) Encycl. Method 10: 653.

Monanthia monotropidia Stål

Monanthia monotropidia Stål (1860) Bidr. Rio Jan. Hem. 1: 63.—Wolcott, (1924) Jour. Dep. Agr. P. R. 7: 247.

Paranota narrowly turned back over the lateral margin of the pronotum, anteriorly a little wider, with a single series of areoles. The

posterior C-shaped part of the discal area not so strongly flaring outwardly as in *M. C-nigrum* Champ.

Described from Brazil. San Juan, July 9–12, Aibonito, July 14–17, and Arecibo, July 30, 1914 (Barber), July 24–26, 1915 (Lutz & Mutchler)—A.M.N.H. Lares, August 24, 1922 (Sein)—U.S.N.M.

Distributed from Mexico through Central America to Brazil. Elsewhere in the West Indies it occurs in Cuba, Jamaica, and Hispaniola.

Monanthia C-nigrum Champion

Monanthia C-nigrum Champion (1898) Biol. Cent. Am. Rhynch. 2: 47. pl. 3, fig. 25.

Very closely related to the preceding species, but readily distinguished by the character of the paranota, which is more broadly folded over, reaching to mid-way between the lateral margin and the median carina, and with three rows of areolæ. The posterior C-shaped part of the discal area more strongly flaring.

Described from Mexico, Guatemala, and Nicaragua. Joyuda, February 19, 1931 (Danforth)—author's coll. According to available records this species occurs also in Jamaica and Hispaniola in the West Indies.

Family **PHYMATIDÆ**

Body usually either roughly sculptured or granulate. Head small, porrect; tylus not produced. Ocelli present. Antenna 4-segmented; basal and frequently also terminal segment enlarged, the latter usually ovate, or more or less elongate. Bucculæ greatly expanded. Rostrum short and stout, consisting of three visible segments. Forelegs raptorial; femur strongly incrassate, grooved below before the stout spine for partial reception of the retractile tibia; the latter strongly curved; tarsus often absent, if present never terminal, inserted in a tibial scrobe. Other legs short and stout, often granulate; tarsus apparently two-segmented, the basal segment very short. Odoriferous orifice situated in the meso-metasternal suture. All are predaceous.

KEY TO PORTO RICAN SUBFAMILIES

- Scutellum small, triangular. Hemelytra entirely exposed. Head and pronotum with lateral groove for reception of antenna. Anterior tarsus most often present and slender, retractile in a scrobe on anterior face of tibia. PHYMATINÆ.
- Scutellum large, extended to or nearly to apex of abdomen in Neotropical species, and covering inner part of hemelytra. Head and pronotum devoid of lateral groove for reception of antenna. Anterior tibia most often devoid of tarsus. MACROCEPHALINÆ.

Subfamily PHYMATINÆ

PHYMATA Latreille

Phymata Latreille (1802) Hist. Nat. Crust. Ins. 3: 247.

Syritys Fabricius (1803) Syst. Rhyng. 121.

Discomerus Laporte (1832) Essai 14.

Phymata marginata (Fabricius)

Syritys marginata Fabricius (1803) Syst. Rhyng. 122.

Phymata marginata Handlirsch (1897) Ann. Naturh. Hofmus. 155. pl. 5, fig. 4; pl. 8, fig. 35; pl. 9, fig. 10, 11.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott (1923) Jour. Dep. Agr. P. R. 7: 246.

A small species, measuring 5.50–7.00 mm. long. Head short, about as wide as long; anterior process lightly emarginate; distinct preocellar and ocellar process or spine absent. Fourth antennal segment of the male shorter than the two preceding segments conjoined. Pronotum with the longitudinal carina slender, anteriorly very little enlarged; lateral sinus distinctly but not very deeply notched; posterior lateral margin, behind the sinus, strongly and broadly reflexed, the anterior process rather obtuse, the posterior process or “corner” acute. Lateral margin of the fourth visible (fifth) abdominal segment abruptly, strongly flaring, the margin usually provided with two projecting teeth or processes, the posterior one longer and more acute.

Described as “Americæ Insulis.” Aibonito, July 14–17, and Mayagüez, 24–29, 1914 (Barber)—A.M.N.H. Camerio, August 10, 1913 (Jones); Cidra, February 6, 1933 (Anderson & Mills); Ponce, September 22, 1933 (Oakley); Villalba, October 20, 1930—U.S.N.M. Coloso (Wolcott)—Ins. Exp. Sta. Utuado, August 6, 1930 (Danforth)—author’s coll. Also occurs in St. Thomas, Virgin Islands and Hispaniola. The two specimens from Hispaniola have the lateral expansion of the fourth abdominal segment entire, devoid of the two teeth; otherwise typical.

There is some question concerning the occurrence of *P. emarginata* Guérin-Méneville and *P. erosa* Linnæus, recorded from Porto Rico by Gundlach, and *P. angulata* Uhler, recorded by Wolcott, I have omitted them from consideration. It seems very possible that these records may be referred to *P. marginata*.

Subfamily MACROCEPHALINÆ

KEY TO PORTO RICAN GENERA

Antenna with basal segment short and stout, not longer than remaining segments; second segment not compressed and usually shorter than third segment. Ocelli placed rather close together. Rostral groove not expanded. Fore femur with tibial groove with row of teeth on each side. Fore tibia clawlike, not cylindrical, with row of minute teeth within; most often without tarsus. . . . *Macrocephalus*.

Antenna with basal segment longer than any of remaining segments; second segment compressed and much longer than very short third segment. Ocelli widely separated. Rostral groove strongly expanded. Fore femur with tibial groove outwardly with single row of minute teeth. Fore tibia cylindric, unarmed within and with deep scrobe for reception of tarsus *Extraneza*.

MACROCEPHALUS Swederus

Macrocephalus Swederus (1787) Vet.-Akad. Nya. Handl. 3: 183.

KEY TO PORTO RICAN SPECIES

1. Body robust; densely covered with setigerous spicules; disk of posterior lobe of pronotum bituberculate; eyes pilose; terminal antennal segment, male, broadly ovate, nearly twice as long as wide *M. spiculissimus*.
 Body much less robust, more or less granulose; eyes non-pilose. 2
2. Posterior lateral angle of pronotum strongly projecting, acute. Anterior tibia with retractile tarsus inserted in a scrobe. Connexivum strongly flaring.
 *M. productus*.
 Posterior lateral angle of pronotum neither strongly produced nor acute, sometimes emarginate at apex. Anterior tibia devoid of tarsus. 3
3. Body narrow, elongate. Longitudinal median carina rather indistinct, not elevated except toward base. Terminal segment of antenna very nearly three times as long as wide and much longer than second and third segments conjoined. Larger species, 8.00-9.00 mm. (male). *M. crassimanus*.
 Body not elongate. Longitudinal median carina of scutellum distinctly elevated. Smaller species, 5.00-7.00 mm. (male). 4
4. Head very nearly as long as pronotum. Terminal segment of antenna, male, only a little longer than two preceding segments conjoined. Posterior lateral angle of pronotum scarcely produced, not emarginate at apex; posterior lobe rugulose punctate. Connexivum more flaring. *M. pulchellus*.
 Head distinctly shorter than pronotum. Terminal segment of antenna, male, distinctly longer than two preceding segments conjoined. Posterior lateral angle of pronotum more strongly projected, distinctly emarginate at apex; posterior lobe closely punctate. Connexivum narrower. *M. leucogaphus*.

Macrocephalus spiculissimus NEW SPECIES

FIGURE 26

Sordid-ochraceous. The following parts dark brown or fuscous: disk of head behind eyes, corium with a triangular patch occupying the space between the median and claval veins and more or less of the apical angle, connexival segments with the posterior half of the second visible and all of the succeeding segments except the narrow posterior margins, scutellum with large apical spot, separated by the median keel, and terminal segment of the antenna with median band. Membrane heavily infuscated.

Entire body including head, pronotum, scutellum, corium, connexivum, pleura, and venter, as well as the legs, densely covered with setigerous spicules. Head nearly one and one-fourth longer than wide

(1.52×1.20 mm.), much shorter than pronotum; anterior processes diverge at nearly a right angle; eyes finely and sparsely pilose. Antenna with basal segment nearly twice as long as wide ($.44 \times .24$ mm.); second segment a little more than one-half the length of the basal, one-third longer than wide ($.24 \times .16$ mm.); third segment subequal to length of basal and about two and one-half times longer than wide

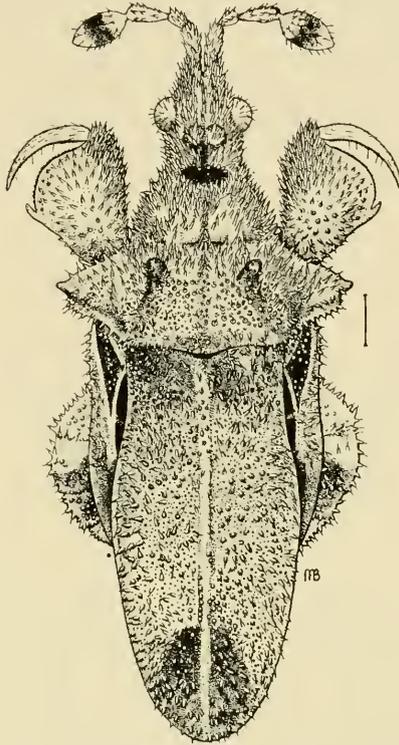


FIG. 26 *MACROCEPHALUS SPICULISSIMUS* N.SP.

($.44 \times .18$ mm.); fourth segment robust, about equal to the two preceding segments conjoined, robust, not quite twice as long as wide ($.68 \times .36$ mm.). Pronotum distinctly wider than long (3.36×2.56 mm.); posterior disk on either side of a prominent stout, obtuse tubercle (viewed laterally), each preceded and followed by a slight, smooth, longitudinal carina, the latter more obsolete and evanescent before the posterior margin; posterior lateral angle distinctly emarginate, its anterior process acutely projected a short distance. Scutellum nearly two and one-half times as long as wide at base (4.60×1.92 mm.),

rather strongly contracted at base, widest about the middle region (2.40); surface finely and closely punctate, more coarsely punctate on the prebasal depressed region either side of the median carina; carina distinctly elevated to apex, somewhat expanded and elevated before the base. Connexivum gradually expanded to the apex of the second visible segment (this nearly one-third longer than wide), thence gradually narrowed posteriorly, the surface, as well as the margin, with distinct setigerous spicules. The fore femur twice as long as wide; anterior tibia with a row of seven or eight fine hairs in addition to the customary minute teeth; a slight prominence on its inner front face, near the middle point; devoid of tarsus. Mesosternum and metasternum narrowly longitudinally carinate, more sharply and narrowly elevated anteriorly and there having a cluster of spicules. Venter with a distinctly impressed longitudinal median carina. Length of male 8.00 mm.

Type, male: Aibonito, Porto Rico, June 8, 1934 (Oakley)—U.S.N.M. Cat. no. 51590.

This species is most closely related to the South American *M. asper* Stål, but is much more spiculose, with two pronotal tubercles more prominent and the terminal segment of the antenna more robust. The eyes are finely pilose.

Macrocephalus productus NEW SPECIES

FIGURE 27

Ochraceous. The following parts brown: head anteriorly, and the disk posteriorly, basal segment of antenna, posterior lateral angle and more or less of the posterior disk of the pronotum, oblique fascia of the scutellum on either side of the median carina from base to beyond middle as well as the apical third, corium with apical third and most of the surface except the subcostal and median nervure and a transverse area behind the middle, connexivum with all of the third visible segment, and most of the preceding segment, except for an anterior transverse fascia and posterior margins of the first, fourth, and fifth visible segments, and more or less of the pleura and sternum. Membrane slightly embrowned. Anterior femur suffused with red.

Head about one fourth longer than wide across the eyes (1.28×1.00 mm.), finely and profusely granulose; both anterior processes well projected above the bases of the antennae, their inner margins diverging at a right angle. Ocelli rather strongly elevated. Antenna with the basal segment twice as long as wide ($.40 \times .20$ mm.); second segment less than twice as long as wide ($.24 \times .14$ mm.); third segment

one-third longer than second and nearly two and one-half times as long as wide ($.36 \times .14$ mm.); fourth segment two and one-half times as long as wide ($.68 \times .28$ mm.) and a little longer than the second and third segments conjoined. Bucculae much expanded below the carinated lateral margins of the rostral groove, the latter with a few small, granule-like tubercles. Pronotum one and three-fifths wider than long (3.20×2.00 mm.); posterior lateral angle strongly and acutely produced and obliquely elevated; margin behind this expanded, with

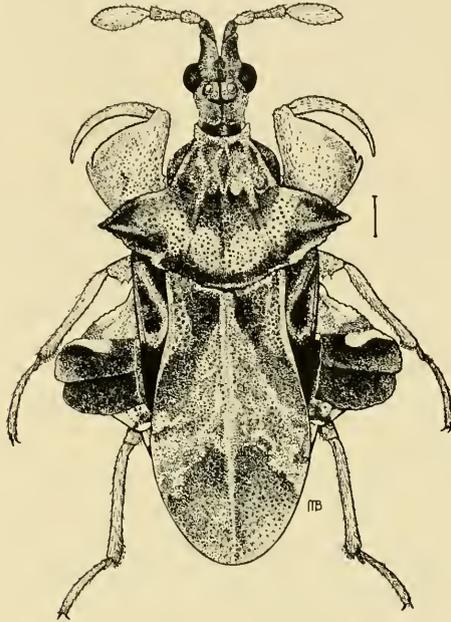


FIG. 27 *MACROCEPHALUS PRODUCTUS* N. SP

small, granule-like tubercles; anterior lobe finely and rather closely granulose in somewhat irregular longitudinal series, with intervening smooth areas; posterior lobe a little longer than the anterior, distinctly and rather closely punctate; carinae two, longitudinal, anteriorly very distinctly more elevated, granulose, extended a short distance on anterior lobe, not reaching posterior margin. Scutellum not quite two and one half times as long as basal width (3.44×1.44 mm.), the lateral margins of the basal one-fourth parallel-sided, thence distinctly rounded to the widest part across the middle (1.88 mm.); median longitudinal carina complete to apex, but little widened anteriorly; prebasal surface strongly depressed on either side, the punctures

there coarser, elsewhere finely and closely punctate; disk on either side behind the middle with irregular aggregations of white granules. Corium with a few series of close-set, small, whitish granules. Connexivum rather strongly flaring from base to apex of second visible segment, which projects in an obtuse angle a little beyond the following segment; second visible segment very nearly twice as wide as long. Anterior margin of the propleurum with two short, rather stout tubercles. Anterior femur about twice as long as wide, finely profusely granulose. Anterior tibia with a small retractile tarsus set in a scrobe. Other legs finely granulose and sparsely setose. Sternal carina broadly elevated and beset with granules. Venter obsolete carinate along the middle line. Length of males 7.00 mm.

Type, male: Aibonito, Porto Rico, July 14-17, 1914 (Barber)—A.M.N.H.

This species is quite distinct from any other described member of the genus. The strongly acutely produced, and reflexed posterior lateral angle of the pronotum, as well as the character of the connexivum, are very suggestive of certain species of the genus *Phymata*. The presence of a tarsus on the fore tibia also occurs in several other species of *Macrocephalus*.

***Macrocephalus crassimanus* (Fabricius)**

Syrts crassimana Fabricius (1803) Syst. Rhyng. 123.

Macrocephalus crassimanus Handlirsch (1897) Ann. Naturh. Hofmus. 12: 203. pl. 7, fig. 6.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Tallaboa, near Ponce, July 23, 1914 (Barber); Ensenada, February 13, 1925 (Woodruff); St. Thomas, Virgin Islands, June 3, 1911 (Lutz)—A.M.N.H. Lares, April 16, 1922 (Sein); Aibonito, August 3, and Ponce, September 8, 1933 (Oakley); Naguabo, April 20, 1934—U.S.N.M. Jayuya, November 12, 27 (Danforth)—author's coll.

This corresponds to Handlirsch's description and figure as well as to Stål's diagnosis of the Fabrician specimen as "America meridionali." Handlirsch cites Westwood's specimen in the Berlin Museum as from "San Jean," which is in French Guiana.

This is a rather narrow, elongate species, with the head, most of the posterior lobe of the pronotum, more or less of the scutellum in the male, and the corium fuscous or rufo-fuscous. Fourth segment of the antenna three times as long as wide, almost one and one-half times longer than the second and third segments conjoined. The connexivum is not much expanded, the abdomen being longer than wide. Length 7.00-9.00 mm.

Macrocephalus leucographus Westwood

Macrocephalus leucographus Westwood (1843) Trans. Ent. Soc. Lond. 3: 25.—Handlirsch (1897) Ann. Naturh. Hofmus. 12: 198.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from Haiti. Santurce, December 26, 1914 (Miner)—A.M.N.H. Lares, September 6, 1921 (Wolcott); Adjuntas, March 23, 1933 (Oakley)—U.S.N.M.

This is a small species, measuring 6.00–7.00 mm., closely related to *M. pulchellus* Westwood, from which it can be distinguished by the characters given in the key. Although the author has not seen *M. pulchellus* from Porto Rico, it probably occurs there.

Wolcott (1924) in his "Insectæ Portoricensis," records *M. bergrothi* Handlirsch and *M. granulatus* Champion, both determined by McAtee, as occurring at Lares. As neither of these species has been seen from Porto Rico, they are omitted from consideration.

EXTRANEZA NEW GENUS

Head longer than pronotum; antecular and postocular regions equally long; both anterior processes strongly compressed, and turned vertically, extended well beyond the preocular lateral processes; laterally, behind the eyes, carinate. Eyes rather strongly protruding. Ocelli widely separated, nearly as far apart as the eyes. Bucculae greatly expanded, bilobate. Rostral groove, behind bucculae, greatly expanded. Rostrum nearly straight, rather slender for the Macrocephalinae. Antenna with the granulose basal segment longer than the remaining segments, the apex above produced in a short process, armed above near the middle with a short acute tubercle; second segment compressed, much longer than the very short third segment; fourth segment nearly as long as the second. Pronotum much wider than long, the lateral margin strongly impressed, carinate; anterior lobe much shorter than the posterior lobe, the central disk of the former distinctly elevated in a low, broad tubercle; posterior lobe with two longitudinal carinae, angularly elevated anteriorly; posterior lateral angle entire, obtusely angled and reflexed; anterior lower angle of the propleurum with a stout, acute tooth. Scutellum much longer than wide, reaching apex of abdomen, sharply carinate longitudinally. Connexivum strongly expanded. Mesosternum widely exposed, longitudinally carinate on each side, with a low, broad, median, granulose carina; metasternum with a short, median, blunt, granulose process. Fore leg with elongate, cylindric coxa, having anteriorly a small spine near middle; fore femur strongly compressed; a shallow tibial groove on the front face of the femur; a single row of minute spines or teeth along the outer side; the inner side unarmed but with a row of

fine hairs; a minute spine at the apex of the tibial groove. Fore tibia cylindric, not claw-like, gently curved, without minute teeth within; a deep scrobe before the middle for the reception of the retractile, three-segmented tarsus. Venter longitudinally carinate in the middle line.

Type of the genus: *Extraneza nasuta* new species.

Closely related to the genus *Macrocephalus*, but the character of the head, antennæ, rostral groove and fore legs will readily differentiate it.

***Extraneza nasuta* NEW SPECIES**

FIGURE 28

Pale cinereous, faintly marked with small, irregular, brownish spots on the pronotum and scutellum; margin of each connexival segment, midway, with a small black spot; side of head, pleura, coxæ and venter distinctly maculated with irregular, fuscous spots; fore femur black,

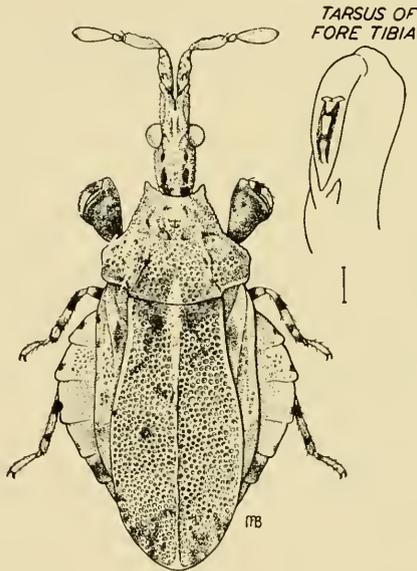


FIG. 28 *EXTRANEZA NASUTA* N. SP.

except at extreme apex and base; fore tibia with a black ring before middle; tibiæ and femora of the intermediate legs broadly biannulate with fuscous. Antenna entirely sordid-white. Second segment of rostrum annulate with black.

Head to apices of anterior processes twice as long as width across eyes ($1.36 \times .68$ mm.); eye projecting, width of eye a little more than

one-half that of interocular space ($.18 \times .32$ mm.); head granulose, more sparsely so through the middle of the vertex, longitudinally carinate on each side from the inner middle region of the eye anteriorly to the compressed apex of the anterior process; latter turned vertically; ocelli widely separated, interocellar space very nearly equal to interocular space; anterior process, viewed laterally, projected .24 mm. beyond the preocular part of the head, the apex nearly semicircularly rounded; with a postocular, granulose, lateral carina, continuous to base of head. Bucculæ greatly and abruptly expanded, bilobate; ventrally with the rostral groove behind the position of the eyes, greatly expanded, the lateral margins strongly, laminately expanded and flared obliquely outwards. Antenna with the basal segment granulose, compressed, the apex above extended in a slight process; above, midway, with a small, acute tubercle; this segment nearly three times as long as wide ($.64 \times .22$ mm.); second segment compressed, granulose above, somewhat shorter than basal and more than three times as long as wide ($.52 \times .16$ mm.); third segment very short, but little longer than wide ($.14 \times .10$ mm.); fourth segment narrowly obovate, nearly three times as long as wide ($.48 \times .18$ mm.), distinctly shorter than the preceding two segments conjoined. Pronotum one-third wider than long (1.68×1.12 mm.); lateral margin impressed, carinate; posterior lateral angle broadly, obtusely angulated, somewhat reflexed; anterior lobe nearly one-third shorter than posterior lobe; anterior disk with a slight rounded elevation; posterior lobe coarsely punctate; carinæ two, longitudinal, continuous from transverse constriction between the lobes to posterior margin; before the middle angularly elevated. Scutellum about three times as long as basal width (3.20×1.04 mm.), much expanded beyond the middle (1.52 mm. wide); closely and coarsely reticulate-punctate, the punctures on the depressed basal one-third larger; carina continuous, sharply elevated, median, but slightly expanded anteriorly. Connexivum strongly expanded; the outline of the outer margin nearly semicircular to the apex of the fourth visible segment, the posterior angles narrowly rounded, slightly projected. Structure of remaining parts discussed in generic description. Length 5.68 mm.

Type, male: Yauco, Porto Rico, August 6, 1934 (Oakley)—U.S.N.M. Cat. no. 51591.

Family ENICOCEPHALIDÆ

Small, slender, delicate insects. Head porrect, transversely constricted behind the eyes; posterior lobe often inflated; ocelli present. Antennæ 4-segmented. Rostrum short, apparently 4-segmented.

Pronotum in Nearctic and Neotropical species divided transversely into three lobes, of which the first is quite short; middle lobe the largest and often inflated. Odoriferous orifice absent. Anterior femur more or less incrassate; anterior tibia expanded apically; anterior tarsus with a single stout segment, having one or sometimes two claws. Hemelytra membranous, provided with a number of thickened veins. Members of this family are predaceous. Two genera occur in Porto Rico.

KEY TO PORTO RICAN GENERA

Discal cell of corium not closed posteriorly. Usually smaller, more delicate species with subdued colors. *Systellerodes*.
 Discal cell of corium closed posteriorly. Larger and more conspicuously colored species. *Enicocephalus*.

SYSTELLERODES Blanchard

Systellerodes Blanchard, in Gay (1852) Hist. Chile Ins. 7: 224.

Henschiella Horvath (1888) Rev. Ent. 7: 169.

Hymenodectes Uhler (1892) Trans. Maryland Acad. Sci. 1: 180.

Systellerodes sp.?

Very similar to both *S. angustatus* Champion from Guatemala and *S. nitidus* Usinger described from Honduras but in too poor condition to describe.

ENICOCEPHALUS Westwood

Enicocephalus Westwood (1837) Trans. Ent. Soc. Lond. 22.

Henicocephalus Stål (1865) Hem. Afr. 3: 166.

Enicocephalus semirufus NEW SPECIES

FIGURE 29

Posterior lobe of the head, pronotum, and scutellum subshining, finely pilose. Following parts either black or fuscous: anterior lobe and side of posterior lobe of the head, disk of the middle lobe of pronotum, on either side of the median sulcus, corium behind the apex of the scutellum, antenna with the exception of the apical two-thirds of the terminal segment, rostrum with the exception of the terminal segment, and legs. Following parts carmine-red: posterior lobe of the head except laterally, pronotum except the disk of the middle lobe, scutellum, corium anteriorly, before the apex of the scutellum, and underside with the possible exception of the sometimes slightly infuscated venter. Apical two-thirds of terminal segment of the antenna and apical segment of the rostrum pale yellow. Head a little longer than the pronotum (.72 × .64 mm.); anterior lobe .44 mm. long, posterior lobe wider than long (.36 × .28 mm.), strongly elevated above anterior lobe, scarcely wider than the head across eyes; eyes rather strongly projected; interocular space one-fourth greater than width of an eye.

Ocelli small, separated by a slight longitudinal groove not prolonged posteriorly. Antenna rather slender, finely pilose, shorter than head and pronotum conjoined; lengths of the segments are as follows: I-.12, II-.28, III-.40, IV-.36 mm. Pronotum wider across posterior lobe than long; middle lobe, on the median line, twice as long and nearly one-third wider than the anterior lobe, longitudinally sulcate, the sulcus terminating posteriorly in a rather deep pit before the transverse constriction; posterior lobe, on the median line, about as long as

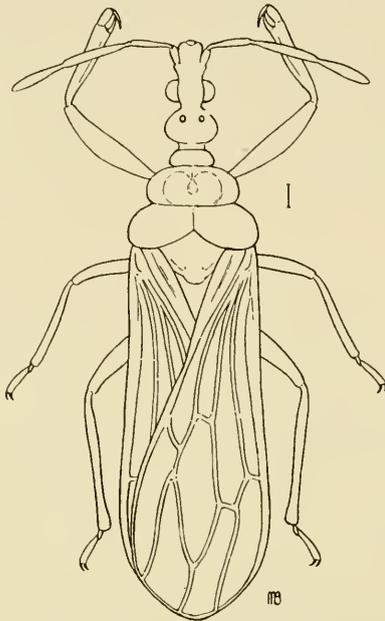


FIG. 29 ENICOCEPHALUS SEMIRUFUS N. SP.

the middle lobe and about one-third wider; disk posteriorly in the middle with a slight, longitudinal carina; posterior margin obtusely, angularly cut out. Scutellum short, broadly rounded, two-fifths wider than long; apex calloused. Hemelytra dull, covering the abdomen; discal cell of corium elongate, closed behind. Anterior femur moderately incrassate, four times as long as its greatest width. Fore tibia with numerous long hairs, narrowed basally, gradually expanded towards apex and there nearly as wide as the femur, the inner angle with several small spines. Anterior tarsus short, nearly twice as long as wide, with a slender, curved claw at apex; intermediate and hind tarsus with two short claws. Length 3.85 mm.

Type, male: Adjuntas, Porto Rico, June 8-13, 1915 (Lutz & Mutchler)—A.M.N.H. Paratype, female: Yauco, December 19, 1935 (Dozier)—U.S.N.M. Cat. no. 51592.

This is apparently very closely related to *Enicocephalus cubanus* Bruner (Mem. Soc. Hist. Nat. Pocy 6: 54, 1924)—The coloration is much the same as in that species; however, the anterior lobe of the head and disk of the middle lobe, in part, are black, and only the terminal segment of the rostrum is yellowish. The shape of the pronotum is different, the posterior lobe being distinctly wider than the middle lobe, the scutellum is shorter and more broadly rounded; the fore femur is only moderately incrassate, the fore tibia narrower basally and apparently more profusely pilose; the anterior tarsal claw is more slender. The author not having seen specimens of *E. cubanus* has based his comparisons on Bruner's excellent description and figures.

Family REDUVIIDÆ

Body, except in the Ploiariinæ and Saicinæ, usually robust. Head most frequently porrect. Ocelli present except in the two before-mentioned subfamilies. Antenna 4-segmented, supplementary segments sometimes present, often more or less geniculate, the basal segment often enlarged and the last two segments very slenderly filiform. Prosternum longitudinally grooved between the fore coxæ and finely transversely striate. Rostrum stout, 3-segmented, usually curved and not closely applied to the under surface of the head. All of the legs ambulatory, or the forelegs frequently prehensile; in the latter case the femur more or less enlarged and spined beneath; apex of tibia frequently with a spongy apical fossa. Scutellum small, more or less triangular. Hemielytra in most subfamilies composed of a clavus, corium, and membrane; the latter, when present and differentiated, with two or three large, enclosed, elongate cells. Odoriferous orifice small or obsolete. All reduviids are predaceous. This family, from the evidence at hand, is poorly represented in Porto Rico, as well as elsewhere in the West Indies.

KEY TO PORTO RICAN SUBFAMILIES

1. Body and appendages long and slender. Ocelli absent. Anterior coxal cavities open in front; fore coxa very elongate; forelegs prehensile, most often with fore femur spined or setulose beneath. Hemielytra of uniform texture. (EMESIINÆ)..... PLOIARIINÆ.
- Body and appendages usually more robust. Ocelli present with few exceptions. Anterior coxal cavities most often open behind. Fore coxa rather short,

- rotatorial, hind coxa nearly globose (trochalopodous); forelegs ambulatory or prehensile; in latter case with femur often enlarged and spined beneath. Hemielytra most often consisting of clavus, corium, and membrane. 2
2. Corium posteriorly with distinct 4- or 5-angled discal cell, and from its apex extending posteriorly two elongate membrane cells, the outer one extended farther caudad. Head porrect. Antenna more or less geniculate, the basal segment often enlarged. Prosternal spines porrect, more or less acutely produced. STENOPODINÆ.
- Corium at base of membrane with or without a discal cell, followed by two elongate membrane cells; if present, the inner one of the two extended farther caudad. 3
3. Corium devoid of discal cell at base of membrane. Thorax most often strongly constricted behind middle. Anterior coxa outwardly flat or concave; fore femur enlarged; anterior tibia with apical spongy fossa. Scutellum acute, often tipped with porrect spine. PIRATINÆ.
- Corium with discal cell at base of membrane, both membrane cells not arising from distal end of discal cell; posterior one arising from inner apical margin of corium, extended farther caudad. Anterior coxa convex; fore femur most often not enlarged. Scutellum usually foliaceous at apex. ZELINÆ.

Subfamily PLOIARIINÆ

KEY TO PORTO RICAN GENERA

1. Fore femur devoid of distinguishable spines or setæ on ventral surface, finely pilose. Third segment of antenna equal to the second. Head, pronotum, legs, sternum, and venter long-pilose. Pronotum devoid of lateral carina. Mesonotum without spine. Metanotum with spine. *Emesopsis*.
- Fore femur with spines or bristles on ventral surface. Third segment of antenna much shorter than the second. Body most often devoid of long hairs. 2
2. Ventral spines on fore femur commencing at or very close to middle; fore tibia distinctly less than one half length of fore femur; fore tarsus heavily chitinized, of one piece, appearing serrate below. Head with anterior spine or process between bases of antennæ. Adults always apterous. *Ghilianella*.
- Ventral spines or bristles of fore femur commencing at or very close to base; fore tibia nearly one-half or more than one-half as long as fore femur. 3
3. Pronotum not extended over mesonotum, even in winged forms. Fore tarsus inflexible, obsolete 3-segmented; fore tibia commonly more nearly one-half as long as fore femur. Corium with one large discal cell. Adults sometimes apterous. *Ploiaria*.
- Pronotum extended over mesonotum. Fore tibia distinctly more than one-half as long as fore femur. 4
4. Prothorax always with deep transverse constriction, distinctly bilobate, often pedunculate; mesonotum and metanotum devoid of spines. Disk of corium with three closed cells. Fore tarsus three-segmented. *Emesa*.
- Prothorax at most slightly constricted, never bilobate; pronotum commonly vittate; mesonotum and metanotum each with long spine. Disk of corium with one large cell. Fore tarsus short, two-segmented. *Empicoris*.

EMESOPSIS Uhler

Emesopsis Uhler (1893) Proc. Zool. Soc. Lond. 1893: 718.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 9, 13.

Emesopsis nubilus Uhler

Emesopsis nubilus Uhler (1893) Proc. Zool. Lond. 1893: 718-719.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 13. fig. 1.

Described from St. Vincent and Cuba. Vieques Island, Porto Rico, April 2, 1930 (Leonard)—author's coll.

EMPICORIS Wolff

Empicoris Wolff (1811) Icon. Cim. 5: iv.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 10, 13.

Ploiariodes White (1881) Ann. Mag. Nat. Hist. V. 7: 58-59.

Ploiariola Reuter (1888) Rev. Syn. Het. 711.

KEY TO PORTO RICAN SPECIES

1. Pronotum with lateral carina distinct only at anterior and posterior extremities, obsolete in middle. Stigma near apex of corium with red line along inner margin. Eighth sternite in male with large rounded emargination in middle of posterior margin. *E. rubromaculatus*.
 Pronotum with lateral carina completely pale throughout. Stigma devoid of red line along inner margin. Eighth sternite in male not emarginate in middle of posterior margin. 2
2. Pronotum with two dorsal, linear, whitish carinae, similar to lateral carina, extending entire length; lateral carina not capitate at anterior extremity; posterior margin of pronotum devoid of spine. Hemelytra covered with very minute, circular, hyaline dots. *E. barberi*.
 Pronotum devoid of sharp dorsal carinae; with two rather broad, whitish vittae, which are incomplete; lateral carina of posterior lobe more or less distinctly produced or capitate at anterior extremity; posterior margin of pronotum with distinct spine. Hemelytra not as above. Eighth sternite in male with very slender apical process. *E. armatus*.

Empicoris rubromaculatus (Blackburn)

Ploiariodes rubromaculatus Blackburn (1889) Proc. Linn. Soc. N. S. Wales II. 3: 349.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 243 (listed).

Empicoris rubromaculatus McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 15, 16. fig. 2.

Described from Hawaiian Islands. Tallaboa, near Ponce, July 23, 1914 (Barber)—A.M.N.H. Río Piedras, July 23, 1916 (Symth)—U.S.N.M. Vieques Island, Porto Rico, April 28, 1930 (Leonard)—author's coll. Feeding on thrips and mosquitoes (Wolcott). Widely distributed in United States, and Rio Janeiro, Brazil.

Empicoris barberi (McAtee & Malloch)

Ploiariodes barberi McAtee & Malloch (1923) Am. Mus. Novit. 75: 7.

Empicoris barberi McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 15, 19.

Described from Tallaboa, near Ponce, July 23, 1914 (Barber)—A.M.N.H. Río Piedras, June 14, 1934 (at light)—U.S.N.M.

Empicoris armatus (Champion)

Ploiariodes armatus Champion (1898) Biol. Centr. Am. Rhynch. 2: 165. pl. 10, fig. 9, 9a, b.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 243 (listed).

Empicoris armatus McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 16, 20, fig. 8.

Described from Guatemala and Panama. Aibonito, July 14–17, 1914 (Barber)—A.M.N.H. Vega Alta, February 26, 1917 (Cotton)—U.S.N.M. Vicques Island, Porto Rico, September 25, 1931 (Leonard)—author's coll. Recorded also from Florida and Jamaica.

PLOIARIA Scopoli

Ploiaria Scopoli (1786) Del. Flor. Faun. Insulariae 1: 60.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 10, 48.

Cerascopus Heineken (1830) Zool. Jour. 17: 36.

Emesodema Spinola (1840) Essai 87.

Lutera Dohrn (1860) Emesina 242.

Ploiariopsis Champion (1898) Biol. Cent. Am. Rhynch. 2: 173.

Ploiaria gundlachi (Dohrn)

Lutera gundlachi Dohrn (1860) Linn. Ent. 14: 244. pl. 1, fig. 19.

Ploiaria gundlachi Barber (1923) Am. Mus. Novit. 75: 13 (listed).—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 52, 56. fig. 72.

Described from Cuba. Mayagüez, July 14, 1914 (Barber)—A.M.N.H. Coamo, May 5, 1931 (Leonard); Isabela, April 24, 1930 (Leonard)—author's coll. Recorded also from French Guiana and Grenada, West Indies.

EMESA Fabricius

Emesa Fabricius (1803) Syst. Rhyn. 263.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 9, 38.

Westermannia Dohrn (1860) Emesina 251.

Emesa tenerrima (Dohrn)

Westermannia tenerrima Dohrn (1860) Linn. Ent. 14: 251.

Emesa tenerrima McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 46.

Described from Porto Rico. McAtee & Malloch (1925) list Dohrn's genus as a synonym of *Emesa* and consider *E. tenerrima* as probably belonging to that genus. As the author has not seen specimens from Porto Rico, it is omitted from further discussion.

GHILIANELLA Spinola

Ghilianella Spinola (1852) Generi Ins. Artr. 25: 142.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 10, 90.

Ghilianella varicornis (Dohrn)

Emesa varicornis Dohrn (1860) Linn. Entomol. 14: 266.

Ghilianella varicornis Bergroth (1906) Verhandl. Zool.-Bot. Ges. 56: 317.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 96, 101.

Described from Porto Rico. Unknown to the author. McAtee & Malloch, in the above reference, fully describe the female.

Ghilianella longula McAtee & Malloch

Ghilianella longula McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67: 96, 104, fig. 173.

Described from Cuba. Aibonito, June 1-3, 1915 (Lutz & Mutchler)—A.M.N.H. El Yunque, altitude 2000 feet, March 30, 1930 (Leonard—Cornell Univ.

Much larger than the preceding species, 30.00-38.00 mm. Anterior process of the head and the spines of the fore femur whitish.

Subfamily **STENOPODINÆ**

KEY TO PORTO RICAN GENERA

Head ventro-laterally behind eye with ramose spines. Antenna strongly geniculate; basal segment enlarged, produced in apical process beyond insertion of second segment. *Pnirontis*.
 Head devoid of spine behind eye. Antenna weakly geniculate; basal segment very little enlarged, not produced in apical process. *Stenopoda*.

PNIRONTIS Stål

Pnirontis Stal (1859) Oefv. Vet.-Akad. Forh. 16: 381.

Pnirontis infirma Stål

Pnirontis infirma Stål (1859) Oefv. Vet.-Akad. Forh. 16: 382.—Barber (1930) Ent. Am. 10: 171.

Described from Carolina. Río Piedras, May 29, 1916 (Smyth), June 14, 1934 (Mills); Mayagüez, October 3, 1934 (Harley)—U.S.N.M. Isabela, April 24, 1930 (Leonard)—author's coll. Widely distributed: United States and southward through Mexico, Central America, British Guiana, Bolivia, Brazil; Cuba and Jamaica in the West Indies.

STENOPODA Laporte

Stenopoda Laporte (1832) Ess. Class. Syst. Hemip. 26.—Barber (1930) Ent. Am. 10: 201.

Stenopoda cinerea Laporte

Cimex culiciformis Fabricius (1775) Syst. Ent. 728 (name preoccupied).

Stenopoda cinerea Laporte (1832) Ess. Class. Syst. Hemip. 26. pl. 52, fig. 2, 2a, b.—Stahl (1883) Cat. Cab. Zool. 212.

Stenopoda culiciformis Gundlach (1894) Fauna Puerto-Riquena 598.

Described from Cuba. Río Piedras, October 22, 1912 (Jones)—U.S.N.M. Widely distributed: United States, Mexico, Central America, Colombia, Brazil, Trinidad, Cuba, Hispaniola, Grenada, and St. Vincent.

Subfamily **PIRATINÆ****RASAHUS** Amyot & Serville*Rasahus* Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 325 (part).**Rasahus biguttatus** (Say)*Petalochirus biguttatus* Say (1832) Ins. La. 13: Compl. Writ. 1: 307.*Reduvius mutillarius* Guérin-Méneville, in Sagra (1857) Hist. Cuba Ins. 410.

Described from Louisiana. Río Piedras, July 10, 1917 (Cotton)—U.S.N.M. Yabucoa, July, 1930 (Danforth)—Univ. Puerto Rico.

Widely distributed: southern United States, Mexico, Central America, Brazil, and Cuba.

Subfamily **ZELINÆ**

KEY TO PORTO RICAN GENERA

- Mesopleurum anteriorly with "plica" or blunt tubercle. Second segment of rostrum not distinctly longer than basal. Head with two distinct spines. Posterior lobe of pronotum with 4 distinct spines *Heza*.
 Mesopleurum devoid of plica anteriorly. Second segment of rostrum distinctly longer than basal. Head and pronotum less often spined *Zelus*.

HEZA Amyot & Serville*Heza* Amyot & Serville (1843) Hist. Nat. Ins. Hemip. 374.

KEY TO PORTO RICAN SPECIES

- Abdomen parallel-sided in both sexes; first connexival segment with distinct spine; connexival segments 2-5 in male, second in female, with small tubercles only. Pronotum and pleura in part, and scutellum, densely tomentose. Hypopygium of male with long, erect, blunt spine. Membrane bronze-brown, with veins scarcely paler *H. pulchripes*.
 Abdomen with fifth segment angularly expanded, much more evident in female; first connexival segment with distinct spine; connexival segments 2-4 with small tubercles only in both sexes. Scutellum densely tomentose. Hypopygium of male with shorter, stouter spine. Membrane hyaline, with veins distinctly darker *H. angulifer*.

Heza pulchripes Stål*Heza pulchripes* Stål (1859) Oefv. Vet.-Akad. Förh. 199.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from Porto Rico and apparently confined to that island. Aibonito, July 14-17, 1914 (Barber)—A.M.N.H. Mayagüez, May 25, 1933 (Harley); Ponce, August 3, 1933 (Oakley)—U.S.N.M.

Heza angulifer NEW SPECIES

FIGURE 30

Dull fuscous, covered with fine, appressed, pale pubescence, denser in the female. Scutellum through the central disk tomentose. An-

tennæ, first segment of rostrum, all coxæ, forelegs, apices of femora, tibiæ, and tarsi of intermediate and posterior legs ferruginous-brown;

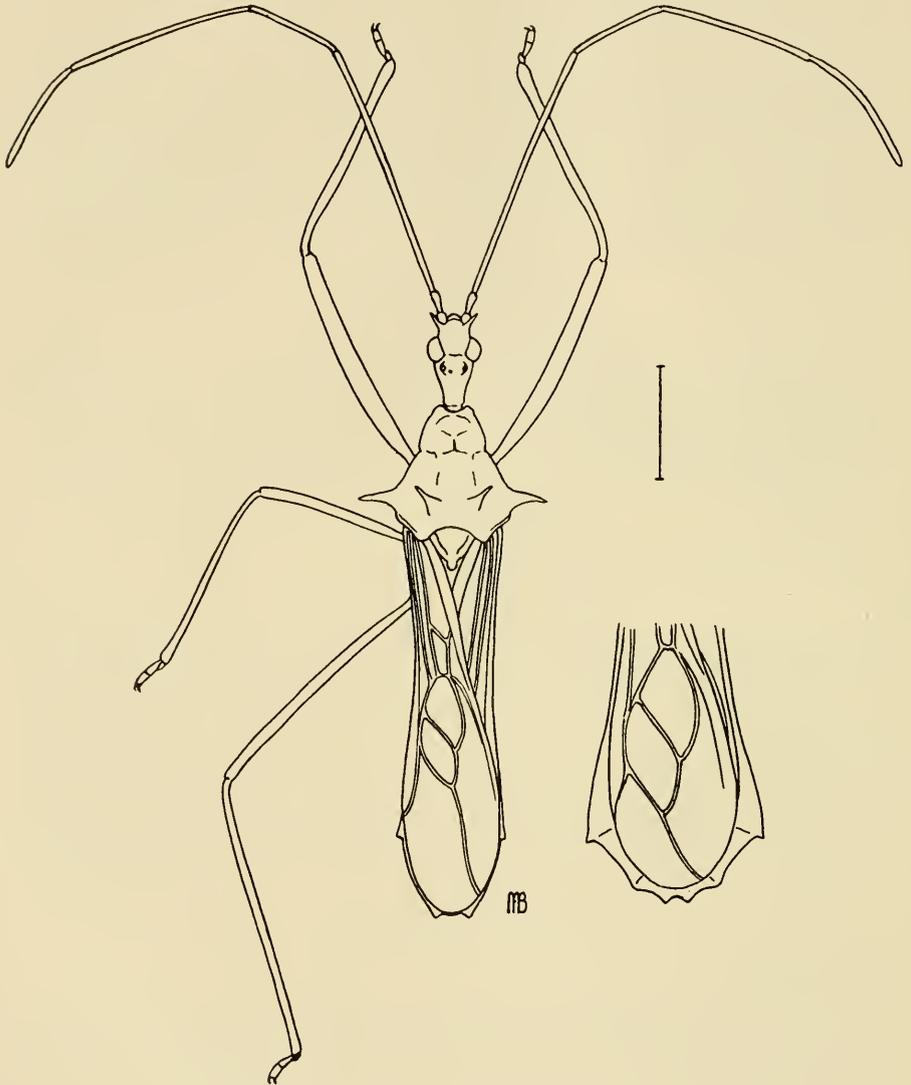


FIG. 30 *HEZA ANGULIFER* N.SP.

femora and tibiæ of intermediate and posterior legs, except at apices, yellow-green. Connexivum of female heavily infuscated. Membrane clear hyaline, with brown veins.

Head a little shorter than pronotum; the two anterior, erect spines rather short. First segment of antenna much longer than head and pronotum conjoined, obscurely, if at all, annulate with pale. First segment of rostrum subequal to the second and third conjoined. Pronotum as long as wide across posterior angles, excluding spines; anterior lobe before transverse constriction with a slight, acute tubercle on each side of the longitudinal groove; posterior lobe with four long, acute spines, the two discal ones not preceded by distinct carinæ. Abdomen of the male anteriorly narrow, more nearly parallel-sided, fifth visible connexival segment gradually flaring posteriorly to an acute, slightly projected angle; abdomen in the female much wider, gradually flaring from base of abdomen to apical angle of the fifth connexival segment, more strongly produced than in the male. Hypopygium of the male with a rather short, stout, blunt process; sixth visible segment with a short, acute, porrect tooth on either side of the posterior concave sinus. Length, male 13.00 mm.; female 16.00 mm.

Type, male: U.S.N.M. Cat. no. 51593, Bayamón, Porto Rico, August 7, 1932 (Anderson & Lesesne). Paratypes, male: Ponce, August 3, 1933 (Oakley); females: Porto Rico, September 13, 1925 (Cooley); Mayagüez, September 7, 1934 (Harley)—U.S.N.M.

ZELUS Fabricius

Zelus Fabricius (1803) Syst. Rhyn. 281.

KEY TO PORTO RICAN SPECIES

- Coloration conspicuous, red and black; legs and antennæ black, frequently annulate with pale yellow; ventral segments often transversely margined with black. . . .
 *Z. longipes*.
 Coloration testaceous or greenish-testaceous; head, pronotum, and corium frequently ferruginous-brown. Legs testaceous. *Z. subimpresus*.

Zelus longipes (Linnaeus)

Cimex longipes Linnaeus (1767) Syst. Nat. ed. 12. 724.

Reduvius rubidus Lepeletier & Serville (1825) Encycl. Meth. 10: 278.

Zelus longipes Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott, (1924) Jour. Dep. Agr. P. R. 7: 242.

Zelus rubidus Wolcott (1924) Jour. Dep. Agr. P. R. 7: 242.

Having examined several hundred specimens from various parts of the Neotropical regions, including many of the West Indian Islands, the author is convinced that Champion was correct in stating in reference to *Z. rubidus*, "perhaps not really distinct from *Z. longipes* (Linnaeus) from the Island of St. Thomas." This species varies considerably in size and extent of black markings on various parts of the body; the legs and the antennæ may be entirely black or more or less conspicuously annulate with pale; the ventral segments of the abdomen

may be distinctly transversely margined with black but frequently these fasciæ are missing.

Described from St. Thomas, Virgin Islands. It is a common species all over Porto Rico having been reported from many stations. Specimens are at hand also from St. Thomas and St. Croix, Virgin Islands. Other West Indian Islands represented by specimens are: Bahamas, Cuba, Hispaniola, Jamaica, Dominica, Antigua, Guadeloupe, and St. Kitts. On the continent it ranges from Mexico through Central America and northern South America at least as far south as Ecuador and northern Brazil.

Note.—*Zelus nugax* Stål, recorded by Wolcott from Porto Rico, should be referred to *Leptocorisa filiformis* Fabricius.

Zelus subimpressus Stål

Zelus (Diplodus) subimpressus Stål (1872) Sv. Vet.-Akad. Handl. 11 10 (4): 91.
Diplodus subimpressus Gundlach (1894) Fauna Puerto-Riquena 598.
Zelus subimpressus Barber (1923) Am. Mus. Novit. 75: 13 (listed).

A somewhat variable species. Either entirely testaceous or the head, the pronotum except for narrow lateral margin, and the corium ferruginous-brown. Apices of first and second and all of the remaining segments of antenna infuscated. Humeral angle of pronotum with a slight spine.

Described from Cuba. Coamo Springs, July 17–19, 1914 (Barber); Arecibo, June 1–4, 1915 (Lutz & Mutchler)—A.M.N.H. Río Piedras, July 29, 1916, and Vega Alta, February 26, 1917 (Cotton); Bayamón, May 15, 1932 (Anderson & Lesesne); Peñuelas, September 8, 1932 (Oakley)—U.S.N.M. Occurs also in Hispaniola.

Family MESOVELIIDÆ

Small, narrow forms having a relatively large head, inserted to eyes, but little shorter than pronotum. Eyes protruding. Ocelli placed close together. Antenna rather long and slender, consisting of 4-segments. Rostrum slender, 3-segmented. Pronotum slightly constricted before the middle. Hemelytra membranous, with conspicuous, infuscated veins. Legs rather long and slender; tarsus 3-segmented, the basal segment very short. Living mostly on floating vegetation or objects on the water. Predaceous on small forms of life.

MESOVELIA Mulsant & Rey

Mesovelia Mulsant & Rey (1852) Ann. Soc. Linn. Lyon, 138.

Mesovelia mulsanti caraiba Jaczewski

Mesovelia mulsanti White (1879) Trans. Ent. Soc. Lond. 268 (part).—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Mesovelia mulsanti caraiba Jaczewski (1930) Ann. Zool. Mus. Polon. 9: 8.

Sordid-flavo-testaceous; posterior lobe of pronotum more or less infuscated, with a median pale line. Scutellum laterally and veins of corium fuscous. Anterior and intermediate femora of male each armed beneath with a row of black spine-like setæ. Venter of the eighth abdominal segment with two black tufts of minute spines. The parameres rather widely hook-like, with the terminal process of each rather slender.

Described from Mexico, Panama, and the West Indian Islands of St. Thomas, St. Vincent, Grenada, and Cuba. Coamo Springs, July 17–19, Ponce, July 20–22, Mayagüez, July 26, and Arecibo, July 30, 1914 (Barber); Caguas, May 28, Adjuntas, June 8–13, and Ensenada, June 15, 1915 (Lutz & Mutchler)—A.M.N.H.

Family **NABIDÆ**

Antennæ slender, either 4- or 5-segmented. Rostrum free, basal segment short and wide. Pronotum separated into two lobes by a transverse constriction. Prosternum devoid of a longitudinal, strigose groove between the anterior coxæ. Anterior legs usually raptorial, less evidently so in *Carthasis*; all tarsi, except in *Carthasis*, 3-segmented; arolia between the tarsal claws none. Posterior coxæ rotatorial. Hemelytra often abbreviated; membrane, when fully developed, most often with one or two discal cells (except *Carthasis*), most often closed. All are predaceous. The eggs are inserted in plant-tissue.

KEY TO PORTO RICAN SUBFAMILIES AND GENERA

1. Pronotum either devoid of distinct collar or with very narrow one. Legs, at least forepair, short and thickened. Clavus scarcely widened posteriorly. Antennæ often 5-segmented. Body shining, black in local species. Pronotum distinctly constricted to form two lobes. Supplementary segment of antenna about one-half as long as basal. Anterior femur elongate-fusiform, with piceous teeth beneath. (PROSTEMMINÆ).....*Pagasa*.
Pronotum most often with wide distinct collar (less evident in *Carthasis*). Rostrum and legs rather slender. Clavus widened posteriorly. Antennæ always 4-segmented. (NABINÆ)..... 2
2. Anterior coxæ only moderately elongate, stout; anterior acetabula open behind. Ocelli present in local species. Head somewhat elongate, porrect. Apex of scutellum devoid of spine..... 3
- Anterior coxæ distinctly elongate, rather slender; anterior acetabula closed behind. Ocelli absent in local species. Scutellum unarmed..... 4

3. First antennal segment not twice as long as head, not abruptly thickened towards apex. Discal cells of membrane most often closed. Intermediate tibia with minute teeth on inner side. *Nabis*.
 First antennal segment nearly or quite twice as long as head, abruptly enlarged toward apical third. Membrane devoid of closed cells. Intermediate tibia muticous. *Metatropiphorus*.
4. Scutellum equilateral. Costal margin of corium strongly constricted before middle. Small delicate species. Less than 5.00 mm. *Carthasis*.
 Scutellum much longer than wide. Costal margins of corium parallel. Large slender species. 12. 00 mm. *Neogorpis*.

Subfamily PROSTEMMINÆ

PAGASA Stål

Pagasa Stål (1862) Río. Jan. Hemip. 2: 60.—Harris (1928) Ent. Am. 9: 20.

Pagasa fusca (Stein)

Prostemma fuscum Stein (1857) Berl. Ent. Zeit. 1: 90.

Pagasa fusca Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Shining, black, with flavo-testaceous antennæ, rostrum, and legs. Hemielytra often abbreviated. Very variable in size.

Described from Pennsylvania. A single, small, brachypterous male, measuring only 4.00 mm. long, Coamo Springs, June 5, 1915 (Lutz & Mutchler).

Widely distributed: United States, spreading south through Mexico as far at least as Panama.

Subfamily NABINÆ

NABIS Latreille

Nabis Latreille (1802) Hist. Nat. Ins. 3: 248.

Reduviolus Kirby (1837) Richardson's Fauna Bor. Am. 4: 279.

Coriscus Stål (1873) Sv. Vet.-Akad. Handl. III. 11 (2): 112.

KEY TO PORTO RICAN SPECIES

1. Anterior and intermediate femora beneath with minute, short, rather blunt, piceous teeth. All tibiæ annulate throughout their length; posterior tibia with numerous short hairs, never more than twice as long as diameter of tibia and arising at a sharp angle from the surface. Basal segment of antenna equal to, or slightly longer than, width of head across eyes. Margins of connexival segments of abdomen often conspicuously fuscous-marked. Very often brachypterous. *N. sordidus*.
 Anterior and intermediate femora below muticous or at most with minute, piceous, spine-like setæ, never with short teeth. Tibiæ, if annulate, only so at their base and apex. Body narrowly elongate. 2
2. Posterior lobe of pronotum distinctly, closely punctate. Costal margin of corium constricted before middle, with fine, ciliate hairs. Femora each with

preapical annulus; anterior and intermediate ones below with several long, spine-like setæ. Posterior tibia with numerous long, nearly erect hairs. . . .

.....*N. spinicrus*.

Posterior lobe of pronotum not or only obsoletely punctate. Costal margins of corium nearly parallel, not ciliate. Femora all devoid of preapical annulus; anterior and intermediate ones devoid of spine-like setæ. Posterior tibia with shorter hairs, extending obliquely from the surface. First antennal segment two-fifths longer than width of head across eyes. Legs unicolorous. Macropterous only. . . .*N. capsiformis*.

***Nabis sordidus* Reuter**

Nabis sordidus Reuter (1872) Oefv. Vet.-Akad. Forh. 29: 85.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Nabis pallescens Reuter (1872) Oefv. Vet.-Akad. Forh. 29: 85.

Described from Mexico. San Juan, July 10, and Tallaboa, near Ponce, July 23, 1914 (Barber); Coamo Springs, July 17, 1915 (Lutz & Mutchler)—A.M.N.H.

Distributed over the eastern half of the United States, spreading south through Mexico and Central America to Panama. In the West Indies it is recorded from Cuba, Haïti, and Grenada.

***Nabis spinicrus* Reuter**

Nabis spinicrus Reuter (1890) Rev. Ent. 9: 305.

Coriscus signatus Uhler (1894) Proc. Zool. Soc. London 1894: 205.

Nabis signatus Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from Brazil. Aibonito, June 2, 1915 (Lutz & Mutchler)—A.M.N.H. Ranges from Florida south through Mexico and Central America to the northern part of South America. In the West Indies it occurs in Cuba, Haïti, Grenada, and St. Vincent.

***Nabis capsiformis* Germar**

Nabis capsiformis Germar, in Silberm (1837) Rev. Ent. 5: 132.

Described from Africa. St. Thomas, Virgin Islands, February 24, 1925 (Woodruff)—A.M.N.H. A cosmopolitan species, occurring in the southern United States, Mexico, Central America, northern South America, and the West Indies—Cuba, Hispaniola, Grenada, and St. Vincent. For synonyms see Van Duzee, Cat. Hem. 280. 1917.

METATROPIPHORUS Reuter

Metatropiphorus Reuter (1872) Oefv. Vet.-Akad. Forh. 29: 93.—Harris (1928) Ent. Am. 9: 71.

***Metatropiphorus drakei* Harris**

Metatropiphorus drakei Harris (1928) Ent. Am. 9: 73.

Somewhat smaller than *M. belfragii* Reuter, with shorter, paler legs and antennæ. First segment of the antenna slightly more than two

times as long as width of head across eyes. Second segment of rostrum about one-half longer than third. Pronotum slightly broader than long, rather thickly clothed with grayish pubescence. Scutellum considerably smaller than in *M. belfragii*. Legs flavo-testaceous, the markings more brownish than in *M. belfragii*. Length 5.70 mm., width 1.10 mm.

Not having seen a specimen of this species, some of the more important characters in Harris's description have been copied.

Utuaado, April 8, 1900—Harris coll.

CARTHASIS Champion

Carthasis Champion (1900) Biol. Cent. Am. 2: 305.—Harris (1928) Ent. Am. 9: 74.
Orthometrops Uhler (1901) Proc. Ent. Soc. Wash. 4: 508.

Carthasis gracilis Harris

Carthasis minor Barber (not Reuter) (1923) Am. Mus. Novit. 75: 13 (listed).
Carthasis gracilis Harris (1925) Bull. Brooklyn Ent. Soc. 20: 172.—Harris (1928) Ent. Am. 9: 77.

Gular region of head with 4 spine-like setæ. Corium devoid of erect hairs. First antennal segment distinctly less than twice the width of head across eyes, and one-third longer than head. Form slender; pronotum slightly longer than wide; anterior lobe one-half longer than posterior and almost equally elevated. Length 3.30–3.80 mm.

Described from Cuba. Aibonito, July 14–17, 1914 (Barber)—A.M.N.H. Río Piedras, January 3, 1925 (Dozier); Aguirre, April 24, 1925 (Box)—U.S.N.M.

NEOGORPIS Barber

Neogorpis Barber (1924) Jour. N. Y. Ent. Soc. 32: 136.—Harris (1928) Ent. Am. 9: 82.

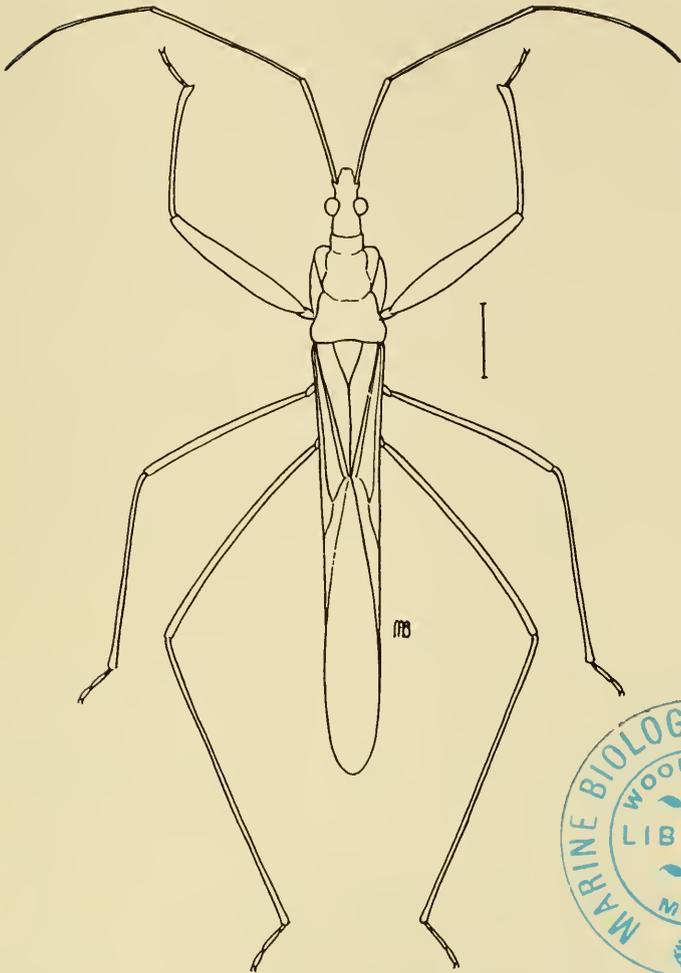
Neogorpis neotropicalis (Barber)

FIGURE 31

Gorpus neotropicalis Barber (1923) Am. Mus. Novit. 75: 78.
Neogorpis neotropicalis Barber (1924) Jour. N. Y. Ent. Soc. 32: 136.—Harris (1928) Ent. Am. 9: 83.

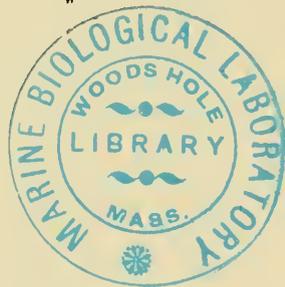
Sordid-yellow-white; antennæ, dorsum of head in part, scutellum posteriorly, streak on clavus posteriorly and also along inner and apical margin of corium, rostrum, apices of all femora, base and apices of all tibiæ, dilute red. For additional characters see above references.

Described from Porto Rico. Aibonito, July 14–17, 1914 (Barber); Adjuntas, June 1915 (Lutz & Mutchler)—A.M.N.H.

FIG. 31 *NEOGORPIS NEOTROPICALIS* BARBER

Family CIMICIDÆ

Body much flattened, oval, with a short, broad head and prominent compound eyes. Ocelli absent. Antennæ 4-segmented, last two segments more slender than basal two. Forewings represented by mere oval, thickened pads; hind wings none. Tarsi short, 3-segmented. Parasitic on certain birds and mammals, particularly bat and man.



CIMEX Linnaeus

Cimex Linnaeus (1758) Syst. Nat. ed. 10, 441.

Acanthia Fabricius (1775) Syst. Ent. 693 (part).

Clinocoris Fallen (1829) Hemip. Suec. Cimic. 141.

Cimex hemipterus (Fabricius)

Acanthia hemiptera Fabricius (1803) Syst. Rhyng. 113.

Cimex hemipterus Horvath (1912) Ann. Mus. Nat. Hung. 10: 258, 259.

The tropical bedbug is commonly darker-colored than *C. lectularius*. The structure of the pronotum is very distinctive, being much narrower, more strongly contracted posteriorly and the lateral margin scarcely impressed and not expanded as in *C. lectularius*.

Described from South America. San Juan, November 3, 1899; November 1, 1932 (Anderson); February 14, 1933 (Mills); August 23, 1933, on bed (Anderson); July 12, 1934 (in house); Mayagüez, March 21, 1934 (Van Volkenburg); Manatí, July 10, 1934.—U.S.N.M.

This is a tropical species, occurring in human habitations in many of the warmer countries of the world: Africa, India, South America, Panama. West Indian specimens are before me from Cuba, Jamaica, Haïti and Porto Rico. Riley & Johannsen (Med. Entom. 157. 1932) reported *C. hemipterus* as occurring in Porto Rico.

Cimex lectularius Linnaeus

Cimex lectularius Linnaeus (1758) Syst. Nat., ed. 10. 441.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 244.

Acanthia lectularia Stahl (1883) Cat. Cab. Zool. 212 (listed).

No specimens of this species have been seen from the Island. There is a probability that it occurs there, as I have seen specimens from Haïti. No reliance can be placed upon Stahl's record.

Family **POLYCTENIDÆ**

Body flattened, more narrow-elongate than in the Cimicidæ, to which they are related. Head with a large, apical, semilunar-shaped, moveable sclerite, referred to as clypeus by Horvath in 1910, and as labrum by Jordan in 1922. Eyes and ocelli absent. Antennæ and short rostrum each 4-segmented. Scutellum absent. Forewings reduced to thickened pads; hind wings absent. Forelegs short, with the femur greatly enlarged; tarsus with a prehensile claw. A characteristic feature is the presence of rows of comb-like spines or stout setæ on various parts of the body, particularly on the head. All are parasitic on bats, in both the Old and New World.

HESPEROCTENES Kirkaldy

Polyctenes Westwood & Giglioli; Giglioli (1864) Quart. Jour. Micr. Sci. II. 4: 25 (part).

Hesperoctenes Kirkaldy (1906) Canad. Ent. 38: 375.

Hesperoctenes fumarius (Westwood)*Polyctenes fumarius* Westwood (1874) Thes. Ent. Oxon. 198. pl. 38.*Hesperoctenes fumarius* Kirkaldy (1906) Canad. Ent. 38: 375.—Jordan (1922) Ectoparasites 1: 212. fig. 205-207.

Described from Jamaica. Vieques Island, Porto Rico, January 1899, on bat (Busck)—U.S.N.M.

Family **ANTHOCORIDÆ**

Comprised of small, inconspicuous forms with flattened, ovate bodies. Head porrect, most often longer than wide. Ocelli present. Bucculæ absent. Rostrum and tarsi each 3-segmented, the former acuminate apically. Arolia of tarsi absent. Hemiclytra, if present, composed of clavus, corium, embolium, cuneus, and membrane; the last with a transverse basal or prebasal vein, often somewhat obsolete, from which arise 1-4 often obscure veins. Genital segment of male asymmetric. In the female the external vagina exposed in a narrow, longitudinal slit between the genital segments. Brachypterous forms often occur. With few exceptions they are predaceous on smaller insects.

KEY TO PORTO RICAN SUBFAMILIES AND GENERA

1. Last two antennal segments thin, filiform, usually with long hairs. Discal cell of wing either with or without hamus; hamus, if present, arising from terminal connecting cross-vein ("connectens"). *LYTCOCORINÆ* (*Lytcocoraria* and *Xylcocoraria*)..... 2
- Last two antennal segments most often little thinner than second segment, shortly pilose. Discal cell of wing with hamus, arising from median vein ("subtensa") either before or at junction of terminal connecting cross-vein *ANTHOCORINÆ*..... 6
2. Discal cell of wing devoid of hamus. Canal from odoriferous orifice curved posteriorly, from its apex arising a fine carina, extending anteriorly in a gentle curve to anterior margin of metapleurum. Pronotum with lateral margin finely impressed; posterior margin deeply concave.....*Cardiastethus*.
 Discal cell of wing with a hamus arising from terminal cross-vein ("connectens"). Canal from odoriferous orifice otherwise formed..... 3
3. Canal from odoriferous orifice long, nearly transverse, beyond middle of metapleurum terminating in a fine carina extended anteriorly at right angle, parallel to lateral margin and reaching base of metapleurum. Pronotum devoid of distinct collar; lateral margin distinctly impressed. Corium densely punctate and finely pilose. (Extralimal?),.....*Lytcocoris*.
 Canal from odoriferous orifice most commonly not terminating in a fine carina; if so, then not extended at right angle to base of and parallel to lateral margin of metapleurum..... 4
4. Canal from oriferous orifice rather short, towards apex distinctly curved posteriorly. Pronotum devoid of distinct collar; lateral margin neither impressed nor carinate, this, as well as costal margin of corium, with rather long hairs.....*Lasiochilus*.

- Canal from odoriferous orifice toward apex anteriorly curved. Margins of pronotum and of corium devoid of long hairs. 5
5. Canal from odoriferous orifice very long, near middle strongly curved anteriorly and almost or quite reaching base of metapleurum. Pronotum devoid of distinct collar; lateral margin not distinctly impressed. *Xylocoris*.
Canal from odoriferous orifice short, gently anteriorly curved, not nearly reaching base of metapleurum. Pronotum with slight collar; lateral margin finely impressed, acute *Asthenidea*.
6. Head distinctly longer than wide, anteriorly prolonged; antecular region distinctly longer than eye. Antenna with second segment longer than interocular space; third and fourth segments little more slender than second. Pronotum anteriorly narrow, conic, cylindric in cross section; posteriorly abruptly elevated behind rather deep transverse constriction; lateral margin finely carinate. Canal from odoriferous orifice long, calloused posteriorly, curving anteriorly, reaching anterior margin of metapleurum. Dorsum for most part black, highly polished, sparsely long-pilose. *Macrotracheliella*.
Head short, not longer than wide, moderately prolonged anteriorly; antecular region not longer than eye. Antenna with second segment not much if any longer than width of interocular space; third and fourth segments narrowly fusiform. Pronotum anteriorly not conic, across anterior margin one half or nearly one half as wide as across posterior margin; posterior lobe strongly but not abruptly elevated behind slight, transverse constriction; lateral margin finely carinate. Canal from odoriferous orifice long, broadly curved anteriorly, reaching anterior margin of metapleurum. Posterior coxæ narrowly separated. 7
7. Head, pronotum, scutellum, and ventral parts of body black. Disk of pronotum slightly transversely impressed; anterior lobe with a distinct wide, smooth, calloused area; posterior lobe punctate or finely rugulose. Hemielytra flat *Orius*.
Head, pronotum and all ventral parts for most part testaceous-yellow. Disk of pronotum scarcely transversely impressed; anteriorly smooth, devoid of calloused area. Hemielytra convex. *Paratriphleps*.

Subfamily LYTCOCORINÆ

LASIOCHILUS Reuter

Lasiochilus Reuter (1871) Oefv. Vet.-Akad. Forh. 562.

Lasiochilus pallidulus Reuter

Lasiochilus pallidulus Reuter (1871) Oefv. Vet.-Akad. Forh. 562. pl. 7, fig. 5.

The body more broadly ovate, with pronotum more strongly narrowed anteriorly than in the following species. Anterior lobe of pronotum with a short fovea or sulcus posteriorly. Clavus coarsely and closely punctate.

Described from South Carolina. Vieques Island, Porto Rico, April 28, 1930 (Leonard)—author's coll. A common species in the southern United States, spreading south through Mexico and Central America

to Panama. In the West Indies it has been reported from Cuba, Guadeloupe, Grenada, and St. Vincent.

***Lasiochilus divisus* Champion**

Lasiochilus divisus Champion (1900) Biol. Cent. Am. Rhynch. 2: 307, 310.—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 243 (listed).—Drake & Harris (1926) Proc. Biol. Soc. Wash. 39: 35 (listed).

The body is rather narrowly elongate. Pronotum less narrowed anteriorly than in the preceding species and deeply longitudinally sulcate in the middle of the anterior lobe.

Described from Mexico and Grenada. Barceloneta, April 9, 1920 (Wolcott)—Ins. Exp. Sta. Río Piedras, December 15, 1911 (Jones)—U.S.N.M.; Isabela, April 24, 1920 and Vieques Island, Porto Rico, April 28, 1930 (Leonard)—author's coll.

***Lasiochilus microps* Champion (?)**

Lasiochilus microps Champion (1900) Biol. Cent. Am. Rhynch. 2: 307, 308.

Fuscous; corium anteriorly and the fracture before cuneus, ochraceous. Head and pronotum shining, the former as long as wide; eyes small. Pronotum not quite twice as wide in front as across humeral angles; anterior lobe with a short, median, longitudinal sulcus posteriorly; posterior lobe slightly depressed and faintly rugulose. Scutellum and corium dull, the former, except at base, transversely rugulose; corium and clavus evenly and finely punctate and with numerous inclined hairs, the costal margin ciliated with hairs similar to those of the general surface, and also with several long, erect hairs anteriorly.

Not having at hand specimens of Champion's species, described from Guatemala, I am somewhat uncertain regarding this determination. However, it answers very closely to the description of that species and, as Poppius has recorded it from Guadeloupe, it is probably correctly identified.

Bayamón, May 15, 1932 (Lesesne & Anderson)—U.S.N.M.

***XYLOCORIS* Dufour**

Xylocoris Dufour (1831) Ann. Sci. Nat. Paris, 22: 423.

Piezostethus Fieber (1860) Wien. Ent. Monat. 4: 265 (part).

***Xylocoris sordidus* (Reuter)**

Piezostethus sordidus Reuter (1871) Oefv. Vet.-Akad. Forh. 560.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from Texas and Brazil. Mona Island, Porto Rico, February 21–26, 1914 (Lutz); San Juan, August 2–3, 1914 (Barber)—A.M.N.H. Bayamón, April 6, 1934—U.S.N.M.

Widely distributed: United States, Mexico, Central America, and South America, as well as in the West Indies, where it has been recorded from Guadeloupe, Grenada, and St. Vincent.

ASTHENIDEA Reuter

Asthenidea Reuter (1884) Monogr. Anthocoridae 5, 48.

Asthenidea picta (Uhler)

Lasiophilus pictus Uhler (1894) Proc. Zool. Soc. Lond. 1894: 156, 157.

Asthenidea picta Wolcott (1924) Jour. Dep. Agr. P. R. 7: 243.

Head, pronotum, scutellum, cuneus, at least outwardly, and basal two segments of rostrum piceous; corium, with exception of cuneus, ochraceous and finely pilose; antennæ and legs stramineous. Scutellum opaque apically. Embolium narrow, about one-third the width of the corium. Canal from the odoriferous orifice short and curved posteriorly.

Described from St. Vincent and Grenada Islands. Pueblo Viejo, July 23, 1932 (Anderson & Faxon); St. Croix, Virgin Islands, June 14, 1917 (Morrison)—U.S.N.M.; Arecibo (Wolcott)—Ins. Exp. Sta. Specimens are also at hand from Cuba and Jamaica, as well as from Mexico and Central America. Champion records it from Mexico.

CARDIASTETHUS Fieber

Cardiastethus Fieber (1860) Wien. Ent. Monat. 4: 266.

Dasypterus Reuter (1871) Oefv. Vet.-Akad. Forh. 28: 564.

Cardiastethus rugicollis Champion

Cardiastethus rugicollis Champion (1900) Biol. Cent. Am. Rhynch. 2: 331.

Head, pronotum, scutellum, cuneus, and pleura fuscous, finely pilose dorsally. Eyes large. Head almost equally as long as wide; preocular part of head shorter than the length of an eye. Rostrum short; apex nearly reaching anterior coxæ. Pronotum short, about three times as wide posteriorly as long; posterior margin strongly concave; posterior lobe finely and closely rugulose. Apex of embolium much narrower than corium. Small species, 2.00 mm. long.

Described from Mexico, St. Vincent, and Grenada. Arecibo, September 26, 1933 (Faxon & Anderson); St. Croix, Virgin Islands, May 20, 1931 (Loftin)—U.S.N.M.

Specimens are also at hand from Cuba and Hispaniola.

Subfamily **ANTHOCORINÆ**

MACROTRACHELIELLA Champion

Macrotrachelilla Champion (1900) Biol. Cent. Am. Rhynch. 2: 322.

Macrotracheliella lævis Champion

Macrotracheliella lævis Champion (1900) Biol. Cent. Am. Rhynch. 2: 322. pl. 19, fig. 21, 22 22a.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Black, very shining, and very sparsely finely pilose. Base of second segment of antenna, commissural margin of the clavus and bases of all tarsi whitish.

Described from Mexico and Panama. San Juan, August 3, 1914 (Barber)—A.M.N.H. Caguas, April 8, 1932 on *Ficus nitida* (Mills & Anderson)—U.S.N.M.

The variety *floridana* Drake & Harris (1926) occurs also in Cuba; a single specimen so labeled is in the United States National Museum collection. Dr. H. L. Dozier (Jour. Dep. Agr. P. R. 10: 280. 1927) reports *M. nigra* Parshley, determined by C. J. Drake, as feeding on thrips at Juana Diaz on January 11, 1925 and at San Juan, July 2, 1925. It is possible that this may be a misidentification.

ORIVS Wolff

Orius Wolff (1811) Icon. Cim. 5: iv.

Tripheps Fieber (1860) Wien. Ent. Monat. 4: 266.

Orius insidiosus (Say)

Reduvius insidiosus Say (1832) Heterop. New Harm. 32.—Say (1859) Complete Writ. 1: 357.

Tripheps insidiosus Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Wolcott (1924) Jour. Dep. Agr. P. R. 7: 244.

In this species the posterior lobe is distinctly rugulose, the first segment of the antenna, the rostrum and the legs in part fuscous. Clavus black at base. For synonyms and additional references see Van Duzee, Cat. Hemip. 294. 1917.

Described as inhabiting the United States. San Juan, February 1914 (Lutz); July 9–12, 1914 (Barber); Naguabo, March 7–9, 1914 (Lutz); Coamo Springs, July 17–19, 1914 (Barber); Mayagüez, June 22, and Manatí, June 27–29, 1915 (Lutz & Mutchler)—A.M.N.H. Río Piedras, July 3, 1912 (Jones); Ponce, December 29, 1932 (Oakley); Loiza, April 11, 1932, on corn (Faxon & Anderson); Barceloneta, February 21, 1933 (Faxon, Mills & Anderson); Guyama, December 25, 1933 (Mills); Santurce, May 19, 1934; St. Thomas, Virgin Islands, June 4, 1917 (Morrison)—U.S.N.M. Recorded by Wolcott from Arecibo and Isabela, in the latter locality on red spider. The same author records it as occurring on corn, "presumably predaceous on *Aphis maidis* Fitch."

A common species in the United States; also recorded from Mexico, Central America, South America, and many of the islands of the West Indies.

PARATRIPHLEPS Champion

Brachysteles Reuter (1884) (part, not Mulsant & Rey) Monog. Anthoc. 113, 115.

Paratriphleps Champion (1900) Biol. Cent. Am. Rhynch. 2: 328.

Paratriphleps pallidus (Reuter)

FIGURE 32

Brachysteles pallidus Reuter (1884) Monogr. Anthoc. 115, 118.—Uhler (1894) Proc. Zool. Soc. Lond. 1894: 201.

? *Paratriphleps pallidus* Champion (1900) Biol. Cent. Am. Rhynch. 2: 329.

Pale ochraceous, with the anterior and also sometimes the posterior margin of the pronotum and the apex of the scutellum infuscated. Corium rather densely and distinctly punctate. *P. læviusculus* Champion, described from Panama, is very similar to, if not identical with,

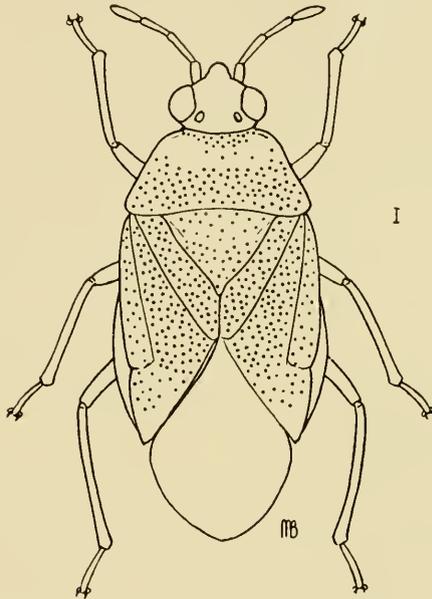


FIG. 32 PARATRIPHLEPS PALLIDUS REUTER

the above species. The chief distinction, as indicated by Champion, is the almost impunctate corium and the partly infuscated intermediate and hind tibiae. In the five specimens of *P. pallidus* cited below from Spring Gut, St. Croix, Virgin Islands, June 14, 1917, collected by Harold Morrison, one male specimen is finely, rather densely punctate, the other four specimens, consisting of a male and four females, have the corium smooth, almost impunctate, thus answering to Champion's description of *P. læviusculus*.

Described from the islands of St. John and St. Thomas, Virgin Islands. San Juan, July 9–12, 1914 (Barber)—A.M.N.H. Spring Gut, St. Croix, June 14, 1917 (Morrison)—U.S.N.M.

Uhler lists it from Grenada and St. Vincent. Specimens are at hand also from Jamaica and Florida.

Family CRYPTOSTEMMATIDÆ

Minute forms, often brachypterous. The 4-segmented antennæ and the head long-setose; the last two segments of the antenna very slender. Ocelli minute, placed close to eyes. Rostrum 3-segmented, rather long, very slender apically. Hemelytra either entirely membranous or entirely subcoriaceous. Scutellum relatively large; width at base over more than one-half the width of the basal margin of the pronotum. All tibiæ provided with strong bristles. All coxæ greatly developed. Odoriferous orifice absent. Only the subfamily Cryptostemmatinæ is represented in Porto Rico.

CERATOCOMBUS Signoret

Ceratocombus Signoret (1882) Ann. Soc. Ent. France 11. 10: 542.—McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67 (13): 3, 4.

Ceratocombus vagans McAtee & Malloch

Ceratocombus vagans McAtee & Malloch (1925) Proc. U. S. Nat. Mus. 67 (13): 7.

Head, pronotum, and scutellum pale chocolate-brown, somewhat shining; hemelytra pale brown; antennæ and legs stramineous. Pronotum with the apical constriction not complete, widely interrupted in the middle; disk just behind middle with a pair of widely separated foveæ; anteriorly frequently with a median, longitudinal, impressed line. Hemelytra subcoriaceous; venation rather indistinct.

Described from Glen Echo, Maryland. Río Piedras, January 19, 1935 (Mills)—U.S.N.M. Jayuya, September 9, 1931 (Leonard)—author's coll. Probably occurs over the entire eastern United States from New York to Florida; recorded also from Panama.

Family HYDROMETRIDÆ

The members of this family have very elongate, slender bodies and appendages. Head subcylindric, enlarged anteriorly, about as long as the pronotum, with three pairs of setæ, two on the enlarged anterior part and one near the base; eyes remote from anterior margin of pronotum; ocelli absent. Antennæ 4; rostrum 3-segmented, rather short. Wings usually absent. All are predaceous, living in quiet

waters, walking on floating vegetation or on the surface of the water; occasionally along the shore. They are commonly called marsh-treaders.

HYDROMETRA Latreille

Hydrometra Latreille (1796) Précis Caract. Ins. 86 (no species named).*—Lamarek (1801) Systeme Anim. Sans Vertebr. 295. (Two species named, one of which, *H. stagnorum* Linn. was specified as type by Latreille, 1810.)
Limnobates Burmeister (1835) Handb. 2: 210.

Hydrometra consimilis Barber

Hydrometra consimilis Barber (1923) Am. Mus. Novit. 75: 9.—Torre-Bueno (1926) Ent. Am. 7: 106.—Hungerford (1934) Ann. Mus. Nat. Hung. 28: 92.

Head with the anteoocular region twice or nearly twice as long as the postocular; clypeus small, narrow, pointed. Rostrum reaching to beyond the middle of the postocular region. Posterior lobe of the pronotum with large, rather obscure punctures. Two pits on each side of the cleft of the anterior and intermediate acetabula. Mesosternum devoid of a median longitudinal groove. Processes of the sixth ventral abdominal segment of the male transverse, linear. Length 8.00–9.50 mm.

Described from Porto Rico. Coamo Springs, July 19, 1914 (Barber)—A.M.N.H. Añasco District, July 3, 1917 (Morrison)—U.S.N.M.

Torre-Bueno adds Cuba to the record of distribution. This is evidently an insular species.

Family GERRIDÆ

Antennæ free, usually slender but sometimes variously modified, 4-segmented, inserted before the eyes. Rostrum 4-segmented, with the first and second segments much the shortest. Anterior legs remote from the intermediate pair, rather short and raptorial, the femur somewhat enlarged, the claws ante-apical, inserted in a cleft of the last tarsal segment; intermediate and hind legs very long, either simple or modified; apex of hind femur extended behind apex of abdomen; all tarsi and body beneath covered with short, close-set pile, often presenting a silvery-white appearance. Both apterous and winged forms occur. In the latter case the hemielytra are somewhat membranous and undifferentiated. The family is subdivided into Gerrinæ, and Halobatinæ. They glide about over the surface of the water, feeding upon dead and living prey.

* According to Opinion 46 of the International Code the genus will have to be accredited to Latreille, 1796.

KEY TO PORTO RICAN GENERA

1. Inner margin of the eye rounded. Body relatively short and broad. Antennæ and legs, particularly of male, often variously modified. First segment of antenna equal to or shorter than the second and third conjoined. Basal segment of anterior tarsus much shorter than flattened second segment. *Rheumatobates*.
 Inner margin of the eye sinuate behind the middle. Body relatively longer and narrower. Antennæ and legs simple in both sexes. 2
2. Head and pronotum shining. First tarsal segment of foreleg much shorter than second. *Limnogonus*.
 Head and pronotum dull. Tarsal segments of foreleg of equal length. *Gerris*.

RHEUMATOBATES Bergroth

Rheumatobates Bergroth (1892) Insect Life 4: 321.

Hymenobates Uhler (1894) Proc. Zool. Soc. Lond. 1894: 214.

Rheumatobates imitator (Uhler)

Hymenobates imitator Uhler (1894) Proc. Zool. Soc. Lond. 1894: 214.

Described from Grenada. Guayabal Reservoir, February 20, 1934 (Hildebrand).

This species, described by Uhler (1984), and *R. bergrothi*, described by Meinert also from Grenada the following year, are closely related but distinct species. Before me are three brachypterous males of *R. bergrothi*, two from Jamaica and one from Haïti. In Uhler's species the posterior trochanter is much less swollen and devoid of a prominent preapical tubercle above, and the intermediate and hind tibiæ are strongly sinuate. In *R. bergrothi* the intermediate tibia is straight and the posterior tibia is much less sinuate. Sketches of a Porto Rican specimen were sent to Mr. W. E. China of the British Museum, who has kindly compared these with Uhler's type male from Grenada and in a recent letter he states that these agree with *R. imitator*. He also pointed out the distinctions between these two species. It seems therefore, that Bueno (Ohio Nat. 8: 380. 1908) and Kirkaldy & Bueno (Proc. Ent. Soc. Wash., 10: 212. 1909) are in error in treating *R. bergrothi* as a synonym of *R. imitator*.

LIMNOGONUS Stål

Limnogonus Stål (1868) Hemip. Fabr. 1: 132.

Tenagogonus Van Duzee (not Stål) (1917) Cat. Hemip. 429.

Limnogonus franciscanus (Stål)

Gerris marginatus Guérin-Méneville (1844) Icon. Regne Anim. Ins. 351. pl. 57, fig. 2 (pre-occupied).—Stahl (1883) Cat. Cab. Zool. 212 (listed).

Gerris franciscanus Stål (1859) Freg. Eugen. Resa Ins. 265.

Limnotrechus marginatus Gundlach (1894) Fauna Puerto-Riquena 599 (listed).

Gerris guerini Lethierry & Severin (1896) Cat. Gen. Hem. 3: 61 (new name).

- Limnogonus guerini* Kirkaldy & Bueno (1908) Proc. Ent. Soc. Wash. **10**: 210. (Catalogued).—
 Drake & Harris (1934) Ann. Carn. Mus. **23**: 206. pl. 24, fig. 3.
Tenagogonus (Limnogonus) guerini Barber (1923) Am. Mus. Novit. **75**: 13 (listed).
Tenagogonus (Limnometra) quadrilineatus Wolcott (not Champion) (1924) Jour. Dep. Agr.
 P. R. **7**: 244 (listed).
Limnogonus marginatus Wolcott (1924) Jour. Dep. Agr. P. R. **7**: 244 (listed).
Limnogonus franciscanus Drake & Harris (1935) Arkiv Zool. **28**: 2.

Brownish black. The following parts marked with yellow: head with two widely separated, longitudinal lines and base transversely; pronotum with margin, anterior lobe with two short, discal, median lines, posterior lobe with a median, longitudinal line, abdomen with more or less distinct median line, and usually the connexivum, except for extreme edge. Beneath pale yellow, the pleura with a broad longitudinal black streak. Size variable, 5.50–10.00 mm.

Described from Cuba. San Juan, February 11–14, 1914 (Lutz), July 1–5, 1914 (Barber); Mona Island, Porto Rico, February 21–26, 1914 (Lutz); Coamo Springs, July 17–19, 1914 (Barber), January 7, 1915 (Lutz & Mutchler); Martin Peña, December 31, 1914; Quebradillas, January 3, Caguas, May 28–29, Barros, June 4, and Adjuntas, June 8–13, 1915 (Lutz & Mutchler); Aibonito, February 10, and Ensenada, February 12, 1925 (Lutz & Woodruff); St. Thomas, Virgin Islands, February 27–28, and St. John, Virgin Islands, March 8, 1925 (Lutz & Woodruff)—A.M.N.H. Utuado, January, Arroyo, February, Culebra Island, Porto Rico and Vieques Island, Porto Rico, February 1899 (Busck); Mayagüez, January 26, 1912 (Hooker); Ponce, July 12, 1934 (Oakley); St. Thomas, Virgin Islands, June 2, 1917 (Morrison)—U.S.N.M.

Recorded from southern California and Texas, spreading south through Mexico and Central America. In the West Indies it is known from Cuba, Haïti, Jamaica, Grenada, and St. Vincent.

Several species of this genus are colored and marked much the same, but *L. franciscanus* is the only species thus far known from the West Indies.

GERRIS Fabricius

- Gerris* Fabricius (1794) Ent. Syst. **4**: 187 (part).
Hygrotrechus Stål (1868) Oefv. Vet.-Akad. Forh. **27**: 395.
Limnoporus Stål (1868) Oefv. Vet.-Akad. Forh. **27**: 395, 396.
Limnotrechus Stål (1868) Oefv. Vet.-Akad. Forh. **27**: 395.

Gerris remigis Say

- Gerris remigis* Say (1832) Heterop. N. Harm. Ind. 35.

Dull blackish-brown, with a median longitudinal yellow stripe anteriorly on the pronotum. Beneath densely grayish-pubescent. First segment of the antenna equal to the second and third conjoined.

Posterior margin of the sixth ventral segment, male, deeply and roundly excavated; connexival spine of this segment rather long. Median carina of the first genital segment rather prominent, strongly impressed on each side. Larger and more robust than the other included species.

Described from the United States. Quebradillas, January 1, 1915 (one specimen)—A.M.N.H.

Distributed over Canada and the United States, spreading south through Mexico and Central America. This is apparently the first record of its appearance in the West Indies.

Gerris cariniventris Champion

Gerris cariniventris Champion (1898) Biol. Cent. Am. Rhynch. 2: 145, 148. pl. 9, fig. 11-12.—Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Drake & Harris (1934) Ann. Carnegie Mus. 23: 197. pl. 24, fig. 6.

Brownish-black. The following parts marked with ochraceous: head with an irregular fascia before the eyes, an arcuate transverse basal fascia, which is frequently continued anteriorly along the side to connect with the preocular patch; pronotum with lateral margin, the anterior lobe with a median, longitudinal line; mesonotum exposed in the apterous form; tergal segments each with a median ovate spot. Pleura yellow-ochraceous, often with a longitudinal black stripe. Beneath pale yellow. First segment of the antenna much shorter than the second and third conjoined. Outer apical angle of the sixth connexival segment not produced in a spine. Anterior femur of the male strongly curved towards base and subangularly dilated below. Pronotum in apterous form extending over the anterior part of the mesonotum.

Described from Mexico, Guatemala, Costa Rica, and Panama. Maricao, July 27, 1914 (Barber); Barros, June 4, 1915 (Lutz & Mutchler)—A.M.N.H. Drake & Harris record it from Haïti.

Family VELIIDÆ

Antennæ and rostrum each 4-segmented (the latter apparently 3-segmented in *Rhagovelia*). Ocelli either absent or obsolete. Intermediate legs most often nearly equidistant from anterior and posterior pairs (except *Rhagovelia*). Legs in comparison with the Gerrinæ relatively short, all either simple and similar in structure or often variously modified; apex of hind femur scarcely or not at all extended beyond end of abdomen. Often apterous. Consisting for the most part of small forms which skim about over the surface of the water, feeding

upon smaller animals. Only two genera have thus far been found to occur in Porto Rico.

KEY TO PORTO RICAN GENERA

- Legs similar and simple; all femora of nearly equal size. Anterior tarsus 2-segmented, others 3-segmented. Intermediate tarsus shorter than tibia, terminal segment only slightly cleft for reception of claws. First antennal segment not particularly elongate as compared with remaining segments. *Microvelia*.
- Legs dissimilar; posterior femur, particularly of male, often enlarged and often armed beneath with spines. All tarsi 3-segmented; first and second segments of anterior, and basal segment of others, very short. Intermediate tarsus subequal to length of tibia, deeply cleft and there provided with long, ciliate hairs. First antennal segment distinctly longer than remaining segments combined.
 *Rhagovelia*.

MICROVELIA Westwood

Microvelia Westwood (1834) Ann. Soc. Ent. Fr. 3: 647.

Microvelia pulchella Westwood

Velia (*Microvelia*) *pulchella* Westwood (1934) Ann. Soc. Ent. France 3: 647. pl. 6, fig. a-g.

Microvelia pulchella Gundlach (1894) Fauna Puerto-Riquena 599 (listed).—Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Winged form. Dark brown, slightly cinerous on head and pronotum; a transverse, testaceous fascia anteriorly on the pronotum, which at the middle point is continued posteriorly in a calloused longitudinal line, either abbreviated or sometimes continued beyond the middle of the disk. Corium with distinct, brown veins enclosing two conspicuous, elongate, basal, lacteous fasciæ; apical half embrowned, with a conspicuous, oval, preapical spot, preceded by a transverse row of four fainter, oval spots. The following parts yellow-testaceous: rostrum except at apex, head beneath, prosternum, posterior margin of proplurum, acetabula, connexivum, and broad central disk of the venter. Legs stramineous, frequently with the femora apically and tibiæ above lightly infuscated. Head one-sixth longer than wide (.48 × .40 mm.); preocular part a little shorter than length of an eye; before the middle with a slight, longitudinal, median, impressed line. Antenna finely pilose, a little shorter than head and pronotum conjoined; relative lengths of the segments variable; average length of segments in three specimens as follows: I-.187, II-.147, III-.247 and IV-.313 mm. Pronotum a little more than one and one-half times wider than long, provided anteriorly at either end of the testaceous fascia with a distinct, silvery, pubescent area. Legs finely pilose; posterior femur in the male unarmed and straight; intermediate tibia within provided with several long, fine hairs; posterior tibia straight. Length 2.00–2.32 mm.

Described from St. Vincent. Coamo Springs, July 17-19, 1914 (Barber); Aibonito, June 1-3, 1915 (Lutz & Mutehler)—A.M.N.H. St. Thomas, Virgin Islands, June 4, 1917 (Morrison)—U.S.N.M. Other specimens in the United States National Museum collection are from Cuba and Grenada. Van Duzee lists it from Jamaica.

***Microvelia robusta* Uhler**

Microvelia robusta Uhler (1894) Proc. Zool. Soc. Lond. 1894: 219.

Winged form. Head and pronotum black; pronotum anteriorly with a rather inconspicuous, transverse, yellow-testaceous fascia; either side of the middle densely covered with short silvery pubescence, similar to that bordering the inner margin of the eye. Corium with conspicuous, brown veins, heavily bordered with brown; two elongate basal fasciæ and a preapical oval spot lacteous, the latter preceded by two inconspicuous fasciæ, the inner one elongate. Connexivum black. Body beneath cinerous, pruinose, with the following parts more or less distinctly testaceous: head, prosternum, posterior margin of the propleurum, and acetabula. All coxæ, trochanters, and bases of femora stramineous. Head nearly one-fourth wider than long; preocular part a little shorter than the length of an eye, anteriorly with a short, median, longitudinal, linear impression. Antenna much shorter than head and pronotum conjoined; length of the segments as follows: I-.20, II-.14, III-.22 and IV-.36 mm. Pronotum nearly one and one-fourth times wider than long (.94 × .76 mm.), with a median, longitudinal, velvety black carina. Posterior femur of the male unarmed; posterior tibia distinctly curved and with long, slender hairs within; intermediate tibia with a row of long, fine hairs. Length 2.30-2.36 mm.

Described from Grenada. San Juan, February 11-14, and Mona Island, Porto Rico, February 21-26, 1914 (Lutz); San Juan, July 17, and Arecibo, July 30-August 1, 1914 (Barber); Martin Peña, December 31, 1914 (Lutz); Caguas, May 28-29, and Adjuntas, June 8-13, 1915 (Lutz & Mutehler)—A.M.N.H. Isabela, March 25, 1935 (Hoffman); St. Thomas, Virgin Islands, June 2, 1917 (Morrison)—U.S.N.M. Occurs also in Cuba and Florida.

The males are readily distinguished from the preceding species by the curvature of the posterior tibiæ.

***Microvelia capitata* Guérin-Ménéville**

Microvelia capitata Guérin-Ménéville, in Sagra (1857) Hist. Cuba Ins. 417.—Barber (1923)

Am. Mus. Novit. 75: 13 (listed).

? *Microvelia albonotata* Champion (1898) Biol. Cent. Am. Rhynch. 2: 129. pl. 8, fig. 17.

Microvelia albonotata Wolcott (1924) Jour. Dep. Agr. P. R. 7: 244.

Winged form. Preocular part of head and pronotum black; vertex of head fulvous, the black anterior patch frequently continued posteriorly in a median, longitudinal line, and a narrow line near inner margin of eye. Pronotum anteriorly with a distinct, calloused, transverse, yellow-testaceous fascia, which is not outwardly covered by a silvery pubescent patch as in *M. robusta*. Corium with veins strongly bordered with dark brown, with two distinct elongate basal fasciæ, and a preapical oval spot, preceded by an outer oval and an inner elongate fascia, this frequently divided. Connexivum yellow-testaceous with incisures black. Beneath black, plumbeous, with the following parts conspicuously yellow-testaceous: acetabula, posterior margin of propleurum, and lateral margin of venter. Most of the basal segments of the antennæ, the coxæ and trochanters and bases of all femora above and below stramineous; apices of all femora and of all tibiæ embrowned.

Head nearly one-sixth wider than long (.44 × .38 mm.), the preocular part much shorter than the length of an eye; longitudinal impression obsolete. Pronotum one-sixth wider than long (.72 × .60 mm.), longitudinally carinate along the middle line. Antenna long and slender, somewhat longer than head and pronotum conjoined; terminal segment as long as or longer than the second and third conjoined; length of segments as follows: I-.20, II-.14, III-.30, IV-.48 mm. Body, particularly of the male, narrower than in the two preceding species, with the legs relatively longer. Hind femur of the male beneath, almost throughout, with a series of fine spines; hind tibia straight, having within a row of very minute spines. First ventral segment beneath, in the male, with a distinct yellow tubercle. Length 2.20-2.40.

Described from Cuba. Río Piedras, December 18, 1911 (Jones), July 12, 1916 (Smyth); Isabela, March 25, 1935 (Hoffman)—U.S.N.M. Occurs also in Grenada.

Very distinct from the other species herein discussed by reason of the more narrow body of the male, with longer antennæ and legs. The posterior femur of the male with a row of spines and the venter anteriorly with a distinct, pallid tubercle. Apterous form not seen.

This species as occurring in the United States has been called *M. albonotata* Champion by a number of workers. Before me are a number of specimens, both males and females, of Champion's species from Mexico and Central America. There are no structural or color distinctions either between these and the West Indian specimens, known as *M. capitata*, or those from the United States. It seems entirely

possible that Champion's *M. albonotata* will have to be considered a synonym of Guérin-Ménéville's species.

***Microvelia paludicola* Champion**

Macrovelia paludicola Champion (1898) Biol. Cent. Am. Rhynch. 2: 127. pl. 8, fig. 13.

Winged form. Head and pronotum brownish black, the latter anteriorly with a transverse fulvous fascia; area at either end of this silvery-pubescent; posterior margin flavo-testaceous. Corium with conspicuous brown, silvery-pubescent veins, enclosing two elongate basal cells, followed by two other 4-angulate cells, and a terminal cell that is open behind. Connexivum yellow-testaceous, with black incisures. Beneath black, plumbeous, with the following parts yellow: prosternum, posterior margin of propleurum, and acetabula. Lateral margin of the venter fulvous. Legs embrowned, with the coxæ, trochanters, bases of femora above and beneath yellowish.

Body broad. Head almost one-third wider than long; preocular part a little shorter than length of an eye, a distinct, longitudinal, linear impression along the middle line, continuous almost to base. Pronotum but little wider than long, with a median, longitudinal carina. Antenna shorter than head and pronotum conjoined. First and second segments subequal; length of segments as follows: I-.40, II-.40, III-.48, IV-.52. Legs rather long and slender. Posterior femur of male with 4 or 5 spines near apex. Posterior tibia straight. Length 2.80-3.50 mm.

Described from Guatemala. Coamo Springs, July 20-22, and Ponce, July 20-22, 1914 (Barber); Adjuntas, June 8-13, 1915 (Lutz & Mutchler)—A.M.N.H.

Winged and apterous forms were collected. Winged forms are larger and broader than the other three species discussed and the posterior femur of the male is armed with spines. What seems to be the same species occurs in Texas.

RHAGOVELIA Mayr

Rhagovelia Mayr (1865) Verh. Zool. Bot. Ges. Wien 15: 445.

Trochopus Carpenter (1898) Ent. Mo. Mag. 34: 78.

***Rhagovelia collaris* (Burmeister)**

Velia collaris Burmeister (1835) Handb. Ent. 2: 212.

Rhagovelia collaris Mayr (1865) Verh. Zool. Bot. Ges. Wien. 15: 445.—Gould (1931) Bull. Univ. Kansas 32: 21.

Rhagovelia tayloriella Barber (1923) (not Kirkaldy) Am. Mus. Novit. 75: 13 (listed).

Described from San Domingo. Naguabo, March 7-9, 1914 (Lutz); Aibonito, July 14-17, Tallaboa, near Ponce, July 23, and Maricao,

July 27, 1914 (Barber); San Juan, May 26, Barros, June 4, Adjuntas, June 8-13, Mayagüez, June 21-23, and Naranjito, July 6, 1915 (Lutz & Mutehler)—A.M.N.H. Barranquita, February 20, 1927 (Hoffman); Marieao, January 26, 1929 (Danforth), February 20, 1934 (Hildebrand); Ponce, July 12, 1934 (Oakley)—U.S.N.M.

The author formerly identified this as *R. tayloriella* Kirkaldy, in fact there are evidently no constant structural characters, besides the shape, which can be relied upon to separate these two species. Before me are an apterous female from Jamaica labeled by Kirkaldy as his species and two apterous males determined by Drake & Harris as the same species. These are more narrow-elongate than *R. collaris*. It seems very probable that *R. angustipes* in Wolcott's "Insecta porticensis" should be referred to *R. collaris*.

Rhagovelia plumbea Uhler

Rhagovelia plumbea Uhler (1894) Proc. Zool. Soc. Lond. 1894: 217.

Described from inlets of Florida Keys and from Bay of St. George, Grenada. A single female labeled Boqueron, March 7, 1929 (Danforth)—author's coll.

Family **SALDIDÆ**

Bodies oval and somewhat flattened. Eyes large, strongly projecting, the inner margins either emarginate or sinuate. Ocelli 2, distinct. Antenna with 4 similar segments, or with the last two sometimes enlarged. Rostrum 3-segmented; first segment very short. Pronotum trapezoidal with lateral margin impressed, sometimes expanded, sometimes reflexed; anterior disk most often occupied by a transverse elevation or callus, with usually a deep central fovea. Scutellum large. Membrane with 4 or 5 elongate cells. Hind legs fitted for leaping. Coxæ enlarged, placed close together; all tarsi three-segmented, the claws devoid of arolia. Last ventral segment of the female produced, covering the genital segments. They live along the margins of bodies of waters, leaping, running and flying with great facility, feeding upon smaller forms of animal life which frequent the shore. Three genera occur in Porto Rico.

KEY TO PORTO RICAN GENERA

1. Membrane with 5 entire cells. Last ventral segment of female truncate. *Pentacora*.
 Membrane with 4 cells. Anterior margin of pronotum narrower than head across eyes, rarely as wide as this, in which case the corium not punctate. The inner cell of membrane prolonged very little or not more than one-third of its length beyond next cell. 2
2. Corium with two distinct veins, inner one forked towards apex. Anterior callus of pronotum distinctly not reaching lateral margins on each side. . . . *Saldula*.

Corium with at least inner forked vein obsolete or absent. Anterior callus of pronotum very nearly or quite reaching lateral margins on each side.
 *Micracanthia*.

PENTACORA Reuter

Pentacora Reuter (1912) Oefv. Vet.-Akad. Forh. 54: 7, 10.

Pentacora sphacelata (Uhler)

Salda sphacelata Uhler (1877) Bull. U. S. Geol. Geogr. Surv. 3: 434.

Described from Massachusetts and Maryland. Porto Rico near shore (no other data)—A.M.N.H.

Widely distributed in the United States, and recorded from Cuba by Uhler.

SALDULA Van Duzee

Acanthia Reuter (1895) Acta Soc. Sci. Fenn. 21: 5, 9.

Saldula Van Duzee (1914) Trans. San Diego Soc. Nat. Hist. 2: 32.

Saldula pallipes (Fabricius)

Salda pallipes Fabricius (1803) Syst. Rhyn. 115.

Saldula pallipes Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from Denmark. Ensenada, June 14-19, 1915 (Lutz & Mutchler)—A.M.N.H.

A very common species in most of the United States and recorded from Cuba and Hispaniola by Kirkaldy & Bueno. For synonyms and references see Van Duzee, Cat. Hemip. 443, 444. 1917.

MICRACANTHIA Reuter

Micracanthia Reuter (1912) Oefv. Vet.-Akad. Forh. 54: 8, 16.

Micracanthia sulcata NEW SPECIES

FIGURE 33

Head, except in front, pronotum, and scutellum black, slightly shining, rather densely covered with appressed, golden-brown pubescence. Hemelytra with the clavus and corium dull, velvety-black, sparsely clothed with appressed, golden-brown pubescence. Bucculae, head in front, and a small spot on each side of the vertex at the inner margin of the eyes testaceous-yellow. Costal margin of the hemelytra narrowly sordid-white, expanded somewhat towards apex; before the middle with a sordid-white fascia extending inwardly on the disk nearly to the claval vein. The small preapical spot of the clavus and also two spots along the posterior margin of the corium yellow-testaceous, the one nearest the outer angle comma-shaped, being prolonged and anteriorly enlarged. Membrane slightly embrowned, the cells devoid of darker maculations. Antenna with the basal two segments testa-

ceous, the remainder fuscous. Body beneath black, with the posterior margins of the ventral segments of the abdomen very narrowly pale; last ventral segment of the female, posteriorly, broadly white. Legs with the coxæ black, the remaining parts stramineous; femora apically, extreme apices of the tibiæ, and tarsi lightly infuscated. Head before the ocelli with a distinct, median, longitudinal sulcus. Antenna with the basal segment a little more than one-half as long as second, the latter a little longer than the third, which in turn is equal to the fourth

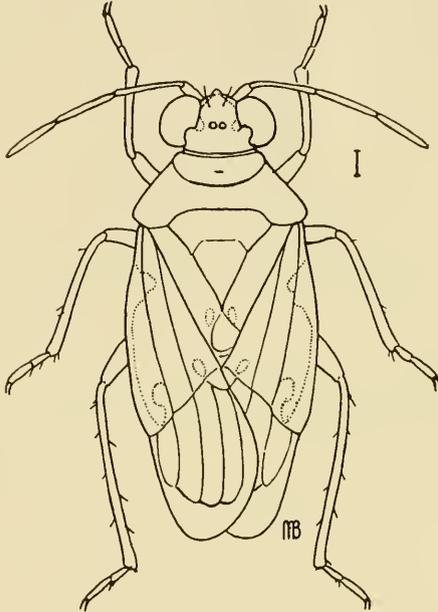


FIG. 33 *MICRACANTHIA SULCATA* N.SP.

segment; length of segments as follows: I-.28, II-.52, III-.40, IV-.40 mm. Pronotum three times as wide as long; lateral margin straight, very narrowly impressed, the transverse callus on the anterior disk appearing more strongly elevated than in *M. humilis* by reason of the deeper transverse impressions before and behind this. Length 3.28 mm.

Type, male: Coamo Springs, Porto Rico, July 17-19, 1914 (Barber)—A.M.N.H. Paratypes, male: Cicales, November 28, 1921 (Sein)—U.S.N.M. Cat. no. 51594; 6 females: same data as type.—A.M.N.H.

This is the species reported as *Micracanthia* sp. in the author's report on the Hemiptera Heteroptera of Porto Rico in 1923. It is re-

lated to *M. humilis* (Say); it differs by being more densely pubescent, this pubescence being golden-brown, not silvery-white, the pronotal callus appearing more elevated, the head sulcate anteriorly, the corium differently marked and the membrane-cells devoid of fuscous spots.

***Micracanthia humilis* (Say) ?**

? *Acanthia humilis* Say (1832) Heterop. N. Harm. 35.

Described from Florida. A single male specimen from San Juan, July 9-12, 1914 (Barber)—A.M.N.H.

This single specimen is very small, only about one-half as large as typical specimens from the United States, or about the size of *M. pumpila* Blatchley, described from Florida. Uhler reported *M. humilis* from Grenada. Of the eight Grenada specimens from the Uhler collection in the United States National Museum only one is the true *M. humilis*, the others represent an undescribed species quite different from *M. sulcata*.

Family **PLEIDÆ**

Small insects, with strongly arched bodies. Head short, wide, strongly deflexed anteriorly. Ocelli absent. Antennæ 3-segmented. Rostrum very short, 4-segmented. Hemelytra devoid of a membrane, thick, coriaceous, covering entire abdomen, with an interlocking device posteriorly; two clavi either absent or present; when present forming a commissure where the two meet behind the scutellum; and also in this case the hind wings fully developed. Legs similar, not specially adapted for swimming. Tarsi either 2- or 3-segmented. Predaceous on small crustaceans.

PLEA Leach

Plea Leach (1817) Trans. Linn. Soc. Lond. 12: 11.—Esaki & China (1928) Eos 4: 166.

***Plea puella* Barber**

FIGURE 34

Plea striola Uhler (not Fieber) (1894) Proc. Zool. Soc. Lond. 1894: 224.

Plea puella Barber (1923) Am. Nus. Novit. 75: 11.

Considerably smaller than *P. striola* Fieber, with the dorsum much less arched, and the hemelytra posteriorly more abruptly declivous. Pronotum posteriorly with fairly large reticulate cellules. Clavus distinctly set off from the corium and the hind wings fully developed.

Described from Porto Rico. Arcibo, July 30-August 1, 1914 (Barber)—A.M.N.H.

Distribution: St. Vincent, Grenada, Cuba, and Panama.—U.S.N.M.

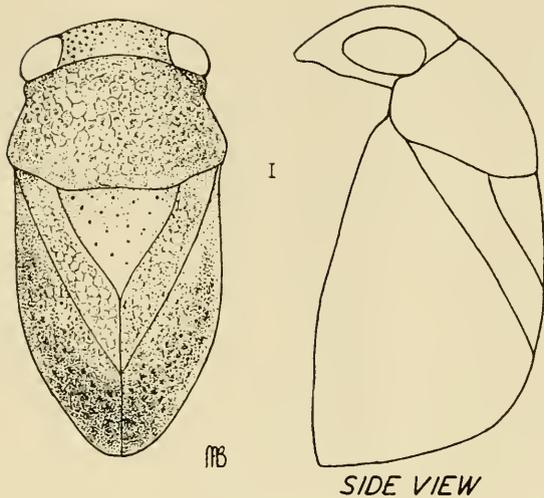


FIG. 34 PLEA PUELLA BARBER

Plea punctifer Barber

FIGURE 35

Plea punctifer Barber (1923) Am. Mus. Novit. 75: 10.

Considerably larger than the preceding species and slightly larger than *P. striola*, from which it differs by being less arched above; clavus present; pronotum, clavus, and corium closely, finely, and evenly punctate.

Arecibo, July 30–August 1, 1914 (Barber)—A. M. N. H.

Family NOTONECTIDÆ

Body deep, strongly convex dorsally. Eyes very large, reniform, bisinuate outwardly. Ocelli absent. Antennæ very short, 3- or 4-segmented, partly concealed in a groove between the head and pronotum. Rostrum very short, 4-segmented. Fore and intermediate legs adapted for grasping; posterior pair long, adapted for swimming, being more or less flattened and fringed with hairs. Tarsi 2- or 3-segmented; claws on posterior pair inconspicuous. Venter of the abdomen with a median, longitudinal carina, fringed with long hairs; lateral margin also fringed with hairs. They are called back swimmers. Only two genera occur in Porto Rico.

KEY TO PORTO RICAN GENERA

Commissure of hemielytra, behind apex of scutellum, devoid of a pit. Intermediate femur stout, with preapical tooth. Intermediate tarsus with two well developed

segments and very short basal segment. Terminal segment of antenna much shorter than preceding one. *Notonecta*.
 Commissure of hemelytra, behind apex of scutellum, provided with a pit. Intermediate femur slender. Terminal segment of antenna longer than preceding one. Body usually smaller and more slender than in preceding genus. Apex of fore femur much wider in male than in female. *Buenaia*.

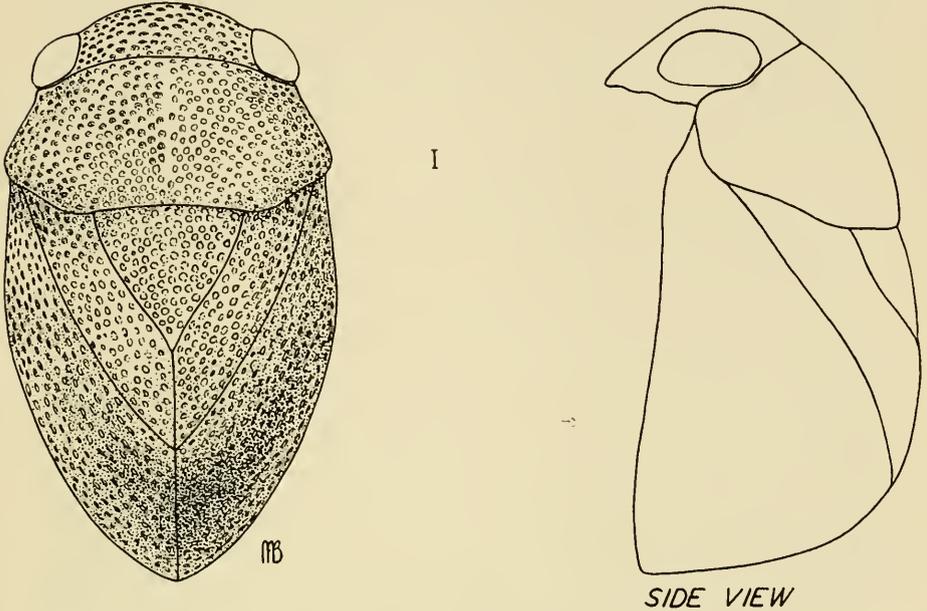


FIG. 35 PLEA PUNCTIFER BARBER

NOTONECTA Linnaeus

Notonecta Linnaeus (1758) Syst. Nat. ed. 10. 439.—Kirkaldy (1897) Trans. Ent. Soc. Lond. 397.—Hungerford (1933) Bull. Univ. Kansas 34: 9, 23.

Notonecta indica Linnaeus

Notonecta indica Linnaeus (1771) Mant. Plant. 2: 534.—Hungerford (1933) Bull. Univ. Kans. 34: 68, 113.

Notonecta variabilis var. *scutellaris* Fieber (1851) Rhynch. 477.

Notonecta undulata Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Color extremely variable, being entirely luteous, or sometimes almost entirely black, but most typically black and white, in which case the following parts are black: scutellum, broad apex of corium, and base of membrane or often all of last. Closely related to the equally variably colored *N. undulata* Say, both in color and structure, and often confused with that species. As remarked by Hungerford, the

head is relatively shorter and blunter in front and the lateral margins of the pronotum more nearly parallel-sided in *N. indica*.

Coamo Springs, July 17-19, and Arecibo, July 30, 1914 (Barber)—A.M.N.H. Río Blanco, Lares, March 1, 1934; Guayabal Reservoir, Juan Diaz, February 7, and Guinea Reservoir, Juan Diaz, February 20, 1934 (Hildebrand); St. Thomas, Virgin Islands, June 7, 1917 (Morrison)—U.S.N.M.

Its distribution extends through the southern United States, Mexico, and Central America as far south as Colombia. It has been recorded in the West Indies from Cuba, Jamaica, Porto Rico, St. Croix, and St. Thomas.

BUENOA Kirkaldy

Anisops Fieber (1851) Abh. Böhm. Ges. Wiss. V. 7: 483 (part).

Buenoa Kirkaldy (1904) Wien. Ent. Zeit. 23: 120 (new name).—Hungerford (1919) Bull. Univ. Kansas 11: 173 (characterized).

Buenoa macrophthalma (Fieber)

Anisops macrophthalmus Fieber (1851) Rhynch. 58.

This species occurs in two forms with both sexes represented in each, one for the most part black, the other entirely pale, the latter in all of specimens seen having the hind wings abbreviated.

Black form: interocular part of head (notocephalon) and anterior part of pronotum pale, yellowish white; more than the posterior half of the pronotum, the scutellum, inner part of the clavus, broad outer field of the corium, and the membrane black; outer claval margin, and the adjoining inner field of the corium sordid-white, subhyaline. Legs pale yellow, the femora and tibiæ frequently striped with fuscous.

Head short, twice as wide across eyes as long; inner margin of eye straight; vertex in the male about four times wider than the narrow synthlipsis; synthlipsis is a little wider in the female. Pronotum nearly one-fifth wider posteriorly than across anterior margin just back of eyes.

The pale form with abbreviated hind wings is somewhat shorter and differs from the black form chiefly in the shape of the pronotum; this is very nearly parallel-sided.

Described from Haïti. Coamo Springs, July 17-19, 1914 (Barber); Aibonito, June 1-3, Barros, June 4, and Adjuntas, June 8-13, 1915 (Lutz & Mutchler)—A.M.N.H. Maricao R., February 20, 1934 (Hildebrand); Río Finca, Ponce, July 12, 1934 (Oakley)—U.S.N.M.

Buenoa femoralis (Fieber)

Anisops femoralis Fieber (1851) Rhynch. 59.

? *Anisops antigone* Kirkaldy (1899) Entomol. 32: 30.

Pale cinereous, hyaline; scutellum often more yellowish; labrum and rostrum black; hind femur with a fuscous line beneath. Head short, blunt in front, much shorter than pronotum, more than two and one-half times as wide across eyes as long; inner margin of eye not straight but gently concavely arcuate; vertex not nearly twice as wide as the synthlipsis, the latter .20 mm. wide. Pronotum much shorter than the scutellum, very little wider posteriorly than across anterior margin. Robust; somewhat shorter than the preceding species, 8.00–8.50 mm.

Described from Porto Rico. Mona Island, Porto Rico, February 21–26, 1914 (Lutz); Coamo Springs, July 17–19, 1914 (Barber); Quebradillas, January 1–3, 1915; San Juan, July 1–5, 1915 (Lutz & Mutchler); St. Croix, April 4–9, 1925 (Woodruff)—A.M.N.H. St. Thomas, Virgin Islands, June 2, 1917 (Morrison)—U.S.N.M.

Specimens of *B. antigone* have been seen from Jamaica labeled by Kirkaldy as his species, and they are the same as specimens from Porto Rico which were determined by the author as *B. femoralis*. It seems fairly certain that Kirkaldy's species is a synonym. A single specimen of this species from Cuba is in the collection of the American Museum of Natural History.

Buenoa pallipes (Fabricius)

Notonecta pallipes Fabricius (1803) Syst. Rhyn. 103.

Anisops platygenemis Fieber (1851) Rhynch. 61 (*vide* Champion).

Anisops pallipes Champion (1901) Biol. Cent. Am. Rhynch. 2: 372. pl. 22, fig. 13, 13a.

Somewhat variable in color. Head and pronotum cinereous-white; scutellum fuscous, with lateral margin and apex pale; hemelytra cinereous, translucent, with the black abdomen showing through it. Head twice or more than twice as wide across eyes as long; vertex twice as wide as the synthlipsis. Pronotum not at all or but little shorter than the scutellum, longitudinally depressed (in the male) on either side of a low median carina. 5.00–7.00 mm. long.

Described as "Americæ insulis." Mona Island, Porto Rico, February 21–26, 1914 (Lutz); Coamo Springs, July 17–19, 1914 (Barber); Aibonito, June 1–3, 1915 (Lutz & Mutchler), St. John, March 8 and St. Thomas, March 11, 1925 (Lutz & Woodruff)—A.M.N.H. Aguadilla, January 1899, Culebra Island, Porto Rico, February 1899; St. Thomas, February 8, 1899 (Buseck) and June 2, 1917 (Morrison)—U.S.N.M.

Distribution: southern California, Mexico, Central America, Cuba, Jamaica, Haiti, St. Vincent, Grenada, and Trinidad.

A fourth species occurs in Porto Rico which is not assignable to any recognized species and for the present it is undescribed. It seems rather closely related to *B. albida* Champion.

Family NAUCORIDÆ

Bodies broad and smooth. Head short and wide, with the large eyes occupying the margin of the head, not protruding. Ocelli absent. Antennæ 4-segmented, very short and stout, concealed just behind eyes. Rostrum short and stout, 3-segmented. Forelegs raptorial; fore femur greatly enlarged. Intermediate and posterior legs not adapted for swimming, their tarsi 2-segmented. Membrane devoid of veins. Predaceous. Apparently only one genus with a single species occurs in Porto Rico.

PELOCORIS Stål

Pelocoris Stål (1876) Sv. Vet.-Akad. Handl. V. 14: (4) 142.

Differs chiefly from other members of the family likely to occur in Porto Rico in having the anterior margin of the head not deeply excavate behind base of head.

Pelocoris femorata (Palisot de Beauvois)

Naucoris femoratus Palisot de Beauvois (1805) Ins. Afr. Am. 237; Hem. pl. 20, fig. 4.

Naucoris poeyi Guérin-Méneville (1894) Icon. Règne Anim. Ins. 352. pl. 57, fig. 5.

Pelocoris femorata Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Described from the United States. *N. poeyi* was described from Cuba, New Orleans, and Mexico. Guánica, January 12, 1915 (Lutz); Eusenada, June 14-19, 1915 (Lutz & Mutchler)—A.M.N.H. Desengano, April 18, 1924 (Danforth)—U.S.N.M.

Distribution: United States, Central America, and several islands of the West Indies.

Family NEPIDÆ

Body elongate. Head porrect; eyes often prominent; ocelli absent; rostrum very short, 3-segmented; antennæ short, concealed beneath the eyes. Elytra complete, with clavus, corium, and membrane, the last usually reticulate-veined. Legs long and slender. Forelegs raptorial; coxa usually elongate, femur grooved beneath, tarsus of a single segment. Intermediate and hind legs ambulatorial. Abdomen terminating in two long slender filaments which, fitted together, form a breathing-tube.

These are called water scorpions. They inhabit stagnant bodies of water, where they stalk about over the surface of water plants, etc. or paddle awkwardly about in the water. All are predaceous. Only one genus, *Ranatra*, is represented in Porto Rico.

RANATRA Fabricius

Ranatra Fabricius (1790) Skrift, Nat. Selskabet 1: 227.

Body rather narrowly elongate. Head wide, with strongly protruding eyes. Pronotum elongate, subcylindric; posterior margin deeply con-

cave. Fore leg raptorial, with very elongate coxa, the tibia curved and much shorter than the femur, and the latter narrowly grooved beneath before the premedian tooth.

Ranatra insulata NEW SPECIES

FIGURE 36

Head and pronotum pale cinereous; narrow anterior part of the pronotum with a broad fuscous stripe along the side and two parallel narrower stripes along the side of the broader part; provided dorsally with small scattered spots, composed of short wax-like hairs. Hemelytra darker, more slate-gray, vaguely mottled with sordid-white; subcostal vein alternately banded with fuscous and sordid-white. Venter sordid-luteous. Legs lurid, faintly fuscous-mottled.

Head sparsely long-pilose, with the eyes slightly transverse, each subequal to the width of the vertex; tylus scarcely elevated above the juga. Antenna with the lateral prolongation of the penultimate segment very nearly as long as the ultimate segment. Pronotum rather slender, distinctly constricted in the middle, the expanded anterior part much narrower than the width of the head across the eyes; anterior lobe along the median dorsal line nearly twice as long and at its narrowest point a little less than one-half as wide as the posterior lobe. Prosternum anteriorly with two distinct longitudinal grooves separated by a distinct carina. Anterior femur rather slender, the tooth placed nearer to apex than base, devoid of a preapical tooth. Metaxyphus reaching well beyond the middle point of the hind coxæ. Respiratory filaments 22.00–27.00 mm. long. The small preapical process of the paramere is distinctly curved and almost in contact apically with the terminal hooklike process. Length of body 35.00 mm.

Professor H. B. Hungerford, who has contributed so much to our knowledge of the aquatic forms, has examined specimens of this species and pronounced it new to science, and has compared it with his *R. australis*, to which it is closely related. This Porto Rican species differs from *R. australis* in the following respects: the juga is shorter, with the tylus more projected before these; the pronotum has much fewer and shorter waxlike hairs; the antenna has the lateral process of the penultimate segment nearly or quite as long as the ultimate one; the paramere has the preapical process more curved and almost in contact apically with the terminal hooklike process.

Type, male: Las Marias, Porto Rico, October 26, 1930 (S. T. Danforth). Paratypes, 7 males and 4 females: the same data.—U.S.N.M. Cat. no. 51595.

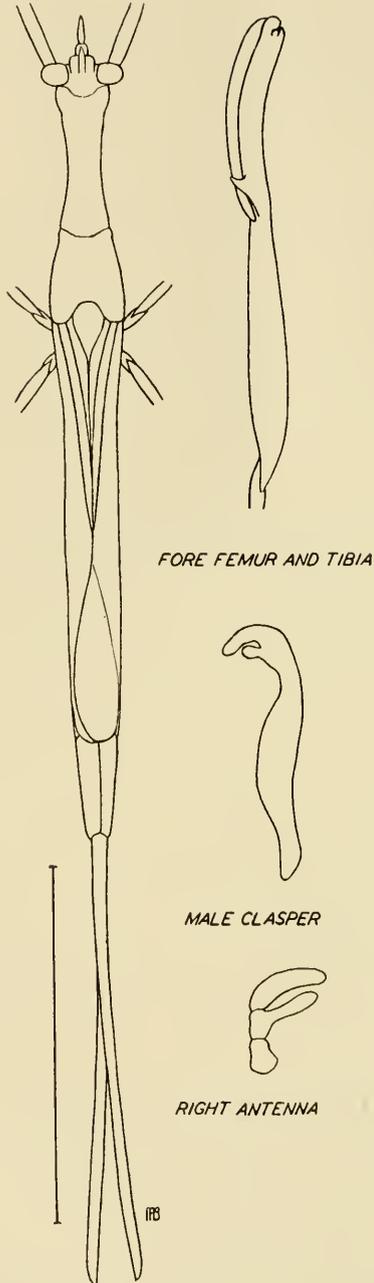


FIG 36 *RANATRA INSULATA* N SP.

Family **BELOSTOMATIDÆ**

Usually large brown insects, with flattened oval bodies. Forelegs raptorial, with the femur enlarged and the 2-segmented tarsus having a single claw; intermediate and hind legs adapted for swimming, having the tibiæ and 2-segmented tarsi expanded and fringed with long hairs. Head with large eyes, devoid of ocelli. Antennæ 4-segmented, situated behind the eyes. Membrane provided with numerous veins, often reticulate. The abdomen posteriorly bears two retractile straplike appendages. All are predaceous. Called giant water bugs or electric light bugs as they are frequently attracted to such lights when making their nocturnal migrations. Two genera are represented in Porto Rico.

KEY TO PORTO RICAN GENERA

Head nearly porrect, conically produced; rostrum long and slender, first segment longer than second. Smaller forms.....*Belostoma*.
 Head strongly deflexed anteriorly; rostrum short and stout, first segment shorter than the second. Larger forms.....*Lethocerus*.

BELOSTOMA Latreille

Belostoma Latreille (1807) Gen. Crust. Ins. 3: 144.

Zaitia Amyot & Serville (1843) Hist. Nat. Ins. Hem. 430.

Belostoma boscii (Lepeletier & Serville)

Zaitia boscii Lepeletier & Serville (1825) Encyc. Method. 10: 273.

Zaitia anura Gundlach (1894) Fauna Puerto-Riquena 600 (listed).

Belostoma boscii Barber (1923) Am. Mus. Novit. 75: 13 (listed).

Brownish with iridescent, coppery reflections. Conic portion of head before eyes a little longer than remainder of the head, faintly punctate on either side of the middle. Pronotum a little longer than head, with a longitudinal, median, pale streak, and usually with two black fasciæ at anterior margin. Legs faintly banded with fuscous. Length 30.00–32.00 mm.

Described from Carolina. Mayagüez, July 24–29, 1914 (Barber); Cayey, May 30, and Coamo Springs, June 5–7, 1915 (Lutz & Mutchler); St. Croix, April 6, 1925 (Woodruff)—A.M.N.H.

This species has a wide distribution from the southern United States through Mexico and Central America into South America. In the West Indies it has been recorded from Cuba, Hispaniola, Grenada, and Jamaica. Gundlach was the first to record it from Porto Rico.

The synonymy of this species has not been fully worked out. It would seem from the very short description and figure that *B. sub-spinosum* Palisot de Beauvois might be a synonym. *B. imparidum* Bueno, described from Antigua, is unknown to the author.

LETHOCERUS Mayr

Lethocerus Mayr (1852) Verh. Zool.-Bot. Ges. Wien 5: 17.

***Lethocerus annulipes* (Herrich-Schaeffer)**

Belostoma annulipes Herrich-Schaeffer (1845) Wanz. Ins. 8: 28. fig. 803, 804.

Lethocerus annulipes Barber (1923) Am. Mus. Novit. 75: 13 (listed).—Cummings (1933) Bull. Univ. Kansas 21: 203.

A fairly large species, ranging in size from 53.00 to 75.00 mm. long, with a longitudinal, fuscous stripe on each side of the abdominal venter. The interocular space, midway on the vertex, is relatively wider in relation to the width of the eye than in the next species, being also greater than the width of the hind tarsus.

Described from South America. Ponce, July 20, 1914, at light (Barber)—A.M.N.H. Mayagüez (Bowdish); Ponce, August 30, 1899—U.S.N.M. Reported from Porto Rico by Cummings.

***Lethocerus del-pontei* De Carlo**

Lethocerus del-pontei De Carlo (1930) Rev. Soc. Ent. Argent. 7: 108. fig. 24.—Cummings (1933) Bull. Univ. Kansas 21: 206.

Very close to and difficult to distinguish from *L. annulipes*, with which it agrees very generally in size but lacks the two longitudinal fuscous stripes of the abdominal venter. The interocular space is relatively narrower, being less than the width of the basal segment of the hind tarsus.

Described from Argentine Republic. One specimen labeled Porto Rico in the United States National Museum Collection.

According to the records furnished by Cummings, its range extends from Arizona and Texas south through Mexico, Central America, and South America as far as Patagonia. In the West Indies it is known from Jamaica, Cuba, and Porto Rico.

Cummings records this species from Florida, Colombia, British Guiana, Venezuela, Paraguay, Argentina, and Porto Rico.

LIST OF NEW GENERA AND SPECIES

(A. M. N. H. = American Museum of Natural History. U. S. N. M. =
United States National Museum.)

New Genera

	Page
<i>Paragonatas</i>	362
<i>Extraneza</i>	379

New Species

	Location of type	
<i>Amnestus diminuat</i>	U. S. N. M.	274
<i>Diolcus disjunctus</i>	A. M. N. H.	281
<i>Megarix puertoricensis</i>	U. S. N. M.	283
<i>Banasa humeralis</i>	Cornell University	297
<i>Brepholoxa rotundifrons</i>	A. M. N. H.	300
<i>Podisus borinquensis</i>	U. S. N. M.	305
<i>Jalysus reductus</i>	A. M. N. H.	331
<i>Ozophora atropicta</i>	A. M. N. H.	356
<i>Ozophora subimpicta</i>	A. M. N. H.	358
<i>Ozophora quinquemaculata</i>	A. M. N. H.	359
<i>Macrocephalus spiculissimus</i>	U. S. N. M.	374
<i>Macrocephalus productus</i>	A. M. N. H.	376
<i>Extraneza nasuta</i>	U. S. N. M.	380
<i>Enicocephalus semirufus</i>	A. M. N. H.	382
<i>Heza angulifer</i>	U. S. N. M.	389
<i>Micracanthia sulcata</i>	A. M. N. H.	415
<i>Ranatra insulata</i>	U. S. N. M.	423

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