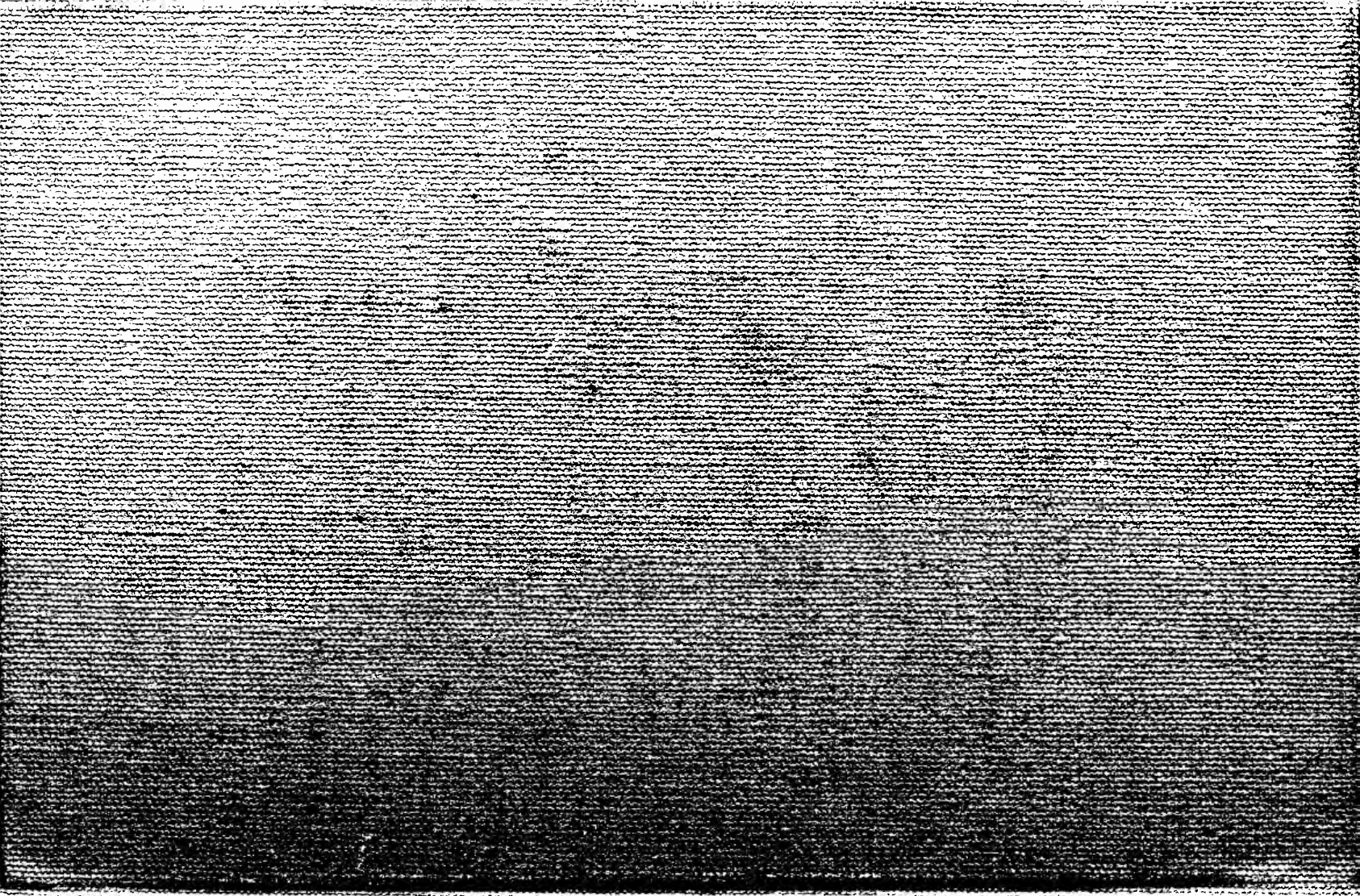

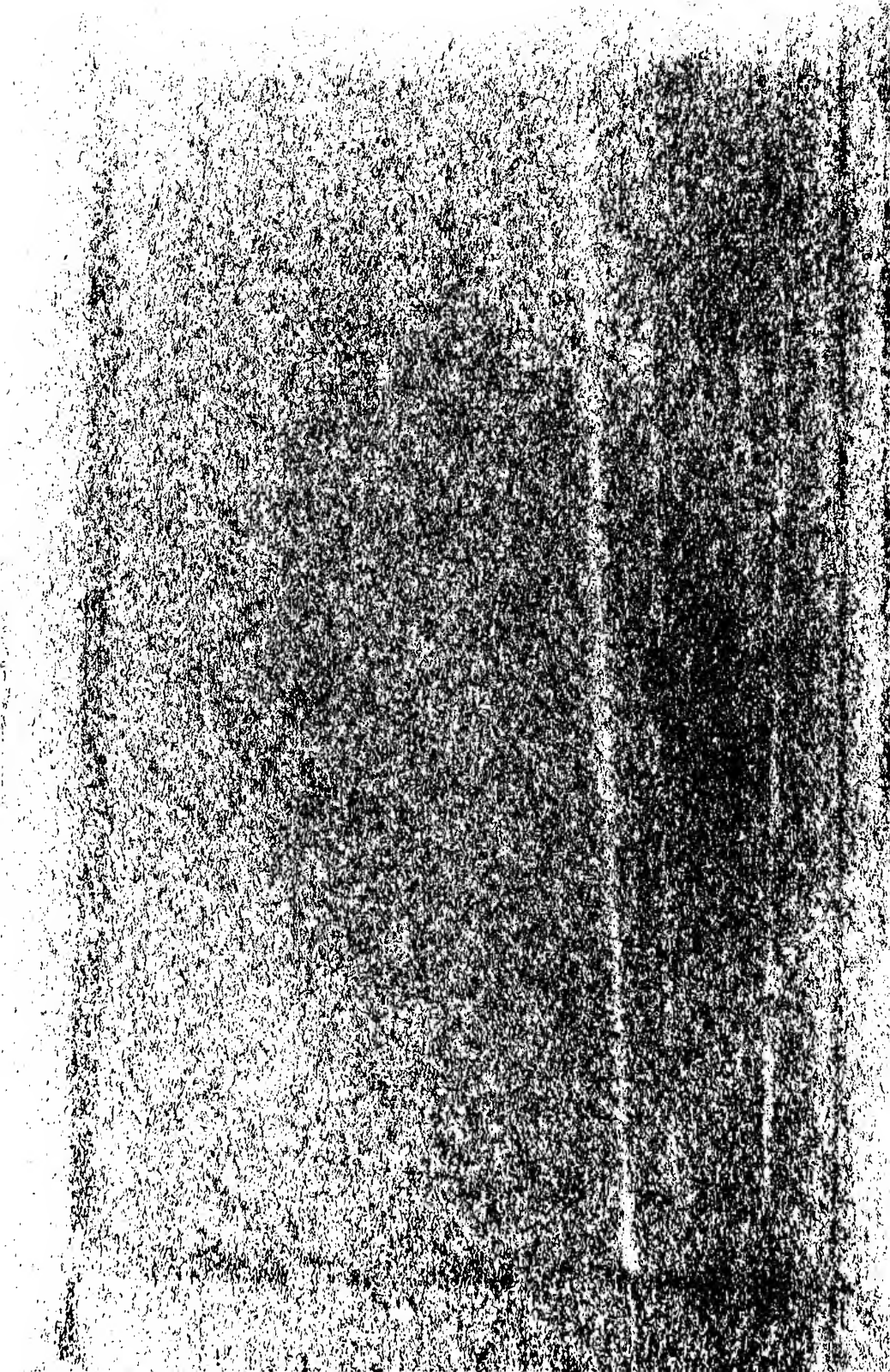

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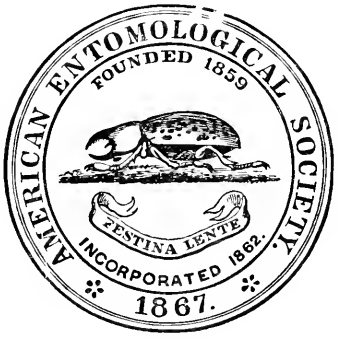

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VOLUME XLII

NEW OR LITTLE-KNOWN CRANE-FLIES FROM COLOMBIA, ECUADOR AND PERU TIPULIDAE, DIPTERA[1]

BY CHARLES P. ALEXANDER
Ithaca, New York

The present paper is the result of the study of numerous specimens of crane-flies received from Mr. H. S. Parish, who collected the material in the countries above mentioned during 1914, and from Prof. C. H. T. Townsend, while Entomologist in Peru. I am much indebted to Mr. Parish and to Prof. Townsend for this material. The types and uniques are deposited in the collection of the author. I have secured a brief account of his trip from Mr. Parish and this is given herewith in order to complete the data.

Mr. Parish's Account of His Trip:

Colombia.—We sighted Buenaventura about six o'clock on the evening of May 5th, 1914, and as darkness falls quickly here in the tropics we had to content ourselves with staying one night longer aboard the steamer. Next morning we were up bright and early and bartered with the natives for a small boat to paddle us ashore. Viewing the town from the sea it appeared to be quite a pretentious place, but after we got ashore it lost all of its beauty as far as the outskirts went, but in the center the town appeared quite clean. Near the coast and for quite a

[1] Contribution from the Entomological Laboratory of Cornell University.

distance up the mountains it rains nearly every day. The second day after my arrival I took a train for Cisneros, which is at an altitude of 525 feet above the sea-level. On the road up there is a great forest extending as far as the eye can reach, broken only by the huts of the Indians or the thatched cottages of the Negroes. One could see the insects gathered around a muddy pool left by the rain and some of these were splendid in their coloring. At times one would see a blue flash while looking into the woods and those who are acquainted with the denizens of the tropics would recognize a *Morpho*. The train had to go slowly up the mountain and that left time to look around. Soon we arrived at Cisneros and after luncheon we proceeded on our journey, this time on horse-back for about twenty miles along a mule track where there was just enough room for two mules to pass at one time. In many instances we had to crowd our horses toward the inside when we met a pack-team and it would often require ten or fifteen minutes to pass. After some hours' ride we caught another train which took us up 4400 feet to the town of Caldas, which is a rather pretty place. I stopped here for about ten days although it was not a very good location for a naturalist, since the land is highly cultivated and most of the trees have been cut away. A small stream flowed through the middle of the town, however, and that made it attractive for some species of crane-flies and other insects. After my ten days were up I took a train that brought me still higher to a place called La Cumbre. This is on the edge of the mountain at an altitude of 6600 feet and is an ideal place for anyone in my calling. Some of the nights were cold and windy, others were cold but would allow my putting out the lights to attract insects. At night there were but few specimens, but these were worth while. From here I rode over the first range of mountains until I began to descend, and far in the distance we could see the Cauca River, like a silver line, winding its way toward the Caribbean Sea. In a short time we arrived at Cali, which is about 500 feet above the sea. Cali is a large town and they keep it about as clean as any South American town is kept. It is no place for work, however, and after remaining there my usual time I hired a couple of horses and returned to La Cumbre and thence to the coast, because I had

a slight attack of malaria, prevalent in this climate. I just had time to catch the boat that plies between Balboa and Guayaquil.

Ecuador.—We arrived here about six days after leaving Colombia and after going up the river for about thirty miles we came to the city of Guayaquil, and right across the river Duran, where I remained for about three days. During the daytime I went after specimens as usual and captured a number of all orders, but night was when I reaped a harvest. There was a gasolene lamp that hung overhead and I spread a sheet on the table underneath and the insects would swarm around and finally fall on the sheet. Leaving there I went on to Huigra, which is at an altitude of 4500 feet, and there I took more specimens than I ever remember taking, before or since. It was getting too high up for the large specimens, but the smaller ones were still numerous. I went as far as Alaousi (9450 feet) and found the ground all cultivated and did not remain over two days, as the climate, due to the altitude, was very cold. From there I went down to Huigra, and after remaining there two days back to Duran and Guayaquil. After a wait of a day or two I caught the boat to Peru.

Peru.—Calloa is situated on the sea while Lima, the capital, is about seven miles inland and 500 feet above the sea. Lima has a very large population and is an up-to-date city. Collecting is very good down by the river-beds. Chosica (2800 feet) was the first mountain town that I visited and I found collecting very good. There is little more vegetation around Chosica than at Lima. Matucana was the next, a very small place among the mountains that rise up a thousand feet on either side of the railroad. It was not a very good place for collecting, but I caught some rare and interesting specimens. Then I came to Oroya (12178 feet) and scarcely expected to find insect life very abundant since it is so high up, and I was glad to put on some extra clothing. About 10.30 A. M. I went out and in a sheltered part of the mountains was surprised to find insect life quite abundant, especially Diptera and Lepidoptera. After remaining there about five days I went to Jauja (11878 feet) and then to Huancayo (10636 feet). I kept along the mountain tops and should have liked to have gone to the other side of the Andes, and except for the war coming on I should have done so.

The general European holocaust had its effect down in Peru, for the bank in which my money was deposited was closed and I had to go back to the United States.

Family TIPULIDAE

Subfamily LIMNOBINAE

Tribe *Limnobini*

Genus **DICRANOMYIA** Stephens

Dicranomyia virilis sp. n.

Thoracic dorsum with four stripes; femora broadly tipped with yellowish; wings pale yellowish subhyaline; abdominal segments with a pale terminal annulus.

Female.—Length, 8.5 to 8.6 mm.; wing, 10.8 to 11.2 mm.

Rostrum and palpi dark brown. Antennae with the basal segments dull yellow, flagellum dark brown; the segments of the flagellum oval or slightly elongate oval. Head light gray.

Pronotal and cervical sclerites prolonged, dark brown. Praescutum reddish-brown with four dark brown stripes, the middle pair being long and narrow, extending almost the entire length of the sclerite; lateral stripes shorter and broader, the entire sclerite sparsely pollinose; scutum with the lobes dark, median area paler; scutellum pale gray on the basal two-thirds, the caudal third dull yellow; postnotum brownish yellow, sparsely gray pollinose. Pleura dull brownish yellow, the dorsal sclerites darker brown. Halteres rather long, slender, pale yellow, the knob dark brown. Legs with the coxae reddish yellow; trochanters dull yellow; femora light brown, toward the tip slightly darkened, the actual tip broadly pale yellow; tibiae and tarsi brown. Wings pale yellowish subhyaline, stigma oval pale, veins brown. Venation: (see plate I, fig. 5) *Sc* moderately long, Sc_2 about one-fifth the length of Sc_1; the tip of Sc_1 opposite or slightly before the origin of *Rs*; *Rs* long, arcuated, twice the length of the basal deflection of R_{4+5}; basal deflection of Cu_1 just before the fork of *M*.

Abdominal tergites dark brown, the caudal margin of the sclerites slightly paler; sternites dull yellow.

Habitat.—Peru. Holotype, ♀, Matucana, Peru, altitude 7788 feet, July 14, 1914. (Parish coll.) Paratype, ♀, topotypic.

This species suggests *D. insignifica* Alexander [2] in the wing-venation but the thoracic dorsum is quadrivittate instead of trivittate, the femora are conspicuously paler at their apices, the segments of the abdomen ringed with paler at the caudal margin and other characters are different.

[2] 1912. *insignifica* Alexander, Canadian Entomologist, xliv, p. 363, pl. XI, fig. i; (*Furcomyia*).

Dicranomyia mulsa sp. n.

Dark brown; head grayish, antennae black; legs uniformly colored; wings dusky with a quadrate brown stigmal spot; the radial sector sinuate near the tip, basal deflection of Cu_1 long.

Male.—Length, 7.6 mm.; wing, 10 mm.

Female.—Length, 8 to 8.2 mm.; wing, 11.3 to 11.8 mm.

Rostrum and palpi black. Antennae black, rather short, the flagellar segments oval. Head with a brownish gray bloom.

Thoracic dorsum with the pronotum yellow on the sides, darker above; praescutum very deep reddish brown with dark brown stripes which merge insensibly into the ground color; these stripes cover most of the sclerite, the ground color being brightest before the pseudosutural foveae; scutum with the lobes deep liver-brown, the median area and the scutellum with a yellowish or grayish yellow bloom; postnotum dark brown medially, paler on the sides and here with a sparse grayish bloom. Pleura dull yellow with a broad interrupted pleural stripe extending from the fore coxa to the sides of the postnotum. Halteres rather short, base of the stem pale, tinged with pale green, remainder of the stem and the knobs dark brown. Legs with the fore and middle coxae dark, hind coxae pale; trochanters brownish; remainder of the legs uniformly brown. Wings slightly suffused with darker; a large quadrate stigmal spot and a broad brown seam along the cord. Venation: (see plate I, figs. 1, 2) *Sc* short, ending opposite the origin of *Rs*; Sc_2 about one-half the length of Sc_1; *Rs* sinuate near its tip; basal deflection of Cu_1 very long in the male, half as long again as Cu_2 alone.

Abdominal tergites dark brown, the basal sternites more yellowish, the apical sternites dark brown.

The female sex is similar to the male but the basal deflection of Cu_1 of the wings is not as long and cell Cu_1 is consequently not so wide.

Habitat.—Peru. Holotype, ♂, Matucana, Peru, altitude 7788 feet, July 14, 1914. (Parish coll.) Allotype, ♀, topotypic. Paratype, ♀, topotypic.

This species is readily separated from related species by the deep liver-brown color and the peculiar wing-venation.

Dicranomyia regifica sp. n.

Color of the head and thorax light gray, unmarked; antennae dark brown; femora light brown, yellow at the tip; wings with an ocellate brown pattern; abdomen banded black and yellow.

Male.—Length, 7 to 7.2 mm.; wing, 10 to 10.2 mm.

Female.—Length, 6.8 mm.; wing, 10.3 mm.

Rostrum rather short, light brown, palpi dark brown. Antennae dark brown throughout, rather short. Head brownish gray.

Thoracic dorsum dull opaque gray pollinose, the scutellum much paler, almost white. Pleura light gray. Halteres rather long, stem pale, the knob dark brown. Legs with the coxae and trochanters light yellow, femora pale

brown, obscurely tipped with yellow, tibiae and tarsi dark brown. Wings whitish or subhyaline with rather small to medium rounded brown spots on the membrane arranged as in the figure, many of these markings being interrupted ocelliform; these markings are clearest on the cephalic half of the wing, more indistinct, pale grayish, in the caudal cells. Venation: (see plate II, fig. 1) *Sc* ending at about one-third the length of *Rs*; Sc_2 about one-third the length of Sc_1; *Rs* long, angular at its origin; basal deflection of Cu_1 before the fork of *M*.

Abdominal tergites light yellow, segment one with a broad brown patch on the sides of the sclerite; segment two with a broad brown subbasal annulus; remaining tergites with about the basal half dark brown, very conspicuous; pleurites of the male hypopygium dark brownish black, the pleural lobes yellowish, a little browned at the base; sternites mostly light yellow, the extreme base of the segments obscurely brown, this occupying from the basal quarter to one-half of the segment.

In the female, the brown bands on the abdominal sternites are subequal in width and position to the tergal annuli so that the abdomen presents an evenly striped appearance.

Habitat.—Peru. Holotype, ♂, Matucana, Peru, altitude 7788 feet, July 14, 1914. (Parish coll.) Allotype, ♀, topotypic. Paratypes, 3 ♂, Jauja, Peru, altitude 11,878 feet, June 23, 1914. (Parish coll.)

In its spotted wings this insect suggests a number of Andean species. *Limnobia guttata* Philippi [3] (now *Dicranomyia chilensis* Alexander) is described as having 16-segmented antennae and the thorax with a brown stripe; *L. polysticta* Philippi [4] (Chile) has the spots on the wings very abundant and the thorax with three darker stripes. *D. muscosa* Enderlein [5] (Ecuador) and *D. tricincta* [6] Alexander (Peru) have a supernumerary cross-vein in cell R_3 of the wings.

Dicranomyia gibbera sp. n.

Antennae black; thorax brown or gray with a broad darker median stripe; wings with a radial sector very short, about equal to the basal deflection of R_{4+5}.

Male.—Length, 4 to 5 mm.; wing, 5.1 to 5.5 mm.

Female.—Length, 6 to 7 mm.; wing, 7 mm.

Rostrum, palpi and antennae black, the latter short with the segments of the flagellum subglobular. Head with the front light gray, the vertex and occiput grayish brown; a brownish blotch on the middle of the vertex in front.

[3] 1865. *guttata* Philippi, Verh. k.-k. zool.-bot. Ges. Wien, xv, p. 613. 1913. *chilensis* Alexander, Proc. U. S. Nat. Mus., xliv, p. 487.

[4] 1865. *polysticta* Philippi, Verh. k.-k. zool.-bot. Ges. Wien, xv, p. 613.

[5] 1912. *muscosa* Enderlein, Zool. Jahrb., xxxii, pt. 1, pp. 75, 76, fig. W[1].

[6] 1913. *tricincta* Alexander, Ent. News, xxiv, p. 405.

Mesonotum very gibbous, brownish with a very broad brown median stripe and shorter, less distinct stripes on the sides of the praescutum; scutum with the lobes gray, the middle area brownish; scutellum and postnotum grayish. Pleura light brown with a sparse gray bloom, deepest and brightest on the sclerites just in front of the base of the halteres. Halteres short, the stem pale, knob brown. Legs with the coxae and trochanters dull yellow, femora pale brown, a little darkened at the tips, tibiae and tarsi dark brown. Wings hyaline, the stigma present or absent, varying from subhyaline to a dark brown, in shape full and rounded. Venation: *Sc* short, ending far before the origin of *Rs*; Sc_1 about five times as long as Sc_2; *Rs* short, about equal in length to the basal deflection of R_{4+5}.

Abdomen dark brown with a sparse gray bloom.

Habitat.—Peru. Holotype, ♂, Lima, Peru, altitude 500 feet, August 19, 1914. (Parish coll.) Allotype, ♀, topotypic, August 11, 1914. Paratypes, 20 ♂, ♀, topotypic, August 3 to 30, 1914; Matucana, Peru, altitude 7788 feet, one ♂, July 14, 1914. (Parish coll.)

This insect agrees most closely with *D. vernalis* Philippi[7] (Chile), which is a larger species having the stigmal spot of a different shape and the abdomen of a very distinct pattern. In the shortness of the radial sector *D. gibbera* suggests *D. omissa* Alexander[8] which has the cell *1st* M_2 open.

Dicranomyia invalida sp. n.

Antennae dark brown; thorax gray with darker stripes; wings with a brown blotch at the fork of *Rs*; abdomen dark gray, the hypopygium yellowish.

Male.—Length, 5.5 mm.; wing, 8.5 mm.

Female.—Length, 5.8 to 6.3 mm.; wing, 8.9 to 9.6 mm.

Rostrum dull yellowish brown, palpi dark brown. Antennae dark brown, the flagellar segments subrounded to oval. Head light gray.

Thoracic dorsum dull grayish yellow with brownish stripes, the median one broad, divided by a very narrow, pale median line, lateral stripes short, behind becoming confluent with the middle stripe; scutum, scutellum and postnotum light gray. Pleura gray. Halteres pale, the knob darker. Legs with the coxae dull yellow with a pale greenish tinge, trochanters pale, femora pale yellowish brown, a little darkened toward the tip, tibiae and tarsi brown. Wings whitish subhyaline, stigma subquadrate, brown; an oval mark at the fork of *Rs* connected with the stigma; seaming along the cord and outer deflection of cell *1st* M_2 very narrow and indistinct. Venation: (see plate I, fig. 4) *Sc* rather short, ending about opposite the origin of *Rs*; Sc_2 about one-fifth

[7] 1865. *vernalis* Philippi, Verh. k.-k. zool.-bot. Ges. Wien, xv, p. 612 (*Simnobia*).

[8] 1912. *omissa* Alexander, Can. Ent., xliv, p. 340, pl. XI, fig. 6 (*Furcomyia*).

the length of Sc_1; basal deflection of Cu_1 far before the fork of M, this distance equal from one-third to almost the length of the deflection.

Abdomen dark brownish gray, the lobes of the male hypopygium yellowish.

Habitat.—Peru. Holotype, ♂, Matucana, Peru, altitude 7788 feet, July 14, 1914. (Parish coll.) Allotype, ♀, topotypic, Paratype, ♀, topotypic.

This species comes closest to *D. andicola* Alexander[9] but differs in the conspicuous gray coloration of the body.

Genus **RHIPIDIA** Meigen

Rhipidia (Arhipidia) vicina sp. n.

Thorax broadly edged with yellow in front; wing-pattern heavy; pleural stripe broad.

Female.—Length, 8 mm.; wing, 7.4 mm.

Rostrum and palpi dark brownish black. Antennae black, excepting segments 12 and 13 which are pale yellowish white. Head brownish gray.

Pronotum above dull light yellow. Mesonotal praescutum rich chestnut-brown, in front broadly margined with dull light yellow; scutellum and middle line of the scutum dull yellow; lobes of the scutum brown with a margin of darker brown, most distinct on the caudal and proximal sides of the lobe; scutellum at the base with a brownish spot on either side of the middle line; postnotum brownish. Pleura with the dorsal portions clear light yellow, a broad black band extending from the sides of the pronotum to the base of the abdomen, the dorsal margin of the stripe sharply defined, the ventral margin passing into paler brownish black; an indistinct narrow dark brown stripe beginning on the fore coxa, traversing the mesosternum and ending on the hind coxa. Halteres dull yellow, the knob only a little darker. Legs with the coxae dull yellow, more or less browned at or near the base as described above; trochanters dull yellow; femora and tibiae brown, the tips of the segments slightly darkened; tarsi brown. Wings light gray or subhyaline, brighter, more yellowish, on the costal portion; a few large brown spots as follows: at the tip of *Sc*, at the origin of *Rs*, at mid-length of *Sc*, along the cord and outer deflection of cell *1st* M_2; paler grayish brown clouds in all the cells, these clouds and dots large and becoming confluent. Venation as in plate II, fig. 2.

Abdominal tergites dark brown, darkest on the caudal margin; sternites dull yellow.

Habitat.—Colombia. Holotype, ♀, La Cumbre, Colombia, altitude 6600 feet, May 20, 1914. (Parish coll.)

In my key to the species of the genus *Rhipidia*[10] this species runs down to *R. schwarzi* Alexander[11] of the Greater Antilles

[9] 1912. *andicola* Alexander, Can. Ent., xliv, p. 362, pl. XI, fig. h (*Furcomyia*).

[10] Bull. Brookl. Ent. Soc. viii, pp. 7, 8, 1912.

[11] 1912. *schwarzi* Alexander, Bull. Brookl. Ent. Soc., viii, p. 13, pl. I, fig. *e*.

and Florida. It is a much larger and more vigorous species with the black pleural stripe broader, the wing-pattern much heavier and better defined.

Rhipidia (Arhipidia) annulicornis Enderlein

1912. *Rhipidia annulicornis* Enderlein, Zool. Jahrb., xxxii, pt. 1, pp. 80, 81, fig. V).

One female from La Cumbre, Colombia, altitude 6600 feet, collected May 15, 1914, by H. S. Parish.

Rhipidia (Arhipidia) domestica Osten Sacken

1859. *Rhipidia domestica* Osten Sacken, Proc. Acad. Nat. Sci. Phila., 1859, p. 208.

Several specimens. Cali, Colombia, altitude 500 feet, May 25, 1914 (Parish). La Cumbre, Colombia, altitude 6600 feet, May 18, 1914 (Parish). Lima, Peru, altitude 500 feet, July 29 to August 24, 1914 (Parish).

Genus **GERANOMYIA** Haliday

Geranomyia lachrymalis sp. n.

Color dull black, the thoracic dorsum without distinct stripes; legs dark brown except the bases of the femora which are yellowish; wings dark colored without a distinct stigmal spot.

Male.—Length, excluding rostrum, 5.6 mm.; wing, 7.1 mm.; rostrum, 2.5 mm.

Female.—Length, excluding the rostrum, 4.5 mm.; wing, 5.6 mm.; rostrum, 3 mm.

Rostrum and palpi black. Antennae black. Head blackish gray.

Mesonotal praescutum dull black without apparent stripes; scutum with the lobes dull black, the middle portion more brownish; scutellum black, the caudal margin more reddish; postnotum dull blackish brown. Pleura gray. Halteres rather short, the base dull yellow, the knob dark brown. Legs with the coxae and trochanters yellowish brown, femora yellowish at the base, soon passing into dark brown; tibiae and tarsi dark brown. Wings tinged with blackish, stigma scarcely distinct, veins dark brown. Venation: (see plate II, fig. 3) *Sc* ending just beyond the origin of *Rs*; in the holotype, cell *1st* M_2 is long and narrow, the cross-vein *r-m* obliterated by fusion of R_{1+5} and M_{1+2}, the basal deflection of Cu_1 at the fork of M; in the allotype, cell *1st* M_2 is shorter, cross-vein *r-m* present, the basal deflection of Cu_1 before the fork of M.

Abdomen dark grayish black.

Habitat.—Ecuador. Holotype, ♂, Huigra, Ecuador, altitude 4500 feet, June 13, 1914 (Parish coll.). Allotype, ♀, topotypic.

G. lachrymalis differs from *G. tristis* Loew[12] in the lack of distinct stripes on the thoracic dorsum, the indistinct stigma, etc.

Geranomyia insignis Loew

1851. *Aporosa insignis* Loew, Linnaea Entomologica, v, p. 395.

Nineteen specimens of both sexes from Duran, Ecuador, at the sea-level, collected June 25, 1914, by H. S. Parish.

Geranomyia plumbeipleura sp. n.

Rostrum black, paler at the tip; antennae black; head silvery gray, black on the vertex; thoracic stripes broadened in front, the pleura plumbeous; wings nearly hyaline, the caudal cells grayish, the tip infuscated, a few dark brown spots.

Male.—Length, excluding the rostrum, 7.2 to 7.5 mm.; wing, 7.3 to 8 mm.; rostrum, 3.2 mm.

Female.—Length, excluding the rostrum, 9.4 mm.; wing, 8.8 mm.; rostrum, 3 mm.

Rostrum long, nearly half as long as the body in the male, black, paler near the tip. Antennae dark brownish black. Front and the sides of the vertex adjoining the eyes light gray, remainder of the head blackish.

Mesonotal praescutum light yellowish brown, the region before the pseudosutural foveae light yellow; three dark brown stripes, the middle one broadest in front where it suffuses the anterior end of the sclerite, narrowed behind; lateral stripes narrow, subsinuous; scutum with the lobes dark brown, the middle portion grayish; scutellum and postnotum dark brown, the latter tinged with grayish plumbeous; in some specimens the scutellum is pale gray. Pleura grayish plumbeous including the lateral margins of the mesonotal praescutum; sternum yellowish brown, paler than the pleura. Halteres pale, the knob a little darker. Legs with the coxae yellow, the outer faces of the fore and middle coxae a little suffused with brown; trochanters yellow; femora pale greenish yellow at the base soon passing into brown, the tip broadly yellowish and including a broad subapical dark brown ring; tibiae and tarsi dark brown. Wings with the costal half nearly hyaline, the caudal half more grayish, the tip infuscated; a few dark brown markings as follows: at the base of *Rs*, a large mark at the stigma; along the cord and outer end of cell *1st* M_2, on the supernumerary cross-vein in the subcostal cell; veins brown, paler in the pale areas on the costal half. Venation: (see plate II, fig. 4) *Sc* moderately long, ending slightly beyond the base of *Rs*; Sc_2 at the tip of Sc_1; *Rs* about twice the length of the basal deflection of R_{4+5}; cross-vein *r-m* very short, punctiform or obliterated by fusion; cell *1st* M_2 elongate; basal deflection of Cu_1 just before the fork of *M*.

Abdominal tergites dark brown, the sternites much paler, yellowish.

The female is similar to the male; the gray color of the front continues back to the occiput as a narrow stripe, isolating a dark brown mark on the vertex

[12] 1854. *tristis* Loew, Linnaea Entomologica, v, p. 396 (*Aporosa*).

on either side of the middle stripe; the pronotum shows a dark brown dorsal line continuous with the median praescutal vitta and a short dark brown lateral stripe; praescutum with the ground color more grayish, the lateral stripes broadened toward the caudal end; pleura with the dorsal pleurites grayish plumbeous, the sclerites underneath the wing yellowish; wings with *Sc* a little longer, sometimes extending to about half the length of *Rs*.

Habitat.—Colombia, Ecuador, Peru. Holotype, ♂, Huigra, Ecuador, altitude 4500 feet, June 16, 1914 (Parish coll.). Allotype, ♀, topotypic, June 19, 1914. Paratypes, 6♂ ♀, Caldas, Colombia, May 11, 1914 (Parish); La Cumbre, Colombia, altitude 6600 feet, May 12 to June 1, 1914 (Parish). Huigra, Ecuador, topotypic. Lima, Peru, altitude 500 feet, August 19, 1914 (Parish coll.).

Related to *G. insignis* Loew[13] which has the antennal flagellum light brown, not black; stripes on the praescutum narrow, the middle one not broadened out in front; pleura yellow, not grayish; the wings more uniformly yellowish, not infumed with darker, the brown markings neither so dark nor so extensive. With *G. numenius* Alexander[14] it agrees in the color of the antennae and the head but the antennae are shorter, the individual flagellar segments being much more rounded; the thorax is plumbeous, not yellowish as in *numenius*, and the wing-pattern is entirely different; the rostrum of *numenius* is much longer than in *plumbeipleura*.

Geranomyia townsendi sp. n.

Rostrum very long and slender, in the male almost as long as the body; head silvery and black; thoracic coloration reddish with indistinct narrow stripes; femora with a brown subapical ring; wings light gray with large rounded brown clouds.

Male.—Length, excluding the rostrum, 7.3 to 8.2 mm.; wing, 8.8 to 9 mm.; rostrum, 7.1 to 7.4 mm.

Rostrum very long and slender, black, a little paler at the tip. Palpi two-segmented, black. Antennae rather long, the flagellar segments elongated, the segments dark brown with a gray bloom, the extreme tips of each segment indistinctly reddish. Head with a narrow median pale gray silvery mark, a dark brown patch on the vertex on either side of this pale mark; vertex adjoining the eyes and the occiput gray.

Thoracic dorsum reddish brown with narrow indistinct brown stripes as follows: a dark brown median stripe extending the length of the praescutum, more or less indistinct lateral stripes behind the pseudosutural foveae; scutum

[13] 1851, *insignis* Loew, Linnaea Entomologica, v, p. 395. (*Aporosa*.)

[14] 1913, *numenius* Alexander, Entom. News, xxiv, p. 106, pl. XIV, fig. 3.

with the lobes deep reddish brown, the middle portion of the scutum and the scutellum with a pale whitish bloom; postnotum reddish with a very narrow brown median stripe, this latter sometimes indistinct. Pleura reddish brown with a sparse grayish bloom on the dorsal sclerites. Halteres pale, the knobs dark brown. Legs with the coxae and trochanters dull yellowish, the margins of the trochanters and the bases of the femora black; femora pale yellowish brown, the tip broadly yellowish and including a rather broad subapical dark brown annulus; tibiae and tarsi dark brown. Wings with a pale grayish tinge, the costal cell more yellowish; large rounded brown markings or clouds as follows: mid-length of *Sc*, at the origin of *Rs*, at the tip of *Sc*, at the stigma, at the tip of R_{2+3}; brown seams to the cord and outer end of cell *1st* M_2; veins brown excepting *R* between the dark markings where it is golden-yellow. Venation: (see plate II, fig. 6) *Sc* long, extending about two-thirds the length of *Rs*; Sc_2 at the tip of Sc_1; *Rs* long, about four times the length of the basal deflection of R_{4+5}; cell *1st* M_2 long and narrow, as long as the veins issuing from it.

Abdominal tergites dark brown; sternites, especially the basal ones, paler, more yellowish.

Habitat.—Peru. Holotype, ♀, Matucana, Peru, altitude 7800 feet, April 22, 1913 (C. H. T. Townsend coll.). Paratypes, 3 ♂, topotypic.

The insect was found in caves in the day-time.

The species is not closely related to any of the described forms and requires no comparison with any of them.

Geranomyia scolopax Alexander

1913. *Geranomyia scolopax* Alexander, Entom. News, xxiv, p. 408.

One male from Huigra, Ecuador, altitude 4500 feet, June 19, 1914, agrees with the type in all of the essential characters, differing as follows: femora with the tips rather broadly yellowish; wings with the dark markings larger, more conspicuous; venation (see plate II, fig. 5), basal deflection of Cu_1 before the fork of *M*.

Geranomyia glauca sp. n.

Light green, thoracic stripes rather indistinct except on the sides of the praescutum; femora with two brown bands; wings spotted with brown.

Male.—Length, excluding the rostrum, 6.1 mm.; wing, 6.6 mm.; rostrum, 3. mm.

Rostrum black, the lobes paler toward the tip. Antennae dark brownish black, extending to about one-half the length of the rostrum. Head brownish gray.

Mesonotal praescutum pale yellowish green with indistinct brownish stripes; the middle stripe is broad but is represented only by two dark lines on the caudal portion of the sclerite near the transverse suture; lateral stripes a little more distinct; scutum yellowish green with the lobes conspicuously dark brown;

scutellum greenish, unmarked; postnotum broadly brown above, greenish white laterally. Pleura yellowish green. Halteres yellowish green, the knobs darker. Legs with the coxae and trochanters yellowish with a green tinge, a broad pale brown ring just before mid-length and a broad dark brown ring before the tip, tip broadly pale; tibiae yellowish with a green tinge; tarsi greenish brown. Wings yellowish subhyaline, costal region still more yellowish; conspicuous brown markings as follows: at the base of the wing, midway between the base of the wing and the origin of *Rs*; at the origin of *Rs*; a stigmal blotch connected with a broad seaming on the cord; outer end of cell *1st* M_2 and the tips of several of the longitudinal veins; veins brownish green. Venation: (see plate II, fig. 7) *Sc* long, extending about to mid-length of *Rs*; *Rs* long, some three to four times as long as the deflection of R_{1+2}; cell *1st* M_2 long and narrow; basal deflection of Cu_1 just beyond the fork of *M*.

Abdomen bright green throughout, the lobes of the hypopygium more yellowish.

Habitat.—Ecuador. Holotype, ♂, Huigra, Ecuador, altitude 4500 feet, June 16, 1914 (Parish coll.).

From the described green or greenish species of *Geranomyia* (*virescens* Loew[15] *philippii* Alexander[16]) this species differs in the spotted wings and brown bands on the femora.

Geranomyia tibialis Loew

1851. *Aporosa tibialis* Loew, Linnaea Entomologica, v., p. 397.

Several specimens taken at Lima, Peru, altitude 500 feet, collected from July 29 to August 24, 1914, by H. S. Parish.

Tribe *Antochini*

Genus **TEUCHOLABIS** Osten Sacken

Teucholabis jocosa Alexander

1913. *Teucholabis jocosa* Alexander, Entomological News, xxiv, pp. 140, 141, pl. XVI, fig. 3.

Two males from Cali, Colombia, altitude 500 feet, May 28, 1914, collected by Parish. One male from La Cumbre, Colombia, May 18, 1914, taken by Parish.

Genus **TOXORHINA** Loew

Toxorhina brasiliensis Westwood

1835. *Limnobiorhynchus brasiliensis* Westwood, Ann. Soc. Entom. France, iv, p. 683.

[15] 1851. *virescens* Loew, Linnaea Entomologica, v, p. 398 (*Aporosa*).

[16] 1865. *virescens* Philippi, Verh. k.-k. zool.-bot. Ges. Wien, xv, p. 597, pl. XXIII, fig. 1, (*Plattusa*). 1913. *philippii* Alexander, Proc. U. S. Nat. Mus., xliv, p. 487.

Two males from Lima, Peru, altitude 500 feet, August 19, 20, 1914, collected by Parish.

Genus **ORIMARGA** Osten Sacken

Orimarga andina sp. n.

Light gray, the thoracic pleura with a broad silvery stripe; wings subhyaline; legs medium brown.

Male.—Length, 8.6 mm.; wing, 5.8 mm.

Female.—Length, 8.5 mm.; wing, 6 mm.

Rostrum and palpi dark brownish black. Antennae very dark brown, the first segment dusted with gray. Head light gray, brightest on the front.

Thoracic praescutum plumbeous with a gray bloom; an indistinct darker median stripe; lateral margin of the sclerite brightest; scutum light gray, each lobe with a darker mark, these markings almost contiguous on the middle line, scutellum pale brown; postnotum with a pale gray bloom. Pleura light silvery gray with an indistinct narrow brown line from the cervical sclerites to the base of the halteres; sternites darker, brownish, the sternum and the pleura together enclosing a broad silvery stripe. Halteres with the extreme base orange brown, stem white, knob brown. Legs with the coxae and trochanters orange-brown with a very sparse gray bloom; remainder of the legs brown. Wings with the extreme base orange-brown; remainder subhyaline; veins brown. Venation: (see plate I, fig. 7) basal deflection of Cu_1 about mid-length of the radial sector.

Abdomen dark brown with a sparse gray bloom, the hypopygium reddish.

Habitat.—Colombia. Holotype, ♂, La Cumbre, Colombia, altitude 6600 feet, May 15, 1914 (Parish coll.). Allotype, ♀, topotypic.

The described American species of this genus may be separated by the following key:

1. Wings subhyaline with dots on the cross-veins and deflections of veins [color of the body blue-gray; legs pale, almost white]. (British Guiana) *punctipennis* Alexander[17]

   Wings subhyaline or suffused with darker, not spotted with brown.... 2

2. Tips of the tarsi white. (Panama) *nivitarsis* Alexander[18]

   Tips of the tarsi not white.

3. Thoracic pleura without a silvery band; legs pale yellow with the tip of the femur, base and tip of the tibia black. (Southwestern United States) *arizonensis* Coquillett[19]

   Thoracic pleura with a broad silvery band; legs with the segments uniform in color throughout..... 4

[17] 1914. *punctipennis* Alexander, Trans. Am. Ent. Soc., xl, p. 239, pl. IV, fig. 3.

[18] 1915. *nivitarsis* Alexander, Proc. U. S. Nat. Mus., xlix, p. 765, pl. 75, fig. 5.

[19] 1902. *arizonensis* Coquillett, Proc. U. S. Nat. Mus., xxv, pp. 83, 84.

4. Dark brownish black; legs dark brown; wings uniformly suffused with dark, the veins almost black. (Guatemala) *argenteopleura* Alexander[20]

Light brown with a gray bloom; legs medium brown; wings subhyaline, the veins pale brown. (Colombia) *andina* sp. n.

Genus **ATARBA** Osten Sacken

Atarba brunneicornis sp. n.

Antennae brown; femora uniform in color throughout; wings very light yellow.

Male.—Length, 4.8 mm.; wing, 5.3 mm.

Rostrum rather long, dark brown; palpi dark brownish black. Antennae very long and slender, longer than the head and thorax together; the flagellar segments elongated, covered with a thick white pubescence and with one long hair on the outer face; antennae with the basal segments reddish brown, the flagellum dark brownish black. Head with a delicate impressed line extending from the occiput cephalad to a slight frontal tubercle which is provided in front with two small hairs; head brown, thinly whitish pollinose.

Thoracic dorsum dull yellow without apparent darker stripes. Pleura whitish yellow. Halteres pale, the knob brownish. Legs with the coxae and trochanters dull yellow; femora yellow; tibiae and tarsi brownish yellow. Wings very light yellow, iridescent, a faint brown ill-defined suffusion in the region of the stigma; veins pale brown. Venation: (see plate I, fig. 6) *Sc* ending opposite the origin of *Rs*; *Rs* straight or nearly so, oblique; cell *1st* M_2 twice as long as broad; basal deflection of Cu_1 under the middle of cell *1st* M_2.

Abdominal tergites dark brown, the apex of the segments rather paler; hypopygium brownish yellow; sternites dull yellow. Hypopygium (see plate IV, fig. 2) with the pleurites rather long and slender, bearing two chitinized appendages, the ventral apical appendage rather flattened, the caudal or outer edge with about five sharp teeth, the tip produced into a point; the dorsal apical appendage is slender, subcylindrical, curved slightly dorsad, and slightly longer than the ventral appendage; guard of the penis a little shorter than the pleurites, cylindrical.

Habitat.—Colombia. Holotype, ♂, La Cumbre, Colombia, altitude 6600 feet, May 18, 1914 (Parish coll.).

A. brunneicornis is allied to *A. columbiana* Alexander[21] also from Colombia but the two forms may be separated by means of the following key:

Femora with a brown ring just before the tip, *Rs* longer, arcuated; cell *1st* M_2 short and almost square; basal deflection of Cu_1 just beyond the fork of *M*. *columbiana* Alexander[22]

[20] 1913. *argenteopleura* Alexander, Psyche, xx, p. 18, pl. 2, fig. f.

[21] Journ. N. Y. Ent. Soc., xxi, p. 199, 1913.

[22] 1913. *columbiana* Alexander, Journ. N. Y. Ent. Soc., xxi, p. 199, pl. 5, fig. 4.

Femora unicolorous, without a brown ring before the tip; *Rs* short, straight, oblique; cell *1st* M_2 longer, almost twice as long as broad; basal deflection of Cu_1 about mid-length of cell *1st* M_2. *brunneicornis* sp.n.

These two species are the only American forms so far discovered with unicolorous antennae, the remaining species, *picticornis* Osten Sacken[23] and *varicornis* Alexander,[24] having the antennal segments bicolorous.

Tribe *Eriopterini*

Genus **ERIOPTERA** Meigen

Subgenus **Mesocyphona** Osten Sacken

Erioptera (**Mesocyphona**) **caloptera** Say, var.

1823. *Erioptera caloptera* Say, Journ. Acad. Nat. Sci. Phila., iii, p. 17.

Three males and one female from Huigra, Ecuador, altitude 4500 feet, collected by Parish; two males from Lima, Peru, altitude 500 feet, Parish collector.

This insect, which seems to be a variety of the common *caloptera*, has a broad dark brown premedian and apical band on the femora, the pale band enclosed by them being a little more extensive than in typical *caloptera*.

Erioptera (**Mesocyphona**) **annulipes** Williston

1896. *Erioptera annulipes* Williston, Trans. Ent. Soc. Lond., p. 294.

Two males from Caldas, Colombia, May 12, 1914; a male and a female from Cali, Colombia, May 23, 1914; collected by Parish.

Erioptera (**Mesocyphona**) **eiseni** Alexander

1913. *Erioptera* (*Mesocyphona*) *eiseni* Alexander, Proc. U. S. Nat. Mus., xliv, p. 516, pl. 67, fig. 26.

One female from Cisneros, Colombia, June 3, 1914; two males, three females from La Cumbre, Colombia, altitude 6600 feet, May 18, 1914; collected by Parish.

Genus **GONOMYIA** Meigen

Subgenus **Leiponeura** Skuse

Gonomyia (**Leiponeura**) **recurvata** Alexander

1914. *Gonomyia* (*Leiponeura*) *recurvata* Alexander, Journ. N. Y. Ent. Soc., xxii, p. 121, pl. 11, fig. 6.

[23] 1869. *picticornis* Osten Sacken, Monogr. Dipt. N. Am., iv, p. 128, pl. 1, fig. 13.

[24] 1913. *varicornis* Alexander, Ent. News, xxiv, p. 418, pl. XIV, fig. 10.

A male and a female from Alaousi, Ecuador, altitude 9450 feet, June 18, 1914; one male and one female from Huigra, Ecuador, altitude 4500 feet, June 13 to 16, 1914; collected by Parish.

The genitalia of the male differs somewhat from the description of the typical Costa Rican specimens, but I do not think at this time that the material represents a distinct species. These differences are: the two chitinous points at the tip of the recurved ventral gonapophyse are longer; the fleshy lobe near the middle of the intermediate apical appendage is not tooth-like or conical as in typical *recurvata*, but is truncated at the apex which bears two large hairs.

Gonomyia (**Leiponeura**) near **alexanderi** Johnson

1912. *Elliptera alexanderi* Johnson, Psyche, xix, p. 3, fig. 6.

Abundantly represented in the collection from Lima, Peru, altitude 500 feet, collected by Parish; both sexes are represented in the material which is dated from August 4 to August 21, 1914. This fly probably represents a new species closely related to *alexanderi*.

Subgenus **Gonomyia** Meigen

Gonomyia (**Gonomyia**) **jejuna** sp. n.

Basal segments of the antennae yellow; a conspicuous dark brown pleural stripe; wings with cell *1st* M_2 open.

Male.—Length, 3.8 to 4 mm.; wing, 5 to 5.3 mm.

Female.—Length, 4.4 to 4.6 mm.; wing, 5.5 to 5.7 mm.

Rostrum and palpi very dark brown. Antennae rather long and slender, in the male if bent backward, extending beyond the wing-root, the scapal segments orange-yellow, flagellar segments oval, dark brown with a rather dense silvery pubescence. Head light yellow with darker markings on the vertex.

Thoracic praescutum brown with a sparse yellowish brown bloom, the sclerite darker in front but without distinct stripes; scutellum and postnotum darker, plumbeous. Pleura pale yellowish white with a broad dark brown stripe from the sides of the pronotum to the base of the halteres. Halteres brown, the knobs darker. Legs dull yellowish, the femora, tibiae and tarsi more brown. Wings nearly hyaline, the veins brown. Venation: (see plate I, fig. 8) *Sc* short ending far before the origin of *Rs*; R_2 shorter than R_{2+3} alone; *Rs* in a line with R_{4+5}, the deflection of the latter being obliterated; cell *1st* M_2 open due to the atrophy of the outer deflection of M; basal deflection of Cu_1 at the fork of M.

Abdominal tergites dark brown, the basal sternites paler, more yellowish. Hypopygium (see plate IV, fig. 1) with the pleura (a) rather short and stout, cylindrical, the inner dorsal angle with a fleshy lobe projecting dorsad and in-

ward. Two apical appendages, the outer appendage (b) fleshy, slender at the base, gradually enlarged into the flattened tip and here provided with numerous long hairs, the dorsal margin produced into a single subappressed sharp chitinized spine; this appendage is bent inward and the flattened expanded tips almost meet on the middle line; the inner pleural appendage (c) fleshy, bent at the middle, the tip directed dorsad. The penis-guard (d) is represented by a central subfleshy lobe with the tip constricted and ending in an obtuse point beneath, on either side with a very slender, chitinous hook whose tip is bent ventrad.

The female is quite as in the male, the antennae a little shorter but still longer than is usual in this genus of flies; lateral margin of the praescutum whitish; a more or less conspicuous white band on the pleura beneath the brown pleural stripe; ovipositor with the valves long and slender.

Habitat.—Peru. Holotype, ♂, Lima, Peru, altitude 500 feet, July 29, 1914 (Parish coll.). Allotype, ♀, topotypic; August 19, 1914. Paratypes, 10 ♂, ♀, topotypic, July 29, to August 31, 1914.

The three related species, *cognatella* O. S., *delicata* Alex. and the present form may be separated by the following key:

1. Wings hyaline or nearly so; *Sc* short, ending far before the origin of the radial sector 2
   Wings tinged with yellow; *Sc* long, ending nearly opposite or just before the origin of the radial sector. (Eastern United States)
   cognatella O. S.[25]
2. Mesonotum broadly edged with yellow in front and on the sides; two brown pleural stripes. (Guatemala) ..... *delicata* Alex.[26]
   Mesonotum without a conspicuous yellowish margin; a single broad brown pleural stripe. (Peru) ..... *jejuna* sp.n.

The members of the *cognatella* group have the following common characters: Cell R_2 of the wings large, vein R_2 being oblique; cell *1st* M_2 open by the atrophy of the outer deflection of N_3; basal deflection of Cu_1 at the fork of M; basal segments of the antennae yellow.

Gonomyia (Gonomyia) velutina sp. n.

Head gray; pleura with a prominent white longitudinal band; wings sparsely spotted with brown.

Male.—Length, 5.3 mm.; wing, 7–7.4 mm.

Female.—Length, 6.5 mm.; wing, 6.8 mm.

Rostrum dark brown; palpi dark brownish black. Antennae dark brownish black, rather short, the segments of the flagellum oval to slightly elongate-oval. Head dark brown, dusted with gray.

[25] 1859. *cognatella* Osten Sacken, Proc. Acad. Nat. Sci. Phila., p. 230, pl. 1, fig. 17.

[26] 1913. *delicata* Alexander, Proc. U. S. Nat. Mus., xliv, p. 506.

Pronotum dark brown, whitish laterally. Mesonotal praescutum dark brown, thinly dusted with gray, the pseudosutural foveae very prominent, elongate; scutum light gray; scutellum very pale grayish white; postnotum grayish medially, broadly and abruptly whitish on the sides. Pleura brownish gray with a very broad white band extending from behind the fore coxa to the base of the abdomen. Halteres brownish. Legs with the coxae brownish, more yellow at the base; trochanters dull yellow; femora dull yellow, a little darkened at the tip; tibiae dull yellow, the tip narrowly brown; tarsi brown. Wings light gray to brownish subhyaline, usually with distinct brown clouds as follows: stigmal, base of *Rs*, along the cord, cross-vein *m*, middle of cell *M*, above the tip of *2nd A*. Venation: (see plate H, figs. 9, 10) *Sc* varying in length, the distance beyond the base of *Rs* sometimes one-half the length of *Rs*, at other times only about one-quarter of this length.

Abdominal tergites yellowish brown; sternites dull brownish yellow.

Habitat.—Peru. Holotype, ♂, Matucana, Peru, altitude 7700 feet, April 22, 1913 (C. H. T. Townsend coll.). Allotype, ♀, topotypic, altitude 7788 feet, June 14, 1914 (Parish coll.). Paratypes, 2 ♂, 1 ♀, topotypic, same data as for the allotype but taken June 15, 1914.

This species agrees quite closely with *Gonomyia* (*Gonomyia*) *slossonae* Alexander [27] but the gray head, different thoracic coloration and the spotted wings will serve to separate the two forms.

Genus **MOLOPHILUS** Curtis

Molophilus capricornis sp. n.

Color medium brown; antennae short; wings with a brown blotch at the cord; ventral pleural appendage of the male hypopygium almost straight, pointed at its tip, the inner margin with obscure teeth.

Male.—Length, 4.2 mm.; wing, 5.1 mm.

Female.—Length, 3.9–4 mm.; wing, 4.3 mm.

Rostrum and palpi dark brownish black. Antennae short, the segments oval, clothed with long, pale hairs, the organ black throughout. Head dark colored with a gray bloom.

Mesonotal praescutum light brown; a row of hairs on either side, just inside the proximal end of the pseudosutural foveae; the region anterior to the pseudosutural foveae is light yellow; ends of the pronotal scutellum light shiny yellow. Pleura plumbeous. Halteres pale, the elongate knob only a little darker. Legs with the coxae light yellowish brown; trochanters light brown; remainder of the legs dark brown. Wings light brown, a darker coloration amounting to a spot in the vicinity of the cord and caused by the abundance of hairs at that place. Venation as in plate I, fig. 9.

Abdomen dark brown. Male hypopygium with the ventral pleural appendage (see plate IV, fig. 3) heavily chitinized, almost straight, or the tip directed

[27] Proc. Acad. Nat. Sci. Phila., 1911, p. 588, pl. XXVII, fig. 26.

a little proximad; the base is cylindrical, smooth, at about mid-length widened out into a subflattened blade whose inner margin is provided with about a dozen very obscure, appressed teeth, the tip produced into a long, sharp point.

Habitat.—Colombia, Peru. Holotype, ♂, La Cumbre, Colombia, altitude 6600 feet, May 18, 1914 (Parish coll.). Allotype, ♀, topotypic, May 15, 1914. Paratypes, 2♂, 2♀, topotypic, May 18, 1914; 1♂, Matucana, Peru, altitude 7788 feet, June 15, 1914.

Molophilus tenebricosus sp. n.

Color dark brownish black; antennae elongate, sub-nodulose; ventral pleural appendage of the male hypopygium simple, curved, acutely pointed.

Male.—Length, 3.5 to 3.6 mm.; wing, 4.6 to 4.8 mm.

Rostrum and palpi dark brownish black. Antennae elongate, if bent backward extending nearly to the base of the abdomen, sub-nodulose, the segments enlarged at the base, the apex more slender, the segments clothed with long, outstretched hairs; antennae black throughout. Head dark brownish black with a gray bloom.

Thoracic dorsum dark brown with a sparse gray bloom, the anterior margin of the praescutum before the pseudosutural foveae and the lateral margin of the pronotal scutellum very pale yellow. Pleura grayish brown. Halteres rather stout, the base pale yellow, the knob more brownish. Legs with the coxae light yellow; trochanters yellowish brown; remainder of the legs dark brown. Wings dark brown, the venation as in plate I, fig. 10.

Abdomen dark brownish black. The male hypopygium with the ventral pleural appendage (see plate IV, fig. 4) heavily chitinized, simple, slender, curved and ending in a sharp point. From between the pleurites there projects an elongate, straight appendage of a yellow color which is presumably the penis-guard.

Habitat.—Colombia. Holotype, ♂, La Cumbre, Colombia, altitude 6600 feet, May 18, 1914 (Parish coll.). Paratypes, 3♂, topotypic, May 15 to 20, 1914.

Genus **TRIMICRA** Osten Sacken

Trimicra andensis sp. n.

Male.—Length, 6.2 to 6.4 mm.; wing, 9.8 to 10 mm.

Head and thorax gray, the latter with three brown stripes; wings gray spotted with brown on the cross-veins.

Rostrum, palpi and antennae dark brownish black. Head light gray with several long black hairs.

Thoracic dorsum light gray with three narrow dark brown lines on the praescutum; several long black hairs along these stripes; lobes of the scutum indistinctly browned; scutellum pale, whitish; postnotum light gray. Pleura pale gray. Halteres pale brown, the knobs darker. Legs with the coxae dark brown; trochanters yellowish brown; femora light brown, broadly infuscated

at the tip; tibiae brown soon passing into dark brown; tarsi dark brown; legs densely hairy. Wings rather narrow, grayish; distinct brown clouds along the cord and outer dellection of cell *1st* M_2; veins dark brown. Venation as in plate II, fig. 8.

Abdominal segments dark brown, the lateral margins narrowly and abruptly pale; hypopygium reddish; abdomen provided with numerous long pale hairs.

Habitat.—Ecuador, Peru. Holotype, ♂, Alaousi, Ecuador, altitude 9450 feet, June 17, 1914 (Parish coll.). Paratype, ♂, Matucana, Peru, altitude 7788 feet, July 14, 1914.

Similar to the North American *T. anomala* Osten Sacken[28] but the thorax is much clearer gray, the head gray instead of brownish, the wings gray instead of brown, the cell *1st* M_2 smaller and the veins issuing from it much longer. I would have identified this with the *Limnophila trichopus* Philippi,[29] but the latter is described as having five posterior cells to the wings.

Genus **GNOPHOMYIA** Osten Sacken

Gnophomyia pervicax Alexander

1914. *Gnophomyia pervicax* Alexander, Ent. News, xxv, p. 208, pl. IX, fig. 7.

One female from La Cumbre, Colombia, altitude 6600 feet, May 18, 1914, collected by Parish.

Tribe *Limnophilini*

Genus **EPIPHRAGMA** Osten Sacken

Epiphragma gracilicornis sp. n.

Wings diversified, not banded; antennae elongated.

Female.—Length, 11 mm.; wing, 11.2 mm.; antennae about 3.8 mm.

Rostrum and palpi dark brownish black. Antennae very long and slender, in this sex, if bent backward, extending about to the base of the abdomen; segments 1 and 2 black, segment 3 yellow with a brown ring about mid-length; segments 4 and 5 dark brown with the apical fourth to third dull yellow; remaining segments dark brown with the extreme tip slightly paler. Front very narrow between the eyes, head dark gray.

Pronotal scutum dull yellow with a brown cross-band about mid-length; scutellum dull yellow. Mesonotal praescutum rich chestnut with darker markings as follows: the extreme cephalic margin is brown and sends back a narrow median point to almost mid-length of the segment; lateral margin behind broadly dark brown, at the pseudosutural fovea sending a short point proximad; a large quadrate spot on either side of the middle line on the posterior end of the sclerite just before the caudal margin; caudal margin of the praes-

[28] 1861. *anomala* Osten Sacken, Proc. Acad. Nat. Sci. Phila., p. 290.

[29] 1865. *trichopus* Philippi, Verh. k.-k. zool.-bot. Ges. Wein, xv, p. 610, (*Limnophila*).

cutum and the anterior two-thirds of the scutum light yellow pollinose; scutellum light gray pruinose, a dark brown basal spot on either side of the middle line; postnotum with the margins brown enclosing a gray pruinose triangle whose point is behind. Pleura light yellow pollinose with large brown patches on the mesepisternum and mesosternum. Halteres long and slender, the extreme base and the tip of the knob light yellow, the remainder brown. Legs with the coxae dull yellow with brown clouds over a large portion of the outer faces; trochanters dull yellow, a brown cloud at the tip behind; femora light yellowish brown, the apical third yellow and including a broad brown subapical band; tibiae and tarsi brown. Wings hyaline, the costal cell before the supernumerary cross-vein with two yellow blotches surrounded by a brown margin; remainder of the wing with numerous brown markings arranged as in the figure. Venation: (see plate I, fig. 11) a spur near the origin of *Rs* which is very long; R_{2+3} in a line with *Rs;* inner end of the elongate cell *1st* M_2 only a little longer than the cross-vein *r-m* and the basal deflection of R_{4+5}.

Abdominal tergites brown with a large rounded yellowish brown patch enclosing the impressed mark at near mid-length of the segments; caudal margins of the sclerites narrowly pale; sternites dark brown.

Habitat.—Colombia. Holotype, ♀, La Cumbre, Colombia, altitude 6600 feet, May 18, 1914 (Parish coll.).

This insect is closely related to *E. circinata* Osten Sacken, of Costa Rica, in the elongate antennae, but the two forms may be separated by the following key:

1. Antennae brown, the first flagellar segment yellow; wings broader, grayish, cell *1st* M_2 not so elongated, the petiole of cell R_2 long. (Costa Rica) *circinata* O. S.[30]

   Antennae brown, the first flagellar segment yellow with a brown ring, the two succeeding segments broadly tipped with yellow; wings narrower, hyaline, cell *1st* M_2 elongated, the petiole of cell R_2 short. (Colombia) *gracilicornis* sp. n.

Genus **LIMNOPHILA** Macquart

Limnophila lloydi Alexander

1913. *Limnophila lloydi* Alexander, Journ. N. Y. Ent. Soc., xxi, p. 205, pl. 5, fig. 9.

One male from Huigra, Ecuador, altitude 4500 feet, June 15, 1914, collected by Parish.

Subfamily TIPULINAE

Tribe *Tipulini*

Genus **TIPULA** Linnaeus

Tipula obliquefasciata Macquart

1846. *Tipula obliquefasciata* Macquart, Dipt. Exot. Suppl., i, p. 15, pl. 1, fig. 10.

[30] 1886. *circinata* Osten Sacken, Biol. Centr.-Amer., Dipt., i, p. 9, pl. I, fig. 1.

One female from Lima, Peru, altitude 500 feet, taken on August 21, 1914, by Parish.

The *Monilifera* Group.

In *Linnaea Entomologica* for 1851, Dr. Loew described a remarkable species of crane-fly as *Tipula monilifera* n. sp. This insect came from Rio de Janeiro, Brazil, and was indicated as being notable by the beautiful wing-pattern and the interesting structure of the antennae in the male sex. In 1886 von Roder[31] described from Ecuador, under the name of *moniliformis*, a second form distinguished from Loew's species by the much lighter (yellow) ground-color of the wings and other characters. In 1891, the third species, *ornaticornis*, was described by Van der Wulp,[32] his type coming from Colombia.

The group is very well represented in collections received from South and Middle America, especially from the Andean region, and in the present account the author has endeavored to give his opinions concerning the status of the group. From the great variation in the specimens it is easily understood that we are here not only dealing with numerous forms that are closely related to one another, but also with species which show a considerable degree of variability in color-pattern.

It appears that the group has been derived from forms such as *exilis* sp. n. and *jivaro* sp. n., and the following lines of specialization seem to have been followed: the antennae, from the short, normal Tipuline organ with the flagellar segments enlarged-oval at the base and slightly and gradually constricted about midlength, have gradually evolved into the slender, graceful antenna which in the more specialized forms (*monilifera* Loew, *moniliformis* Roder, *armillatus* sp. n.) is nearly as long as the entire body; in these forms the ten apical flagellar segments are enlarged-rounded at the base, abruptly constricted into a long, slender, uniform pedicel beyond, producing the nodulose, beadlike effect that is so conspicuous in these insects. Evolution in the wing-venation is not so apparent, as might well be expected in this remarkably homogeneous genus of flies; however, the slight shortening of the radial sector and the tendency of R_2 to

[31] Stett. Ent. Zeit., xlvii, p. 259.

[32] Tijd. voor Entomol., xxxiv., p. 195, pl. 12, figs. 1, 2.

diverge from R_3 is apparent. The genitalia of the male sex shows several distinct lines of specialization. The generalized *jivaro* and *exilis* have the ninth tergite large, subquadrate, with a broad and deep median furrow; the ninth pleurite is extensive, the eighth sternite very small but with a conspicuous median tripartite organ. As evolution proceeds we find the broad furrow on the ninth tergite narrowed to a delicate impressed line, the ninth pleurite becoming small, oval or elongate-oval, situated on the caudal face of the ninth sternite and the eighth sternite with the median lobe single and finally becoming reduced to a mere tuft of hairs. The order of specialization in the forms known to me seems to be about as follows:

1. More generalized with shortened antennae and generalized hypopygium,—*jivaro*, *exilis* and possibly other species described by earlier workers, but from their insufficient descriptions not definitely recognized.

2. No representatives of the intermediate group are known to me.

3. With the antennae elongated but still much shorter than the body,—*mitua*, *ornaticornis* V. d. W., *carizona* Alex.

4. Highly specialized species with the antennae only a little shorter than the entire body,—*monilifera* Loew, *moniliformis* Rod., *armillatus*. Of uncertain position, known only from the female sex,—*quichua* sp. n.

The body color-pattern is curious and is indicated in all of the species. The insects show a more or less distinct, very narrow, dorso-median vitta running from the head over the entire length of the thorax; on the ground color between the usual thoracic stripes occur rather abundant hair-like setae and each of the setigerous punctures is surrounded by a brown circle, producing a spotted appearance.

Tipula exilis sp. n.

Monilifera group; antennae short in both sexes; head and thorax dark gray; a narrow dorso-median line running the length of the thorax; wings mottled white, brown and gray; abdomen of the female very long and slender.

Male.—Length, 12 to 15 mm.; wing, 12.1 to 14.1 mm.; abdomen, 11.6 mm.

Female.—Length, 21 to 26 mm.; wing, 15.2 to 15.5 mm.; abdomen, 19 to 21.5 mm.

Frontal prolongation of the head moderately long, brown, a little darker on the sides of the organ; palpi moderately long, dark brown. Antennae rather short (see plate IV, fig. 5), a little longer than in *T. jivaro* which is very

closely related; the three basal antennal segments light yellow; the following two with the enlarged basal quarter black, the remainder brownish yellow; remaining antennal segments almost uniformly dark brown with an abundant silvery pubescence. Frontal tubercle distinct; head dull gray with a narrow, indistinct brown median vitta; occiput tinged with reddish yellow.

Thoracic dorsum almost uniformly dull gray excepting the narrow dark brown median vitta which is distinct on the praescutum, broadened on the postnotum; scutellum paler on the sides. Pleura mostly dark gray, the integument more brown. Halteres long, slender, with the knob brown, the stem dull yellow. Legs with the coxae light yellowish brown; trochanters and femora light brown, the latter dark brown at the tip; tibiae light brown, the tip dark brown; tarsi light brown, the apical segments dark brown. Wings with the costal cell yellowish, remainder of the wings variegated with whitish, brown and gray; the white area beyond the stigma includes most of the wing-apex, the tips of cells R_2 and R_3 and smaller areas in cells R_5 and the outer medial cells being grayish; the stigmal area is brown; gray clouds at the origin of *Rs*, at mid-length of cell *R*, and in most of the basal cells. Venation: (see plate III, fig. 1) the tip of R_2 indistinct, very pale.

Abdominal tergites 1 to 5 dull yellow, 6 to 8 dark brown, the ninth medium brown; an indistinct brown lateral stripe; sternites dull yellow, the terminal segments dark gray. Hypopygium quite similar to that of *T. jivaro*, the eighth tergite broad, conspicuous, the caudal margin straight across or even slightly convex medially; ninth tergite (see plate V, fig. 2) broadly subquadrate, with a deep median furrow as in *jivaro*, the caudal margin produced into a median lobe whose outer angles are chitinized teeth. Ninth pleurite about as in *jivaro*, the caudal prolongation (a) reduced to a tiny lobe which is scarcely visible; the more chitinized lobe (b) which arises from the ventral portion of the sclerite is a little smaller; the pleural appendages are similar to those of *jivaro*. The tripartite appendage to the eighth sternite is as shown in the figure (see plate V, fig. 5), the lateral lobes being elongated, only a little shorter than the median lobe.

The female is similar to the male, the antennae a little shorter, with the dorso-median thoracic vitta running the whole length of the sclerite; abdomen greatly elongated, slender, tergal valves of the ovipositor short and high, the sternal valves still shorter, very high.

Habitat.—Peru. Holotype, ♂, San Cristobal Hill, Lima, Peru, altitude 1000 feet, September 26, 1912 (C. H. T. Townsend coll.). Allotype, ♀, topotypic. Paratypes, 2 ♂, 4 ♀, topotypic.

Tipula jivaro sp. n.

Monilifera group; antennae short, bicolorous; thorax gray with brown stripes and numerous brown spots on the interspaces of the praescutum; wings marbled with subhyaline, gray and brown.

Male.—Length, 18 mm.; wing, 18 mm.; antennae about 5.5 mm.

Female.—Length, 22 mm.; wing, 16.4 mm.; abdomen, 16.1 mm.

Frontal prolongation of the head yellowish brown, rather elongated, a narrow dark brown line along the side; palpi short, dark brownish black. Antennae with the first segment elongate cylindrical, a little narrowed toward the base; the second segment small, without a distinct tooth as in the other members of the *monilifera* group; the segments 4 to the end of the organ with a basal swelling which occupies about one-quarter of the segment; the segment beyond the basal swelling slightly constricted (see plate IV, fig. 6); antennae with the three basal segments light yellow, remaining segments dark brownish black on the basal enlargement, the remainder of the segment yellowish brown. Front with a distinct tubercle, scarcely if at all notched in front; vertex light brown passing into gray on the occiput; median portion of the vertex darker brown, paler, more yellowish adjoining the eyes.

Pronotum light grayish brown with a darker brown longitudinal line and a transverse row of dark brown dots. Mesonotal praescutum light brownish gray; a very narrow dark brown median line broadened behind; on either side of this line, a broader paler grayish brown line, darkest in front, behind becoming confluent with the narrow median vitta. Lateral stripes short and rather indistinct; the interspaces between the thoracic stripes are provided with rather numerous setae, the base of each of which is surrounded by a dark brown spot producing the spotted appearance characteristic of this group of species; scutum light gray with two small brownish spots, the smallest of which lies in the outer anterior angle of the sclerite, the larger one behind; a few brown setigerous markings on either side of the dark brown middle line; scutellum and postnotum light gray with a delicate brown middle line and a few sparse brown setigerous punctures. Pleura light brown, heavily gray pruinose. Halteres light brown, rather short. Legs with the coxae light yellowish gray, the outer face provided with numerous setiferous punctures; trochanters yellow; femora dull yellow, the tip broadly dark brown; tibiae light yellow, tipped with dark brown; tarsi dark brown. Wings with the costal cell rich yellow, remainder of the membrane light brownish gray, a broad white cross-band extending from beyond the stigma almost across the wing outside the cord, occupying the end of cell *2nd* R_1, base of R_2, basal portion of R_3 and R_5, basal half of *1st* M_2 and parts of M_3 and Cu_1; a hyaline dash in cell R along vein R, this including the proximal end of cell *1st* R_1; a whitish blotch at about three-fourths of the length of cell M; brown clouds as follows: stigmal blotch, this being continued down the cord to the cell *1st* M_2; narrow seams along Cu and *2nd* A, at the end of Sc, at the origin of Rs and on vein R midway between the arculus and the base of Rs. Venation as in plate 3, fig. 2.

Abdominal tergites dull yellow with a distinct interrupted dorsal brown line; lateral edges of the segments broadly brown, the terminal segments darker, more uniformly brown. Hypopygium (see plate V, fig. 1) with the eighth tergite rather broad, straight across the caudal margin. Ninth tergite (plate V, fig. 3) elongate, subquadrate, with a deep and broad median furrow extending the length of the sclerite; caudal margin with a sharp chitinized tooth on either side of the broad furrow described above. The ninth pleurite distinct, situated on the caudal face of the ninth sternite; a cylindrical fleshy lobe (*b*) with long hairs on the ventro-cephalic portion of the pleurite; a large

fleshy organ (*a*) directed caudad, enlarged at the base, pointed at the tip, their inner surface at the base with a great patch of chitinized bristles which are contiguous with those of the opposite side in a position of rest. Pleural appendages consisting of an outer, very slender, subcylindrical, fleshy lobe, and an inner appendage consisting of a subchitinous arm ending in two chitinized lobes; the outer lobe is subrounded at the apex, the inner one produced cephalad into a short, cylindrical point. Ninth sternite deeply split medially. Eighth sternite small, widely separated from the 8th tergite; from the middle portion of this sternite arises a tripartite appendage (see plate V, fig. 6) consisting of a long median lobe which is curved upward in dried specimens but becomes straightened out when the specimen is boiled; on either side of this elongate median lobe is a small, pale lateral lobe.

The female is similar to the male with the antennae shorter; the ovipositor with the upper valves long, slender, subacute at their apices and slightly upcurved; sternal valves shorter and slightly higher.

Habitat.—Ecuador. Holotype, ♂, Alaousi, Ecuador, altitude 9450 feet, June 18, 1914 (Parish coll.). Allotype, ♀, topotypic.

The specific name is that of a native tribe of Ecuador; called also Xibaro and Gibaro.

I regard this species as being the second most generalized member of the *monilifera* group, *exilis* being a little more primitive in many respects.

The two known species of this group with the antennae short in both sexes may be separated by the following key:

1. Head and thorax dark gray with a narrow dorso-median line running the length of the thorax; male hypopygium without a distinct caudal prolongation to the ninth pleurite; eighth sternite with the lateral lobes of the tripartite appendage long; abdomen of the female long and slender (20 mm.). (Peru) *exilis* sp. n.

   Head light brown passing into gray on the occiput; thorax light brownish gray with brown stripes and numerous brown spots on the interspaces between these stripes; male hypopygium with a distinct fleshy lobe directed caudad and situated on the ninth pleurite; eighth sternite with the lateral lobes of the tripartite appendage short; abdomen of the female of moderate length (16 mm.). (Ecuador) *jivaro* sp. n.

Tipula quichua sp. n.

Monilifera group; antennae, bicolored; thorax light gray with a delicate dark brown dorso-median line running the entire length; wings largely gray and white; femora with the tips brown and a subterminal yellow ring.

Female.—Length, 21 mm.; wing, 15.2 mm.; abdomen, 11.5 mm.

Frontal prolongation of the head light brownish gray; palpi short, dark brown. Antennae with the three basal segments light yellow; fourth segment with the

basal portion blackish around the insertions of the bristles; remaining segments dark at the base, toward the tip of the organ the entire segment is darkened. Head gray, a median stripe and the region adjoining the eye dark brown.

Thoracic dorsum light gray with a narrow dark brown median stripe running from the pronotum to the end of the mesonotal postnotum; on either side of this vitta on the praescutum is a light brownish gray stripe, darkest in front; lateral stripes shortened but distinct; numerous dark brown spots, some being confluent, on the interspaces of the praescutum; scutum, scutellum and postnotum with the ground color light gray. Pleura very pale whitish gray. Halteres light yellow, the knob darkened. Legs with the coxae pale grayish white; trochanters dull yellow; femora dull yellow passing into brown beyond the middle, the tip dark brown, a broad yellow subapical ring; tibiae brownish yellow, tipped with brown; tarsal segments 1 and 2 yellowish brown, the tips brown, segments 3 to 5 dark brown. Wings with the costal cell yellowish; remainder of the wings whitish, gray and brown; the white markings are as follows: a large band beyond the stigma including the end of cell *2nd* R_1, basal half of R_2, portions of R_3 and R_5 near the base, most of *1st* M_2, tip of cell M and base of cell M_3; cell R_5 largely pale; cell R similar excepting isolated gray blotches; cell M and large portions of cells *Cu*, *1st A* and *2nd A* whitish; the stigmal area is dark brown; the tip of the wing, the cord, the base of *Rs* and most of the cells of the wing contain gray suffusions. Venation: (plate III, fig. 3) R_2 tends to be swung cephalad at its tip as in the *monilifera* group.

Abdominal tergites light brown, a distinct dark brown dorsal line and the lateral margins of the segments dark brown; sternites brownish; ovipositor with the tergal valves very slender and delicate, the tip scarsely expanded; sternal valves shorter and a little higher.

Habitat.—Peru. Holotype, ♀, Matucana, Peru, altitude 7788 feet, July 14, 1914 (Parish coll.).

The specific name is that of the native Indian nation of Peru.

This interesting species is readily separable by the gray thorax with the prominent dorso-median brown vitta and the gray and white diversified wings. The subterminal yellow annulus to the femora is a character not found in the near relatives of this insect.

Tipula carizona Alexander

1913. *Tipula carizona* Alexander, Journ. N. Y. Ent. Soc., xxi, p. 208, pl. 7, fig. 7 (wing), figs. 2 to 4 (genitalia).

A male from Matucana, Peru, altitude 7788 feet, July 14, 1914, collected by Parish; another male from Huancayo, Peru, altitude 10,636 feet on June 27, 1914, Parish, collector.

This species is quite widely distributed in the Andes; it differs from Van der Wulp's description of *ornaticornis* by the light gray color of the thorax instead of opaque rufous.

Tipula mitua sp. n.

Monilifera group; antennae slender, moderately long (♂, 8.5 mm.); thorax brown without apparent stripes; wings variegated brown and white; male genitalia with the caudal margin of the ninth tergite deeply rounded, eighth sternite with a prominent median lobe that is directed caudad.

Male.—Length, 15.5 mm.; wing, 19 mm.; antennae, 8.5 mm.

Frontal prolongation of the head rather long and slender, light brown; palpi black, paler at the joints. Antennae moderately long (see plate IV, fig. 7) but with the segments slender as in *monilifera;* the antennae are less than one-half the length of the wings; the two basal segments are dull yellow, the remaining segments with the basal enlargement black, the stem dark brown, on the terminal segments almost black. Head light brownish yellow with a narrow dark brown median vitta.

Thoracic praescutum brown without apparent darker stripes; on the interspaces between the usual stripes are numerous brown spots surrounding setigerous punctures; scutum and postnotum brown, narrowly edged around with dark brown; scutellum yellowish brown. Pleura dull yellow. Halteres moderately long, dull yellow, darkened toward the knob. Legs with the coxae and trochanters yellowish brown, broadly tipped with dark brown; tibiae and tarsi dark brown. Wings brown and white, the shade of the brown a little paler than that of *monilifera;* venation and pattern as in plate III, fig. 4.

Abdomen dull brownish yellow with the lateral margins broadly dark brown; terminal segments dark brown; sternites dull yellow. Hypopygium as in the *monilifera* group; ninth tergite (plate V, fig. 4) with the median furrow of the more generalized forms (*exilis*, et al.) reduced to a mere line; caudal margin of the segment broadly and evenly rounded. Ninth pleurite rather prominent, subrounded. Eighth sternite (plate V, fig. 7) prominent, with the caudal margin very convex, bearing an elongate fleshy median lobe, this lobe directed caudad.

Habitat.—Colombia. Holotype, ♂, Valle de las Papas, Colombia, altitude 10,000 feet, March 29, 1913, collected by Mr. John Thomas Lloyd.

The specific name is that of a native Indian tribe occupying the same region as the species.

This species is similar to *monilifera* Loew and *armillatus* n. sp. in the dark brown and whitish wing-pattern, but differs in the shortness of the antennae in the male sex (8.5 mm., with a wing of 19 mm.) as opposed to *monilifera* with an antennal length of 10 mm. and *armillatus* with the antennae over 12.5 mm. in length. From *T. carizona* Alex. it differs in the diversified brown and white wings; from *T. ornaticornis* V. d. Wulp, by the color-pattern of the thorax and abdomen. It agrees with these two last species in the slender median appendage to the eighth

sternite of the male hypopygium. This species is based on a member of the Lloyd collection and is described from one of the two specimens referred to *monilifera* in my previous paper.[33]

The other specimen is here described as *T. armillatus* n. sp. and so *monilifera* is not yet definitely known from Colombia.

Tipula armillatus sp. n.

Monilifera group; antennae of the male very long, nearly as long as the wing (antenna, 12.8 mm.; wing, 14 to 15 mm.).

Male.—Length, 13 to 14 mm.; wing, 14.2 to 15.2 mm.; antennae, 12.8 to 12.9 mm.

Similar to *T. monilifera* Loew and *T. mitua* sp. n., differing as follows: antennae very long and slender, the longest for any member of this group of species, being some four-fifths the length of the wing (see plate IV, fig. 8); segment one is quite normal, segment two with a dense brush of black hairs on the dorsal inner surface; remainder of the organ light yellow, the last ten flagellar segments with the brownish black basal swelling, the slender stem passing into dark brown at about mid-length of the organ.

Thoracic dorsum light brown, the lateral stripes quite lacking, the brown setigerous punctures on the interspaces scanty. Abdomen mostly dark brown except on the basal segments. Hypopygium with the ninth tergite having the median furrow reduced to a mere line as in the specialized members of this group, the latero-caudal angles prominent, slightly incurved; ninth pleurite very small, reduced to an elongate-oval lobe on the caudal face of the ninth sternite; eighth sternite (see plate V, fig. 8) prominent, the caudal margin gently concave, medially bearing a small lobe which is provided with a tiny tuft of silvery hairs.

The wing-pattern is shown in plate III, fig. 6; that of *Tipula monilifera* Loew in plate III, fig. 5.

Habitat.—Colombia. Holotype, ♂, La Cumbre, Colombia, altitude 6600 feet, May 16, 1914 (Parish coll.). Paratype, ♂, Popayan, Colombia, altitude 6590 feet, March 1, 1912 (Lloyd coll.).

The longer antennae and the different hypopygium in the male serves to distinguish *armillatus* from the related species with brown and white wings (*monilifera* Loew, *mitua* sp. n.); *moniliformis* Roder has the wings diversified yellow and hyaline.

The paratype was previously determined as *T. monilifera* in an earlier paper by the author, as mentioned under the description of *T. mitua*.

[33] Journal of the New York Ent. Soc., xxi, p. 209, 1913.

EXPLANATION OF THE PLATES

Plate I

Fig. 1.—Wing of *Dicranomyia mulsa* sp. n.; ♀.
Fig. 2.—Wing of *Dicranomyia mulsa* sp. n.; ♂.
Fig. 3.—Wing of *Dicranomyia*, species.
Fig. 4.—Wing of *Dicranomyia invalida* sp. n.
Fig. 5.—Wing of *Dicranomyia virilis* sp. n.
Fig. 6.—Wing of *Atarba brunneicornis* sp. n.
Fig. 7.—Wing of *Orimarga andina* sp. n.
Fig. 8.—Wing of *Gonomyia jejuna* sp. n.
Fig. 9.—Wing of *Molophilus capricornis* sp. n.
Fig. 10.—Wing of *Molophilus tenebricosus* sp. n.
Fig. 11.—Wing of *Epiphragma gracilicornis* sp. n.

Plate II

Fig. 1.—Wing of *Dicranomyia regifica* sp. n.
Fig. 2.—Wing of *Rhipidia (Arhipidia) vicina* sp. n.
Fig. 3.—Wing of *Geranomyia lachrymalis* sp. n.
Fig. 4.—Wing of *Geranomyia plumbeipleura* sp. n.
Fig. 5.—Wing of *Geranomyia scolopax* Alexander.
Fig. 6.—Wing of *Geranomyia townsendi* sp. n.
Fig. 7.—Wing of *Geranomyia glauca* sp. n.
Fig. 8.—Wing of *Trimicra andensis* sp. n.
Fig. 9.—Wing of *Gonomyia velutina* sp. n.
Fig. 10.—Wing of *Gonomyia velutina* sp. n.

Plate III

Fig. 1.—Wing of *Tipula exilis* sp. n.
Fig. 2.—Wing of *Tipula jivaro* sp. n.
Fig. 3.—Wing of *Tipula quichua* sp. n.
Fig. 4.—Wing of *Tipula nitua* sp. n.
Fig. 5.—Wing of *Tipula monilifica* Loew.
Fig. 6.—Wing of *Tipula armillatus* sp. n.

Plate IV

Fig. 1.—Hypopygium of *Gonomyia jejuna*; lateral aspect. a=pleura. b=inner pleural appendage. c=outer pleural appendage. d=penis-guard.
Fig. 2.—Hypopygium of *Atarba brunneicornis*; dorsal aspect, pleura and the apical appendages.
Fig. 3.—Hypopygium of *Molophilus capricornis*; ventral aspect of the ventral apical appendage.

FIG. 4.—Hypopygium of *Molophilus tenebricosus*; ventral aspect of the ventral apical appendage.
FIG. 5.—Fifth antennal segment of *Tipula exilis*.
FIG. 6.—Fifth antennal segment of *Tipula jivaro*.
FIG. 7.—Fifth antennal segment of *Tipula mitua*.
FIG. 8.—Fifth antennal segment of *Tipula armillatus*.

PLATE V

FIG. 1.—Hypopygium of *Tipula jivaro*; lateral aspect. 7 t, 8 t, 9 t, = tergites; 8 s, 9 s, = sternites. a = outer lobe of the ninth pleurite. b = inner lobe of the ninth pleurite.
FIG. 2.—Hypopygium of *Tipula exilis*; dorsal aspect of the ninth tergite.
FIG. 3.—Hypopygium of *Tipula jivaro*; the same.
FIG. 4.—Hypopygium of *Tipula mitua*; the same.
FIG. 5.—Hypopygium of *Tipula exilis*; ventral aspect of the eighth sternite.
FIG. 6.—Hypopygium of *Tipula jivaro*; the same.
FIG. 7.—Hypopygium of *Tipula mitua*; the same.
FIG. 8.—Hypopygium of *Tipula armillatus*; the same.

STUDIES IN AMERICAN TETTIGONIIDAE (ORTHOPTERA)

VII

BY JAMES A. G. REHN AND MORGAN HEBARD

A REVISION OF THE SPECIES OF THE GENUS ATLANTICUS (DECTICINAE)

The acquisition of certain very peculiar types belonging to this interesting genus, not referable to any of the generally recognized forms, made necessary not only the examination of all the material in our possession or in our charge, but also that in the other more important American collections. As a result we have been compelled to completely revise the classification of the genus, to correct the assignment of certain of the older names and to distinguish the more permanent from the many relatively variable, and therefore taxonomically valueless, characters found in the genus. Although the number of valid species in the genus has been considerably increased, but two were previously unknown, as a number of previously synonymized or incorrectly assigned names represent well characterized species, which are here correctly located.

ATLANTICUS Scudder

1838. *Decticus* Burmeister, Handb. der Entom., ii, abth. ii, pt. i, p. 709. (Part.)

1859. *Orchesticus* Saussure (not of Cabanis, 1851), Revue et Magasin de Zoologie, 2e ser., xi, p. 201.

1862. *Thyreonotus* Scudder (not of Serville, 1839), Boston Journ. Nat. Hist., vii, p. 453.

1893. *Engoniaspis* Brunner, Ann. Mus. Civ. Stor. Nat. Genova, xxxiii, p. 185. (No species described.)

1894. *Engoniaspis* Scudder, Canad. Entom., xxvi, pp. 177, 179. (No species described.)

1894. *Atlanticus* Scudder, Ibid.

1900. *Engoniaspis* Scudder, Proc. Davenp. Acad. Nat. Sci. viii, p. 96. (Genus properly charaeterized.)

1900. *Stipator* Rehn, Trans. Amer. Entom. Soc., xxvii, p. 90. (To replace the preoccupied genus *Orchesticus* Saussure.)

The genus was based on three species: *pachymerus* and *dorsalis* Burmeister and *gibbosus* Scudder.

GENOTYPE: *Atlanticus pachymerus* [*Decticus pachymerus*] (Burmeister), selected by Kirby, 1906.

Generic Position.—The position which was assigned to the genus by Caudell in 1908,[1] *i. e.* adjacent to *Stipator* of authors (vide page 44), appears to us to be the correct one. Without a more detailed study of all the related genera we can not analyze the features of relationship to the several allied North American and certain Old World genera. The chief feature of difference from *Stipator* of authors (*Pediodectes*, vide page 45) is in the possession by *Atlanticus* of distinct and continuous, though sometimes rounded, lateral marginal angles to the pronotal disk.

Generic Description.—Head not prominent, of medium size; fastigium moderately prominent, varying from one-third to two-thirds (*calcaratus*) of the width of the interocular space; eyes subcircular to flattened (cephalad) circular in outline, hardly to distinctly prominent. Pronotum large, much produced caudad over remaining thoracic segments and proximal section of abdomen; disk subdeplanate to well rounded in transverse section, in form slightly to greatly narrowed at or in cephalic third or fourth or narrow and subequal in width, cephalic margin of disk truncate to weakly emarginate, caudal margin subtruncate to strongly arcuate; lateral angles of disk always indicated, persistent, gently rounded or prominent and cariniform, median carina absent or indicated caudad; lateral lobes longer than deep, humeral sinus distinctly, weakly or not at all indicated. Prosternum with or without distinct spines. Mesosternal lobes angulate produced. Tegmina of male abbreviate, merely stridulating organs wholly or largely concealed under the pronotum, strongly vaulted in form, overlapping, with stridulating field well developed. Tegmina of female rudimentary and wholly covered by the pronotum. Wings vestigial. Limbs moderately robust. Cephalic femora with the ventro-cephalic margin

[1] Genera Insectorum, fasc. 72, Decticinae, p. 14, (1908).

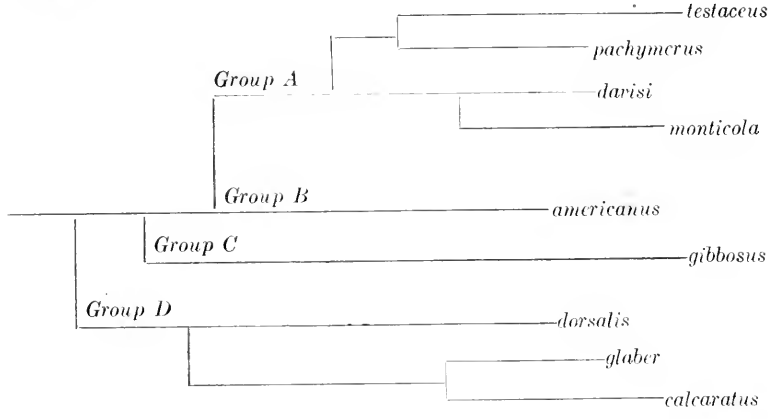
unarmed or with from one to five spines; cephalic tibiae armed dorsad on the external margin with but three (rarely four) spines. Caudal femora variable in length, proximal portion moderately to decidedly bullate, ventro-internal margin unarmed or with a number of spines; caudal tibiae with all margins well armed, dorsal ones with greater number, distal spurs with dorsal pair distinctly dorsal in position, median and ventral ones distinctly ventral in insertion, median pair of average or unusual length; caudal metatarsi with plantulae of short to great (*calcaratus*) length. Supra-anal plate small, trigonal to rounded in both sexes, seated in the emargination of the disto-dorsal abdominal segment. Cerci of male styliform, of robust or elongate type or corniform and elongate; tooth on internal face short and uncinate, elongate or corniform. Cerci of female simple and tapering. Ovipositor of medium or considerable length, straight, faintly or distinctly upcurved or very weakly decurved, apex on median line or ventral in position. Subgenital plate of male subtruncate to deeply fissate, styles varying from decided terete structures to mere nodes; subgenital plate of female always cleft, but this of variable degree and form, lateral portions of the plate ranging from rounded to lanceolate produced.

Classification.—The characters which stand out after detailed study as of diagnostic value are: the general form of the disk of the pronotum, the character of the caudal margin and the lateral margins and angles of the same, the relative depth compared with dorsal length of the lateral lobes of the same, the degree of projection of the male tegmina, the general character of the same, the form of the male cerci, the form of the subgenital plate of the female, the relative length and proportionate proximal inflation of the caudal femora and the character of the caudal tibial distal (particularly internal) spurs. In addition the degree of carination of the abdomen and the relative depth and general form of the ovipositor are features usually of diagnostic value, but not absolute for all the species, both showing variation in certain forms.

One of the striking things demonstrated by our study of the series of this genus is that the degree of development of the prosternal spines has little or no significance, as we find them well

marked or represented by mere nodes in individuals of the same species. Instead of being a character of prime importance, which has been used for the separation of genera groups, in the Decticinae the degree of development of these spines can not be used as a basic character, as we now know it is valueless as even a specific criterion in *Atlanticus* and, as Caudell has shown, in *Eremopedes*.

Our study makes it evident that the species of the genus fall quite naturally into four groups, our ideas of the general relationship of which, and of the component species, are as follows:



These groups may be in general characterized as follows:

GROUP A { *testaceus*, *pachymerus*, *davisi*, *monticola* }

Size medium to small. Pronotal disk with sharp lateral angles; disk proper distinctly constricted on cephalic third to fourth. Tegmina of male always with distal section not covered by the pronotum. Cerci of male moderately robust, with a distinct but short, approximately median, tooth. Subgenital plate of male angularly or arcuately emarginate, but never fissate. Subgenital plate of female moderately but never very deeply divided; lateral sections arcuate, obtuse-angulate or rectangular distad. Spurs of caudal tibiae normal.

GROUP B	(*americanus*)	Size medium to rather large. Pronotal disk with sharp lateral angles; disk proper distinctly constricted at cephalic third to fourth. Tegmina of male always with distal section not covered by the pronotum. Cerci of male moderately elongate, substyliform, acuminate, with an approximately median tooth. Subgenital plate of male fissate. Subgenital plate of female very deeply divided; lateral sections sublanceolate produced distad. Spurs of caudal tibiae normal.
GROUP C	(*gibbosus*)	Size large. Pronotal disk with distinct but rounded lateral angles; disk proper distinctly constricted at cephalic third to fourth. Tegmina of male almost or quite completely concealed under the pronotum. Cerci of male very elongate, corniform, tooth quite elongate and relatively slender. Subgenital plate of male subfissate. Subgenital plate of female moderately divided; lateral sections rounded rectangulate. Spurs of caudal tibiae normal.
GROUP D	*dorsalis* *glaber* *calcaratus*	Size medium to small. Pronotal disk with distinct but always rounded lateral angles; disk gently narrowing cephalad (*dorsalis*) or subequal and very narrow (*glaber* and *calcaratus*). Tegmina of male completely hidden under, or slightly projecting caudad of, the pronotum. Cerci of male short, robust, acutely pointed, with short stout median tooth. Subgenital plate of male acutely emarginate to subfissate (*calcaratus*). Subgenital plate of female moderately divided (female unknown in *calcaratus*); lateral sections moderately acute distad. Spurs of caudal tibiae elongate, straight for the greater portion of their length.

Of these, group B appears to be more nearly the probable ancestral type, group C being a strongly modified or rather specialized phylum, which probably diverged from the primitive stock before the more complex group A. The latter group shows in its *davisi-monticola* line a complex which is very dis-

tinctly breaking up, with the differentiation as yet visibly under way, and of the elements *monticola* probably represents the greatest divergence. The *testaceus-pachymerus* line is more permanent than the other line of the group, although the elements are more divergent. The species *pachymerus* appears to be breaking up at present. Group D is probably the oldest of the divergences from the presumably ancestral line, and in *dorsalis* we may assume we have the nearest to the primitive type of the group. The species *glaber* and *calcaratus* form a relatively old line of this group, but *calcaratus* is a much more specialized and differentiated form than *glaber*.

Notes on Male Tegmina.—The male tegmina are of use only as stridulating organs and are largely or wholly covered by the pronotum, the stridulating field proper being always covered, the portion which is exposed caudad of the pronotum in most of the species being the area distad of the speculum. The general form of the speculum and surrounding veins and areas shows some variation within specific limits, and again, in general character of the same, certain species show no important differences, but as a whole the form of the stridulating field is a good group character. The marginal field varies in form in certain closely allied species (i. e. *davisi* and *monticola*). The coloration of the tegmina is discussed under Coloration Notes. The tegmina of the female are small, pad-like, always completely hidden under the pronotum and of a general subcircular form.

Morphological Notes on Male Genitalia.—The disto-dorsal abdominal segment and the supra-anal plate of the male and of the female show a considerable amount of variation in form. The former is always emarginate mesad, but the same varies from an obtuse-angulate to an arcuate character, and within specific limits there is great variation in this respect. The supra-anal plate is more or less trigonal in character, but a tendency to become semi-elliptical is evident and this also is within specific limits. The same plate bears, usually, a medio-longitudinal sulcus, which may be complete or may be apparent only on the distal half. The cerci, as we have shown above under Classification, develop four principal types, one in each group, which are fairly or quite (*gibbosus*) decided and show no variation from their specific forms except in the following ways. There is a tendency to become more elongate or shorter and more

robust; another of the attenuation of the distal (distad of tooth) portion alone; a tendency to curve inward instead of remaining straight, which may involve the whole cercus or but the distal portion, and, faintest of all, a fluctuation in the curvature of the tooth. These features are liable to occur within specific limits, where we have sufficient material to permit us to speak with authority, except in *A. gibbosus*, which, while having the most complex cercus, is very fixed in these characters. The subgenital plate of the male has a very great amount of individual variability in the character of its distal margin, which ranges in a number of species from subtruncate to rectangulate and even acute-angulate. In one species (*americanus*) it is, however, invariably fissate.

Morphological Notes on Female Genitalia.—The disto-dorsal abdominal segment and supra-anal plate have been discussed above under the male genitalia. The cerci of the female are simple, tapering and without differential characters. The ovipositor shows variation along three lines: first, in relative length, secondly, in general straightness or curvature and in straightness or curvature of the ventral margin, and, lastly, in the position of the apex. In the matter of relative length, we find the variation exhibited is largely individual or possibly environmental, but not distinctly geographic. In several forms which have a faint decurvature of the whole ovipositor we find individuals which have the same straight (*pachymerus* and *davisi*), and this is probably (*pachymerus*) or certainly (*davisi*) geographic in character. The curvature or straightness of the ventral margin of the ovipositor is, of course, correlated with the general form, but to a slightly greater degree than the dorsal margin. The immediate apex of the ovipositor may be nearly median in position, but is generally ventral, the case in which it is median being geographic (northern specimens of *davisi*) and passing into the more normal type. The relative depth of the ovipositor varies somewhat, but this is chiefly in *davisi* and is there geographic. The form of the subgenital plate of the female is one of the most constant diagnostic characters found in the genus; this is always emarginate and ranges from subrectangulate and U-emarginate to V-emarginate, or subfissate (*americanus*) and divided well

toward the base (*davisi*), the lateral portions ranging from sublanceolate (*americanus*) to rotundate-rectangulate. In *davisi* the depth of the division of the plate is somewhat variable but the form is constant.

Notes on Pronotal Disk.—The disk of the pronotum is slightly different in the two sexes of the same species, in the female averaging more elongate with the caudal margin more truncate than in the male. This difference is, however, in large part nullified or at least modified by the character of variation found in both sexes. There is a very great amount of variation in the general form and proportions of the disk in at least three groups of species (A, B and C), or those with strangulate pronotal disks, this being purely individual, irrespective of sex and often the extremes are found in material taken at the same time and at the same locality. We find by measuring the greatest length, greatest caudal width and the least (at cephalic third) width of the disk we have three proportions no two of which seem to correlate with the third. In other words, two specimens of a series may show the same ratio of greatest width of disk to length of same, yet their least width will show no correlation to the other percentage but instead give widely different ratios. In a given species, by taking either of the width measurements, we find their extremes linked up by connecting intermediates of approximately the same disk length, so that there is no true dimorphism, but instead a wide range of variation in dimension of two portions of the same surface, yet these variations show no correlation.

General Morphological Notes.—In the present genus we find an interesting morphological condition to which attention has been called by Caudell, who found it present in the related genus *Eremopedes*.[2] The presence or absence of prosternal spines has been used by most authors as an important group character for separating genera in the Decticinae, but as Caudell has shown in regard to *Eremopedes*, and as we find in the present genus, these spines are not to be relied upon as invariable criteria. In certain species of the present genus (*davisi*, *monticola* and *americanus*) the spines may be represented by the merest

[2] Proc. U. S. Nat. Mus., xxxii, pp. 330 to 331, (1907).

nodes or by aciculate structures ranging to what would be considered long spines. In another species (*calcaratus*) the spines are completely absent and, although we have but two specimens of the species and cannot say how constant this feature is, this shows the condition which may occur in a genus supposed to be characterized by having strongly developed prosternal spines. The mesosternal lobes show an appreciable amount of individual variation in form in most of the species of the genus, the angle generally being submammillate. The abdomen almost always bears traces of a median and accompanying lateral carinae, which are sometimes continuous and again broken but indicated. There is, however, some variation in certain species in the intensity of the abdominal carinae. In several species the carinae bound color areas in individuals of certain color patterns. The caudal femora show as great a percentage of fixity in their general character and proportionate length as any of the more evident features of these insects. The only variation in femoral length seen, which is not correlated with general bulk, is geographic and can be demonstrated as such from the material in hand. The spination of the ventro-internal margin of the caudal femora is very variable in the number of spines present and we have found it of no diagnostic value. The spination of the cephalic and median limbs and of the caudal tibiae do not furnish us with any features of classificatory value. The spurs of the distal extremity of the caudal tibiae, and particularly of the internal face, do, however, give important features not previously utilized. These have been indicated under Classification (page 35).

Coloration Notes.—All of the forms of this genus are characterized in general coloration by somber or warm browns, red browns, or ochers, of a more or less protective character. The principal feature of the coloration, which modifies the appearance of individuals of the genus, is the presence of blackish fuscous as a wash on the dorsal section of the lateral lobes of the pronotum, and occasionally on a portion of the pleura and sides of the abdomen. This feature is variable in extent and depth and is frequently accompanied, when decided, with a fine stippling of the same fuscous over the paler area, but this fuscous

stippling may have no correlation with the intensity of the areas on the lateral lobes of the pronotum. Rarely the dorsum of the head, pronotum and abdomen has a pair of fine closely placed medio-longitudinal lines of fuscous (certain specimens of *glaber*). An invariable marking in the genus, although of variable extent and width, is the whitish area at the position of the humeral sinus of the lateral lobes of the pronotum. The general dorsal color may be washed with rufous or even bright green, but this is purely individual. Both *A. glaber* and *calcaratus* have their surface more glabrous or even polished than the other forms of the genus.

Distribution.—The genus is known to range from as far north as New Hampshire, northern Vermont (Sudbury), northeastern New York (Lake George), southern Ontario (Arner), northern Michigan (Porcupine Mountains) and Minnesota, south to extreme southern Florida, southern Alabama (Opelika) and Mississippi (Meridian and Natchez) and western Arkansas (Ozark region), and from the Atlantic coast west to Minnesota, Iowa, Missouri (record doubtful) and western Arkansas (Ozark region). It is quite probable that the genus will be found to reach the Gulf coast of Alabama, Mississippi and Louisiana, and also to extend into eastern Oklahoma. The Minnesota record is merely a state one and probably refers to the southeastern portion of the state. Two species of the genus have been reported by Bruner from eastern Nebraska, but his collection contained no material from that region and we have not positively accepted these records in consequence.

Individuals of this genus prefer woodland situations, living in the dead leaves and grasses, in low bushes and in wet meadowy areas near woods. They are occasionally found in numbers in low bushes along the edge of woods and at night we have found them climbing on the trees to a height as great as nine feet from the ground. Work with a flash-lamp will reveal them in many situations in wooded regions and they frequently fall victims to the molasses ground trap.

The center of distribution appears to be the southeastern part of the United States, five of the nine forms being found only in that region; it is there we find the greatest diversity in the genus and it is only in that general region that we find all four

groups of the same. The New England States form part of the range of three species, the Middle Atlantic States and the mountainous region of the southern states of four species, while but two species are found in the northern Mississippi Valley and but one reaches Arkansas. The genus is thus seen to be a group of essentially austral character.

Of the species of Group A, *testaceus* is a more northern adaptation of the austral *pachymerus* type, while *davisi* is the more nearly boreal of any of the forms of the genus, being represented in the southern Appalachians by the allied *monticola*. The single species of Group B (*americanus*) occupies an area in general more or less elevated and somewhat to the northward of the range of the single species of Group C (*gibbosus*), which latter extends southward to central Florida. Of Group D all are Coastal Plain or Floridian, *dorsalis* is coastal and north Floridian, occurring with *calcaratus*, which latter is also north Floridian and Coastal, replaced in central and south Florida by *glaber*.

History.—In 1838, Burmeister [3] described two species of this genus from South Carolina, calling them *Decticus pachymerus* and *dorsalis*. In 1859, Saussure [4] described a new genus and species from Tennessee, as *Orchesticus americanus*, this clearly being a member of the present genus. The generic name *Orchesticus* has been generally used for a quite different genus. Scudder, in 1862,[5] used the Burmeisterian names for two species found in the northeastern states, which he referred to the Old World genus *Thyreonotus*. In 1869, Walker [6] described a species from Massachusetts as *Decticus derogatus*. Brunner, in 1893,[7] described a genus *Engoniaspis* in a key, basing it on an undescribed species from Missouri. A sketch of this species, later supplied to Caudell,[8] showed it to be a member of the present genus. In 1894, Scudder [9] published a brief key to the species of the genus, which he there diagnosed and named *Atlanticus*, also

[3] Handb. der Entom., ii, abth. ii, pt. 1, pp. 712 to 713, (1838).
[4] Revue et Magasin de Zoologie, 2e ser., xi, p. 201, (1859).
[5] Boston Journ. Nat. Hist., vii, p. 453, (1862).
[6] Catal. Dermapt. Saltat. Brit. Mus., ii, p. 260, (1869).
[7] Ann. Mus. Civ. Stor. Nat. Genova, xxxiii, p. 185, (1893).
[8] Proc. U. S. Nat. Mus., xxxii, p. 325, fig. 29, (1907).
[9] Canad. Entom., xxvi, p. 180, (1894).

describing *A. gibbosus* from the southern states. In the same paper Scudder placed the genus *Engoniaspis* in his key to the genera of the North American Decticinae[10] on the basis of an unnamed species, which he presumed was from Missouri. In 1900, the same author[11] described this previously unnamed specimen as *Engoniaspis testaceus*. Rehn, in 1900, finding the name *Orchesticus* Saussure, which had been used in connection with a quite different genus, preoccupied by *Orchesticus* Cabanis in birds, replaced it by a new name *Stipator*,[12] this being due to his use of the older name in the erroneous sense of all authors subsequent to Saussure. Caudell, in 1907, published a revision of the North American species of this subfamily and showed that the genus *Engoniaspis* is a synonym of the present genus,[13] the supposed differential characters given by Scudder not being of generic rank. In 1912, Rehn and Hebard[14] described *Atlanticus glaber* from southern Florida.

Nomenclature.—The identity of Burmeister's two species has been universally allowed to rest on the basis of Scudder's 1862 placing. However, he had no material from their original locality for study, and the species he examined are different from those found in the region from which Burmeister's material probably came. For discussion of this, see under *A. pachymerus*. We have before us two species from that region which answer the descriptions of Burmeister. Saussure's *Orchesticus* and *O. americanus* have been erroneously used by all authors for the genus and one of the species of a western genus allied to *Atlanticus*, to which, however, as we have shown beyond, the name has no application. On account of the preoccupation of *Orchesticus* by *Orchesticus* Cabanis in birds, Rehn, in 1900, unfortunately in ignorance of the real application of the name, and following previous authors in its usage, renamed the genus *Stipator*. This peculiar situation, when corrected by making *Stipator* a pure synonym of *Atlanticus*, makes necessary a new name for the *Orchesticus* of Scudder, not of Saussure, for which we here

[10] Canad. Entom., xxvi, pp. 177 and 179.

[11] Proc. Davenp. Acad. Nat. Sci., viii, p. 96, (1900).

[12] Trans. Amer. Entom. Soc., xxvii, p. 90, (1900).

[13] Proc. U. S. Nat. Mus., xxxi, pp. 321, 324 and 325, (1907).

[14] Proc. Acad. Nat. Sci. Phila., 1912, p. 269, (1912).

propose **Pediodectes**[15] with *Pediodectes grandis* (Rehn) [*Stipator grandis* Rehn] as its type. Saussure's *americanus* is really the species for which Scudder used Burmeister's name *dorsalis*. The name *Engoniaspis* Brunner, 1893, and Scudder, 1894, having no described species cannot be considered, the 1900 description of Scudder being the first of complete form, from which consequently *testaceus*, the first included species, must be taken as the type. As we have shown under *testaceus*, that name should apply to the species for which Scudder used the Burmeisterian name *pachymerus*, *testaceus* having been based on a damaged female, which, however, Scudder considered of uncertain sex. Walker's *derogatus* we now know to have been based on the species called *dorsalis* by Scudder, not of Burmeister, and *americanus* by Saussure. Caudell, in 1907, had *pachymerus*, *testaceus* and *davisi* confused as a single species, the evident differences being ascribed by him to individual variation. The same author referred to the present genus immature specimens belonging to other genera from Arizona and California.

Material Examined.—We here record 419 specimens of the genus, these comprising practically all the series in the collections of the Academy of Natural Sciences of Philadelphia, of the junior author, the United States National Museum, the Museum of Comparative Zoology, of Prof. A. P. Morse of Wellesley, Massachusetts, of Mr. W. T. Davis of New Brighton, New York, the Pennsylvania State Department of Zoology, the Georgia State Collection, the North Carolina Department of Agriculture and Cornell University. Certain specimens belonging to the American Museum of Natural History have also been examined. To the gentlemen above named and the authorities in charge of the collections of the above mentioned institutions and departments we wish to tender our thanks for the assistance so ungrudgingly given to our work. Of the total number of specimens examined 211 were collected by the authors, these representing all but one of the forms.

The types of the following have been examined by us:

Engoniaspis testaceus Scudder

Atlanticus davisi new species

Atlanticus monticola Davis

[15] From πεδίον *plain* (in allusion to its habitat) and δήκτης *a biter*.

Atlanticus glaber Rehn and Hebard

Atlanticus calcaratus new species

In addition, Mr. Caudell has kindly furnished us with information on the type of Walker's *Decticus derogatus* (= *americanus*), which is in the British Museum.

Key to Species

This key is admittedly artificial in a number of features, as it has been found almost impossible to construct a key to the forms along natural or presumably phylogenetic lines. The use of the plate figures in connection with the key is strongly recommended.

A. Medio-internal spur of caudal tibiae more than twice as long as the ventro-internal spur. (Disk of pronotum narrow, subequal in width. Prosternum unspined.) **calcaratus** new species

AA. Medio-internal spur of caudal tibiae distinctly less than twice or not more than twice as long as the ventro-internal spur.

B. Pronotal disk in both sexes very narrow, subequal, the greatest width contained nearly or quite two and one-half times in the greatest length of the disk, with lateral angles subparallel. **glaber** Rehn and Hebard

BB. Pronotal disk in both sexes more or less distinctly expanding caudad, the greatest (caudal) width almost never contained twice in the greatest length of the disk, the lateral angles more or less distinctly diverging caudad.

C. Lateral angles of pronotal disk distinct but rounded in section and never sharp and carinate. Tegmina of male almost or quite completely covered by the pronotum.

D. Size medium. Pronotum with the width of the disk at cephalic fourth not less than that at cephalic margin; caudal margin of disk arcuato-truncate. Caudal femora not greatly inflated proximad. Cercus of male short, robust, with short tooth. **dorsalis** (Burmeister)

DD. Size very large (largest in the genus). Pronotum with the width of the disk at cephalic fourth appreciably less than that at cephalic margin; caudal margin of disk strongly arcuate. Caudal femora greatly inflated proximad. Cercus of male elongate, corniform, with elongate equally corniform tooth. **gibbosus** Scudder

CC. Lateral angles of pronotal disk very distinct, strongly angulate in section, sharp and frequently carinate. Tegmina of male never completely covered by the pronotum.

D. Cercus of male relatively elongate. Subgenital plate of male narrowly and deeply fissate. Subgenital plate of female deeply divided and lateral portions of same sublanceolate. (Ovipositor straight or faintly decurved, apex ventral.) **americanus** (Saussure)

DD. Cercus of male relatively short, robust. Subgenital plate of male angularly emarginate to various degrees, never fissate. Subgenital plate of female V- or U-emarginate, lateral portions of same never sublanceolate.

E. Tegmina of male projecting caudad of the pronotal disk a distance considerably exceeding half the pronotal length. Pronotum of male proportionately very large. Subgenital plate of female narrowly V-emarginate and with lateral portions of the plate broadly rounded distad. (Caudal femora robust and quite short; ovipositor straight, apex ventral. **testaceus** (Scudder)

EE. Tegmina of male projecting caudad of the pronotal disk a distance distinctly less than one-half the pronotal length. Pronotum of male relatively shorter or narrower. Subgenital plate of female when narrowly V-emarginate always having the lateral portions of the plate at least subangulate distad.

F. Caudal femora more elongate and slender. Pronotum in general more elongate, the disk relatively more slender, the lateral angles less divergent caudad. Tegmina of male slightly produced distad. (Ovipositor straight, with apex ventral.) **pachymerus** (Burmeister)

FF. Caudal femora less elongate, more robust. Pronotum more abbreviate, more robust, the disk relatively broader, the lateral angles strongly divergent caudad. Tegmina of male broadly rounded distad.

G. Subgenital plate of female U-emarginate. Ovipositor distinctly arcuate. Lateral angles of pronotal disk strongly sigmoid. Eyes more prominent. **monticola** Davis

GG. Subgenital plate of female V-emarginate. Ovipositor straight, very faintly arcuate or faintly decurved. Lateral angles of pronotal disk less sigmoid and more regularly (*i.e.* directly) diverging caudad. Eyes as usual in the genus. **davisi** new species

Atlanticus testaceus (Scudder) (Pl. VI, figs. 2, 3, and 20; pl. VII, figs. 1, 10 and 19; pl. VIII, figs. 1 and 11.)

1862. *T[hyreonotus] pachymerus* Scudder (not *Decticus pachymerus* Burmeister, 1838), Boston Journ. Nat. Hist., vii, p. 453. [Connecticut; Mammoth Cave, Kentucky.]

1893. *Thyreonotus pachymerus* Davis (not *Decticus pachymerus* Burmeister, 1838), Canad. Entom., xxv, p. 108. [Staten Island, New York.]

1894. [*Atlanticus*] *pachymerus* Scudder (not *Decticus pachymerus* Burmeister, 1838), Canad. Entom., xxvi, pp. 179, 180, 183. (In key to species of the genus.)

1894. *Atlanticus pachymerus* Beutenmüller (not *Decticus pachymerus* Burmeister, 1838), Bull. Amer. Mus. Nat. Hist., vi, p. 285, pl. VII, fig. 7. [Vicinity of New York City.]

1898. *Atlanticus pachymerus* Lugger (not *Decticus pachymerus* Burmeister, 1838), Bull. 55, Minn. Agr. Exp. Sta., p. 335, fig. 60. [Minnesota.]

1900. *Engoniaspis testacea* Scudder, Proc. Davenp. Acad. Nat. Sci., viii, p. 97. [Missouri?]

1903. *Atlanticus pachymerus* Blatchley (not *Decticus pachymerus* Burmeister, 1838), Orth. of Indiana, p. 393, fig. 98. [Lake, Marshall, Marion, Putnam, Vigo and Crawford Counties, Indiana.]

1907. *Atlanticus pachymerus* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 323, fig. 28. (In part.)

1911. *A[tlanticus] pachymerus* Walden (not *Decticus pachymerus* Burmeister, 1838), Bull. 16, Conn. State Geol. and Nat. Hist. Surv., p. 141, pl. XI, fig. 2. [Scotland, Connecticut.]

The name *pachymerus*, which has been applied to this species by authors, has no relationship to the present form, but should be used instead for a species found in the southeastern states. For a discussion of this matter, see under the treatment of *pachymerus*. The next name available for this species is Scudder's *Engoniaspis testacea*, described from a specimen supposed to be from Missouri. The type of this species was in an imperfect condition when described and to-day it is minus the apex and greater portion of the abdomen, the cephalic and median limbs and neither caudal limb is fully complete. We have been able to compare it with the present series of the species of the genus and it is evident, from a careful study of the proportions of the pronotal disk and of the remaining limbs, that it represents this species and not the allied *davisi*. The figure which has been given of it by Caudell, while exact, is a lateral view and does not bring out such features of the dorsum of the pronotum as would enable one to place it properly.

The species is readily recognized in both sexes by the short caudal femora, in the male sex by the relatively produced tegmina, which extend distad of the striking transverse depression outlining the stridulating field a distance equal to nearly or quite one-half the median length of the pronotal disk, and in the female sex by the relatively short and robust ovipositor, the apex of which is ventral in position.

Type.— ♀ ; Missouri? (Riley Collection.) [No. 5734, United States National Museum.]

Morphological Notes.—The principal features of variation found in this species can best be treated one by one. The pronotum in the male sex always has the greatest caudal width of the disk equalling 60 to 72 per cent of the greatest length of the same, while the caudal margin of the disk varies in form from arcuate, to arcuate with an appreciable median flattening; the cephalic margin of the disk varies in both sexes from truncate to

very shallowly obtuse-angulate emarginate. The greatest width of the pronotal disk in the female equals 63 to 73 per cent the length of the same, while the caudal margin is always subtruncate, at least so mesad. The least width of the pronotal disk, *i.e.* at the cephalic fourth, is, in both sexes, equal to from $\frac{9}{16}$ to $\frac{5}{8}$ of the greatest (caudal) width of the same. The tegmina of the male vary but little in length, as shown by the measurements; the apices of the tegmina are well rounded. In the female the tegmina reach almost or quite to the caudal margin of the pronotal disk, but are always covered by the same. The abdomen is moderately (♂) or quite faintly (♀) tricarinate.

The disto-dorsal abdominal segment of the male is generally angulate-emarginate, the degree of same varying and occasionally the angle is rounded; supra-anal plate of the male is in general form trigonal, occasionally with the angle somewhat rounded, a medio-longitudinal sulcus present on the same and more distinctly indicated proximad. The cerci of the male vary slightly in robustness, particularly in the distal portion, the tooth also showing some slight variation in its exact position and in the sharpness and falcation of the same. The subgenital plate of the male has the distal margin varying from subtruncate to rectangulate-emarginate, generally somewhat rotundate-angulate, the styles varying appreciably in length.

The supra-anal plate of the female varies somewhat in the degree of angulation, the sulcus indicated as in the male. The ovipositor is fairly uniform in length, the variation in this, as illustrated by the measurements, being individual. One representative from Moline, Illinois, has the longest ovipositor (23 mm.), next to which stand two females from Guthrieville and Malvern, Pennsylvania (22 mm.). In the depth of the ovipositor there is some variation but not sufficient to change the general form of the same. The subgenital plate of the female has the form constant and shows no noteworthy variation from that figured.

The caudal femora in both sexes of the present species are quite short, in fact relatively shorter than in any other form of the genus. While there is some variation in the length, aside from that which is proportional, it is of a negligible quantity.

Color Notes.—In general color there is some variation in the depth of the same, but the most noteworthy features of this character found in both sexes are the amount of grayish suffusion on the dorsal surface of the head and pronotum, the strength and extent of the shining black area caudad on the lateral lobes of the pronotum and to a lesser degree the width and extent of the pale caudal area on the same lobes. In the male the tegmina vary considerably in the tone of the ochraceous of the disto-dorsal section and humeral angle of the same, occasionally this being even dark rufous, while the lateral section of the proximal abdominal segments and a dorsal area of the pleura are variable in the presence or absence, and depth when present, of shining black.

Geographic Variation.—There appears to be no geographic variation except that the males show an increase southward in the general size of the pronotum. This is, of course, to a degree correlated with variation in general size, but only to a certain extent. The females show no appreciable geographic variation.

Measurements (in millimeters)

♂	Length of body[16]	Greatest length of pronotum	Greatest width of pronotal disk	Lateral length of tegmen	Length of tegmen distad of transverse depression	Length of caudal femur	Length of ovipositor
Deep Pond, New York	18	9.5	6.5	7.8	4	14.8	....
Newfoundland, New Jersey	19.5	9.4	6.3	8.5	4.6	16.2	....
Guthrieville, Pennsylvania.	23.4	10.8	7	8.5	5	15.6	....
Guthrieville, Pennsylvania.	21.2	9.8	6.5	8	4.5	14.6	....
Plummer's Island, Maryland	20.9	10.1	7.2	7.5	4.1	16	....
Plummer's Island, Maryland	20	11.2	7.8	7.8	5	17	....
Glen Echo, Maryland	24.3	10	7.1	7	4	16	....
Gun Lake, Michigan	19.5	9	6	8	4.9	15.4	....
Vigo County, Indiana	19	10	6.8	7.8	4.5	16.8	....
Kentucky	19.5	10.4	7.5	9	5	17	....
Moline, Illinois	20.4	9.6	7	8.2	4.9	16.5	....

[16] Body length is the most unreliable of any of the measurements here given, depending as it does on the degree of compression or extension of the abdomen; a considerable factor when shrivelling or stuffing are taken into consideration. However, as this measurement is the one most generally given we are including it here, as elsewhere, as a general index to the bulk of the insect.

Measurements (in millimeters)—Continued

♀	Length of body	Greatest length of pronotum	Greatest width of pronotal disk	Lateral length of tegmen	Length of tegmen distad of transverse depression	Length of caudal femur	Length of ovipositor
Marion, Massachusetts....	23.5	9.2	6.2	....	....	16.6	19
Marion, Massachusetts....	20.6	9.2	6.2	....	....	16.3	19.2
Wading River, New York..	19.2	9.5	6.1	....	....	17.8	19.6
Jamesburg, New Jersey ...	19.2	9.2	6.4	....	....	17.2	19
Greeley, Pennsylvania	18.6	8.8	6.1	....	....	17	19
Danville, Pennsylvania ...	20.3	10.4	7.3	....	....	18.2	21.2
Malvern, Pennsylvania....	19.2	10.2	6.6	....	....	18 7	22
Guthrieville, Pennsylvania.	23.8	9.2	6.7	....	....	17.3	20.8
Guthrieville, Pennsylvania. Average and extremes of five specimens	24.6 (22–26.8)	9.7 (9.4–10)	6.7 (6.3–7)	....	....	17.1 (17–17.2)	20.4 (19.2–22)
Plummer's Island, Maryland	21.5	9.4	6.7	....	....	17.1	19
Plummer's Island, Maryland	21	9.4	6.5	....	....	17.2	19.4
Cabin John Run, Maryland	23.5	10	6.9	....	....	18 9	20.5
Washington, D. C.	20.5	9.3	6.5	....	....	17.8	17 6
Washington, D. C.	20.6	9.8	6.5	....	....	18 7	18 9
Arlington, Virginia.....	22	9.5	6.5	....	....	16.2	19.8
Arlington, Virginia	23.7	9.7	6.2	....	....	17.2	19 6
Porcupine Mountains, Michigan.....	25.5	10	7	....	....	19	18 8
Moline, Illinois.....	23.2	9.5	6.6	....	....	18 4	23
Peoria, Illinois	19.5	9.2	6.5	....	....	18 8	21
Locality ? (Missouri ?) *Type*.....		9.2	6.3	....	....	18 4	....

Biological Notes.—The earliest date we have for the occurrence of the species in an adult condition is June 6, when Blatchley secured it in Vigo County, Indiana. The earliest date in the series now before us is June 14 to 15, Bee Spring, Kentucky, while we find mature specimens from northern New Jersey (Ramsey) taken as early as June 23. The latest record we have is from Harrisburg, Pennsylvania, October 15. From information given by Davis, on the basis of the life of a male kept in captivity,

the longevity of individuals of the species is seen to be considerable, the specimen in question living from June 26 to at least the sixth of September. The account given by Davis of the actions of this specimen[17] contains the best information we have of the individual habits of any species of this genus.

Distribution.—The range of this species extends from eastern Massachusetts (Brookline and Marion), southern Ontario (Arner), northwestern Michigan (Porcupine Mountains) and Minnesota, south to northern Virginia (Arlington) east of the Appalachians, and to central Kentucky (Mammoth Cave, Bee Spring and Tyrone), southern Indiana (Crawford County) and central Illinois (Peoria) west of the Appalachians. We have not examined it from the west of the Mississippi River and we have no positive previous record from that area except the general "Minnesota" given by Lugger and the doubtful Missouri one of the type. The figure given by Lugger is clearly this species. Bruner has recorded the species as rare in "Eastern Nebraska," but no material of the genus from that state was contained in his collection. The occurrence of this species there, while possible, appears doubtful and requires further confirmation. In New Jersey, Pennsylvania, Maryland and Virginia the species occurs but little to the eastward of the fall-line.

Specimens Examined: 70; 45 ♂, 25 ♀.

Marion, Massachusetts, VIII, 30, 1905, (H.), 2 ♀.

Croton, New York, (W. T. Davis), 1 ♂, [Davis Cln.]

Deep Pond, Wading River, Long Island, New York, VII, 26, 1914, (W. T. Davis), 2 ♂, [Davis Cln.].

Wading River, Long Island, New York, VII, 25, 1914, (W. T. Davis), 1 ♀, [Davis Cln.].

Staten Island, New York, VI, 26, 1892, (W. T. Davis), 1 ♂, (Davis Cln.].

Ramsey, New Jersey, VI, 23 and 25, 1912, (W. T. Davis), 2 ♂, [Davis Cln.].

Newfoundland, New Jersey, VII, 3, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Bear Swamp, Ramapo Mountains, New Jersey, VI, 24, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Jamesburg, New Jersey, VII, 20, 1912, (W. T. Davis; at sugar), 1 ♀, [Davis Cln.].

Greeley, Pike County, Pennsylvania, 2300 feet elevation, (Einer Olsen), 1 ♀, [Davis Cln.].

Danville, Pennsylvania, IX, 12, 1 ♀, [Pa. St. Dept. Zool.].

Wetzel's Swamp, Harrisburg, Pennsylvania, X, 15, 1 ♂, [Pa. St. Dept. Zool.].

Stoverdale, Pennsylvania, VII, 16, 1915, (E. Daecke), 1 ♀, [Daecke Cln.].

[17] Canad. Entom., xxv, p. 108, (1893).

Serpentine Ridge south of Malvern, Pennsylvania, VI, 26, 1912, (Bayard Long), 1 ♀, [A. N. S. P.].

Guthrieville, Pennsylvania, VII, 11, 1911, (R. & H.; in blackberry tangle on edge of deciduous woods on hilltop), 4 ♂, 25 ♀.

Castle Rock, Pennsylvania, VI, 30, 1907, (E. Daecke), 1 ♂, [Hebard Cln.].

Pattonville, Pennsylvania, VII, 31, 1871, (Shaler), 1 ♀, [M. C. Z.].

Plummer's Island, Maryland, VIII, 11, 17 and 25, 1907, (A. K. Fisher), 2 ♂, 2 ♀; VIII, 27, 1909 and IX, 2, (A. N. Caudell), 2 ♂; VIII, 5, 1914, (Shannon; in trap), 1 ♀, [all in U. S. N. M.].

Cabin John Run, Maryland, VI, 20, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

Glen Echo, Maryland, VII, 10, 1914, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Washington, District of Columbia, VII, 2, 1911, (W. T. Davis) 1 ♂, 1 ♀, [Davis Cln.].

Arlington, Virginia, VII, 9, 1914, (H.; at night), 2 ♀.

Porcupine Mountains, Michigan, VII, 13 to VIII, 12, 1904, (C. C. Adams; on east slopes), 1 ♀, [Morse Cln.].

Gun Lake, Michigan, VI, 13 to 26, 1912, (M. A. Carriker Jr.), 1 ♂, [Hebard Cln.].

Vigo County, Indiana, (W. S. Blatchley), 1 ♂, [Hebard Cln.].

Kentucky, (F. G. Sanborn), 1 ♂, [M. C. Z.].

Bee Spring, Kentucky, VI, 14 to 15, 1874, (F. G. Sanborn), 1 ♀, [M. C. Z.].

Moline, Illinois, (McNeill), 1 ♂, 1 ♀, [Hebard Cln.].

Peoria, Illinois, VII, 1875, 1 ♀, [M. C. Z.].

Missouri ?, (Riley Collection), 1 ♀, *type*, (U. S. N. M.].

Atlanticus pachymerus (Burmeister) (Pl. VI, figs. 4, 5, and 6; pl. VII, figs. 1, 10 and 20; pl. VIII, figs. 1 and 12.).

1838. *D[ecticus] pachymerus* Burmeister, Handb. der Entom., ii, abth. ii, pt. i, p. 712. [South Carolina[18].]

1842. *L[ocusta] (Ephippigera) pachymera* De Haan, Verhandl. Natuurl. Geschied., Bidjr. Kenn. Orth., p. 178. (Bare combination.)

1907. *Atlanticus pachymerus* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 323. (Part.) [North Carolina.]

1911. *Atlanticus dorsalis* Sherman and Brimley, Entom. News, xxii, p. 390. (Part.) [Southern Pines, North Carolina.]

1911. *Atlanticus pachymerus* Sherman and Brimley, Ibid., p. 390.

[18] There is a strong probability that the original specimens of this species were collected by Zimmermann, who was working in South Carolina at that time and regularly sending material to Europe. As we have already shown (Trans. Amer. Entom. Soc., xli, p. 34, (1915)), until 1838 Zimmermann's work in the state was probably all done in the vicinity of Georgetown, which is doubtless the type locality of the present species. In the absence, however, of a positive statement by Burmeister as to the collector we would hardly be justified in positively fixing this matter. The specimens were, according to Burmeister, in Germar's collection, and the collector's name probably had not been preserved. In the case of material belonging to himself and collected by Zimmermann, Burmeister carefully credited it to the collector.

This interesting species, which previously never has been properly differentiated from the more northern *testaceus*, is a moderately close relative of the latter species, but is so distinct in general appearance, particularly in the male sex, that no difficulty need be encountered in distinguishing the two forms. In the female sex the two species might be mistaken in a superficial examination, but the distinctly longer caudal femora of the present form will separate them immediately on comparison of material.

The important features of difference from the generally well known *testaceus* are as follows: In both sexes, the caudal femora are at least twice (♂) or more than twice (♀) as long as the pronotal disk; the cephalic and median limbs are relatively longer; the greatest caudal width of the pronotal disk is equal to 54 to 66 per cent of the greatest length of the same; the prosternal spines are more aciculate and elongate and the mesosternal lobes are more acute. In the male sex the pronotum is less expanded caudad, the divergence of the lateral carinae being less pronounced; the tegmina are well produced, the portion distad of the transverse impression distad of the stridulating field distinctly shorter than in *testaceus;* the cerci are more slender and more acuminate, the apex more produced, the tooth more nearly median than in *testaceus;* subgenital plate of the male with the distal margin rectangulate-emarginate to acutely subfissate, styles slender and relatively elongate. In the female sex the abdomen has the lateral carinae distinctly and the median carina slightly more pronounced; the ovipositor, while of approximately the same length as in *testaceus*, is relatively much shorter, being considerably less than the length of the caudal femur, the form of the ovipositor similar to that of *testaceus* but hardly as deep; the subgenital plate is more deeply divided and the lateral portions rotundato-rectangulate.

Synonymy.—We are able to place Burmeister's name on this species by a process of elimination. It is very briefly characterized, there being nothing diagnostic in the several lines of general description, but the three words describing the male, "elytris liberis fornicatus," clearly refer to this species, *testaceus* or *davisi*; of these only the present form occurs near the coastal region of South Carolina, from which, as already shown, the original material of *pachymerus* probably came. The char-

acters given for the female, "elytris nullis; vagina recta, abdomine longior," are only sufficient to separate the species from *monticola*. The length of the body and of the caudal femora given in the original description, without indication of sex, while less than any found in the material before us, do not invalidate at all the claim of this species to Burmeister's name. The body length given could easily be accounted for by the abdomen being shrunken, a condition which is quite capable of making a change of as much as five millimeters, while geographic or individual size variation could easily cause the discrepancy seen in the femoral length. In the five females examined by us we find a difference of 2.7 mm. in the femoral length, while in the related *testaceus* our series shows a variation of 2.4 mm. in both sexes. It seems evident to us that Burmeister either measured a very small specimen or in giving the caudal femoral length merely approximated the actual proportions. There is a possibility of error in the figures, as he gave them as "Long. corp. 9″, femur. post. 8″.", using the inch sign instead of that for lines, but as this is evidently an error we have used them as if clearly expressed in lines. The femoral length may show undue difference from our measurements on account of difference in method of taking the same; our length of this portion is always taken along the ventral line, while one taken along the dorsal line would give a length at least one-half millimeter less. As shown by an examination of the information given under *testaceus*, that species has not been definitely recorded from nearer South Carolina than Arlington, Virginia, and central Kentucky. There is no evidence that *testaceus* could even be considered a northern form extending into the mountainous region of South Carolina, as we have no information on its occurrence in any of the really mountainous areas of its range. In Pennsylvania, for example, it is replaced in the mountains proper by the short-tegmined *davisi*.

Morphological Notes.—The disk of the pronotum shows the usual variation in the greatest (caudal) width of the same, this being more appreciable in the males before us than in the females. A glance at the measurements will show the extent of this variation. The male subgenital plate, as above mentioned, varies in the degree of angulation of the caudal margin. The cerci of the male vary somewhat in robustness and in the degree of the

attenuation, as well as in straightness or slight curvature of the distal portion. The ovipositor is quite constant in form.

Color Notes.—The dorsum of the body shows a pronounced ochraceous suffusion in some males, this occasionally more decided on the pronotum, while the lateral lobes have their dorsum occasionally quite solid (except for the usual pale humeral border) shining black. The latter feature varies in depth and is most marked in the male, and when decided is accompanied by a corresponding blackening of the dorsal section of the pleura. One female is very distinctive in having the entire dorsum, from the fastigium to the apex of the abdomen, uniform bay, this sharply delimited laterad by the lateral carinae of the pronotum and abdomen.

Measurements (in millimeters)

Sex ?	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of tegmen distad of transverse depression	Length of caudal femur	Length of ovipositor
South Carolina (ex Burmeister)	18.7	....	....	....	....	16.6	....
♂							
Goldsboro, North Carolina	23.2	9.5	5.8	5.4	3	19.8	....
Goldsboro, North Carolina	25.7	9.9	5.9	5.8	3.4	20	....
Goldsboro, North Carolina	23.5	9.9	6.1	5.8	3.1	20.3	....
Southern Pines, North Carolina	25.2	11.4	7	7.6	3.8	22.5	....
Rich Mountain, Arkansas	22	10.2	6.6	6.5	3	23.4	....
Mena, Arkansas	26.7	10.6	6.7	6.5	2.9	24.2	....
Mena, Arkansas	25	10.6	6.6	5.6	2.7	23	....
♀							
Greensboro, North Carolina	20	10	6.5	....	....	21	21
Raleigh, North Carolina	21	9.1	6	....	....	....	21
Goldsboro, North Carolina	25	10.2	6.1	....	....	22.2	19.4
Lake Ellis, North Carolina	21	10	5.7	....	....	22.3	18
Lake Ellis, North Carolina	27.3[19]	10.5	6	....	....	23.7	19.7
Southern Pines, North Carolina	25.2	10.2	6.3	....	....	23.7	21
Southern Pines, North Carolina	28.2	10.6	6.4	....	....	24	23
Magazine Mountain, Arkansas	28.2	10.6	6.2	....	....	24.2	24.2
Mena, Arkansas	25	9.5	6	....	....	23	21.6

[19] Abdomen greatly distended.

It will be seen from these measurements that considerable individual variation is present in the general size and relative, as well as actual, length of the pronotum compared with the length of the caudal femur. The ovipositor is also seen to vary in length individually, but this apparently is also to an extent geographic.

Geographic Variation.—The general size shows no geographic correlation but the length of the caudal femur, actual as well as relative, shows an increase westward; this may be, in a measure at least, environmental, as the series is too small to make satisfactory deductions of this character. The same is true of the length of the ovipositor. The Arkansas males and the one from Southern Pines, North Carolina, have the subgenital plate more deeply and narrowly divided than the specimens from Goldsboro, which may be geographic but more probably is environmental or individual in explanation.

Biological Notes.—From the material before us it is apparent that the species reaches maturity early in June, certainly by June 19, our earliest exact date; the latest date in our small representation is August 29. In late May the species is in at least one instar preceding maturity. The only datum we have on the habits of the species is that, at Goldsboro, North Carolina, we found it among fallen leaves of deciduous trees in a rather open forest composed chiefly of short-leaf pine. In this situation the species was not common.

Distribution.—The Coastal Plain region and adjacent portions of the Piedmont area of North and South Carolina and the Ozark Mountain region of Arkansas, the distribution doubtless being continuous, although we have seen no specimens from between the two regions. The most northern localities known for the species are Greensboro and Raleigh, North Carolina, the former being the most elevated point in the eastern states at which it has been taken, while it occurs at Lake Ellis near sea-level in the same state. We have no exact record of the occurrence of the species in South Carolina. In Arkansas it has been taken as high as 2600 feet on the summit of Rich Mountain.

Specimens Examined: 18; 7 ♂, 9 ♀, 1 juv. ♂, 1 juv. ♀.
Greensboro, North Carolina, VI, (F. C. Pratt), 1 ♀, [U. S. N. M.].

Raleigh, North Carolina, VII, 10, 1902, (F. Sherman, Jr.), 1 ♀, [N. C. Dept. Agr.].

Goldsboro, North Carolina, VII, 25, 1913, (R. & H.; among leaves in forest composed chiefly of short-leaf pine), 3 ♂, 1 ♀.

Lake Ellis, (Havelock), North Carolina, late May, 1907, (L. M. Smith), 1 juv. ♀, [N. C. Dept. Agr.]; VI, 19 to 24, 1905, (F. Sherman), 2 ♀, [U. S. N. M. and N. C. Dept. Agr.].

Southern Pines, North Carolina, V, 17, 1915, (A. H. Manee), 1 juv. ♂, [Hebard Cln.]; early June, 1908, (A. H. Manee), 1 ♂, [N. C. Dept. Agr.]; VII, 8, 1904, (F. Sherman Jr.), 1 ♀, [U. S. N. M.]; VII, 2, 1912, (W.T. Davis), 1 ♀, [Davis Cln.].

Magazine Mountain, Arkansas, 2000 feet elev., VIII, 29, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].

Rich Mountain, Summit, Arkansas, 2600 feet, VIII, 1, 1905, (A. P. Morse), 1 ♂, [Morse Cln.].

Mena, Arkansas, VII, 30, 1905, (A. P. Morse), 2 ♂, 1 ♀, [Morse Cln.].

Atlanticus davisi new species (Pl. VI, figs. 7, 8, and 9; pl. VII, figs. 3, 12 and 21; pl. VIII, figs. 3, 4, 5, and 13.)

1903. *Atlanticus dorsalis* Blatchley (not *Decticus dorsalis* Burmeister, 1838), Orth. of Indiana, p. 395. [Putnam, Vigo, Knox and Crawford Counties, Indiana.]

1907. *Atlanticus pachymerus* Caudell, Proc. U. S. Nat. Mus. xxxii, p. 323, fig. 27. (Part.) [Virginia.]

1911. *Atlanticus pachymerus* Sherman and Brimley, Entom. News, xxii, p. 390. (Part.)

This interesting form has had a varied nomenclatural career, as the above more important references show. Caudell did not distinguish it from true *pachymerus* and *testaceus*, calling all *pachymerus* and ascribing the evident differences to individual variation. Blatchley distinguished it from "*pachymerus*" (i. e. *testaceus*), but erred in calling it "*dorsalis*" (i. e. *americanus*). We have examined practically all the material seen by Caudell and therefore can speak definitely regarding the reference. In regard to Blatchley's determination our study of the available material is sufficient to show the proper interpretation.

As this distinct and easily recognized type requires a name, we take great pleasure in dedicating it to our friend, Mr. William T. Davis of New Brighton, Staten Island, New York, to whose assistance in the way of loans of specimens and suggestions from his large store of field experience we owe so much.

Type.—♂; Orange, Orange County, Virginia. July 21, 1913.

(Rehn and Hebard; in dead leaves and scattered green undergrowth in chestnut forest.) [Hebard Collection, Type no. 399.]

This species can be readily separated from the allied *testaceus* and *pachymerus* by the following characters. From both the older species the male can be readily distinguished by the shorter pronotum and the much reduced area of the disto-dorsal section of the tegmina. From *testaceus* the male of *davisi* is also readily distinguishable by the more slender cerci, while from the same sex of *pachymerus* it is also separated by the slightly more pronounced humeral sinus, the shorter and more robust caudal femora, narrower pronotal disk and less attenuate cerci. The female of *davisi* can be distinguished from that sex of both *testaceus* and *pachymerus* by the relatively shorter pronotum and more deeply divided subgenital plate, while from *testaceus* it can also be separated by the more angulate sections of the subgenital plate, the generally narrower ovipositor and the more sharply attenuate distal portion of the caudal femora, and lastly from that sex of *pachymerus* the female is separated in addition by the less elongate caudal limbs.

From *monticola* the present form can be distinguished by the somewhat less prominent eyes, by the less sigmoid lateral angles of the disk of the pronotum, which are straighter and more regularly divergent caudad in *davisi*, by the less decided contrast between the inflated proximal portion and the slender distal portion of the caudal femora, by the straight or at least straighter ovipositor and the narrower and V-emarginate subgenital plate of the female. More material may show the two forms *davisi* and *monticola* to be geographic races of the same species, the one of the southern Appalachians and the other of the northern portion of the same and adjacent systems and portions of the Piedmont region. As intermediates would be expected in the mountains of Virginia, we have made a careful examination of the few specimens available from that general region, but we have no positive evidence of intergradation, except that the female of *monticola* from Washington County, Virginia, has the subgenital plate less broadly U-emarginate, but it is without the least doubt *monticola*. The northern *davisi* is, apparently, in process of breaking up into at least two forms, not however,

sufficiently defined to recognize by name, and it is certain that *monticola* is a more ancient and more divergent, thoroughly established form, the geographic connecting intermediates of which may not exist to-day. At any rate it is the best policy to consider the two of specific rank until we have the proof of other relationship before us.

Description of Type.—Size rather small (for the genus); surface smooth but in general not polished. Head not elevated dorsad of the level of the pronotal disk, the fastigium moderately declivent, narrowly rounding into the line of the face which is slightly protuberant in the fastigial area, width of the fastigium slightly less than the width of one of the eyes; eyes in outline subovate with a quadrate tendency, their greatest dorso-ventral depth equal to about two-thirds the infra-ocular depth of the genae, when seen from the dorsum the eyes are moderately protuberant; antennae greatly surpassing the body length. Pronotum with the dorsum of the usual type, the narrowest point of the disk at about the cephalic third, the lateral carinae continuously indicated and regularly sigmoid, the greatest (caudal) width of the disk contained one and one-half times in the length of the same, cephalic margin of the disk very faintly obtuse-angulate emarginate, caudal margin flattened arcuate and well rounded laterad; lateral lobes with the greatest depth contained about one and four-fifth times in the greatest dorsal length of the same, cephalic margin of the lobes oblique-truncate, ventro-cephalic angle rounded obtuse, ventral margin subtruncate with the usual ventro-caudal trend, ventro-caudal angle well rounded, caudal margin oblique with a distinct and moderately marked, though shallow, humeral sinus. Tegmina very briefly surpassing the caudal margin of the pronotal disk, the proportion not more than one-half the caudal width of the disk, the distal portion well rounded, the whole strongly vaulted, the marginal field very narrow and subequal in width. Wings vestigial. Abdomen with indications of median and lateral carinae; disto-dorsal abdominal segment obtuse-angulate emarginate; supra-anal plate with the margins rectangulate, a distinct medio-longitudinal suleus present; cerci rather short, of a substyliform type, the apex slightly blunted, internal tooth disto-median in position, short, subuncinate; subgenital plate with the distal margin rotundato-rectangula.e emarginate, styles quite brief. Prosternal spines very short; mesosternal lobes slightly acute, the tips submammillate. Cephalic and median limbs rather short. Caudal femora subequal to twice the length of the pronotal disk, very considerably inflated proximad and relatively slender distad, ventro-external margin unarmed, ventro-internal margins showing from two to four spines; caudal tibiae with the principal internal distal spur not quite reaching the middle of the metatarsus.

Allotype.—♀; Same data as type. (Hebard Collection.)

Description of Allotype.—Differing from the description of the type in the following non-ambisexual characters. Tegmina minute, completely hidden under the pronotum. Supra-anal plate with form more rounded and the

sulcus proximal only; cerci short, terete; ovipositor very slightly longer than the caudal femora, straight, moderately robust, subequal in depth, not tapering (except on proximal third) and rather sharply narrowed to the apex which is ventro-median in position; subgenital plate sharply and deeply divided, the lateral portions of the plate with their tips regularly and sharply rectangulate. Caudal femora in length slightly more than twice that of the pronotal disk, ventro-internal margins of the caudal femora with single spines.

Paratypic Series.—We have indicated as paratypes a series of four males and seven females taken at the type locality and in company with the type and allotype.

Morphological Notes.—The variation in form found in this species is very considerable and has proved quite puzzling. One of the most striking features is the variation in the general form and proportions of the pronotal disk; this is very great, probably the greatest found in the genus, and the two extremes, both of which are present or closely approximated in each of the series from Arlington and Orange, Virginia, are so different that it requires careful examination to show they are not different species. In the male sex the proportion of greatest caudal width of disk to length of same varies from 67 to 74 per cent, and in the female sex the ratio is 62 to 71 per cent. The form of the disk is also influenced by the degree of constriction at the cephalic fourth, this and the general curve of the lateral carinae of the disk varying independent of the ratio of greatest breadth to length. The least width of the disk is contained from but little more than twice (♂; Broad Top Mountain, Penna.) to nearly thrice (♀; Arlington, Va.) in the greatest length of disk. The cephalic margin of the pronotal disk varies from shallowly angulate-emarginate to subtruncate, the latter condition unusual. The caudal margin of the pronotal disk is considerably arcuate in the male, varying in the female from similarly arcuate to truncato-arcuate. The humeral sinus of the lateral lobes is always well indicated. The tegmina of the male show no appreciable variation in length. The prosternal spines are always rather short, but vary greatly in length, and while occasionally quite aciculate are more frequently but brief dentiform projections, and more rarely mere subobsolete nodes. The mesosternal lobes are rectangulate with a subtuberculate angle. The disto-dorsal abdominal segment of the male shows an appreciable amount of variation in the degree of angulation of the median

emargination; the supra-anal plate of the same sex has its apical angle more acute and median sulcus more pronounced and more continuous in some specimens than in others. The male cerci vary somewhat in robustness and degree of attenuation of the distal third, the teeth being median or disto-median and, while short, strongly uncinate. The male sex has the subgenital plate with the margin varying from subtruncate to rectangulate emarginate, the majority of individuals having this portion obtusely emarginate; the styles vary from moderately long and slender to the very briefest knobs. The ovipositor of the female shows an amount of variation similar to that noticed in the form of the pronotal disk, this being chiefly in general form and not so much in length. In the northern specimens, *i. e.*, those from New York, Pennsylvania, Ohio, Indiana and Iowa, the ovipositor averages deeper, with the ventral margin straight or very faintly convex and the apex not distinctly ventral but approaching or reaching the median line of the ovipositor. In the majority of southern specimens, *i. e.* those from Virginia and Maryland, the ovipositor averages more slender, with the ventral margin straight or very weakly concave and the apex distinctly ventral in position. In the twelve females from Arlington and Orange, Virginia, we find two females which represent the more northern type and three others are intermediate. The Beltsville, Maryland female also represents an intermediate condition. The measurements given herein show that the variation in pronotal length is largely relative. The subgenital plate of the female is very deeply and narrowly V-emarginate and the lateral portions are always rectangulate to faintly obtuse-angulate, with the angle not or but very slightly rounded.

Color Notes.—The general color pattern of this form is that found in all the members of this species group. The general tone of the dorsal and lateral surfaces varies from tawny-olive through snuff brown and vinaceous-brown to seal brown, the usual stippling of blackish-fuscous varying in depth and density with the general intensification of the whole pattern. The shining blackish-fuscous areas on the sides of the pronotum, and also occasionally on the pleura and the sides of the proximal abdominal segments, are generally but not invariably correlated with the general intensification of the coloration. The caudal femora generally

show an infuscation of the external face of variable position and depth—this, however, may be absent. Generally this infuscation is ventral and rather solid, again it may be along the median line and narrow or wholly broken up into scattered marmorations. This latter condition is more pronounced in the male than in the female sex and apparently is purely individual. The ovipositor varies in color with the general tone. The entire ventral surface of the thorax and abdomen is bright yellow in the living specimens we have seen.

In this species the pale ochraceous of the disto-dorsal portion of the male tegmina is just as marked as in *testaceus* and *pachymerus*, and perfectly constant in the males seen. The pale border of the humeral sinus of the lateral lobes is equally constant in presence, but varies some in length and also in contrast, the latter largely due to the depth of the blackish of the adjacent portion of the lateral lobes. The latter feature is as variable as in the other species of the genus. One male from Arlington is most strikingly colored, reminding one of certain individuals of the Acridids, *Hippiscus phoenicopterus* and *Scirtetica marmorata*, as it has the entire dorsal surface of the head, pronotal disk and abdomen, except for a narrow median bar of the general brown color, of a uniform Rinnemann's green (Ridgway).

Measurements (in millimeters)

♂	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Sullivan County, New York....	18.9	8.2	5.7	4.7	16	....
Twin Lakes, Pennsylvania.....	17.4	8.4	5.9	5	16.3	....
Cove Mountain, Pennsylvania..	18.6	8.4	5.7	4.5	16	....
Rockville, Pennsylvania.....	21.4	8.2	5.9	4.5	16.3	....
Broad Top Mountain, Pennsylvania.....	16.8	7.7	5.2	4.1	15	....
Arlington, Virginia.....	20.4	9	6.4	4.5	17.5	....
Arlington, Virginia.....	23	9.5	6.4	5	18	....
Orange, Virginia, *Type*.....	22.2	8.2	5.8	5	16.3	....
Orange, Virginia, *Paratype*	21.5	7.9	5.9	3.5	15	....
Orange, Virginia, *Paratype*	23.1	8.5	6.1	4	15.5	....
Wyandotte, Indiana.....	20	9	6.2	5.5	17.6	....

Measurements (in millimeters)—Continued

♀	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Lake George, New York	24	9	6.3	....	20	21
East Jewett, New York	19	9	6	....	18	19.3
Ithaca, New York	17	8.4	5.6	....	17.4	19
Duncannon, Pennsylvania	20.5	8.6	5.5	....	19.3	21.7
Diamond Valley, Pennsylvania	19.6	7.8	4.9	....	17.3	18.7
Beatty, Pennsylvania	23.2	8.6	5.5	....	17.9	19.2
Beltsville, Maryland	21	8.7	6	....	17.6	21.5
Arlington, Virginia	23.3	9	6.1	....	20	21.5
Arlington, Virginia	26.5	9.3	6.1	....	20	21.8
Arlington, Virginia	23.7	9.2	6	....	20.9	20.5
Orange, Virginia, *Paratype*	19.4[20]	8.4	6	....	18.3	19.1
Orange, Virginia, *Allotype*	22.8	8.8	5.9	....	19	20
Orange, Virginia, *Paratype*	23.2	8.6	6	....	18.8	19.2
Orange, Virginia, *Paratype*	23.6	9	5.9	....	18.3	20.6
Stony Man Mountain, Virginia	20.7	8.1	5.5	....	16.4	20.5
Leetonia, Ohio	16[21]	8.5	5.9	....	17.1	18.4
Wyandotte, Indiana	23.9[22]	9.7	6.6	....	20.9	23.5
Vigo County, Indiana	21.5	9.4	6.1	....	20.5	23
Keokuk, Iowa	25	10.6	6.2	....	22.1	23

Geographic Variation.—Under this heading we have several features which need consideration. The species seems to be in process of breaking up into at least two forms, which, however, are not fixed enough to recognize by name and which are not quite absolute in their geographic correlation. One is a heavier, stockier type, with a generally more flaring caudal margin of the pronotum when seen from the side, relatively more robust caudal femora and heavier and straighter, although sometimes faintly arcuate, ovipositor. This type is that of the mountains of New York and portions of Pennsylvania, as well as Ohio, Indiana and Iowa. The other is a relatively more slender type without as much flare to the pronotum, relatively less robust caudal femora and more slender ovipositor, which latter generally has a slight decurvature of the ventral margin and a distinctly ventral apex.

[20] Abdomen compressed.

[21] Body badly shrivelled.

[22] Body bloated.

This type is that of portions of Virginia; Maryland and Pennsylvania individuals are also referable to it. However, certain specimens in both of the larger Virginia series in one or more of these features show the form similar to the type found at the other extreme of the specific range. The species *monticola*, the relationship of which to *davisi* we have already discussed, is in some respects more nearly related to the more northern type than to the more southern type of the *davisi* complex, so it would appear that the lower land type (*i. e.* the southern type of *davisi*) is probably the most recent development and the more northern form the more primitive. On account of the possession of a distinctly curved ovipositor and a characteristically formed subgenital plate in the female sex we would consider *monticola* the more specialized of the forms.

Aside from the features above treated we find that specimens of *davisi* from the higher elevations represented in Pennsylvania (Broad Top Mountain and Diamond Valley) and Virginia (Stony Man Mountain) show a reduction in size when compared with material from lower elevations. Material from the extreme borders of the range is little different in the proportions measured, aside from an increase in the length of the pronotum, caudal femora and of the ovipositor in material from Indiana and Iowa.

The ovipositor form variation, which has been treated under Morphological Notes, shows a geographic correlation; the females from Pennsylvania northward and from Ohio and Indiana have an ovipositor with a straight or very faintly convex ventral margin and an apex which is not truly ventral in position, while those specimens from Maryland south to Virginia have, as a rule, an ovipositor with the ventral margin straight or very faintly concave and the apex distinctly ventral. In the Arlington and Orange series, however, we find both types present.

Biological Notes.—From the available information it is seen that this species appears adult during the latter half of June and early July, and is present in that condition to at least the first week of September. The earliest date for mature specimens is June 16, at Great Falls, Virginia, and the latest September 7, at Diamond Valley, Pennsylvania. Immature individuals representing three instars were taken on June 4 at McConnellsburg, Pennsylvania, and others belonging to the same instars on June

25 on Meadow Mountain, Maryland. The locality at which the latter specimens were taken is at a considerable elevation (3000 feet) and this may account for the date discrepancy of equivalent material.

At Arlington, Virginia, the species, in company with *A. testaceus*, was taken in a variety of situations at night, by working with the aid of a flash-lamp. The Orange, Virginia, specimens were found, in company with *A. americanus*, locally not scarce in dead leaves and scattered green undergrowth of chestnut woods on Southwest Mountain.

Distribution.—From northern New York (Lake George) south to south-central Virginia, west to southern Iowa. The species is not known from the Appalachian region south of western Virginia (Stony Man Mountain and Hot Springs) and we have no Canadian or New England records.

Specimens Examined: 70: 21 ♂, 36 ♀, 5 juv. ♂, 8 juv. ♀.

Lake George, New York, VIII, 29, 1893, (J. L. Zabriskie), 1 ♀, [A. M. N. H.].

Catskill Mountains, New York, (W. T. Davis), 1 ♀, [Davis Cln.]; IX, 23 to 25, 1911, (E. T. Cresson Jr.), 1 ♀, [A. N. S. P.].

East Jewett, Catskill Mountains, New York, VIII, 8, 1914, (W. T. Davis), 1 ♀, [Davis Cln.].

Sullivan County, New York, 1887, (W. T. Davis), 1 ♂, [Davis Cln.].

Ithaca, New York, VII, 6, 1890, VIII, 5 and 6, 1885, (O. E. Pearce and Comstock), 2 ♀, 4 ♀, [Cornell Univ.].

Twin Lakes, Pennsylvania, VII, 15, 1914, (Chapman), 1 ♂, [Davis Cln.].

Enterline, Pennsylvania, VII, 17, 1912, (V. A. E. Daecke), 1 ♂, [Daecke Cln.].

Duncannon, Pennsylvania, VIII, 8, 1 ♀, [Pa. St. Dept. Zool.].

Cove Mountain, Pennsylvania, VIII, 23, 1914, (V. A. E. Daecke), 1 ♂, [Daecke Cln.].

Rockville, Pennsylvania, VII, 5, 1915, (V. A. E. Daecke), 1 ♂, [Daecke Cln.]; VII, 7, 1 ♂, [Pa. St. Dept. Zool.].

Broad Top Mountain, Pennsylvania, (Joseph Leidy), 1 ♂, [A. N. S. P.].[23]

Diamond Valley, Pennsylvania, IX, 7, 1905, (R.), 1 ♀, [A. N. S. P.].

McConnellsburg, Pennsylvania, VI, 4, 1905, (Witmer Stone), 1 juv. ♂, 3 juv. ♂, [A. N. S. P.].

Beatty, Pennsylvania, (Brugger), 2 ♀, [A. N. S. P.].

Meadow Mountain, Maryland, 3000 feet elev., VI, 25, 1907, (Witmer Stone), 2 juv. ♂, 3 juv. ♀, [A. N. S. P.].

Conowingo, Maryland, (Bayard Long), 1 juv. ♂, [A. N. S. P.].

Laurel, Maryland, VII, 15, 1883, 1 ♀, [Hebard Cln.].

Beltsville, Maryland, VIII, 16, 1909, (W. L. McAtee), 1 ♀, [U. S. N. M.].

Glenndale, Maryland, VII, 3, (Nellie Caudell), 1 juv. ♂, [U. S. N. M.].

[23] Recorded by Rehn as *A. dorsalis* (Entom. News, xiii, p. 315, (1902)).

Rock Creek, District of Columbia, V, 28, 1905, (D. H. Clemons), 1 juv. ♀, [U. S. N. M.].

Arlington, Virginia, VI, 9, 1914, (H.; taken at night with flash-lamp), 3 ♂, 5 ♀.

Fairfax County, Virginia, VI, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

Great Falls, Virginia, VI, 16, 1910, (W. T. Davis), 1 ♂, [Davis Cln.].

Falls Church, Virginia, VI, 24, 1915, (C. T. Greene), 1 ♀, [U. S. N. M.].

Green Dell Farm, two miles west of Pohick, Fairfax County, Virginia, VIII, 25, 1912, 1 ♂, [U. S. N. M.].

Orkney Springs, Virginia, (G. W. Hiflebower), 1 ♀, [U. S. N. M.].

Stony Man Mountain, Virginia, (Miss Pollock), 1 juv. ♀; VII, 28, 1912, (H. G. Dyar), 1 ♀, [U. S. N. M.].

Orange, Virginia, VII, 21, 1913, (R. & H.; in dead leaves and scattered green undergrowth in chestnut forest), 5 ♂, 8 ♀, *type*, *allotype* and *paratypes*, [Hebard Cln. and A. N. S. P.].

Hot Springs, Virginia, IX, 6, 1914, (Henry Fox), 1 ♂, [Fox Cln.].

Addison, Virginia, VIII, 27, 1914, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Leetonia, Ohio, VII, 20, 1892, (H. G. Wolfgang), 1 ♀, [U. S. N. M.].

Lawrence County, Indiana, VII, 15, 1903, (W. S. Blatchley), 1 ♀, [Hebard Cln.].

Wyandotte, Indiana, VIII, 1905, (A. N. Caudell), 1 ♂, 1 ♀, [U. S. N. M.].

Keokuk, Iowa, VII, 19, 1913, (M. P. Somes; near rocks in timber at foot of bluff), 1 ♀, [Somes Cln.].

This species has been recorded by Mead as *A. dorsalis* from Ohio.

Atlanticus monticola Davis (Pl. VI, figs. 10, 11 and 12; pl. VII, figs. 4, 13 and 22; pl. VIII, figs. 6 and 14.)

1911. *Atlanticus pachymerus* Rehn and Hebard (not *Decticus pachymerus* Burmeister, 1838), Proc. Acad. Nat. Sci. Phila., 1910, p. 644. [Jones' Knob, North Carolina.]

1915. *Atlanticus monticola* Davis, Bull. Brooklyn Entom. Soc., ix, p. 104. [Lake Toxaway (type locality), Valley of the Black Mountains, Black Mountains, Balsam, Linville and Jones' Knob, North Carolina; Pinnacle Peak and Clayton, Georgia[24].]

This interesting form, which has quite a circumscribed range, is a close relative of *davisi*, agreeing in the general form and proportions, in the character of the tegminal development of the male, in the general form of the male cerci and in the type of the subgenital plate of the female, showing far greater affinity with

[24] Of the two immature males and one immature female from Clayton, Georgia, referred to this species by Davis, we are able to assign positively only the males. Of the females in this condition seen from that locality, all which can be identified with certainty are referable to *americanus*. Immature specimens of this genus are extremely hard to determine as many of the important features of diagnostic value are obscured or not fully revealed until the mature condition is reached.

that species than with the other members of this species group—*testaceus* and *pachymerus*. The present form and *davisi* may prove to be geographic races of the same species, but more conclusive evidence than we possess will be necessary to warrant us in so considering them. Proof of intergradation of the two in the Virginian mountains would make such action necessary.

In both sexes of *monticola* the eyes are somewhat more prominent than in *davisi*, the lateral angles of the pronotal disk are more sigmoid and more decidedly incurved caudad, while the contrast between the inflated proximal and slender distal portions of the caudal femora is more apparent and the latter section is relatively longer than in *davisi*. The male sex can also be separated from that sex of *davisi* by the marginal field of the tegmina being broader proximad and narrowing distad, instead of quite narrow and subequal as in *davisi*. The female sex of *monticola* can also be distinguished from that of *davisi* by the distinctly arcuate distal portion of the ovipositor, which is there distinctly upcurved and has an appreciable concavity to the dorsal margin, by the distal section of the ovipositor also narrowing to the submedian tip and by the median incision of the subgenital plate being broader and rounded at the bottom, thus in general more U-shaped.

Morphological Notes.—In this species the extremes of variation of pronotal form are very decided, being due not so much to the variation in width of the metazonal portion of the disk as to the variation in width of the greatest constriction of the carina of the prozona. All of the individuals with the more constricted form of pronotum are from the more northern (Virginia and West Virginia) or more elevated (Linville, Black Mountains, Jones' Knob) localities and the least constricted ones are from lower (Valley of Black Mountains, Lake Toxaway) or more southern (Pinnacle Peak) points. This correlation may be accidental and due to the small size of the series examined or it may be supported by collections made in the future. That this cephalic constriction is entirely independent of the varying proportion of the greatest caudal width to length is evident in figuring out, from the measurements, the ratios of the two. The greatest width varies in the males from 64 to 78 per cent of the length, in the females from 64 to 72 per cent. When the males showing the greatest amount of difference in

the cephalic constriction of the lateral carinae (viz. greatest—Shaver's Mountain, West Virginia; least—Pinnacle Peak, Georgia) are compared, no correlation with the ratio of the greatest (caudal) width to length is found. Of the extremes of constriction, one (Pinnacle Peak) shows the greatest or 78 per cent of greatest width ratio, the other (Shaver's Mountain) shows a proportion (73 per cent) much nearer this figure than, as one would imagine, to the other extreme of the series. The lack of correlation of the two features is quite evident. Of the females the Lake Toxaway paratype is relatively the narrowest over all. The Shaver's Mountain male has the least width of the pronotal disk contained two and one-third times in the greatest (caudal) width of the same, while the Pinnacle Peak male has the same proportions one and five-eighths times. The Washington County, Virginia, female has the same proportion one and two-thirds times and the Lake Toxaway specimens both show one and two-fifths. The cephalic margin of the pronotal disk varies from subtruncate to very shallowly subangulate emarginate. The caudal margin of the disk is moderately arcuate to arcuate-truncate with the lateral sections of this margin strongly arcuate. The lateral lobes of the pronotum show a well marked humeral sinus in both sexes, but the degree of indentation is variable.

The male tegmina vary but slightly in the degree of production caudad of the pronotum, while the vestigial female tegmina are well concealed. The disto-dorsal abdominal segment of the male is always angulate emarginate, the degree of the same varying from obtuse to nearly rectangulate. The supra-anal plate of the male varies greatly in form, from broad semi-elliptical to sharply rectangulate in outline, the medio-longitudinal sulcation continuous or limited to the proximal section. The cerci of the male vary appreciably in robustness and to a lesser degree in relative length, while the tooth is always disto-median in position and in form moderately incrassate and relatively uncinate; the distal section of the cereus shows some variation in attenuation. The male subgenital plate, as in most of the forms of the genus, shows a considerable degree of variation in the character of the emargination of the distal margin, this ranging from nearly truncate to U-emarginate, while the styles vary as much in length as in *davisi*, one male (Black Mountain) having them present as the

merest nodes. The ovipositor of the female, always, as far as our material goes, shows the characteristic dorsal curve of the distal section, although this is subject to some fluctuation in the degree of the curvature. The apex of the ovipositor is always nearer the median line than is usual in the genus and there is a slight and very gradual approximation of the margins distad. The depth of the ovipositor is relatively considerable and its length proportionate to the caudal femora appears to be well fixed. The female subgenital plate has the median emargination constant in form and diagnostic of the species. The prosternal spines, as in *davisi*, vary from the merest nodes to spines of medium length. The mesosternal lobes are always slightly acute-angulate with the apex submammillate.

Color Notes.—The coloration of this species varies greatly; in several specimens the base color of the limbs, and in one, of the pronotum, is pale ochraceous. Some individuals have pencillings of blackish fuscous on the dorsum of the pronotum and abdomen and heavy stipplings and cloudings of the same on the limbs, while the majority of the specimens show a narrow median or a broad medio-ventral area of the same blackish fuscous on the external face of the caudal femora, although several representatives have this absent. In addition several specimens show cloudings of fuscous proximad, mesad and distad on the caudal femora and distal clouds on the other femora, these more evident in the pale specimens. The fuscous of the lateral lobes of the pronotum varies in proportion to the contrast of the pattern. These color differences are irrespective of sex.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Shaver's Mountain, West Virginia	17.6	8	5.9	4.6	14.8	....
Linville, North Carolina, *Paratype*	18	8.2	5.7	5.4	16.8	....
Black Mountains, North Carolina, *Paratype*	19	8.2	5.9	5.4	17.9	....

Measurements (in millimeters)—Continued

♂	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Valley of Black Mountain, North Carolina, *Paratype* ...	19.5	9	5.8	5.2	18.8	....
Jones' Knob, North Carolina, 6000 feet, *Paratype*.....	18.5	8.7	6.4	6	17.7	
Jones' Knob, North Carolina, *Paratype*.....	18.8	8.7	6	5	17.9	....
Pinnacle Peak, Georgia, *Paratype* ♂.....	19.8	7.6	6	4.4	18	....
♀						
Washington County, Virginia ..	22.7	8.9	6.3	....	20.2	[25]
Valley of Black Mountain, North Carolina, *Paratype* ...	20.6	8.9	6.1	.	20	19.4
Jones' Knob, North Carolina, *Paratype*.....	21.3	8.8	6.3	.	19	19
Lake Toxaway, North Carolina, *Type*.....	20	8.3	6		18.5	18.5
Lake Toxaway, North Carolina, *Paratype*.....	23.2	9.9	5.7		19.6	17.6

Geographic Variation.—Our material is too scanty to reach any definite conclusions regarding this type of variation in the present species. However, as we have stated above under Morphological Notes, the individuals with the relatively greatest cephalic constriction of the pronotal disk are from the more northern or more elevated localities and those with the least constriction from the lower or more southern ones. Whether additional material will give more light on this point remains to be seen. The female from Washington County, Virginia, has the subgenital plate more narrowly emarginate than the other material, but the form is typically that of *monticola*.

Biological Notes.—From the material at present available this species is seen to reach maturity as early as July 28 (Linville, North Carolina) and to occur as late as October 7 (Jones' Knob). We know the insect is adult at Jones' Knob from August 19 to the last date given above. The only information we have on the

[25] Ovipositor broken in this specimen.

habits of *monticola* is that, at Jones' Knob, it occurred in the undergrowth of the deciduous forest immediately below the spruce belt.

Distribution.—The more elevated areas of the southern Appalachian region, the known localities being almost entirely above an elevation of three thousand feet, the highest record being from six thousand feet. The most northern locality known is Shaver's Mountain near Durbin, West Virginia and the most southern, Clayton, Rabun County, Georgia.

Remarks.—As we have said above this insect and *davisi* may prove to be forms of the same species, one possibly being the equivalent of the other in a more restricted and peculiar (*monticola*) or a more extended and varied (*davisi*) environment. We have already commented upon this under *davisi*.

Specimens Examined: 14; 7 ♂, 5 ♀, 2 juv. ♂.

Shaver's Mountain, Durbin, West Virginia, 3500 feet elevation, VIII, 26, 1909, (A. D. Hopkins), 1 ♂, [U. S. N. M.].

Washington County, Virginia, (E. A. Smyth Jr.), 1 ♀, [Hebard Cln.].

Linville, North Carolina, VII, 18, 1903, (A. P. Morse), 1 ♂, *paratype*, [Morse Cln.].

Black Mountains, North Carolina, IX, (C. Schaeffer), 1 ♂, *paratype*, [Bklyn. Inst. A. & S.].

Valley of Black Mountain, North Carolina, VIII, 5 to 30, 1906, (W. Beutenmüller), 1 ♂, 1 ♀, *paratypes*. [A. M. N. H.].

Jones' Knob, Balsam Mountains, VIII, 19, 1903, (A. P. Morse,) 1 ♂, 1 ♀, *paratypes*, [Morse Cln.]; 6000 feet elevation, X, 7, 1905, (M. Hebard; in undergrowth of deciduous forest), 1 ♂, *paratype*, [Hebard Cln.].

Lake Toxaway, North Carolina, (Mrs. A. T. Slosson), 2 ♀, *type* and *paratype*, [Davis Cln.].

Pinnacle Peak, Rabun County, Georgia, VIII, 20, 1913, (J. C. Bradley), 1 ♂, *paratype*, [A. N. S. P.].

Clayton, Georgia, 2000 to 3700 feet elevation, VI, 1909, (W. T. Davis), 2 juv. ♂, [Davis Cln.].

Atlanticus americanus (Saussure) (Pl. VI, figs. 13, 14 and 21; pl. VII, figs. 5, 14, and 23; pl. VIII, figs. 7 and 15.)

1859. *O[rchesticus] americanus* Saussure, Revue et Magasin de Zoologie, 2e ser., xi, p. 201. [Tennessee.]

1862. *T[hyreonotus] dorsalis* Scudder (not *Decticus dorsalis* Burmeister, 1838), Boston Journ. Nat. Hist., vii, p. 454. [Massachusetts; Rhode Island; Maryland.]

1869. *Decticus derogatus* Walker, Catal. Derm. Salt. Brit. Mus., ii, p. 260. [Massachusetts.]

1894. [*Atlanticus*] *dorsalis* Scudder (not *Decticus dorsalis* Burmeister, 1838), Canad. Entom., xxvi, pp. 179, 180, 183. (In key to species of genus.)

1900. *Stipator americanus* Rehn, Trans. Amer. Entom. Soc., xxvii, p. 90. (Bare combination.)

1907. *Atlanticus dorsalis* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 321, fig. 26. (Part.) [Maryland; Virginia; District of Columbia; Mississippi.] (*Atlanticus dorsalis* of authors.)

The nomenclatorial tangles of the present species have been due almost entirely to two unfortunate misidentifications by Scudder. The first was the determination of the present species as Burmeister's *dorsalis*, which, like the similar one of *pachymerus*, was pardonable on account of the lack of material of true *dorsalis*. We now know, however, that the present species does not occur in the region from which the typical material of *dorsalis* probably came (*i. e.* the coastal region of South Carolina). The other error was the identification of Saussure's *Orchesticus americanus* as a member of a related genus, which is not known from east of the trans-Mississippean prairie and plain region, for which the name *Orchesticus* and later *Stipator* have been used. For comments on these generic names see remarks made under the generic treatment. The original generic and specific descriptions of *americanus* are sufficiently full to bring out the following features possessed by Saussure's species: pronotum subcarinate, margins of the median area sinuate; caudal femora beneath finely spined; ovipositor straight, very long (30 mm.); coloration fuscous, lineate with yellow on both sides in pronotal sinus. Of these features none apply to the forms of the genus for which Scudder and other authors have used the name, while all are descriptive of the *Atlanticus* found in Tennessee, the type locality.

Walker's *derogatus* is identical with the present species; Kirby[26] so considered it and Mr. Caudell has kindly supplied us with notes and measurements made by him from the type which fully corroborate Kirby's assignment.

This species is easily recognized when compared with the other forms of the genus, the characters given in the key being sufficient to distinguish it. The male will under no circumstance cause the least hesitation in recognition, on account of cercal and tegminal characters, and the female can invariably be recognized by the deep division of the subgenital plate, the lateral portions of which

[26] Syn. Catal. Orth., ii, p. 181, (1906).

are sublanceolate and more produced than in any of the other forms of the genus. True *dorsalis* can be readily distinguished, in addition, by the weak lateral carinae of the pronotal disk and the more elongate and more slender caudal femora.

Morphological Notes.—This species exhibits the same amount of variation in the relative proportion of the greatest (caudal) width of pronotal disk to length of the same, as found in *davisi* and the other species treated in the preceding pages. In the male sex alone this ratio varies from 56 to 64 per cent and in the two females from Lookout Mountain, Tennessee, the variation is so great that we get the decidedly different ratios of 54 and 67 per cent. The remarks we have already made regarding the non-correlation of this ratio difference with the width of the area of greatest convergence of the lateral carinae of the disk, *i. e.* at cephalic third to fourth, is strikingly illustrated and supported by these two Lookout Mountain specimens, as while they are so strikingly different in their other ratios they have exactly the same least width of the disk. The cephalic margin of the disk of the pronotum varies from subtruncate to distinctly arcuato-emarginate, and this in the large Dias Creek series alone. The caudal margin of the pronotal disk is always well arcuate and though the degree of the same varies that portion is never subtruncate. The lateral lobes of the pronotum have little variation in the form of the humeral sinus, which is broad and relatively well indicated. The disto-dorsal abdominal segment in both sexes is always angularly emarginate mesad, the exact angle varying somewhat and the deeper portion of the angle is more or less rotundate. The supra-anal plate of the male is always trigonal and sulcate. The cerci of the male show a considerable amount of individual variation in material from the same locality and also some geographic difference, this being due to an attenuation or a shortening and thickening of the cercus, the tooth holding relatively the same position in all. In the more robust type of cercus, the proximal portion is slightly disproportionately thickened. The tooth varies little in character, but is more decided and heavier in southern specimens. The male subgenital plate is always fissate, the apparent degree depending on the amount to which the plate has been compressed in drying, and the styles vary

individually as much in length as in the other species of the genus. The supra-anal plate of the female is similar to that of the male but more obtuse. The form of the ovipositor is fairly uniform, being always straight except in a few individuals which show the faintest decurvature, while the relative depth shows little variation and the apex is always ventral. As a general rule the ovipositor is slightly shorter than the caudal femur, two specimens, however, showing a difference in the length in favor of the ovipositor of as much as 2.1 to 7.6 millimeters. The degree of difference in the length in favor of the femoral length appears to increase southward, but our evidence is not conclusive on this point. The subgenital plate of the female shows no noteworthy variation in its distinctive form. The prosternal spines vary in length from mere nodes to aciculate spines of medium length, while the mesosternal lobes range in form from distinctly acute-angled to rectangulate, the immediate apex faintly mammillate.

The females from Holly Springs and Winona, Mississippi, are noteworthy in having relatively shorter and broader ovipositors than is usual in the species. The specimens are, however, representative of this form, although they may indicate a variation developed from the more usual type at this extreme point of the range of the species. The two females from Meridian, Mississippi, are similar in this respect to more eastern specimens.

Color Notes.—The color variations found in this species are essentially those occurring in most of the forms of the genus, in general a range of the body color from ochraceous tones to dark umber shades, as well as diminution or intensification of the shining blackish fuscous area on the lateral lobes of the pronotum, the two features in no way correlated. The difference from the other species appears to be that but very rarely does the blackish fuscous color appear on the pleura or any of the abdominal segments, which almost invariably remain of the general tone. The minute "pepper and salt" character of the pattern is indicated in all the specimens seen.

In certain individuals, most of which are from the southern states, a longitudinal series of blackish fuscous quadrate spots are indicated along the line on which the traces of the lateral carinae of the abdomen are situated, more particularly ventrad

of these spots are placed a number of parallel series of similar but much smaller dots. These markings are independent of the depth of the pronotal infuscation. The male tegmina show some little variation in the strength and shade of the ochraceous distodorsal patch. The caudal femora vary in the intensity and general size of the usually present marmorations, there also occasionally being a fine medio-longitudinal line on the external face. In certain strongly contrasted individuals from River Junction, Florida, the external face of the caudal femora is heavily infuscate.

Measurements (in millimeters)

♂	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Staten Island, New York	20	9.9	5.7	5.1	22.9	....
Staten Island, New York	20.8	9.5	5.7	4.8	23.4	....
Dias Creek, New Jersey. Average and extremes of ten specimens	23.8 (21.2–25.7)	9.4 (9–10)	5.8 (5.2–6.2)	5.1 (4.8–5.7)	22.1 (20.8–23.6)	....
Orange, Virginia	26	10	6.3	5.1	26.3	....
Orange, Virginia	28.3	10.3	6.6	5.8	24.7	....
Greensboro, North Carolina	30.7[27]	11	6.6	5.8	25.5	....
Topton, North Carolina	21.8	9.2	6	5.3	22.3	....
Murphy, North Carolina	23.5	10.8	6.9	5.8	25	....
Tuckoluge Creek, Georgia	20.8	9.4	5.4	5.3	22	....
Tuckoluge Creek, Georgia	19.6	9.5	6	4.7	23	....
River Junction, Florida	25.4	10.5	6.4	5.5	27.8	....
River Junction, Florida	24	9.6	6.1	5.4	27.4	....
Chehawhaw Mountain, Alabama	26.3	10.5	6.8	5.2	27	....

[27] Abdomen slightly stretched in stuffing.

Measurements (in millimeters)—Continued

	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
♂						
Winona, Mississippi	24.7	10.5	6.6	6.2	26.6	...
Meridian, Mississippi	24.8	10.2	6	5.7	27.2	....
Natchez, Mississippi	25.3	10.2	6.2	5.4	27.3	....
♀						
Massachusetts. *Type* of *Decticus derogatus* Walker.[28]	....	10	....	....	26	27
Dedham, Massachusetts	21.8	11.1	6.2	....	26.6	25.8
Staten Island, New York	20	9.9	6	....	24.3	25
Staten Island, New York	29	10.4	6.5	....	25.8	25.8
Dias Creek, New Jersey. Average and extremes of ten specimens.....	24.4 (21.5–26.4)	10 (9.7–10.3)	6.2 (6–6.6)	....	24.9 (23–26.5)	24.1 (22.7–27)
Cabin John Run, Maryland.....	22.2	9.9	6.3	....	25	26
Roanoke, Virginia ..	29.3	10.5	6.4	....	27.2	25
Sulphur Springs, North Carolina ..	24.2	10.2	6.2	....	25.6	26.3
Greensboro, North Carolina.....	29	11.3	6.6	....	29.4	26.8
Greensboro, North Carolina.....	27	10.9	6.3	....	28	25.5
Greensboro, North Carolina	27.4	11	6.7	....	29.4	26
Waynesville, North Carolina	24	10.2	6.7	....	21.6	26.7
Andrews, North Carolina.....	26.	10.8	6.6	....	28	28.3
Murphy, North Carolina..	27.5	10.2	6.5	....	27.8	26.3
Tuckohuge Creek, Georgia	25	10	6.5	....	27	24.8
Jasper, Georgia....	28.4	10.5	6.4	....	28.1	24.8

[28] Measurements made and kindly supplied by Mr. A. N. Caudell.

Measurements (in millimeters)—Concluded

♂	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Lateral length of tegmen	Length of caudal femur	Length of ovipositor
Lost Mountain, Georgia	25.9	10.9	6.8	....	28.2	25.9
Bainbridge, Georgia	25.2	10.2	6	....	29	26.4
River Junction, Florida	23.8	10.6	6.2	....	29.2	28
River Junction, Florida	28.4	11.7	7.3	....	32.2	31.2
Tennessee (ex Saussure)						30
Lookout Mountain, Tennessee	28.3	11	6.8	....	30.2	28.6
Lookout Mountain, Tennessee	29.5	11.5	6.5	....	28	25.3
Opelika, Alabama	27.2	12	7	....	29.5	29.5
Opelika, Alabama	26.5	10.7	6.2	....	28.4	26.3
Holly Springs, Mississippi	30[29]	12	7	....	30.6	23
Winona, Mississippi	27	12	7.3	....	30.4	25.6
Meridian, Mississippi	26.4	11	6.4	....	31	30.5

Geographic Variation.—It is evident, from the above measurements, that as one passes to the south and southwestward over the range of this species, the individuals from the highest elevations remain of approximately similar size to those from the more northern localities, while in the valleys and on the lower elevations the individuals are progressively larger, the maximum being reached in northern Florida, central Alabama and the whole of Mississippi. The best index to this increase is furnished by the length of the caudal femur. It is also noteworthy, although not so conclusively demonstrated, that the ratio of the length of the caudal femur to that of the ovipositor changes from but slightly, to distinctly, in favor of the femur as we proceed southward. In northern Mississippi (Holly Springs and Winona) there appears to be developing an incipient race, with a much shorter and heavier ovipositor. Meridian, Mississippi specimens are of the usual type. Males from northern

[29] Body abnormally compressed.

Florida and southern Mississippi show an elongation of the distal section of the cercus, which is distinctly more attenuate than in individuals from the Carolinas and northward.

Biological Notes.—The earliest date we have for this species to reach maturity in the northern states is July 15 at Pink Hill, Pennsylvania, when and where an immature specimen in the instar preceding maturity was also taken. In the southern states it matures somewhat earlier, as our material shows dates as early as July 8 (Sand Mountain, Georgia). At higher elevations in the southern states the development of the species may be slower, as our July material from points in Rabun County, Georgia, is largely immature, but we lack specific information. At Dias Creek, New Jersey, on July 20, both mature and immature specimens were taken, and at Pink Hill, Pennsylvania, on July 1, only immature individuals were found. On July 9, at Arlington, Virginia, all material taken (five specimens) was in the instar preceding maturity.

The present species is a frequenter of the areas of dead leaves and low undergrowth in pine and deciduous forest, occasionally being more numerous along the edge of the timber than in the depth of the woods. Its presence will often be signalized by the patter on the leaves as it jumps away from the disturbing footsteps. The insects are so thoroughly protected by their coloration that it is often difficult to see them, even when moving, much less when stationary. Their activities are chiefly nocturnal and work with a flash-lamp will sometimes reveal them in many situations.

Distribution.—The range of the species covers the Carolinian life zone and also portions of the Alleghanian and Austroriparian zones, and extends from central New England (Dedham, Massachusetts and possibly New Hampshire) south to northern Florida (River Junction), central Alabama (Opelika) and south-central Mississippi (Natchez), west to the last mentioned locality. In no case have we seen material from west of the Appalachians in the northern portion of the range of the species, but southward it occurs in the drainage basin of the Tennessee River, while it is found as far north in the general Mississippi Valley region as Holly Springs, Mississippi. In New York and New Jersey, the range covers the coastal region and Costal Plain area, but in

Virginia and North Carolina, it occurs in the Piedmont and in the large valleys of the Tennessee in North Carolina, in the latter state leaving the vicinity of the coast. The species is not known from the vicinity of the coast south of Virginia Beach, Virginia. In Pennsylvania and New York the species appears to be absent from the more elevated country, where it is replaced by *A. davisi*, both forms occurring together, however, at localities in Virginia. A record of this species from Sudbury, Vermont, made by Scudder, probably refers to *A. davisi*, which is found in the same region, while the present species appears to be absent.[30] The vertical distribution of this species appears to be from sea-level in the north, to 3000 to 4000 feet above the same in North Carolina (Topton).

Specimens Examined: 162; 52 ♂, 79 ♀, 10 juv. ♂, 21 juv. ♀.

Dedham, Massachusetts, VIII, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].

Yaphank, Long Island, New York, IX, 5, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

East Quogue, Long Island, New York, VIII, 1899, (W. T. Davis), 1 ♀, [Davis Cln.].

Staten Island, New York, VII, 1895, VIII, IX, 8, IX, 1893, late fall, (W. T. Davis), 3 ♂, 2 ♀, [Davis Cln.].

Jamesburg, New Jersey, VIII, 31, IX, 23, 1904, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Lakehurst, New Jersey, IX, 6 and 13, X, 10, 1914, (W. T. Davis), 5 ♀, [Davis Cln.].

Cassville, New Jersey, VIII, 1910, (W. T. Davis), 1 ♂, [Davis Cln.].

Pasadena, New Jersey, VIII, 11, 1914, (H. K. Plank; on cranberry bog), 1 ♀, [U. S. N. M.].

Stafford's Forge, New Jersey, VIII, 24, 1914; (R.; in oak scrub, sweet fern and huckleberry low undergrowth) 1 ♂, 1 ♀.

West Creek, New Jersey, VIII, 28, 1914, (R.; trapped in molasses jar in oak and pine woods), 1 ♀.

Tuckerton, New Jersey, VIII, 31, (W. T. Davis), 1 ♀, [Davis Cln.].

Parkdale, New Jersey, VII, 30, 1911, (R. & H.), 1 juv. ♀.

Atsion, New Jersey, VII, 30, 1911, (R. & H.), 1 ♀.

Reega, New Jersey, VII, 31, VIII, 1 to 4, 1914, (H.; in undergrowth of pine forest), 1 ♂, 2 ♀.

Dennisville, New Jersey, IX, 7, 1908, (W. T. Davis), 1 ♀, [Davis Cln.].

Swainton, New Jersey, VIII, 21, 1914, (H.; in pine woods undergrowth), 1 ♀.

[30] Caudell (Proc. U. S. Nat. Mus., xxxii, p. 321, (1907)) has recorded immature examples of *dorsalis* from Arizona, Florida and California. Those from Florida represent true *dorsalis* but the immature individuals from the western states represent other genera.

Dias Creek, New Jersey, VII, 20, 27 and 31, VIII, 1 to 8, 1914, (H.; in dead leaves and among huckleberry bushes in deciduous forest), 22 ♂, 25 ♀, 1 juv. ♂, 2 juv. ♀.

Wildwood Junction, New Jersey, VII, 27, 1914, (H.; undergrowth in oak woods), 2 ♂.

West of Bennett, New Jersey, IX, 25, 1915, (B. Long; in dry woods), 1 ♀, [A. N. S. P.].

Pink Hill, Pennsylvania, VII, 1, 1910. VII, 15, 1911, (R. & H.; in open woods on serpentine barrens), 1 ♂, 2 juv. ♂, 1 juv. ♀.

Cabin John Run, Maryland, IX, 19, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

Plummer's Island, Maryland, VIII, 11, 1907, (W. L. McAtee), 1 ♀, [U. S. N. M.].

Washington, District of Columbia, 1 juv. ♂, 1 juv. ♀, ; VIII, 30, 1914, (A. N. Caudell; in woods), 1 ♂, [U. S. N. M.].

Arlington, Virginia, VII, 9, 1911, (H.; taken in a variety of situations at night with flash-lamp), 2 juv. ♂, 3 juv. ♀.

Clarendon, Virginia, VI, 8, 1914, (H. A. Allard), 1 juv. ♀, [U. S. N. M.].

Falls Church, Virginia, VIII, 20, 1 ♀, [U. S. N. M.].

Seven-mile Ford, Virginia, VIII, 19, 1900, 1 ♀, [Morse Cln.].

Orange, Virginia, VII, 21, 1913, (R. & H.; in dead leaves and scattered green undergrowth in chestnut woods), 2 ♂, 1 juv. ♂, 5 juv. ♀.

Roanoke, Virginia, IX, 6, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Virginia Beach, Virginia, IX, 20, 1914, (H. Fox), 1 ♂, [Fox Cln.].

Greensboro, North Carolina, VII, 26, 1913, (R. & H.; one small colony in leaves among grasses in deciduous forest), 1 ♂, 4 ♀.

Sulphur Springs, North Carolina, IX, 24, 1904, (H.), 4 ♀.[31]

Waynesville, North Carolina, 2500 to 3000 feet elevation, IX, 14, 1908, (Z. P. Metcalf), 1 ♀, [N. C. Dept. Agr.].

Lake Toxaway, North Carolina, (Mrs. A. T. Slosson), 1 ♀, [Davis Cln.].

Topton, North Carolina, 3000 to 4000 feet elevation, VIII, 21, 1903, (A. P. Morse), 1 ♂, [Morse Cln.].

Andrews, North Carolina, VIII, 21, 1908, (F. Sherman), 1 ♀, [N. C. Dept. Agr.].

Murphy, North Carolina, VII, 25, and VIII, 22, 1903, (A. P. Morse), 1 ♂, 1 ♀, [Morse Cln.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (A. P. Morse), 2 ♀, [Morse Cln.].

Clayton, Georgia, 2000 to 3700 feet elevation, VI, 1909, (W. T. Davis), 3 juv. ♂, 3 juv. ♀, [Davis Cln.].

Tuckoluge Creek, Rabun County, Georgia, VII, 1910, (W. T. Davis), 2 ♂, 1 ♀, 1 juv. ♀, [Davis Cln.].[32]

Rabun Bald, Georgia, VII, 1910, (W. T. Davis), 1 juv. ♀, [Davis Cln.].

[31] Previously recorded as *dorsalis* by Rehn and Hebard (Proc. Acad. Nat. Sci. Phila., 1910, p. 644, (1911)).

[32] Recorded as *dorsalis* by Davis (Journ. N. Y. Entom. Soc., xix, p. 218, (1911)).

Top of Pinnacle Peak, Georgia, VII, 1910, (W. T. Davis), 1 juv. ♀, [Davis Cln.].

Tallulah Falls, Georgia, VI, 19 to 23, 1909, (J. C. Bradley), 1 juv. ♀, [Ga. State Cln.].[33]

Sand Mountain, Georgia, VII, 8, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].

Jasper, Georgia, VII, 26, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Lost Mountain, Georgia, VII, 13, 1913, (J. C. Bradley), 1 ♀, [Ga. State Cln.].

Bainbridge, Georgia, IX, 5, 1915, (R. & H.; on dead leaves under water oaks near lake), 1 ♂, 1 ♀.

River Junction, Florida, VIII, 31, 1915, (R. & H.; among tree shoots in heavy forest of beech, hickory, oak, magnolia, etc., on limestone hills), 5 ♂, 4 ♀.

Chehawhaw Mountain, Alabama, 2400 feet elevation, VII, 13, 1905, (A. P. Morse), 1 ♂, [Morse Cln.].

Opelika, Alabama, VIII, 2, 1915, (H.; in heavy thicket near stream in woods), 1 ♂,1 ♀.

Holly Springs, Mississippi, VII, 12, 1910, (E. H. Raidle), 1 ♀, [U. S. N. M.].

Winona, Mississippi, IX, 15, 1915, (H.; in dead leaves under scrub in mixed forest on hillside), 1 ♂, 1 ♀.

Meridian, Mississippi, IX, 10, 1915, (H.; in open areas with sparse partridge-berry and other small plants and vines in oak, sweet gum and tulip woods on low hills), 1 ♂, 2 ♀.

Natchez, Mississippi, IX, 13, 1915, (R.; hopping over dead oak leaves in dense low woods on high ground east of town), 1 ♂.

Atlanticus gibbosus Scudder (Pl. VI, fig. 15, 16 and 22; pl. VII, figs. 6, 15 and 24; pl. VIII, figs. 8 and 16.)

1877. *Thyreonotus dorsalis* Scudder, Proc. Bost. Soc. Nat. Hist., xix, p. 83. (Part.) [Fort Reed, Florida.]

1894. [*Atlanticus*] *gibbosus* Scudder, Canad. Entom. xxvi, p. 180. [North Carolina; Florida.]

1907. *Atlanticus gibbosus* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 326, fig. 31. [Florida; North Carolina.]

This striking species is one of the easiest forms of the genus to recognize. The rounded yet clearly indicated lateral carinae of the pronotal disk in both sexes will serve to distinguish this form, while the strongly arcuate character of the caudal margin of the same disk and the great length of the lateral lobes of the pronotum will also prove of service. The form of the male cercus is unique in the genus.

Morphological Notes.—In this species the pronotal form exhibits the same features of individual variation found in other members of the genus, the greatest (caudal) width of the disk

[33] Previously recorded by the present authors as *dorsalis* (Proc. Acad. Nat. Sci. Phila., 1910, p. 596, (1911)).

showing a proportion to length of from 50 to 58 per cent in the female. Of these figures the Billy's Island males alone show from 51 to 58 per cent in the male and 53 to 58 per cent in the female. The area of least width is as little correlated with the relative caudal width proportion as in the other species, but the general form of the disk is more uniform in this species than in other forms. The lateral carinae of the pronotal disk vary but slightly in the degree of their indication. The cephalic margin of the pronotal disk varies from subtruncate to shallowly arcuato-emarginate; the caudal margin is always greatly arcuate. The lateral lobes of the pronotum have their greatest depth contained twice or nearly twice in their greatest dorsal length, while there is some variation in the truncation or arcuation of the ventral margin of the same; the humeral sinus is slightly more indicated in some specimens than in others, but in all it is weak or subobsolete. The male tegmina reach, but generally do not surpass, the caudal margin of the pronotal disk, in several specimens they project slightly. The female tegmina are deeply buried under the pronotum. The usual dorsal and lateral carinae of the abdomen are at most but weakly indicated in this species, generally being obsolete. The disto-dorsal abdominal segment is angulato-emarginate mesad in both sexes; in the male the angle varies from acute to rectangulate, in the female it is rotundato-obtuse, the resultant lateral angles moderately sharp. The supra-anal plate is acute in both sexes. Cerci of the male uniform in their form and curvature. Subgenital plate of the male always fissate-emarginate, styles moderately long and not appreciably varying in length. Ovipositor always robust and straight, the apex ventral, the length, as shown by the measurements, varying from 21.2 to 29.2 mm. and not correlated with that of the caudal femora. Subgenital plate of the female with the median emargination moderately deep and narrow, almost fissate, the lateral sections well rounded. Prosternal spines always well developed and aciculate, occasionally very long; mesosternal lobes varying from but slightly more acute than rectangulate to strongly acute-angulate. The caudal femora vary in length in a manner largely correlated with general size; the ventro-internal margins bears a series of spines varying in number from two to nine. The median disto-internal spur of

the caudal tibiae is but slightly longer than the dorsal disto-internal one.

The immature males examined by us show that as early as the second instar preceding maturity (Jacksonville) the characteristic form of the cercus is clearly indicated, while in similar individuals of the female sex (Hastings) the general form and character of the pronotum is sufficiently pronounced to enable one to place the material.

Color Notes.—The general color in this species ranges from bister through mummy brown, prout's brown, cinnamon brown, tawny to cinnamon, with a few specimens washed with hazel. Over this, of course, is the "pepper and salt" of the fuscous overcolor, of a variable density and distinctness, the marmorations on the limbs varying with this and the lateral sections of the abdomen heavily stippled in the specimens with the densest overcolor. The blackish fuscous pattern of the lateral lobes of the pronotum is more extensive than in any other species of the genus except *calcaratus*, and when it is fully indicated its ventral margin is of an approximately similar form to that found in the other species. In its most extreme condition this fuscous marking covers all of the lobes except a broad marginal area including all the ventral margin and the caudal margin to the usual position of the sinus, as well as a relatively small dorsal section of the metapleura. The usual pale humeral sinus marking is frequently but a small semicircular spot, which, however, is generally connected with the pale ventral section of the lobes. The interantennal region and the proximal antennal joint is always washed with blackish fuscous in individuals with the heavily infuscated pronotal lobes. At the base of all the femoral and all the tibial spines, with the exception of the dorso-caudal, are fuscous markings, and occasionally there is a more or less complete annulus of the same proximad on the cephalic tibiae. The tegmina of the male have a strong disto-sutural blotch of fuscous.

Measurements (in millimeters)

	Length of body	Greatest length of pronotal disk	Greatest (caudal) width of pronotal disk	Length of caudal femur	Length of ovipositor
♂					
Sandfly, Georgia	33.3	13.8	7.5	32.7	....
Sandfly, Georgia	32	13	6.9	31.5	....
Billy's Island, Georgia. Average and extremes of six specimens	30.9 (28.6–33)	13.9 (13.7–14.1)	7.6 (7.2–7.9)	33.8 (33–34.8)	....
Spring Creek, Georgia	26	12.6	6.8	29.5	....
Tallahassee, Florida	32	11.6	6.7	28.5	....
Carabelle, Florida	28.8	12.8	7	30.5	....
Pablo Beach, Florida	29	13	7	33.7	....
Lake City, Florida	31.5	13.9	7.6	33.5	....
♀					
Florence, South Carolina	34.4	13.4	7.8	33.8	25.4
Magnolia, South Carolina	31.4	13.1	7.5	33	25
Currahee Mountain, Georgia	32.8	12.8	7.1	31.7	24.2
Warm Springs, Georgia	29	13.5	7.4	32.4	23.4
Sandfly, Georgia	33	13.4	7.7	34	26.9
Billy's Island, Georgia. Average and extremes of four specimens	29.4 (27.2–32.6)	14.2 (14–14.7)	7.9 (7.6–8.2)	36.5 (36–37)	27.5 (27–27.5)
Crestview, Florida	30.5	14.6	8	35.5	27.8
Tallahassee, Florida	31.8	13.6	7.9	34	28.6
Atlantic Beach, Florida	32.6	12.5	7.1	32.4	28.7
Pablo Beach, Florida	28	12.5	7.2	34.5	29.2
Lake City, Florida	29.2	(broken)	8.2	36.7	29
Merritt, Florida	27.6	13.4	7.8	35.2	27.5

We have not given the length of the tegmen in the males, as in the majority of specimens of that sex they are completely covered by the pronotum.

Geographic Variation.—The only structural feature which seems to have geographic correlation in its variation is the length of the ovipositor of the female, this being shorter in the specimens from the more northern (Florence and Magnolia, South Carolina) and the more elevated (Currahee Mountain and Warm Springs,

Georgia) localities, when compared with the length of the same in the individuals from northern Florida and southern Georgia. The general size and length of the pronotum and caudal femora show no geographic correlation in their variation. The Billy's Island individuals of both sexes, however, represent the optimum development of the species.

Biological Notes.—This striking species is chiefly an inhabitant of pine and mixed pine and oak woods, where it lives among the dead leaves in the undergrowth of low bushes and in wire grass. Individuals jump with considerable agility considering their bulk and are capable of defending themselves vigorously with their powerful jaws. The earliest exact record is June 9 at Lake City, Florida, while adults and immature specimens from Billy's Island, Georgia are labelled June and an adult from Bainbridge, Georgia was taken between June 7 and 23. The latest date for adults is October 15 to 16, at Crestview, Florida. The Jacksonville immature example taken in May, as well as that from Fort Reed taken in April, seems to indicate that the species is always immature on those dates.

Distribution.—The Coastal Plain and the adjacent portions of the Piedmont region from North Carolina (exact locality not known) south to north-central Florida (Fort Reed and Merritt), west to western Florida (Crestview) and inland as far as Currahee Mountain and Warm Springs, Georgia. It ranges vertically from sea-level to as high as 1700 feet in favorable localities.

Specimens Examined: 47; 21 ♂, 20 ♀, 3 juv. ♂, 3 juv. ♀.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in short-leaf pine forest), 1 ♀.

Magnolia, South Carolina, IX, 5, 1911, (H.; in long-leaf pine woods), 1 ♀.

Currahee Mountain, Georgia, 1700 feet elevation, VIII, 5, 1913, (H.; in undergrowth of short-leaf pine woods), 1 ♀.

Warm Springs, Georgia, VII, 31, 1910, (J. C. Bradley), 1 ♀, [Ga. State Cln.].

Sandfly, Georgia, IX, 3, 1911, (R. & H.; taken on ground or climbing up in weeds along edge of forest of gray-bark pine), 2 ♂, 1 ♀.

Billy's Island, Okeefenokee Swamp, Georgia, VI, 1912, IX, 1 to 16, 1913, (J. C. Bradley), 11 ♂, 4 ♀, 1 juv. ♂, 1 juv. ♀, [Cornell Univ.].

Spring Creek, Georgia, VI, 7 to 23, 1911, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

Crestview, Florida, X, 15 to 16, 1914, (Lutz and Watson), 1 ♀, [A. M. N. H.].

Tallahassee, Florida, IX, 2, 1915, (R. & H.; on dead leaves around bushes and under tall water oaks on oak and pine clad hill crest), 2 ♂, 6 ♀.

Carrabelle, Florida, IX, 3, 1915, (H.; among bushes on outer border of swampy area), 1 ♂.

Lake City, Florida, 1 ♂,[34] [U. S. N. M.]; VI, 9, 1899, 1 ♀, [Davis Cln.].

Jacksonville, Florida, V, 1885, (Ashmead), 1 juv. ♂, [Hebard Cln.].

Atlantic Beach, Florida, VII, 24, 1911, (R. & H.; on ground under live oak), 1 ♀.

Pablo Beach, Florida, VIII, 11 and 14, 1905, (R. & H.; in palmetto scrub and near edge of salt marsh), 3 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].[35]

Hastings, Florida, (A. J. Brown), 2 juv. ♀, [Morse Cln.].

Fort Reed, Florida, IV, 17, 1876, (Comstock), 1 juv. ♂ (sex uncertain, abdomen imperfect), [Cornell Univ.].[36]

Merritt, Florida, VII, 15, 1915, (A. R. Moore), 1 ♀, [U. S. N. M.].

Atlanticus dorsalis (Burmeister) (Pl. VI, figs. 17 and 23; pl. VII, figs. 7, 16 and 25; pl. VIII, figs. 9 and 17.)

1838. *D[ecticus] dorsalis* Burmeister, Handb. der Entom., ii, abth, ii, pt. 1, p. 713. [South Carolina[37].]

1905. *Atlanticus gibbosus* Rehn and Hebard (not of Scudder, 1894), Proc. Acad. Nat. Sci. Phila., 1904, p. 797. [Thomasville, Georgia.]

1907. *Atlanticus dorsalis* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 323. (Part.) [Jacksonville, Florida.]

Our association of Burmeister's name with this species is, as in the case of *pachymerus*, a matter of elimination. The present species certainly occurs in eastern South Carolina; a statement we feel warranted to make with our knowledge of the field conditions there and also where the present species has been taken. Of the other species taken near the probable type locality not one would answer the brief description of Burmeister. He particularly mentions that the tegmina of the male sex (the only sex known to him) are hidden under the pronotum, a condition found only in the present species, *gibbosus* and *glaber*. The large *gibbosus* far exceeds Burmeister's measurements and again has the lateral angles of the pronotum well

[34] Reported by Caudell (Proc. U. S. Nat. Mus., xxxii, p. 327, (1907)).

[35] Previously reported by Rehn and Hebard (Proc. Acad. Nat. Sci. Phila., 1907, p. 315, (1907)).

[36] Recorded as *dorsalis* by Scudder (Proc. Boston Soc. Nat. Hist., xix, p. 83, (1877)).

[37] Probably in the vicinity of Georgetown, South Carolina—see footnote 18, page 53.

rounded, while Burmeister's key leading through the text to *pachymerus* and *dorsalis* describes these angles as sharp. The slender bodied *glaber* is found nowhere near South Carolina and would not answer the description on account of the strongly rounded character of the angles of the pronotum. In addition Burmeister would doubtless have mentioned the very peculiar cerci of *gibbosus* or the very slender and unusual form of *glaber* if he had had either form before him. These features would not be noteworthy in connection with the present species.

This species stands quite apart from the other forms of the genus, although it is a member of the *glaber-calcaratus* group. It appears to be sort of a connecting link bridging the gap between this rather aberrant section and the other more coherent units of the genus. The relationship to the *pachymerus* and *americanus* groups is, however, more apparent than real, consisting as it largely does of a similarity in the general form of the dorsum of the pronotum. When we take the features of relationship to *glaber* and *calcaratus*, however, the form of the lateral lobes of the pronotum, the appreciable rounding of the lateral angles of the disk of the same, the character of the male tegmina, *i. e.* form and position, the form of the male cerci and the characters of the distal caudal tibial spurs, we find the real affinity is strongly in that direction.

The form of the pronotum in the two adults before us is very similar, the humeral angle, which is subobsolete in the male, being weakly indicated in the female. The pronotal disk is hardly constricted in form, the width at the cephalic third being hardly less than that at the cephalic margin, the lateral margins weakly diverging on the median third with the caudal third of the disk subequal in width. The greatest width (caudal third) of the disk is 49 (♀) to 57 (♂) per cent of the total length of the same. A faint but appreciable median carina is present on the caudal half of the disk and the lateral angles of the same are somewhat rounded although well defined. The cephalic margin of the disk is very shallowly arcuate—or faintly angulate-emarginate; caudal margin of the same moderately arcuate in the female, approaching subtruncate in the male. The lateral lobes have their greatest depth contained twice in the greatest dorsal length of the same.

The male tegmina project but very slightly caudad of the caudal margin of the pronotal disk, are distinctly vaulted in form with the mirror of the tympanum relatively large. The abdomen has the dorsal and lateral carinae well indicated in both specimens. The disto-dorsal abdominal segment is roundly obtuse-angulate emarginate in the male, more decidedly angulate in the female. The supra-anal plate in both sexes is small, rectangulate, with a medio-longitudinal sulcus. The male cerci are short and robust, the distal portion moderately acute. The male subgenital plate is slightly acute-angulate emarginate, the styles of medium length, slender.[38] The ovipositor of the female is moderately robust and straight, the apex ventral, the length of the ovipositor but little more than two-thirds that of the caudal femur. The subgenital plate of the female is deeply and broadly U-emarginate, the tips of the lateral sections of the plate well rounded. The prosternal spines are of medium length, aciculate; the mesosternal lobes acute, varying in degree in the two specimens, the tips faintly mammillate. Caudal femora elongate, moderately bullate proximad and passing regularly into the slender distal portion, the ventro-internal margin with three to five spines; caudal tibiae with the medio-internal distal spur twice as long as the ventro-internal one.

The immature specimens have an elongate, narrow type of pronotum resembling that of *glaber* and *calcaratus*, but with indications, however, in the outline of the disk of the condition of the adult, while the form of the lateral lobes is distinctly the same. The abdomen is strongly carinate in all these immature individuals.

Color Notes.—Both adults seen are very dull colored, having little contrast, the general dorsal tone being bone brown to fuscous, the pale section of the lateral lobes, venter and genae sayal brown in the female, bister in the male. The face is washed with the dorsal color in both adults. The fuscous of the lateral lobes of the pronotum is restricted to the caudal extension of the lateral lobes and the very narrow edging of the region of the humeral sinus is strongly contrasted. The immature specimens are in general colored much as the adults, the fuscous

[38] The male seen has one style normal, the other is replaced by a heavy incompletely articulated process, apparently an abnormal condition.

of the lateral lobes of the pronotum being more extensive in some few specimens in the second instar preceding maturity. In two immature individuals (♂ and ♀) in the same stage the pronotum and the abdomen bear a median closely placed pair of fuscous lines, such as are frequently seen in *A. glaber*.

Measurements (in millimeters)

	Length of body	Greatest length of disk of pronotum	Greatest (caudal) width of pronotal disk	Length of caudal femur	Length of ovipositor
♂ South Carolina (ex Burmeister)...	22.9			25.4	
♂ Billy's Island, Georgia.....	25.4	10.7	6.1	24.3	
♀ Thomasville, Georgia.	25.7	12.2	6	29.8	20.6

Biological Notes.—From the scanty information available it is seen that the species becomes adult by June and the specimens taken as late as April 9 are in the second instar preceding maturity. The immature individuals taken March 16 are in the third instar preceding maturity, while the December 10 and 18 specimens are extremely small. We should judge the eggs hatch about December 1 (at Thomasville). The species was taken in damp areas in the pine woods.

Distribution.—From South Carolina (exact locality not certainly known) south to northeastern Florida (Jacksonville[39]), west at least to southwestern Georgia (Thomasville).

Remarks.—This species is unquestionably a divergent member of the *glaber* group, the evidence of the immature specimens supporting that found in the adults.

Specimens Examined: 12; 1 ♂, 1 ♀, 7 juv. ♂, 3 juv. ♀.

Billy's Island, Okeefenokee Swamp, Georgia, VI, 1912, (J. C. Bradley), 1 ♂, [Cornell Univ.].

Thomasville, Georgia, XII, 10, 1903, XII, 18, 1908, III, 16 to IV, 9, 1904, (H. and R. & H.; in wire grass in pine woods), 5 juv. ♂, 3 juv. ♀; VII, 23, 1903, (for H.), 1 ♀, [all Hebard Cln. and A. N. S. P.].[40]

Jacksonville, Florida, III, 4, 1905, (H. G. Dyar), 2 juv. ♂, [U. S. N. M.].

[39] Blatchley's record of the young of *Atlanticus pachymerus* from Ormond, Florida (A Nature Wooing, p. 223, (1902)) may refer to this species. See also under *glaber* and *calcaratus*.

[40] Recorded by Rehn and Hebard (Proc. Acad. Nat. Sci. Phila., 1904, p. 797, (1905)) as *A. gibbosus*.

Atlanticus glaber Rehn and Hebard (Pl. VI, figs. 18 and 24; pl. VII, figs. 8, 17 and 26; pl. VIII, figs. 10 and 18.)

1877. *Thyreonotus dorsalis* Scudder, Proc. Boston Soc. Nat. Hist. xix, p. 83. (Part.) [Fort Reed, Florida.]

1905. *Atlanticus* sp. Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 48. [Miami and Tampa, Florida.]

1912. *Atlanticus glaber* Rehn and Hebard, *Ibid.*, 1912, p. 269, figs. 20 to 22. [Miami and Homestead, Florida.]

There is little to add to the description of this species, except a few slight amplifications and additions. The pronotum is uniform in shape as described and figured, except that the Marco and several Miami males show no trace of a sinus indentation in the caudal margin of the lateral lobes. The caudal section of the pronotal disk has a trace of a median carina. The tegmina in the male type do not exceed the caudal margin of the pronotal disk, those of a number of the other males in the series slightly surpass the same; the form of the tegmen is characteristic, the mirror of medium size. Disto-dorsal abdominal segment in both sexes nearly rectangulate-emarginate, varying somewhat individually in this respect, the lateral angles bordering the same moderately produced; supra-anal plate of male rectangulate, sometimes with a rotundate tendency, of the female acute-angulate, with a medio-longitudinal sulcus on the greater (proximal) portion of its length. Subgenital plate of male acute- to rectangulate emarginate; styles of medium length, slender. Ovipositor varying slightly in depth and in length, faintly decurved in the Marco female, the apex ventral or submedian. Subgenital plate of the female rather broadly U-emarginate, the lateral angles rotundate-subacute. Caudal femora with four to nine spines on the ventro-internal margin. Medio-internal distal spur of the caudal tibiae slightly more than twice as long as the ventro-internal spur.

Color Notes.—The following notes are supplementary to those given in the original description. The pale dorsal coloration is occasionally (two males, Marco and Miami) entirely uniform pale chestnut (between burnt sienna and chestnut of Ridgway); the same area may bear a closely placed median pair of fine medio-longitudinal lines (weak in allotype, pronounced in Marco female and one Miami male and several immature specimens), while the black maculations on the sides of the abdomen may be

present or absent (female from Marco). The shining black of the lateral lobes of the pronotum varies from strongly indicated and extending over the dorsal section of the lobes to obsolete (Marco female); the pale caudal border is always marked. The male tegmina are very pale maize yellow to sanford brown, lined along the humeral trunk and broadly painted along the sutural margin with blackish fuscous, the mirror outlined with the same. In life the ventral surface of the abdomen is pale lemon yellow (Ridgway). The immature material does not differ essentially from the adults in coloration.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Greatest width of disk of pronotum	Length of caudal femur	Length of ovipositor
Pineland, Florida	27.6	10.7	4.7	26.2	....
Marco, Florida	24.2	11.2	4.7	26.3	....
Miami, Florida, *Type*	31.5[41]	11.5	4.1	25.8	....
Miami, Florida. (Matured in Philadelphia)	24	10.6	4.3	25	....
Miami, Florida. (Matured in Philadelphia.)	27.4	12	4.4	27	....
♀					
Pineland, Florida	27.4	11.7	4.3	28	17.5
Pineland, Florida	29.2	11.3	4.3	28.2	18.2
Marco, Florida	24.5	11.2	4.9	30.2	20.4
Miami, Florida, *Allotype*	32.5[41]	11.8	4.1	28	20

Biological Notes.—From available material it is evident that the present species matures in south Florida by March 16, while the last date we have for adults is May 20. In early February the specimens from that region are about half-grown, while others taken March 6, 16, 17, and 28, as well as one May 18 to 20, are in the instar preceding maturity. The Tampa specimen, January 17, is very small, but clearly referable to this species. The Fort Reed individual, taken April 20, is in the instar preceding maturity.

The species occurs in undergrowth in pine woods and in grasses in meadowy regions within its range.

[41] Body probably slightly overstuffed.

Distribution.—Central[42] and southern Florida; from Fort Reed and Tampa south to the extreme point of the eastern pine belt (Homestead).

Specimens Examined: 28; 10 ♂, 7 ♀, 5 juv. ♂, 6 juv. ♀.

Fort Reed, Florida, IV, 20, 1876, (Comstock), 1 juv. ♀, [Cornell Univ.].[43]

Tampa, Florida, I, 17, 1904, (H.), 1 juv. ♂.

Pineland, Pine Island, Charlotte Harbor, Florida, V, 18 to 20, 1915, (H.; in undergrowth of pine woods), 1 ♂, 5 ♀, 1 juv. ♀.[44]

Marco, Florida, IV, 20 and 21, 1912, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].[45]

Miami, Florida, II, 6 and 9, 1904, (H.), 4 juv. ♂, 2 juv. ♀,[46] III, 6, 1915, (juv. only), III, 16, 1915, (adult and juv.), (H.; rare but widely distributed through undergrowth in pine woods), 1 ♂, 7 juv. ♂;[47] III, 28, 1910, (H.), 1 ♂, *type*, 1 ♀, *allotype*, 1 juv. ♀, *paratype*, [Hebard Cln. and A. N. S. P.].

Homestead, Florida, III, 17 to 19, 1910, (H.), 1 juv. ♀, *paratype*.

Atlanticus calcaratus new species (Pl. VI, figs. 1, 19 and 25; pl. VII, figs. 9, 18 and 27.)

This interesting species is a development of the *glaber* type, being much nearer to that form than to *A. dorsalis*. From *A. glaber* the present species can be separated by the shorter pronotum, the truncate caudal margin of the disk of the same, the deeper and shorter lateral lobes of the pronotum, which also have an appreciable indentation at the sinus, the more acute angles of the disto-dorsal abdominal segment, the less exserted and shorter cerci of the male, the subfissate subgenital plate of the same sex, the more robust limbs and the greatly elongate medio-internal distal spur of the caudal tibiae. The prosternal spines are lacking in the available material of *calcaratus*, but as these may be individual in their indication we have refrained from giving this feature as diagnostic.

[42] Blatchley's record of the young of *A. pachymerus* (A Nature Wooing, p. 223, (1902)) may refer to this species. See also under *A. dorsalis* and *calcaratus*.

[43] Recorded by Scudder (Proc. Boston Soc. Nat. Hist., xix, p. 83, (1877)) as *Thyreonotus dorsalis*.

[44] Hebard, Entom. News, xxvii, p. 21, (1916).

[45] See Journ. N. Y. Entom. Soc., xxii, p. 113, (1914).

[46] Proc. Acad. Nat. Sci. Phila., 1905, p. 48, (1905).

[47] The immature specimens were brought north alive and all but one successfully reached maturity April 12 to 24 (See Hebard, Entom. News, xxvi, pp. 459 to 460, (1915)).

Type: ♂; Billy's Island, Okeefenokee Swamp, Georgia. June, 1912. (J. Chester Bradley.) [Acad. Nat. Sci. Phila., Type no. 5275.]

Description of Type.—Size rather small (for the genus); form moderately compressed; surface glabrous dorsad, somewhat polished laterad, on the face and on the limbs. Head with the occiput following the general curve of the dorsum of the pronotum; fastigium, when seen from the lateral aspect, broadly rounding into the moderately retreating line of the face, when seen from the dorsum the fastigium is very broad, the width equal to the greatest depth of the eye, the ventro-lateral margins of the fastigium rectangulate convergent, the ventral extremity faintly produced, narrow, truncate and in full contact with the facial fastigium; eyes subcircular in outline, flattened cephalad, their greatest depth not more than two-thirds that of the infra-ocular portion of the genae; antennae moderately surpassing the apex of the abdomen. Pronotum when viewed from the lateral aspect appreciably arcuate cephalo-caudad, distinctly compressed, the disk narrow, subequal, the greatest caudal width of the disk but 38 per cent of the greatest length of the same, the lateral angles of the disk straight, subparallel, but moderately indicated and well rounded into the lobes; cephalic margin of the disk gently arcuato-emarginate, caudal margin of the disk moderately arcuate, more rounded laterad where it passes into the caudal margin of the lateral lobes, surface of the disk with the faintest possible indication of a median carina; lateral lobes of the pronotum with the greatest depth contained one and three-fourths times in the greatest dorsal length of the same, cephalic margin of the lobes weakly arcuato-emarginate, ventro-cephalic angle broadly rounded obtuse-angulate, ventral margin gently convex, ventro-caudal angle broadly obtuse, caudal margin of the lobes oblique with a distinctly indicated though shallow humeral sinus. Tegmina relatively narrow, projecting nearly a third their length caudad of the caudal margin of the pronotal disk, distal margin well rounded, costal margin nearly straight, marginal field of medium width at base and becoming narrower distad, mirror relatively of medium size, of a subquadrate form. Abdomen distinctly tricarinate, the lateral carinae about as distant from one another as the lateral angles of the pronotal disk, all becoming weaker caudad; disto-dorsal abdominal segment rather deeply acute-angulate emarginate mesad, the lateral angles of the same sharp and acute, the emarginations at the cercal bases strongly contrasted in consequence; supra-anal plate brief, rounded rectangulate, with a median deep longitudinal sulcus in the greater (distal) portion of its length; cerci short, robust, distal extremity subattenuate, acute, very faintly sublamellate on internal margin, tooth median, robust, strongly falcate; subgenital plate relatively narrow, distal margin subfissate mesad, styles slender, terete, faintly longer than the width of the distal margin of the plate. Prosternum unspined; mesosternal lobes acute-angulate with their apices submammillate. Cephalic and median limbs rather short (for the genus). Caudal femora elongate, considerably over twice the length of the pronotal disk, moderately inflated proximad and passing regularly into the slender distal portion, internal margin with four to six spines; caudal tibiae when flexed against the femur slightly shorter than the latter, external

distal spurs with the median one largely straight and twice as long as the ventral one, median internal distal spur very long and straight, about two and one-half times as long as the ventral one and reaching to the distal margin of the metatarsus; caudal tarsi moderately slender, subcompressed.

Female unknown.

Paratype.—In addition to the type we have examined a paratypic male in the Morse Collection, taken at Hastings, Florida, by A. J. Brown.

Measurements (in millimeters)

	Length of body	Greatest length of pronotum	Greatest (caudal) width of pronotal disk	Length of tegmen	Length of caudal femur
♂ Billy's Island, Georgia, *Type*	22.5	10.1	3.9	3.6	23.9
♂ Hastings, Florida, *Paratype*	24.4	10.9	4	5.2	24.8

Color Notes.—The type and paratype are very different in general coloration, but comparison shows this is largely due to the difference in the pale color tone, the type being in a strongly contrasted phase, the paratype in a much less contrasted one. General base color of the type dull mustard yellow (Ridgway) on the head and pronotum and ochraceous tawny on the abdomen and limbs, of the paratype benzo brown to chaetura drab (Ridgway), both fairly solid and little broken by the overlying blackish fuscous. In the type the overlying blackish fuscous is fairly solid on the head, except the dorsum, solid on the lateral lobes on the pronotum, except for the pale ventral and caudal margins of the same, and on the infra-carinal lateral sections of the abdomen it is represented by a dense stippling and a juxta-carinal longitudinal series of deep dorso-ventrad lanceolate markings and several longitudinal series of dots ventrad of the other markings, while on the cephalic and median limbs it is present as a heavy overlying marmoration and on the lateral faces of the caudal femora as a wash which varies in depth, and through which the sculptured pattern is indicated. The paratype shows a blackish fuscous coloration similar to the type

except that the head is not as solidly colored but instead is finely vermiculate with that shade, the pronotal lobes are not as deeply or as solidly washed and the infuscation of the caudal femora is not as solid. The dorsum of the head in the type has a pair of broken closely placed dark medio-longitudinal lines, absent in the paratype. Eyes blackish fuscous (type) to old gold (paratype); antennae russet, becoming fuscous distad. The pale margin of the lateral lobes is similar in shape in both individuals, being broad on the ventral margin and narrowest over the sinus, the ventral section of the pale margin clouded with fuscous and the extreme caudal section occasionally washed with greenish (paratype). Tegmina with the marginal field and extreme proximal portion pale, the base color of the remainder ferruginous, the other veins and cross nervures lined with fuscous, which is solidly the color of the disto-sutural section of the tegmina. The median carina of the abdomen is brokenly lined with fuscous in the type, but almost unmarked in the paratype, which has, however, the dorsal surface of the abdomen finely stippled with the same shade. Venter aniline yellow, in the paratype becoming pyrite yellow distad. Ventral area of the caudal femora washed with yellow ochre to antimony yellow; caudal tibiae with the spines tipped with blackish fuscous.

Morphological Notes.—The two specimens seen fully agree in the morphological features except that the paratype has the subgenital plate less narrowed and the emargination of the distal margin less fissate and shallower than in the type.

Biological Notes.—We know nothing definite regarding the habits or occurrence of the species.

Distribution.—The low coastal region of southeastern Georgia and northeastern Florida.[48]

Specimens Examined: 2 males.

Billy's Island, Okeefenokee Swamp, Georgia, VI, 1912, (J. C. Bradley), ♂, *type*, [A. N. S. P.].

Hastings, Florida, (A. J. Brown), 1 ♂, *paratype*, [Morse Cln.].

[48] Immature specimens recorded as *A. dorsalis* by Blatchley (A Nature Wooing, p. 223, (1902)) from Ormond, Florida, may represent this species. See also under *dorsalis* and *glaber*.

EXPLANATION OF PLATES

Plate VI

Fig. 1.—*Atlanticus calcaratus* new species. Billy's Island, Georgia. Dorsal view of male type). (× 2)

Dorsal outline of disk of pronotum, and tegmina (when projecting). (× 1½)

Fig. 2.—*Atlanticus testaceus* (Scudder). Male. Guthrieville, Pennsylvania.

Fig. 3.—*Atlanticus testaceus* (Scudder). Female. Guthrieville, Pennsylvania.

Fig. 4.—*Atlanticus pachymerus* (Burmeister). Male. Goldsboro, North Carolina.

Fig. 5.—*Atlanticus pachymerus* (Burmeister). Female. Goldsboro, North Carolina.

Fig. 6.—*Atlanticus pachymerus* (Burmeister). Female. Lake Ellis (Havelock), North Carolina.

Fig. 7.—*Atlanticus davisi* new species. Male (*type*). Orange, Virginia.

Fig. 8.—*Atlanticus davisi* new species. Female (*allotype*). Orange, Virginia.

Fig. 9.—*Atlanticus davisi* new species. Female. East Jewett, New York.

Fig. 10.—*Atlanticus monticola* Davis. Male (*paratype*). Linville, North Carolina.

Fig. 11.—*Atlanticus monticola* Davis. Female (*type*). Lake Toxaway, North Carolina.

Fig. 12.—*Atlanticus monticola* Davis. Female. Washington County, Virginia.

Fig. 13.—*Atlanticus americanus* (Saussure). Male. Dias Creek, New Jersey.

Fig. 14.—*Atlanticus americanus* (Saussure). Male. Murphy, North Carolina.

Fig. 15.—*Atlanticus gibbosus* Scudder. Male. Billy's Island, Georgia.

Fig. 16.—*Atlanticus gibbosus* Scudder. Female. Atlantic Beach, Florida.

Fig. 17.—*Atlanticus dorsalis* (Burmeister). Male. Billy's Island, Georgia.

Fig. 18.—*Atlanticus glaber* Rehn and Hebard. Male (*type*). Miami, Florida.

Fig. 19.—*Atlanticus calcaratus* new species. Male (*type*). Billy's Island, Georgia.

Internal distal spurs of caudal tibia. (× 5)

Fig. 20.—*Atlanticus testaceus* (Scudder). Female. Guthrieville, Pennsylvania.

Fig. 21.—*Atlanticus americanus* (Saussure). Male. Murphy, North Carolina.

Fig. 22.—*Atlanticus gibbosus* Scudder. Female. Atlantic Beach, Florida.

Fig. 23.—*Atlanticus dorsalis* (Burmeister). Male. Billy's Island, Georgia.

Fig. 24.—*Atlanticus glaber* Rehn and Hebard. Female (*allotype*). Miami, Florida.

Fig. 25.—*Atlanticus calcaratus* new species. Male (*type*). Billy's Island, Georgia.

Plate VII

Lateral lobe of pronotum. ($\times 1\frac{1}{2}$)

Fig. 1.—*Atlanticus testaceus* (Scudder). Male. Guthrieville, Pennsylvania.
Fig. 2.—*Atlanticus pachymerus* (Burmeister). Male. Goldsboro, North Carolina.
Fig. 3.—*Atlanticus davisi* new species. Male (*type*). Orange, Virginia.
Fig. 4.—*Atlanticus monticola*. Davis. Female (*type*). Lake Toxaway, North Carolina.
Fig. 5.—*Atlanticus americanus* (Saussure). Male. Dias Creek, New Jersey.
Fig. 6.—*Atlanticus gibbosus* Scudder. Male. Billy's Island, Georgia.
Fig. 7.—*Atlanticus dorsalis* (Burmeister). Male. Billy's Island, Georgia.
Fig. 8.—*Atlanticus glaber* Rehn and Hebard. Male (*type*). Miami, Florida.
Fig. 9.—*Atlanticus calcaratus* new species. Male (*type*). Billy's Island, Georgia.

Outline of detached tegmen of male. ($\times 2$)

Fig. 10.—*Atlanticus testaceus* (Scudder). Guthrieville, Pennsylvania.
Fig. 11.—*Atlanticus pachymerus* (Burmeister). Goldsboro, North Carolina.
Fig. 12.—*Atlanticus davisi* new species. *Paratype*. Orange, Virginia.
Fig. 13.—*Atlanticus monticola* Davis. *Paratype*. Linville, North Carolina.
Fig. 14.—*Atlanticus americanus* (Saussure). Dias Creek, New Jersey.
Fig. 15.—*Atlanticus gibbosus* Scudder. Billy's Island, Georgia.
Fig. 16.—*Atlanticus dorsalis* (Burmeister). Billy's Island, Georgia.
Fig. 17.—*Atlanticus glaber* Rehn and Hebard. *Type*. Miami, Florida.
Fig. 18.—*Atlanticus calcaratus* new species. *Type*. Billy's Island, Georgia.

Outline of left cercus of male. ($\times 5$)

Fig. 19.—*Atlanticus testaceus* (Scudder). Guthrieville, Pennsylvania.
Fig. 20.—*Atlanticus pachymerus* (Burmeister). Goldsboro, North Carolina.
Fig. 21.—*Atlanticus davisi* new species. *Type*. Orange, Virginia.
Fig. 22.—*Atlanticus monticola* Davis. *Paratype*. Linville, North Carolina.
Fig. 23.—*Atlanticus americanus* (Saussure). Dias Creek, New Jersey.
Fig. 24.—*Atlanticus gibbosus* Scudder. Billy's Island, Georgia.
Fig. 25.—*Atlanticus dorsalis* (Burmeister). Billy's Island, Georgia.
Fig. 26.—*Atlanticus glaber* Rehn and Hebard. *Type*. Miami, Florida.
Fig. 27.—*Atlanticus calcaratus* new species. *Type*. Billy's Island, Georgia.

Plate VIII

Lateral outline of ovipositor. ($\times 1\frac{1}{2}$)

Fig. 1.—*Atlanticus testaceus* (Scudder). Guthrieville, Pennsylvania.
Fig. 2.—*Atlanticus pachymerus* (Burmeister). Goldsboro, North Carolina.
Fig. 3.—*Atlanticus davisi* new species. *Allotype*. Orange, Virginia.
Fig. 4.—*Atlanticus davisi* new species. *Paratype*. Orange, Virginia.
Fig. 5.—*Atlanticus davisi* new species. East Jewett, New York.
Fig. 6.—*Atlanticus monticola* Davis. *Type*. Lake Toxaway, North Carolina.
Fig. 7.—*Atlanticus americanus* (Saussure). Dias Creek, New Jersey.
Fig. 8.—*Atlanticus gibbosus* Scudder. Atlantic Beach, Florida.
Fig. 9.—*Atlanticus dorsalis* (Burmeister). Thomasville, Georgia.
Fig. 10.—*Atlanticus glaber* Rehn and Hebard. *Allotype*. Miami, Florida.

Outline of subgenital plate of female. ($\times 2$)

Fig. 11.—*Atlanticus testaceus* (Scudder). Guthrieville, Pennsylvania.
Fig. 12.—*Atlanticus pachymerus* (Burmeister). Goldsboro, North Carolina.
Fig. 13.—*Atlanticus davisi* new species. *Allotype*. Orange, Virginia.
Fig. 14.—*Atlanticus monticola* Davis. *Type*. Lake Toxaway, North Carolina.
Fig. 15.—*Atlanticus americanus* (Saussure). Dias Creek, New Jersey.
Fig. 16.—*Atlanticus gibbosus* Scudder. Atlantic Beach, Florida.
Fig. 17.—*Atlanticus dorsalis* (Burmeister). Thomasville, Georgia.
Fig. 18.—*Atlanticus glaber* Rehn and Hebard. *Allotype*. Miami, Florida.

STUDIES IN THE AMERICAN EPHYDRIDAE (DIPTERA)

BY E. T. CRESSON, JR.

This general title is selected to cover a series of systematic papers treating of all the North and South American genera and species of the dipterous family Ephydridae known to the author. Each paper of the series will be complete in itself in the form of a revision of one or more genera. At the end of the series a general summary will be given, comprising notes on the systematical relationships and arrangement, and a table of the known genera occurring in the Americas.

The material upon which this series of papers is based has been accumulating for more than six years and is no doubt the most extensive collection in this family ever gotten together for study. This is due largely to the generosity of those individuals and institutions who have patiently allowed the author to retain their material for so long a period. For this privilege the author feels deeply appreciative, and trusts this mention will suffice in lieu of individual acknowledgment. Following is a list of individuals and institutions who kindly placed their collections at the author's disposal. The abbreviation in brackets [ ] following each, is that used in the list of specimens examined given under each species to indicate the source of such material. The source as given does not in every case indicate ownership, but rather refers to the individual or institution through whom the material was secured for study.

Prof. J. M. Aldrich, [Aldrich]; Nathan Banks, [Banks]; Erich Daecke, [Daecke]; H. S. Harbeck, [Harbeck]; C. W. Johnson, [Johnson]; W. L. McAtee, [McAtee]; M. C. Van Duzee, [VanD]; The American Entomological Society, [A. E. S.]; The American Museum of Natural History, [A. M. N. H.]; The Academy of Natural Sciences of Philadelphia, [A. N. S. P.]; The Boston Society of Natural History, [B. S. N. H.]; University of California, [Cal.]; Cornell University, [C. U.]; The Hungarian National Museum, [H. N. M.]; Illinois State Laboratory of Natural History,

[Ill.]; University of Kansas, [Kans.]; University of Nebraska, [Neb.]; Ohio State University, [Ohio]; United States National Museum, [U. S. N. M.]; Washington State College, [Wash.].

It may be well to explain that in the list of specimens examined under each species, the sequence of citation and punctuation is as follows: Locality, date of collecting, (collector), number of specimens, [source]. Although some of the data may be wanting there should be no confusion in understanding the citation. The list of the specimens examined always include the typical series in case of new species or forms.

I. REVISION OF THE SPECIES OF THE GENUS PARALIMNA

It is with much hesitancy that I undertake to publish a synopsis of the species of this difficult genus at this time, but owing to the recent acquisition for a limited time of an extensive collection, I feel that it will not profit much to withhold the results of my study. The genus is very discouraging to the student on account of its homogeneousness. I have been compelled time and again to lay it aside after repeated attempts to separate the mass of material into satisfactory species. This is especially true respecting the *appendiculata*-group. It will take a great deal of study with much more material from all possible localities to obtain more satisfactory results. However, I feel that this somewhat preliminary study will throw some light on the classification of the species of this genus.

PARALIMNA Loew

1862. *Paralimna* Loew, Mon. N.A. Dipt., i. 138.
1862. *Paralimna* Loew, Öfver. Kong. Vet.-Akad. Forh., 13.
1896. *Paralimna* Becker, Berl. Ent. Zeit., xli, 114.

This genus belongs to the Notiphilinae of the group Notiphilae, a group including the genera *Dichaeta* and *Notiphila*.

The position of the genus is rather isolated. It is not interrelated to any of the others so far as our present knowledge goes. Its closest ally is *Dichaeta*, apparently through the abbarent *Paralimna decipiens* and its allies. On the other hand may be observed the similarity to *Discocerina* in the frontal characters and the arrangement of the setulae and macrocheatae of the mesonotum. However, the erect extensor bristles on the middle

femora (fig. 3) and the unusually long mesopleural bristles at once decide its membership in the Notiphilae. Further notes on the position of this genus will be discussed in the systematical summary which I intend to give at the end of this series of papers. The primary characters of the genus are the presence of three extensor bristles on the middle tibiae (fig. 3) and the continuation of the costa to the fourth vein (fig. 1).

Generic Description.—Robust, mostly large species. Head generally broader than high, higher than long. Eyes bare generally rounded. Frons broad, with parallel orbits; vertex rounded; ocelli situated slightly in advance of the vertical angle, with a pair of post-ocellar bristles diverging; the usual ocellars well separated, parallel, situated in advance of, or opposite the anterior ocellus; inner and outer verticals strong, also distinct occipito-centrals present; a strong reclinate frontal and two or three proclinate orbitals of which the anterior one is the strongest. Anterior portion of frons more or less setulose or hairy. Face broad, bare medianly; foveae shallow; facalia scarcely differentiated, setulose, with a series of one or more incurved bristles along inner margin, the uppermost of which is the largest; parafacial groove sharp and well defined to oral margin. Cheeks generally broad with distinct bristles; lower occiput moderately swollen. Clypeus always visible, moderately broad. Palpi cylindrical. Antennae short; second joint subglobular, without distinct apical "thorn"; third joint hardly twice as long as broad; arista long with long hairs above.

Thorax quadrate, dorsum convex, wholly setulose; no acrostichals; one pair of prescutellars; one anterior and two posterior dorsocentrals; one humeral (long); one presutural; one supra- and one post-alar; two noto- and two or more meso-pleurals, one of the latter being very long; one sterno-pleural. Scutellum flat, roundly truncate apically with four long marginal bristles. Abdomen broad as thorax, with five to six segments; fifth of male convex, truncate; genital segments inconspicuous. Legs slender; fore femora of male sometimes characteristically ciliate beneath; middle tibiae of both sexes with three erect extensor bristles, one at each extremity and one before middle. Wings elongate, slightly overreaching abdomen; costa broken just beyond humeral c. v., slightly notched at first, and extends to tip of wing at fourth vein; second, third and fourth veins generally straight. Allulae narrow.

Genotype.—The name for this genus was used for the first time in 1862, in two separate publications, given in the above bibliography under the genus, without direct reference to each other, so that one, unless knowing dates of issue of the two, is at a loss to determine which reference has priority. It will depend upon the actual dates of issue of these publications as to which of three species can be used as the genotype. Osten Sacken in a foot note in his Catalogue of the North American Diptera, 1878,

page 201, considers the Öfversigt as having priority, but as the name *Paralimna* is given only in combination with the newly described species, without any diagnosis, he does not consider such citation as establishing the generic name. In his Monograph Loew does state "The characters of this genus , of which I hitherto only know South African and North American Species . . . .", and one might infer from this that Loew had published on this genus, but on the other hand he may have had such a paper only in preparation or only such specimens before him at that time. I cannot find the actual date of issue of that part of the Öfversigt, but should it have been published prior to that of the first volume of the Monographs (April 1862), then I herewith designate *Paralimna confusa* Loew as the type species of this genus. Until such priority be proven, the present genotype, *Paralimna appendiculata* Loew, must stand. Only one species was given under the generic description in the Monographs.

There are a few species described, mostly from the neotropics, which I have been unable to locate in my material, mainly on account of inadequate original descriptions. Rather than risk misidentification I prefer not to consider the names of such species. The correct status of these will be easily found when the types are examined and redescribed more accurately. Following is a list of these unrecognizable species with their original references:

1868. *Paralimna secunda* Schiner, Reise Novara, Zool., ii, Dipt., 241, [S. Am.]
1868. *Paralimna molossus* Schiner, Reise Novara, Zool., iii, Dipt., 242, [S. Am.]
1896. *Paralimna multipunctata* Will., Tr. Ent. Soc. London, 1896, 390, [St. Vincent.]
1902. *Paralimna nuda* Coq., Jour. N. Y. Ent. Soc., x, 182, [Mexico.] (This I have referred to the genus *Oedenops* Becker.)

The species possessing the generic characters as above given fall into two groups which are treated here as subgenera. These may ultimately prove to be valid genera, but from the present knowledge of the species I cannot consider them as such.

The two subgenera may be conveniently separated as follows:

The entire thorax and venter unicolourous; face less prominent . . . **Phaiosterna**
Pleura and venter more or less cinereous, contrasting with the dorsum; face large, swollen and prominent . . . . . **Paralimna**

Phaiosterna new subgenus

The species comprising this subgenus are so different from all the others in their color pattern and hardly less so in a few structural characters, that one naturally places them aside when

studying the genus. From the other species they differ most noticeably in the uniformity of the color over the entire insect, the usual grays of the face, pleura and abdomen being entirely absent. The abdomen is, however, generally banded with olivaceous but is never whitish. Structually the head is more flattened in profile; the face less prominent; eyes vertical, thus reducing the otherwise broad cheeks. In many respects the species here suggest a tendency towards *Dichaeta*.

Description.—Eyes vertical; face flattened, slightly convex; parafacalia linear; cheeks moderately broad; third antennal joint broad apically. Pleura and venter never cinereous.

Type species.—*Paralimna decipiens* Loew.

Table of Species

Opaque species ..... **decipiens** p. 108.
Shining species ..... **obscura** p. 109.

Subgenus **Paralimna**

The species comprising this subgenus are quite homogeneous in their color pattern and form a group that is not to be confused with the preceding. The group may be characterized as follows:

Description.—Eyes rounded; face large, broad, swollen, prominent, with more or less distinctly convex hump near middle, lower portion broad and vertical in profile; parafacials moderately broad; cheeks very broad. Third antennal joint tapering apically. Pleura and venter more or less cinereous.

Type species.—*Paralimna appendiculata* Loew (Subject to the condition mentioned in the discussion of the type of the genus *Paralimna*).

Description of Color Pattern.—The color pattern of the species of this group is so constant that the repetition of the same in each description of the species is superfluous. A general review of such characters is given here and will not be referred to again unless there are important differences.

Frons dark brown, more or less variegated with lighter labyrinthal markings which may vary in intensity of pattern or color or may be almost wanting; orbits more or less narrowly silvery with one or more interruptions; opposite the antennae or slightly below on the parafacials are usually present two opaque black spots separated by a silvery spot, best seen from the side. Clypeus concolorous with the face. Mesonotum light pruinose with numerous minute darker brown irrorations which sometimes coalesce into larger blotches; between the dorsocentral series may be two to three well defined dark stripes. Scutellum concolorous and irrorated, with apex more shining and black. Pleura and metanotum densely cinereous, becoming darker below, contrasting

with the mesonotum. Abdomen may said to be opaque cinereous with bases of each segment more or less broadly subglabrous brown with a median projection to apical margin; thus forming the ever present median stripe which, however, may be indistinct in some species. Sometimes the gray or brown is reduced to narrow bands, and the former more or less irrorated with brown. Legs normally black with bases of tarsi tawny. The males may be distinguished by having the apex of the abdomen truncate and convex.

Notes on the Classification of the Species.—Systematically the species are very unsatisfactory, the characters of most value being found in the male. By these the species may be divided into two groups, based on the ciliation of the fore femora, but this character shows some intergradation. However, one will have little difficulty in placing this sex of the species within these groups.

Of the species of this subgenus *plumbiceps* is most closely related to those of *Phaiosterna*, but is quite separate. This species with *flexinervis, ciliata* and *texana* form a distinct group, characterized by the peculiar ciliation of the fore femora of the male. In *texana* we have what seems to be an intermediate form suggesting *appendiculata* in other respects. In the latter we have one of the four species constituting what may be termed the typical group; the femora here not being ciliate, and the frons convex with the antennae situated well down about on a line with the middle of the eyes. Another group has the femora normal and frons convex, but with a silvery flattened spot on the second antennal joint above. This includes the two species *argyrostoma* and *puncticornis*. A third group has the frons flattened and horizontal, with the antennae situated above the middle line of the eyes. This group includes two species, *pleurivittata* and *taurus*. The latter is somewhat of an anomaly in its large heavy face with the upper parts very prominent.

The species may be systematically arranged as follows:

Fore femora of male ciliate beneath (fig. 7).
- Frons narrow ..... **plumbiceps**
- Frons broad.
  - Parafacials narrow ..... **flexineuris, ciliata**
  - Parafacials broad ..... **texana**

Fore femora of male not ciliate.
- Frons convex, antennae opposite middle of eyes.
  - Second antennal joint without flattened area above.
    - Parafacials broad ..... **appendiculata, nigropicta**
    - Parafacials narrow ..... **meridionalis, brunneiceps**

Second antennal joint with flattened area above.
argyrostoma, puncticornis
Frons flattened, horizontal, antennae above middle line of eyes.
Eyes horizontal ..... **pleurivittata**
Eyes round ..... **taurus**

Table of Species

1. Second antennal joint with a flattened, mostly silvery, area above at apex 2
Second joint normal 4
2. Mesopleura traversed by a broad brown stripe; frons and eyes horizontal ..... **plurivittata** p. 122.
Mesopleura cinereous or more or less irrorated and marked with brown at sutures; eyes round 3
3. Frons horizontal; face dark ..... **puncticornis** p. 121.
Frons convex; face white ..... **argyrostoma** p. 120.
3. Frons in profile flattened, horizontal; face long with well marked hump above middle (fig. 6) ..... **taurus** p. 123.
Frons convex; face short, without marked hump 5
5. Males 6
Females 11
6. Fore femora more or less constricted beneath on apical third and with mesal series of curved flattened bristles (fig. 7) 7
Fore femora and ciliation normal 9
7. Head at least as high as broad; frons and face narrow; latter opaque, plumbaceous ..... **plumbiceps** p. 110.
Head broader than high; frons and face broad; latter more or less sericeous 8
8. Lateral flexor series on fore femora simple, limited to a few bristles at basal fourth; parafacials narrow ..... **ciliata** p. 111.
Lateral series complicated, limited to basal half.
Second vein of wing curving, subparallel to costa (fig. 8).
flexineuris p. 111.
Second vein straight, normal ..... **texana** p. 113.
9. Face except foveae and parafacials entirely dark brown.
brunneiceps p. 120
Face mostly cinereous or yellowish brown 10
10. Parafacials at least one half as broad as third antennal joint.
appendiculata p. 114.
Parafacials much less than one half as broad as third joint.
meridionalis p. 119.
11. Frons broader than long 12
Frons not broader than long; face dull lead color ..... **plumbiceps** p. 110.
12. Face with a velvety black spot between antennae ..... **nigropicta** p. 118.
This spot if present brownish 13
13. Face except foveae and parafacials entirely dark brown, not mottled with yellow ..... **brunneiceps** p. 120.
Face mostly cinereous or mottled with yellow or brown 14

14. Parafacials broader than one half of third antennal joint 15
Parafacials narrower, paralleling orbits 16
15. Lateral flexor series on fore femora of numerous bristles in series complete to apex ..... **appendiculata** p. 114.
Lateral series of fewer bristles, series generally interrupted before apex ..... **texana** p. 113.
16. Face dull, dark, sometimes nearly black ..... **meridionalis** p. 119.
Face sericeous, light in color ..... **ciliata** p. 111.

Paralimna (Phaiosterna) decipiens Loew Pl. IX, fig. 5.

1878. *Paralimna decipiens* Loew, Zeit. f. Ges. Naturf., 1878, 195.

?1893. *Drosophila excita* Giglio-Tos. Bol. Mus. Zool. Anat. Comp. R. Univ. Torino, VIII, 158.

It is possible that this species is not specifically distinct from the next. As treated here the species is typically opaque, with at most the abdomen somewhat shining, with bands generally well developed. The thorax may be more or less shining due to abrasion.

Description.—Black with yellow halteres. Opaque, head and thorax dark brown, yellow brown or olivaceous pruinose. Abdomen sub-opaque, olivaceous, with or without brown basal segmental bands, or, brown with or without traces of olivaceous apices to segments. Mesonotum generally with two or three dark vittae between dorso-centrals, being most distinct anteriorly.

Head broader than high. Eyes higher than broad. Frons broader than long; orbits nearly parallel; chaetotaxy normal. Face three-fourths width of vertex, slightly longer than broad, in profile, vertical with slight hump above middle; parafacials very narrow, concentric with orbits to cheeks; facalia sparsely setulose with one or more bristles. Cheeks about as broad as third antennal joint. Antennae with arista of 10 to 12 hairs.

Thorax and abdomen normal. Fore femora of male sparsely and weakly bristly below. Length.—2.5 to 3.5 mm.

Type.—Described from Texas. The type in the Museum of Comparative Zoology, Cambridge, Massachusetts. I have not examined it.

The variation in the pruinose color is considerable, ranging anywhere from dark brown to golden brown on the head and thorax, but the abdominal olivaceous bands are fairly constant in color although varying in extent. The thoracic vittation is also subject to variation in extent or may be absent. In poor and abraded specimens the pruinose vesture may be nearly absent so that the surface is shining. Of such specimens the student should be careful and not refer them to *obscura* Will., a form that may possibly be found with this. In the golden colored specimens the abdomen is generally olivaceous with the

brown reduced or wanting. Rarely are the olivaceous bands wanting. The specimens from Biscayne Bay and Lake Worth, Florida, may not belong here, and may be a distinct variety. They are shining but marked as this form.

Drosophila excita Gig.-Tos is probably one of the color varieties of this species. Mr. F. Knab of the U. S. National Museum called my attention to the probability of it being an Ephydrid.

Specimens Examined.—99.

Georgia: Billy's Island, Okeefenokee Swamp, June 1912, 1, [C. U.]; Spring Creek, Decatur Co., July 16–29, 1912, 1, [C. U.].

Florida: 1, [A. M. N. H.]; 2, [Wash.]; Biscayne Bay, (A. T. Slosson), 2 [U. S. N. M.]; Bradentown, March, (M. C. Van Duzee), 4, [Van D.]; Crescent City, April 19, 1908, (Van Duzee), 1, [A. M. N. H.]; Lake Worth (Slosson), 1, [U. S. N. M.].

Texas: Austin, Oct. 6–29, 1901, 4, [Wash.]; 1, [Kans.]; Oct. 7, 1899, 2, [A. M. N. H.].

Arizona: Hot Springs, June 24, (H. S. Barber), 6, [U. S. N. M.]; Bill Williams Fork, August, (F. H. Snow), 14, [Kans.].

Mexico: Frontera, Tabasco, May 9, (C. H. T. Townsend; on moist sand at river edge), 1, [U. S. N. M.]; Guadalajara, Aug. 8, 1905, (McClendon), 1, [A. N. S. P.].

Guatemala: Gualan, Feb. 15, 1905, 22, (J. S. Hine), [Ohio]; Los Amates, June 16–20, 1905, 1, (J. S. Hine), [Ohio].

Costa Rica: Filadelfia, Jan. 18, 1910, (P. P. Calvert; muddy bank of Rio Tempisque), 1, [A. E. S.]; Santa Cruz, Rio de la Canas, Jan. 30, 1910, (P. P. Calvert), 5, [A. E. S.]; Cartago, May 25, 1909, (P. P. Calvert; along ditch), 9, [A. E. S.]; Cartago, July 4, 1909, (P. P. Calvert, 1, [A. E. S.].

Panama: Canal Zone, (A. H. Jennings), 1, [U. S. N. M.]; Ancon, Canal Zone, Dec. 4, 1909, (S. T. Darling), 9, [U. S. N. M.].

Bermuda Islands: July 29, 1905, (T. Kincaid), 1, [A. N. S. P.].

Jamaica: April 1891, (Johnson), 4, [A. N. S. P.].

Porto Rico: Mayaguez, Jan. 1899, (A. Busck), 2, [U. S. N. M.]; Utuado, Jan. 1899, (A. Busck), 1, [U. S. N. M.].

Paralimna (Phaiosterna) obscura Williston

1896. *Paralimna obscura* Williston, Trans. Ent. Soc. London, 1896, 391.

Whether or no this is a distinct species I am not prepared to say, for my series is hardly extensive enough to show the possible range of variation. However, there seems to be very well marked difference in the amount of opacity. In this form we have no absolutely opaque surfaces unless they are on the face and pleura. There may be considerable amount of pollen but not of sufficient density to subdue the gloss. Structurally the form does not differ

from *decipiens*. The specimens examined are all quite shining, dark brown or black, with faint olivaceous abdominal bands. The study of more material may show intergradations sufficient to relegate this form to varietal rank.

Type.—Described from numerous specimens from St. Vincent, West Indies. The type should be in the British Museum of Natural History. I am unable to examine the cotypes. These are supposed to be distributed as follows: three in the University of Kansas Collection and five in the American Museum of Natural History.

Specimens Examined.—14.

FLORIDA: Titusville, Nov. 8, 1911, 1, [A. M. N. H.].

COSTA RICA: Filadelfia, Jan. 18, 1910, (P. P. Calvert; muddy bank of Rio Tempisque), 1, [A. E. S.]; Santa Cruz, Rio de la Canas, Jan. 30, 1910, (P. P. Calvert; sweeping over mud), 2, [A. E. S.].

CUBA: Havana, (Baker), 3, [A. M. N. H.]; 1, [Johnson]; San Banos, 2, [U. S. N. M.].

PORTO RICO: Bayamon, Jan. 1899, (A. Busck), 1, [U. S. N. M.]; Fajardo, Feb. 1899, (A. Busck), 1, [U. S. N. M.].

BRAZIL: Rio de Janeiro, (H. H. Smith), 1, [A. N. S. P.].

PARAGUAY: (Fiebrig), 1, [H. N. M.].

Paralimna plumbiceps new species

This species belonging to the group in which the male fore femora are characteristically ciliated beneath, is, however, quite distinct in its narrow frons and face, and is easily distinguished by the dull lead color of the latter.

Description of Male.—Black; halteres yellow; base of tarsi tawny. Opaque; frons yellowish brown with design obscured, anterior half blackish; face, cheeks, clypeus, antennae, pleura, venter and legs, dull, bluish lead color; yellowish facial spots obscured. Mesonotum yellowish, with irrorations, large spots and three median vittae, brown. Scutellum concolorous. Mesopleura with large brown spot above. Abdomen with narrow gray fasciae which are somewhat oblique medianly; median stripe broad and well defined. Wings hyaline with yellow veins.

Head as high as broad. Eyes oblique. Frons long as broad. Face longer than broad with median hump rather distinct; Parafacials linear; upper bristles differentiated. Cheeks one-third as broad as eye. Arista with 8 to 10 hairs. Fore femora of male obliquely constricted beneath on apical fourth, with mesal ciliation of flattened, curved bristles; lateral ciliation of normal bristles in complete series extending to apex. Fore tibiae bent, with flexor surface flattened and bearing short ciliation. Wings normal. Length.—3.5. mm.

Female.—Similar with lateral flexor series on fore femora complete, but of few well separated weak bristles.

Type.—♂; Jamaica (Johnson), [A. N. S. P. Type No. 6090]. *Paratypes.*—4♂, 4♀; topotypical.

Specimens Examined.—10.
JAMAICA: (Johnson), 9, [Johnson].
CUBA: Baracoa, Nov. 1901, (A. Busck), 1, [U. S. N. M.].

Paralimna flexineuris new species Pl. IX, fig. 8.

In this species the resemblance to *texana* is evident. The difference, however, may be found in the more marked curvature of the second vein and the tuft-like arrangement of the lateral ciliation of the male fore femora. Unfortunately the abdomen of the only male specimen is missing. The markings on this may give additional characters of note. The females as usual are difficult to separate from those of other species. The correct status of this species is somewhat difficult to ascertain from such a small amount of material and from a locality which is poorly represented.

Description of Male.—Frons mottled with black and gray, overcast with bronze or light brown. Mesonotum cinereous and brown also similarly overcast; irrorations fine; vittae absent; mesopleura faintly irrorated. Face, clypeus, cheeks, third antennal joint, pleura and femora densely cinereous. Face immaculate, more or less sericeous, nearly white. Wings yellowish with cross veins slightly clouded.

In build similar to *texana*. Parafacials narrow but not as much so as in *ciliata*. (Abdomen missing.) Fore femora depressed beneath on apical third, with mesal ciliation of curved bristles; lateral series complicated, bushy, confined to basal half. Second vein markedly curved at middle causing the apical third to run subparallel to the costa (fig. 8). Length.—4.0 mm.

Female.—Similar, darker, cinereous only on the ventral portions. General color tinged with olive. Face mottled with yellowish brown. Cross veins of wings not clouded. Lateral flexor ciliation of fore femora consisting of a few bristles on apical half.

Type.—♂; Chosica, Peru, (C. H. T. Townsend; TD4197), [U. S. N. M. Type No. 19684]. *Paratypes.*—2♀; topotypical.

Paralimna ciliata new species Pl. IX, fig. 7.

The present species is readily distinguished from *plumbiceps*. It is a member of the group including the two following species, from which it is separated by the characters given in the table of species, although the females will be found difficult to treat. However, there seem to be very good characters in the ciliation of the fore femora even in this sex of these species. Whether

this character is of value will have to be left for the future to determine. On the other hand there is the color pattern and general facies to guide the student who is familiar with this group. The present species may be separated from *texana* by the more yellowish abdomen with broader bands, and a distinct stripe; the narrower parafacials and the lateral cilia of the male fore femora confined to a single series on the basal third. From *flexinervis* it may be separated by the course of the second vein besides the other characters given in the description of that species. The females are similar to those of *meridionalis* but the face is more sericeous and the abdominal bands more oblique, besides averaging smaller in size. On the whole this species is distinctly lighter in general coloration owing to the less tendency of the irrorations to coalesce—the specimens from Guatemala being very noticeable in this respect.

Description of Male.—Black; halteres yellow; basal joints of tarsi tawny. Frons dark, nearly black, mottled with brown or ochreous; face cinereous to yellowish or sometimes grayish white, sericeous, with yellow spots; in certain aspects seemingly transversely banded with darker shade. Cheeks and clypeus concolorous. Mesonotum brownish gray, irrorations but slightly coalescing; vittae rather distinct. Scutellum concolorous. Mesopleura indistinctly irrorated, more or less brownish tinged above. Abdominal brown bands rather arcuate, obliquely terminated and dilated medianly; medial stripe well defined. Legs sparsely cinereous. Wings yellowish with cross veins slightly clouded.

Eyes rather oblique. Frons convex, broader than long. Face slightly longer than broad with few weak bristles; parafacial very narrow. Cheeks three-fourths of height of eyes. Arista with 7 to 10 hairs. Fore femora flattened and obliquely sulcate on apical third beneath; mesal cilia of distinct, flattened, curved bristles (fig. 7); lateral series normal, simple but confined to basal fourth; their tibiae not ciliate. Length.—3.5. mm.

Female.—Similar with lateral flexor cilia wanting or of a few weak bristles confined to basal part.

Type.—♂; Cartago, Costa Rica, Dec. 12, 1909, (P. P. Calvert; sweeping over mud), [A. E. S. Type No. 6091]. *Paratypes*—1♂, 1♀; topotypical.

Specimens Examined.—32.

FLORIDA: Bradentown, March 29, (M. C. Van Duzee), 2, [Van D.]; Fort Worth, (Mrs. Slosson), 1, [U. S. N. M.].

GUATEMALA: Gualan, Feb. 15, 1905, 9, (J. S. Hine), [Ohio]; Santa Lucia, Feb. 2, 1905, 1, (J. S. Hine), [Ohio.].

COSTA RICA: Banana River, 100 ft. alt., Nov. 9, 1909, (P. P. Calvert; sweeping near upper reservoir), 1, [A. E. S.]; Cartago, Oct. 27, 1909, (P. P.

Calvert; sweeping over mud), 1, [A. E. S.]; Nov. 21, 1909, 2; Dec. 12, 1909, 3; Jan. 3, 1901, 1; Southern slope of Irazu, north of Cartago, Dec. 15, 1909, (P. P. Calvert; sweeping over mud), 4, [A. E. S.].

JAMAICA: April 1891, (Fox & Johnson), 2, [A. N. S. P.].

ST. THOMAS, WEST INDIES: Feb. 8, (A. Busck), 5, [U. S. N. M.].

Paralimna texana Cresson

1915. *Paralimna texana* Cresson, Ent. News, xxv, 69.

This species while belonging to the *ciliata*-group is, however, very similar to *appendiculata* Lw. in general build and appearance; so much so that the females are very difficult to separate satisfactorily. The only character I can find to separate this sex from those of that species is in the stouter and lesser number of bristles in the lateral flexor series on the fore femora of this species. Whether or no this is constant my series is not large enough to determine. On the whole this species seems to average lighter; the forms not so liable to darken anteriorly; the abdomen whitish with the dark bands reduced, especially in the males, and the median brown stripe poorly defined or rudimentary, especially apically. Further than this my series is too small and many specimens in too poor condition to warrant more exhaustive study. The following description should suffice to characterize the species.

Its affinity to the Neotropical *ciliata* is evident. The character separating these may be found in the greater width of the parafacials in this species and the males having the lateral flexor ciliation rather clustered and not arranged in a distant series.

Description of Male.—Black; halteres pale yellow; tarsi except apically, tawny. Opaque, densely cinereous, more or less yellowish tinged. Frons ochreous, slightly darker on vertex and lighter in spots on orbits; design faint or obsolete; irrorations minute. Face and cheeks whitish sericeous, faintly yellow on hump and mesad of the upper bristles. Mesonotal irrorations well defined; vittae weak and only two medianly. Mesopleura faintly irrorated above. Abdomen whitish with the brown bands narrow, often wanting on fifth segment, attenuating mesally and laterally; median stripe narrow, poorly defined or incomplete; ventral lobes immaculate. Femora cinereous. Wings rather milky.

Frons much broader than long. Face as broad as long; in profile, convex with weak hump at middle; parafacial nearly as broad as third antennal joint. Cheeks nearly as broad as eye-height. Pile of antennae moderate; arista with 9–11 hairs. Fore femora flattened beneath with shallow, oblique sulci on apical third; mesal ciliation comprising of flattened, curved bristles;

lateral ciliation normal confined to basal third and rather clustered, not serially arranged. Second vein of wings straight; second costal section three times length of third; no appendages present. Length.—3.0 to 4.0 mm.

Female.—Similar, but lateral series on fore femora of six to ten bristles well separated and rather stout, sometimes the series is interrupted at apical third.

Type.—♂; Austin, Texas, Oct. 1900, [University of Washington]. *Paratypes.*—In the original citation of the typical series for this species a male of *appendiculata* was unintentionally included. Of the five females, four of these are in very poor, stained condition and practically of no value. However, I have a series before me of six males and three females, including the holotype and allotype, in good condition which may be considered typical.

Specimens Examined.—39.

Kansas: Clarendon Siding, July 29, 1891, 1, [U. S. N. M.].

Oklahoma: Ardmore, April 4, 1907, (F. C. Bishopp), 1, [U. S. N. M.].

Texas: Oct. 7, 1899, 3, [Wash.]; Austin, 5; Feb. 12, 1900, 1; Mar. 2, 1900, 2; Oct. 1900, 5; Oct. 6–20, 1901, 6, all [Wash.]; Brownsville, July, 1, [Kans.]; Chinlan, Sept. 7, 1905, (F. C. Bishopp), 1; Clarendon, Aug. 11, 1905, (W. D. Pierce), 6; Corpus Christi, Apr. 13, 1906, (F. C. Pratt), 1; Dallas, June, 22, 1908, (E. S. Tucker), 1, all [U. S. N. M.]; Galveston, June 1900, 1; Granite Mountain, Mar. 30, 1901, 1, all [Wash.]; Rondo, May 1, 1908, (J. D. Mitchell), 1, [U. S. N. M.]; Round Mountain, 1, [A. N. S. P.]; Waco, (Belfrage), 1, [U. S. N. M.].

The male from Brownsville, Texas is a fine specimen, well marked, with the face glistening bluish-white.

Paralimna appendiculata Loew Pl. IX, figs. 1, 2, 3, 4.

1862. *Paralimna appendiculata* Loew, Mon. Dipt. N. Am., i, 138.

In this we have the commonest species of the genus inhabiting the Nearctic region, and it is found all over the United States east of the Rocky Mountains. Although a few other species have been generally confused with it, fortunately it is involved in little or no synonymy. It has, however, some variations which are confusing and are liable to be considered distinct forms by those not having an extensive series for study.

This species, as I consider it, has the face and parafacials broad, of a silky lustre when in good condition. In rare cases the face is narrow and dull lead color. Generally the face is yellowish gray with stains of yellow or brown, sometimes largely brown or on the other hand silvery gray to almost white. The parafacials

are broad, usually as broad as the third antennal joint, but often narrower; however, never linear and concentric with the orbits. The frons are generally dark with lighter areas about the bristles and the ocellar triangle, conspicuous, sometimes in very dark colored specimens these markings are, or nearly, obsolete; in which cases the face is usually more leaden in color.

The males have the ciliation of the fore femora normal. Of course those species having the flattened area on the antennae must not be confused with this. The following description is full, this species being the genotype.

Description.—Black; base of tarsi more or less tawny to yellow, sometimes black; halteres white or yellowish; wings hyaline with cross veins and appendages generally clouded; veins dark.

Opaque. Frons dark brown, more or less intricately varied with lighter markings, or sometimes nearly black; the lighter markings, gray or yellowish, are most distinct as orbital spots and subcircular areas surrounding the ocellar tubercle and the shining black spots at the base of the bristles. Face varying from almost silvery to dark brown, generally with three yellow to brown spots, one on the carina and the other two mesad of the upper bristles; parafacial spots distinct. Cheeks, clypeus, lower orbits and post orbits gray. Third joint of antennae in certain angles somewhat gray or yellowish.

Mesonotum gray to ochreous with numerous dark brown irrorations which sometimes coalesce forming large areas of such color; between the dorsocentral rows there are generally, especially anteriorly two or three dark stripes. Pleura and metanotum gray; mesopleura and scutellum irrorated with dark brown, rarely immaculate. Sternopleura and pectus darker to nearly black. Abdomen gray to yellowish, more or less irrorated; bases of third to fifth segments dark brown, more shining, which color attenuates laterally and medianly with more or less distinct medial extenuation attaining the apical margins; forming a pair of brown median stripes; second segment with the stripes seldom complete and the brown basal areas usually isolated or limited to the lateral angles. Legs sparingly dark brown pruinose. All bristles black with more or less distinct shining black spot at their bases.

Head as broad as high or broader. Eyes round or slightly oblique. Frons nearly one and a half times as broad as long, about half as broad as head, sparingly setulose anteriorly; orbits parallel. Face as broad or broader than long, rarely narrower; facalia broad, setulose, with two or more medianly curved bristles, the uppermost being strongest and at middle of profile. Cheeks one- to two-thirds diameter of eyes. Third antennal joint longer than broad, subconical, long pilose above (fig. 4). Abdominal segments subequal; sixth of male just visible, roundly truncated. Fore femora of male densely ciliate on lateral flexor margin with normal bristles in series complete to apex; mesal series weak. Wings with second costal section two and a half to three and a half times as long as third; fourth vein generally emitting one or more stumps

or appendages into the first posterior (fig. 1), and sometimes into the discal cell; sometimes these extend to the third vein as a cross vein or are reduced to isolated spots in the cells, but always enveloped in a cloud. Rarely are these appendages entirely absent, but all possible intergradations exist. Length.—2.0 to 4.5. mm.

Type.—Described from both sexes from the Middle States and Georgia. Type in Coll. Museum of Comparative Zoology. I have not seen it.

A very variable species, which, in a genus possessing so few well marked characters, is difficult to characterize. Its similarity to *meridionalis* is evident and in some cases it is almost impossible to separate them. The presence or absence of the stump on the fourth vein is soon found to be of no specific value, at least I have been unable to find it constant. In a few specimens I find it well developed in one wing and totally absent in the other. However, it is noticed that the specimens from Texas and New Mexico generally lack these appendages, those from the Central and Southeastern states may or may not have them, while in those from the more northern states they are seldom absent. The face although varying little in shape does vary in color, from a bluish-white to nearly brown. The frons ranges from grayish with faint irrorations and marks to very dark. The thorax especially the mesonotum may be nearly unicolorous with faint irrorations or dark brown, with or without the median stripes. The brown of the abdominal segments may occupy almost the entire segment or limited to narrow spots on each side of the gray medial stripe.

I have been tempted to separate some of the more marked variations but could get no satisfactory results. There is one which may prove to be worth recognizing. In this the sternopleura and femora are decidedly gray and the wings somewhat lactaceous. This series I have labeled *appendiculata* var.? but have not recognized it otherwise.

There are also two specimens before me from Florida, Jacksonville, (C. W. Johnson) and Bradentown, March, (M. C. Van Duzee) which are in too poor a condition for critical study. They are noticeably larger (4.7 mm.) but seem to belong here or are allied. I have also a series from North Carolina and Georgia which average smaller than usual, are darker, with the face narrower and the legs black, scarcely brown pruinose.

Specimens Examined.—377.

NEW YORK: Ithaca, 1, [C. U.].

PENNSYLVANIA: Dauphin, June, 2, [Daecke]; Lansdale, May 30, 1909, 1; (E. T. Cresson), 1, [A. E. S.]; Manayunk, 1 (C. W. Johnson), 1, [A. N. S.]; Swarthmore: June 4, 1905, 2; June 4, 1906, 1; July 1908, 2; Aug. 1908, 20; June 6, 1909, 2; June 13, 1909, 1; July 4, 1909, 5; Aug. 22, 1909, 2; Sept. 26, 1909, 1; July 31, 1910, 1; Aug. 21, 1910, 1; Aug. 28, 1910, 1, all (E. T. Cresson, Jr.), [A. E. S.].

NEW JERSEY: Riverton, May–July, 3, [H. N. M.].

MARYLAND: 6, [U. S. N. M.]; Bay Ridge, Aug. 6, 1899, 1, [Ohio]; Beltsville, Sept. 26, 1911, (F. Knab), 2, [U. S. N. M.]; Bladensburg, Oct. 2, 1914, (R. C. Shannon), 1, [U. S. N. M.]; Sept. 23, 1915 (R. C. Shannon), 1, [U. S. N. M.]; Sept. 16, 1915, (R. C. Shannon), 5, [U. S. N. M.]; College Park, May 25, 1913, (F. Knab), 1, [U. S. N. M.]; Hyattsville, Sept. 1, 1912, (Knab & Malloch), 3, [U. S. N. M.].

DISTRICT OF COLUMBIA: 1, [U. S. N. M.]; Anacosta, May 4, 1913, (P. R. Myers), 1, [U. S. N. M.]; Washington, (N. Banks), 1, [Banks].

VIRGINIA: Boykins, June 10, 1896, 1, [H. N. M.]; Dead Run, Fairfax Co., June 29, 1915, (R. C. Shannon), 1, [U. S. N. M.]; Difficult Run, Sept. 14, 1913, (R. C. Shannon), 1, [U. S. N. M.]; Falls Church, May 5, (N. Banks), 1, [Banks]; May 20–30, (N. Banks), 6, [Banks]; June 9, 14, 16, 20, (N. Banks), 4, [Banks]; Sept. 7, (N. Banks), 2, [Banks]; Aug. 3, 1914, (R. C. Shannon), 3, [U. S. N. M.]; Glencarlyn, May 9, (N. Banks), 3, [Banks]; near Plummer's Island, May 20, 1914, (R. C. Shannon,) 2, [U. S. N. M.]; Ocean View, Aug. 9, (A. N. Caudell), 4, [U. S. N. M.]; Rosslyn, May 15, 1913, (R. C. Shannon), 3, [U. S. N. M.]; Virginia Beach, Aug. 14, 1913, (F. Knab), 9, [U. S. N. M.].

NORTH CAROLINA: 9, [U. S. N. M.]; Beaufort, June 18, 1908, (F. Sherman), 1, [C. U.].

GEORGIA: 7, [U. S. N. M.]; South Georgia, (Morrison), 2, [U. S. N. M.]; 2, [C. U.]; Atlanta, Aug. 2, 1913, 1, [C. U.]; Austell, Aug. 27, 1910, 2, [C. U.]; Billy's Island, Okeefenokee Swamp, June 1912, 6, [C. U.]; July 1912, 1, [C. U.]; Blackshear, May 10, 1911, 2, [C. U.]; Clayton, 2000 ft. alt., May 18–26, 1911, (J. C. Bardley), 2, [C. U.]; De Witt, July 24, 1912, 1, [C. U.]; Spring Creek, Decatur Co., June 7–23, 1911, (J. C. Bradley), 1, [C. U.]; July 16–29, 1912, 16, [C. U.]; Thomasville, Mar. 22, 1909, 1, [Johnson].

FLORIDA: Eastern Fla., (Ashmead No. 3968), 1, [U. S. N. M.]; Crescent City, Apr. 20, 1908, (E. P. Van Duzee), 1, [A. M. N. H.]; Jacksonville, Mar. 31, 1913, 2, (M. C. Van Duzee), 2, [Van D.]; St. Petersburg, Aug. 12, 1910, (J. C. Bradley), 1, [C. U.].

MISSISSIPPI: 1, [U. S. N. M.]; Holly Springs, Sept. 4, 1890, (F. W. Mally), 1, [U. S. N. M.]; Aug. 28, 1891, (F. W. Mally), 1, [U. S. N. M.]; Jackson, Oct. 30, 1894, 5, [Johnson]; Utica, Aug. 7, [U. S. N. M.].

LOUISIANA: Logansport?, Mar. 24, 1908, (E. S. Tucker), 3, [U. S. N. M.]; Mound, May 21, 1907, (F. C. Bishopp), 2, [U. S. N. M.]; Opelousas, Apr. 9, 1, [Wash.]; May 7, 1908, (R. A. Cushman; on Polygonum), 1, [U. S. N. M.]; Shreveport, May 7, 1891, (F. W. Mally), 1, [U. S. N. M.]; June 1, 1891, (F. W. Mally), 1, [U. S. N. M.]; Slidell, July 2–6, 1902, 3, [Ohio].

OHIO: Akron, Aug. 16, 1; Cincinnati, June 9–16, 1901, 1; Columbus, May 9, 1899, 1; May 29, 2; Ironton, May 26, 2; Sandusky, July 1913, 2; Sugar Grove, May 19, 1; Vinton, June 5–12, 1900, 2; Wauseon, Aug. 23–29, 1902, 28, all [Ohio].

ILLINOIS: Chicago, 1, [C. U.]; Grand Tower, June 30, 1909, (sweeping from grass), 2, [Ill.]; Muncie, July 24, 1909, 1; Murphysboro, May 16, 1910, 3; Odin, May 10, 1910, (sweeping), 2; May 31, 1910, (sweeping in meadow), 1; June 1, 1909, (sweeping), 1; Pulaski, June 28, 1909, (Cypress swamp), 4, all [Ill.]; Rockford, Sept. 8, 1898, 1, [Wash.]; Thebes, July 31, 1905, 1, [Ill.].

MISSOURI: Columbia, May 26–June 8, 1906, (C. R. Crosby), 38, [C. U.].

NEBRASKA: 1, [C. U.]; Fremont, July 17–18, 1909, 4, [C. U.]; Neligh, June 20, 1909, (J. T. Zimmer), 1, [Neb.].

KANSAS: Sept. 1, [Kans.]; Baldwin, June, (J. C. Bridwell), 1, [Ohio]; Garden City, June 1895, (C. F. Adams), 1, [Kans.]; Douglas Co., (F. H. Snow), 5, [Kans.]; May, (U. of K. Lot 31), 1, [Wash.]; Morton Co., 3200 ft. alt., (C. F. Adams), 1, [Kans.]; Onagra, 1, [U. S. N. M.]; May 19, 1901, 2, [Ohio].

OKLAHOMA: Ardmore, Apr. 11, 1907, (F. C. Bishopp) 4, [U. S. N. M.].

TEXAS: Austin, Mar. 2, 1900, 3, [Wash.]; Oct. 1900, 1, [Wash.]; Calvert, Apr. 19, 1906, (W. W. Yothers), 1, [U. S. N. M.]; Clarendon?, Aug. 4, 1905, (W. D. Pierce), 2, [U. S. N. M.]; Clarendon, Aug. 11, 1905, (W. D. Pierce), 1, [U. S. N. M.]; Denison, June 22, 1904, (H. S. Barber), 3, [U. S. N. M.], Jacksonville, Oct. 20, 1894, 1, [Johnson]; Liberty, Mar. 18, 1908, (E. S. Tucker), 6, [U. S. N. M.]; Richmond, Mar. 14–19, 1907, (Cushman & Pierce; on *Rubus*), 2, [U. S. N. M.]; San Augustine, Oct. 13, 1895, 1, [Johnson]; Oct. 19, 1896, 1. [Johnson]; Victoria Apr. 5, 1907, (J. D. Mitchell), 1, [U. S. N. M.]; June 21, 1909, (J. D. Mitchell), 3, [U. S. N. M.]; Waco, (Belfrage), 2, [U. S. N. M.];

COLORADO: 4, [U. S. N. M.]; Colorado Springs, 5915 ft. alt., July, (E. S. Tucker), 3, [Kans.]; Aug. (E. S. Tucker), 2, [Kans.]; Ute Creek, Aug. 7, (R. W. Dawson; on sage flats), 3, [Neb.].

NEW MEXICO: Des Moines?, June 18, 1910, (F. C. Bishopp), 5, [U. S. N. M.]; Highrolls, May–June 1, 1902, (Viereck & Rehn), 6, [A. N. S. P.]; Pecos, July 1, (T. D. A. Cockerell), 2, [U. S. N. M.]; Rio Ruidoso, White Mts., 6500 ft. alt., July, 30, (Townsend; on rocks by stream), 1, [U. S. N. M.].

ARIZONA: Douglas, San Bernardino Ranch, 3750 ft. alt., Aug. (F. H. Snow), 1, [Kans.]; Oak Creek Canon, 6000 ft. alt., Aug. (F. H. Snow), 1, [Kans.].

GUATEMALA, all (J. S. Hine), [Ohio]; Gualan, Feb. 15, 1905, 1; Los Amates, Jan. 16–20, 1905, 1; Puerto Barrios, Mar. 3–14, 1905, 2.

Paralimna nigropicta new species

This species, represented by a small series of females, is distinguished from all others by the velvety black spot between the bases of the antennae. In some of the other species there may be a brown stripe or spot here but it is never velvety black. There seem to be no variation in this respect.

Description of Female.—Similar to *appendiculata* but with a round velvety spot between bases of antennae. Face, pleura and femora densely cinereous. Yellowish spots on face faint or confined to the one on the hump below the black spot. Ciliation of fore femora weak. Parafacials moderately narrow. Abdomen mostly brown with interrupted cinereous apical bands on segments more or less dilated medianly; venter cinereous with irrorations. Wings hyaline with yellowish tinge; cross veins more or less clouded; no stump on fourth vein. Length.—3.5 to 4.0 mm.

Type.—♀; Puerto Barrios, Guatemala, March 3–14, 1905, [Ohio State Univ.]. *Paratypes.*—2 ♀; topotypical. 1 ♀; Los Amates, Jan. 16–20, 1905. 1 ♀; Gualan, Feb. 15, 1905; all in Guatemala, [Ohio].

Paralimna meridionalis new species

Allied to *appendiculata* but evidently distinct, although the characters of differentiation are very weak. On comparison with that species, those belonging here have the head, especially the frons and face, narrower, appearing longer in proportion to the width. The face generally of a dark dull color, not sericeous, with a dark dash of brown or yellow on the carina between and a spot or dash laterad of each upper bristle. Eyes oblique, causing the parafacials to become narrower; the groove is more concentric with the orbits. Special attention should be given to the latter character. The orbital spot is less distinct, and the gray abdominal bands are always broadly interrupted and less dilated medianly. Fore femora of the male with lateral ciliation of close bristles, sometimes arranged in double series basally; mesal series of short bristles in one row; lateral series in the female complete, well developed.

Type.—♂; La Carpentera, Costa Rica, Dec. 4, 1909, (P. P. Calvert), [A. E. S. Type No. 6092.] *Paratypes.*—5, topotypical.

Specimens Examined.—40.

Guatemala: Puerto Barrios, Mar. 3–14 1905, 1; Los Amates, Feb. 18, 1905, 1; Santa Lucia, Feb. 2, 1905, 2, all [Ohio].

Costa Rica: Alajuela, 3100 ft. alt., Sept. 15, 1909, (P. P. Calvert; sweeping), 1; Banana River, Upper Reservoir, Nov. 9, 1909, (Calvert; sweeping), 1; Cachi, Rio Reventazon, Mar. 10, 1910, (Calvert; stagnant pool near bank), 1; Cartago, July 4, 1909, (Calvert), 9; Oct. 27, 1909, (Calvert), 1; Dec. 12, 1909, (Calvert; sweeping over mud), 1; Irazu Volcano, near Cartago, 5000 ft. alt., Dec. 15, 1909, (Calvert; over mud), 7; La Carpentera, Dec. 4, 1909, (Calvert), 6; Bonnefil Farm, Rio Surubres, Oct. 21, 1909, (Calvert; sweeping), 2; Turrucares, Dec. 21, 1909, (Calvert; sweeping over mud), 1, all [A. E. S.].

Panama: Paraiso, Dec. 19, 1909, (A. H. Jennings), 1; Jan. 16, 1911, (A. Busck), 1; Tabernilla, Apr. 29, 1907, (A. Busck), 1; Rio Trinidad, Mar. 20, 1912, (A. Busck), 1, all [U. S. N. M.].

Peru: Calanga, 1, [H. N. M.].

Argentina: Tucuman, May 8, 1914, (T. C. Barber), 1, [U. S. N. M.].

A series of female before me show a slight variation which may prove to be worthy of note. The sternopleura, especially the sutures, also the femora are blackish, and the wings are hyaline with the cross veins faintly clouded. A male from the same series, however, does not show these differences so I hesitate to consider this form at present as a variety worthy of a name.

Specimens Examined.—25.

Brazil: Bonito, Prov. Pernambuco, Jan. 18–22, 1885, 2, [U. S. N. M.].

Paraguay: (Fiebrig), 1, [H. N. M.].

Argentina: Tucuman, April 18, 1913, (Barber and Rosenfeld), 1♂, 6♀, [U. S. N. M.]; May 8, 1914, (T. C. Barber), 15, [U. S. N. M.].

Paralimna brunneiceps new species

This is hardly a variety of *meridionalis* although the parafacials are narrow, much narrower than in that species. The constant brown color of the face is, I think, of specific value.

Description of both sexes.—Entire face between the parafacials and below the foveae evenly dark brown. Parafacials very narrow, almost linear; cheeks scarcely longer than third antennal joint. All the lighter areas darker than usual except the foveae and abdomen; pleura brownish. Otherwise similar to *meridionalis*. Length.—3.5 to 4.4. mm.

Type.—♂; Turrucares, Costa Rica, Dec. 22, 1909, (P P. Calvert; sweeping over mud), [A. E. S. No. 6093]. Paratypes.—2♀; topotypical.

Specimens Examined.—13.

Guatemala: Gualan, Feb. 15, 1905, (J. S. Hine), 1, [Ohio].

Nicaragua: Chinandega, (Baker), 2, [U. S. N. M.].

Costa Rica: Alajuela, 3100 ft. alt., Sept. 8, 1909, 3; Sept. 15, 1909, 1, both (P. P. Calvert; sweeping over mud), [A. E. S.]; Rio Siquiares, Dec. 19, 1909, (Calvert), 2, [A. E. S.]; Turrucares, Dec. 22, 1909, (Calvert; sweeping over mud), 3, [A. E. S.]; Bonnefil Farm, Rio Surubres, 800 ft. alt., Oct. 21, 1909, (Calvert; sweepings), 1, [A. E. S.].

Paralimna agryostoma new species

The present species should not be confused with any other. The white face, general olivaceous color and silvery antennal spot will distinguish it.

Description of both sexes.—The general color inclining to olive-green instead of brown, that is the grays and browns tinged with green, except the cinereous occiput, pleura and venter. Frons mottled; the black orbital spot large encroaching on the foveae, with minute white spot. Face and cheeks gray to shining white, more or less yellowish tinged on hump. Second antennal joint with distinct white spot above near apex. Mesonotum indistinctly irrorated,

with rather distinct vittae. Mesopleura immaculate. The median brown abdominal stripe well defined. Femora and tibiae anteriorly densely cinereous; knees and bases of tarsi yellowish. Wings yellowish hyaline; cross veins slightly clouded.

Frons convex, scarcely broader than long. Face one and a half times as long as broad, with only one strong facial bristle; parafacial very narrow, linear. Cheeks about half as high as the eye. Second antennal joint with a small flattened area above near apex in which is situated the white spot; arista long with 8–10 hairs. The bristles of the frons and thorax are unusually long. The ciliation of femora microscopic. Length.—2.8 mm.

Type.—♂; Banana River, Costa Rica, Nov. 9, 1909, (P. P. Calvert), [A. E. S. No. 6094]. *Paratypes.*—5 ♂, 1 ♀; topotypical.

Specimens Examined.—8.

COSTA RICA: Banana River, 100 ft. alt., Nov. 9, 1909, (P. P. Calvert; sweeping near upper reservoir), 7, [A. E. S.]; Rio Aranjuez, Puntarenas, Sept. 15, 1905, (F. Knab), 1, [U. S. N. M.].

Paralimna puncticornis new species

Here we have a form in which the frontal design is very strongly and completely developed. The frons is rather horizontal but the eyes are round, large, so the species should not be confused with *pleurivittata*.

Description of Female.—Black; halteres and base of tibiae tawny. Generally yellowish gray and brown, becoming gray ventrally. Frons brown with distinct labyrinthine lighter markings, the stripe from the ocelli converging anteriorly. Face mottled; facalia and a pair of spots on median area below hump brown; parafacials and cheeks lighter; clypeus brownish. Antennae with silvery spot on second joint above.

Irrorations of mesonotum coalescing into irregular vittae; mesopleura and scutellum irrorated with brown. Sternopleura blackish below. Grays of abdomen narrow except on second segment and broadly interrupted medianly; venter brownish medianly. Femora faintly grayish. Wings brownish hyaline; c. v. narrowly clouded.

Eyes large, round. Frons broader than long, rather horizontal but convex. Face nearly as broad as long, prominent; hump and foveae weak; parafacials very narrow. Antennae situated above middle line of eyes; second joint with flattened area above near apical margin; third joint small; arista with 12 to 14 hairs. Cheeks one-fourth height of eyes. Wings with second vein slightly bent; third costal section twice as long as second. Length.—4.0 mm.

The males are similar with normally ciliated femora.

Type.—♀; Peralta, Costa Rica, March 24, 1910, (P. P. Calvert; sweeping over muddy road), [A. E. S. No. 6095].

Specimens Examined.—5.

COSTA RICA: Peralta, Mar. 24, 1910, (P. P. Calvert; sweeping over muddy road), 1, [A. E. S.].

PANAMA: Paraiso, Canal Zone, Jan. 16, 1911, (A. Busck), 1, [U. S. N. M.]; Tabernilla, Canal Zone, July 31, 1907, (A. Busck), 1, [U. S. N. M.].

COLOMBIA: Sierra San Lorenzo, (Ujhelyi), 2, [H. N. M.].

Var. **captiosa** new variety

Color more subdued and markings less distinct. Face more evenly yellowish or brownish gray; facalia not darker. The grays of the abdomen more dilated medianly. The male with the mesal ciliation of fore femora consisting of somewhat flattened but smaller bristles.

Type.—♂; Montserrat, Trinidad, West Indies, July 4 1905, (A. Busck), [U. S. N. M. No. 19685]. *Paratypes.*—2♂; topotypical.

Specimens Examined.—6.

TRINIDAD: Montserrat, July 4, 1905, (A. Busck), 3, [U. S. N. M.].

BOLIVIA: Cillutincara, 1, [H. N. M.]; Coroico, 2, [H. N. M.].

The specimens from Bolivia may belong to a distinct species. The silvery antennal spot is rather indistinct and the flattened area not noticeable. They may be closely allied to *flexineuris*.

Paralimna pleurivittata new species

This species is distinct in its horizontal eyes and frons, no other species known having them so to such a degree. The only other one approaching it in this respect is *taurus*, but that species has the eyes round. The present species may seem to belong to the group in which the second antennal joint has the flattened silvery spot, but probably represents another distinct group.

Description of both sexes.—Black; halteres and basal joints of tarsi, tawny. General color dull yellowish gray and brown with pectus and metanotum dull cinereous. Frontal design complicated, more or less distinct; the lighter stripe from the ocellar bristles subparallel. Face gray tinged above with brown. Second antennal joint with silvery spot above. Cheeks lighter. Mesonotal irrorations obscure; two or three median vittae indistinct; laterad of the dorso-centrals at the suture and extending obliquely to the post-alar region is a broad brown stripe, also a similar stripe extending over the prostigma and mesopleura to the pteropleural suture. Scutellum concolorous with mesonotum. The grays of the abdomen broad laterally, attenuated mesally and broadly interrupted except that of second segment. Venter brown, laterally gray. Femora weakly ciliated. Wings brownish hyaline with all veins narrowly, and the c. v. more broadly, clouded.

Eyes horizontal, not rounded or vertical. Frons broader than long, horizontal. Face much longer than broad, prominent, retreating below with

weak hump. Parafacials very narrow. Cheeks half height of eyes. Antennae well above middle line of eyes; arista with 12 to 14 hairs. Femora weakly but normally ciliated. Wings with second vein slightly curved; second costal section nearly three times the length of third. Length.—3.5 to 4.0 mm.

Type.—♂; Callanga, Peru, [Hung. Nat. Mus.]. *Paratypes*.—3♂, 1♀; topotypical.

I have not seen any specimen from other localities.

Paralimna taurus new species Pl. IX, fig. 6.

The specimen selected as the type of this species is one of three received from Dr. Williston as *P. multipunctata*, and is one of those belonging to the series from Brazil determined by him as that species. However, I cannot consider his determination conclusive. The three specimens I have are much larger than the size given for the St. Vincent material. As I have said elsewhere, I must have better descriptions to follow or must examine the types of many of the heretofore described species, especially of the early authors, before I can recognize them.

This species is apparently allied to *meridionalis* and is sometimes not easy to separate. It is based on the bold profile of the head, with its long face caused by the prominence of the anterior part of the frons and upper face, thus making the frons more horizontal and flattened than usual (fig. 6). The facial hump is well defined and prominent, with deep foveae.

Description of both sexes.—Similar to *meridionalis*. Head high as broad, Eyes round or slightly horizontal. Frons broader than long, flat, horizontal, abruptly angulated with the face; orbits at vertex angular. Face three-fourths as broad as vertex, nearly as high as head, much longer than broad, with prominent hump and distinct foveae, retreating slightly below; parafacials half as broad as third antennal joint, gradually dilating below; facalia distinctly setulose. Cheeks half as broad as eyes. Scutellum flat. Fore femora normal. Length.—3.5 to 5.5. mm.

Type.—♂; Corumba, Brazil, May, (H. H. Smith), [A. E. S. No. 6096]. *Paratypes*.—1♂, 1♀; topotypical.

Specimens Examined.—14.

Guatemala: Puerto Barrios, Mar. 13–14, 1905, (J. S. Hine), 7, [Ohio]; Santa Lucia, Feb. 2, 1905, (J. S. Hine), 2, [Ohio].

Brazil: Corumbá, May, (H. H. Smith), 3, [A. E. S.].

Paraguay: (Fiebrig), 2, [H. N. M.].

EXPLANATION OF PLATE IX

Fig. 1.—*Paralimna appendiculata*. Wing. X 18.
Fig. 2.—*Paralimna appendiculata*. Profile of head. X 22.
Fig. 3.—*Paralimna appendiculata*. Middle tibia. X 22.
Fig. 4.—*Paralimna appendiculata*. Antenna. X 35.
Fig. 5.—*Paralimna decipiens*. Profile of head. X 22.
Fig. 6.—*Paralimna taurus*. Profile of head. X 22.
Fig. 7.—*Paralimna ciliata*. Fore femur and tibia. X 35.
Fig. 8.—*Paralimna flexineuris*. Wing. X 18.

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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME

THE GENUS CERATINOPTERA (ORTHOPTERA, BLATTIDAE, PSEUDOMOPINAE)

BY MORGAN HEBARD

Recently, in studying certain species of North American Blattidae, it has been found necessary to determine what species should properly be referred to the genus *Ceratinoptera*. Fortunately, the genotype *C. picta* and also *nahua*, genotype of *Paraceratinoptera*, are represented in the collections before us, and, with these important species at hand, we are able, for the first time in its history, to restrict the genus to reasonable bounds.

CERATINOPTERA Brunner

1865. *Ceratinoptera*, Brunner, Nouv. Syst. Blatt., p. 75.

GENOTYPE.—*Ceratinoptera picta* Brunner, selected by Kirby, 1904.

This genus, from the very time of the original description, has been the repository of any species of the Pseudomopinae which showed somewhat abbreviate but not truncate tegmina (at least in the male sex), and which did not exhibit some striking feature considered sufficient to warrant further generic distinction (such as found in *Anisopygia jocosicluna* and other species). The generic history given below compels the restriction of this entity to the complex described by Saussure as *Paraceratinoptera;* to this belong the genotype, *Ceratinoptera picta* Brunner, *Ceratinoptera nahua* (Saussure), a new species here described and probably *Ceratinoptera castanea* Brunner. No material of *castanea* being available, we have not discussed that species in the present paper. Of the many other species which have been referred to this genus, the vast majority represent forms having reduced tegmina, belonging to other genera the recognized species of which do not show this feature, or to genera yet undescribed. The use of moderate tegminal reduction as a feature of the first importance has brought about this unfortunate situation.

Greater tegminal reduction, showing these organs truncate in both sexes, has been built up into the present heterogeneous

genus *Temnopteryx*,[1] while into *Loboptera* have been forced a host of forms showing still greater tegminal reduction, these organs in such forms being represented by mere lateral pads. We have cited these genera as they at present represent in the literature the same sort of misconception and resultant unnatural association of species as is found in *Ceratinoptera* as generally understood.

History

In 1865, Brunner described the genus *Ceratinoptera*,[2] including three new species, *picta, castanea* and *peruviana; Blatta diaphana* Fabricius (unknown to Brunner), and *Blatta poeyi* and *porcellana* of Saussure. In 1868, Saussure described *Paraceratinoptera*,[3] including the single species *nahua*. Saussure and Zehntner later described *Paraceratinoptera dohrniana*.[4] Kirby, in 1904, selected *picta* as the type of *Ceratinoptera*.[5] In 1906, Bruner described *Phyllodromia* (?) *binotata*.[6]

The names *picta, nahua, dohrniana, binotata*, and probably *castanea*, are referable to *Ceratinoptera* in its restricted sense. We are able furthermore to add that, from material undoubtedly correctly determined as to the species, *diaphana, poeyi, porcellana, pygmaea, lutea, puerilis*, probably *peruviana* and a number of the African species referred to *Ceratinoptera*, belong to other and very distinct genera.

Synonymy

Saussure's *Paraceratinoptera* was separated from *Ceratinoptera* by a single character, the absence of arolia between the tarsal claws. We find that Brunner's *picta*, later properly selected as genotype of *Ceratinoptera* by Kirby, not only agrees in this feature but in all other features of generic diagnostic importance found in

[1] This has caused the females of a number of species of *Ischnoptera* having truncate tegmina to be described as species of *Temnopteryx* and those having lateral greatly reduced tegmina as *Loboptera*. See Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 407, (1910).

[2] Nouv. Syst. Blatt., p. 75.

[3] Rev. et Mag. Zool., 2e ser., xx, p. 357.

[4] Biol. Cent.-Amer., Orth., i, p. 49, (1893).

[5] Synon. Cat. Orth., i, p. 98.

[6] Journ. N. Y. Ent. Soc., xiv, p. 140.

Saussure's genus.[7] As a result *Paraceratinoptera* is an absolute synonym of *Ceratinoptera*.

Generic Position

The present genus is a member of the group Blattellites, in linear position best placed at the beginning of the genera having the tegminal discoidal sectors oblique. It is widely separated from the other genera of the group, not only by the very heavy femora, but also by the absence of arolia between the tarsal claws. The armament of the ventro-cephalic margin of the cephalic femora agrees best, among the described genera, with *Mareta*. The nearest general resemblance in femoral form and armament of piliform (but not the distal) spines is, however, found in the widely separated genus *Pleetoptera*.

The features of greatest generic importance are found in the short heavy maxillary palpi; the very narrow and scarcely opaque deflexed lateral margins of the pronotum; the corneous tegmina, which, when elongate and overlapping, have the dextral concealed area as colorless as the wings, and the short heavy and weakly spined limbs, with armament of ventro-cephalic margin of cephalic femora unusual in the group, and arolia absent between the tarsal claws.

Generic Description

Size small, form compact and rather stout for the Blattellites. Head evenly convex without flattening between or below the eyes; ocellar spots weakly indicated or distinct meso-dorsad of antennal sockets, or entirely absent; maxillary palpi short and stout, with distal joint much enlarged and decidedly longer than penultimate joint; lateral margins of face weakly convexo-convergent to bases of jaws. Pronotum ample; evenly convex, this decided only at the very narrow deflexed lateral margins which are rather broadly rounded; caudal margin truncate, transverse or very faintly convex. Tegmina fully developed, decidedly reduced or greatly reduced and truncate distad; moderately corneous to corneous, with veins not pronounced to very weakly indicated. In the fully developed tegminal condition, the area of the dextral tegmen concealed when at rest, is conspicuous in being colorless and as transparent as the wing. In conditions where the discoidal sectors of the tegmen are not eliminated by

[7] Material before us, referable with certainty to the genotypes of both *Ceratinoptera* and *Paraceratinoptera*, clearly demonstrates these facts. Many important features were omitted in the description of *picta*; though the original description of *nahua* is incomplete, the genus and species was later much more fully discussed and figured by Saussure, Miss. Sci. Mex., Rech. Zool., vi, p. 87. pl. I, fig. 30a, pl. II, figs. 47, 47a, (1870).

reduction, these are seen to be distinctly oblique; all of the veins of the tegmen and wing are, in their fully developed condition, numerous but somewhat irregular. Wings fully developed, decidedly reduced or minute and vestigial. Wing, in its fully developed condition, exceedingly delicate, with marginal area very elongate and scapular field brief with few weakly clavate costal veins; a decided transverse vein connects the discoidal and ulnar veins proximad, the median vein does not extend proximad to this point (all of these veins are not strongly defined, which probably explains the omission of the median vein in Brunner's figure of *picta* and the omission of this transverse vein in Saussure's figure of *nahua*), the ulnar vein branching only extremely distad or not at all; intercalated triangle present but very small; axillary vein with a number of branches. Abdomen of males with seventh dorsal segment distinctly specialized mesad. Supra-anal plate (tenth dorsal abdominal segment) in both sexes wider than long, rather strongly triangularly produced, with lateral margins weakly convex and apex rounded. Subgenital plate of males somewhat asymmetrical, bearing stout styles; of females ample, rather strongly emarginate and with a brief longitudinal cleft mesad on the distal margin. Limbs short and stout for the group. Cephalic femora with ventro-cephalic margin unarmed in proximal third, supplied in distal two-thirds with a close-set row of minute piliform spines terminated by two long stout distal spines, no genicular spine present, ventro-caudal margin with a single distal spine and occasionally one or two very small marginal spines. Other femora with ventral margins weakly supplied with small spines, armed distad with a long genicular spine and at the extremity of each ventral margin with a single shorter spine. No arolia are present between the tarsal claws.

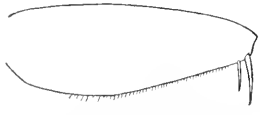


Fig. 1. *Ceratinoptera nahua* (Saussure).

♀. Minatitlan, Mexico. Outline of cephalic face of cephalic femur. (Greatly enlarged.) (Typical for genus *Ceratinoptera*.)

Material Examined

The genus is apparently rare in collections; twenty-three specimens before us are, with four exceptions, all from the Philadelphia collections.

Generic Distribution

The genus is known from the eastern mountains and coastal section of Mexico, as far north as the vicinity of Vera Cruz, and is probably widely distributed southward through Central America and northern South America, the limital records being Caparo, Trinidad; Brazil; Contamano, Peru,[8] and Cauca, Colombia.

[8] From Brunner's description it does not appear probable that *C. peruviana*, described from Peru, is a member of this genus as properly restricted. All our exotic material suggests, furthermore, that the genus is restricted in distribution to the Americas.

Ceratinoptera picta Brunner (Fig 2.)

1865. *Ceratinoptera picta* Brunner, Nouv. Syst. Blatt., p. 76, pl. I, figs. 4, A to E. [♂, ♀, Brazil.]

1906. *Phyllodromia* (?) *binotata* Bruner, Journ. N. Y. Ent. Soc., xiv, p. 140. [♀?(mistake, specimen a male), Trinidad.]

The type of Bruner's *binotata*, which that author has most kindly sent us for examination, shows beyond question the above synonymy. The specimen exhibits a slight and unimportant color variation, the striking meso-caudal pronotal marking being narrowly and very weakly suffused mesad; the tegmina are fully developed.

Brunner's description of the insect leaves no room for doubt as to the identity of the material before us, but he fails to mention any of the important features found in the limbs (see generic description), furthermore his figures are not minutely accurate, portions of the wing venation and of the distal abdominal segments being clearly sketchy.

The species is appreciably smaller and more slender than *C. nahua*. The ocellar spots are pale and distinct. The distal (fifth) joint of the maxillary palpi is very large and strongly obliquely truncate, nearly half again as long as the fourth joint, subequal in length to the third. Pronotum very weakly transverse. Tegmina and wings fully developed in all material known, as in *nahua* when this condition there occurs (see generic description); but the area of the dextral tegmen, concealed when at rest, is in the present insect suddenly and very sharply defined, while the area embracing the swollen portions of the costal veins of the wings is somewhat embrowned. The broad proximo-mesal depression of the seventh abdominal segment in the male is weakly raised mesad, the margins of this elevation forming a triangle with apex cephalad and supplied with a cluster of hairs; the eighth and ninth dorsal abdominal segments are narrower with caudal margins alone visible. The male supra-anal plate is triangularly produced with margins weakly convex and apex rounded; in the female it is similar but with apex distinctly angulato-emarginate. The male subgenital plate is moderately large,

Fig. 2. *Ceratinoptera picta* Brunner.

♀. Caparo, Trinidad. Dorsal view of pronotum (X 4.)

strongly convex, with two stout briefly separated styles deeply inserted mesad on the distal margin, the dextral twice as long and more deeply inserted than the sinistral, both with very minute teeth on their dorsal surfaces. The female subgenital plate is large, with distal margin broadly convex, with a decided median emargination the sides of which are broadly convex, thus forming toward its apex a brief longitudinal cleft. Limbs similar to *nahua* (see generic description).

Measurements (in millimeters)

	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	W
♂						
Contamano, Peru	(1)	8.3	2.6	2.9	8.1	2.5
Trinidad	(1)	8.7	2.7	3.1	8.3	2.8
♀						
Caparo, Trinidad	(1)	8.9	2.6	3	8.4	2.7

It is evident from Brunner's description that the types of the species are slightly larger than the specimens before us, while the males have the tegmina distinctly reduced ("length 6 mm."). So much size and tegminal variation occurs in *nahua* that we attribute the difference here found to similar individual variation.

General color of head and pronotum very deep shining blackish brown, the pronotum with a large meso-caudal marking of light buff (see fig. 2); in the male the lateral margins of the pronotum are very narrowly and very slightly paler than the general color. Tegmina clear shining blackish brown, darkest proximad; excepting third of dextral tegmen concealed when at rest which, like the wings, is hyaline, transparent, the veins giving a whitish cast. Maxillary palpi and limbs buffy, ventral surface of thorax dark brown. Abdomen above and below ochraceous buff, very broadly suffused laterad and distad with blackish brown.

Specimens Examined: 5; 4 males and 1 female.

Olas de Moka, Solola, Guatemala, 3000 feet, IX, 1908, (G. P. Englehardt), 1 ♂, [U. S. N. M.].

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 1907, 1 ♂, [U. S. N. M.].

Trinidad, (H. D. Chipman), 1 ♂, *type* of *P.*(?) *binotata* Brunner, [Brunner Coll.].

Caparo, Trinidad, VI, 1913, (S. M. Klages), 1 ♀, [A. N. S. P.].

Contamano, Rio Ucayali, Peru, X to XII, 1912, 1 ♂, [A. N. S. P.].

Ceratinoptera nahua (Saussure) (Figs. 1 and 3.)

1868. *Paraceratinoptera nahua* Saussure, Rev. et Mag. Zool., 2e ser., xx, p. 357. [♂, ♀, Cordillera Oriental, Mexico.]

1893. *Paraceratinoptera dohrniana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 49. [♂, Guatemala.]

That *dohrniana* is a synonym of *nahua* is evident from the description and study of the series now before us, the name being based solely on a specimen showing the fully developed condition of tegmina and wings. Specimens from the same Guatemalan series with reduced tegmina were at the same time recorded as *nahua*. In the present Mexican material two of three series show both of the above conditions and decided size variation as well. Brunner's *castanea*, from Brazil, appears, from the original description, to be a closely related but distinct species.

The species is rather small and stout. The ocellar spots are distinct in specimens having fully developed tegmina, distinct to obsolete in individuals having reduced tegmina.[9] The maxillary palpi are as in *C. picta*. The pronotum is distinctly transverse. The tegmina and wings when fully developed are much as in *picta*, but the area of the dextral tegmen, concealed when at rest, is less suddenly and more gradually defined, while the area embracing the swollen portions of the costal veins of the wings is very weakly suffused. The specialization of the seventh dorsal abdominal segment in the male is as in that sex of *picta* and the eighth and ninth dorsal abdominal segments are also similar. The genitalia are very similar in both species, the supra-anal plate in the female of the present insect has the apex very slightly angulato-emarginate. The two species differ distinctly in size and form and conspicuously in coloration.

Fig 3. *Ceratinoptera nahua* (Saussure).

♀ Minatitlan, Mexico. Dorsal view of pronotum. (X 1¼.)

[9] Reduction in the ocelli or the ocellar spots almost always occurs in the Blattidae with reduction in the organs of flight. Ignorance of this fact has in the past often given rise to decided difficulties and in some cases serious mistakes.

Measurements (in millimeters)

♂	Number of specimens	Length of body[10]	Length of pronotum	Width of pronotum[11]	Length of tegmen	Width of tegmen
Orizaba, Mexico	(1)	10	2.7	3.3	8.5	2.9
Motzorongo, Mexico.	(2)	9.6–9.8	2.9–3	3.4–3.8	9.3–10	3.2–3.3
Motzorongo, Mexico.	(2)	9.9–10	2.9–3.1	3.9–4.1	6.3–6.4	2.7–2.8
Minatitlan, Mexico..	(1)	9.8	2.6	3.8	6.7	2.6
♀						
Orizaba, Mexico	(1)	10.5	3	3.8	6.2	2.5
Motzorongo, Mexico.	(2)	10.7–10.8	3.3–3.4	4.1–4.6	6.1–6.2	2.9–3
Minatitlan, Mexico..	(2)	9	2.8–2.9	3.9–4.1	5.1–5.3	2.7–2.8
Quirigua, Guatemala	(1)	10	3	4	5.4	2.7

It is evident from this series that the variation in size and in tegmina and wings is due to individual variation and not to geographic distribution.

General color shining dark chestnut brown to dark russet. Pronotum unicolorous or varying individually as follows; lateral margins sometimes very narrowly to narrowly paler, disk sometimes with much suffused tawny markings, these two meso-caudal minute dots varying to a small meso-caudal blotch (see fig. 3), sometimes with the greater mesal portion of the disk in addition very slightly paler than the other portions of the same. Maxillary palpi and limbs ochraceous tawny, usually somewhat suffused. Abdomen of general color, shading mesad both above and below to tawny.

Immature examples have the head, pronotum, mesonotum and lateral margins of the dorsal abdominal segments, shining chestnut brown. The pronotum narrowly margined laterad, the entire metanotum and the mesal portion of the dorsum of the abdomen, buffy. Limbs and underparts, not including the head, buffy.

[10] The even numbers given for this dimension are approximated, the specimens being in these cases much distorted.

[11] A widening in the pronotum caudad, accompanied by a lessening of the convexity of the caudal margin, appears often to accompany reduction in the organs of flight in the Blattidae. Such variation in the pronotum is noticeable, but not pronounced, in the present series.

The ootheca is carried with suture dorsad, this suture with minute double-knobbed projections separated by about twice their own diameter. Surface of ootheca strongly convex, weakly roughened and covered with a scattering of minute hairs. The extruded distal surface is curved evenly upward to base of suture without a keel.

Specimens Examined: 17; 7 males, 6 females and 4 immature examples.[12]

Orizaba, Vera Cruz, Mexico, I, 1892, 1♂, 1♀, 1 juv. ♂, [Hebard Cln.]. (♂, tegmina elongate.)

Motzorongo, V. C., Mex., II, 1892, 4♂, 2♀, 2 juv. ♂, [Hebard Cln.]. (2♂, tegmina elongate.)

Minatitlan, V. C., Mex., II, 1, 1892, 2♂, 2♀, [Hebard Cln.].

Quirigua, Guatemala, II, 1912, (W. P. Cockerell), 1♀, [U. S. N. M.].

Pózo Azúl de Pirrís, Costa Rica, V. 10 to 20, (M. A. Carriker Jr.), 1 juv. ♂, [Hebard Cln.].

Ceratinoptera tropaia[13] new species (Fig. 4.)

This species is related to *C. nahua*, the greatest differences in males being found in the smaller size, decidedly less transverse pronotum, truncate tegmina, vestigial wings, less decidedly specialized mesal portion of seventh dorsal abdominal segment and solid and darker general coloration.

Type: ♂; Motzorongo, Vera Cruz, Mexico. February 1892. [Hebard Collection, Type No. 417.]

Description of Type.—Size very small, form moderately stout. Eyes very widely separated, not quite reaching as far as mesal portion of dorsal margin of antennal sockets, ocellar spots absent (see footnote 9). Head and maxillary palpi as given in generic description. Pronotum proportionately deeper than in *nahua*, margin evenly rounding to latero-caudal angles which are rather broadly rounded, rectangulate; caudal margin truncate, transverse. Tegmina corneous, very slightly longer than wide, sutural margins attingent distad, caudal margins truncate and moderately oblique toward the sutural margins, this truncation causing a decided inward bending of the anal vein, brief proximal portions of other veins almost indistinguishable. Sev-

[12] In addition we have before us an immature example of the genus from Cauca, Colombia. This specimen is dark shining blackish brown in general coloration with pronotum immaculate, but in other features of paler coloration agrees exactly with the immature examples here recorded.

[13] From τροπαία=a change from. In allusion to the differences from the genotype in the organs of flight.

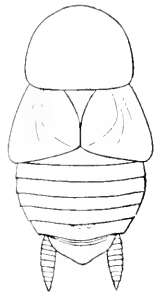


Fig 4. *Ceratinoptera tropaia* new species. ♂, *type*. Motzorongo, Mexico. Dorsal outline. (X 5.)

enth dorsal abdominal segment with a slight mesal depression (this gland opening much more specialized in both *picta* and *nahua*). Supra-anal plate moderately transverse, triangularly produced with rounded apex. Subgenital plate convex, with sides raised and margins suddenly declivent mesad, the stout styles there deeply inserted, the sinistral style decidedly the smaller, the remaining brief mesal portion of the plate produced between these styles and moderately convex, so that margins of lateral portions of plate, of styles and of the produced mesal portion are all attingent (of the same type as found in *picta* and *nahua*). Limbs short and stout, armed as given in generic description, the larger spines all very small and weakly developed.

Measurements (in millimeters)

♂	Length of body[14]	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Motzorongo, Mexico, *type*	7.5	2.4	2.9	2.6	2

Coloration. General color dark shining chestnut brown; the very narrow lateral margins of the pronotum, alone of the entire dorsal surface, very slightly paler. Head shining chestnut brown, with antennae and maxillary palpi of the same color. Limbs suffused dresden brown. Median portion of ventral surface of abdomen cinnamon-brown, merging gradually into the general darker coloration laterad and distad.

The type is unique.

[14] This measurement is approximated as the type has the abdomen somewhat crushed proximad.

SYNOPTICAL TABLE OF THE NORTH AMERICAN SPECIES OF ORMOSIA RONDANI (RHYPHOLOPHUS KOLENATI), WITH DESCRIPTIONS OF NEW SPECIES (DIPTERA)

BY WILLIAM G. DIETZ, M. D.

1. Discal cell closed 2
   Discal cell not closed (*Dasyptera* Schiner) 13
2. Wings variegated or bicolored 3
   Wings unicolorous 7
3. Wing-veins 6 and 7 diverging to the wing margin 4
   Wing-veins 6 and 7 parallel or converging to the wing margin 6
4. Wings spotted brown in all the cells ..... **innocens** Osten Sacken
   Wings not spotted as in alternative 5
5. Basal portion of wing between veins 1 and 5, and apical part of wing fuscous ..... **apicalis** Alexander
   Three fuscous costal spots and transverse veins margined with fuscous. **atriceps** sp. n.
6. Three more or less distinct, grayish brown transverse bands in apical part of wing ..... **nubilus** Osten Sacken
   An indistinct band extends from stigma along the central cross vein. **fascipennis** Zetterstedt
7. Seventh vein arcuated, axillary cell in the middle as wide as, or wider than at the wing margin 8
   Seventh vein diverging from vein 6 to wing margin 9
8. Antennae entirely brown ..... **arcuata** Doane
   Antennae yellow at base ..... **fumata** Doane
9. Antennae entirely brown; thorax shining. Great cross vein at middle of discal cell ..... **abnormis** sp. n.
   Antennae not entirely brown 10
10. Entire thorax and coxae yellowish-red; antennae pale yellowish, infuscate towards the tip ..... **luteola** sp. n.
    Thorax not as in the alternative 11
11. Mesonotum reddish with median fuscous line ..... **pilosa** sp. n.
    Thorax fuscous 12
12. Four basal joints of antennae pale yellow ..... **nigripila** Osten Sacken
    Two basal joints of antennae yellow ..... **fusiformis** Doane
13. Discal cell coalescing with the second posterior cell 14
    Discal cell coalescing with the third posterior cell 17
14. Seventh vein arcuated; axillary cell at middle as wide as or wider than at the wing margin ..... **holotricha** Osten Sacken
    Veins 6 and 7 diverging towards the wing margin 15

15. Color yellow ..... **flaveola** Coquillett
Color yellowish-brown 16
16. Wings brown; stigma distinct ..... **divexa** Doane
Wings nearly hyaline; stigma faint ..... **palpalis** sp. n.
17. Antennae of male shorter than the thorax 18
Antennae of male approximately as long as or longer than the body (*Ormosia* stricte sic dicta) 29
18. Seventh vein arcuate; axillary cell at middle as wide as or wider than at the end 19
Seventh vein not arcuate, diverging from vein 6 25
19. Thorax reddish with dark median dorsal line ..... **rubella** Osten Sacken
Thorax not reddish 20
20. Stigma distinct 21
Stigma indistinct 23
21. Two basal joints of antennae yellow ..... **lanuginosa** Doane
Antennae entirely fuscous 22
22. Claws of hypopygium simple; wing-veins heavy ..... **meigenii** Osten Sacken
Claws of hypopygium complicated; wing-veins not heavy ..... **cornuta** Doane
23. Thorax light yellow 24
Thorax brown or yellowish-brown ..... **perplexa** sp. n.
24. Antennae and palpi, except basal joints, brown ..... **cockerelli** Coquillett
Antennae wholly yellow ..... **parallelus** Doane
25. Basal joints of antennae yellow or, at least, paler than the rest 26
Antennae entirely fuscous 27
26. Brown; stigma darker ..... **manicata** Doane
Yellowish brown; region of stigma not darker ..... **modica** sp. n.
27. Mesonotum with a blackish line on each side ..... **bilineata** sp. n.
Mesonotum with a median brown stripe 28
28. Thorax reddish-brown ..... **deviata** sp. n.
Thorax yellow above ..... **affinis** Lundbeck
29. Antennae longer than the body, conspicuously hairy ..... **longicornis** Doane
Antennae not longer than the body 30
30. Veins 6 and 7 widely diverging to the wing margin ..... **divergens** sp. n.
Veins 6 and 7 subparallel 31
31. Joints of antennal flagellum strongly attenuated apically ..... **monticola** Osten Sacken
Joints of flagellum of equal width throughout ..... **taeniocera** sp. n.

Ormosia atriceps sp. n. (Pl. X, figs. 1 and 2.)

Yellowish-brown. Antennae—male—scarcely reaching the transverse suture of the thorax. Wings grayish, costa yellowish with three fuscous spots, central cross vein and beginning of the two branches of vein two, margined with fuscous. Discal cell closed. Veins six and seven diverging to the wing margin.

♂, Length, 5 mm.; wing, 7 mm.

Head blackish. Eyes very narrowly separated below. Palpi stout, fuscous. Antennae not long, scarcely reaching the transverse thoracic suture; yellowish, thinly beset with rather long hair; basal joint stout, the second moderately

so, the following four or five joints ovoidal, outer joints cylindrical and attenuated.

Thorax entirely yellowish-brown with a few fine scattered hairs. Halteres pale, tip slightly tinged with fuscous. Legs slender, pale yellowish, tarsi somewhat infuscate, joints darker at tip; the whole leg beset with rather long, blackish hairs, denser and more conspicuous on the tarsi. Wings relatively narrow, tinged with grayish; costal and subcostal cells yellowish; veins fuscous. Discal cell closed. The seventh vein diverging from the sixth and attaining the margin of the wing about opposite of middle of vein five. Three fuscous costal spots, one over origin of the praefurca, one midway between the latter and the end of the subcostal vein and one over the last mentioned point; central cross vein margined with fuscous, likewise the beginning of the two branches of vein two; costal margin beyond apex of subcostal vein to apex of wing infuscate, branches of vein two and vein three, narrowly margined with fuscous. Pubescence sparse, inconspicuous.

Abdomen fuscous with scattered hairs. Hypopygium yellow; the ninth tergite projects in the form of a subtriangular plate; lobes with an apical, dark fuscous, bird-head like appendage, the latter incurved, hairy.

Holotype: ♂; Hazleton, Pennsylvania. July 11, 1913.

Type in author's collection. The nearest ally of this species is *O. innocens* Osten Sacken, with which it agrees in venation, except that the marginal cross vein in the latter species, is at the point where the second longitudinal vein divides into its two branches, whereas in *O. atriceps* this cross vein runs into the anterior branch of vein two. The wing spots in the latter species are very few compared with those of *O. innocens*. *O. apicalis* differs by its very different wing coloration, being infuscated at base and on apical part of wing.

Ormosia abnormis sp. n. (Pl. X, fig. 3.)

Antennae entirely fuscous. Thorax reddish-brown shining. Discal cell closed; the great cross vein about its middle, vein seven diverging from vein six.

♂, Length, 5 mm.; wing, 4.5 mm.

Head, palpi and rostrum dark fuscous, the latter shining. Antennae fuscous, the first two joints stout, clavate, flagellum very slender, outer joints elongate, the whole antennae sparsely beset with long hairs. Eyes contiguous above.

Thorax reddish-brown, shining; scutel and metathorax subopaque. Halteres pale, club infuscate at apex. Legs slender, femora sordid yellowish, fuscous at the tip, tibiae yellowish-fuscous, darker towards the apex, tarsi fuscous. Wings hyaline, pubescence fine and sparse, denser in apical part of wing; stigma concolorous or nearly so; marginal cross vein very faint, discal cell closed, the great cross vein at its middle, veins six and seven diverging towards the wing margin.

Abdomen yellowish-fuscous, lateral margin dark fuscous. Hypopygium ferruginous, pleurites somewhat tumid, incurved toward each other apically, appendages long, slender.

♀, Length, 4 mm.; wing, 5 mm.

Scarcely differing from male in appearance. Antennae apparently not shorter than in the male. Abdomen entirely blackish, hence the fuscous lateral margin of the male not present. Ovipositor sordid yellowish, the upper valves very slender, diverging and a little shorter than the lower valves.

Holotype: ♂; Hazleton, Pennsylvania. August 25, 1914.

Allotype: ♀; topotypic. August 31, 1914.

Paratypes: two males, topotypic. August 25, and September 3, 1913.

An aberrant form. The great cross vein at the middle of the discal cell does not occur in any other of our North American species known to me. Aside from this character, it is distinguished from our other species of *Ormosia* with closed discal cell, unicolorous wings with veins six and seven divergent, by its entirely brown antennae and the reddish-brown, shining thorax. Four specimens in author's collection.

Ormosia luteola sp. n. (Pl. X, fig. 4.)

Thorax yellow. Antennae yellowish, infuscate towards the apex. Discal cell closed; veins six and seven diverging to the wing margin.

♂, Length, 3.45 mm.; wing 3.5 mm.

Head and palpi blackish. Antennae slender, yellowish, outer joints of flagellum infuscate, reaching a trifle beyond the insertion of the wings, flagellar joints densely pubescent, each with one or more setaceous hairs. Eyes large, narrowly separated above.

Thorax yellow above; mesonotum dull, no stripes, a few long, scattered hairs posteriorly and on the scutellum; metanotum yellowish-brown. Pleura yellowish-brown with a faint, whitish bloom. Halteres pale yellow. Legs yellowish-fuscous, knees yellow. Wings broad, grayish, stigma fuscous, pubescence dense and long; discal cell closed, posterior cross vein before the discal cell, veins six and seven diverging to wing margin.

Abdomen brown, darker posteriorly, covered with a pale rather long, dense pile. Hypopygium concolorous, lobes short, appendages long claw-like.

♀, Length, 5 mm.; wing, 6 mm.

Antennae shorter. Pubescence of wing shorter and less dense. Legs fuscous, femora paler towards the base. Abdomen fuscous, the hairy vestiture shorter and sparser. Ovipositor ferruginous, upper valves strongly curved lower valves much shorter, straight. Wings inclined to fuscous and somewhat iridescent.

Holotype: ♂; East River, Connecticut. August, 1911. (Chas. Ely—collector.)

Allotype: ♀; Hazleton, Pennsylvania. July 7, 1913.

Paratype: 3 females. June 11, 1913, July 25, 1914.

Easily distinguished from the other species of *Ormosia* with unicolorous wings, closed discal cell and veins six and seven diverging towards the wing margin, by the yellow color of the thorax and the pale yellow antennae but slightly infuscate towards the apex. The difference in size between the male type and the females, may possibly be due to difference in environment of the respective localities. All in author's collection.

Ormosia pilosa sp. n. (Pl. X, fig. 5.)

Wings unicolorous. Discal cell closed. Veins six and seven diverging to wing margin. Antennal flagellum pale, infuscate towards the tip. Body and wings conspicuously pubescent.

♂, Length, 3.5 mm. (abdomen contracted); wing, 4.5 mm.

Head and rostrum blackish. Palpi brown, stout. Eyes large, black. Antennae rather long, reaching a trifle beyond the insertion of the wings, basal two joints of moderate length and thickness, brownish-red and shining; flagellum pale, densely clothed with rather long pale pubescence, each joint with a few long bristles, outer joints elongate, attenuated at each end.

Thorax dull reddish above, tinged with brown; mesonotum with an ill-defined, median fuscous vitta which does not attain the anterior margin nor the transverse suture, a small fuscous dot each side anteriorly; a row of fine pale hairs each side, converging towards the middle posteriorly. Metathorax reddish fuscous. Pleura fuscous. Halteres pale yellow, club somewhat infuscate, tip pale. Legs long and slender; coxae and legs yellowish-fuscous, apices of femora and tibiae pale. Wings of moderate width, hyaline, pubescence short and dense, giving the wing a grayish tinge, stigma concolorous; discal cell closed; the large cross vein before the discal cell. Vein seven diverges from vein six to wing margin.

Abdomen fuscous, clothed with rather long, coarse pale hair. Hypopygium small, fuscous; pleural lobes convex externally, upper appendages slender, strongly incurved, claw-like, the lower short.

♀, Length, 4.5 mm.; wing, 5 mm.

Differs from the male as follows: Antennae shorter and less slender, bent back they reach midway between the anterior thoracic margin and the root of the wing; flagellum pale fuscous, pubescence shorter and less conspicuous. The mesonotal vitta reaches the anterior margin. Wings somewhat iridescent. Pubescence of abdomen shorter, not so coarse and less conspicuous. Ovipositor reddish, upper valves strongly curved, lower approximately straight.

It is with some hesitation that I place this as the female of the above described male. It agrees in general habitus and coloration, especially of the thorax, but differs in the iridescence of the wing and the less pronounced pilosity of the abdomen. Both specimens were taken at the same locality, though on different dates.

Holotype: ♂; Hazleton, Pennsylvania. May 18, 1913.

Allotype: ♀; Hazleton, Pennsylvania. June 29, 1913.

Paratypes: 4 males and 4 females, Hazleton, Pennsylvania, May, June, July, August, October. One male and two females, Black Mountains, North Carolina, May, 1913 (Wm. Beutenmueller—collector. One female, East River, Connecticut, September, 1910. (Charles Ely—collector).

In some specimens the basal joints of the antennae are but slightly darker than the flagellum; the wings less densely pubescent. The mesonotum is somewhat darker in some specimens than in others. All material in the author's collection.

Ormosia palpalis sp. n. (Pl. X, fig. 6.)

Fuscous; antennae fuscous, basal joints pale. The discal cell opens into the second posterior cell. Veins six and seven diverging to the wing margin.

♂, Length, 3.25 mm.; wing, 4.25 mm.

Head and palpi blackish. Antennae slender, bent back they reach beyond the insertion of the wings; first joint light yellowish fuscous, the following four joints pale yellowish and like the first joint, incrassate; rest of flagellum pale fuscous, joints elongate elliptical, about twice as long as wide, the whole antennae densely pubescent, pubescence long and pale and interspersed with a few long bristles.

Thorax. Mesonotum grayish-fuscous with an ill-defined median fuscous vitta and an obscure fuscous line on each side. Scutellum and metanotum grayish-fuscous. Pleura fuscous with a grayish bloom. Halteres entirely whitish. Legs slender; coxae yellowish-brown; femora and tibiae light fuscous, darker at the tip; tarsi darker, outer joints blackish. Wings hyaline, a faintly darker shade in region of stigma; pubescence very fine, inconspicuous; veins not pronounced. The discal cell opens into the second posterior cell. Veins six and seven diverge towards the margin of the wing.

Abdomen fuscous, densely clothed with pale, rather short pile. Hypopygium rather small, concolorous. The upper appendages long, and ending into a fine point; lower appendages much shorter and nearly straight.

Holotype: ♂; Hazleton, Pennsylvania. October, 16, 1913.

Paratype: ♂; topotypic. September 14, 1915.

Agrees with *O. flavcola* Coquillett and *O. divexa* Doane, in the discal cell opening into the second posterior cell and veins six and seven diverging. From the former, it differs in its grayish-fuscous coloration and the elongate joints of the flagellum; from *O. divexa* in the gray color of the mesonotum, the shorter hairy vestiture of the abdomen, wings hyaline with the stigma but a shade darker, and the pubescence very fine and less dense. Types in author's collection.

Ormosia perplexa sp. n.

Fuscous, wings unicolorous, discal cell opens into the third posterior cell, veins six and seven subparallel, stigma indistinct.

♀, Length, 3.5 mm.; wing, 3.75 mm.

Head, palpi and antennae fuscous, the two basal joints of the latter a shade paler than the flagellum, joints of the latter ovoidal, becoming more elongate outwardly, the whole antennae covered with short, fine pubescence.

Thorax fuscous, mesonotum with a grayish bloom, a rather broad, median darker stripe with a row of short pale hairs along its lateral margins, some longer, scattered hairs behind the transverse suture; scutellum and metathorax with a grayish bloom and some scattered hairs. Legs light brown, coxae and femora towards the base, paler. Halteres pale with a brownish tinge, knob yellowish-white. Wings brownish, pubescence dense, stigma concolorous, the discal cell opens into the third posterior cell, posterior cross vein before the discal cell, outer half of vein seven parallel to vein six.

Abdomen fuscous, the hairy vestiture very fine and sparse. Ovipositor curved, reddish, paler towards the apex.

Holotype: ♀; Waverly, New York. May.

A single specimen in my collection. Agrees with *O. cockerelli, paraltela* and *monticola*, in the discal cell opening into the third posterior cell and vein six and seven not diverging towards the wing margin. From the first two of these it differs in the fuscous color of the thorax and from *monticola* in its darker thorax, wings more brownish with no trace of darker stigma, and the knob of the halteres whitish yellow.

Ormosia modica sp. n. (Pl. X, figs. 7 and 7A.)

Yellowish-fuscous, basal joints of antennae yellow, the discal cell opens into the third posterior cell, vein six and seven diverging towards the wing margin.

♂, Length, 4 mm.; wing, 7.75 mm.

Head yellowish-fuscous, palpi and antennae fuscous, basal joints of latter yellowish, flagellum slender, beset with long, soft hairs, generally speaking longer than the respective joints, and a short pubescence; the antennae bent backwards reach to the insertion of the wings. Eyes rather widely separated above.

Thorax tinged above with pale brown, its dorsum with an ill-defined, median, pale fuscous stripe and a row of long, yellow hairs on each side; metanotum brown, shining, with some scattered hairs. Pleura with faint silvery reflection. Halteres pale, knob fuscous. Legs yellowish-brown, coxae and femora towards the base, yellowish. Wings pale gray, moderately wide, pubescence long and dense; the subcostal cross vein very remote from the end of subcostal vein, the discal cell opens into the third posterior cell, great cross vein curved and at the proximal end of the discal cell; vein seven strongly diverging from vein six; region of stigma scarcely darker, costa dark brown, other veins paler.

Abdomen fuscous, clothed with rather long pale pubescence. Hypopygium ferruginous, the ninth sternite paler, strongly prolonged and deeply incised, each side somewhat dilated and infuscate distad.

♀, Does not differ from the male, except that the antennae are a trifle shorter. Ovipositor yellowish-red, upper valves slightly curved.

Holotype: ♂; Sonoma Co., California. April 8, 1914. (August Kusche—collector.)

Allotype: ♀; topotypic. May 13, 1914.

Paratypes: 2 females; topotypic. May 13, 1914.

In its unicolorous wings, the discal cell opening into the third posterior cell and veins six and seven diverging towards the wing margin, the present species approaches closest to *O. manicata* Doane and differs from it in its more yellow color, the region of the stigma not darker and the pale pubescence of the abdomen, as well as differences in the construction of the hypopygium. From *O. deviata*, it differs in the pale basal joints of the antennae. Four specimens in author's collection.

Ormosia bilineata sp. n. (Pl. X, fig. 8.)

Brown, antennae entirely fuscous, wings unicolorous, discal cell opening into the third posterior cell, vein six and seven diverging to wing margin; mesonotum with a blackish line each side.

♂, Length, 3.25 mm.; wing, 5 mm.

Head fuscous, front with a grayish bloom, palpi dark fuscous, antennae fuscous, bent back they reach to the insertion of the wings, two basal joints stout, basal joints of flagellum nearly equal in thickness to the former, outer joints gradually decreasing in thickness and clothed with a dense pubescence, the length of which is nearly equal to the length of the respective joints, each joint bearing one or more setae. Eyes widely separated above.

Thorax above and pleura with a fine, grayish bloom; mesonotum with a narrow, blackish line on each side and bearing a row of fine, pale hairs; these lines do not reach the transverse suture, but behind the latter there is an oblique blackish line each side; some scattered hairs on scutellum and metanotum. Legs slender, yellowish-brown, coxae and femora towards the base, yellowish. Halteres entirely pale yellow. Wings moderately wide, nearly hyaline with a faint brownish tinge and a pearly lustre, pubescence fine, not dense and rather short; stigma, or rather the entire second marginal cell, infuscate; the discal cell opens into the third posterior cell, great cross vein at base of discal cell, veins six and seven diverging to the wing margin, veins brown.

Abdomen reddish-brown, sparsely clothed with whitish hairs. Hypopygium short, ferruginous with long yellow hairs, pleural lobes short, appendages small, blackish, the ninth sternite prolonged into a narrowed, flattened process, slightly widened distad and projecting somewhat beyond the lobes.

♀, Length, 3.5 mm.; wing, 5 mm.

Brown with a reddish tinge; antennae shorter and more attenuate, pubescence more sparse and of less length, the second joint distinctly thicker than the first; the dark mesonotal lines are less distinct, hairs of mesonotum longer and more conspicuous. Wings more brownish, pubescence longer and more dense; the hairy vestiture of the abdomen is longer and denser posteriorly. Ovipositor yellowish-red, upper valves curved, with an angular projection each side at base.

Holotype: ♂; Holland, New York. May 25, 1911.

Allotype: ♀; topotypic. Same date.

Paratypes: 3 females; topotypic. Same date.

The nearest ally of this species is *O. deviata* and from which it is distinguished by its generally darker coloration, the mesonotal lines and the darker wings. The construction of the hypopygium is also very different. The specimens are in the collection of Mr. M. C. Van Duzee.

Ormosia deviata sp. n. (Pl. X, figs. 9 and 9A.)

Brown; wings unicolorous, discal cell opens into the third posterior cell, veins six and seven diverging to the wing margin.

♂, Length, 4 mm.; wing, 5.5 mm.

Head, palpi and antennae fuscous, the latter reach to the insertion of the wings, the two basal joints moderately stout, flagellum slender, joints one to five or six ovoidal, outer joints elongate, each joint with a whirl of long and rather soft hairs, the latter being about two or three times the length of the joint, no short pubescence noticeable, eyes widely separated above. Occiput beset with long hairs.

Thorax reddish-brown, sides of collare and lateral margin of mesonotum whitish, the latter with broad fuscous median stripe and scattered, short, fine hairs; scutel and metanotum concolorous. Pleura yellowish-brown with grayish bloom. Halteres pale, peduncle with a short, fine pubescence, club partially infuscate. Legs yellowish-fuscous, coxae and femora towards the base yellowish, outer tarsal joints fuscous. Wings moderately wide, grayish, pubescence dense and rather long in apical part of wing and giving the wing a pale fuscous appearance, region of stigma infuscate, the discal cell opens into the third posterior cell, the subcostal cross vein very close to origin of the praefurca, the posterior cross vein at the base of the discal cell, veins six and seven diverging to the wing margin.

Abdomen fuscous, hairy vestiture pale, not dense and rather long on the apical part of the abdomen. Hypopygium reddish-brown, pleurites long, basal half yellowish-white, infuscate towards the apex; a pair of strong, curved bristles, thickened towards the base, arise from the ninth tergite.

♀, Length, 3.5 mm.; wing, 4.5 mm.

Does not differ in appearance from the male; antennae shorter and hairy vestiture not quite so long; mesonotum rather yellowish-fuscous. Abdomen clothed with fine, short pale pubescence, a few long hairs at the extremity. Ovipositor reddish, upper valves—as usual in the genus—curved.

Holotype: ♂; Hazleton, Pennsylvania. April 15, 1914.

Allotype: ♀; topotypic. August 25, 1914.

Paratypes: topotypic. May, June, October. Hamburg, New York. May 26 (Coll. Van Duzee).

All the material with the exception of the last mentioned, in author's collection. In appearance this species resembles *O. rubella* Osten Sacken in the color of the thorax, but the vitta of the latter is less pronounced and broader, veins six and seven diverging towards the wing margin and the hypopygium has a very different construction. From the other species of *Ormosia* with unicolorous wings, the discal cell opening into the third posterior cell and veins six and seven diverging, it differs from *O. manicata* and *modica* in the antennae being entirely fuscous and from *O. bilineata* in the absence of a dark line on each side of the mesonotum and the different formation of the hypopygium.

Ormosia divergens sp. n. (Pl. X, fig. 10.)

Reddish-brown, antennae of male long, discal cell coalescing with the third posterior cell, veins six and seven widely diverging, stigma faintly infuscate.

♂, Length, 3.25 mm.; wing, 4.75 mm.

Head fuscous, front and occiput with silvery gray bloom. Palpi and antennae brown, the latter slender, basal two joints yellowish above, joints of flagellum elongate, the first and second joints slightly, the following strongly attenuated apically; joints one to eight of the antennae—the remainder missing—when bent back reach beyond the metathorax; basal joints of flagellum beset with long hairs—the pubescence of the remaining joints probably abraded. Eyes approximate above.

Thorax reddish-brown; collare pale yellowish; mesonotum with an ill-defined and rather indistinct, darker median stripe, some pale, short scattered hairs, the latter more evident behind the transverse suture and on the metanotum. Halteres pale, knob infuscate. Legs yellowish-brown, coxae and femora towards the base, paler. Wings rather broad, hyaline with a pale brownish tinge and having a bluish, pearly lustre in certain lights, pubescence sparse, region of stigma slightly infuscate; discal cell coalescing with the third posterior cell, posterior cross vein at base of discal cell; veins six and seven widely diverging towards the wing margin, vein seven short and nearly straight.

Segments one to four of abdomen yellowish-brown, margins darker, remaining segments brown, hairy vestiture short and scant. Hypopygium ferruginous, densely covered with a long, yellow pile, pleurites short, tumid, appendages slender and claw-like.

Holotype: ♂; Hazleton, Pennsylvania. July 5, 1910.

The type, a mutilated specimen, is in my collection; although but eight joints of one antenna are left, there is no doubt that the

entire organ equals at least the length of the body. In appearance this species resembles most nearly *O. monticola* Osten Sacken, but is at once distinguished from it, and all others with greatly elongated antennae in the male, by veins six and seven being widely divergent and also by the greater width of the wings.

Ormosia taeniocera sp. n. (Pl. X, fig. 11.)

Fuscous, antennae of male, approximately the length of the body, joints of flagellum of nearly equal thickness throughout; discal cell coalescing with the third posterior cell, veins six and seven subparallel, stigma distinct.

♂, Length, 3 mm.; wing, 4.5 mm.

Head, palpi and antennae dark fuscous; antennae about as long as the body, the two basal joints rather short and thick, flagellum densely pubescent, no setae, segments of nearly equal thickness, very little narrowed at each end. Eyes large, closely approximate above.

Thorax dark fuscous; collare pale yellow on each side; mesonotum with a grayish bloom, without stripes, some scattered pale hairs. Halteres sordid white, knob partially fuscous. Legs fuscous, coxae light brown, tarsi dark brown, the latter and tibiae clothed with short hair. Wings with a brownish tinge, pubescense dense and rather long, the discal cell coalescing with the third posterior cell; veins six and seven subparallel, the large cross vein at base of discal cell; stigma distinct.

Abdomen fuscous, with pale, long pile. Hypopygium concolorous, somewhat shining, hairy, pleurites short, appendages short, curved, the ninth sternite prolonged into a spatulate process.

Holotype: ♂; Sonoma Co., California. February, 1915 (August Kusche—collector.)

A single specimen, the type, in the author's collection. From the other species of *Ormosia* with greatly elongate antennae in the male, the present species is distinguished by the segments of the antennal flagellum not being attenuated apically. In the prolongation of the ninth sternite in the male, it resembles *O. modica* and *bilineata*.

EXPLANATION OF PLATE X

In the drawings of the hypopygia, the hairy vestiture has been omitted.

Fig. 1.—Hypopygium of *Ormosia atriceps* spec. n. Ventral aspect.
Fig. 2.—Hypopygium of *Ormosia atriceps* spec. n. Lateral aspect.
Fig. 3.—Hypopygium of *Ormosia abnormis*, spec. n. Ventral aspect.
Fig. 4.—Hypopygium of *Ormosia luteola* spec. n. Dorsal aspect.
Fig. 5.—Hypopygium of *Ormosia pilosa* spec. n. Ventral aspect.
Fig. 6.—Hypopygium of *Ormosia palpalis* spec. n. Dorsal aspect.
Fig. 7.—Hypopygium of *Ormosia modica* spec. n. Dorsal aspect.
Fig. 7A.—Hypopygium of *Ormosia modica* spec. n. Lateral aspect.
Fig. 8.—Hypopygium of *Ormosia bilineata* spec. n. Lateral aspect.
Fig. 9.—Hypopygium of *Ormosia deviata* spec. n. Dorsal aspect (dorsal setae omitted).
Fig. 9A.—Hypopygium of *Ormosia deviata* spec. n. Lateral aspect.
Fig. 10.—Hypopygium of *Ormosia divergens* spec. n. Dorsal aspect.
Fig. 11.—Hypopygium of *Ormosia taeniocera* spec. n. Lateral aspect.

A NEW GENUS, CARIBLATTA, OF THE GROUP BLATTELLITES (ORTHOPTERA, BLATTIDAE)

BY MORGAN HEBARD

Among the various well defined groups formerly treated under the generic name *Phyllodromia* Serville, (*Blattella* Caudell sens. lat.), we find one clearly marked, composed of diminutive species occurring in the West Indies, Trinidad, Panama and the southeastern United States. Certain of the species have been described under the generic name *Blatta*, these being later referred to *Phyllodromia*, as has been one synonymous name originally placed in *Theganopteryx* (*Pseudectobia*), while still another was described as, and has for quite a few years been erroneously considered, a member of the genus *Ceratinoptera*.

So little constructive work had been done in the classification of the group Blattellites, that the true relationship of these species only became apparent to us when extensive collections from the West Indies and Trinidad came into our hands for study.

With the material now in hand, we are able to assign this group, which we find it necessary to describe as a new genus, to its proper position, and we are also obliged to describe six species and one geographic race which were previously unknown or unrecognized.

CARIBLATTA[1] new genus

GENOTYPE.—*Cariblatta punctulata* [*Blatta punctulata*] (Beauvois).

This genus is a member of the group Blattellites, there forming one of the groups of species to which Shelford has hastily applied

[1] This name is chosen since the greater number of the forms of the present complex would appear to be found in the regions in which the Carib Indians were native.

the name *Neoblattella*.[2] In position it follows *Blattella* and comes before *Neoblattella* as here restricted.[3]

Generic Description.—Size small to very small, form moderately slender to distinctly slender for the group. Sexes showing but little difference in size or form. Head with eyes normally separated by distinctly more than their exceptional depth, this slightly more pronounced in the female sex; the entire contour of face convex, the area between the eyes and between the ocellar spots (in some genera of the group decidedly flattened) very weakly defined, weakly flattened; below this the face is somewhat pinched and transversely convex mesad, the remaining lower portions weakly transversely convex, the lateral margins below the eyes slightly convergent ventrad (in *Neoblattella* these margins are in most cases more nearly parallel, the face in consequence being proportionately slightly broader at the clypeal suture). Maxillary palpi with first two joints mere knobs, third and fourth joints very long and slender, fifth (distal) joint distinctly shorter than fourth joint, distinctly enlarged and obliquely truncate to near its base. Pronotum with dorsal surface weakly convex; cephalic margin narrower and less distinctly truncate than caudal margin; lateral margins convex; point of greatest width meso-caudad. Disk of pronotum rotundato-octagonal with angles blunted; remaining marginal portions transparent, these broad laterad. Abdomen of males with dorsum not strikingly specialized. Tegmina, in normal fully developed condition (changes due to reduction occur in tegmina and wings

[2] Ent. Month. Mag., 2d ser. xxii, p. 155, (1911).

[3] We here restrict the genus *Neoblattella* to the forms more closely agreeing with the genotype, *N. adspersicollis* (Stål). These differ from the species of *Cariblatta* in size, which is medium small to large; proportionately wider head at clypeal suture; number of longitudinal discoidal sectors of the tegmina, which are normally always more than five (this count including the median vein, all its branches and the ulnar vein), and three or more spines on the ventro-caudal margin of the cephalic femora (not counting the distal spine). Closely related, these two genera in a way are comparable with the genera *Orchelimum* and *Conocephalus* in that they form two definite and easily recognized units which, however, are most difficult to diagnose in that they "differ not in one or several invariable characters, but instead may be distinguished by combinations of characters and a general complex not found in the other genus." All of the species of the present genus are decidedly smaller than the smallest species of *Neoblattella*, which species, *N. fratercula*, Hebard (Ent. News, xxvii, p. 159, (1916)) shows the closest approach in that genus to the present complex, as here *C. insularis* does to that genus.

in *C. lutea* as discussed under that species), moderately broad with costal and sutural margins straight and in greater part subparallel; scapular area very broad; discoidal sectors (except in *insularis* and possibly in *punctipennis*) normally five in number (this including the median vein and its branches and the ulnar vein); diagonal channel of dextral tegmen (diagonal vein of authors) pronounced in anal field, extending to discoidal vein and occasionally traceable beyond among the costal veins; portion of dextral tegmen, which is concealed when at rest, less suffused and with cross-veinlets more distinct than in other portions of the organ. Wings weakly to distinctly iridescent (except in *imitans*); a number of costal veins strongly and briefly clubbed distad; ulnar and axillary vein branched; intercalated triangle small but evident. Supra-anal plate in both sexes very small and strongly transverse. Cerci elongate, flattened; with lateral margin of each segment narrowly deplanate and with this margin weakly convex in lateral outline; segments normally ten in number and well defined, the last three decreasing rapidly in size, the last segment being minute and cylindrical. Subgenital plate of males moderately large, in the majority of species symmetrical but in some very strongly asymmetrical. Subgenital plate of females very large, decidedly produced mesad. Cephalic femora slender with ventro-cephalic margin supplied proximad with (usually four) long, widely spaced spines the more distal shortest, succeeded distad by a more closely set row of shorter spines terminated by two long spines; ventro-caudal margin with two widely spaced long spines meso-distad and a single long distal spine. Other femora supplied distad with a long dorsal spine and single shorter distal spines on each of the ventral margins, which margins are further supplied with a few long spines. Moderately well developed arolia present.

Generic Distribution.—The genus is known from the southeastern United States, the Bahamas, Greater Antilles, Little Cayman Island, Antigua, Dominica, Barbados, Trinidad and Panama. It is not represented in large series of material before us from continental tropical North America north of Panama.

Environmental Notes.—In the southeastern United States we have found *C. lutea* widely distributed among the dead leaves, pine needles and grasses in the forest, and also in the open under

debris of every kind. The tropical species of the present genus found by the author, in most cases inhabited preferably the heavy forest, where numbers were discovered among the loose leaves resting on the leaf mould on the ground, in dead agaves and in the bromeliads on the branches of the trees. Of the material collected, it is interesting to note that *C. insularis* was found to be the most numerous Orthopterous insect in the bromeliads growing on the branches of the trees at Montego Bay, Jamaica. In an area of a few feet of leaves and leaf mould in the hillside forest at Stony Hill, Jamaica, which was minutely examined, series of *C. reticulosa* and *C. cuprea* and a number of specimens of *C. punctulata* were secured; these species of the present genus forming a large proportion of the Orthopteran life there found. These diminutive insects ran about with great speed and took wing readily, though usually flying but short distances. When in flight, they appeared very much like small brownish moths. The series of *C. imitans* was secured at Corozal, Panama, also in the dead dry leaves and leaf mould of the jungle. Material of *C. punctulata,* however, was secured both in Cuba and Jamaica, under various rubbish in fields of short grass, the species appearing to be widely distributed in the open as well as in the forest.

Structural Characters.—The species are decidedly similar in many structural features. Slight size variation is found within individual species (except in *punctulata* and *lutea*), but all of the species show only slight differences from each other in this feature. In form the species are constant, and appreciable differences in this character are found between some. The head is the same throughout the genus, the maxillary palpi alone showing slightly different degrees of attenuation in different species, but in occasional individuals these appendages are deformed, on one side or both, and the character is in consequence dangerous to rely upon when determining single specimens. The male genitalia, but particularly the subgenital plate and its appendages, furnish strikingly different characters in the majority of the species and show hardly any variation, (only in *punctulata* are distinct individual differences found as discussed on p. 160, footnote 16). The female genitalia offer much less striking differences; in but a few species showing slight differences, in the degree of mesal emargination of the supra-anal plate and of the production of

the subgenital plate, which appear to be of diagnostic value. The limbs and armament of the same are not variable and agree in all the species.

Color Characters.—In the species of the genus, the coloration is decidedly constant, minor differences are found due wholly to recession and intensification (in *punctulata* alone such differences being in some series very decided). The head markings, though showing a similar type in many species, show features of real diagnostic importance in several and of marked distinction in two, *craticula* and *insularis*. This is likewise true for the pronotal markings, the most distinctive species in this respect being *reticulosa*. The tegmina and wings show very slight differences for the majority of species, but in two, *punctipennis* and *insularis*, show striking features of excellent diagnostic value. The markings of the ventral surface of the abdomen are also diagnostically useful in some species, but recession and intensification appears to be particularly marked in these features and in consequence, in several species normally well marked, these markings are occasionally found unusually pronounced or entirely absent.

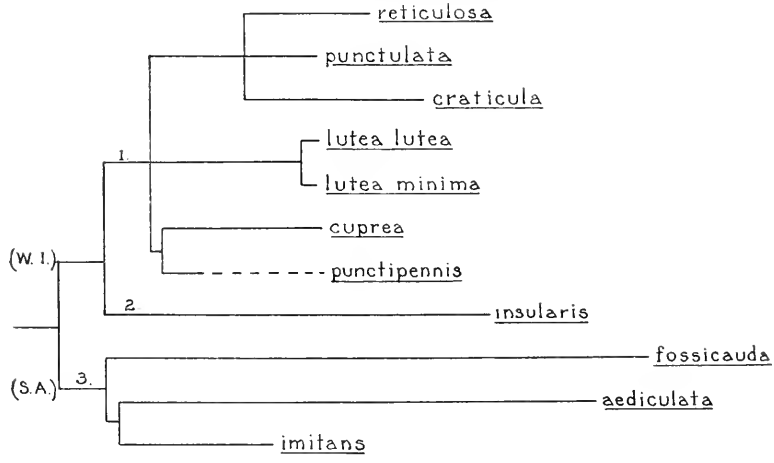
Tegminal Venation.—The number of longitudinal discoidal sectors is, in the normal fully developed condition (under *lutea* are discussed the various differences there found, due to reduction in tegmina and wings), normally five[4] in the majority of the species; variation sometimes occurs and we have examples of *punctulata* showing but four of these sectors, while the few examples of *punctipennis* show five, six or seven and *insularis* shows the same range, the number being less often five than otherwise.

Wing Venation.—The wings show few and usually unimportant specific diagnostic features. The degree of iridescence and coloration of the veins and particularly of the distal cross veinlets are of some importance in separating certain species and appear to show little variation. The ulnar vein shows in the majority of species normally two distinct rami, but in a number of species as many as four rami occur, two of these usually being decidedly

[4] In *Neoblattella*, the great majority of the species show more of these sectors. In considerable series before us, we find in the species of the *adspersicollis* (genotype) complex an average of ten, in the *detersa* complex eight, while in the complex showing nearest approach to the present genus we find *brunneriana* with five to seven and *fratercula* six. As the number of veins increase, greater variation in their number appears to occur.

distal in position; individual variation is so great that in specific diagnoses this feature is best omitted. The same is true for the axillary vein; in addition to a number of the free veins of the axillary field, which frequently spring from this vein near its base, it is found to have three, very rarely four, rami; the rami spring from the vein normally caudad, very rarely cephalad and sometimes both divisions of the rami diverge equally, or one of the rami itself again divides.

Specific Groups.—The relationship of the forms of the present genus can be best expressed diagrammatically as shown below.



The genus divides into three distinct groups, of which the first and second may be termed the West Indian complex and the third the South American. The West Indian complex, excepting the single species of group two, shows the ulnar vein of the wings with but one or two conspicuous rami, though other rami may occur distad; all have more or less distinctive features of coloration; *reticulosa, punctulata, craticula* and *insularis* are the more slender forms. The second group includes the single species, *insularis*; distinctive in general appearance, in the unusual pronotal marking, in the tegminal markings and in the remarkable male genitalia. The ulnar vein of the wings has more than one or two conspicuous rami. The South American forms, excepting *fossicauda,* have the ulnar vein of the wings with several rami; all are inconspicuously colored; none are as slender as *punctulata.*

The male subgenital plate shows a most remarkable diversity in its development; the species *reticulosa*, *insularis*, *fossicauda*, *aediculata* and *imitans* each showing an utterly different type.

Key to Males of the Species Based Primarily on Genital Characters[5]

A. Subgenital plate symmetrical.
  B. Subgenital plate with two appendages (styles).
    C. Styles specialized.
      D. Styles represented by rounded knobs with dorsal surface thickly covered with minute chitinous spines.
        E. Tegmina and wings fully developed.[6]
          F. Subgenital plate moderately produced. Styles separated by a broad space.
            G. Pronotum and tegmina with heavy lateral bands of dark brown. (Form decidedly slender. Median portion of distal margin of subgenital plate scarcely produced.)
              reticulosa (Walker)
            GG. Pronotum and tegmina without lateral bands.
              H. Disk of pronotum buffy with an olive tinge, normally finely pictured. Form rather slender. (Median portion of distal margin of subgenital plate variable but never elongate attenuate produced.) **punctulata** (Beauvois)
              HH. Disk of pronotum ochraceous tawny, immaculate except for two dark dots. Form less slender. (Median portion of distal margin of subgenital plate scarcely produced.)
                cuprea new species
          FF. Subgenital plate decidedly produced (median portion of distal margin very elongate attenuate produced). Styles separated by a very narrow space. **craticula** new species
        EE. Tegmina and wings not fully developed (accompanied by a distinct broadening of the pronotum and a lessening in the convexity of the caudal margin of the same[7]).

[5] Other features are given only where the genitalia are of similar type and do not afford sufficient differences to separate readily certain of the species. As the male of *punctipennis* is unknown, that species is omitted from the present key.

[6] Slight reduction is found in a single female specimen of *punctulata* from the Bahamas. The tegmina and wings in this specimen reach only 1 mm. beyond the apex of the supra-anal plate. In no female of the large series of the species of the alternate category, *lutea*, do the tegmina extend beyond the apex of the supra-anal plate.

[7] This interesting feature is discussed on page 166, footnote 23.

F. Median portion of distal margin of subgenital plate very broadly rectangulate produced. Tegmina and wings normally moderately reduced.[8] Average size larger.[9]

lutea lutea (Saussure and Zehntner)

FF. Median portion of distal margin of subgenital plate small, subquadrate, very slightly longer than wide. Tegmina decidedly reduced, wings vestigial. Average size smaller.

lutea minima new subspecies

DD. Sinistral style represented by a curved chitinous spine; dextral style a rounded knob with dorsal surface thickly covered with minute chitinous hairs. (Distal margin of subgenital plate very strongly raised laterad with styles set very deeply within the cleft between lateral portions and median portion, which later projects outward with truncate distal margin raised.) **insularis** (Walker)

CC. Styles simple. (Distal margin of subgenital plate but little raised laterad, briefly notched at base of styles.) **imitans** new species

BB. Subgenital plate with four appendages (simple styles and accessory knobs with dorsal surface covered with minute chitinous spines, these situated at base of cerci). (Subgenital plate with very broad median portion of distal margin having acute-angulate divergent projections.)

aediculata new species

AA. Subgenital plate strongly asymmetrical (sinistrad strongly but narrowly produced with lateral margins parallel and ventral surface transversely convex; adjacent dextrad is a similar decidedly shorter projection with margins convergent: within these projections are concealed greatly specialized styles, sinistral a thin circular disk with free margin clothed with microscopic chitinous spines, dextral a rounded knob with dorsal surface supplied with minute chitinous spines). **fossicauda** new species

Key to the Species Based on Diagnostic Characters of Coloration

Many features of coloration and particularly of color pattern, serve in the present group to distinguish readily many of the species. Use of such characters in the study of material can only lead to mistakes, unless the effect of recession and intensification in the color pattern and coloration is thoroughly understood.

[8] In the female the tegmina and wings are normally more decidedly reduced, while in that sex the wings are found to be vestigial in occasional specimens from the southeastern portion of the distribution of typical *lutea*. In addition, the female is found to average slightly larger and more robust than the male; these features result in a greater contrast between the sexes in typical *lutea*, and to a lesser degree in *lutea minima*, than in any other species of the genus.

[9] Nearest relationship is found to *punctulata*. In addition to the features here given, we would add that the buffy general coloration in *lutea* is always more or less tinged with cinnamon, while the buffy coloration in *punctulata* is instead tinged to varying degrees with olivaceous.

Thus in every species, but particularly in those normally showing weak or very delicate markings, individuals of the maximum recessive condition will show faintly, or wholly lack, features usually recognizable with the greatest ease and which, when present, are frequently of real diagnostic value. Similarly, in the maximum of intensification, the darker and increased size of the markings often give such examples an extraordinary appearance. A goodly number of synonymic names are based upon just such misconceptions of the intra-specific range of coloration, but such mistakes need not occur in future and many characters of coloration and particularly of color pattern, will be found distinctly useful if the conditions discussed above are taken into consideration.

A. Tegmina without distinct dots.

B. Various distinctive features of color pattern or coloration present, ventral surface of abdomen frequently variously maculate.

C. Tegmina distinctively marked.

D. Tegmina with heavy elongate suffused band of mummy brown from base of discoidal vein to about two-thirds the distance to its apex. Pronotum with heavy paired blackish brown bands expanding and diverging slightly caudad, running from cephalic margin to caudal margin of pronotum through lateral borders of disk. Head with normal markings.[10] **reticulosa** (Walker)

DD. Tegmina with two small elongate maculations of bister, one at base of anal vein and one slightly distad of this point on discoidal vein. Pronotal markings of normal type, disk finely pictured. Head with distinctive markings. **insularis** (Walker)

CC. Tegmina immaculate, or weakly marked (only in intensive phases of *punctulata*).

D. General color of disk of pronotum buffy, very finely pictured, this picturing normally strongly defined.

E. Head with markings variable (see pages 161 and 167), transverse bands when present on face always concave.

F. Buffy general coloration always tinged to varying degrees with olivaceous. **punctulata** (Beauvois)

FF. Buffy general coloration always tinged to varying degrees with cinnamon. **lutea lutea** (Saussure and Zehntner)

lutea minima new subspecies

[10] We term the character of cephalic markings found in this species normal, as this condition is found in *reticulosa*, *fossicauda* and *audiculata*, in the intensive condition of *punctulata* and weakly suggested in *cuprea*. A broad band ventrad between the eyes, a narrower concave band between the ocellar spots and below on the face two still narrower, sometimes mesally interrupted, concave bands.

EE. Head with distinct transverse bands on face narrow and always straight. **craticula** new species

DD. General color of disk of pronotum ochraceous tawny, immaculate except for two rather widely separated dark dots. (Head very obscurely marked.) **cuprea** new species

BB. Distinctive features of coloration and color pattern not present, except that ventral surface of abdomen has a proximo-median suffusion of dark brown. (General coloration uniform warm buff. Head showing normal markings weakly or distinctly defined—(see footnote 10). Disk of pronotum obscurely or very finely pictured.)

C. Normal markings of head distinct. Disk of pronotum very finely pictured. (Cross-veinlets of tegmina and wings moderately well defined in darker brown.)

D. Proximo-median suffusion of ventral surface of abdomen usually less extensive, in male sometimes almost disappearing. **fossicauda** new species

DD. Proximo-median suffusion of ventral surface of abdomen usually conspicuous, in male often forming a suffused but extended medio-longitudinal dark band, in female often represented by an extensive dark blotch sometimes reaching as far as base of subgenital plate. **aediculata** new species

CC. Normal markings of head weakly defined. Disk of pronotum obscurely pictured. (Cross-veinlets of tegmina and wings well defined in darker brown. Proximo-median suffusion of abdomen weakly indicated or subobsolete.) **imitans** new species

AA. Tegmina with minute, scattered, distinct dots of dark brown. (Disk of pronotum buffy with a few or numerous slightly darker brown dots. Head immaculate or with very obscure suffusions of slightly darker shade.) **punctipennis** new species

Specimens Examined.—The total number of specimens listed in the present paper is 333, of which 206 examples are in the Philadelphia collections. We wish to express our hearty thanks to Mr. Wm. T. Davis and to the curators of the collections of the United States National Museum, American Museum of Natural History, Museum of Comparative Zoology and Brooklyn Institute of Arts and Sciences, for the privilege of studying all of the material in those collections referable to the present genus.[11] We have been unable to examine the types of the four previously described species, but we have had before us series of topotypic specimens of each of these, which agree fully with the original descriptions.

[11] The material from Porto Rico, excepting those specimens from the National Museum, was secured in connection with the New York Academy-Porto Rico Survey. The first set of this material is in every case the property of the American Museum of Natural History.

Cariblatta reticulosa (Walker) (Pl. XI, fig. 1; Pl. XII, figs. 1 to 3.)
1868. *Blatta reticulosa* Walker, Cat. Blatt. Br. Mus., p. 103. [♂, Jamaica.]

This beautiful species is the most strikingly colored member of the genus. Nearest relationship is shown to *C. punctulata*, the present insect differing from that species mainly in the very distinctive color pattern and coloration. The genitalia of the two species are similar, showing only in the male subgenital plate slight differences of degree.

The following features are found in a pair from Stony Hill, Jamaica. ♂. Size small, form slender. Cross-veins between discoidal sectors of tegmina very heavy; in the area of the dextral tegmen which is concealed when at rest, being as pronounced as the sectors themselves. Supra-anal plate very small, strongly transverse, very weakly produced, with distal margin very broadly convex. Subgenital plate much as in *C. punctulata*, but with lateral portions not as much upturned and style sockets on distal margin less decided, represented by very weak nicks in the distal margin, these are also slightly more widely separated, the space between them transverse and representing a full third of the distal margin; styles as in *punctulata*.

♀. Agrees with male except in the following features. Supra-anal plate very small, strongly transverse, weakly produced with distal margin broadly convex. Subgenital plate large, scoop-shaped, as in *punctulata*.

Measurements (in millimeters)

	Number of specimens	Length of body[12]	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Aibonito, Porto Rico	(1)	8.6	2	2.7	9.7	2.7
Stony Hill, Jamaica	(2)	6.8–7.3	1.8–1.9	2.7–2.8	8.4–8.7	2.4–2.5
♀						
Stony Hill, Jamaica	(5)	7.6–7.8	1.9–2	2.7–2.8	8.4–8.7	2.3–2.4

Though this small series shows some size variation, the coloration is very constant.

[12] The body length of males and females of the present group is not wholly comparable; the female subgenital plate in the present genus is without exception distinctly more produced, this dimension consequently showing a greater difference in the sexes than is true for their relative size of body.

Coloration.—Head showing the normal color pattern, (see page 155, footnote 10); ocellar spots located in pale area and, in consequence, usually inconspicuous. Pronotum with lateral margins transparent with a very weak brownish suffusion; from the cephalic to the caudal margin run two blackish brown bands which, weakly diverging caudad, occupy the lateral margins of the disk, these bands briefly invade the mesal portion of the disk, which is clear light buff, immaculate except for a pair of exceedingly slender pencilled lines of dark brown. At the caudal margin of the disk the dark lateral bands spread out forming pyramids of that color, the apices of which are lost cephalad in the bands and the bases of which fuse mesad on the caudal margin. Tegmina transparent tinged with brownish; a heavy elongate suffused band of mummy brown extending from the base of the discoidal vein usually two-thirds the distance to its distal extremity; the entire area occupied by the discoidal sectors suffused with mummy brown, these sectors and the numerous cross-veinlets strongly defined in this color. Wings transparent with a dark suffusion, strongly iridescent; veins and cross-veinlets conspicuously dark brown, excepting area of enlarged portions of costal veins which is conspicuously buff. Limbs and underparts cinnamon buff, the abdomen slightly suffused mesad and laterad with brown, this suffusion shining blackish brown and more decided in the females, in that sex spreading out over the greater portion of the subgenital plate. The limbs at the bases of the heavier spines are usually heavily flecked with dark brown.

Specimens Examined: 8; 3 males, 5 females.

Aibonito, Porto Rico, VII, 14 to 17, 1914, (H. G. Barber), 1 ♂, [Am Mus. Nat. Hist.].

Stony Hill, St. Andrew Parish, Jamaica, X, 25, 1913, (Hebard; in leaves on leaf mould in hillside forest), 2 ♂, 5 ♀, [Hebard Cln.].

Cariblatta punctulata (Beauvois) (Pl. XI, figs. 2 and 3; Pl. XII, figs. 4 to 8; Pl. XIII, figs. 1 and 2.)

1805. *Blatta punctulata* Beauvois, Ins. Rec. Afr. Amer., p. 184, Orth. pl. 1b, fig.8. [San Domingo.]

1857. *Blatta* (*Phyllodromia*) *delicatula* Guérin, in Ramon de la Sagra, Hist Cuba, Ins., p. 346. [Cuba.]

It is not surprising that the present species was redescribed by Guérin, there appearing the most complete description of the

insect. The description of Beauvois is wholly superficial and his figure lacks all indication that it is enlarged, a feature explained by that author, who in his introduction states that all the specimens are drawn an inch long, lines giving the natural size being placed beside the enlarged figures, a feature omitted by accident on plate 1b. This has been noted and the synonymy first established by Rehn.[13]

The present species is apparently the most widely distributed of the genus. Nearest relationship is shown to *C. reticulosa*, though the general appearance of the present insect is far less distinctive.

The following features are as found in a pair from the San Francisco Mountains, San Domingo. ♂. Size small, form slender. As in the other species of the group, the eyes are normally separated by distinctly more than the ocular depth, this usually a little, occasionally about one third, less than the width between the antennal sockets (one large male from Mayaguez, P. R., shows excessive variation in having the interocular space scarcely more than half the ocular width). Crossveinlets between discoidal sectors of tegmina numerous but inconspicuous. Supra-anal plate very small, strongly transverse, very weakly produced with distal margin very broadly convex. Concealed genitalia:[14] sinistrad is situated a very thin spatulate chitinous projection, from the apex of which springs a very slender elongate chitinous process directed sinistro-caudad and then curving at its middle very sharply dextrad with immediate apex showing a minute bulb. Subgenital plate moderately produced, lateral portions raised, weakly convex to mesal fourth of distal margin, the lateral margins each comprehending about three-eighths of the total margin and terminated on each side by a brief concavity, in which emargination is situated a small rounded knob, slightly longer than wide, with dorsal surface heavily

[13] Bull. Amer. Mus. Nat. Hist., xxii, p. 109, (1906).

[14] We have been unable to consider fully the concealed male genitalia for the species of the present genus, as the insects are so small and delicate and in many cases represented in collections by so few specimens that it would often be impossible to examine these parts without destroying important material. In many groups these features are of the utmost importance in distinguishing species which might be easily confused, but in the present complex the species can be satisfactorily determined without this aid.

clothed with minute chitinous spines directed inward;[15] between these specialized styles the median portion, slightly less than a third of the distal margin, is straight or weakly produced.[16]

♀. Agrees with the male except in the following features. Form very slightly less slender. Supra-anal plate very small, strongly transverse, weakly produced with distal margin broadly convex but showing a short though marked median concavity. Subgenital plate large, scoop-shaped, distal margin proximo-laterad distinctly convex, then weakly and broadly concave at base of cercus, thence weakly convex to the rather decidedly produced apex, the margin of which is broadly rounded but the plate at this point slightly pinched.

Measurements (in millimeters)

♂	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cayamas, Cuba	(4)	6.6–7.8	1.7–1.9	2.4–2.5	7.4–8.6	2.1–2.4
San Francisco Mts., San Domingo	(6)	7–7.8	1.8–2	2.6–2.7	8–8.9	2.3–2.6
Rio Piedras, Porto Rico	(1)	7	1.8	2.4	7.4	2
Mayaguez, Porto Rico	(2)	7.6–8.1	2–2.1	2.7–2.8	7.2–8.9	2.3–2.7
Stony Hill, Jamaica	(1)	7.3	1.9	2.4	8	2.3
Montego Bay, Jamaica	(6)	7.4–7.6	1.8–1.9	2.3–2.4	7.2–7.4	2.1–2.2

[15] A single male in this series, typical in other respects, has a large proportion of these spines apparently fused into one much longer and stouter spine. This condition may indicate the manner in which the extraordinary sinistral style in *C. insularis* has been evolved.

[16] In the series from San Domingo this is perfectly transverse; those from Hayti and Cuba have it more or less asymmetrical and weakly produced to varying degrees; in those from Jamaica it is more produced, constituting a brief truncate lobe, while in the males from Porto Rico, those from Mayaguez, Adjuntas and Coamo have a minute median production longer than wide, the one from Mayaguez has the median space narrower but the production larger, while those from Manati and Rio Piedras have the median portion of the plate very unusually asymmetrical, large and decidedly projecting, terminating in an acute dextral apex. From this evidence it is clear that frequently variation in this feature occurs in the present species, apparently partially geographic in character but showing much too great instability to afford grounds for nominal recognition of any sort.

♀	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Nassau, Bahamas....	(2)	6.6–8.6	2–2.3	2.7–3.2	6.4–9	2.2–2.8
Cayamas, Cuba.....	(3)	7.7–8.2	2–2.1	2.7–3	7.9–9.3	2.4–2.8
Little Cayman Island.	(3)	8.1–8.2	1.9–2.1	2.6–2.8	7.8–8.3	2.3–2.6
San Francisco Mts., San Domingo.....	(11)	7.3–7.7	1.9–2.2	2.6–3	8.3–8.6	2.4–2.7
Stony Hill, Jamaica...	(3)	7.7–8.6	1.9–2	2.7–2.9	8.6–8.9	2.3–2.4
Montego Bay, Jamaica	(1)	6.8	1.9	2.6	6.7	2.2

This series indicates clearly that the size variation in the species, sometimes particularly pronounced in the organs of flight, is due rather to local environmental conditions than to geographic distribution.

The species shows greater variation than is usual in the species of the present genus, particularly in size, interocular width and in certain features of the genitalia of both sexes. It would seem that very frequently in the Orthoptera, the apparently most widely distributed and most abundant species in a genus shows the greatest variability in that complex, as we find to be true in the present case.

Ootheca.—From a female from Montego Bay, Jamaica, with ootheca projecting, it is evident that this is carried with suture dorsad. Other oothecae of the species from Cayamas, Cuba, are 5.3 to 5.8 mm. in length, by 2.4 mm. in width; the dorsal and ventral margins are parallel and very slightly curved, the dorsal (suture) being slightly convex with numerous regularly placed minute knob-like projections; the extremities are both slightly concave and weakly produced dorsad, this somewhat greater at the proximal extremity. From one of these oothecae has emerged a Hymenopterous parasite, identified as *Hyptia* sp., by Ashmead.

Coloration.—Head cinnamon buff with a broad transverse band of bister ventrad between the eyes, ocellar spots normally located in a pale area and, in consequence, inconspicuous; below, the face is sometimes immaculate, sometimes a few flecks of darker color are apparent, while in individuals of the maximum intensive coloration three nearly equidistant, distinct, narrow and weakly concave transverse bands of the darker color are found: in some Porto Rican specimens of great intensive colora-

tion dark markings occur dorsad on the vertex and dark blotches break the dorsal facial bands, of which the dorsal is the widest; while in one from San Domingo, a condition somewhat resembling the normal type in *C. insularis* is found. Pronotum with lateral margins transparent with a very weak brownish suffusion; disk buffy washed with saccardo's umber with a very fine picturing of bister.[17] Tegmina transparent tinged with brownish, the veins translucent saccardo's umber.[18] The dorsal portions of the insect, as a result, appearing diaphanous but in general shaded with saccardo's umber. Wings transparent, hyaline, moderately iridescent; veins translucent brownish. Abdomen clay color below, with a broad medio-longitudinal band and on each side a narrower submarginal band of blackish brown, which bands extend only to the base of the subgenital plate.[19] Limbs cinnamon buff, frequently flecked at the bases of the heavier spines with dark brown.

Specimens Examined: 68; 31 males, 34 females and 3 immature specimens.

Nassau, New Providence Island, Bahamas, (G. P. Englehardt), 2 ♀, [Bklyn. Inst. and Hebard Cln.].

Cabañas, Pinar del Rio, Cuba, V, 18, (Palmer and Riley), 1 ♂, 1 ♀, [U. S. N. M.].

Pinar del Rio, Pinar del Rio, Cuba, IX, 9 to 24, 1913, (F. E. Lutz; at light), 1 ♀, [Am. Mus. Nat. Hist.].

Cabañas, Havana, Cuba, I, 29, 1904, (Hebard; debris in short grasses in open), 1 ♂, [A. N. S. P.].

Jesús del Monte, Havana, Cuba, I, 23, 1904, (Hebard; debris in short grasses in open), 2 ♂, [Hebard Cln.].

Cayamas, Oriente, Cuba, III, 2 to XII, 23, (E. A. Schwarz), 4 ♂, 3 ♀, [U. S. N. M. and Hebard Cln.].

[17] Specimens in the maximum recessive coloration show only traces of these markings. In the series before us every gradation from this condition to the maximum of intensive coloration, in which the picturing is very strongly and sharply defined, is found. In the material from Hayti and Little Cayman Island and numerous specimens from Cuba and Jamaica, distinctly recessive coloration is shown, the maximum of this being found in a few Cuban specimens. The series from San Domingo and Porto Rico average rather intensive in coloration. These differences would appear to be due wholly to local environmental conditions.

[18] Occasional individuals have the anal vein of the tegmina slightly suffused with a darker brown, while in a few specimens from Cuba the tegmina have a few microscopic dots, very much smaller but of the same character as those found in *C. punctipennis* (see p. 174).

[19] In specimens of recessive coloration, the median band is no wider than the submarginal bands; in some females of intensive coloration, the subgenital plate is heavily marked mesad with blackish brown.

Little Cayman Island, III to IV, 1888, 3 ♀, [M. C. Z. and Hebard Cln.].

Hayti, (P. R. Uhler), 2 ♂, [M. C. Z.].

San Lorenzo, San Domingo, VI, 27 to 29, 1915, (F. E. Watson; at night on royal and cocoanut palms), 1 ♂, 1 ♀, [Am. Mus. Nat. Hist.].

San Francisco Mountains, San Domingo, IX, 1905, (A. Busck), 6 ♂, 12 ♀, [U. S. N. M.].

Sanchez, San Domingo, VI, 7 to 12, 1915, (F. E. Watson), 1 ♀, [Am. Mus. Nat. Hist.].

Mayaguez, Porto Rico, I, 1899, (A. Busck), 1 ♀, [U. S. N. M.]; VI, 21 to 23, 1915, (Lutz and Mutchler; at light), 1 ♂, [Am. Mus. Nat. Hist.].

Adjuntas, Aguadilla, Porto Rico, VI, 8 to 13, 1915, (F. E. Lutz; beating), 1 ♂, 2 ♀, 1 juv., [Am. Mus. Nat. Hist.].

Manati, San Juan, Porto Rico, VI, 27 to 29, 1915, (Lutz and Mutchler; at automobile headlights), 3 ♂, [Am. Mus. Nat. Hist.].

Baños de Coamo, Ponce, Porto Rico, VI, 5 to 7, IX, XII, 27, 1914 and 15, (Crampton, Mutchler and S. Morgan), 1 ♂, 2 ♀, [Am. Mus. Nat. Hist.].

Rio Piedras, Humacao, Porto Rico, XII, 18, 1914, 1 ♂, [U. S. N. M.].

Stony Hill, St. Andrew Parish, Jamaica, X, 25, 1913, (Hebard; in leaves on leaf mould in hillside forest), 1 ♂, 3 ♀, [Hebard Cln.].

Rio Cobre near Bogwalk, St. Catharine Parish, Jamaica, X, 25, 1913, (Hebard; in leaves on leaf mould in hillside forest), 1 juv., [Hebard Cln.].

Montego Bay, St. James Parish, Jamaica, X, 28 to XI, 2, 1913, (Hebard; under debris on Cretaceous limestone sand near beach, in leaves and leaf mould in hillside forest), 6 ♂, 2 ♀, 1 juv., [Hebard Cln.].

Cariblatta craticula[20] new species (Pl. XI, figs. 4 and 5; Pl. XII, fig. 9.)

The present species is closely related to *C. punctulata*, differing from that species in the distinctive facial markings and in the male genitalia which show a maximum specialization of the type of subgenital plate found in that insect.

Type.—♂; Mayaguez, Porto Rico. July 24 to 29, 1914. (Lutz and Mutchler.) [American Museum of Natural History.]

Description of Type.—Size small, form slender. Maxillary palpi with third joint very elongate, fourth joint slightly shorter, fifth (distal) joint about three-quarters as long as fourth. Tegmina with cross-veinlets between discoidal sectors numerous but inconspicuous. Supra-anal plate very small, strongly transverse, very weakly produced, with distal margin broadly and very weakly convex. Subgenital plate with lateral margins moderately raised proximad; distinctly produced mesad, where, in distinct briefly separated sockets with ventral surface of plate there raised and convex, is situated on each side a brief knob-like protuberance which has its dorsal surface covered with minute chitinous spines directed mesad (these spines heavier than is normal in *C.*

[20] In allusion to the straight transverse bars of the face which suggest the bars of a gridiron (craticula).

punctulata); between these specialized styles the brief median portion of the plate is somewhat inset, but produced mesad in a very narrow cylindrical projection about three times as long as broad.[21] Face markings distinctive.

Allotype.—♀; same data as type. [American Museum of Natural History.]

Description of Allotype.—Similar to type except in the following features. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin broadly convex, showing scarcely any mesal emargination. Subgenital plate large, scoop-shaped, free margin proximo-laterad weakly convex, then even more weakly concave at base of cercus, thence as weakly convex to the produced apex, which is broadly rounded but slightly pinched due to the contour of the plate.

Measurements (in millimeters)

Mayaguez, Porto Rico.	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Type		8.9	2	2.7	8.9	2.4
Paratypes	(2)	8.5–8.7	2	2.7	8.8–9.2	2.4–2.5
♀						
Allotype		8.4	2	2.9	8.9	2.8
Paratype		8.9	2	2.8	9	2.6

The present very small series is constant in size, approximating the specimens of *punctulata* before us with longest tegmina, and shows little color variation as well.

Coloration.—Similar to the normal condition in *punctulata* except in the distinctive features of the facial pattern, which readily distinguish the present species from any other of the genus. Face pale with four straight transverse parallel dark brown bands; the first between the ventral portions of the eyes broad, the second between the weakly indicated ocellar spots much narrower, the third and fourth ventrad, but dorsad of the clypeal suture, narrow lines slightly less widely separated than the more dorsal is from the interocellar band. The picturing of the disk of the pronotum is distinct but not heavily defined, the tegmina are immaculate, while the limbs have at the bases of the heavier spines the dark brown flecks usually found in the species of the present genus.

[21] In one male before us this projection is clearly somewhat malformed; it is much shorter than in the other specimens and the chitinous spines covering the dorsal surfaces of the styles have their apices interlocking above it.

It is clear that the *punctulata* unit shows various specializations in both coloration and structure of the male subgenital plate. After careful consideration of the considerable series of this complex before us, we are convinced that none of the different conditions developed by that species have as yet progressed far enough, or become sufficiently constant, to warrant the recognition of geographic races. On the other hand it is evident that *reticulosa*, *craticula* and *cuprea* have, with *punctulata*, all been derived from a common ancestor, but have reached distinctive and constant degrees of specialization fully worthy of specific distinctions. Of these *reticulosa* shows very marked color specialization, accompanied by slight changes in the male subgenital plate; *cuprea* shows differences in the same features but developed along wholly distinct lines, while *craticula* not only shows distinctive features of facial color pattern, but also the maximum condition of specialization of the type of male subgenital plate found in the species placed by us in the first group of the West Indian complex.

Specimens Examined: 7; 4 males, 2 females and 1 immature male.

Mayaguez, Porto Rico, IV, 3, 1912, (C. W. Hooker), 1 ♀, *paratype*, [U. S. N. M.]; VI, 21 to 23, 1915, (Lutz and Mutchler; at light), 3 ♂, *type*, *paratypes*, [Am. Mus. Nat. Hist.]; VII, 24 to 29, 1914, (H. G. Barber), 1 ♂, 1 ♀, *paratype*, *allotype*, [Am. Mus. Nat. Hist.].

Adjuntas, Aguadilla, Porto Rico, VI, 8 to 13, 1915, (A. J. Mutchler; beating in high altitude forest), 1 juv. ♂, [Am. Mus. Nat. Hist.].

Cariblatta lutea lutea (Saussure and Zehntner) (Pl. XIII, fig. 3.)

1893. *Ceratinoptera lutea* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 48. [♂, ♀: Georgia; Louisiana.]

This insect, though being, with its geographic race, distinctive as the only species of the genus showing decided reduction in the organs of flight, is very closely related to *C. punctulata*. In fact the only diagnostic features besides those mentioned above are, the normally constant form of the median production of the male subgenital plate; the distinctly less slender form of the female and less produced subgenital plate, and in both sexes the buffy general coloration tinged with cinnamon (never olivaceous) to varying degrees. The male subgenital plate, though not more distinct from the typical condition found in *punctulatus* than are occasional specimens of that species showing abnormal features,[22] is

[22] See page 160, footnote 16.

constant in typical *lutea* in having the distal margin between the specialized styles rather broadly and weakly produced, the produced portion forming a strongly transverse rectangle.

The following features are found in a pair from Spring Creek, Georgia. ♂. Size small, form slender. Pronotum with point of greatest width distinctly caudad of the normal meso-caudal point in the species of the genus; caudal margin truncate, very weakly convex.[23] Tegmina moderately reduced, not quite reaching apex of abdomen, with four longitudinal discoidal sectors, the cross-veinlets very weakly defined.[24] Wings of equal length, reduced, the ulnar vein simple or forked, the intercalated triangle minute.[25] Supra-anal plate very small, strongly transverse, very weakly produced with distal margin very broadly convex and emargination weakly indicated mesad. Subgenital plate moderately produced, with lateral margins distinctly raised; styles weakly inset, these specialized as in *punctulata*; space between styles about one fourth of the free margin, this median portion symmetrically produced, truncate, the production transverse rectangulate and nearly three times as broad as long.[26]

♀. Agrees with the male except in the following features. Form distinctly less slender. Tegmina and wings rather decidedly reduced and showing the resultant coincident reduction in the

[23] As we have found elsewhere in the Blattidae, tegminal reduction appears to be accompanied by a broadening of the pronotum, with a lessening of the convexity of the caudal margin and a coincident shifting caudad of the point of greatest pronotal width. The pronotal features given above show rather this adjustment than what might appear to the casual observer to be features separating the present species widely from the other members of the genus.

[24] These features are exactly as would be expected in such cases of tegminal reduction; where moderate reduction is found in the present species five to four discoidal sectors are present, where moderately decided to decided reduction occurs five to three, four being usual in females of the typical race, three being frequently found in both sexes of *lutea minima*.

[25] These features are exactly as would be expected in such cases of wing reduction.

[26] The Lakeland specimens show a tendency toward *lutea minima*; the male has this production only twice as broad as long.

number of vein branches.[27] Supra-anal plate very similar, but showing a small, short, but rather decided, median concavity on the distal margin. The subgenital plate is much as found in this sex of *punctulata* but distinctly less produced, the median portion of the caudal margin being broadly rounded and the plate at this point not pinched.

Measurements (in millimeters)

♂	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Southern Pines, North Carolina	(1)	7.7	1.9	2.7	6.3	2
Spring Creek, Georgia	(1)	7.8	2.1	2.8	5.6	2
Natchez, Mississippi	(1)	8	2.1	2.7	6.6	2.1
Ormond, Florida	(2)	5.8–6	1.8	2.6–2.7	5.2–5.4	—
Lakeland, Florida	(1)	8.1	2	2.6	5.6	2.1
♀						
Raleigh, North Carolina	(2)	7.4–8.7	2.2–2.3	2.9–3.1	5–5.7	2.2–2.3
Southern Pines, North Carolina	(4)	7.2–9.5	2.2–2.3	2.8–3.1	4.9–6	2–2.4
Spring Creek, Georgia	(4)	7.5–8.3	2.2–2.4	2.9–3	5.2–5.7	2.1–2.2
Jacksonville, Florida	(2)	8–9.2	2.3–2.6	3.6	5.2–5.3	2.3–2.6
Lakeland, Florida	(1)	7	2.3	3.2	4.9	2.2
Baños San Vincente, Cuba	(1)	8.2	2.3	3.2	6	2.6

The specimens from Lakeland, Florida, show a slight tendency toward *lutea minima*. It is very surprising to find a specimen from Cuba which is apparently in every way typical of *lutea lutea*.

Coloration.—Head cinnamon, seldom varying to cinnamon buff; rarely immaculate, usually with a broad transverse band of bister between the eyes and often a narrower concave band of the same between the ocellar spots, rarely a third similarly narrow concave

[27] But four females of *lutea lutea*, (two, Jacksonville and one, Lakeland, Florida; one, Baños San Vincente, Cuba), show very great wing reduction, these organs being vestigial in these.

We have scarcely any material of the species from central peninsular Florida, where intergradation with the geographic race *lutea minima* probably occurs, and where this condition in intermediate females is probably frequently encountered.

band is found on the face, while a fourth, more ventral similar but much suffused band is weakly indicated in a few specimens.[28] Pronotum with lateral margins transparent with a very faint brownish suffusion, disk ochraceous tawny, varying rarely to warm buff, with a very fine picturing of snuff brown to bister, these markings normally decided, their pattern exactly as in *punctulata*, in very rare examples of maximum recessive coloration they are almost obliterated. Tegmina transparent tinged with ochraceous tawny, rarely with ochraceous buff (recessive), the veins translucent and very slightly darker. Wings, when not vestigial, hyaline, very weakly iridescent. Abdomen with dorsum of general coloration, heavily maculate (except in recessive condition) with blackish brown, venter normally heavily maculate with suffused blackish brown mesad, this not extending to subgenital plate, rarely (except in males) entirely pale, ventral surface with a faintly suggested narrow median line of dark brown and lateral dots of the same on each segment (recessive), or ventral surface blackish brown with paler lateral margins and narrow distal margin of subgenital plate (intensive, female). Limbs pinkish cinnamon (intensive) to warm buff (recessive), frequently flecked at the bases of the heavier spines with dark brown.

The males before us are of average distinctly recessive, the females of average moderately intensive, coloration.

The known distribution of the present geographic race is defined by the records given below and that of one of the types from Louisiana. In the southeastern United States it occurs northward and westward as far as Roanoke Island and Raleigh, North Carolina; Swansea, South Carolina; Thompsons Mills, Macon and Warm Springs, Georgia, and Natchez, Mississippi. In peninsular Florida intergradation with *lutea minima* probably occurs in the south-central section, material from Lakeland being referable to *lutea lutea* but showing some tendency toward *lutea minima*. This latter race is confined in distribution to southern peninsular Florida and the Florida Keys.

[28] These features, produced by recession and intensification in color pattern, are similarly found in *punctulata*, but in that species the maximum of intensification shows further decided differences from the normal.

Outside of the United States, *lutea lutea* is known from the single example before us from Baños San Vincente, Pinar del Rio, Cuba.

Specimens Examined: 54; 10 males, 32 females, 7 immature males and 5 immature females.

Roanoke Island, North Carolina, VII, 25, (G. P. Englehardt), 1 ♀, [Bklyn. Inst.]

Raleigh, N. C., VI, 8, 1905, 1 ♀, [A. N. S. P.]; VI, 23, 1904, (C. S. Brimley; under rubbish), 1 ♀, [Hebard Cln.].

Fayetteville, N. C., IX, 9, 1911, (Rehn and Hebard; under dead oak leaves), 1 juv. ♂, [Hebard Cln.].

Southern Pines, N. C., VI, 17 to VII, 22, 1914 and 1915, (A. H. Manee), 1 ♂, 4 ♀, [Davis and Hebard Cln.]; XI, 22, 1915, (A. H. Manee), 1 juv. ♂, [Hebard Cln.].

Wrightsville, N. C., IX, 7, 1911, (Rehn and Hebard), 1 juv. ♀, [A. N. S. P.].

Swansea, South Carolina, VIII, 6, 1911, (F. Knab) 1 ♀, [U. S. N. M.].

Thompson's Mills, Georgia, (H. A. Allard), 2 ♂, 1 ♀, 1 juv. ♀, [U. S. N. M.].

Macon, Ga., VII, 31, 1913, (Rehn and Hebard; undergrowth of short-leaf pine and oak woods), 1 ♀, not retained.

Warm Springs, Ga., VIII, 9 and 10, 1913, (Rehn; beaten from undergrowth), 1 ♀, 1 juv. ♀, [Hebard Cln.].

Albany, Ga., VIII, 1, 1913, (Rehn and Hebard; under needles in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Thomasville, Ga., XII, 31, 1902, (Hebard; in dead oak leaves), 3 juv. ♂, [Hebard Cln. and A. N. S. P.].

Spring Creek, Ga., VI, 7 to 23, 1911, (J. C. Bradley), 3 ♂, 5 ♀, [Ga. State Cln., A. N. S. P. and Hebard Cln.].

Isle of Hope, Ga. IX, 3, 1911, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

St. Simon's Island, Ga., IV, 22 to V, 12, 1911, (J. C. Bradley), 2 ♀, [A. N. S. P. and Ga. State Cln.].

Billy's Island, Okeefenokee Swamp, Ga., VI, 1912, (J. C. Bradley), 2 ♀, [Cornell Univ. and Hebard Cln.].

Suwannee Creek, Okeefenokee Swamp, Ga., VIII, 28, 1911, (Rehn and Hebard), 1 ♀, [A. N. S. P.].

Jacksonville, Florida, (T. J. Priddey), 2 ♀, [Hebard Cln.].

Atlantic Beach, Fla., VIII, 25, 1911, (Hebard; under boxes lying on short grass), 1 juv. ♂, [Hebard Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♀, [A. N. S. P.].

Ormond, Fla., III, 12 and 20, 1899, (W. S. Blatchley), 2 ♂, [A. N. S. P. and Hebard Cln.].

La Grange, Fla., IX, 10, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Lakeland, Fla., VI, 8, 1912, XI, 8, 1911, (W. T. Davis), 1 ♂, 2 ♀, [A. N. S. P. and U. S. N. M.].

Carrabelle, Fla., IX, 2 and 3, 1915, (Rehn and Hebard; beaten from heavy scrub in damp spot of sand dune area and from high bush, *Ilex lucida*, fringing inland swampy areas), 2 ♀, [Hebard Cln. and A. N. S. P.].

River Junction, Fla., VIII, 31, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Springhill, Mobile County, Alabama, VIII, 25, 1915, (Hebard; undergrowth in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Natchez, Mississippi, VI, 15, 1909, (E. S. Tucker; at sugar), 1 ♂, [U. S. N. M.]; IX, 14, 1915, (Rehn; beaten from low oak on hills), 1 small juv. ♀, [Hebard Cln.].

Baños San Vincente, Pinar del Rio, Cuba, IX, 16 to 22, 1913, (F. E. Lutz; moderately moist place in pasture land on valley floor), 1 ♀, [Am. Mus. Nat. Hist.].

Cariblatta lutea minima new subspecies (Pl. XIII, fig. 4.)

This geographic race differs from typical *lutea* in the average smaller size; average paler and more yellowish buff, rather than distinctly cinnamon, tones of general coloration; more decided tegminal reduction, particularly in the male sex, in which these organs show fully as much reduction as in the female; apparently always vestigial wings, and the median production of the male subgenital plate being much narrower than in typical *lutea*, very small and subquadrate, slightly longer than broad.

Type.—♂; Miami, Florida. March 3, 1915. (M. Hebard.) [Hebard Collection, Type No. 418.]

Description of Type.—Size very small, form slightly more robust than is normal in typical *lutea*. Pronotum with point of greatest width at the latero-caudal angles, caudal margin nearly straight, truncate. Tegmina decidedly reduced, reaching only to base of seventh dorsal abdominal segment; with three longitudinal discoidal sectors (thus the median vein branches but once) and no cross-veinlets. Wings vestigial. Supra-anal plate as in typical *lutea*. Subgenital plate as in that race but with specialized styles slightly closer to each other and production of intervening portion of distal margin very small, subquadrate, very slightly longer than wide.

Allotype.—♀; Miami, Florida. March 14, 1916. (M. Hebard.) [Hebard Collection.]

Description of Allotype.—Similar to type but larger and distinctly more robust. Pronotum slightly broader, caudal margin straight, truncate. Tegmina and wings much as in type, except that dextral tegmen has four discoidal sectors. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin showing a small, short, median concavity. Subgenital plate as in typical *lutea*.

Measurements (in millimeters)

♂	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
South Bay, Florida....	(11)	7–7.7	1.9–2.1	2.8–2.9	4.4–5	1.9–2
Everglade, Florida....	(10)	6.2–6.6	1.8–2.1	2.7–2.9	4.1–4.3	1.9–2
Miami, Florida.....*Type*		5.9	1.9	2.8	3.7	1.9
Miami, Florida	(1)	6.2	2	3.1	4	1.9
Long Key, Florida....	(4)	5.4–5.8	1.8–1.9	2.6–2.9	3.6–3.8	1.7–1.9
Key West, Florida....	(3)	6–6.5	1.9–2	2.7–2.9	3.8–3.9	1.8–1.9
♀						
South Bay, Florida...	(24)	7–8.8	2.2–2.3	2.9–3.3	4.5–4.7	2–2.2
Everglade, Florida....	(23)	6.2–8	2.2–2.3	2.8–2.9	4.1–4.7	1.9–2
Long Key, Florida....	(2)	6.5–7	2	2.7–3	3.8–3.9	1.8–1.9
Key West, Florida....	(4)	5.8–7.2	2–2.1	2.9–3	3.6–4	1.9

The flattening of the caudal margin of the pronotum is more pronounced in this race, which shows normally greater tegminal and wing reduction than does typical *lutea*.[29] The reduction in the discoidal sectors of the tegmina is also more decided, the number being normally three, rarely two or four, in the present series.

Specimens Examined: [30] 118; 44 males, 65 females, 5 immature males and 4 immature females.

Punta Gorda, Florida, XI, 14 to 16, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Fort Myers, Fla., III, 29 to V, 20, 1912, (W. T. Davis), 2 ♂, 2 ♀, [Davis Cln.].

Citrus Center, Fla., V, 2, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

South Bay, Lake Okeechobee, Fla., IV, 30 to V, 2, 1912, (W. T. Davis), 11 ♂, 24 ♀, 1 juv. ♀, [Davis Cln.].

Marco, Fla., IV, 19, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Everglade, Fla., IV, 5 to 13, 1912, (W. T. Davis), 10 ♂, 23 ♀, [A. N. S. P. and Hebard Cln.].

Chokoloskee, Fla., IV, 8, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Miami, Fla., III, 4, 1916, (Hebard; Musa Isle, under dead petioles of cocoanut palm on sandy soil in grapefruit grove), 8 ♂, 5 ♀, *paratypes*, *allotype*, 2 juv. ♂; III, 8, 1915, (Hebard; Brickell's Hammock, on ground under luxuriant undergrowth in opening of forest), 1 ♂, *type*, [Hebard Cln.]; III, 20, 1910, (Hebard), 1 ♂, *paratype*, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

[29] See page 166, footnote 23.

[30] A portion of the material here recorded, has been previously recorded as *Ceratinoptera lutea*.

Virginia Key, Fla., III, 11, 1915, (Hebard; under dark water-soaked leaves in heavy red mangrove, *Rhizophora mangle*, swamp), 1 juv. ♂, [Hebard Cln.].

Homestead, Fla., III, 17 to 19, 1910, (Hebard), 1 ♂, *paratype*; VII, 10, 1912, (Hebard; under board in everglades), 1 ♂, *paratype*, [both Hebard Cln.].

Key Largo, Fla., III, 18, 1910, (Hebard), 1 ♀, *paratype*, [Hebard Cln.].

Long Key, Fla., III, 13 and 17, 1910, (Hebard; under dead petioles of cocoanut palm on moist ground), 4 ♂, 3 ♀, *paratypes*, 2 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 20, 1904, (Hebard), 1 ♂; III, 15 to 16, 1910, (Hebard; under boards, short grass in open), 1 ♂, 4 ♀, 1 juv. ♀; VII, 7, 1912, (Rehn and Hebard; leaf mould in jungle key scrub), 1 ♂, [all Hebard Cln. and A. N. S. P.].

Cariblatta cuprea[31] new species (Pl. XI, figs. 6 and 7; Pl. XII, fig. 10.)

When compared with *C. punctulata*, the present species is found to differ in the stouter form, different coloration and character of color pattern, and in the male subgenital plate in slight differences of degree; in this last respect agreeing more nearly with *C. reticulosa*, a species otherwise even more widely separated. In general form, a decided resemblance is found to *C. punctipennis*, but, as the male sex of that species is unknown, its exact position can not be definitely determined.

Type.—♂; Stony Hill, St. Andrew Parish, Jamaica. October 25, 1913. (M. Hebard.) [Hebard Collection, Type No. 413.]

Description of Type.—Size small, form rather slender, appreciably more robust than *C. punctulata*. Maxillary palpi with third joint very elongate, fourth joint slightly shorter, fifth (distal) joint about two-thirds as long as fourth. Tegmina with cross-veinlets between discoidal sectors numerous but inconspicuous. Supra-anal plate very small, strongly transverse, very weakly produced, with distal margin very broadly convex and very weakly angulato-emarginate mesad. Subgenital plate moderately produced, laterad but little raised; distal margin convex, very slightly irregular, with scarcely any depression at styles, which are small rounded knobs distinctly wider than long, with dorsal surface heavily clothed with minute close set chitinous spines; the portion of the distal margin between these distinctly less than a third of the whole and transverse.[32] Coloration distinctive.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in following features. Form very slightly more robust. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin broadly convex but showing a brief but rather decided median concavity. Subgenital plate large, scoop-shaped,

[31] In allusion to the general coloration of the insect, which is much more coppery than in the other species of the genus.

[32] In one specimen before us a slight convexity of this median portion of the distal margin of the subgenital plate is apparent.

free margin proximo-laterad distinctly convex, then distinctly and broadly concave at base of cercus, thence distinctly convex to the produced apex, which is slightly pinched due to the contour of the plate.

Measurements (in millimeters)

Stony Hill, Jamaica.	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Type		8.2	2.1	3	9.7	2.8
Paratypes	(4)	7.8–8.4	2–2.3	2.8–3.1	9.2–9.8	2.6–2.8
♀						
Allotype		9	2.3	3.2	9.9	2.8
Paratypes	(4)	8.7–9.	2.3–2.4	3.1–3.2	9.6–9.7	2.7–2.8

The present series shows scarcely any variation either in size or coloration.

Coloration.—Head pale ochraceous tawny, obscured between the eyes with prout's brown, ventrad of this on the face are two weakly defined, narrow, weakly concave, transverse bands of prout's brown; ocellar spots conspicuous, cream color. Pronotum with lateral margins transparent with a very weak brownish suffusion; disk pale ochraceous tawny, immaculate except for two rather widely separated mesal dots of prout's brown; caudal margin of pronotum narrowly suffused with prout's brown. Tegmina transparent, tinged with brownish which shows a very slightly more tawny cast than in the other species of the genus. Wings transparent, hyaline, moderately iridescent; veins translucent brownish. Limbs and underparts weak ochraceous-tawny; the abdomen with a narrow submarginal line on each side of prouts brown, a dot of this color on each segment near the inner margin of this line. Limbs immaculate.

Specimens Examined: 11; 5 males, 5 females and 1 immature individual.

Stony Hill, St. Andrew Parish, Jamaica, X, 25, 1913, (Hebard; in leaves on leaf-mould in hillside forest), 5 ♂, 5 ♀, *type*, *allotype*, *paratypes*, 1 juv., [Hebard Cln.].

Cariblatta punctipennis new species (Pl. XII, figs. 11 to 13.)

As the male of this species is unknown, it can not be placed with as much certainty as the other species here discussed. The species in general form agrees best with *C. cuprea*. The widely scattered but conspicuous dots, everywhere present on the

tegmina, are a condition found pronounced in no other species of the genus.[33]

Type.—♀; Barbados. [Academy of Natural Sciences of Philadelphia, Type No. 5297.]

Description of Type.—Size and form very similar to *C. cuprea*. Maxillary palpi with third joint extremely elongate, fourth joint slightly shorter, fifth (distal) joint over two-thirds as long as fourth. Tegmina with cross-veinlets between discoidal sectors numerous and but weakly defined, except in area of dextral tegmen concealed when at rest, where they are well developed. Rather widely scattered dots on tegmina situated on veins everywhere over exposed surfaces when at rest, under binocular microscope each is found to constitute the base for a minute but stout hair. Supra-anal plate very small, strongly transverse, very weakly produced, with distal margin very broadly convex and with a rather broad and shallow concave emargination mesad. Subgenital plate large, scoop-shaped, distal margin distinctly convex proximo-laterad, then distinctly but broadly concave at base of cercus, thence distinctly convex to the produced apex which is pinched due to the contour of the plate.

Measurements (in millimeters)

♀	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Barbados, *type*		7.8	2.4	3	9.3	2.8
Long Ditton, Dominica *paratype*		7.9	2.3	3	9.6	2.9
Laudet, Dominica *paratypes*	(3)	8.3–9.2	2.3–2.4	3 –3.1	8.7–9.8	2.9–3.1

Coloration.[34]—Head entirely honey yellow (recessive), with a brownish suffusion between the eyes and traces of apparently vertical lines ventrad on the face of the same color (intensive). Pronotum with lateral margins transparent with a very weak brownish suffusion (recessive); suffusion buffy and more decided than in any other species of the genus (intensive). Disk of pronotum chamois, with a very few dots of prout's brown (recessive); or dots numerous and a cinnamon brown suffusion present (intensive). Tegmina transparent tinged with brownish, with all portions visible when at rest showing rather widely scattered

[33] Similar dots are present on the tegmina of Brunner's *Phyllodromia conspersa*, an aberrant South American member of the genus *Neoblattella*, which, however, shows no divergence toward the present complex.

[34] The type represents the extreme of recessive coloration found in the present small series.

dots of prout's brown. Wings hyaline, moderately iridescent; veins translucent brownish. Limbs and underparts immaculate warm buff (recessive); limbs with minute dots of blackish brown at base of each larger spine, abdomen with a heavy proximomesal maculation and dots laterad on each segment of the same color, but subgenital plate immaculate (intensive).

Specimens Examined: 5; 5 females.

Long Ditton, Dominica, VI, 20, 1911, (Crampton and Lutz), 1 ♀, *paratype*, [Am. Mus. Nat. Hist.].

Laudet, Dominica, VI, 11 to 13, 1911, (Crampton and Lutz), 3 ♀, *paratypes*, [Am. Mus. Nat. Hist. and Hebard Cln.].

Barbados, 1 ♀,[35] *type*, [A. N. S. P.].

Cariblatta insularis (Walker) (Pl. XI, figs. 8 to 12; Pl. XII, figs. 14 to 16.]

1868. *Blatta insularis* Walker, Cat. Blatt. Br. Mus., p. 101. [♀, Jamaica.,

1893. *Theganopteryx* (*Pseudectobia*) *antiguensis* Saussure and Zehntner) Biol. Cent.-Amer., Orth., i, p. 17. (In part ?) [♀, Antigua; ♀, Cuba.]

The description of *antiguensis* leaves no doubt that it belongs to the present genus,[36] and the material from Antigua is described as having the markings near the bases of the humeral and anal veins of the tegmina, which constitute a feature readily distinguishing the present species from any other of the present complex. The brief description of the Cuban female as a variety of *antiguensis*, is too short and indefinite to reveal any diagnostic features of value; the likelihood is that it represents an example of *C. punctulata*.

In general appearance the present insect suggests *C. punctulata*, but upon closer examination it is seen to be very widely separated from that species, differing in striking features of color pattern of which the cephalic markings and proximal maculations of the tegmina are distinctive from any other species of the genus, as is also the form of the male subgenital plate and of the styles.

The following features are as found in a pair from Montego Bay, Jamaica. ♂. Size small, form slender. Cross-veinlets between discoidal sectors of tegmina numerous but inconspicuous. Supra-anal plate similar to that of *C. punctulatus*. Subgenital

[35] This specimen has been incorrectly recorded by Rehn as a male of "*Blattella*" *conspersa* (Brunner). Ent. News, XVI, p. 175, (1905).

[36] The species has already been referred to the genus *Phyllodromia* by Shelford. Ann. Mag. Nat. Hist., (7), xix, p. 36, (1907).

plate moderately produced, the lateral portions bent strongly upward leaving lateral margins dorsal in position; the short remaining median portion projecting caudad beneath the lateral portions which, curving mesad, nearly meet above it. This short median portion has the distal margin briefly curved upward and nearly transverse. At the base of the sinistral cleft between the lateral and mesal portions, is situated a chitinous thorn, curving regularly upward with sharp apex adjacent to the apex of the sinistro-lateral portion; at the base of the dextral cleft, is situated a rounded knob, slightly wider than long, with dorsal surface covered with small chitinous spines.[37] The form of the subgenital plate is symmetrical and is such that with the supra-anal plate, when in normal position, the specialized styles are almost hidden and the anal orifice nearly closed.

♀. Agrees with male except in the following features. Form very slightly less slender. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin broadly convex but showing a rather broad, shallow median concavity. Subgenital plate similar to that of *punctulata* but with distal median portion somewhat wider.[38]

Measurements (in millimeters)

	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Montego Bay, Jamaica	(11)	7.7–8.3	1.8–2.1	2.7–2.9	8–9	2.3–2.6
♀						
Montego Bay, Jamaica	(9)	8–9.4	1.8–2.1	2.9–3	8.3–8.9	2.7–2.8

Coloration.—Head with vertex dark mummy brown to near point of narrowest interocular space, thence a large cream colored marking extends nearly to base of the antennae and is terminated ventrad by four rounded projections, its form thus resembling an inverted crown,[39] ventrad this is mummy brown with a median

[37] It is evident that these projections represent the styles in this distinctive species; the sinistral being of a type found nowhere else in the genus, but the dextral is similar to those found in *reticulosa*, *punctulata* and *cuprea*.

[38] Females of the species are more readily separated by the distinctive features of coloration rather than by structural characters.

[39] The lateral projections of this inverted crown are in part formed by the cream colored ocellar spots, this fusion making the latter inconspicuous.

dot and an indistinct transverse line of cinnamon-buff to the clypeus, which is of the paler coloration. Pronotum with lateral margins transparent with a brownish tinge; disk saccardo's umber with a few points of darker brown and numerous dots and lines of buffy, the caudal margin often narrowly suffused with bister. The pattern suggests that of *punctulata* but, as the darker coloring is more diffuse, the paler portions appear as dots and dashes rather than as the ground color. Tegmina transparent clear tawny olive with small elongate dark brown maculations, one at base of the anal vein, the other slightly distad on the discoidal vein.[40] Wings hyaline, moderately iridescent; veins almost colorless. Abdomen cinnamon buff with a few lateral indistinct maculations of darker brown. Limbs pale cinnamon buff, the tibiae at the bases of the spines frequently flecked with darker brown.

Specimens Examined: 22; 11 males, 9 females, 2 immature individuals.

Montego Bay, St. James Parish, Jamaica, III, 19, 1911, (J. A. Grossbeck; beating shrubbery), 1 ♀, [Am. Mus. Nat. Hist.]; X, 29 to XI, 3, 1913, (Hebard; moderately numerous and the most frequent Orthopteron encountered in bromeliads growing on the limbs of trees), 11 ♂, 8 ♀, 2 juv., [Hebard Ch. and A. N. S. P.].

Cariblatta fossicauda[41] new species (Pl. XI, figs. 13 to 17, Pl. XII, figs. 17 and 18.)

In general appearance the present insect is almost identical with *C. aediculata* and further closely resembles *C. imitans*. Like in each of those species, however, the male genitalia are entirely different from those of any other species of the genus. When compared with *aediculata*, the present species is seen to be slightly smaller and less robust; the maxillary palpi are not as elongate; the tegmina and wings are shorter and the latter proportionately decidedly wider, not as clearly hyaline, with veins and veinlets more decided. In the female, the supra-anal plate shows no distinct mesal notch and the subgenital plate is less produced, with distal portion not roundly truncate.

Though in appearance one of the most inconspicuous species of the genus, the male subgenital plate shows the greatest specialization found in *Cariblatta*.

[40] These markings, though varying somewhat in intensity, are present in every specimen before us and represent a feature peculiar to the present species.

[41] In allusion to the singular channels (fossa) of the male subgenital plate.

Type.—♂, Caparo, Trinidad. August, 1913. (S. M. Klages.) [Hebard Collection, Type No. 415.]

Description of Type.—Size small, form rather slender, slightly more so than in *C. aediculata*. Maxillary palpi as in *C. imitans*, with fifth (distal) joint about three-quarters as long as fourth. Tegmina with numerous cross-veinlets between discoidal sectors weakly indicated, except in portion of dextral tegmen concealed when at rest. Supra-anal plate very small, transverse, distinctly but not strongly triangularly produced with apex rounded. Subgenital plate with dextral surface convex and curving inward above sinistral portion; sinistral portion strongly and narrowly produced sinistrad, with lateral margins parallel and ventral surface transversely convex, this production truncate distad with angles rounded; adjacent to this production dextrad is another lesser production, with lateral margins convergent and ventral surface transversely convex, this briefly truncate disto-sinistrad and briefly and roundly produced disto-dextrad. The greater portion of the plate is occupied by these two channeled processes. Within the apex of the sinistral production lies normally concealed a rather thin circular disk, with free margin thickly clothed with microscopic chitinous spines arranged in a whorl; within the niche formed by the distal truncate portion of the dextral process lies normally concealed a rather thin but moderately broad projection, longer than broad, with apex clothed with minute chitinous spines.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with the male sex except in the following features. Form very slightly more robust. Tegmina very slightly shorter. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin nearly transverse in greater part, this margin weakly convex laterad and very weakly emarginate mesad. Subgenital plate large but not as large as in the majority of the species of the genus, scoop-shaped, distal margin proximo-laterad decidedly convex, then as decidedly concave at base of cercus, thence moderately convex to the moderately produced apex which is somewhat obtuse-angulate emarginate, the apex being distinctly less produced than in *aediculata*.

Measurements in (millimeters)

Caparo, Trinidad.	Number of specimen	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Type		8.3	2	2.7	8.7	2.6
Paratypes	(24)	8.3–9.5	1.9–2	2.6–2.8	8–9	2.3–2.7
♀						
Allotype		9.4	2.2	2.8	8.1	2.7
Paratypes	(15)	8.8–10.2	2.1–2.3	2.7–2.9	8.3–9	2.4–2.7

Coloration.—Head with vertex and face tawny olive, ventrad between eyes a broad weakly defined band of bister, ventrad of this a narrower, concave, weakly defined band of the same color between the ocellar spots and on the face two very narrow, mesally

interrupted, transverse bands of this color, (a slightly obscured type of the normal color pattern for the genus, see p. 155, footnote 10). Pronotum with lateral margins transparent with a brownish tinge; disk warm buff with picturing of minute lines of dresden brown and dots of mummy brown; form of colored portion of pronotum more noticeably octagonal than usual but with angles blunted. Tegmina transparent tinged with brownish; the veins pale, but the cross-veinlets dresden brown. Wings hyaline, with a weak iridescence; veins and distal cross-veinlets weakly brownish. Ventral surface of abdomen pinkish buff; ♂, with a suffused dark brown maculation at the apex of the caudal trochanter, sometimes this is almost wholly absent (recessive), while rarely it becomes a diffused band which is broad and heavy proximad, but very narrow and much broken distad (intensive); ♀, with a suffused dark brown blotch at the base of the caudal trochanter. Limbs warm buff, sometimes with minute flecks of brown at the bases of the heavier spines.

Specimens Examined: 42; 25 males and 17 females.

Caparo, Trinidad, VI, 1913, (S. M. Klages), 1 ♂, *paratype*, [A. N. S. P.]; VIII, 1913, (S. M. Klages), 24 ♂, 17 ♀, *type*, *allotype*, *paratypes*, [Hebard Cln.].

Cariblatta aediculata[42] new species (Pl. XI, figs. 18 and 19; Pl. XII, figs. 19 and 20.)

Individuals of the present species, though in general appearance suggesting only unusually large examples of *C. fossicauda*, may be readily separated by a number of excellent diagnostic characters, as given under that species. The form of the male subgenital plate and particularly its appendages, are distinctive.

Type.—♂; Caparo, Trinidad. August, 1913. (S. M. Klages.) [Hebard Collection, Type No. 414.]

Description of Type.—Size small, form but moderately slender, very much as in *C. imitans*. Maxillary palpi slightly longer than in *imitans*, with fifth (distal) joint slightly more than two-thirds as long as fourth joint.[43] Tegmina with numerous cross-veinlets between discoidal sectors distinct in distal part of sinistral tegmen and in portion of dextral tegmen concealed when at rest, fully as decided as in *imitans*. Supra-anal plate very small, transverse, weakly produced, with lateral margins weakly convex and with a very weak

[42] In allusion to the niches (aediculae) formed by the distal margin of the subgenital plate, in each of which are situated two appendages.

[43] In several specimens of the present species before us, the maxillary palpi, at least on one side, show varying degrees of deformity, the joints in such cases being sometimes distinctly less elongate than is normal.

median emargination. Subgenital plate with free margin proximo-laterad very briefly straight and horizontal, then abruptly and sharply declivent, thus rectangulate at the base of the cereus; bearing ventrad of the base of the cereus a small, smooth, stout finger with its external surface concave and rounded apex supplied with several minute chitinous spines, and immediately ventrad of this a minute, conical style with apex very sharply rounded; the entire distal portion of this margin is produced beyond this point with acute angulate, slightly divergent projections which extend slightly beyond the apices of the styles; the median portion of the margin is transverse.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in the following features. Form somewhat more robust. Tegmina proportionately shorter than in male, not as much so as in *imitans*. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin weakly triangularly produced with apex rather narrowly but decidedly rotundato-emarginate. Subgenital plate large, scoop-shaped; free margin proximo-laterad decidedly convex, then distinctly but not as strongly concave at base of cereus, thence convex to an equal degree to the decidedly produced apex.

Measurements (in millimeters)

Caparo, Trinidad. ♂	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type		8.6	2.3	3	10.3	3
Paratypes	(3)	9.2–9.7	2.3–2.4	3–3.1	9.6–10	3–3.1
♀						
Allotype		10.9	2.7	3.2	9.4	2.9
Paratypes	(5)	9.8–10.8	2.6–2.7	3.2–3.4	8.9–9.7	2.9–3.1

Coloration.—Almost identical with that of *C. fossicauda*, excepting that in both sexes the markings of the ventral surface of the abdomen are as heavy normally, as in the maximum condition of intensive coloration in that species, sometimes being distinctly more extensive, that of the female occasionally reaching to the base of the subgenital plate.

Specimens Examined: 11; 5 males and 6 females.

Caparo, Trinidad, VI, 1913, (S. M. Klages), 1 ♂, *paratype*, [A. N. S. P.]; VIII, 1913, (S. M. Klages), 4 ♂, 6 ♀, *type*, *allotype*, *paratypes*, [Hebard Cln.].

Cariblatta imitans new species (Pl. XI, fig. 20; Pl. XII, fig. 21.)

In general appearance this species closely resembles *C. fossicauda* and *C. aediculata* but with the inconspicuous color pattern of head and pronotum somewhat obscured. The species is distinctive in the genus in having the male subgenital plate simply formed and bearing two unspecialized styles.

Type.—♂; Corozal, Canal Zone, Panama. November 17, 1913. (M. Hebard.) [Hebard Collection, Type No. 412.]

Description of Type.—Size small, form but moderately slender, with *C. aediculata* representing the stoutest condition found in the genus. Maxillary palpi with third and fourth joints very elongate, fifth (distal) joint about two-thirds as long as fourth. Tegmina with cross-veinlets between discoidal sectors numerous and distinct, particularly in portion of dextral tegmen concealed when at rest, more so than in any other species of the genus except *C. reticulosa* and *C. aediculata*. Supra-anal plate very small, distinctly but not strongly triangularly produced. Subgenital plate moderately produced and but little raised toward distal margin, this margin with lateral portions very weakly concave to mesal third, at this point on each side the margin is very briefly notched, from which emargination on each side springs a minute simple cylindrical style, about four times as long as broad, with apex narrowly rounded; between these styles the median fourth of the margin is transverse with a very weak suggestion of bilobation.

Allotype.—♀; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in following features. Form distinctly more robust. Tegmina proportionately distinctly shorter. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin showing a slight median emargination, which gives a general weakly bilobate outline. Subgenital plate large, scoop-shaped, much as in *aediculata*, more produced than in *C. punctulata*.

Measurements (in millimeters)

Corozal, Panama.	Length of body.	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂					
Type	8.8[41]	2.3	2.9	9.5	2.8
Paratype	8	2.2	2.8	9.4	2.7
♀					
Allotype	10.5	2.4	3.2	8.7	2.6
Paratype	10.3	2.4	3.2	8.8	2.7

Coloration.—Head with vertex mikado brown, ventrad between the eyes clouded with warm sepia; ventrad of the antennal sockets pinkish cinnamon, shading to buffy toward the clypeus. Pronotum with lateral margins transparent with a brownish tinge; disk warm buff faintly washed to varying degrees in the specimens before us with ochraceous tawny, with numerous obscured markings (of the pattern of the pencilling and dots in *aediculata* but more obscured and recessive) of darker brown (in individuals

[41] The abdomen of this specimen has been squeezed out about half a millimeter beyond its probable normal length.

before us as russet to ochraceous-tawny and prout's brown). Tegmina transparent tinged with brownish; the veins slightly darker, the distal cross-veinlets conspicuous tawny-olive. Wings hyaline, not iridescent; veins and numerous distal cross-veinlets tawny-olive. Antennae, limbs and ventral surface of abdomen warm buff, the latter with a proximal medio-longitudinal suffusion of dark brown. Limbs with traces of minute darker flecks at bases of heavier spines.

Specimens Examined: 4; 2 males and 2 females.

Corozal, Canal Zone, Panama, XI, 17, 1913, (Hebard; among loose leaves lying on leaf-mould in heavy jungle), 2 ♂, 2 ♀, *type, allotype, paratypes*, [Hebard Cln.].

EXPLANATION OF PLATES

Plate XI

Supra-anal and subgenital plates greatly enlarged. Genital appendages highly magnified.

Fig. 1.—*Cariblatta reticulosa* (Walker). ♂. Stony Hill, Jamaica. Ventral view of subgenital plate.

Fig. 2.—*Cariblatta punctulata* (Beauvois). ♂. San Francisco Mountains, San Domingo. Ventral view of subgenital plate.

Fig. 3.—*Cariblatta punctulata* (Beauvois). ♂. Jésus del Monte, Cuba. Concealed genital hook (termed titillator penis by Shelford).

Fig. 4.—*Cariblatta craticula* new species. ♂, *type*. Mayaguez, Porto Rico. Ventral view of subgenital plate.

Fig. 5.—*Cariblatta craticula* new species. ♂, *type*. Ventro-caudal view of subgenital plate.

Fig. 6.—*Cariblatta cuprea* new species. ♂, *type*. Stony Hill, Jamaica. Ventral view of subgenital plate.

Fig. 7.—*Cariblatta cuprea* new species. ♂, *type*. Specialized style. This type found also in *reticulosa*, *punctulata* and *craticula*.

Fig. 8.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Ventral view of subgenital plate.

Fig. 9.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Caudal view of subgenital plate with specialized styles visible.

Fig. 10.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Sinistral specialized style.

Fig. 11.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Dextral specialized style.

Fig. 12.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Concealed genital hook.

Fig. 13.—*Cariblatta fossicauda* new species. ♂, *type*. Caparo, Trinidad. Ventral view of subgenital plate.

Fig. 14.—*Cariblatta fossicauda* new species. ♂, *type*. Caparo, Trinidad. Ventro-caudal view of subgenital plate.

Fig. 15.—*Cariblatta fossicauda* new species. ♂, *type*. Caparo, Trinidad. Dorsal view of supra-anal plate. This type is found throughout the genus.

Fig. 16.—*Cariblatta fossicauda* new species. ♂, *paratype*. Caparo, Trinidad. Dextral concealed specialized style.

Fig. 17.—*Cariblatta fossicauda* new species. ♂, *paratype*. Caparo, Trinidad. Sinistral concealed specialized style.

Fig. 18.—*Cariblatta aediculata* new species. ♂, *type*. Caparo, Trinidad. Ventral view of subgenital plate.

Fig. 19.—*Cariblatta aediculata* new species. ♂, *type*. Caparo, Trinidad. Ventro-caudal view of subgenital plate.

Fig. 20.—*Cariblatta imitans* new species. ♂, *type*. Corozal, Panama. Ventral view of subgenital plate.

Plate XII

Figures greatly enlarged

Fig. 1.—*Cariblatta reticulosa* (Walker). ♂. Stony Hill, Jamaica. Cephalic view of head.

Fig. 2.—*Cariblatta reticulosa* (Walker). ♂. Stony Hill, Jamaica. Dorsal view of pronotum.

Fig. 3.—*Cariblatta reticulosa* (Walker). ♂. Stony Hill, Jamaica. Dorsal view of sinistral tegmen.

Fig. 4.—*Cariblatta punctulata* (Beauvois). ♂. San Francisco Mountains, San Domingo. Cephalic view of head.

Fig. 5.—*Cariblatta punctulata* (Beauvois). ♂. San Francisco Mountains, San Domingo. Lateral outline of maxillary palpus.

Fig. 6.—*Cariblatta punctulata* (Beauvois). ♂. San Francisco Mountains, San Domingo. Dorsal view of pronotum. (Moderately intensive color pattern.)

Fig. 7.—*Cariblatta punctulata* (Beauvois). ♂. Jésus del Monte, Cuba. Dorsal view of pronotum. (Maximum recessive color pattern.)

Fig. 8.—*Cariblatta punctulata* (Beauvois). ♀. San Francisco Mountains, San Domingo. Ventral outline of subgenital plate.

Fig. 9.—*Cariblatta cruticula* new species. ♂, *type*. Mayaguez, Porto Rico. Cephalic view of head.

Fig. 10.—*Cariblatta cuprea* new species. ♂, *type*. Stony Hill, Jamaica. Dorsal view of pronotum.

Fig. 11.—*Cariblatta punctipennis* new species. ♀, *type*. Barbados. Dorsal view of pronotum. (Maximum recessive color pattern.)

Fig. 12.—*Cariblatta punctipennis* new species. ♀. Laudet, Dominica. Dorsal view of pronotum. (Intensive color pattern.)

Fig. 13.—*Cariblatta punctipennis* new species. ♀, *type*. Barbados. Dorsal view of sinistral tegmen.

Fig. 14.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Cephalic view of head.

Fig. 15.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Dorsal view of pronotum.

Fig. 16.—*Cariblatta insularis* (Walker). ♂. Montego Bay, Jamaica. Dorsal view of sinistral tegmen.

Fig. 17.—*Cariblatta fossicauda* new species. ♂, *type*. Caparo, Trinidad. Lateral outline of maxillary palpus.

Fig. 18.—*Cariblatta fossicauda* new species. ♂, *type*. Caparo, Trinidad. Dorsal view of pronotum.

Fig. 19.—*Cariblatta aediculata* new species. ♂, *type*. Caparo, Trinidad. Lateral outline of maxillary palpus.

Fig. 20.—*Cariblatta aediculata* new species. ♂, *type*. Caparo, Trinidad. Dorsal view of pronotum.

Fig. 21.—*Cariblatta imitans* new species. ♂, *type*. Corozal, Panama. Dorsal view of pronotum.

Plate XIII

Fig. 1.—*Cariblatta punctulata* (Beauvois). ♀. Adjuntas, Porto Rico. Showing maximum size and maximum development of organs of flight. (X $4\frac{1}{2}$)

Fig. 2.—*Cariblatta punctulata* (Beauvois). ♂. San Francisco Mountains, San Domingo. Showing normal size and normal development of organs of flight. (X $4\frac{1}{2}$)

Fig. 3.—*Cariblatta lutea lutea* (Saussure and Zehntner). ♂. Ormond, Florida. Showing normal size and normal development in this sex of organs of flight. (X $4\frac{1}{2}$)

Fig. 4.—*Cariblatta lutea minima* new subspecies. ♂. Homestead, Florida. Showing normal size and extreme reduction in the species of the genus in the organs of flight. (X $4\frac{1}{2}$)

Explanation of diagram of fully developed tegmen and wing in *Cariblatta*.

1. Marginal Field. Marginal or Mediastine Field (Brunner); Mediastine Area (Saussure); Basal Area (Saussure and Zehntner); Mediastinal Area (Shelford).
2. Scapular Field. Scapular Field (Brunner); Costal Area (Saussure). [1 and 2 termed Marginal Field (Saussure, Saussure and Zehntner); Marginal Area (Shelford).]
3. Discoidal Field. Discoidal Field (Saussure, Saussure and Zehntner); Discoidal Area (Shelford).
4. Anal Field. Anal Field (Brunner, Saussure, Saussure and Zehntner); Anal Area (Shelford).
5. Anterior Field. Anterior Field (Saussure and Zehntner). [Portion to discoidal vein termed Marginal Field (Saussure).] [Portion between discoidal vein and first radiate vein termed Discoidal Field (Saussure).]
6. Intercalated Triangle. Triangular Apical Field (Brunner); Intercalated or Reflexed Field (Saussure); Triangular Apical Area (Shelford).
7. Posterior Field. Posterior Field (Saussure and Zehntner). [Portion included between axillary vein and its branches termed Intermediate or Axillary Field (Saussure and Zehntner).] [Portion included between radiate veins termed Anal Field (Brunner, Saussure); Posterior Field (Saussure); Radiate Field (Saussure and Zehntner).]

Ms. Mediastine Vein. Mediastine Vein (Brunner; Saussure; Saussure and Zehntner); Mediastinal Vein (Shelford).

D. Discoidal Vein. Scapular or Principal Vein (Brunner); Humeral Vein (Saussure); Discoidal Vein (Saussure and Zehntner); Radial Vein (Shelford).

C. Costal Veins. Costal Veins of Authors.

M. Median Vein. Median Vein (Brunner, Saussure, Saussure and Zehntner); Median or Ulnar Vein (Shelford).

Mr. Branches of Median Vein. Rami of Median Vein (Saussure and Zehntner).

U. Ulnar Vein. Infra-Median Vein (Brunner); Discoidal Vein (Saussure); Ulnar Vein (Saussure and Zehntner, Shelford). When two veins are found in wing between the median and anal veins these are termed Anterior Ulnar and Posterior Ulnar (Saussure and Zehntner, Shelford).

A. Anal Vein. Anal Vein (Brunner (in tegmen only), Saussure, Shelford); Anal Sulcus (Saussure and Zehntner). In wing termed Dividing Vein (Brunner); Anal or Dividing Vein (Saussure and Zehntner, Shelford).

Ax. Axillary Vein. In tegmen Axillary Veins of Authors. In wing Axillary Veins (Saussure and Zehntner, Shelford); including radiate veins, Axillary Nervures (Brunner).

R. Radiate Veins. Radiate Veins (Saussure and Zehntner).

CONTRIBUTIONS TOWARD A MONOGRAPH OF THE MUTILLIDAE AND THEIR ALLIES OF AMERICA NORTH OF MEXICO

BY JAMES CHESTER BRADLEY

As a result of five years collecting in Georgia, I some time ago became much interested in the study of our southern Mutillidae. With the lapse of years this interest has widened, and it has been my good fortune recently to have nearly three months of uninterrupted leisure, which I have devoted entirely to the study of this family and its allies. Much more material must be gathered, especially from the Southwest, before anything like a satisfactory monograph of the Mutillidae of the United States can be undertaken. At present I wish to present, as a result of my recent work, several papers contributory to our knowledge of the family.

When the study of a group of insects approaches in any locality what one might term a quantitative stage, we begin to feel some confidence in the degree of completeness of our knowledge of it in that place. This stage has been approached by the very extensive collections of Mutillidae made by Mr. Nathan Banks in eastern Virginia. I wish to express to him my sincere appreciation of his kindness in permitting me to study his entire collections from that region. His material has pointed toward the solution, or actually solved, many questions that have arisen in this work.

I also wish to express my obligations to the following gentlemen for the loan of material: Mr. G. P. Engelhardt, collections from Long Island; Mr. Wm. T. Davis, collections made in Georgia and Florida; Dr. William A. Hilton, collections from southern California, belonging to Pomona College; Mr. C. M. Greene, collections from New Jersey and Virginia; Mr. Franklin Sherman, Jr., collections from North Carolina; Mr. Carl Schaeffer, the eastern Mutillidae of the Brooklyn Museum; Dr. Frank E. Lutz, collections from Florida belonging to the American Museum of Natural History; and Dr. Leonard Haseman, specimens from Missouri.

In describing colors in the papers that follow I have used the terms as defined by Ridgway.[1]

The classification of the family Mutillidae is moot. I do not believe that there is at present any firmer basis than personal opinion or prejudice for answering certain queries that arise in regard to genera, their status and relations. As time permits I hope to undertake a comparative study of the genitalia of the males with the hope of solving some of these questions. In the mean time I do not wish to express more than a tentative opinion in regard to the status of such groups as *Pseudomethoca*, *Dasymutilla*, *Sphaerophthalma*, *Photopsis*, etc. *Ephuta* Say and *Timulla* Ashmead are on the other hand, clearly defined groups certainly deserving of generic differentiation from the other North American Mutillidae.

The attempt made by the late Dr. Ashmead to divide the Mutillidae into two subfamilies and four tribes, or any number of either, is entirely untenable. With this statement I believe any one will agree who may base his conclusions upon a knowledge of the characters presented by the known species, rather than upon an enthusiasm for a pigeon-hole system of classification.

To any one who wishes to settle for himself the validity of the Ashmeadian classification I would suggest the following comparisons:

a). Compare the shape of the petiole of *waco* female and male (type of *Pycnomutilla*) with that of *harmonia* female (type of *Bruesia*) and *bexar* male (pretty certainly the male of *harmonia*). The former are placed by Ashmead in the Ephutinae characterized only by having the first segment petiolate, the latter in Mutillinae distinguished by having it sessile. Compare carefully the females of *waco* and *harmonia*, noting the shape of the head, thorax, eyes, clypeus, first segment, and character of the pygidium. Is there any basis apparent for their generic differentiation? Compare the males of *waco* and *bexar*, noting especially the characteristic crest of hairs on the second ventral segment. Despite the short wings of *waco* is their generic identity not strongly indicated?

[1] Color standards and color nomenclature. By Robert Ridgway . . . Washington, D. C., published by the Author, 1912. 1 p. l., iv, 44 p. 53 col. pl.

b). Examine the petioles of *pluto* (type of *Neophotopsis*), *imperialis* (type of *Photopsis*), *exogyrus* (type of *Odontophotopsis*), *helicaon* (*Photopsis*), and *albicincta* (*Photopsis*). These are all supposed to be sessile and to belong to the Mutillinae. Compare with them the petioles of *pennsylvanica* (=*scaeva*, type of *Sphaerophthalma*), *lepeletierii* (a *Dasymutilla*), and the male of *waco* (type of *Pycnomutilla*). These three are placed by Dr. Ashmead in the Ephutinae, characterized by petioliform first segments.

c). Compare the eyes of the female *grandiceps* (type of *Myrmilloides*) and the female of *canadensis* (type of *Pseudomethoca*) with *simillima* or *montivaga* (one of which is doubtless the female of *sanbornii*, type of *Nomiaephagus*). In *Nomiaephagus* the eye is supposed to be "small, rounded, hemispherical *or ellipsoidal*, prominently convex, smooth and highly polished, not facetted or with the facets vaguely defined" and therefore to belong to the tribe Photopsidini. The two former (i. e. *grandiceps* and *canadensis*), are supposed to have their eyes "larger, not rounded or hemispherical, ovate, obovate *or ellipsoidal*, always distinctly facetted." Do the specimens carry out the distinction, if there be any? Is the distinction as stated a wise one for the recognition of two tribes? Before deciding about the facetting, compare a number of specimens of each species and also of *waco*, *propinqua*, and *nana* (in the latter two they are supposed not to be facetted). Compare the eyes of the males of the first mentioned species, including *sanbornii*.

d). Compare the eyes of *exogyrus* (type of *Odontophotopsis*), *pluto* (type of *Neophotopsis*), *nana* (type of *Micromutilla*), and *imperialis* (type of *Photopsis*), all of which are supposed to have the eyes "small, rounded, etc.," (and all of which really have extraordinarily large, bead-like eyes) with the males of *grandiceps* (type of *Myrmilloides*) and *canadensis* (type of *Pseudomethoca*), in both of which they are said to be "larger, not rounded, etc." The reverse as to size is most emphatically the case. Furthermore the eyes of *nana* are strongly facetted, although placed in the Photopsidini where they are supposed not to be.

e). Examine the mandibles of *sanbornii* (type of *Nomiaephagus*) and of *bexar* (probable male of *harmonia*, type of *Bruesia*).

They show no trace of the inferior incision which is supposed to separate them from certain other genera.

f). Compare the wings of several specimens of *imperialis* and of *pluto* (type of *Neophotopsis*). The former is supposed to have two, the latter only one, recurrent vein, that being the method of distinguishing between the two genera. In *imperialis* the second recurrent vein is represented by a very faint color mark, sometimes perceptible with difficulty and for only part of its length. In *pluto* it is usually less distinct, but sometimes faintly indicated. Is it an acceptable character for separating genera and groups of genera?

The following table will illustrate the classification of the Mutillidae, albeit a tentative one, used in the present series of papers.

GENERA	SUBGENERA	CHIEF SYNONYMS	TYPE SPECIES	EQUIVALENT SPECIES GROUPS OF FOX'S CLASSIFICATION
Hyperallobia André	. . . . .	. . . . .	*grandiceps* Blake	*grandiceps*
Psalmathoa Ashmead	*Psalmathoa* Ashmead	. . . . .	*canadensis* Blake	*canadensis* (except part)
	Nomiaphagus Ashmead	. . . . .	*sanborni* Blake	*similimus* plus part of *canadensis*
Basgmatilla Ashmead	*Brassia* Ashmead	[*Hyperamatilla* Ashmead]	*harmonia* Fox	*vivo* plus *asapus*
	Basgmatilla Ashmead	[*Ephata* André *vice* Say]	*vivo* Blake	
			gorgon Blake	
Sphaerophthalma Blake	*Sphaerophthalma* Blake	. . . . .	[*sericea* Blake] = *pennsylvanica* Lepeletier	*occidentalis* *pennsylvanica*
	Thalamoglyphas Viereck	. . . . .	*abdita* Viereck	. . . . .
Phalopsis Blake	*Odontophalopsis* Viereck	. . . . .	*evagrus* Viereck	*anthaphoroe* part, plus *imperialis* part
	Tetraphalopsis Ashmead	. . . . .	*T. habbardi* Ashmead	. . . . .
	Phalopsis Blake	[*Agama* Blake]	*imperialis* Blake	*anthaphoroe* part, plus *imperialis* part
		[*Neophalopsis* Ashmead]	*pluto* Fox	
		[*Micromatilla* Ashmead]	*nana* Ashmead	
		[*Hyperhamatilla* Ashmead]	*anthaphoroe* Ashmead	
	Phalopsites, n. subg.	. . . . .	*papaya* n. sp.	. . . . .
Matilla Latreille	*Matilla* Latreille	. . . . .	*europaea* Linnaeus	Not American
Ephata Say	*Pematilla* Ashmead	. . . . .	*dubitata* Smith	*hexagona* *scrupea*
	. . . . .	. . . . .	*scrupea* Say	
Mesapsa Fox	. . . . .	[*Rhaphomatilla* André]	*ashmeadi* Fox	Genus *Mesapsa*

I. A REVISION OF EPHUTA *SAY*, A GENUS OF MUTILLIDAE EQUIVALENT TO THE SPECIES GROUP SCRUPEA OF FOX

In describing several new males of this genus, I take occasion to present a revised key to the species of America north of Mexico, and a brief review of our knowledge of the group.

A Key to the Males of the Species of America North of Mexico

(The females of only one species, *puteola*, are known.)

1. Head and thorax entirely black ..... (2)
   Head, thorax, and abdomen except apex red; an interrupted, straight carina between the eyes and bases of the antennae....**slossonae** Fox
2. Abdomen entirely red..... (3)
   Entire insect black, or in one species the second abdominal segment largely red ..... (4)
3. Petiole red, except at base; second abdominal segment rather coarsely, closely punctured, with pubescence entirely reddish yellow.
   copano Blake
   Petiole black; second abdominal segment more coarsely punctured, its pubescence largely dusky.....**susura** Melander
4. Tegulae finely, often sparsely punctulate, more or less polished, at most with a few medium sized punctures near the base..... (5)
   Tegulae very rugosely punctured and hirsute entirely or nearly to the tip. ..... (7)
5. Tegulae with a strong, longitudinal, curved, ridge, minutely and evenly punctulate all over, with no coarser punctures; transverse diameter of posterior ocelli equal to approximately one-third of their distance from the eyes, equal to about three-fourths their distance from each other, greater than their distance from the front ocellus; abdomen entirely black. .....**tegulicia** n. sp.
   Tegulae not longitudinally ridged, or very feebly ridged at base, in which case there are some coarser punctures, and the second abdominal segment is red. ..... (6)
6. Transverse diameter of the posterior ocelli slightly less than one-fourth as great as their distance from the eyes, equal to about one-third of their distance from each other and about two-thirds of their distance from the front ocellus; tegulae with minute, regular punctulation only; entire insect black, the apical segments with griseous bands....**grisea** n. sp.
   Transverse diameter of the posterior ocelli about one-half as great as their distance from the eyes, equal to seven-ninths of their distance from each other, and about one and one-half times their distance from the front ocellus; tegulae with a few coarse basal punctures; second abdominal segment red, the apical segments with only scant, scattered, griseous, pubescence.....**battlei** n. sp.

7. Carinae below the antennae parallel for a distance, usually about half-way to the margin of the clypeus, where they are produced into a tooth, sometimes connected by a transverse carina, and then diverge in straight lines to the sides of the anterior margin of the clypeus, delimiting a triangle; propodeum with its posterior face reticulate, not separated from the dorsal by a prominent transverse ridge. . . . . **scrupea** Say

Carinae below the antennae flaring immediately in a wide curve to the sides of the anterior margin of the clypeus; caudal face of the propodeum not reticulate, usually polished and sometimes with weak rugosities, separated from the dorsal surface by a strong transverse ridge. . . . **pauxilla** n. sp.

Ephuta slossonae (Fox)

1899. *Mutilla slossonae* Fox, Trans. Amer. Ent. Soc., 35:273, ♂.

Known only from the unique type from "Florida," until recently recorded by G. M. Greene from Loggerhead Key, Dry Tortugas, July 8, 1912, one specimen collected by Messrs. Rehn and Hebard. I have received two specimens from Mrs. Slosson, collected at Biscayne Bay, Florida; two from Clearwater, Florida, 29 April, 1908, collected by E. P. VanDuzee; one from Exter, Florida, also collected by Mr. VanDuzee, in the collection of the American Museum of Natural History.

The coloration is quite constant.

Ephuta copano (Blake)

1871. *Mutilla copano* Blake, Trans. Amer. Ent. Soc. 3:232, ♂.

Texas and Mexico.

Ephuta susura (Melander)

1903. *Mutilla susura* Melander, Trans. Amer. Ent. Soc., 29:324, ♂.

I have not seen this species. The description would apply in all details except as noted in the key to *copano*, but Melander states that the second dorsal segment is more coarsely punctate than in that species.

Known from the unique type from Galveston, Texas, presumably in the collection of Mr. Melander.

Ephuta tegulicia n. sp.

♂. Coal-black; with erect and appressed short, white, pubescence, the head and thorax appearing griseous, the petiole and the second dorsal segment with an apical band of short, thick, white, appressed, pubescence, on the other segments only sparse, erect, white hairs; wings slightly infuscated, a little paler in the middle. Length 8 mm.

Head coarsely rugosely punctured, much obscured by vestiture below the ocelli; transverse diameter of the hind ocelli, .7 mm., of the front ocellus, .21

mm.; the distance of the former from each other, .25 mm., from the eyes, .47 mm., from the front ocellus, .1 mm.; between the antennae two high, thin carinae diverge shortly, then proceed downward nearly parallel but very slightly converging about half-way to the anterior margin of the clypeus, at which point they are connected by a carina, turn outward, and rapidly diminishing in height, disappear a considerable distance before reaching the reflexed margin of the clypeus, the enclosed space rather oval, smooth and highly polished. Third antennal segment broader than long, approximately two-thirds of the length of the fourth, on its inferior surface.

Anteriorly the thorax is squarely truncate, its cephalic surface vertical, impunctate, polished, the humeral angles produced and strongly carinate, an inferior prolongation of these carinae traversing the side pieces of the pronotum obliquely. The most obvious features of the thorax are the large, very thick, tegulae, shaped like a horse-mussel, which slope on either side from a median longitudinal ridge running their entire length, and are very minutely and regularly, but not closely punctulate and setose. The coarse punctuation of the pronotum is much concealed by vestiture, that of the mesonotum less so and more coarse; the scutellum is gibbous and rugosely punctured, with erect hairs longer than elsewhere on the dorsum; dorsal surface of the propodeum very coarsely reticulate or irregularly areolate, the median cells coalesced into a large irregular areola, with a median carina abbreviated in front and behind, this surface with rosette-like appressed, fine and silky pubescence; the truncate, polished, smooth caudal surface separated from the dorsal by a dentate ridge; the lateral surfaces with three or four rows of coarse reticulate punctures.

In the hind wing Sc+R+M terminates as a chitinized vein, about halfway to the apex of the cell M, and shows metallic violaceous reflections; other veins are piceous.

Petiole transverse, rather cylindrical, coarsely punctured, with a keel but no tooth beneath; second segment evenly and coarsely, remaining segments more finely and sparsely, punctured, the pygidial segment rugosely punctured; the last ventral segment black, and closely, somewhat rugosely punctured; third to sixth and base of seventh dorsal segments with a longitudinal keel.

Type.—Fedor, Lee County, Texas, 1 to 7 June, 1909. Collection of Mr. Nathan Banks.

Ephuta grisea n. sp.

♂. Coal-black, with erect and appressed white pubescence, the apex of the petiole and second dorsal segment with a band of fine, curly, white pubescence, similar but weaker bands on the apex of the third and fourth segments; wings somewhat unevenly infuscated. Length 9 mm.

Head coarsely rugosely punctured, the front a little less coarsely than the vertex, the sculpture concealed above the base of the antennae by the vestiture; transverse diameter of the hind ocelli .11 mm., of the front ocellus .17 mm.; distance of the former from each other .32 mm., from the eyes .53 mm., from the front ocellus .17 mm.; from between the antennae a carina on each side

slopes away in a nearly straight line toward the side of the clypeus, disappearing before reaching the same and thus setting off a not very deep triangular basin with two tall sides and a not very wide base, its bottom roughened, not polished, the carinae each with a weak median tooth; anterior margin of clypeus not reflexed. Third antennal segment broader than body, about two-thirds the length of the fourth.

Dorsum with sculpture and vestiture as described for *tegulicia*, but the humeral angles are much less pronounced, hardly carinate, the oblique carinae on the sides of the pronotum weak and concealed by vestiture. The tegulae are large, but not thick as in *tegulicia*, evenly but not strongly convex, without a median ridge, very sparsely, finely and minutely punctulate, the punctures uneven and apically almost wanting. Dorsal face of propodeum coarsely reticulate, the reticulations smaller and more numerous than in *tegulicia*, with a median longitudinal irregular area; basally with appressed silky pubescence, the posterior face separated from the dorsal by an indistinct irregular carina, more weakly reticulate than the dorsal; the lateral faces with several rows of reticulate punctures.

Veins piceous; Sc+R+M in the hind wings weakly violaceous, about half as long as the median cell.

Petiole rather cylindrical, coarsely punctured, with a strong ventral keel, not toothed; second segment evenly, closely, coarsely punctured, a little more coarsely on the venter, its dorsal disc noticeably flattened, laterally with large areas of very fine short appressed white pubescence, which replace the felted lines of many Mutillidae; the remaining dorsal segments are a little less coarsely but not sparsely punctured, the punctures closer on the pygidium, each of these with a longitudinal median keel; the last ventral segment reddish, buff at base.

Type material.—Holotype: Colorado, collection of the American Entomological Society; two paratopotypes; two paratypes from Montana, all in the collection of that Society.

All of these were included by Mr. Fox under the species *scrupea* Say. The last ventral segment is sometimes piceous.

Ephuta battlei n. sp.

♂. Coal-black, the second abdominal segment red, with a darker stain above, the other segments piceous; clothed with rather scanty appressed and erect white pubescence, the petiole above and the apex of the second dorsal segment each with a band of appressed pubescence, the latter rather meagre; front wings fuscous, the median cell nearly hyaline; apical third of the hind wings fuscous. Length 5.5 mm.

Head coarsely, rugosely punctured, neither more finely punctured nor obscured by vestiture below the front ocellus, above the antennae with a deep median channel; ocelli unusually large, the transverse diameter of the posterior ocelli .15 mm., of the anterior ocellus .15 mm.; the distance of the former from each other .19 mm., from the eyes .28 mm., from the front ocellus .09 mm.; between the antennae high carinae enclose a small, deep, square basin, from

the lower lateral angles of this a straight carina on each side proceeds at a wide angle almost to the side of the reflexed margin of the clypeus, enclosing a smooth, polished, equilateral triangle with truncate apex. Third segment of the antennae below wider than long, almost as long as the pedicel, hardly more than half as long as the fourth segment.

Humeral angles very prominent, strongly carinate, the carina below bent and traversing the side pieces of the pronotum almost cephalo-caudad; pronotum with side pieces impunctate, dorsally with the mesonotum very coarsely punctured, sparsely pubescent; scutellum convex but hardly gibbous, coarsely punctured; mesopleura coarsely punctured, densely pubescent; dorsal surface of propodeum with two rows of large reticulations or areoles, becoming smaller laterally, the median basal one largest; dorsal surface separated from the smooth, polished posterior surface by a prominent transverse arched rim; sides irregularly reticulate.

Veins piceous, wanting in the hind wings, there being no closed cells, but Sc+R+M and a short weakly chitinized piceous stump of another vein, are present, but without violaceous reflections.

Petiole rugose, rather cylindrical, transverse, keeled ventrally, the keel with an anterior recurved tooth; second segment coarsely evenly punctured, the punctures becoming sparse and finer posteriorly; remaining segments each with a median keel, and finely, sparsely punctured, the last more closely but not roughly nor coarsely; last ventral segment buff, weakly punctured.

Type material.—Holotype: Bainbridge, Decatur County, Georgia, 15 to 27 July, 1909, collected by the author. Collection of Cornell University, No. 106.1. One paratopotype, same date.

Dedicated to Paul Battle of Bainbridge, Georgia, my faithful companion on many a collecting trip.

Ephuta scrupea Say

1836. *Mutilla scrupea* Say, Journ. Boston Soc. Nat. Hist., 1:297, ♂.

Ocellar measurements are as follows: transverse diameter of the posterior ocelli .13 mm., of the front ocellus .16 mm.; distance of the former from each other .19 mm., from the eyes .40 mm., from the front ocellus .10 mm.

Of a large series of specimens of *Ephuta* collected by Mr. Nathan Banks in Virginia, twenty-eight belong here and nineteen in *pauxilla*. In deciding to which of these two species Say's name *scrupea* should apply, I was guided by his description of the propodeum, which would not seem to fit *pauxilla* so well as the other. The remainder of the description might apply to either.

Of the specimens assigned by Fox[1] to *scrupea*, those from Connecticut and Delaware belong to *pauxilla*, the one from Texas

[1] Trans. Amer. Ent. Soc., 1899, 25:272.

is of doubtful identity and probably represents an undescribed species, as does the one from California. The specimens from Colorado and Montana become the types of *grisea*. It will, therefore, be seen that Fox did not know what I consider the true *scrupea*. It is unlikely that the species occurs in the Rocky Mountain States.

Habitat: INDIANA (type locality). VIRGINIA: Falls Church, June 19, July 7, 13, 14, 16, 21, 28, 31, August 2, 7, 11, 30, 31, September 19, 25 specimens; Great Falls, July 13 and 31, 3 specimens; Glencarlyn, July 26, 3 specimens, all collected by Mr. Nathan Banks.

Ephuta pauxilla n. sp.

♂. Coal-black, with meagre white pubescence; apex of petiole and of the second segment with a band of appressed white pubescence; wings medially nearly hyaline, infumed around the edges. Length 8 mm., paratype 6 to 10 mm.

Head coarsely rugoso-punctate, less coarsely on the front, which is without a median channel at base of the antennae; transverse diameter of the posterior ocelli .13 mm., of the anterior ocellus .16 mm., distance of the former from each other .26 mm., from the eyes .43 mm., from the anterior ocellus .13 mm.; from between the antennae two high, thin carinae flare in a somewhat sinuous curve, abruptly diminishing in height, to the sides of the margin of the clypeus, setting off a spatulate basin with striolate bottom.

The humeral angles are weak, scarcely carinate, pronotum and mesonotum coarsely punctured, the latter with flattened irregular interstices, side pieces of the former punctate only above the almost longitudinal median carina; dorsum sparsely pubescent; tegulae large, very rugose, thick, weakly ridged, but the ridge lost in the rugose punctures; scutellum convex but hardly gibbous, coarsely punctured; mesopleura with coarse punctures obscured by vestiture; dorsal surface of the propodeum with coarse reticulate areas, becoming smaller laterally, the basal median one largest, elongate, irregular, the posterior surface not or but slightly roughened, not reticulate, separated from the dorsal by a prominent, arched, crenulate, ridge.

Veins piceous, very faint in the hind wings; Sc+R+M chitinized basally in the latter.

Petiole rugose; rather cylindrical, the keel with a long, anterior, recurved, blunt hook, and two basal teeth; second segment evenly, coarsely punctured; apical dorsal segments sparsely punctulate, more closely but not coarsely on the last, each with a keel; last ventral segment mostly buff, weakly punctured.

Type Material.—Holotype: Falls Church, Virginia, collected by Mr. Nathan Banks from honey dew on a tulip tree, August 8. Cornell University No. 105.1; eighteen paratopotypes, July 12, 14, 21, 28, August 2, 4, 9, 23, 31 and September 17. A specimen from Fedor, Lee County, Texas, June 21, 1909, seems identical.

Ephuta puteola (Blake)

1879. *Mutilla puteola* Blake, Trans. Amer. Ent. Soc., 3:252, ♀.

The female only known, and may include more than one species, which however I am unable to separate. A specimen collected by Mr. Banks in Virginia only 3 mm. in length and with sparse small punctures on the head, is possibly distinct, but it seems advisable to await more material before deciding.

Habitat.—NEW YORK: Yaphank, Long Island, September 24, '11, 2 ♀, and Long Island, May 19, '07, 1 ♀, (G. P. Engelhardt), [coll. of same]. PENNSYLVANIA: Beatty, 1 ♀; Philadelphia, 1 ♀, [Amer. Ent. Soc.]. VIRGINIA: Pennington Gap, 1 ♀, [Amer. Ent. Soc.]; Falls Church, Great Falls, and Glencarlyn, May 10 to September 5, 11 ♀, (N. Banks), [coll. N. Banks]. NORTH CAROLINA: Southern Pines, July 18, '08, 1 ♀, (A. H. Manee). GEORGIA: Rabun County, June '09, 2000 to 3700 ft. elev., 1 ♀, and Clayton, Rabun County, July '10, 1 ♀, (W. T. Davis). ALABAMA, 2 ♀, [Amer. Ent. Soc.]. TEXAS, 2 ♀, [Amer. Ent. Soc.].

CONTRIBUTIONS TOWARD A MONOGRAPH OF THE MUTILLIDAE AND THEIR ALLIES OF AMERICA NORTH OF MEXICO

BY JAMES CHESTER BRADLEY

II. A REVISION OF TIMULLA *ASHMEAD*, A SUBGENUS OF MUTILLA EQUIVALENT TO THE SPECIES GROUP HEXAGONA OF FOX

Failure to apprehend certain excellent structural characteristics which in reality differentiate the males of our eastern species of this group, and consequent attempts to separate them by their color, has led to complete confusion. Five abundantly characterized, distinct species have been included under the names *hexagona, promethea* and *floridensis*. The character by which separation has heretofore been sought, especially of the two former, has been largely the degree of redness. Erythrization, the replacing of black with red, is a phenomenon commonly met with in Hymenoptera as we proceed from north to south in the eastern United States. Consequently, when the species are correctly separated, it is no surprise to find each of them varying to a greater or less extent from red to black. In the species *rufa*, as here defined, we find the majority of the northern specimens with black head and thorax, all of the southern ones, except one from northern Georgia, and some northern ones with head and thorax partially red; of *brioxus* I have specimens from Virginia and northward, all with black thorax, and one from Florida with red dorsum; of *hexagona* my series is smaller, but the only two entirely black ones come from Virginia; *promethea* is entirely confined to the far south, and all the specimens have the top of the head and the dorsum red; *floridensis* is confined to south Georgia and Florida, and has not only the dorsum but also the sides of the thorax red, except in one specimen from Georgia.

It would seem, from the evidence at hand, that the red forms are to be looked for not only in the distinctly Lower Austral Zone, but also in its northern coastal extension, while the black forms occur inland and perhaps far southward in the Carolinian Zone.

This is suggested by the fact that the only red specimens I have from the north came from along the coast, Ocean County, New Jersey, and Yaphank, Long Island, while Melander records them from Woods Holl, Mass. A series of twenty, representing three species, collected by Mr. Nathan Banks at Falls Church in the Piedmont region of Virginia are all black, and so is the only specimen that I have from Upper Austral Georgia, namely, from Austell, while all of my numerous specimens from Lower Austral localities, namely, Southern Pines, North Carolina; St. Simon Island, Okefenokee Swamp and Decatur County, Georgia, and various Florida localities are all red. The present evidence therefore suggests that black specimens of *hexagona*, *rufa* and *briaxus* are to be looked for in the Upper Austral region, except along the very coast, and red ones in the Lower Austral and strictly coastal regions of the Carolinian.

The following characters of the males, varying within the genus but showing no variation within the species, are of importance for specific diagnosis: shape and size of tooth on the inferior margins of the mandibles, or its absence; shape and sculpture of the face, size of the ocelli (varying within certain limits, see remarks under *hexagona*), presence and shape of a swelling on each side of the mesosternum; presence of a carina or other process on the middle coxa in front, and of a subapical blunt tooth behind; nature of lateral carinae or tubercles on the fifth to eighth ventral segments, and armature of the pygidial segment.

The females of the genus have heretofore been all associated under the name *dubitata* Smith, excepting *euterpe* which occurs only in Florida. Rohwer has identified certain Coloradan females with *briaxus* Blake, known otherwise in the male sex. The statement has been general that *dubitata* is the female of *hexagona*.

When I received the type of *ornatipennis* from Mr. Mance, it still held, clasped in its mandibles around the neck, a female, with which it had presumably been mating. The extreme similarity of this female, evidently belonging to the very rare *ornatipennis*, with the very common eastern *dubitata*, led to the suspicion that this was in reality a composite species. A careful study of over one hundred specimens of "*dubitata*" from various regions, substantiates this inference. There are four species

each represented by a considerable number of specimens, and probably three others from the extreme south represented by a small number. The former seem to correspond sufficiently both in distribution and abundance to the four commoner eastern males, *briaxus*, *hexagona*, *rufa*, and *promethea*, to make their association justifiable, at least tentatively, and certainly preferable to the creation of new names.

There can be little query concerning the identity of the females that I here call *briaxus* with that species, and by reason of their truncate thorax and square humeral angles the individuals of this species are more readily recognized than some of the others. Like the males of *briaxus* these are the only females occurring in Canada. They occur in Colorado and are common in the Northeast south to Virginia. I am led to identify *promethea* as such, by the fact that, like the male, it occurs only in South Georgia and Florida, and is common at Spring Creek, where I took many males of *promethea*. Of another species I have two females caught at Yaphank, Long Island, on the same day that males of *hexagona* were caught, and this taken with similar distribution leads me to assign this group of females to *hexagona*. There remains the fourth group, which agreeing in distribution, must be assumed to be *rufa*.[1] I am well aware that this method of associating sexes is not conclusive, but under the circumstances it seems to me better in the present case than to establish the females under new specific names.

The only character by which I have been able to separate the females is the shape of the thorax, and this can not be expressed in a key with sufficient exactness to make it probable that it can be used for the identification of specimens without a series for comparison. The structure of the pygidium varies from entirely

[1] Since drawing this conclusion it has been substantiated by the receipt from Mr. Banks of a male *rufa* pinned with one of these females, and taken together but not *in coitu*. Still later I have seen in the collection of the United States National Museum a male *briaxus* pinned with the female as above defined, from Centreville, Florida, and bearing the label "Taken in copulation, Hubbard," and also a male *promethea* stated by R. A. Cushman to have been positively taken in copulation with the female specimen with which it is pinned, at Tallulah, Louisiana. This female is a typical specimen of the form which I have above assigned to *promethea*. The females of *briaxus*, *promethea*, *rufa*, and *ornatipennis* may therefore be considered as positively established.

smooth to granular and through various stages of wrinkling to completely rugose. I can not conclude that its differences are specific; nor are those found in the carina of the petiole. In these four species this carina usually has an anterior tooth, which sometimes is reduced or wanting or modified in shape. The color is no better. Specimens with an excess of black pubescence on the abdomen are in the majority in *briaxus* including *ornativentris*, but individuals of other species approach this condition and exceed that of some specimens of *briaxus*. I am inclined to think it possible that the amount of black pubescence may to some extent be correlated with locality, as is the case with the blackness of thorax of the male. The amount of silvery pubescence is similarly variable.

Males

1. Scape with a dense brush of white pubescence beneath, at apex or along entire length. In one species with barred wings this brush is thin, but the hairs are long and white; ocelli small, the posterior pair distant from the eyes by from two and one-half to five times their transverse diameter ..... (2)

   Scape without a brush of white pubescence, nearly nude beneath with moderate, appressed, grey, pubescence above, or with that also largely wanting; wings never barred ..... (6)

2. Pygidium with a raised longitudinal impunctate, polished platform, strongly elevated posteriorly and terminating before the apex of the segment in the flaring arms of a prominent Y-shaped carina, best seen from an apical view, the stem of which reaches the apex of the pygidium in the median line; wings fuscous but without a transverse hyaline band ..... (4)

   Pygidium with a low median impunctate polished ridge, terminating rather gradually before the apex, there being no carina between its apex and that of the segment; wings with a hyaline transverse band, giving the species a strikingly ornate appearance; basal segment of scape strongly compressed ..... (3)

3. Scape not carinate, with a very dense brush of long white pubescence; clypeus with a median tubercle near its apex; eyes distant from the posterior ocelli by five times the diameter of the latter ... **barbata** Fox

   Scape with a strongly raised carina near its apex (sometimes weak), its white pubescence sparse; clypeus without a median tubercle; eyes distant from the posterior ocelli by three times the diameter of the latter.

   ornatipennis n. sp.

4. Middle coxae with a strong inner subapical tooth, pointing backwards; tubercles on mesosternum transverse, their anterior margins subtruncate and nearly vertical; fifth ventral segment and sometimes the sixth without tubercles, the sixth and seventh usually with weak tubercles and the eighth with a moderately strong, oblique, dentiform carina on each side ..... (5)

Middle coxae unarmed; tubercles on mesosternum oblique, without truncate anterior margin; sixth and following ventral segments on each side with strong mammiliform tubercles, the fifth also with a trace of a tubercle ..... **barbigera** n. sp.

5. Dorsal abdominal segments with long, dense, rather tomentose, orange pubescence ..... **grotei** Blake

Dorsal segments with much shorter and sparser, red or black, erect, pubescence, not at all tomentose ..... **briaxus** Blake

6. Inferior border of mandibles with a deep emargination and large tooth near the base; ocelli small, the distance of the posterior pair from the eyes equal to from three to four and one-half times their transverse diameter ..... (7)

Inferior margin of the mandibles not emarginate; ocelli usually large, the distance of the posterior pair from the eyes (except in *rufosignata*) equal to or at most two times their transverse diameter; mesosternum not tuberculate ..... (11)

7. Pygidium with a low median impunctate ridge, not elevated posteriorly, but continued on the apical half of the segment by a low but sharp median carina which has no lateral arms; sixth, seventh and eighth ventral segments with mammiliform tubercles, those on the sixth minute; middle coxae without subapical teeth, but with an anterior swelling.

promethea Blake

Pygidium with a median, raised, impunctate, polished ridge, strongly elevated posteriorly, and there abruptly terminated by the spreading arms of a Y-shaped carina which extends to the apex of the segment, the arms of the Y being usually very short, in one species the ridge itself almost wanting, the Y-shaped carina alone distinct ..... (8)

8. Arms of the carina on the pygidium spreading broadly, enclosing a broad ridge or elevated platform; fifth and sixth ventral segments with a papilla on each side, that on the sixth prominent, while the seventh and eighth have oblique, low, not angular nor toothed, carinae; middle coxae with a weak posterior subapical tooth, and a sharply carinate swelling on the anterior part ..... **rufa** Lepeletier de Saint Fargeau

Arms of the carina on the pygidium very short, the tip of the ridge being therefore very narrow; fifth ventral segment without and sixth without or in one species with very small lateral tubercles ..... (9)

9. The vertex between the anterior and posterior ocelli prominently elevated on each side, the posterior ocelli in an almost vertical position, their distance from the eyes four and one-half times their diameter; pubescence of abdomen sparse and mostly dark red, with a small quantity of fine, appressed, coppery pubescence ..... **floridensis** Blake

The vertex not unusually elevated between the ocelli, the posterior pair more oblique, their distance from the eyes three and one-half times their diameter; pubescence of abdomen dense and longer, orange colored, and with much fine, appressed, golden pubescence on the apex of each segment ..... (10)

10. Punctuation of the third and following dorsal segments shallow, small, and except on the sides sparse, the vestiture correspondingly sparse; minute tubercles on the sides of the sixth ventral segment; posterior ocelli separated from each other by three times the length of their transverse diameter ..... **nestor** Blake

Punctuation of the third and following dorsal segments dense and not shallow, the vestiture correspondingly dense; sixth ventral segment unarmed; posterior ocelli separated by twice the length of their diameter ..... **oajaca** Blake

11. Pygidium with a median carina which is very strongly angularly elevated some distance before the apex; sixth ventral segment simple, seventh with a short oblique carina, eighth with a long low ridge on each side; scape of antennae not carinate ..... **navasota** n. sp.

Pygidium with a Y-shaped apical carina, the two arms of the Y embracing the abrupt termination of a median, longitudinal, raised, impunctate, polished platform; scape in front bicarinate, in one species rather feebly so ..... (12)

12. Distance of the eyes from the posterior ocelli three times as great as the diameter of the latter, this equal to three-fifths of their distance from the front ocellus ..... **rufosignata** n. sp.

Distance of the eyes from the posterior ocelli less than twice as great as the diameter of the latter, this equal to or exceeding their distance from the front ocellus ..... (13)

13. Distance of the eyes from the posterior ocelli equal to about one and one-half times their diameter (1.5–1.8); this about equal to their distance from the front ocellus ..... **hexagona** Say

Distance of the eyes from the posterior ocelli scarcely exceeding the diameter of the latter (1.2 thereof); this equal to about one and one-half times their distance from the front ocellus ..... **sayi** Blake

Females

1. Head orange red ..... (2)

Head black, front sometimes a little reddish; thorax with sides nearly straight, slightly concave, not much widened behind, posterior face squarely truncate ..... **oajaca** Blake

2. Sides of thorax very deeply emarginate, only three-fourths as wide in the middle as behind or in front, the width in front and behind subequal; posterior face truncate; last three dorsal abdominal segments red. **euterpe** Blake

Sides of the thorax much less deeply, sometimes not, emarginate ..... (3)

3. Sides of the thorax not noticeably emarginate; thorax posteriorly gradually sloped; inferior carina of petiole with an anterior blunt tooth, not red at apex ..... **ornatipennis** n. sp.

Sides of thorax distinctly emarginate ..... (4)

4. Thorax much widened and truncate posteriorly ..... **promethea** Blake

Thorax little or no wider behind than in front ..... (5)

5. Thorax rather long with its caudal face sloping and gradually rounded into the dorsal, the humeral angles (as seen from above) rounded.
rufa Lepeletier de Saint Fargeau

Thorax long, its humeral angles broadly rounded, its posterior face truncate, but rounded above into the dorsum. . . . . **hexagona** Say.

Thorax short, rectangular, its humeral angles sharp, its posterior face squarely truncate and rather sharply separated from the dorsal.
briaxus Blake

Mutilla (Timulla) barbata Fox

1899. *Mutilla barbata* Fox, Trans. Amer. Ent. Soc., 25:212, ♂.

This species is still known only from the unique type. It is a close ally of the following. The transverse diameter of the posterior ocelli is .09 mm.; their distance from the eyes .43 mm., from each other .38 mm., from the front ocellus .21 mm.

Habitat.—Missouri.

Mutilla (Timulla) ornatipennis n. sp.

♂. Orange rufous, the second dorsal segment medially xanthine orange, apical segments auburn-black, antennae black, the tip of scape and the pedicel pale; legs black; front and dorsum with sparse, short, erect, red hairs; propodeum with sparse, erect, short, white hairs, under side of scape, base of mandibles, sternal parts and under surface of coxae and femora with mostly rather dense, long, white pubescence; head with silky, appressed, red pubescence; dorsum with short, depressed, red pubescence; second and third dorsal segments with very sparse and short, appressed, white hairs, along the apex with dense appressed, bristly, red pubescence; following three segments with similar white pubescence, the seventh with depressed, sparse, white pubescence; wings ornate, fuscous, a transverse, broad, hyaline band in the region of the stigma, the cell M except at apex, and the extreme apical margin also hyaline, the darkest fuscous is at the apex of the cells 2d R_1+R_2 and R_4. Length 11 to 17 mm. (Type 17 mm.)

Vertex and front rather shallowly punctured, the punctures separated; diameter of the posterior ocelli .17 mm., their distance from the eyes .58 mm., from each other .42 mm., from the front ocellus .28 mm.; platform on the front at base of the antennae with only feeble bounding carinae; face below the antennae raised to form a rounded tubercle, bearing a tuft of white hairs, the clypeus below strongly concave, impunctate, and polished clear to the bases of the mandibles, without a median tubercle, the margin subtruncate; mandibles with a very deep external notch and tooth on the inferior border. Anterior margin of the scape with a carina inflated beyond the middle, forming a rounded tooth; first segment of the flagellum greatly compressed, approximately equal to the second.

Pronotum weakly, but closely punctured, its side pieces obsoletely; these each with an inferior, vertical, anterior carina; mesonotum and scutellum with close round punctures, the scutellum convex; mesopleura each with a shallow oblique fossa interrupted near the posterior borders; mesosternum on each

side with a weak round tubercle; the inner surface of the mesocoxae with a week anterior carina and a small subapical tubercle; propodeum reticulate, with a median basal irregular channel.

Petiole with a carina beneath, not incised nor toothed, truncate posteriorly; second ventral segment posteriorly with a transverse raised ridge; sixth ventral segment with a small papilla on each side; seventh and eighth each with an oblique carina, raised and subtruncate posteriorly; second dorsal segment impunctate medially; pygidium coarsely punctured, truncate, with a median impunctate ridge which terminates some distance before the apex of the segment.

The carina on the scape is less elevated in one of the paratypes.

♀. Mahogany red, abdomen from third segment to apex, antennae, tibiae and tarsi black; each segment of the abdomen with an apical band of white pubescence, that on the third interrupted medially, on the second with a triangular median elongation; other pubescence small and sparse, the sides and ventral parts with a silvery sheen.

Type material.—Holotype, ♂, and allotype, ♀: Southern Pines, North Carolina, August 12, 1907, (A. H. Manee), [Cornell University, Nos. 111.1, 111.2]. Paratopotype ♂; Sept. 1, 1911, (A. H. Manee), [Nathan Banks]; paratype, 1 ♂, Spring Creek, Decatur County, Georgia, June 1 to 23, 1911, (the author); paratypes, 2 ♂, Falls Church, Virginia, 16 Sept., at honey dew on tulip tree (N. Banks), [N. Banks and Cornell University].

Additional female: Billy's Island, Okefenokee Swamp, Georgia, June 1912, (Cornell University Expedition).

This species evidently replaces *barbata* in the east, and is very closely related to that species. The much sparser brush of hairs and carina on the scape and absence of a clypeal tubercle will distinguish it. It approaches no other species very closely in the male sex.

The allotype of this species was pinned below the holotype, which still held her with jaws clasped around her neck.

Mutilla (Timulla) barbigera n. sp.

♂. Black and red; head black, its upper half mahogany red; antennae black, the tip of scape and the pedicel red; thorax black, the pronotum and mesonotum mahogany red; legs black; petiole black; rest of abdomen Sanford's brown; rather thickly clothed with short, erect, black pubescence, which is dense along the apex of the second and third dorsal segments, not mixed with short appressed pubescence; wings dark brown. Length 19 mm.

Head closely, shallowly punctured; transverse diameter of the posterior ocelli .21 mm., their distance from the eyes .75 mm., from each other .58 mm., from the front ocellus .36 mm.; inferior margin of the mandibles with a rather small tooth, not deeply emarginate; scape lined beneath with silvery white

pubescence, which is lengthened apically into a brush, not carinate; the first segment of the flagellum not strongly compressed, equal to the second.

Side pieces of pronotum, each with an inferior carina near its anterior border; scutellum strongly convex and coarsely closely punctured; mesopleura with an oblique fossa, interrupted before the hind margin; mesosternum on each side with an oblique, not carinate tubercle, inner surface of mesocoxae with a swelling, smooth in front, their posterior surface without a subapical tooth.

Carina beneath the petiole rather prominent, thick, deeply notched in the middle; middle of the second ventral near the base slightly prominent but rounded, not carinate; fifth ventral on each side with a trace of a tubercle, sixth with a mammiliform tubercle, seventh and eighth with oblique carinae strongly elevated and subtruncate posteriorly; pygidial segment at apex with a Y-shaped carina, the two arms of which are broadly spreading and enclose the end of a raised, impunctate, polished, median longitudinal platform.

Type.—Dallas, Texas. Collection of the American Entomological Society.

Mutilla (Timulla) grotei Blake

1871. *Mutilla grotei* Blake, Trans. Amer. Ent. Soc., 3:228, ♂.

Transverse diameter of the posterior ocelli, .17 mm., their distance from the eyes .58 mm., from each other .51 mm., from the front ocellus .30 mm.

Habitat.—Colorado and, according to Melander, Texas.

Mutilla (Timulla) briaxus Blake

1871. *Mutilla briaxus* Blake, Trans. Amer. Ent. Soc., 3:227, ♂.

1887. *Mutilla canadensis* Provancher, Add. et Corrections au vol. ii de la Faune Entomologique du Canada, Traitant des hyménoptères, p. 250, ♂.

1897. *Mutilla secunda* Dalle Torre, Catalogus hymenopterorum, 8:84, ♂.

1899. *Mutilla hexagona* Fox, (pars), Trans. Amer. Ent. Soc., 25:270, ♂.

1909. *Mutilla (Timulla) briaxus* Rohwer, Trans. Amer. Ent. Soc., 35:132, ♂, ♀.

♂. Diameter of posterior ocelli .23 mm., their distance from the eyes .61 mm., from each other .51 mm., from the front ocellus .21 mm.; front and clypeus deeply concave, highly polished, laterally striolate almost to the bases of the mandibles; these with a deep external notch and strong tooth. Scape with a weak carina obscured by vestiture.

Not only the brush on the apex of the scape, but the armature of the apical segments, the structure of the clypeus and other

characters separate this from *hexagona* and *rufa*. To *grotei* it is much more closely allied.

This is the most northern species of the group, and one of our most northern Mutillidae. In common with many species of other families, its known range bridges the gap between the northern Rocky Mountains and our eastern mountain regions by way of Canada. The western specimens usually have somewhat more greyish pubescence on the thorax than those from the East. All of the specimens before me have the head and thorax black except one from Florida, and that individual is the only record from south of Falls Church, Virginia.

The identify of *Mutilla canadensis* of Provancher with *briaxus* is made clear from his description. Not only is it the only species known from Canada, but Provancher refers to the white brush at the apex of the scape, thereby leaving no doubt of the insect to which he had reference. The name *secunda* was proposed by Dalle Torre to replace *canadensis* of Provancher.

There is little doubt of the identity of the males referred to this species by Rohwer. That the female which he also describes belongs to it, seems likewise probable.

Habitat.—Males. CANADA: [Coll. Amer. Ent. Soc.]; Cap Rouge, Quebec, (*canadensis* Provancher). NEW HAMPSHIRE: Claremont, 10 July, 1911, (G. P. Engelhardt). NEW YORK: Queens, Long Island, 23 July, [Brooklyn Museum]. PENNSYLVANIA: [Amer. Ent. Soc.]. NEW JERSEY: Monmouth County, 1 June, 1891 and Gloucester, Camden County, 15 July [Amer. Ent. Soc.]. DELAWARE. [Amer. Ent. Soc.]. VIRGINIA: Falls Church, 5, 19, 22, 30 July and 2 August, 5 ♂ (N. Banks), [N. Banks]. FLORIDA: [Amer. Ent. Soc.].

BRITISH COLUMBIA: Osayoos, 26 July, [Amer. Ent. Soc.]. MONTANA: 3 specimens [Amer. Ent. Soc.]. COLORADO: 3 specimens, [Amer. Ent. Soc.]; Boulder, May 1908, (recorded by S. A. Rohwer).

Females. CANADA: 2 specimens [Amer. Ent. Soc.]; Ridgeway, Ontario, 13 August 1884, [Amer. Ent. Soc.]. NEW YORK: New Russia, Essex County, 18 August 1912, (the author); Crown Point, August; Rosslyn, Long Island; Yaphank, Long Island, 10 July, 1910, (G. P. Engelhardt); Amagansett, 10 August, 1911, (G. P. Engelhardt); Sea Cliff, Long Island (N. Banks); East Hampton, Long Island, 26 September, 1910, (G. P. Engelhardt); Cold Spring Harbor, 9 September, 1911, (G. P. Engelhardt). NEW JERSEY: Westville, 30 August, 2 ♀ (the author). MARYLAND: Chestertown, 2 August, 1901 (E. G. Vanatta). VIRGINIA: Glencarlyn, 26 July, (N. Banks); Falls Church 4, 6, 7 August, 4 ♀, (N. Banks). GEORGIA: Atlanta, 6 July, 1909, (the author). FLORIDA: 1 specimen, [Amer. Ent. Soc.]. OHIO: Wanseon, 5 August, 1896. NEBRASKA: Hat Creek, August; West Point, 24 June. COLORADO: 5, [Amer. Ent. Soc.].

Type.—Virginia. Collection of the American Entomological Society.

Mutilla (Timulla) promethea Blake

?1855. *Mutilla dubitata* Smith, Cat. Hymen. in Brit. Mus., 3:60, ♀.
1871. *Mutilla promethea* Blake, Trans. Amer. Ent. Soc., 3:229, ♂.

♂. Diameter of posterior ocelli .19 mm., their distance from the eyes .72 mm., from each other .64 mm., from the front ocellus .36 mm.; face and clypeus very deeply concave and highly polished, impunctate, the polished area reaching half way to the base of the mandibles, surmounted above by a dense tuft of hair, a very few hairs at apex. Scape rather strongly bicarinate beneath, with little pubescence.

Mesosternum with strong transverse tubercles, ridged on their summit and with nearly vertical anterior faces; middle coxae with a weak anterior tubercle, without posterior subapical tooth.

Judging from the carina on the pygidium *promethea* would seem to be closer to *barbata* and *ornatipennis* than to other species.

Habitat.—Males. North Carolina: Southern Pines, 24 September, 1907, (A. H. Mance). Georgia: St. Simon's Island; Billy's Island, Okefenokee Swamp, June, 1912, 3 ♂, (Cornell University Expedition); Bainbridge and Spring Creek, Decatur County, 30 May, 1 June, 16–29 June, 5 ♂, (the author). Florida: South Bay, Lake Okeechobee, 2 ♂ (Wm. T. Davis); Sanford, 27 April, 1908, (E. P. VanDuzee), [Amer. Mus. Nat. Hist.]. Louisiana: 2 specimens, [Amer. Ent. Soc.].

Females. Georgia: Spring Creek, Decatur County, 16 to 29 July, 1912, 9 ♀, (Cornell University Expedition); Bainbridge, 30 July, 1912, (C. U. Expedition); Thomasville, 21 May, 1915, 1 ♀ (C. S. Spooner); 2 specimens, [Amer. Ent. Soc.]. Florida: Jacksonville, 21 April; Enterprise, 18 April; Gulfport, May. Louisiana: 1 specimen, [Amer. Ent. Soc.].

So far as known, this species is confined to the Austroriparian Zone.

Type.—Male from Louisiana in the collection of the American Entomological Society. Allotype, ♀, from Thomasville, Ga., in the collection of Cornell University, No. 110.1.

Mutilla (Timulla) floridensis Blake

1879. *Mutilla floridensis* Blake, Trans. Amer. Ent. Soc., 7:249, ♂.

♂. Diameter of posterior ocelli .15 mm., their distance from the eyes .66 mm., from each other .43 mm., from the front ocellus .21 mm.

Habitat.—Georgia: 1 ♂, [Amer. Ent. Soc.]; St. Simon's Island, 9 June, 1911, (W. V. Reed). Florida: Enterprise, 15 May, [Amer. Ent. Soc.]; Enterprise, 30 March to 10 May, [Amer. Mus. Nat. Hist.]; Biscayne Bay, (Mrs. A. T. Slosson), [Amer. Ent. Soc.].

Mutilla (**Timulla**) **euterpe** Blake

1879. *Mutilla euterpe* Blake, Trans. Amer. Ent. Soc., 7:249, ♀.

As suggested by Fox, this species is very likely the female of *floridensis*. So far it is known only from the unique type. The deeply contracted thorax clearly distinguishes it from the females of other species.

Type: Enterprise, Florida, May. Collection of American Entomological Society.

Mutilla (**Timulla**) **rufa** Lepeletier

1845. *Mutilla rufa*, Lepeletier de St. Fargeau, Hist. nat. ins., Hymen., 3: 631, ♂.

1899. *Mutilla hexagona* Fox, (pars), Trans. Amer. Ent. Soc., 25:270, ♂.

♂. Diameter of posterior ocelli .21 mm., their distance from the eyes .62 mm., from each other .43 mm., from the front ocellus .21 mm.; face and clypeus convex and polished, laterally roughened; emargination on inferior border of mandibles not deep, the tooth rather small, blunt. Scape apically weakly bicarinate.

Mesosternum with an inconspicuous somewhat oblique tubercle, not ridged on its summit.

♀. Sanford's brown: antennae except scape, legs except femora beneath and coxae, and dorsal segments beyond the second black; the scape dark red; each abdominal segment with an apical silvery band, that of the third interrupted and that of the second triangularly produced in the middle; other pubescence scanty, the second dorsal with an inconspicuous appressed black pubescence; pleura and sternal parts with a silvery sheen. Under side of petiole with an anterior acute tooth; pygidium rugulose.

The color characters are subject to variation. I may be wrong in considering the females of *rufa* and *hexagona* as here identified distinct species, and would not do so were it not for the considerations already stated. The males are very distinct.

There is very little likelihood, as Fox points out, that the species identified by Blake and tentatively accepted by Fox as *rufa* is really that species. It is represented in the collection of

the American Entomological Society by a single female from an unknown locality. The hirsute appearance of the specimen is similar to that of species inhabiting Texas and Mexico, but quite unlike any known from the Eastern United States. As *rufa* was described from Philadelphia, it seems much better to identify it with a form known to occur here. A specimen of the present species from Ocean County, New Jersey, in the collection of the American Entomological Society, agrees very well with Brullé's description. From a study of his other descriptions it is apparent that in speaking of the head, thorax and abdomen as "villosum" he means to imply not tomentose, but such a condition as actually exists in *rufa* as here identified. It is possibly this character that lead to the previous identification of the species.

Habitat.—Males. NEW YORK: Long Island, 5 September, 1907, (G. P. Engelhardt). NEW JERSEY: Ocean County, [Amer. Ent. Soc.]; Lakehurst, [Brooklyn Mus.]. MARYLAND: Chestertown, 12 August, 1901, (E. G. Vanatta). VIRGINIA: Falls Church, 2, 10, 15, 23, 30 August, 9, 12, and 20 September, 13 ♂, (N. Banks), [N. Banks]. NORTH CAROLINA: Smith's Island, 3 August. GEORGIA: Austell, 27 August, 1910, (the author); St. Simon's Island, 1 and 7 June, 1911, (W. V. Reed); Spring Creek, Decatur County, 7 to 23 June, 1911, 2 ♂, (the author). FLORIDA: [Amer. Ent. Soc.].

Females. NEW YORK: Sea Cliff, Long Island, 2 ♀, (N. Banks). NEW JERSEY: Lakehurst, 23 April, 1905, (G. P. Engelhardt). MARYLAND: Chesapeake Beach, 18 September, (N. Banks). VIRGINIA: Falls Church, 4, 14 July, 2, 3, 7, 11, 30 August, 13, 23 September, (N. Banks); Chain Bridge, 21 May (N. Banks). NORTH CAROLINA: Southern Pines, 1 April, 1908, (A. H. Manee). GEORGIA: Tallulah Falls, 19 to 25 June, 1909, (the author); Spring Creek, 16 to 29 June, 1912, (Cornell Univ. Expedition). FLORIDA: Lake Worth, (Mrs. A. T. Slosson).

Mutilla (Timulla) nestor Fox

1899. *Mutilla nestor* Fox, Trans. Amer. Ent. Soc., 25:271, ♂.

♂. Transverse diameter of the hind ocelli .13 mm., their distance from the eyes .43 mm., from each other .38 mm., from the front ocelli .21 mm.

Habitat.—Texas. Recorded by Mr. Melander as common during June 1900 at Galveston, and as occuring at Fedor. I have seen only the type.

Mutilla (Timulla) oajaca Blake

1871. *Mutilla oajaca* Blake, Trans. Amer. Ent. Soc., 3:228, fig., ♂, ♀.

Diameter of the posterior ocelli .13 mm., their distance from the eyes .58 mm., from each other .53 mm., from the front ocellus .28 mm.

Habitat.—Louisiana: [Amer. Ent. Soc.]. Texas: [Amer. Ent. Soc.]. Mexico: [Amer. Ent. Soc.].

Type.—Mexico, in the Collection of the American Entomological Society.

Mutilla (Timulla) rufosignata n. sp.

♂. Black, pronotum and mesonotum claret-brown, the abdomen except the petiole and apex of the second and third segments burnt sienna; clothed with erect, rather short, black pubescence, and also short, woolly, dirty-white pubescence, the sternal parts with whitish pubescence, neither long nor dense; disc of second dorsal segment with fine pale hairs, apex with moderately dense, black, bristly hairs, as also of the third, fourth and fifth, where they are sparser; sixth and seventh with sparse, erect, fine, white hairs, the former mixed with shorter, coarser, reddish hairs; wings deeply infuscated. Length 13 mm.; paratype 16 mm.

Head coarsely punctate; the diameter of the posterior ocelli .15 mm.; their distance from the eyes .49 mm., from each other .62 mm., from the front ocellus .28 mm.; clypeus with a nearly flat, semicircular, smooth and polished area, the face between this and the base of the mandibles punctate and hirsute; inferior border of the mandibles entire. Scape slightly pubescent, bicarinate in front.

Side pieces of pronotum with a weak vertical carina in front; scutellum convex and rugosely punctate; mesopleura with a deep oblique fossa, interrupted near the posterior border; mesosternum coarsely punctate, without tubercles, but with a distinct anterior face which is polished and almost impunctate; mesocoxae with rudimentary anterior tubercle and subapical tooth.

Second ventral segment not ridged; fifth and sixth unarmed, seventh with rudimentary tubercles and eighth with a weak oblique long ridge of chitin, scarcely raised at all; polished ridge on pygidium short and rather narrow, the arm of the Y-shaped carina not spreading very widely.

This species is quite close in structure to both *hexagona* and *sayi*.

Type material.—Holotype: Everglade, Florida, April 11, 1912, (Wm. T. Davis), [Cornell University, No. 112.1]. Paratype: "Florida," [American Entomological Society].

Mutilla (Timulla) navasota n. sp.

♂. Black, the abdomen with its pubescence appearing orange rufous, the ground color a trifle more red; head and posterior part of dorsum with erect black hairs; head and dorsum in front of the tegulae with felted, cartridge-buff pubescence, abdomen dorsally thickly covered with erect mars-orange pubescence, concealing shorter appressed, cadmium-orange pubescence; wings dark violaceous. Length 13 mm.

Head coarsely, closely punctured; ocelli large, diameter of the posterior pair .32 mm., their distance from the eyes .36 mm., from each other .66 mm., from the front ocellus .26 mm.; face strongly elevated below the antennae; it and the clypeus with a strong, concave, highly polished, impunctate, V-shaped area, between which and the base of the mandibles the face is aciculate; inferior margin of the mandibles entire.

Mesopleura with a deep oblique fossa, interrupted near the posterior margin; mesosternum with a weak transverse callous spot, its anterior surface sloping, punctate; under surface of the middle coxae with a callous spot, without subapical tubercle, under surface of posterior coxae with a rather long carina. Propodeum coarsely, rather shallowly reticulated, with a short median channel.

Second ventral segment not ridged; fifth and sixth unarmed; seventh with rudimentary tubercles; eighth with a very feeble oblique ridge; pygidium without median impunctate ridge, but toward the apex with a strongly elevated keel, the dorsal and caudal lines of which form a right angle.

Holotype: Brazos County, Texas. Collection of Mr. Nathan Banks.

Mutilla (Timulla) hexagona Say

1836. *Mutilla hexagona* Say, Bost. Journ. Nat. Hist., 1:295, ♂.
1899. *Mutilla hexagona* Fox (pars), Trans. Amer. Ent. Soc., 25:270, ♂.
1903. *Mutilla sayi* var. *hollensis* Melander, Trans. Amer. Ent. Soc., 29:324.

♂. The ocellar measurements of an average of 10 specimens are: diameter posterior ocelli .22 mm., their distance from the eyes .37 mm., from the front ocellus .21 mm. There is a trifling variation in the individuals of this species, the distance between eyes and ocelli exceeding the diameter of the latter by an extreme range of from 1.5 to 1.77 times.

♀. Claret brown; legs except femora beneath, antennae, petiole and pygidium black; apex of each abdominal segment except the first ventral with a band of silvery pubescence, interrupted medially on the third dorsal and triangularly produced in the middle on the second dorsal; dorsal segments otherwise mostly covered with short black pubescence, giving way to brown, red, and on the second, silvery pubescence on the sides; other pubescence sparse; head and front of dorsum with erect black hairs; sides of thorax and venter with a silvery sheen.

Petiole with an inferior, anterior, truncate, process; pygidium with oblique wrinkles, converging caudad.

The coloration of the female is not constant.

Taking all things into consideration this form seems to be the most suitable to identify as Say's species. In all respects except the size of their ocelli, the species *sayi* Blake and *rufosignata* appear to be alike.

Habitat.—Males. NEW YORK: Yaphank, Long Island, 22 September, 1911 and 11 October, 1913, (G. P. Engelhardt). VIRGINIA: Falls Church, 7 and 12 August, (N. Banks). ILLINOIS: Lake Forest, 22 August, 1906, (J. G. Needham), [Cornell Univ.]. INDIANA and MISSOURI (Original records by Say). TEXAS: 2 specimens, [Amer. Ent. Soc.]. COLORADO: 1 specimen, [Amer. Ent. Soc.]. MONTANA: 1 specimen, [Amer. Ent. Soc.].

Females. NEW YORK: Yaphank, Long Island, 22 and 24 September, 1911, (G. P. Engelhardt); Central Park, 17 April, 1912, (G. P. Engelhardt). NEW JERSEY. VIRGINIA: Falls Church, 18 April, 17 May, 2, 4, 11, 27 August, 3, 24 September; Great Falls, 28 June, 12 September; Glencarlyn, 26 September, (N. Banks), [N. Banks]. GEORGIA: 1 specimen, [Amer. Ent. Soc.].

Allotype, ♀. Yaphank, Long Island, [Cornell University, No. 113.2].

Mutilla (**Timulla**) **sayi** Blake

1871. *Mutilla sayi* Blake, Trans. Amer. Ent. Soc., 3:29, ♂.

♂. Transverse diameter of the posterior ocelli .32 mm., their distance from the eyes .37 mm., from each other .58 mm., from the front ocellus .22 mm.

This species agrees in all structural characteristics, so far as I have observed, except the size of the ocelli with *hexagona*. The records given by Fox "Montana" and "Colorado" are based on specimens of *hexagona*. It would be no cause for surprise if future series would reveal the identity of the two.

Habitat.—MISSOURI: Columbia, 8 ♂, 13, 21, 22, 29 July, 2 September, 1905, [Univ. Mo., Cornell Univ.]. TEXAS: 3 ♂, [Amer. Ent. Soc.].

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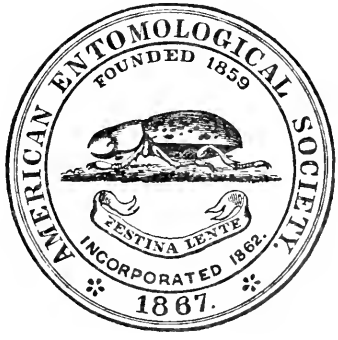

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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME

THE STANFORD EXPEDITION TO BRAZIL, 1911

J. C. BRANNER, DIRECTOR

DERMAPTERA AND ORTHOPTERA I

BY JAMES A. G. REHN

The very interesting and diversified collection of Dermaptera and Orthoptera made by the Stanford Expedition to Brazil was placed in my hands for study several years ago, but numerous other matters prevented an earlier completion of the report. We are now able to place in print the results of the study of the Dermaptera, the non-saltatorial groups of the Orthoptera and the Acrididae, which contributions we expect to follow, as early as possible, with others on the Tettigoniidae and Gryllidae.

A considerable portion of the material had been collected in liquid preservative, from which it was mounted, and in consequence the colors have been very greatly altered in some individuals, while in others the shrivelling during drying has greatly altered and distorted certain structural features. Due allowance has been made for possible changes in all of the material which shows evidence of having been dried from liquid preservative.

Three well separated regions are represented by the material: the extreme north-eastern portion of Brazil, which previously has been almost unexplored entomologically; the vicinity of Pará, State of Pará, and localities along the line of the Madeira-Mamoré Railroad on the Madeira affluent of the Amazon. A few specimens were also collected at Manaos, on the lower Rio Negro, State of Amazonas. For further data than here given on the position of localities mentioned, see Baker's paper on the mollusca of the Expedition.[1]

To make the present work more complete we have added records of a number of species taken at Pará, by C. F. Baker; at Peixe Boi, a short distance east of Pará, taken by H. B. Merrill, and at Igarapé de Candelaria, Rio Madeira, by E. A. Smith; the material on which all of the same are based being contained in

[1] Proc. Acad. Nat. Sci. Phila., 1913, pp. 623 to 624, (1914).

the collections of the Academy of Natural Sciences of Philadelphia. The first set and greater portion of the Stanford material has been placed in the collections of the same Academy, while a smaller set will be retained by Stanford University.

In the present paper are treated one hundred and twenty-five species, belonging to eighty-five genera, of which seventeen species and two genera are described as new. The total number of specimens examined in this connection is three hundred and seventy-five.

DERMAPTERA

Pygidicranidae

Pygidicrana V-nigrum (Serville)

1831. *Pygidicrana V-nigrum* Serville, Ann. Sci. Nat. xxii, p. 31. [Brazil.]

Natal, Rio Grande do Norte. (Mann.) One imperfect immature specimen.

This individual has lost the apex of its abdomen, so the sex is uncertain.

Pyragropsis[2] **brunnea** (Burr)

1909. *Pyragra brunnea* Burr, Ann. and Mag. Nat. Hist., (8), iii, p. 254. [Fonteboa, Brazil (nec Peru); Iguapo, Peru.]

Pará, Pará. (Mann.) Two females.

Porto Velho, Rio Madeira. One immature female.

The immature female has lateral series of small yellowish spots on the dorsal segments of the abdomen, such as are mentioned by Borelli as occurring occasionally in *P. paraguayensis*. The Pará record is the most eastern for the species.

Pyragropsis emarginata new species (Plate XIV, fig. 1.)

Type.—♂; Manaos, Amazonas, Brazil. (Stanford Brazilian Expedition; Mann and Baker.) [Acad. Nat. Sci. Phila., Type no. 5233.]

This very striking species is clearly a member of the genus *Pyragropsis*[3] agreeing with the original description of the genus in every important character but one, namely, the emargination of the margin of the penultimate ventral abdominal segment.

[2] For remarks on the genus see Burr, Ann. K.-K. Naturhist. Hofmus. Wien, xxvi, p. 334, (1912).

[3] Boll. Mus. Zool. Anat. Comp. Univ. Torino, xxiii, no. 594, p. 2, (1908).

This, however, Burr has stated cannot be considered of generic value, and his *Propygragra*, based on this feature, is now placed by him in the synonymy under *Pyragropsis*.[4]

The nearest ally of the new form is *P. thoracica* Serville, which, according to Burr, agrees in the emarginate penultimate abdominal segment of the male, but from which *emarginata* differs in the obliquely instead of squarely truncate distal margin of the tegmina and in a number of features of the color pattern, as the bicolored exposed portion of the wings, the spotted tegmina, the absence of rufous from the pronotum and more infuscate limbs. When compared with the very ample and satisfactory description of *P. tristani* Borelli, which is also very close to the new form, the latter is found to differ in having twenty-two antennal segments, in the obliquely truncate instead of rounded distal margin of the tegmina, in the caudal margin of the disto-dorsal abdominal segment being truncate instead of concave, and in certain color differences, as the absence of longitudinal tegminal bars and in the femora having the same base color as the tibiae.

Size rather small; form weakly depressed; surface entirely dull except that of the disto-dorsal abdominal segment and of the forceps which are moderately polished, dorsal surface of unpolished abdominal segments probably in an unrubbed condition completely covered with silvery scales, well marked traces of which remain, long and short hairs disposed over the surface as in *P. tristani*. Head triangular, caudal angles roundly obtuse, occipital margin straight, surface of occiput gently convex dorsad, indications of several short irregular sulci present, usual transverse sulcus not indicated; eyes but little prominent; antennae composed of twenty-two segments, proportioned as in *P. tristani*. Pronotum very slightly broader than long, general form as in *tristani* but caudo-lateral angles more rounded; cephalic two-thirds of surface subconvex, remainder flattened and moderately elevated toward the lateral and caudal margins; medio-longitudinal sulcus delicate but continuous. Tegmina one and one-half times as long as the pronotal disk, lateral outline when viewed from the dorsum gently arcuate, the tegmen appreciably narrower distad than mesad; caudal margin obliquely truncate. Exposed portion of the wings not more than a fourth as long as the tegmina, apices squarely truncate, lateral outline arcuate. Scutellum exposed between the tegminal bases, subtrigonal. Abdomen moderately broad, subfusiform, all of the dorsal segments more or less produced caudate along the lateral line, the sixth, seventh and eighth segments with carina similar to *P. tristani*, structure of same region of ninth segment similar to *tristani;* disto-dorsal abdominal segment with the caudal margin truncate, sculpture as in *tristani;* forceps as in *tristani* but faintly more slender; penultimate ventral segment with the lateral margins converging

[4] Burr, Ann. and Mag. Nat. Hist., (8), iii, pp. 333 to 334.

caudad in a sigmoid fashion, the distal extremity deeply and rather broadly U-emarginate, the lateral angles well rounded; ultimate ventral segment covered. Limbs moderately robust; tarsi with distinct arolia between the claws.

General color dull fuscous-black (Ridgway), on the abdomen burnt umber, all pale maculations cream color. Head with distal margin of clypeus pale; antennae with joints 16 to 18 or 15 to 17 pale. Pronotum with lateral "wings" and all except median portion of caudal third pale. Tegmina with a pale proximal spot placed nearer the sutural than the costal margin; exposed portion of wings with external half pale. Limbs with the disto-dorsal portion of the femora, adjacent portion of the tibiae, distal extremity of tibiae and all (caudal) or a portion (cephalic and median) of the metatarsi pale. Abdomen with the ventral surface paling to mahogany red; forceps becoming mahogany red distad, the pilosity of internal face cream color.

Length of body (exclusive of forceps), 9.5 mm.; length of pronotum, 1.9; length of tegmen, 3; length of left branch of forceps, 1.5.

The type is unique.

Labiduridae

Anisolabis annulipes (H. Lucas)

1847. *Forficelisa annulipes* Lucas, Bull. Soc. Entom. France, IIe ser., v, p. LXXXIV. ["Jardin de Plantes, Paris"; probably introduced.]

Independencia, Parahyba. (Mann and Heath.) Three females.

Euborellia janeirensis (Dohrn)

1864. *F[orcinella] janeirensis* Dohrn, Entom. Zeit. Stettin, xxv, p. 285. [Rio de Janeiro, Brazil.]

Ceará Mirim, Rio Grande do Norte. (Mann.) Two males.
Independencia, Parahyba. (Mann and Heath.) Two males, four females.

The pale antennal annulus is present in all the specimens which have complete antennae, its width generally covering two segments, but its position varying from segments seven to nine to fifteen to sixteen, the individual having the seven to nine extreme on one antenna having the annulus on segments twelve to thirteen on the other antenna.

Psalis scudderi Bormans?

1900. *Ps[alis] scudderi* Bormans, Ann. Mus. Civ. Stor. Nat. Genova, (2), xx, p. 449. [Puerto 14 de Mayo, Upper Paraguay (now in Bolivian Chaco); Olivenza, Amazon River (Brazil).]

Pará, Pará. (C. F. Baker.) Two males.

These specimens are assigned to this species with some doubt, as in this extremely complex genus with several polymorphic

species, it is difficult to judge what are and what are not criteria of specific value. Both of our specimens are without apparent wing scales, these being present in the type of *scudderi*, but we know other species of the genus vary in this respect. The tegmina are shorter in proportion than Bormans describes, but this also we know is intra-specifically variable in the genus. The antennae have the distal pale annulus as described but the proximal joints are not pale. When compared with the closely related *P. burri* Borelli[6], from Paraguay, our material differs in the more longitudinal pronotum, in the tegmina having the distal margin slightly oblique truncate toward the disto-costal angle instead of the disto-sutural angle, in the form of the anal segment and forceps and in the color of the limbs; agreeing, however, in the absence of wing scales and in the form of the lateral portion of the abdominal segments. As *scudderi* was based on the female sex and *burri* on the male, the last mentioned difference is probably sexual.

Psalis species

Porto Velho, Rio Madeira. (Mann and Baker.) One female.

Labidura riparia (Pallas)

1773. *Forficula riparia* Pallas, Reise Russ. Reichs, pt. ii, p. 727. [Shores of Irtysch River, western Siberia.]

Pará, Pará. (Mann.) One male.

Abuna, Bolivia. (Mann and Baker.) One male.

We have not attempted to allocate these specimens in the present species complex, as that seems unwarranted in the present state of our knowledge. Both individuals have the caudal margin of the anal segment bidentate, the teeth larger and closer together in the Pará specimen than in the Abuna one.

Labiidae

Spongovostox alter (Burr)

1912. *Spongovostox alter* Burr, Ann. K.-K. Naturhist. Hofmus. Wien, xxvi, p. 336, fig. 13. [Mapiri, Bolivia (type locality); Minas Geraes, Brazil; Bugaba, Panama.]

Porto Velho, Rio Madeira. (Mann and Baker.) One male.

Abuna, Bolivia. (Mann and Baker.) One male.

[6] Boll. Mus. Zool. Anat. Comp. Torino, xx, no. 516, p. 2, fig., (1905).

The type locality (Mapiri [or Mapari]) is on the upper Beni, a tributary of the Mamoré-Madeira drainage, situated 68° W, 14° 40′ S. The specimens recorded above are perfectly typical.

Spongovostox pygmaeus (Dohrn)

1864. *P[salidophora] pygmaea* Dohrn, Ent. Zeit. Stettin, xxv, p. 421. [Rio de Janeiro, Brazil.]

Madeira-Mamoré R. R. Company Camp 41, Rio Madeira. (Mann and Baker.) One male.

This specimen differs in several respects from the original description of this variable species, to which, however, it clearly belongs. The forceps have no distinct teeth on the internal margin, but are denticulate for the greater portion of their length, while the pale humeral maculation on the tegmina does not reach the distal margin of the same, the pale area on the exposed portion of the wings not being continuous with that on the tegmina. The character of the forceps is as found in the synonymous (according to Burr) *Labia tricolor* Kirby from Santarem, Brazil, but the pygidium is as figured by Burr for the species.[6]

The previously known records in addition to those given above are: Brazil (Burr), Peru (Burr).

We have encountered some difficulty in using the notes and figures made by Burr for the species of this genus.[7] Two forms as there treated do not agree with the original descriptions of the species: *ghilianii* Dohrn being described originally as possessing a male pygidium "longe productum, postice rotundatum," while Burr informs us the same is "breit, mehr oder weniger abgerundet, mit einem mikroskopischen Fortsatz an dem Ende": *confusus* Borelli was originally figured as having the male pygidium nearly a third as long as the forceps, while Burr illustrates this feature as not a tenth the length of the same; the forceps of *confusus*, which were originally described and figured as being straight for two-thirds of their length with their internal margin armed with a tuberculariform dilation, are figured by Burr as sinuate proximad with several denticulations of quite different character on the internal margin. It appears to us that Dohrn in describing *ghilianii* probably utilized the Pará specimen collected by Ghiliani more than the material from Cayenne and Venezuela, that from the latter locality, in the Vienna Museum,

[6] Ann. K.-K. Naturhist. Hofmus. Wien, xxvi, p. 335, fig. 7, (1912).

[7] Ibid., pp. 335 to 337, figs. 7 to 16, (1912).

having been examined by Burr and designated as "type." If the Venezuelan specimen shows the different type of pygidium described and figured by Burr it certainly does not accord with the original description. In the case of *confusus* it is evident to us that the Colombian material examined by Burr is not specifically identical with the typical Paraguayan specimens of Borelli.

Labia curvicauda (Motschulsky)

1863. *Forficelisa curvicauda* Motschulsky, Bull. Soc. Nat. Moscou, xxxvi, p. 2, pl. II, fig. 1. [Nura-Ellia Mountains, Ceylon.]

Pará, Pará. (C. F. Baker.) One male, one female.

These specimens fully agree with individuals from Long Key, Florida. Aside from the present record, the only one we can find of the occurrence of this circumtropical species on the mainland of South America is that of the synonymous *Labia glabricula* Kirby, from Santarem (Kirby) and São Paulo (Burr), Brazil. It seems desirable to call attention to the fact that the key for the genera of Labiinae given by Burr[8] would run this species to *Chactospania* or *Sphingolabis*, the head in this species being subsinuate caudad when compared with *L. minor*, the genotype, which is in the alternate category. Apparently this feature is not of generic value in the present instance, as *curvicauda* is congeneric with *minor*.

Sparatta semirufa (Kirby)

1896. *Sparatta semirufa* Kirby, Journ. Linn. Soc. London, Zool., xxv, p. 528, pl. XX, figs. 4, 4a. [Igaurassu, near Pernambuco, Brazil.]

Pará, Pará. (Mann.) One female.

This specimen is referred tentatively to the present species, the exact relationship of which to certain of the other forms of the genus is not at present clearly understood. However, our individual fully agrees with Kirby's description except that there are no blackish markings on the head or pronotum.

Borelli has reported this species from Tacuru Pucu, Paraguay and San Pedro, Misiones, Argentina.

Prosparatta incerta (Borelli)

1905. *Sparatta incerta* Borelli, Boll. Mus. Zool. Anat. Comp. Torino, xx, no. 516, p. 11, figs. [Puerto Bertoni, Paraguay.]

Porto Velho, Madeira River. (Mann and Baker.) Two males, three females.

[8] Genera Insect., Dermapt., p. 53, (1911).

Madeira River. (Mann and Baker.) One female.

These specimens are somewhat smaller than the original measurements, but otherwise they are in complete accord. The species has also been recorded from San Bernardino, Paraguay; Iatahy, Goyaz, Brazil (Burr), as well as several localities in Costa Rica and Vera Cruz, Mexico (Borelli).

Forficulidae

Doru lineare (Eschscholtz)

1822. *Forficula linearis* Eschscholtz, Entomogr., p. 81. [Santa Catharina, Brazil.]

Independencia, Parahyba. (Mann and Heath.) One female.
Madeira-Mamoré R. R. Camp 43, Rio Madeira. (Mann and Baker.) One male.

The last mentioned individual belongs to the form (*californica*) without the usual tooth on the internal margin of the forceps.

ORTHOPTERA

Blattidae

ECTOBIINAE

Anaplecta grandipennis (Saussure and Zehntner)

1893. *Anaplecta grandipennis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 25, tab. iv, fig. 5. [Pernambuco, Brazil.]

Manaos, Amazonas. (Mann and Baker.) One female.

This specimen fully agrees with the description of the type and considerably extends the range of the species. When compared with the allied *A. replicata* the shape of the costal margin of the tegmina is seen to differ, in addition to the other differential character cited by the describers.

Anaplecta analisignata new species (Plate XIV, figs. 2 and 3.)

Type.— ♀ ; Manaos, Amazonas, Brazil. (Mann and Baker.) [Acad. Nat. Sci. Phila., Type no. 5235.]

Allied to *A. nahua* Saussure, *pallicornis* (Walker) and *bivittata* Brunner, differing from the first in the much more extensive appendicular field of the wing, the more numerous costal veins of the wing, the broader medio-discoidal area of the same and the rather different coloration. From *pallicornis* it differs in the bilineate pronotum and details of the tegminal coloration, while from *bivittata* it can be separated by the tegminal infuscation not being squarely cut mesad.

Size small; form elliptical. Head with the greatest depth slightly greater than the greatest width across the eyes; occipital outline strongly arcuate, the width between the eyes one and one-third times the depth of one of the eyes; face with the width between the antennal scrobes about three-fifths that between the eyes; eyes hardly projecting, in basal outline strongly reniform; antennae at least a third again as long as the head, pronotum and closed tegmina together. Pronotum trapezoid in general form, the cephalic margin narrow, subtruncate, cephalo-lateral angles broadly rounded, lateral margins moderately arcuate, caudo-lateral angles rotundato-rectangulate, caudal margin subtruncate; lateral sections rather strongly deflexed, disk subdeplanate, a subarcuate impressed area bounding the dark bars laterad. Tegmina about three times as long as the pronotum, lanceolate, the greatest width (mesad) almost equal to the greatest length of the pronotum; costal margin moderately arcuate, sutural margin straight, weakly arcuate distad, apex narrowly rounded; marginal field rather narrow, translucent, reaching almost to the middle of the tegmen, discoidal and anal fields opaque; mediastine vein faintly bent mesad; costal veins ten in number, very faintly clavate, oblique; discoidal vein straight, discoidal rami three in number (costal one also bifurcate), longitudinal; ulnar vein simple; anal vein reaching sutural margin slightly proximad of proximal third; anal field acute pyriform. Wing with the costal margin sinuate; costal veins eight in number, distinctly clavate distad, oblique; humeral vein short, connecting with the four proximal costal veins, irregular; discoidal vein reaching the proximo-costal angle of the appendicular field; medio-discoidal area over three times as broad as the medio-ulnar area, with three transverse nervures which form two quadrate areas mesad; ulnar vein bifurcate at distal third, the cephalic ramus meeting the distal margin of the discoidal field near the discoidal vein; appendicular field ample, in length about one-half that of the remaining section of the wing, semielliptical, the greatest proximal width somewhat greater than the length of the field. Abdomen of type missing. Cephalic femora with the ventro-cephalic margin bearing a pair of spines at the proximal third and a distal pair, the former subequal, the latter very unequal in length (distal longer), intervening section of the margin closely haired. Median femora with three long spines on proximal half of the ventro-cephalic margin, a single one distad, a long genicular spine present, ventro-caudal margin with spaced spiniform bristles. Caudal femora with three spines on the ventro-cephalic margin, one being distal, genicular spine very long, ventro-caudal margin with spaced spiniform bristles; caudal tarsi three-fourths the length of the caudal tibiae, metatarsus but slightly longer than the remaining tarsal joints, a minute arolium present.

General color light buff, becoming warm buff on the median section of the pronotum, a pair of gently diverging bars on the pronotum and the greater portion of the tegmina prout's brown, clearer and more translucent and weakening in intensity distad on the tegmina. Head entirely prout's brown with the buccal region whitish, the occipital region lighter than the face with three spots of the general color transversely disposed; antennae prout's brown, weaker distad, segments narrowly annulate distad with the general color. Pronotum with the lateral sections subhyaline, the dark bars with their external border bisinuate, the enclosed median pale area narrowly flask-shaped,

caudal and lateral margins very narrowly edged with whitish. Tegmina with the marginal field subhyaline, an oblique bar of the general color follows the anal vein for the distal two-thirds of its length, does not sever the dark area at the humeral trunk but passes distad along the sutural margin; the dark discoidal area weakens distad; veins of the infuscate area darker than the general tone. Wings but faintly tinted, appendicular field appreciably tinted with buckthorn brown. Limbs clay color, infuscate at base of tibial spines.

Length of pronotum, 1.7 mm.; greatest width (caudad) of pronotum, 1.6; length of tegmen, 4.8; greatest width of tegmen, 2.

While the unique type of this beautiful species lacks the abdomen, its characters are so decided we feel no hesitation in describing it.

PSEUDOMOPINAE

Pseudomops inclusa Walker

1868. *Pseudomops inclusa* Walker, Catal. Blatt. Brit. Mus., p. 212. [Brazil.]

Independencia, Parahyba. (Mann and Heath.) One specimen, sex uncertain as abdomen is missing.

This individual fully agrees with Walker's description except that the lateral portions of the black figure on the pronotum are not connected caudad. Shelford [9] states that in some specimens there is variation in the depth of the whole marking, but in our individual the lateral sections are black while caudad there is only a transverse arcuate cloud in the position of the usual decided transverse marking in *oblongata*, from which, however, the present insect differs in a number of color characters. The description of Saussure's *amoena* from Pernambuco, which is considered synonymous by Shelford, does not satisfactorily agree with the specimen in hand.

Pseudomops annulicornis (Burmeister)

1838. *Th[yrsocera] annulicornis* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 500. [Bahia, Brazil.]

Pará, Pará. (C. F. Baker.) One male, two females.

Porto Velho, Rio Madeira. (Mann and Baker.) Two males.

The range of the species is greatly extended inland by the last record.

Pseudomops angusta Walker

1868. *Pseudomops angusta* Walker, Catal. Blatt. Brit. Mus., p. 81. [Santarem, Brazil.]

Pará, Pará. (C. F. Baker.) One female.

[9] Trans. Entom. Soc. London, 1906, p. 253, (1906).

This specimen differs from the original description of the species in having the palpi entirely black, the femora blackish dorsad and the cerci almost entirely black. Otherwise the present individual is completely in accord with Walker's description.

Ischnoptera amazonica new species (Plate XIV, figs. 4, 5, 6, 7 and 8.)

This species is related to *I. rubiginosa* Walker, known from Santarem, Brazil and British Guiana. From *rubiginosa* the present species differs in the somewhat larger size, more diffuse and less contrasted color pattern, proportionately more elongate tegmina and wings, narrower interspace between the eyes, less transverse elliptical pronotum and very different male genitalia.

Apparently there is some relationship to *I. taczanowskii* Bolivar, from the western coast region of Peru, but a number of features of differences can be noted in the description.

Type.—♂; Igarapé-Assu, State of Pará, Brazil. (H. S. Parish.) [Acad. Nat. Sci. Phila., Type no. 5318.]

Size medium; form elongate elliptical, depressed. Head projecting but little cephalad of the pronotum; interspace between the eyes narrow, no greater than that between the ocelli and twice as wide as the proximal antennal joint; ocelli reniform; eyes large, their greatest depth cephalad distinctly less than the interspace between them; palpi with third and fifth joint subequal in length, the former relatively slender, subcylindrical; fourth joint faintly shorter than the third joint, moderately conical; fifth joint relatively deep proximad, tapering, subcompressed; antennae exceeding the body in length. Pronotum broad elliptical, moderately transverse, the greatest length contained one and one-third times in the greatest width of the same, greatest width situated slightly caudad of the middle; cephalic margin arcuato-truncate; latero-cephalic angles very slight and broadly rounded obtuse; lateral margins strongly arcuate; latero-caudal angles obtusely rounded; caudal margin gently obtuse arcuate; disk with paired distinct obliquely diverging impressions; lateral portions of pronotum moderately deflected. Tegmina surpassing the apex of the abdomen by nearly the length of the pronotum, elongate, margins in large part subparallel, the greatest width at distal third; costal margin moderately arcuate in proximal third, thence straight except for a short distal arcuation to the apex, which is faintly nearer the costal than the sutural margin; sutural margin straight except in distal third, where it is moderately arcuate to the apex; marginal field relatively short and narrow; scapular field moderately broad, subequal; anal field very elongate pyriform, reaching to two-fifths the entire length of the sutural margin from the base; costal veins eighteen to twenty in number, occasionally (particularly distad) bifurcate; median vein bifurcate slightly proximad of the middle; ulnar vein with four rami, all diverging mesad on the sutural side, all reaching the apical margin, except a bifurcation of the proximal one, which reaches the sutural margin slightly short of the apical margin. Wings reaching to (or faintly

surpassing) the apices of the tegmina, greatest width contained faintly more than one and one-half times in the greatest length: costal margin subtruncate in distal half, apex well rounded: anterior field quite broad; intercalated triangle small, elongate: discoidal vein straight, except for a slight arcuation distad; costal veins fourteen in number, occasionally these are bifurcate, nonclavate; median vein sinuate; medio-discoidal area slightly wider than the medio-ulnar area, divided into a great number of rectangulate, generally transversely oblong, areas by distinct transverse veins; medio-ulnar area divided nto rectangular, generally quadrate, areas, less numerous than those of the medio-discoidal area and with the cross-veins in large part incomplete cephalad; ulnar vein with two complete rami reaching the apical margin and five incomplete rami toward the dividing vein; axillary vein biramose mesad. Sixth dorsal abdominal segment with its margin broadly V-emarginate mesad; seventh dorsal abdominal segment depressed meso-cephalad under the emargination of the preceding segment, moderately vaulted and broadly U-emarginate meso-caudad; eighth dorsal abdominal segment very short, bearing mesad a rounded glandular area; ninth dorsal abdominal segment broadly arcuato-emarginate. Supra-anal plate transverse, margin weakly and rather broadly sinuate laterad, broadly arcuate and moderately produced mesad, margin strongly hirsute; when seen from the caudal extremity the ventral surface of the plate is seen to have on the dextral side an elongate peg-like process, which is directed ventro-mesad within the subgenital plate: cerci depressed, subfusiform, acute distad, hirsute, particularly ventrad: subgenital plate moderately unsymmetrical, styles median, small, slender, simple, subequal in length and in approximately their usual position. Cephalic femora with the ventro-cephalic margin bearing four large median and proximal spines, distad of which is a series of short, fine, regularly disposed and subequal spinules, three apical spines on the same margin large. Median and caudal femora with the ventral margins armed with regularly placed spines: no dorsal genicular spines on the cephalic femora, distinct ones on the median and caudal femora: caudal tarsi with the metatarsus faintly longer than the remaining tarsal joints; arolia small.

Allotype.— ♀ ; Same data as type.

The features here given are those of difference from the description of the male type given above. Interspace between the eyes broader than in the male sex, but retaining its relative proportion to that between the ocelli; eyes with their greatest depth but little greater than the interocular space. Abdomen with no scent-gland opening on dorsal surface. Supra-anal plate moderately transverse, sinuate laterad, broadly V-emarginate mesad and the margin rounded laterad of the same: subgenital plate broad, the margin rounded.

The differences between the recessive and intensive types of coloration is very decided, although the pattern changes but little and the depth of the tone is almost entirely responsible for the apparent diversity. General color cinnamon-buff to clay color, the head, disk of the pronotum and the vicinity of the proximal section of the mediastine vein infuscate with warm sepia to blackish. Head dark; mouth-parts, palpi and ocelli warm buff to ochraceous-tawny; antennae prout's brown to fuscous, proximal jo nt paler; eyes very dark chestnut brown. Pronotum with the dark disk pattern reversed tri-

angular in the recessive specimens, the narrowest point caudad, in the intensive individuals the whole area of the disk is infuscate; the caudal margin of the pronotum is much paler in some individuals than in others, while the dark disk is in all but the most intensive individual distinctly divided in two along the median line by a bar of kaiser brown to pale rufous. In the single exception there is, moreover, a weak indication of such a bar. The pale lateral and cephalic sections of the pronotum are more warm buff to pale ochraceous-buff than the general tone. The tegmina have the marginal and greater portions of the scapular fields pale buffy hyaline, the infuscation along the greater portion of the mediastine vein very decided. Wings with the veins largely clay color, these saccardo's umber on most of the anterior field and the region of the costal veins and apex of the anterior field is washed with yellow ocher. Dorsal surface of the abdomen washed along the lateral borders with mummy brown; ventral surface of abdomen ochraceous-tawny to mummy brown, the paler individuals are mummy brown laterad and distad, the darker ones fuscous; dorsal apex of abdomen and cerci of male mummy brown. Limbs ochraceous-buff to pale ochraceous-buff, the spines ferruginous, the coxae marked with prout's brown proximad.

Measurements in millimeters

♂	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen
Igarapé-Assu, Brazil, *type*	11 2	2 9	3 5	11	3 3
Independencia, Parahyba, Brazil, *paratype*	9 5[10]	2 6	3 2	11 3	3 3
diunuha to Concha Huaya, Peru. *paratype*	8[10]	2 4	3	9 2	3
♀					
Igarapé-Assu, Brazil, *allotype*	11 2	2 9	3 6	11 1	3 8
Ceará, Ceará, Brazil, *paratype*	8 9[10]	2 9	3 4	10 8	3 2

In addition to the type and allotype we have before us the following paratypes of this species:

Pará, Pará, Brazil. (W. M. Mann; C. F. Baker.) Two males.

Independencia, Parahyba, Brazil. (Mann and Heath.) Two males.

Ceará, Ceará, Brazil. (F. Rocha.) One female. [U. S. N. M.]

Piunuha to Concha Huaya, Peru. October 9 to 13, 1913. One male. [A. N. S. P.]

[10] Specimen dried from alcohol. The measurements may, therefore, be unduly small on account of shrivelling.

These specimens show a decided range of depth in the color pattern, almost entirely in a recessive and intensive fashion, while as shown above the size varies considerably. The median vein of the tegmina frequently has one or the other of the forks bifurcate, while the ulnar vein of the same shows appreciable variation in the exact divergence of its branches. The number of incomplete rami of the ulnar vein of the wing varies from as few as five to as many as seven. The supra-anal plate of the male is quite unique in its peculiar ventral unpaired process on the dextral side.

Cariblatta[11] **personata** new species (Plate XIV, figs. 9 and 10.)

Apparently nearest to *C. fossicauda* Hebard, from Trinidad.[12] The female supra-anal plate is briefly cleft mesad, not briefly and roundly emarginate as in *C. aediculata* Hebard, from Trinidad,[13] or with a shallow emargination weakly indicated as in *fossicauda*. Though one of the plain colored species of the genus, the present species differs in having the general coloration a paler, slightly more reddish brown, while the ventral surface of the abdomen is distinctly marked with dark brown. It is the only South American species of the genus which has the female subgenital plate distinctly marked mesad. With males the position of the species and its peculiarities would be easier to indicate, but its distinctness is evident with the female sex alone.

Type.— ♀ ; Ceará Mirim, Rio Grande do Norte, Brazil. (W. W. Mann.) [Acad. Nat. Sci. Phila., Type no. 5236.]

Size as usual in the genus. Maxillary palpi with third joint moderately elongate, fourth joint slightly shorter and tapering proximad, fifth (distal) joint longer than the fourth and subequal in length to the third, inflated; interspace between the eyes very broad, very slightly greater than that between the antennal scrobes and distinctly greater than that between the ocelli. Pronotum of the form usual in the genus, greatest width caudad, the lateral margins obliquely arcuate, caudal margin truncato-arcuate, cephalic margin narrowly rounded; lateral portions moderately declivent. Tegmina lanceolate, somewhat surpassing the apex of the abdomen, apex of tegmina rounded; marginal field reaching to the middle of the costal margin; humeral vein bearing nine complete costal veins proximad of a fork, the costal arm of which bears four additional costal veins; rami of the discoidal vein four in number, sublongitudinal, ulnar vein carried a considerable distance distad along the sutural margin of the tegmina; cross nervures between discoidal rami nu-

[11] Vide Hebard, Trans. Amer. Entom. Soc., xlii, p. 147, (1916).

[12] Ibid., pp. 154, 156, 177, pl. xi, figs. 13 to 17, pl. xii, figs. 17 and 18.

[13] Ibid., pp. 154, 156, 179, pl. xi, figs. 18 and 19, pl. xii, figs. 19 and 20.

merous and weakly indicated, except on the normally covered section of the dextral tegmen, where they are quite distinct; anal field elongate pyriform. Wings reaching to the tegminal apices; costal veins numerous and moderately elavate distad; medio-discoidal and medio-ulnar areas in general subequal in width; ulnar vein with one large ramus; intercalated triangle distinct, of fair size. Abdomen broad, depressed, distal extremity of the abdomen considerably narrowed; penultimate dorsal segment broadly obtuse-emarginate distad; disto-dorsal abdominal segment arcuate-truncate mesad; supra-anal plate transverse, margin obtuse-angulate with a distinct short, narrow, median fissure, the plate depressed on each side of the median area, which in section is tectate; cerci depressed subfusiform, apices imperfect in type; subgenital plate scoop-shaped, rather more produced and compressed than in related forms, the apex is very narrowly emarginate-truncate. Cephalic femora with ventro-distal margin bearing three median and two distal (apical) long spines, the margin between with a fairly closely placed series of much shorter spines. Caudal tarsi slightly shorter than the caudal tibiae, the metatarsus subequal in length to the remaining tarsal joints; arolia on all tarsi.

General color pale yellow ocher, the veins of the wings and of the normally covered portion of the dextral tegmen dresden brown. Head with occiput and interocular region antimony yellow, crossed by a decided transverse bar of cinnamon-brown; maxillary palpi light buff; eyes mars brown. Pronotum with the disk opaque antimony yellow with five pairs of more or less broken lines of ochraceous-tawny; these lines vary in thickness and intensity, but, aside from the parallel median pair, are arranged in an appreciably concentric pattern. Tegmina with the normally covered portion of the dextral tegmen whitish. Dorsum of abdomen mummy brown with the segments margined laterad with, and the distal segments divided mesad by, light ochraceous-buff; venter of abdomen in ochraceous-buff with a paired intermarginal bar on each side, coming to a point at the cercal bases, and a median bar, which is very broad proximad, tapering mesad and narrow and subequal on the subgenital plate, mummy brown. Cerci mummy brown ventrad and at dorsal base.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen
♀ Ceará Mirim, *type*	8.8	2.5	3.3	8.5	3
♀ Ceará Mirim, *paratype*	—	2.6	3.4	8	2.9
♀ Independencia	—	2.4	3.3	7.8	3

In addition to the type we have examined a paratypic female from the type locality and another female (minus the abdomen) from Independencia, Paraiyba, Brazil (Mann and Heath). These specimens show no important features of difference from the description of the type. The eyes are seen to vary in color

from nearly blackish to pale buffy, but this is probably due to the immersion in liquid preservative, to which all have been subjected.

Neoblattella adspersicollis (Stål)

1860. *Blatta adspersicollis* Stål, Kongl. Svenska Fregat. Eugenies Resa, Zool., i, p. 308. [Rio de Janeiro, Brazil.]

Pará, Pará. (C. F. Baker.) One male.

Ceará, Ceará. (F. Rocha.) One male. [U. S. N. M.]

Neoblattella pellucida (Burmeister)

1838. *Bl[atta] pellucida* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 498. [Pará, Brazil.]

Independencia, Parahyba. (Mann and Heath.) Two females.

Pará, Pará. (C. F. Baker.) One male, two females.

We have tentatively identified this species as Burmeister's form, agreeing as it does with his very brief description, but differing in some features from all the other described species. It is a robust insect belonging near *fraterna* Saussure and Zehntner. The species has the interspace between the eyes very wide, equal to one and one-half times the depth of the eye, while the supra-anal plate of the female is deeply divided with margining digitiform processes; the subgenital plate of the female is very slightly produced with the distal margin subsinuato-truncate. The male supra-anal plate is greatly produced and very delicate, with the distal margin broadly rounded; subgenital plate transverse, moderately stout, the styles set in sockets laterad at the bases of the cerci, mesad of which the plate is produced symmetrically in rounded projections, the ventral surfaces of which are strongly convex, and between these projections the margin of the plate is concave.

Four of the seven females seen by us carry oöthecae, their position being vertical with the carina dorsad.

The ventral surface of the abdomen in the female bears a broad medio-longitudinal bar of shining black, which reaches caudad to all but the extreme margin of the subgenital plate. In the male this is represented by a much narrower bar, which is attenuate caudad.

DENDROBLATTA[14] new genus

A member of the Blattellites, but apparently not closely related to any of the previously known genera except *Mareta* Bolivar. The combination of strongly deplanate head, very narrow interspace between the eyes, very wide and deplanate pronotum, the presence of a gland on the seventh dorsal abdominal segment of the male, elongate limbs and peculiar armament of the cephalic femora is diagnostic of the genus.

Generic Characters.—Form deplanate, fully alate in both sexes. Head very strongly deplanate; eyes narrowly separated in both sexes; lateral margins of head ventrad of eyes strongly convergent to the base of the mandibles; maxillary palpi elongate. Pronotum broad, tranverse, with broad lateral margins which are but little deflected. Tegmina with discoidal rami and ulnar vein oblique, former numerous. Wings with intercalated triangle very small, elongate and narrow. Seventh dorsal abdominal segment of male with a decided gland mesad. Supra-anal plate of male strongly transverse; cerci very elongate, deplanate dorsad, ventral surface extremely hirsute and with each segment convex. Limbs extremely elongate; cephalic femora with ventro-cephalic margin armed on distal three-fifths with a close set row of minute chaetiform spines,[15] the series terminated by two elongate spines distad; distinct arolia present.

Genotype.—*Dendroblatta sobrina* new species.

This very striking genus is unique in quite a few morphological features, while its coloration and habits are as distinctive as its structure. The closest affinity of *Dendroblatta* is with *Mareta* Bolivar, from which the narrower eye interspace, the presence of the dorsal gland on the abdomen of the male, the more corneous tegmina and the much more elongate tarsi readily separate the new genus.

[14] This generic name has been given in allusion to the arboreal habits of the species, which will be discussed in detail at a later date.

[15] The proximal two-fifths of the ventro-cephalic margin of the cephalic femora is rarely unarmed, occasionally supplied with one or two small spines and frequently with four or five spines.

Dendroblatta sobrina new species (Plate XIV, figs. 11, 12, 13 and 14.)

Type.—♂; Porto Velho, Rio Madeira, Brazil. (Stanford Expedition; Mann and Baker.) [Acad. Nat. Sci. Phila., Type no. 5245.]

Size medium; form deplanate; surface moderately polished. Head strongly deplanate, in general outline trigonal, the eyes rounded, the lateral margins of the head converging ventrad as far as the bases of the mandibles; occipital outline arcuato-truncate, the least interspace between the eyes less than one-half the greatest thickness of the eyes; eyes in general form strongly arcuate around the insertion of the antennae, greatest thickness cephalad more than twice the thickness ventrad; antennae elongate, setaceous; maxillary palpi of the proportions given in the generic description, the third joint rod-like, the fourth joint tubiform, the fifth joint expanded, the oblique truncation extending two-thirds of the length of the joint. Pronotum transverse subelliptical, the greatest engtli contained one and two-fifths times in the greatest width, strongly deplanate with the lateral portions gently deflected; cephalic margin of disk arcuato-truncate, latero-cephalic angles obtusely rounded, lateral margins oblique arcuato-truncate cephalad, arcuate caudad, the lateral angles roundly obtuse, caudo-lateral angles broadly rounded, caudal margin truncate; irregular converging oblique impressions indicated on disk. Tegmina surpassing the apex of the abdomen by nearly the greatest width of the pronotum, in general form lanceolate, the greatest width contained about three and one-half times in the greatest length; costal margin appreciably arcuate proximad, nearly straight distad but rounded at the apex; sutural margin straight, distad rounding to the apex, which is median and hardly broad; marginal field quite broad, reaching to the proximal two-fifths of the wing, anal field semiovate-pyriform, the distal portion of the anal vein strongly arcuate, joining the sutural margin very slightly distad of the proximal third; costal veins numerous, oblique, regular but generally bifurcating distad; rami of the discoidal vein and anal vein oblique, the rami of the discoidal numerous, the majority reaching the sutural margin, the ulnar vein reaching the same margin at about the distal two-thirds, strongly marked intercalated false nervures present in the discoidal field and connected with the main veins and rami by numerous and less apparent transverse nervures, which are subobsolete distad; six to seven not very clearly defined axillary veins present. Wings moderately elongate, costal margin subarcuate convex in distal three-fifths, apex rotundato-rectangulate; mediastine vein closely paralleling the costal margin, reaching to the middle of the same; costal veins non-clavate, moderately numerous, the distal ones ramifying; medio-discoidal and medio-ulnar areas very narrow, the latter faintly the wider; ulnar vein with five rami, several of which bifurcate; axillary vein with three rami; intercalated triangle very small, elongate, narrow. Seventh dorsal abdominal segment with a median gland depression; supra-anal plate strongly transverse, moderately tectate, distal margin broadly obtuse with a short median fissure, about which the margins are recurved; genital hooks consisting of a simple falciform pair, directed dorsad, and a dextral unpaired larger organ having the form of a "bill-hook"; cerci large, depressed, monili-fusiform, dorsum deplanate, venter rounded, apex moderately acute;

subgenital plate strongly asymmetrical, form shown in figure. Limbs elongate, depressed, a dorsal genicular spines present on the median and caudal femora, none on the cephalic femora. Cephalic femora armed on the ventro-cephalic margin as described under the genus, of the distal spines the proximal is the shorter, the proximal portion of the same margin unarmed in the type, ventro-caudal margin with three spaced spines on distal half; median and caudal femora with margins well and regularly spined; tibiae with spines triseriate; caudal tarsi faintly shorter than the caudal tibiae, very slender, caudal metatarsus exceeding the remaining joints in length.

Allotype.— ♀ ; Chinandega, Nicaragua. (C. F. Baker.) [Acad. Nat. Sci. Phila.]

The following features are those of difference from the description of the male sex. Form shorter and broader than in the male. Interspace between the eyes slightly more than one-half of the greatest thickness of the eye. Pronotum with oblique impressions hardly indicated. Tegmina much shorter than in male, surpassing the apex of the abdomen by hardly more than one-half the length of the pronotum, short lanceolate, greatest width contained two and one-half times in the greatest length; apex of tegmina slightly broader than in the male; marginal field slightly narrower than in male; structure of tegmina more coriaceous and with venation less apparent, particularly in the discoidal and anal fields. Wings hardly surpassing the apex of the abdomen. Supra-anal plate transverse, trigonal, distinctly U-emarginate mesad, not tectate; subgenital plate moderately ample, margin arcuate with a faint median obtuse-angulation.

General color pale maize yellow with a strongly contrasted dark pattern of mahogany red to chestnut-brown. This dark pattern is distributed over the dorsal surface as follows: a pair of broad, marginally sinuate diverging bars defining the pronotal disk laterad, enclosing an equally broad pale central area and never reaching the cephalic and rarely reaching the caudal margin of the pronotum; entire anal and discoidal fields of the tegmina, aside from a narrow elongate reniform sutural area in the anal field; dorsal surface of the abdomen with the exception of a pale marginal edging and scattered pale points. Head with a dark bar between the eyes at their point of greatest proximity, occasionally this is subobsolete; occiput varying from uniformly pale to bearing four fine dark longitudinal lines; eyes blackish fuscous, rarely ochraceous (not normal?); antennae with ventral surface of proximal and third and following joint blackish fuscous, the whole of the distal section becoming the same shade; face with a dark pattern of sinuate transverse lines, which are sometimes so solidly united as to make a dark background with a pattern of pale maize yellow spots, or again the pattern is subobsolete. Pronotum with the lateral sections subhyaline; margins of the dark bars, which latter expand in width caudad, always undulato-sinuate. Tegmina with the marginal and scapular fields subhyaline, washed with maize yellow; the border of dark area toward the costal margin subsinuate mesad, following the sutural side of the humeral trunk on proximal fourth and crossing to distinctly on the costal side on remainder of tegmen; pale area in anal field subhyaline. Wings having the veins fuscous except along the costal margin, where they are maize yellow. Abdo-

men with the depth of the dark color of the disk somewhat variable; cerci fuscous at base, on dorsal surface punctato-marginate with fuscous points, on ventral surface the segments are more or less completely divided from one another by dark margins. Ventral surface ochraceous-buff, of the abdomen more or less heavily margined laterad with fuscous, occasionally with a weaker medio-longitudinal line of the same; subgenital plate of the female largely fuscous. Ventral margins of femora lined or dotted with fuscous; tibiae infuscated at the base of the spines, the distal extremity of the tibiae infuscate; tarsi generally with several broad dark annulations.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen
Porto Velho, Brazil, *type*	11.8	3.6	5	14	5
Corozal, Panama, *paratype*	10	3	4.2	12	4
Corozal, Panama, *paratype*	10.5	3	4.3	11.5	4
Corozal, Panama, *paratype*	10.8	3.3	4.5	11.9	4.3
Old Panama, Panama, *paratype*	10.6	3.2	4.7	12	4.8
Pozo Azul, Costa Rica, *paratype*	12.5	3.7	4.8	12.6	4.4
♀					
Corozal, Panama, *paratype*	11.6	3.3	4.9	10.2	4.2
Chinandega, Nicaragua, *allotype*	11.5	3.3	5	10.4	4.3

In addition to the type and allotype we have before us five adult male and one adult female paratypes and one immature male. The data for these is as follows:

Corozal, Canal Zone, Panama, XI, 17, 1913, (M. Hebard; colony of adults and young on tree-trunk in clearing), 3 ♂, 1 ♀, *paratypes*, 1 juv. ♂, [Hebard Cln.].

Old Panama, Panama, XI, 13, 1913, (M. Hebard; running about on surface of fallen tree-trunk), 1 ♂, *paratype*, [Hebard Cln.].

Pozo Azul, Costa Rica, V to VI, 1902, (Underwood), 1 ♂, *paratype*, [Hebard Cln.].

This series shows there is an appreciable amount of variation in size, while the coloration exhibits no noteworthy variation. The ulnar vein of the wing has the number of rami varying from three to five. The spination of the ventro-cephalic margin of the cephalic femora varies as stated in footnote on page 231.

The immature male from Corozal has a color pattern close to that of similar individuals of "*Ceratinoptera*" *diaphana* (Fabricius), the network of dark markings on the dorsal thoracic and abdominal segments being very similar. In adults, however, the coloration is quite different.

On the habits of this species Mr. Hebard gives me the following information. Individuals ran rapidly about on the bark of trees and when closely pursued would fly for a short distance but always return to the surface they had left. Both adults and young were noted to exhibit exactly the same action as the bark-loving mantis *Gonatista grisea*, in suddenly arresting their movements and remaining perfectly motionless.

Pseudophyllodromia elegans Shelford

1907. *Pseudophyllodromia elegans* Shelford, Ann. & Mag. Nat. Hist., (7), xix, p. 34. [Maroni, French Guiana.]

Pará, Pará. (C. F. Baker.) One male.

This specimen agrees with the original description based on a single female.

Pseudophyllodromia boliviensis Shelford

1909. *Pseudophyllodromia boliviensis* Shelford, Deutsch. Entom. Zeitschr., 1909, p. 617. [Mapiri (Mapari on some maps), Bolivia.]

Pará, Pará. (C. F. Baker.) One male, one female.

Porto Velho, Rio Madeira. (Mann and Baker.) One female.

These specimens fully agree with the original description. The species is apparently quite close to *P. peruana* (Saussure).

Pseudophyllodromia lineolata Saussure

1872. *Ps[eudophyllodromia] lineolata* Saussure, Mel. Orthopt., ii, fasc. 4, p. 99. [Brazil.]

Pará, Pará. (C. F. Baker.) One female.

This specimen fully agrees with the original description in every respect except several which are probably sexual, Saussure's material being of the male sex. The base color of the head is blackish instead of reddish as described, while the antennae are similarly colored except for the testaceous proximal portion. The abdomen is also almost wholly blackish.

It is quite possible that *Blatta variegata* Walker[16] described from Pará may be the same as this species. If such should prove to be the case Walker's name has priority.

[16] Catal. Blatt. Brit. Mus., p. 112. (1868).

NYCTIBORINAE

Nyctibora brunnea (Thunberg)

"1826. *Blatta brunnea* Thunberg, Mém. Acad. Imp. Sci. St. Petersb., x, p. 278."

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) One male.

We are unable to verify Thunberg's reference, but this specimen is clearly referable to Burmeister's *holosericea*, which is identical with Thunberg's species, according to Shelford. It is closely related to Saussure's *obscura*, but is of considerably larger size, with proportionately shorter and more robust tarsi, and the supra-anal plate of the male is broadly emarginate mesad and immediately laterad of the same the margin is deeply U-emarginate, the intervening points acute. In *obscura* the same margin is rounded mesad, with shallow sinuations laterad of the same area.

Nyctibora obscura Saussure

1864. *N[yctibora] obscura* Saussure, Révue et Magasin de Zoologie, 2é ser., xvi, p. 316. [Brazil.]

Natal, Rio Grande do Norte. (W. M. Mann.) One male.

We have used this name as distinct from *N. brunnea* (Thunberg), with which it has been generally associated, as the present individual fully agrees with the description of Saussure and is distinctly under the measurements of *brunnea* as generally understood. Certain other features of difference are mentioned above under *brunnea*.

EPILAMPRINAE

Audreia heusseriana (Saussure)

1864. *Epil[ampra] heusseriana* Saussure, Révue et Magasin de Zoologie, 2é ser., xvi, p. 321. [Uruguay.]

Pará, Pará. (C. F. Baker.) One female.

Ceará, Ceará. (F. Rocha.) One female. [U. S. N. M.]

The Pará specimen has the pronotum distorted by an injury which has completely altered its outline and made deep impressions of the dark markings of the disk. The tegmina in both specimens are subquadrate, the distal margin concave in both specimens, but less so in the Pará one. In neither, however, is this margin as oblique as in Saussure's figure of the species.[17]

[17] Mém. Hist. Nat. Mex., iv, pl. 2, fig. 21, (1864).

The present species differs from *A. hamiltoni* (Rehn), from Cuba, in the bisinuate caudal margin of the pronotum; from *catharina* Shelford, from Santa Catharina, Brazil, in the emarginate apex of the supra-anal plate of the female, and from *carinulata* (Saussure), from Central America, in the larger size, distinct venation of the tegmina, more numerous femoral spines and differences in the coloration.

The localities given above are all known for the species.

Epilampra azteca Saussure

1868. *Epilampra azteca* Saussure, Révue et Magasin de Zoologie, 2é ser., xx, p. 356. [Mexico; Cuba.[18]]

Pará, Pará. (C. F. Baker.) One female.

This specimen, while slightly larger, appears inseparable from Mexican material. The penciling of the humeral trunk is less distinct in the Pará specimen and the specklings of the pronotum heavier and more numerous. The species has been recorded from Ecuador by Giglio-Tos, but not previously from eastern South America.

Epilampra abdomen-nigrum (DeGeer)

1773. *Blatta abdomen-nigrum* DeGeer, Mém. Hist. Ins., iii, p. 538, pl. 44, fig. 5. [Surinam.]

1903. *Epilampra abortivipenna* Rehn, Trans. Amer. Entom. Soc., xxix, p. 273. [Bartica, British Guiana.]

Pará, Pará. (C. F. Baker.) One male, one female.

The above synonymy has been brought about by Shelford's redescription[19] of DeGeer's type resuscitating the name *abdomen-nigrum*, which was unrecognized for over a century. The present specimens and the type of *abortivipenna* fully accord with Shelford's description.

Pará is the most southern point from which the species is known.

BLATTINAE

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Xth ed., p. 424. ["America".]

Ceará Mirim, Rio Grande do Norte. (W. M. Mann.) One female.

[18] Cuban material later separated by Saussure and Zehntner as *E. caraibea*.

[19] Trans. Entom. Soc. London, 1907, p. 460, (1908).

Periplaneta australasiae (Fabricius)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Entom., p. 271. ["In nave e mari pacifico et regionibus incognitis revertente."]

Independencia, Parahyba. (Mann and Heath.) One male, one female.

Periplaneta brunnea Burmeister

1838. *P*[*eriplaneta*] *brunnea* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 503. [Chili; Demerara.]

Natal, Rio Grande do Norte. (W. M. Mann.) One male.

Eurycotis manni new species (Plate XIV, fig. 15.)

This striking new form belongs to the section of the genus formed by the species of black color with decidedly lateral lobiform tegmina. It is distinctly larger than any of the forms to which it is related and the body coloration is entirely black. No detailed comparison of the genital characters with those of several of the allies is possible, as the latter are unknown in the male sex, but the several diagnostic characters given above are amply sufficient to distinguish the new form.

Type.—♂; Maranguape Mountains, State of Ceará, Brazil. (Stanford Expedition; W. M. Mann.) [Acad. Nat. Sci. Phila., Type no. 5246.]

Size rather large; form elliptical, subdepressed; surface moderately polished. Head projecting moderately cephalad of the pronotum; occiput and eye outline regularly arcuate; interspace between the eyes very broad, nearly three times as great as the depth of the eye; face somewhat flattened; eyes not greatly elongate, dorsal margin sinuate where covered by the pronotal margin; antennae at least two-thirds as long as the body, proximal joint nodulose proximad, second joint almost twice as long as the fourth, third joint slightly longer than the proximal one; palpi with third joint slightly longer than the fourth one, fourth joint elongate conical, fifth joint subequal to the fourth joint, moderately broad, compressed. Pronotum semiovate, narrow cephalic margin subtruncate, broad caudal margin bisinuato-truncate, lateral margins arcuate divergent caudad, cephalo-lateral angles narrowly rounded rectangulate; surface with poorly defined shallowly impressed pattern. Mesonotum and metanotum with faintly bisinuato-truncate caudal margins. Tegmina faintly more than half as long as the pronotum, reaching to the caudal margin of the mesonotum, decidedly lateral, separated by two and one-half times their individual width, their length slightly greater than their width; costal margin gently arcuate, apex costal in position, rotundato-subacute, sutural margin gently arcuate, disto-sutural angle moderately rounded, distal margin moderately oblique arcuato-truncate; marginal field moderately defined; venation not indicated. Abdomen with the caudo-lateral angles produced, of the sixth and seventh segments subspinose; disto-dorsal abdominal segment with the

caudal margin broadly sinuato-arcuate over the greater portion of its width; supra-anal plate transverse, subquadrate, distal margin subarcuato-truncate, caudo-lateral angles obtuse rounded, lateral margins convergent caudad, concave; cerci depressed, styliform, blunted; subgenital plate transverse, distal margin bisarcuate, deeply and narrowly arcuato-emarginate at the insertion of the styles, the latter elongate, simple, tapering. Limbs robust, rather short; cephalic femora with ventro-cephalic margin bearing a series of spines of irregular length on distal two-thirds, distal extremity of cephalic face with a pair of strong spines, no dorsal genicular spine, ventro-caudal margin with four spines on distal half, distal one of the series slightly the larger; median and caudal femora each with a dorsal genicular spine and all ventral margins well armed; all tibiae with spines triseriate on dorsal face, median and caudal tibiae strongly compressed; caudal metatarsi very short, other caudal tarsal joints missing.

Color shining black; antennae black proximad, passing at proximal third into ferruginous.

Length of body, 33.5 mm.; length of pronotum, 9.5; greatest width of pronotum, 13.4; length of tegmen, 5.4; greatest width of tegmen, 3.7; length of caudal femur, 9.3.

The type is unique.

PANCHLORINAE

Panchlora exoleta Burmeister

1838. *P[anchlora] exoleta* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 507. [Pará and Bahia, Brazil.]

Madeira-Mamoré Railroad Company Camp 43, Rio Madeira. (Mann and Baker.) One male.

Panchlora peruana Saussure

1864. *P[anchlora] peruana* Saussure, Révue et Magasin de Zoologie, 2é ser., xvi, p. 342. [Peru.]

Madeira-Mamoré Railroad Company Camp 39, Rio Madeira. (Mann and Baker.) Two females.

Provisionally, at least, we are using *peruana* for this species. The specific names in the genus *Panchlora* are greatly involved in uncertainty, due to the variability of the species themselves and the failure of the older, and for that matter some of the more recent, authors to mention the important genital features of their species.

Nauphoeta cinerea (Olivier)

1789. *Blatta cinerea* Olivier, Encycl. Méthod., Ins., iv, p. 314. [Mauritius.]

Pará, Pará. (C. F. Baker.) One female. [A. N. S. P.]

Manaos, Amazonas. (Mann and Baker.) One male.

This species is circumtropical in its distribution.

SCHISTOPELTIS[20] new genus

Related to *Tribonium* Saussure, from which, as well as all other genera of the family, it can be immediately separated by the bifissate cephalic margin of the pronotum. The genus *Schizopilia* Saussure, which also has a bifissate pronotum, can be readily distinguished by the incisions in the older genus being laterad and not cephalad in position and direction.

Generic Characters.—Form depressed. Head visible cephalad of the pronotum, with interspace between eyes broad. Pronotum transverse, caudal margin truncate, cephalic section deeply fissured on each side of the supra-cephalic portion of the disk, the fissures being arcuate, truncate at their caudal extremity and separating from the disk the wing-like lateral sections of the pronotum. Tegmina complete, venation prominent; marginal field broad. Wings complete; ulnar vein with complete and incomplete rami. Femora with no genicular spines, ventral margins unspined; tarsi with large arolia.

Genotype.—*Schistopeltis peculiaris* new species.

Schistopeltis peculiaris new species (Plate XIV, figs. 16 and 17.

Type.—♂; Porto Velho, Rio Madeira, Brazil. (Stanford Expedition; Mann and Baker.) [Acad. Nat. Sci. Phila., Type no. 5244.]

Size medium; surface of body moderately shining. Head strongly depressed, broad, face decidedly deplanate; occipital outline subtruncate, interspace between eyes broad, nearly three times as great as the depth of the eyes, antennal scrobes much more distant than the eyes and situated deeply in the concavity of the ventral margin of the eyes; ocellar spots large; eyes very narrow, elongate reniform, greatly narrowed mesad; clypeus and labrum relatively small, transverse subrectangulate; palpi short, third joint subequal in length to the fifth and distinctly shorter than the fourth joint, fourth joint conical, fifth joint thick, somewhat inflated, in lateral outline sub-lanceolate; antennae nearly as long as the body, articles moniliform with the exception of the first and third, the former being thickened and longer than the second and third together, the third twice as long as the second. Pronotum with its length contained slightly more than one and two-thirds times in the greatest width, lateral sections depressed; cephalic margin of the disk arcuato-truncate mesad and rounding to the fissures laterad, the medio-cephalic section of the disk but little surpassing the head in width, fissures relatively broad, somewhat converging caudad, where they are abruptly truncate; cephalic margins of the lateral "wings" arcuate divergent, the cephalic angle of these sections, i. e. at the fissures, rect-acute; lateral angle of the pronotum obtuse, decided, faintly

[20] Σχιστος *cloven*, πελτη *shield*.

produced, caudo-lateral margins rect-convergent, crassato-cingulate, caudo-lateral angles obtuse, faintly strumose; caudal margin truncate; surface of the disk subimpressed transversely mesad, laterad near end of fissures are indicated paired sinuate sulci, which sever the black markings described under color; surface of "wings" folded, ventral surface of same deeply and broadly channelled, the angle at extremity of fissure strongly thickened and elevated. Tegmina elongate, briefly passing the apex of the abdomen, sublanceolate, greatest width contained nearly three times in the length; costal margin arcuate in proximal half, more decidedly so at the very base and weakly flattened at proximal third, from middle to distal fourth the margin is very faintly concavo-emarginate, thence rounding to the roundly acute apex; sutural margin arcuate in proximal fourth, distal fourth obliquely subtruncate to the apex, remainder of this margin straight; marginal and scapular fields broad, elongate, the former almost entirely cribroso-reticulate, the scapular and distal section of the marginal fields with regular, close and arcuate rami of the mediastine and discoidal veins; anal field elongate subpyriform, in length equal to two-fifths of the entire tegmen; venation decided, standing in relief, distad on discoidal field regularly quadrato-reticulate; discoidal vein bifurcate toward sutural margin; mediastine vein bifurcate; ulnar vein with five rami; anal vein arcuate, joining the sutural margin at nearly a right angle; axillary veins numerous. Wings faintly surpassing the apex of the abdomen, apex similar in form to that of wing; premediastine area opaque for the greater portion of its length; mediastine-discoidal and medio-discoidal areas narrow, quadrato-reticulate in proximal two-thirds; discoidal vein bifurcate at distal third; ulnar vein with four to five rami reaching the free margin of the wing and six terminating at or in the vicinity of the anal vein. Supra-anal plate transverse, broadly bilobato-emarginate distad; cerci rather short, tapering, composed of twelve very short segments, apex rather blunt; subgenital plate small, transverse, arcuate distad with pronounced juxta-cercal emarginations, in each of which is placed a minute simple style. Limbs very short.

General color shading from antimony yellow on the pronotal disk through warm buff to light buff distad on the dorsal surface of the abdomen. Head with the interocular section of the occiput ochraceous-orange, passing through ferruginous on the facial section of the same interspace into liver brown on the remainder of the face; mouth parts light orange-yellow; eyes hair brown; antennae liver brown proximad, passing into cinnamon-rufous. Pronotum shading from the antimony yellow of the greater portion of the disk into warm buff on the lateral "wings" and cephalic margin; disk with a pair of well separated broad comma-shaped fuscous marks placed on the transverse median line; margins of the fissures and caudo-lateral margins ferruginous, the caudal margin fuscous, the caudo-lateral angles more broadly so. Tegmina subhyaline except proximad on the marginal field; the venation of the marginal and anal fields warm buff, of the discoidal field walnut brown. Wings with venation whitish. Mesonotum with cephalic half chestnut brown, shading caudad into the general colors. Dorsum of abdomen with broad lateral clouds of mummy brown, paling mesad and along lateral margins within a regularly defined area much broken up by light buff dots and clouds; supra-anal plate mummy brown touched with light buff; cerci mummy brown, on dorsal surface

broadly banded on each segment with antimony yellow; ventral surface of abdomen much washed with prout's brown, more strongly so laterad, lateral spots nearly fuscous. Limbs of the ventral color, spines chestnut, black tipped; tarsi dull ochraceous buff.

Length of body, 26.8 mm.; length of pronotum, 6.3; greatest width of pronotum, 11.4; length of tegmen, 23; greatest width of tegmen, 8.2.

The type of this most remarkable genus and species is unique.

Zetobora emarginata Burmeister

1838. *Z[etobora] emarginata* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 511. [Pará, Brazil.]

Pará, Pará. (W. M. Mann.) One female.

This topotypic individual fully agrees with the only published descriptions of the same sex,—the very brief original one of Burmeister and the more detailed one of the synonymous *perspicua* Walker. The emargination of the pronotal margin mentioned in the original description, and which Brunner was unable to locate, doubtless because he did not have the female sex, is quite shallow and subtle in character, but apparent immediately caudad of the lateral angle of the pronotum.

Phortioeca peruana Saussure

1862. *Z[etobora] (Phortioeca) peruana* Saussure, Révue et Magasin de Zoologie, 2e ser., xiv, p. 232. [Peru.]

Madeira-Mamoré Railroad Company Camp 39, Rio Madeira. (Mann and Baker.) One female.

This specimen fully agrees with the descriptions of the species except that the supra-anal plate is decidedly less truncate. This is apparently the first exact record of the species.

BLABERINAE

Petasodes reflexa (Thunberg)

"1826. *Blatta reflexa* Thunberg, Mém. Acad. Imp. Sci. St. Pétérsb., x, p. 278."

Pará, Pará. (C. F. Baker.) One female. [A. N. S. P.]

Pará, Pará. (W. Mann.) One female.

Although the species and its congener *P. dominicana* (Burmeister) have frequently been referred to in the literature of the subject, and several times as common, there is almost nothing known regarding the exact distribution of the forms. From the fragmentary information before us, more complete, however, than anything in the literature, it would seem as if *reflexa* occurred in northeastern Brazil and *dominicana* in southeastern Brazil.

Blaberus parabolicus Walker

1868. *Blabera parabolica* Walker, Catal. Blatt. Brit. Mus., p. 8. [Cuenca, Ecuador.]

Pará, Pará. (C. F. Baker.) One male. [A. N. S. P.]
Manaos, Amazonas. One male. [Mus. Comp. Zool.]
Abuna, Bolivia. (Stanford Expedition.) One male, one female.

This species has been found to be distinct from *trapezoideus* Burmeister, with which it has generally been synonymized. An examination of Scudder's *Blabera armigera* show his insect to be the same as Walker's species, while Bolivar's *aequatoriana* is clearly identical. The synonymy of Bolivar's species with Walker's older *parabolicus* has already been established by Kirby. Giglio-Tos' record of *Blabera trapezoidea* from three localities in eastern Ecuador[21] doubtless relates in its entirety to this species, as two of the specimens so determined by him from Valle del Santiago are now before us and belong to *parabolicus*.

The Pará specimen is somewhat aberrant when studied with other material, but is is clearly the same species.

Blaberus scutatus Saussure and Zehntner

1894. *Blabera scutata* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 118, pl. V, fig. 24. [Pernambuco, Brazil.]

Natal, Rio Grande do Norte. (W. M. Mann.) One female.
Ceará Mirim, Rio Grande do Norte. (W. M. Mann.) One male

These specimens agree very fully with the description of the species. In this difficult genus it is very hard to make determinations without physical examination of the types, as the descriptions are by no means as comparable and comprehensive as necessary for satisfactory work.

Blaberus brasilianus Saussure

1864. *B[labera] brasiliana* Saussure, Révue et Magasin de Zoologie, 2é ser., xvi, p. 347. [Brazil.]

Ceará, Ceará. (W. M. Mann.) One male, one female.
Ceará, Ceará. (F. Rocha.) One female. [U. S. N. M.]
Natal, Rio Grande do Norte. (Mann and Heath.) One male.
Independencia, Parahyba. (Mann and Heath.) One male.

[21] Bollett. Mus. Zool. Anat. Comp. Torino, xiii, p. 15, (1898).

The available descriptions of this species leave much to be desired and in consequence there exists some slight uncertainty regarding the determination of this material. The relationship of *B. scutatus* to the present form is apparently close, in fact the species, as we understand them, may be identical. Two of the Ceará specimens are slightly smaller than the others and in both of them there is a tendency toward infuscation of the proximo-sutural section of the discoidal field of the tegmina. In the male from Natal the pronotal escutcheon fails to reach the caudal margin of the pronotum, while in all the others the margin is broadly touched by the maculation.

Blaberus biolleyi Rehn

1906. *Blaberus biolleyi* Rehn, Proc. Acad. Nat. Sci. Phila., 1905, p. 792, fig. 1. [Plains of Santa Clara, Reventazon River, Costa Rica.]

Porto Velho, Rio Madeira. (M. Bolton.) One male. [U. S. N. M.]

Caparo, Trinidad. August, 1913. (S. M. Klages.) One female. [Hebard Cln.]

These specimens, which considerably extend the distribution of the species, show certain differences from the type, but, after a careful examination of all the available material belonging to the section of the genus containing this species, we find it impossible to locate any constant noteworthy differences except in the pronotal pattern, the paler base coloration of the pronotum and tegmina and the larger size of the Caparo female. As shown in the original figure the type has the paired pattern of the pronotal disk made up of groups of five blackish fuscous spots, diverging cephalad, and the area occupied by each paired group broadening in the same direction. In the Porto Velho male the spots are all united in two bars, which follow exactly the same outline as the groups in the type individual and are broadly fused with the black caudal margin of the disk; the small interno-caudal spots of the type are here semi-detached. The Caparo female has the infuscate tendency developed a step farther, the peripheral margin of the disk pattern remaining essentially the same, but the pale central area is reduced by the presence of a pair of elongate comma-shaped spots between the cephalic sections of the dark pattern. The dark caudal margin is also broader laterad than in the other specimens. The base color of the pronotum is faintly paler, more nearly ochraceous-buff than the yellow-ocher of

the type, while the tegmina are cinnamon-buff instead of clay color. We consider the type to represent a recessive type of coloration, while the Caparo female is the intensive extreme, the Porto Velho specimen holding an intermediate position.

The measurements (in millimeters) of the three specimens before us are as follows:

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen
♂ Porto Velho, Brazil	36	10.5	15.7	41	14.5
♀ Caparo, Trinidad	46.3	13.4	19	50	19.2
♀ Santa Clara Plains, Costa Rica, *type*	42	11.5	16.6	42	15.7

The size variation is, of course, either geographic or individual and in the present genus is quite a frequent occurrence. The male sex has never been previously examined. The only features in that sex which show noteworthy differences from the female are that the least interspace between the eyes is distinctly less than the greatest dorso-ventral depth of the eye, while the subgenital plate is of the size and form usual in this genus and moderately unsymmetrical, the dextral style situated at the bottom of an arcuate emargination. The face of the male is solidly blackish fuscous, which is true of the Caparo female as well, the ventral surface of the abdomen is solidly of the same color except for a narrow buffy lateral margin, extending from the base of the abdomen to the apex, represented on the subgenital plate by a complete but very delicate edging.

The section of the genus *Blaberus* containing *B. posticus*, *biolleyi* and *femoratus*, with other species which may be distinct from these three, or synonymous with the first and third, constitute a valid group, quite removed from the bulk of the *Blaberus* forms. The acquisition of more material and a study of the constancy of certain features may result in making necessary the erection of a genus for their reception.

CORYDIINAE

Euthyrrhapha pacifica (Coquebert)

1804. *Blatta pacifica* Coquebert, Illustr. Iconogr. Insect., iii, p. 91, pl. xxi, fig. 1. [Islands of the Pacific Ocean.]

Manaos, Amazonas. (Mann and Baker.) One male.

The other exact records of the occurrence of this circumtropical species in Brazil were from Rio de Janeiro and Pará.

OXYHALOINAE

Chorisoneura polita new species (Plate XIV, figs. 18, 18 and 20.)

A very distinct species which in general smoothness of surface somewhat resembles *Anaplecta fulgida*. The character of the femora, however, shows it has no relationship to that genus and clearly belongs to the present group.

Type.— ♀ ; Independencia, State of Parahyba, Brazil. (Stanford Expedition; Mann and Heath.) [Acad. Nat. Sci. Phila., Type no. 5250.]

Size medium (for the genus): form moderately depressed; surface glabrous. Head projecting cephalad of the cephalic margin of the pronotum; occiput truncato-arcuate when seen from the dorsum, broad, the width about twice the depth of one of the eyes: eyes elongate reniform, narrowed at their extremities: antennae distinct, surpassing the body in length, rather sparsely but distinctly pilose: palpi with the fourth joint simple, slightly tapering; fifth joint slightly more than half again as long as the fourth joint, slender proximad, increasing in thickness to the distal third, thence narrowing to the blunt apex. Pronotum transverse subelliptical, the greatest width about twice the greatest length: cephalic margin gently arcuate, rounding by a faintly marked angle into the moderately arcuate divergent lateral margins; caudal margin arcuate laterad, truncate mesad, caudo-lateral angles broadly rounded: lateral sections of the pronotum deflexed. Tegmina surpassing the apex of the abdomen by more than the length of the pronotum, in form elongate lanceolate, the greatest width contained two and two-thirds times in the greatest length: costal margin regularly and gently arcuate; sutural margin straight except proximad and distad where it is distinctly arcuate; apex roundly subacute-angulate: marginal field narrow, reaching almost to the middle of the tegmina, deplanate; anal field acute pyriform: discoidal and median veins parallel for the greater portion of their length, costal rami of the discoidal vein about twelve in number, the same vein with two rami toward the sutural margin distad; median vein with three rami toward the sutural margin; ulnar vein simple; anal vein strongly arcuate proximad, faintly arcuate mesad and distad, reaching the sutural margin at proximal two-fifths; axillary veins about four in number. Wings with the costal margin considerably arcuate distad; appendicular field of medium size, its greatest length equal to one-third of the length of the remainder of the wing, greatest width of field distinctly exceeding its greatest length, the margin nearly semicircular, having a very slight emargination at the apex of the folding vein, the basal outline of the field nearly rectangulate: mediastine vein reaching to the distal two-thirds of the margin; discoidal vein straight, reaching to costal angle of base of the appendicular field, bearing nine costal rami which are but faintly thickened; median vein weak, rather indistinct, straight except that distad it curves toward the humeral vein; ulnar vein straight except for a short proximal arcuation, bearing a single ramus which diverges at a right

distad toward the dividing vein; axillary vein biramose, one ramus diverging mesad, the other distad; medio-discoidal area divided into ten rectangulate areas of varying size by cross nervures; medio-ulnar area with several divisions of similar character distad. Abdomen broad, depressed; supra-anal plate trigonal, arcuate-emarginate laterad, narrowly bilobate with a deep narrow sinus mesad, with long setae in the distal region; cerci elongate fusiform, depressed, with scattered elongate setae; subgenital plate broad, margin arcuate, weakly emarginate mesad. Femora without spines beneath except a strong distal spine on each margin except the cephalic ventro-caudal; cephalic femora with ventro-cephalic margin having a close series of short pile; dorsal genicular spine absent from cephalic femora, present on median and caudal femora; caudal tarsi with metatarsus faintly longer than the remainder of the tarsus; arolia large.

General color dull ochraceous-orange with the lateral portions of the pronotum and the marginal field of the tegmina clear hyaline, the ochraceous-orange of the tegmina paling distad. Eyes fuscous. Dorsal surface of the abdomen of the general color, darkening distad, ventral surface of the abdomen ochraceous-tawny, the segments laterad and distad narrowly margined with white. Limbs becoming ochraceous-buff distad.

Length of body, 6.4 mm.; length of pronotum, 2.2; greatest width of pronotum, 2.6; length of tegmen, 6.8; greatest width of tegmen, 2.3.

A badly damaged female individual from Manaos, Brazil (collected by Miss H. B. Merrill), in the collection of the United States National Museum, we have provisionally referred to this species. The Manaos specimen has lost all of the limbs and the apex of the abdomen is not perfect. If, as appears evident, this individual and the type are identical, the species has a considerable distribution.

Chorisoneura pulcherrima new species (Plate XV, figs. 23, 24 and 25.)

While apparently related to *C. discoidalis* Burmeister, the pattern of this species is so distinctive it needs comparison with none of the other forms of the genus.

Type.—♂; Pará, State of Pará, Brazil. (C. F. Baker.) [Acad. Nat. Sci. Phila., Type no. 5260.]

Size rather small; form depressed; surface glabrous. Head with the occiput largely exposed cephalad of the pronotum, broad, nearly straight in outline, the least interspace between the eyes equal to one and one-half times the greatest depth of the eye and but faintly less than the interspace between the antennal scrobes; face gently rounded; eyes when viewed from the cephalic aspect are seen to have the margins distinctly converging to the position of the interocular color band, then strongly sinuate about the antennal bases; antennae surpassing the body in length, proximal joint robust, slightly curved; second joint not quite one-half as long as the proximal one; third joint slender, slightly more than one-half as long as the proximal joint; remaining joints moniliform, very

short proximad, increasing in length distad: palpi with third and fourth joints subequal in length, slender, but fourth slightly expanding distad; fifth joint about one-half again as long as the fourth joint, of the conventional form for this segment. Pronotum transverse elliptical, deplanate, greatest length contained nearly one and three-fourth times in the greatest width, which is faintly caudad of the middle: cephalic margin gently arcuate, latero-cephalic angles hardly indicated, lateral margins broadly and strongly rounded, caudo-lateral angles but slightly more apparent than the latero-cephalic ones, caudal margin faintly arcuate: in transverse section the pronotum is gently arcuate. Tegmina slightly surpassing the apex of the abdomen, elongate lanceolate, in greater part subequal in width, the greatest width contained about three and one-half times in the greatest length: costal margin distinctly arcuate proximad and distad; sutural margin briefly but strongly arcuate proximad, the scutellum being exposed between the tegmina, distad the sutural margin is more strongly arcuate than the costal margin; apex of the tegmina narrowly rounded acute-angulate, nearer the costal than the sutural margin: marginal field narrow, well reflexed, reaching to the middle of the tegmen; scapular field broad, occupying at its greatest width about two-fifths of the entire tegminal width; anal field elongate, acute pyriform: discoidal vein arcuate proximad, thence straight to the apex, in the scapular field with nine distinct rami, some of which are bifurcate; median vein paralleling the discoidal vein but well separated from the same, bifurcate at the distal third, the sutural branch biramose, the main vein with three oblique rami proximad of the furcation; ulnar vein short, oblique; anal vein strongly arcuate proximad, thence straight oblique, reaching the sutural margin at proximal third; axillary veins three in number, well separated. Wings reaching to the apex of the tegmina: mediastine vein involved in the costal ramifications, costal veins numbering at least nine, some bifurcating, all poorly defined and weakly or not at all elavate; discoidal vein faintly sinuate proximad, elsewhere nearly straight, reaching to the proximo-cephalic angle of the appendicular field; median vein paralleling the discoidal vein, unbranched, separated from the discoidal vein by a uniform area generally less in width than the medio-ulnar area, the medio-discoidal area divided by regular cross-veins into eight to nine subquadrate sections; medio-ulnar area with several cross-veins distad; ulnar vein simple; axillary vein biramose; appendicular field with its length subequal to one-third that of the remainder of the wing at the dividing vein, semi-ovate in distal outline, basal form obtuse-angulate. Supra-anal plate transverse trigonal, the margin faintly sinuate laterad and the apex well rounded; cerci broad, depressed, incomplete in the unique type; subgenital plate short, relatively narrow as it falls far short of the width of the disto-ventral abdominal segment, the margin converging laterad and produced mesad into an acute process, which is faintly elevated distad; styles situated at the base of the process and compressed cultriform, acute, unequal in size, the dextral the larger, but of relatively similar form: of the internal genitalia elongate paired processes, having the same general divergence and direction of the styles, project distad of the external genital features, while an unpaired arcuate needle-like process is also evident. Femora unspined beneath; cephalic femora with ventro-cephalic margin bearing a distal spine; no dorsal genicular spine on cephalic femora, median and caudal

femora with distinct dorsal genicular spines: caudal tarsi with metatarsus slightly more than one-half of the total tarsal length; arolia present.

General color of head, thorax, abdomen and tegmina burnt sienna to chestnut; pronotum with disk dark seal brown. Head with a transverse bar between the most approximate portions of the eyes cream color, this having a fine median penciling of dark seal brown; eyes prout's brown; antennae and palpi buff-yellow. Pronotum with the disk solidly colored, the caudal margin pale ochraceous-buff, narrowing mesad, lateral margins broadly and cephalic margin narrowly hyaline, tinted with light buff. Tegmina with marginal field and almost all of distal two-thirds of scapular field, and a narrow costal margining connecting these two, subhyaline tinted with buffy, an oblique, faintly arcuate bar, directed disto-caudad and placed at the apex of the anal field and broadly connecting with the costal edging, of similar character. Wings strongly washed with fuscous, the region of the costal veins for a considerable section of the distal half opaque light orange-yellow. Thoracic segments and dorsal apex of the abdomen washed with seal brown. Limbs buff-yellow.

Length of body, 6.8 mm.; length of pronotum, 1.7; greatest width of pronotum, 2.7; length of tegmen, 6.8; greatest width of tegmen, 2.2.

The type of this beautiful and striking species is unique.

Chorisoneura personata new species (Plate XV, fig. 31.)

Apparently close to *C. inquinata* Saussure and *sordida* Brunner, differing from the former in the much smaller size, in the coloration of the front and vertex and in the absence of any trace of a humeral tegminal band. From *sordida* the present species differs in the fewer rami to the discoidal vein of the tegmina and the more fulvous coloration.

Type.—♀; Independencia, State of Parahyba, Brazil. (Stanford Expedition; Mann and Heath.) [Acad. Nat. Sci. Phila., Type no. 5262.]

Size small: form depressed, elongate ovate. Head but faintly projecting cephalad of the cephalic margin of the pronotum, broad, depressed: occiput gently arcuate when seen from the dorsum, the least interspace between the eyes equal to one and a half times their depth: antennae at least as long as the body, proximal joint slightly enlarged: palpi with the third joint moderately elongate, straight; fourth joint shorter than the third joint, slightly and regularly enlarging distad; fifth joint subequal in length to the third joint, rather slender, subequal proximad, tapering from the proximal two-fifths. Pronotum moderately transverse, subreniform-ovate, its greatest length contained one and a half times in its greatest width: cephalic margin relatively narrow, gently arcuate; latero-cephalic angles very faintly indicated, regularly and broadly rounded; lateral margins diverging oblique arcuate; latero-caudal angles broadly rounded; caudal margin arcuato-truncate; greatest width slightly caudad of the middle: disk arcuate dorsad when seen in section; hyaline lateral sections moderately declivent. Tegmina elongate lanceolate, very faintly surpassing the apex of the subgenital plate: costal and sutural margins regularly

arcuate, faintly flattened mesad, apex acute: marginal field of medium width and extending to two-fifths the length from the base of the tegmen; anal field acute pyriform, reaching on the sutural margin almost the same distance as the mediastine vein does on the costal margin: venation distinct, moderately elevated, strongly accentuated by all the principal, cross and accessory veins being hyaline in contrast with the general coloration; costal veins nine to twelve in number, a number bifurcate near their bases; median vein biramose to triramose; ulnar vein bifurcate; axillary veins five in number. Wings relatively narrow: appendicular field relatively small, largely intercalated, the proximal angle of the same acute, distal margin of field strongly rounded, slightly flattened mesad: costal margin of anterior field well arcuate distad, rather sharply rounding to the proximo-costal angle of the appendicular field: costal veins twelve in number, several bifurcate distad, all non-clavate; areas at the bases of the costal veins subquadrate, slightly oblique in trend; discoidal vein straight, entire; median and ulnar veins simple; medio-discoidal area with generally quadrate enclosures; axillary vein biramose. Supra-anal plate produced trigonal, the immediate apex narrowly emarginate: cerci moderately depressed, tapering, hirsute: subgenital plate compressed, subrostrate, a decided V-cleft extending proximad for a short distance along the ventral surface: oötheca carried with the carina dorsad, the carina of the same supplied with a number of regularly placed, minute, conical points. Cephalic femora with an elongate ventro-cephalic spine and no dorso-genicular or ventro-caudal spines; median and caudal femora with large ventro-cephalic, ventro-caudal and dorso-genicular spines; cephalic femora with the ventro-cephalic margin with piliform spines; median and caudal femora with bristles on the same margin, but no spines; caudal tarsi elongate, metatarsus longer than the other joints united, arolia large.

General color chamois, beneath light to warm buff; lateral areas of pronotum, marginal and costal section of scapular fields pellucid; intervenular areas of tegmina washed with old gold, venation pellucid. Wings washed with pale clay color, stronger along the costal margin and at the base of the appendicular field than elsewhere. Head with an interocular bar of pale ochraceous-salmon, this finely outlined dorsad with fuscous, and single points of the same color placed latero-ventrad of the pale bar; antennae briefly lined with fuscous ventro-proximad; eyes blackish.

Measurements of type (in millimeters): length of body, 6.4; length of pronotum, 1.9; greatest width of pronotum, 2.5; length of tegmen, 6.2; greatest width of tegmen, 2.

We have before us a paratypic series of nine females as follows:

Independencia, Parahyba, Brazil. (Mann and Heath.) [A. N. S. P. and Stanford University.] Five females.

Bonito, Pernambuco, Brazil. January, 1883. (A. Koebele.) [U. S. N. M. and A. N. S. P.] Four females.

This series shows some noteworthy variational features in structure and coloration. The median vein of the tegmina, while retaining the described proportions, occasionally has four

rami, while another specimen has two of the three rami bifurcate. Again the ulnar vein is fused with the median, in which case the latter is quinque-ramose; while the most striking variation in the median vein is found in one specimen, which has it short, diverging from the discoidal vein mesad and then biramose. This latter condition is pronounced in but one tegmen, the other one having the structure more nearly approaching the normal, while the ulnar vein of the remarkable tegmen is triramose. The color variation consists of a deepening of the general color, rarely accompanied by an indefinite mottled pronotal pattern of brownish. The tegminal infumation is more brownish and less greenish-brown in these specimens.

Chorisoneura inquinata Saussure?

1869. *Chorisoneura inquinata* Saussure, Révue et Magasin de Zoologie, 2é ser., xxi, p. 112. [Brazil.]

Ceará Mirim, Rio Grande do Norte. (W. M. Mann.) One male.

Independencia, Parahyba. (Mann and Heath.) Four males.

These specimens are appreciably smaller than the measurements of the species given by Saussure and also differ in a few apparently minor features of the coloration, but in the majority of the characters they agree with *inquinata*, which was based on the opposite sex from the material examined by us. It is probable that the differences seen by us can be accounted for by sexual diversity and so we prefer to consider them for the present.

These are the only exact localities from which the species has been recorded.

Chorisoneura tessellata new species (Plate XV, figs. 26 and 27.)

Closely related to *C. gracilis* (Saussure), from which it strikingly differs in the larger size, in the antennae being wholly blackish proximad and in the wings being pale infumate.

Type.—♂; Ceará Mirim, State of Rio Grande do Norte, Brazil. (Stanford Expedition; W. M. Mann.) [Acad. Nat. Sci. Phila., Type no. 5263.]

Size relatively large (for the genus); form depressed; surface polished, venation of the tegmina distinctly raised. Head projecting cephalad of the pronotum for its full width; occipital outline truncate when seen from the dorsum; surface of the occiput rugose; interspace between the eyes equal to one and one-half times the greatest depth of the eye; antennal scrobes more distant than

the eyes: eyes elongate, narrow, strongly reniform: antennae surpassing the length of the body; proximal joint about as long as the ocular interspace, arcuate; second joint short conical, not half as long as the proximal joint; third joint subequal in length to the second one, moniliform; succeeding joints short, moniliform, piligerous: palpi with third joint elongate, slender; fourth joint about two-thirds as long as the third joint, inverted elongate conical; fifth joint of the usual elongate obtuse-angle triangle type, the length of the joint subequal to that of the third joint. Pronotum transverse subequal elliptical, the greatest length contained one and one-half times in the greatest width: cephalic margin faintly arcuate, almost imperceptibly sinuate dorsad of the eyes; lateral margins very broadly, regularly and strongly arcuate; caudal margin arcuato-truncate; in transverse section the pronotum is flattened caudad, elsewhere regularly but not strongly declivent; surface of the disk with a distinct medio-longitudinal depression, which is narrower and deeper caudad, failing to reach either the cephalic or caudal margin, laterad of this the disk shows some irregular but paired impressions and lateral diverging sulci at caudal third. Tegmina surpassing the apex of the abdomen by the length of the pronotum, acuminate lanceolate, the greatest width, which is at the proximal third, contained three times in the greatest length: costal margin strongly arcuate proximad, nearly straight distad; sutural margin straight except for a short proximal arcuation, which exposes the scutellum, and a distal convergence to the acute but narrowly rounded apex: marginal field very broad, reaching to about the middle of the tegmen, very much attenuate distad, in transverse section slightly declivent; scapular field broad at the middle of the tegmen, regularly narrowing distad; anal field pyriform: discoidal vein gently arcuate proximad, thence straight distad; costal veins strong, oblique and sixteen to seventeen in number; discoidal vein with four short rami to the sutural margin distad; median vein paralleling the discoidal vein to the distal third, thence arcuate toward and joining the sutural margin, rami of the median vein five to seven in number and frequently bifurcate; anal vein strongly arcuate proximad, straight distad except for a short arcuation at the sutural margin, which is joined at its proximal third; axillary veins four in number, with two incomplete supplementary veins. Wings moderately elongate; costal margin slightly flattened at the costal veins: appendicular field relatively small and intercalary in position, its free margin arcuate and not extending the margin of the wing, its outline proximad acute: mediastine vein anastomosing with the costal veins; discoidal vein straight, reaching to the proximo-cephalic angle of the appendicular field: median vein in general straight, distad gently approaching the discoidal vein; medio-discoidal area mesad nearly twice as wide as the medio-ulnar area and divided by cross-veins into eleven rectangulate, frequently quadrate, interspaces; medio-ulnar area with five or more short transverse veins; ulnar vein bifurcate distad; axillary vein biramose. Abdomen with the dorsal antepenultimate segment bearing a median circular glandular impression, which is rather regularly clothed with pile directed inward toward its center, a medio-longitudinal carina present within the same impression: supra-anal plate transverse, broadly trigonal; margin faintly indented mesad, the form much obscured due to shrivelling: cerci elongate, subfusiform, depressed; apex attenuate, acuminate;

individual segments well indicated, faintly constricted at the intersegmental sulci, well supplied with long hairs: subgenital plate slightly asymmetrical, strongly concavo-emarginate latero-ventrad of the cerci, moderately produced mesad; styles placed close together, elongate, heavy, compressed structures having much the form of a "bill-hook," their internal margin sulcate, the recurved apex directed meso-ventrad and the proximal half much thickened and broadened ventrad, there bearing proximad several long prominent bristles. Limbs elongate, slender: median and caudal femora unarmed beneath; cephalic femora with ventro-cephalic margin piligerous, the same limbs with two distinct genicular spines distad on the cephalic face, a single one on the caudal face, no dorsal genicular spine present; median and caudal femora with a single distal genicular spine on each face and a dorsal genicular spine: tarsi with arolia.

Pronotum, aside from the disk, the marginal field and all of the scapular field of the tegmina, except a narrow section along the discoidal vein, hyaline: disk of the pronotum ochraceous-orange, remainder of tegmina washed with dull wax yellow, the venation strongly contrasted in mustard yellow. Head with occiput ochraceous-orange, a broad dorsal interocular bar deep seal brown; face clear naples yellow; eyes black; antennae shining seal brown, paling to buckthorn brown distad; palpi dull cinnamon-buff. Pronotum with the hyaline cephalic and caudal margins pale; disk with a pair of faint wax yellow dots caudad. Tegmina with a faint wash of ochraceous-orange along the humeral trunk proximad. Wings infumate with clay color. Abdomen dull primuline yellow. Limbs dull cinnamon-buff.

Length of body, 8.6 mm.: length of pronotum, 2.4; greatest width of pronotum, 3.6; length of tegmen, 9.7; greatest width of tegmen, 3.5.

The type of this really magnificent species is unique.

Chorisoneura lata new species (Plate XV, figs. 28, 29 and 30.)

A very distinct species, allied, however, to *C. tessellata* which it resembles in general form, from which *lata* can be readily separated by the more depressed head and greater interspace between the eyes, the absence of black from the vertex, in the presence of paired white lines on the pronotal disk and in the more ferruginous and less fulvescent wash of the interspaces of the colored portion of the tegmina.

Type.—♂; Pará, State of Pará, Brazil. (C. F. Baker.) [Acad. Nat. Sci. Phila., Type no. 5254.]

Size large (for the genus): form depressed, in outline elongate elliptico-ovoid: surface shining. Head broad, decidedly depressed; when seen from the dorsum practically the whole occiput and cephalic half of the eyes project cephalad of the pronotum, occipital outline truncate, almost imperceptibly concave when viewed from a dorso-caudal point: interspace between the eyes broad, faintly more than one and one-half times the greatest depth of the eye: eyes prominent, elongate reniform in basal outline, their greatest depth contained about two and one-half times in their greatest length: antennae

broken: palpi with third joint elongate, slender; fourth joint shorter than third, very slender at base, gently enlarging distad; fifth joint subequal to fourth joint in length, in proximal third continuing the enlargement of the fourth joint, then regularly narrowing to the apex. Pronotum transverse elliptical with a rectangulate tendency due to the squareness of the cephalic and caudal margins; greatest width slightly more than one and one-half times the greatest length: cephalic margin subtruncate with a relatively broad median section reaching from dorsad of the internal margin of one eye to that of the other eye, gently arcuate; caudal margin with the faintest arcuation; lateral margins broadly arcuate; latero-cephalic angle hardly indicated, the passage from cephalic to lateral margin being so regular; caudo-lateral angle indicated but broadly rounded; greatest width of the pronotum mesad: disk of the pronotum faintly declivent cephalo-laterad, with a distinct medio-longitudinal impression and paired lateral, sinuate, oblique indentations: lateral sections of the pronotum concave cephalad, faintly bossed over the tegminal bases. Tegmina elongate, greatest width at proximal third, thence regularly narrowing to the narrowly rounded but still acute apex: costal margin arcuate, more strongly so proximad than distad, where it is appreciably flattened; sutural margin straight except for the short but decided proximal arcuation and the distinct distal rounding to the apex: marginal field very broad, deflected into a more horizontal plane, reaching to very nearly the middle of the tegmen; scapular field quite broad, at its widest point broader than the marginal field, tapering in width distad; anal field elongate pyriform: venation well indicated, moderately raised; mediastine vein simple; discoidal vein with approximately eighteen costal rami, between the long, more prominent and proximal of which are equally well developed false nervures, which are difficult to distinguish from the true rami, distad the discoidal vein sends four rami to the sutural margin, of which one or more rami may bifurcate; median vein paralleling the discoidal vein in the median third of the tegmen, bearing three to five rami, one or more of which is bifurcate; ulnar vein simple: anal vein joining the sutural margin at the proximal third; axillary veins five in number. Wings with no true appendicular field but instead a considerable intercalated triangle, which in length is equal to approximately one-fourth that of the remainder of the wing and proximad is acute-angulate; anterior field relatively narrow: costal margin slightly flattened meso-distad: mediastine vein short, direct; discoidal vein with a strongly marked humeral branch, which bears four costal veins; costal veins about sixteen in number, the distal ones not clearly marked, all oblique toward the costal margin, but distal ones wholly oblique, moderately clavate; discoidal vein straight and unforked from humeral branching; median vein simple, faintly arcuate; ulnar vein arcuate distad, there bearing three rami; axillary vein biramose, the distal one bifurcate: humero-discoidal area with three subquadrate interspaces; medio-discoidal area faintly broader than the medio-ulnar area, occupied by fairly regular subquadrate interspaces; medio-ulnar area with only incomplete and indistinct divisions. Abdomen narrowing distad: supra-anal plate transverse, trigonal, the apex narrow and faintly emarginate, the free margin with a few relatively long bristles: cerci elongate, depressed fusiform, distinctly attenuate distad: subgenital plate with a pair of distinct semicircular, folded impressions of the margin and of the plate situated ventrad

of the cerci; between these impressions the plate is moderately rectangulate produced and bears distad the styles, which are elongate, heavy, compressed, dagger-like structures, broad at their bases and tapering to the bluntly rounded apices, the styles are symmetrical and reach to about the distal third of the cerci. Femora unarmed beneath, margins only haired but the usual distal ventral spine large; dorsal genicular spines present on cephalic and median femora, caudal femora lacking; arolia present.

General color of the head, disk of the pronotum, and anal and discoidal and juxta-discoidal section of the scapular fields of the tegmina ochraceous-orange; lateral portions of pronotum and remainder of tegmina hyaline; the abdomen as a whole apricot yellow. Head with the face more orange-buff than the occiput, which is of the general color; at the narrowest point of the interocular space is situated a transverse bar of dull cream-white, which broadens laterad and there encloses a minute point of brownish; eyes blackish fuscous mottled with umber. Pronotum with the disk bearing a median pair of elongate comma-shaped whitish lines. Tegmina with the veins finely pencilled with milky white. Wings washed with pale ochraceous-orange, more strongly so distad. Abdomen tending toward ochraceous-orange laterad and ochraceous tawny distad. Limbs dull warm buff.

Length of body, 9.7 mm.; length of pronotum, 2.5; greatest width of pronotum 3.6; length of tegmen, 10.5; greatest width of tegmen, 3.3.

The type of this really beautiful species is unique.

Chorisoneura albonervosa new species (Plate XIV, figs. 21 and 22.)

Apparently allied to *C. calogramma* Walker, differing in the veins of the discoidal field being nearly longitudinal and in numerous features of the coloration; i. e. of the head, pronotal disk, absence of humeral streak, etc.

Type.—♂; Pará, State of Pará, Brazil. (C. F. Baker.) [Acad. Nat. Sci. Phila., Type no. 5265.]

Size medium (for the genus); form elliptico-ovoid moderately depressed; surface polished. Head with its entire width visible cephalad of the pronotum when seen from the dorsum, the occiput truncate, the eyes regularly rounded; interocular space faintly broader than the depth of the eye; eyes reniform in basal outline, subequal in depth the greater portion of their length, shortly narrowing caudad; antennae slightly surpassing the body in length, proximal joint but faintly shorter than the ocular interspace; second joint nearly half as long as the proximal one; third joint subequal to the second; fourth and succeeding joints very short, moniliform; palpi with the third joint elongate, quite slender; fourth joint shorter than the third, regularly enlarging distad, fifth joint subequal in length to the third, relatively robust, of the form usual in the group, with the greater width at the distal third, thence regularly narrowing distad. Pronotum of the same shape as in *C. lata* but slightly less strongly transverse; surface contour identical with that of *lata* except for lacking the medio-longitudinal impression. Tegmina lanceolate, moderately acuminate, greatest width (at proximal third) contained slightly more than three times

in the length: costal margin well arcuate proximad, thence straight with a very faint sinuation; sutural margin arcuate, well flattened on median half; apex rounded acute: marginal field moderately wide, reaching to distal two-fifths of the tegmen, deplanate; scapular field broad, regularly narrowing distad from the middle of the tegmen, where the width of the field is almost one-half of the tegminal width; anal field acute, elongate pyriform: venation decided, elevated: mediastine vein arcuate distad; humeral vein sinuate mesad, much the same as but more decidedly than the costal margin, costal veins numbering about fourteen, the distal ones hard to distinguish from intercalated false nervures, which are as strongly indicated as the costal veins themselves and are between all the latter, on the internal side the humeral vein bears no true rami; median vein biramose, the rami in general longitudinal; ulnar vein biramose, the rami in general longitudinal; anal vein in distal half straight, hardly arcuate at its apex, joining the sutural margin slightly proximad of the proximal third; axillary veins three to four in number, the fourth adventitious, being indicated on the sinistral and not on the dextral tegmen. Wing with anterior field damaged; appendicular field small, also damaged: costal veins at least ten in number, bent in direction, not clavate; discoidal and median veins straight, simple; ulnar vein with a number of rectangularly diverging, short, regularly placed, incomplete cross veins caudad in distal section; axillary vein biramose: medio-discoidal area of medium regular width, divided into a number of subquadrate interspaces by straight cross veins; medio-ulnar area in general narrower than the medio-discoidal area, divided distad into subquadrate interspaces. Abdomen regularly narrowing distad; antepenultimate dorsal segment with a circular, depressed, glandular area, which is deeper proximad than distad and divided into two fairly well marked divisions by a medio-longitudinal fold: supra-anal plate transverse, the greatest length contained slightly more than twice in the greatest width, distal margin sinuato-convergent laterad to a median subtruncate section, which has a very faint median emargination and which passes roundly into the lateral sections of the same margin: cerci damaged: subgenital plate with the distal margin broadly arcuato-emarginate to receive each style, which are closely placed and between whose sockets the margin is obtuse-angulate; styles very similar to those of *C. lata* but proportionately heavier and more twisted. Femora unspined ventrad, there supplied with hairs, disto-ventral spine of the cephalic face of the cephalic femora very elongate, disto-ventral spines of both faces of the median and caudal femora shorter, dorsal genicular spine present on median and caudal femora, very elongate: arolia present.

General color of the disk of the pronotum, anal and discoidal and narrow juxta-discoidal edging of the scapular fields orange rufous; lateral portions of pronotum and marginal and remainder of scapular fields hyaline. Head blackish-fuscous, a transverse band of dull sulphur yellow at narrowest point of interocular space, immediately ventrad of which is a very fine hair line of the same color, which line also margins the eyes ventrad for a short distance; antennae of the color of the head; palpi, labrum and distal half of clypeus light ochraceous-buff; eyes prout's brown mottled with fuscous. Pronotum with the cephalic margin immediately cephalad of the disk clouded with napthalene yellow, caudal margin for its full width narrowly clouded with white. Tegmina

with the general color very dilute in the normally covered section of the dextral tegmen; normally exposed principal venation pencilled with white, the costal veins faintly lined with the same. Wings washed with ochraceous cephalad and infuscate caudad. Abdomen and thorax ochraceous-buff; limbs ochraceous buff.

Length of body, 8.2 mm.; length of pronotum, 1.8; greatest width of pronotum, 2.8; length of tegmen, 8.1; greatest width of tegmen, 2.7.

The type of this species is unique. The coloration is very striking and quite distinctive.

MANTIDAE

ORTHODERINAE

Chaeteessa filata Burmeister

1838. *Ch[aeteessa] filata* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 528. [Siara (Ceará), Brazil.]

Pará, Pará. July. One female.

Porto Velho, Rio Madeira. (Mann and Baker.) One female.

The diagnostic features given by Burmeister in his very brief description are fully evident in this material, of which the Porto Velho specimen shows the following measurements: length of body, 18 mm.; length of pronotum, 3.1; greatest width of pronotum, 2.6; length of tegmen, 21; length of cephalic femur, 4.5. The Pará specimen differs from the Porto Velho one in having the fuscous cloudings of the head and pronotum much reduced, while the pattern on the limbs is as complete and intense as in the Porto Velho representative. The cerci of the Pará specimen are complete except possibly the last joint, and in length are little more than one-half as long as the abdomen.

The present records considerably extend the range of the species to the westward.

Mantoida fulgidipennis Westwood

1889. *Mantoida fulgidipennis* Westwood, Rec. Insect. Fam. Mantid., p. 28, pl. XIV, fig. 9. [Banks of the Amazons.]

Madeira-Mamoré Railroad Company Camp 39, Rio Madeira. (Mann and Baker.) One male.

This specimen fully agrees with the description of the species, but is distinctly smaller, as would be expected, the species having been described from the female sex. The dimensions of the male are as follows: length of body, 12.7 mm.; length of pronotum, 2.1;

greatest width of pronotum, 2; length of tegmen, 13.2; length of cephalic femur, 2.8.

Westwood states that the species occurred in the forest on low trees. Chopard[22] has reported it from Nouveau-Chantier, French Guiana.

MANTINAE

Acontiothespis[23] **brevipennis** (Saussure)

1872. *A[contista] brevipennis* Saussure, Mél. Orthopt., ii, fasc. iv, p. 21, pl. 9, fig. 20. [Brazil.]

Independencia, Parahyba. (Mann and Heath.) Three males, one female.

Baturite Mountains, Ceará. (W. M. Mann.) One male.

Maranguape Mountains, Ceará. (W. M. Mann.) One female.

This species was previously known only from the female sex. It is evident that in both sexes it is close to *A. bimaculata* and in the male sex to the Central American *A. vitrea*, the female of which is not available. All of the present series have been immersed in alcohol and in consequence only structure and wing pattern can be mentioned. In *brevipennis*, when compared with *bimaculata*, the male has the lateral margins of the facial scutellum more arcuate, the pronotum is heavier with the constricted caudal section more elongate, the dorsal line more sinuate when seen from the lateral aspect, the tegmina bears a small irregular more or less pronounced maculation of seal brown mesad on the discoidal field and the wings are immaculate hyaline. From *vitrea* the male of *brevipennis* differs in the head being of a slightly different shape, in the slightly shorter though similarly shaped pronotum, which also is more decidedly constricted caudad, and in the more numerous and closely placed spines on the external margin of the cephalic tibiae. The female of *brevipennis* differs from the same sex of *bimaculata* in the same features of the head and pronotum as the males do, in the equally abbreviate

[22] Ann. Soc. Entom. France, lxxx, p. 316, (1911).

[23] The genus *Acontistes* Burmeister, as has been pointed out by Saussure and Zehntner (Biol. Cent.-Amer., Orth., i, p. 130, (1894), is preoccupied by *Acontistes* Sundevall in Aves. The emendation *Acontista* of Saussure, 1870, was not proposed as a replacement, but apparently as a correction in gender, and in consequence is not available to replace the preoccupied name. As a new name for *Acontistes* Burmeister is necessary, we here propose *Acontiothespis*.

tegmina being sharper and with a relatively narrower and more evenly attenuate marginal field. The female of *bimaculata* is larger than the same sex of *brevipennis*.

A representative Independencia male measures: length of body, 17.5 mm.; length of pronotum, 4.3; greatest width of pronotum, 2.1; length of tegmen, 16.5; length of caudal femur, 4.5.

We feel convinced that the records of this species from northern Argentina and southern Bolivia refer to *A. bimaculata*.

Hagiomantis superba (Gerstaecker)

1889. *Liturgusa superba* Gerstaecker, Mitth. Naturw. Ver. Neu-Vorpomm. und Rügen, xx, p. 53. [Jurimaguas, Peru.]

Igarapé de Candelaria, 8° 45′ S, 63° 54′ W, Rio Madeira. (E. A. Smith.) One female. [Acad. Nat. Sci. Phila.]

Apparently this is the first record of this striking species since the original description. The specimen was badly damaged by pests before coming into our possession.

Metriomantis planicephala new species (Plate XV, figs. 32 and 33.)

A very distinct member of the genus, differing from the previously known species in the female sex having the dorsum of the pronotum tuberculate, in the different proportions of the same portion and in the shape of the facial scutellum, which has an acute angulation dorso-mesad. Doubtless a number of other features found in this species are diagnostic, such as the great flattening of the head and the general outline of the same, but regarding these the descriptions of the other forms are not sufficiently detailed to enable us to judge. The male sex of this genus was previously unknown.

Type.—♂; Ceará Mirim, State of Rio Grande do Sul, Brazil. (Stanford Expedition: W. M. Mann.) [Acad. Nat. Sci. Phila., Type no. 5270.]

Size rather small; form robust, compact. Head moderately broad, very deep, greatest depth but little shorter than the greatest width across eyes; when seen from the cephalic aspect the general form of the head is circular, slightly flattened dorsad and slightly produced ventrad in the buccal region, when seen from the dorsal aspect the head is strongly compressed cephalocaudad, the face even faintly concave, the eyes slightly projecting cephalad of the ocellar and scutellar regions; outline of vertex, when seen from cephalic aspect, arcuate with a slight median truncation; the distance from the median section of the vertex to the dorsal margin of the facial scutellum subequal to that from the latter point to the clypeo-labial suture; ocelli small, distinct, placed in a depressed triangle; facial scutellum about one and one-half times

as wide as the greatest depth, dorsal margin arcuate brace-shaped (⟋⟍⟋), the median point sharply acute-angulate and somewhat produced, lateral margins of scutellum nearly straight, subparallel, ventral margin very faintly arcuate concave, margins of plate appreciably cingulate, surface of plate faintly concave; eyes not prominent, not breaking the regular outline of the head, internal margins nearly straight, subparallel, interspace between eyes subequal to the greatest depth of the eye; antennae filiform, not exceeding the pronotal length. Pronotum robust, rather short, with cephalic half rather broad, narrowing caudad to the narrower caudal third, which is two-thirds of the width of the cephalic section, greatest cephalic width contained slightly more than twice in the greatest length of the same; cephalic margin of the pronotum compressed arcuate, slightly and narrowly flattened mesad, passing by a distinct but blunt angle into a short, straight, subparallel section, this rounding regularly into the narrower caudal section, caudal margin arcuate with a slight median truncation; lateral margins strongly denticulate cephalad and caudad, less distinctly armed mesad. cephalic and caudal margins nearly smooth; surface of pronotum regularly tuberculate and denticulate with the exception of the caudo-lateral sections of the collar, which are unarmed; collar occupying two-fifths of the total pronotal length, transverse sulcus deeply impressed, median line sulcate caudad on collar, faintly so cephalad on shaft and weakly carinate caudad on same. Tegmina falling somewhat short of the apex of the abdomen, in length about one and one-half times that of the pronotum, broad, greatest total width contained nearly one and one-half times in the total length of the tegmen; marginal field very broad, at greatest width forming slightly more than one-third of total tegminal width; costal margin strongly arcuate, slightly flattened mesad, apex very broad, obliquely subtruncate, immediate apex sutural in position, broadly rounded, sutural margin nearly straight to the broad apex; marginal field with the transverse rami of the mediastine vein regular and but slightly oblique, humeral vein strongly and regularly arcuate, sectors of the discoidal vein regularly oblique and four in number, axillary veins four in number. anal vein moderately arcuate, reaching sutural margin slightly proximad of middle; stigma very narrow, linear, longitudinal, situated briefly proximad of middle and about one-third of greatest width of discoidal field from humeral vein. Wing falling little short of tegmina. Abdomen broad, depressed; supra-anal plate slightly transverse, produced meso-caudad in a semi-elliptical fashion; cerci not surpassing the subgenital plate, rather thick, moniliform, composed of nine articles, distal one subconical; subgenital plate ample, compressed rostrate distad. Cephalic limbs very robust; cephalic coxae very slightly shorter than the pronotum, in section strongly compressed triquetrous, dorsal margin with erect biseriate spines, the larger of which are of fair size, ventral margin with a series of numerous adpressed recurved teeth, external margin weakly tuberculate, internal face regularly and serially tuberculate ventrad, dorso-external face weakly tuberculate; cephalic femora strongly compressed, deep, greatest depth contained slightly more than three times in the greatest length of the same, dorsal margin nearly straight, ventro-external face with six teeth, proximal longer than the others, internal margin with fourteen spines increasing in length proximad, where they are biseriate in position. discoidal spines four in number, ungual sulcus at about proximal

third, margins shagreeno-tuberculate, external face tuberculate mesad; cephalic tibiae (exclusive of claw) three-fifths as long as the femur, armed on the external face with seventeen short, rather depressed spines increasing in length distad, on the internal face with thirteen distinctly longer, more arcuate spines increasing in length distad, claw very long; cephalic tibiae subequal to the tibiae; metatarsus comprising slightly more than one-half the tarsal length. Median and caudal limbs simple, moderately slender.

Coloration completely destroyed by immersion in alcohol.

Allotype.—♂; Same data as the type.

Size small; form elongate, moderately slender yet rather robust for the sex. Characters here given supplementary to the type description. Head much resembling that of the female sex but broader in proportion to the depth, the latter being three-fourths of the greatest width, and in the line of the vertex being but faintly arcuate; dorsal portion of face proportionately slightly shorter than in female; ocelli large, paired ones subcircular, ventral one slightly transverse elliptical in outline, elevated on a decided boss; facial scutellum of the same general form as in the male but dorsal margin with the median angle rectangulate and less sharply cut off from the lateral sections of the same margin; eyes with the internal margin more undulate than in the female. Pronotum similar in form to that of the female but caudal compressed section slightly more elongate, margins unarmed, surface but sparsely and weakly tuberculate; shaft non-carinate meso-caudad but with a transverse impression cephalad of the caudal margin. Tegmina elongate, probably surpassing the apex of the abdomen (this missing in the allotype), opaque in the marginal field and vicinity of the humeral trunk, subhyaline elsewhere; costal margin strongly arcuate proximad, very faintly concave thence to the broadly arcuate section of the same margin, sutural margin gently arcuate throughout, oblique subtruncate proximad, more strongly arcuate distad, apex rather narrowly rounded; rami of the mediastine vein numerous, moderately regular, oblique, discoidal field with transverse nervures generally sigmoid and often connected by irregular false intercalated longitudinal nervures; stigma elongate, linear, oblique, distad touching the humeral trunk. Wings reaching to the tegminal tips. Abdomen largely missing. Cephalic limbs in general form similar to those of the male; dorsal margin of coxae with a series of sparse, low, generally uniform, weakly recurved dentiform spines, dorsal margin practically unarmed, external margin unarmed, internal face armed as in the female but more weakly so, dorso-external face unarmed; cephalic femora slightly more than three times as long as deep, teeth of the external margin shorter and more regular in length than in the female; cephalic tibiae distinctly but not greatly exceeding the length of the tibiae exclusive of the claw. Median and caudal limbs simple, moderately slender, very strongly hirsute.

Coloration completely destroyed by immersion in alcohol.

Measurements (in millimeters)

	♂ (allotype)	♀ (type)
Length of body,	Abdomen imperfect.	30.8 (slightly shrunken)
Length of pronotum,	8.9	10.3
Greatest width of pronotum,	3.6	4.7
Length of tegmen,	30.8	16.3
Greatest width of tegmen,	8 (approximately)	11.6
Length of cephalic femur,	9	11.6

In addition to the type and allotype we have before us a topotypic immature female. This individual, although but half grown, shows clearly the specific peculiarities.

MIOPTERYGINAE

Pseudomiopteryx guyanensis Chopard

1911. *P[seudomiopteryx] guyanensis* Chopard, Ann. Soc. Entom. France, lxxx, p. 324, figs. [Saint Jean and Saint Laurent du Maroni, French Guiana.]

Pará, Pará. (W. M. Mann.) One female.

We have compared this specimen with a cotypic pair from Saint Jean and Saint Laurent in the Hebard Collection. The Pará individual is appreciably smaller than the cotypic female, but in character is fully typical of the species. When compared with the male sex of the allied *M. infuscata* Saussure and Zehntner, from Costa Rica, Chopard's species is seen to differ in the male sex in the facial shield being less strongly transverse and the dorsal margin of the same more angulate, in the tubercles of the dorsum of the pronotum being blunter, in the smaller and more irregular reticulations of the tegmina and in the shorter and more decidedly transverse supra-anal plate.

The present record extends the range of the species to the southeastward.

Thesprotia species

Porto Velho, Rio Madeira. (Mann and Baker.) One female.

Madeira-Mamoré Railroad Camp 39, Rio Madeira. (Mann and Baker.) One male.

The male of this pair has lost the greater portion of the abdomen and its determination is accordingly very difficult, which, however, the acquisition in future of more material from the Guianas and eastern Brazil may make easier, by giving us topotypes of certain of the little known species of the older authors, described from these regions.

CREOBOTRINAE

Acanthops falcataria Goeze

1778. [*Mantis*] *falcataria* Goeze, Entom. Beytr., ii, p. 36. [No locality.]

Pará, Pará. (C. F. Baker.) One male.

This individual has been compared with a female specimen from Nouveau-Chantier, French Guiana, determined and recorded by Chopard.

Pseudacanthops caelebs (Saussure)

1869. *H[ymenopus] caelebs* Saussure, Mittl. Schweiz. Entom. Gesell., iii, p. 73. [Unknown locality, later (1870) given as "Mexico".]

Madeira-Mamoré Railroad Camp 43, Rio Madeira. (Mann and Baker.) One male.

This specimen fully agrees with a male individual from Bolivia in the Academy collection. Both specimens tally in every respect with the detailed description given in 1871 by Saussure.[24]

Regarding the locality of the original material; first given as unknown, next as "Mexico" and last as "Orizaba, Mexico"; we feel some doubt. No one has since found the species in Mexico and we now have two definite records from the interior of South America. Might not the geographic association of the material, first considered to be from an unknown locality, have been erroneous? At any rate we will await with interest the acquisition of Mexican material to be compared with our Brazilian and Bolivian individuals.

VATINAE

Cardioptera minor new species (Plate XV, figs. 34 and 35.)

Allied to *C. brachyptera* Burmeister, but differing in the distinctly smaller size, in the less distinctly denticulate character of the caudal portion of the lateral margins of the pronotum, in the contrastingly colored marginal field of the tegmina and in the reduction of the femoral lobes.

Type.—♀; Independencia, State of Parahyba, Brazil. (Stanford Expedition: Mann and Heath.) [Acad. Nat. Sci. Phila., Type no. 5272.]

Size small (for the genus); form rather slender, abdomen strongly depressed. Head with the greatest depth comprising about four-fifths of the greatest width, front appreciably concave, the eyes and the adjacent portion of the

[24] Mem. Mex. Mant., p. 148.

head directed moderately latero-cephalad; occipital outline undulato-arcuate, slightly flattened mesad, the juxta-ocular sections faintly arcuato-elevate; ocelli small, distinct, arranged in a strongly depressed triangle; facial scutellum one and two-thirds times as broad as deep, dorsal margin obtuse-angulate mesad, rounded latero-dorsad, ventral margin weakly concave, surface of plate shallowly concavo-excavate; eyes elongate ovoid in basal outline; antennae filiform, equal to two-thirds the length of the pronotum. Pronotum moderately elongate, the greatest width across the supra-coxal dilation slightly less than one-third the greatest median length; collar comprising almost one-third the total pronotal length, subequal in width and with generally subparallel margins which cephalad round into the arcuate cephalic margin and caudad gently widen to the regularly rounded supra-coxal dilation, which is one and one-half times as wide as the collar; shaft relatively slender, appreciably compressed in the greater portion of its length, the margins gently expanding to the supra-coxal dilation and also to the subarcuate caudal margin, all of lateral margins biseriate denticulate, the denticulations becoming smaller and weaker caudad, on the caudal section of the supra-coxal dilation the denticulations are moderately recurved; median line shallowly sulcate on collar and cephalic portion of shaft, not distinctly marked elsewhere, surface of collar with scattered small tubercles, which are arranged in series and larger and closer bordering the median sulcus; transverse sulcus straight transverse, deep; when seen from the lateral aspect the shaft of the pronotum is slightly sinuate. Tegmina not surpassing the apex of the supra-anal plate, broad, elliptical; costal margin strongly arcuate proximad, then very gently arcuate to the distal section where the margin is more arcuate to the rounded apex, which is more sutural than costal in position, sutural margin nearly straight, shortly arcuate proximad and distad; marginal field very broad, in width constituting more than one-half of the total tegminal width, venation of the same field forming a coarse network enclosing roughly five to eight sided areas of variable size; sectors of the discoidal area regularly oblique, the cross nervures numerous and moderately regular; anal vein distinctly arcuate proximad, thence straight oblique, joining the sutural margin two-fifths the length of the latter from the base, axillary veins three in number. Wings reaching almost to the tegminal apices. Abdomen strongly depressed; supra-anal plate moderately transverse, the median section broad sublinguiform, the lateral portions narrow; cerci reaching nearly to the apex of the subgenital plate, stout, joints very short, apex moderately acute; subgenital plate compresso-rostrate. Cephalic coxae very slightly longer than the shaft of the pronotum, distinctly compressed, trigonal in section, dorsal margin biseriate spinose, the spines directed distad, the larger ones numbering six, ventral margin with eight large recurved spines, between which are smaller teeth generally placed one between each spine, external margin with a numerous series of short recurved teeth, ventro-lateral face with a few dentiform tubercles, internal face with numerous low tubercles; cephalic femora about four-fifths as long as the entire pronotum, moderately slender, greatest depth of the femora less than a fourth of the greatest length of the same, dorsal margin nearly straight, ventro-external margin with five spines of which the proximal one is larger than the subequal median three and the distal small one, discoidal spines three in number, ventro-internal margin

with thirteen spines which are biseriate in position proximad and throughout in length; cephalic tibiae (exclusive of claw) subequal to one-half the femoral length, armed on the ventro-external margin with fourteen spines, these increasing in length distad, ventro-internal margin with fourteen or fifteen spines increasing in length distad, terminal claw large; cephalic metatarsi about three-fifths of the tibial length, remaining tarsal joints about two-thirds of the length of the metatarsus. Median and caudal femora of medium length; femora with the usual distal lobe on the ventro-caudal margin represented by only the merest expansion of the margin, genicular spine aciculate; tibiae subcompressed, the dorsal margin lamellato-carinate on proximal half; caudal metatarsi equal to faintly more than a third of the tibial length.

Coloration destroyed by immersion in a liquid preservative. Marginal field of the tegmina with veins opaque and purplish-pink, their immediately surrounding section opaque yellow and the greater portion of the area much darker and translucent. Apparently when uninjured the coloration of the veins of this field is red, surrounded by borders of green or yellow.

Measurements (in millimeters)

	♀ (type)	♀ (paratype)
Length of body,	36.5	32.5
Greatest width of head,	7	6.4
Length of pronotum,	14.7	13.3
Greatest (supra-coxal) width of pronotum,	4.5	3.9
Length of tegmen,	15.5	12.7
Greatest width of tegmen,	7.6	6.9
Greatest width of marginal field of tegmen,	4	3.3
Length of cephalic femur,	11.8	10.5
Length of caudal femur,	12.3	11.3

In addition to the type we have examined a paratypic female and an immature female from Independencia. The adult is fully typical of the species but is smaller than the type, as the measurements given above show, with the tegmina and wings slightly shorter proportionately and the femoral lobes slightly more indicated than in the type, but these latter are no more than one-third as deep as the femora.

Stagmatoptera supplicaria (Burmeister)

1838. *M[antis] supplicaria* Burmeister, Handb. der. Entom., ii, abth. ii, pt. 1, fig. 542. [Surinam.]

Porto Velho, Rio Madeira. (Mann and Baker.) Two males.

These specimens are inseparable from two male individuals from Cayenne received from Chopard, except that in both of the present specimens there is an additional brownish tegminal maculation proximad of the larger oblique one present in all.

Stagmatoptera predicatoria Saussure

1870. *St[agmatoptera] predicatoria* Saussure, Mitth. Schw. Entom. Gesell., iii, p. 232. [Brazil.]

Rio Madeira five hundred miles from mouth. (Mann and Baker.) One male.

Porto Velho, Rio Madeira. (Mann and Baker.) One male.

Igarapé de Candelaria, 8° 45′ S, 63° 54′ W, Rio Madeira. (E. A. Smith.) One male. [Acad. Nat. Sci. Phila.]

These specimens are quite typical of the species.

Vates multilobata (Chopard)

1910. *Zoolea multilobata* Chopard, Bull. Soc. Entom. France, 1910, p. 182, figs. 1 and 2. [St. Jean du Maroni, French Guiana.]

Peixe Boi, east of Pará, Pará. November 25, 1907. (H. B. Merrill.) One female.

This species has been placed in the genus *Vates* by Giglio-Tos[25], an action with which we fully agree. The very striking greenish white costal edging of the tegmina and the broad fuscous barring of the proximal two-fifths of the humeral trunk of the same, are the most striking color features of the female sex. The large pale stigma interrupts the fuscous bar of the humeral trunk.

Phasmidae

pseudophasminae

Paraphasma conspersum Redtenbacher

1906. *P[araphasma] conspersum* Redtenbacher, Die Insektenfam. Phasmid., i, pp. 115 and 117. [Upper Amazonas, Brazil; Para, Brazil.]

Independencia, Parahyba. (Mann and Heath.) One male.

While referred to the present species this specimen shows differences from the original description, in that it is distinctly smaller and has the tubercle of the tegmina appreciably produced. These features are known to be variable in the allied *P. marginale* and, as the present individual agrees fully with the other characters of *conspersum*, we feel justified in considering it to be this species.

Pseudophasma castaneum (Bates)

1865. *Phasma castaneum* Bates, Trans. Linn. Soc. London, xxv, p. 348. [Pará, Brazil.]

Pará, Pará. (C. F. Baker.) One female.

Obidos, State of Amazonas. One female. [A. N. S. P.]

[25] Bollett. Mus. Zool. Anat. Comp. Torino, xxix, no. 684, p. 50, (1914).

We have gone quite carefully into the relationship of this form and *P. phthisicum* (Linn.) [=*necydaloides* Linn.] under which Redtenbacher placed it as a synonym. We have had French Guiana material of the older species determined by Chopard[26] for comparison, as well as other material of the genus. The Guianan *phthisicum* is, as far as we can ascertain, possessed of a more slender head and thorax, in the male at least, and a much more tuberculate dorsal surface of the same regions, particularly of the mesonotum. The marginal field of the tegmina is pale in *castaneum*, being concolorous with the anal section of the same, but a shade of greenish yellow, instead of the two being somewhat differently colored and the general contrasts less decided as in *phthisicum*, while the velvet black section is more extensive in length and breadth in *castaneum*. In *phthisicum* the antennae are pale rufescent of variable depth in the individuals we have seen. Stoll's *bioculatum*[27] may prove to be the same as *castaneum* and if so would have priority, but the antennae are figured as pale and we provisionally place it under *phthisicum*.

Prisopus cornutus Gray

1835. *P[risopus] cornutus* Gray, Syn. Phasm., p. 43. ["India."]

Pará, Pará. One female. [Cornell University.]

This striking species was never properly recorded for locality until Redtenbacher referred material from Surinam and Cayenne to it. The very characteristic auriform head lobes will readily distinguish it from the other species of *Prisopus*.

ACRIDIDAE

ACRYDIINAE

Eomorphopus antennatus (Bolivar)

1887. *A[morphopus] antennatus* Bolivar, Ann. Soc. Entom. Belg., xxxi, p. 250, pl. 5, figs. 19, 19a and 19b. [Upper Amazonia.]

Abuna, Rio Madeira. (Mann and Baker.) One female.

This species has also been recorded by us from Venezuela.[28]

[26] Ann. Soc. Entom. France, lxxx, p. 339, (1911).

[27] Natuur. Afbeeld. Beschr. Spooken, etc., pp. 61, 77, pl. xx, fig. 76, (1813). [Surinam.]

[28] Proc. Acad. Nat. Sci. Phila., 1904, p. 664, (1904).

Eomorphopus granulatus Hancock

1906. *E[omorphopus] granulatus* Hancock, Genera Insectorum, fasc. 48, Tetriginae, p. 38, pl. IV, figs. 35 and 35a. [Dutch Guiana.]

Pará, Pará. (C. F. Baker.) Seven males, one female. (W. M. Mann.) One male.

These specimens have been compared with a topotype and found to full agree. In this species we find at least four well marked chromatomorphs;[29] one, blackish with obsolete transverse pale fasciae on the dorsal and lateral faces of the caudal femora; another, uniform reddish; a third, ashy white; the fourth, gray brown faintly mottled with darker. The genetic value of these chromatomorphs will probably be found similar to those isolated in *Paratettix texanus* by Nabours.[30]

Chiriquia concinna (Bolivar)

1887. *M[etrodora] concinna* Bolivar, Ann. Soc. Entom. Belg., xxxi, p. 249. [Paramaribo, Dutch Guiana.]

Pará, Pará. (C. F. Baker.) One female.

Bruner[31] has already recorded this species from the same locality.

Otumba lobata Hancock

1906. *O[tumba] lobata* Hancock, Genera Insectorum, fasc. 48, Tetriginae, p. 45. [Demerara,[32] British Guiana.]

Manaos, Amazonas. (Mann and Baker.) Two males, one female.

These specimens fully agree with the description and Guianan material of the species. The tegmina are flavo-maculate in all the individuals.

[29] It is necessary to have some term to designate color form without at the same time using a word as indefinite as "variety," as definite in geographic meaning as "race," as negative a meaning in this connection as the unqualified word "form" or as teratological a meaning as "aberration." We prefer a word like chromatomorph, which expresses an idea, but at the same time does not attempt to give the origin of the concept so named. The use of the term is largely provisional, as many apparent color "forms" will in the future be shown to be Mendelian, while others as certainly will prove to be of environmental or physiological derivation. The word used merely enables one to speak of effect, while the experimental biologist is working on the cause.

[30] Journ. of Genetics, iii, pp. 141 to 170, (1914).

[31] Ann. Carneg. Mus., vii, p. 99, (1910).

[32] Vide Bruner, Ann. Carneg. Mus., vii, p. 111, (1910).

Otumba spinifrons (Stål)

1860. *Tetrix spinifrons* Stål, Kongl. Svenska Fregatt. Eugenies Resa, Zool., i, p. 346. [Rio de Janeiro, Brazil.]

Porto Velho, Rio Madeira. (Mann and Baker.) One male.

This specimen is referred to the present species with some slight misgivings, as the cephalic femora show little indication of the "undate" margins originally described, and the caudal femora are hardly "subundate" dorsad. These features, however, show some individual variation in other forms of the group and without additional material it seems best to so consider them here. With all the other characters given for this species the present individual agrees very satisfactorily.

Bruner has recorded the species from Santarem on the lower Amazon.

Allotettix peruvianus (Bolivar)

1887. *P[aratettix] peruvianus* Bolivar, Ann. Soc. Entom. Belg., xxxi, p. 272. [Pumamarca, Peru.]

Pará, Pará. (C. F. Baker.) Twelve males, seven females. (W. M. Mann.) One female.

Micronotus dubius Hancock

1908. *M[icronotus] dubius* Hancock, Trans. Entom. Soc. London, 1908, p. 423. ["Equatorial America."]

Pará, Pará. (C. F. Baker.) Three males.

These specimens fully agree with the brief original description of the species.

Tettigidea pulchella Rehn

1904. *Tettigidea pulchella* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 669. [Bartica, British Guiana.]

Pará, Pará. (C. F. Baker.) One male, one female.

The female individual is slightly larger than the type and has the wings surpassing the extremities of the caudal femora by more than the tegminal length, while in the type the wings do not surpass the femoral apices. The male has the wings projecting caudad of the pronotum a distance equal to the depth of the eye. This sex also has the face, genae, ventral portion of the lateral lobes and pleura and ventral and distal portions of the abdomen pale ochraceous. The Pará specimens show no other noteworthy differences from the female type.

Scaria hamata (DeGeer)

1773. *Acrydium hamatum* DeGeer, Mém. Hist. Ins., iii, p. 503, pl. 42, fig. 13. [Surinam.]

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) One female.

Manaos, Amazonas. (Mann and Baker.) One female.

The Manaos specimen fully agrees with Trinidad material of the species, and although the tones of the coloration have been affected by spirit immersion the pattern is clearly evident. The Peixe Boi female shows some features of difference from the other specimens, but provisionally at least we prefer to refer the specimen to *hamata*.

Scaria lineata Bolivar

1887. *S[caria] lineata* Bolivar, Ann. Soc. Entom. Belg., xxxi, p. 302. [Upper Amazon.]

Pará, Pará. (C. F. Baker.) One male.

This specimen does not show the median pale line on the pronotum originally described, but the median carina is beaded with pale. As the Pará individual fully agrees with the original description in all the other characters, we feel that the intensity or continuity of this line may be an individual feature.

Paurotarsus amazonus Hancock

1900. *Paurotarsus amazonus* Hancock, Psyche, ix, p. 42, figs. 1a to 1e. [Manaos, Brazil.]

Pará, Pará. (C. F. Baker.) One female.

Manaos, Amazonas. (Mann and Baker.) One male.

These specimens are perfectly typical of this very interesting species, which Bruner has also recorded from Pará and Santarem.

From this and other material it is evident that the species is dimorphic in wing and pronotal length, the male of the present lot being of the caudate type, the female of the abbreviate form, while other females known to us are of the caudate type. As the dimensions of the female sex were previously unknown, the measurements of both individuals are given.

	♂ Manaos	♀ Para
Length of body,	11.5 mm.	14.3 mm.
Length of pronotum,	13.5 "	14.3 "
Length from fastigium to apex of wings,	15.8 "	15.2 "
Length of caudal femur,	6.8 "	9 "

Paurotarsus insolitus new species (Plate XV, figs. 36, 37 and 38.)

Allied to *P. amazonus* Hancock, but differing in the more protuberant frontal costa, in the more angulate cephalic margin of the pronotal disk, in the decided interhumeral depression of the median carina, in the distinctly beaded character of all the carinae on the dorsum of the pronotum, in the more elongate and more slender caudal femora and in the relatively much shorter caudal metatarsus, which latter is not a third longer than the distal tarsal joint instead of at least twice as long as the same. The disparity in length of the two joints is not wholly due to a reduction in size of the metatarsus, but instead is caused as much by the increase in size of the distal joint, which is actually much larger and more robust than in *amazonus*. No close relationship exists to *P. rugosus* Bruner, from Trinidad, with which *insolitus* has been compared.

Type.—♀; Madeira-Mamoré Railroad Camp 43, Rio Madeira, Brazil. (Mann and Baker.) [Acad. Nat. Sci. Phila., type no. 5277.]

Size very similar to that of *P. amazonus;* form similar. Head with the occiput rounded and arcuately passing into the distinctly arcuate-protuberant frontal costa, which is sinuate impressed at the median ocellus when seen from the side; frontal costa when viewed from the cephalic aspect with the diverging rami thick and the intervening sulcus relatively narrow, much as in *P. amazonus;* eyes moderately protuberant, semiglobose, in depth but little more than half that of the infra-ocular portion of the genae; antennae very slender, in length when extended caudad slightly surpassing the humeral angle of the pronotum. Pronotum caudate, surpassing the apices of the caudal femora by more than the greatest ventral width across the pronotal lobes, in general form similar to that of *amazonus* with the following exceptions: cephalic margin decidedly obtuse-angulate instead of subtruncate-angulate; sculpture rougher with more pronounced impressions and more elevated asperities; all carinae distinctly and rather coarsely beaded instead of subglabrous and faintly beaded as in *amazonus;* median carina of the pronotum faintly lower at the highest point than in *amazonus* and distinctly depressed and subobsolete in the inter-humeral region. Tegmina slightly narrower than in *amazonus*. Wings not quite reaching the distal extremity of the pronotum. Ovipositor slightly more slender and with blunter teeth than in *amazonus*. Cephalic and median limbs have the distal tarsal joint relatively longer than in *amazonus*. Caudal femora more elongate and more slender than in *amazonus*, the greatest width contained three times in the length instead of two and two-thirds times as in *amazonus;* dorsal and ventral femoral margins straighter; caudal tibiae more elongate; caudal metatarsi but slightly surpassing in length that of the second and third tarsal joints combined, the depth in consequence relatively greater and the pulvilli individually shorter.

General color dull cream-buff, overlaid with points, blotches and clouds of blackish brown, the carina being more or less regularly beaded with this darker color, while the dorsum of the pronotum shows dark lateral patches cephalad of the humeral angles and the femora and tibiae are much suffused with the same shade.

Length of body, 16.4 mm.; length of pronotum, 20.2; greatest width of dorsum of pronotum across the humeral angles, 4.2; length from fastigium to apex of pronotum, 21.2; length of tegmen, 3.4; length of caudal femur, 10.

The type is unique.

EUMASTACINAE

Eumastax semicaeca (Brunner)

1897. *Mastax semicaecus* Brunner, Observ. Color. Insects, pl. 15, pl. IX, figs. 118a, 118b. [Upper Amazon.]

Pará, Pará. (W. M. Mann.) One female.

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) One immature male.

Abuna, Rio Madeira. (Mann and Baker.) One female.

Although these specimens have lost their natural color tones by immersion in a spirit preservative, the adults show very plainly the peculiar bicolored condition of the eyes characteristic of this species. The present records are the only definite ones known for the species, which is seen to range over a large portion of the Amazon valley.

PROSCOPINAE

Tetanorhynchus humilis Giglio-Tos

1897. *T[etanorhynchus] humilis* Giglio-Tos, Bollett. Mus. Zool. Anat. Comp. Univ. Torino, xii, no. 302, p. 18. [San Lorenzo, Argentina; Caiza and San Francisco, Bolivian Chaco.]

Baturite Mountains, State of Ceará. (W. M. Mann.) Two females.

Baixa Verde, State of Rio Grande do Norte. (W. M. Mann.) Five males, one female.

It was with considerable surprise that we recognized this species in the material from the extreme eastern portion of Brazil. We have before us a male and a female cotype received in exchange from Dr. Borelli and the present specimens show no differences when they are compared. In both sexes we find some variation, as usual in the group, in the relative length of the entire head and the rostrum, while in the number of spines on the caudal tibial margins there is much variation. The spine formulae of the dorsal margins of the caudal tibiae of the specimens before us are as follows:

♂

Caiza, Bolivia (Cotype).		Misiones, Argentina.		Baixa Verde, Brazil.	
external	internal	external	internal	external	internal
10–11	8–9	17–18	18–19	11	11
				19	18
				22	20
				17	15
				19	21
				18	19

♀

Caiza, Bolivia (Cotype).		Baixa Verde, Brazil.		Baturite Mts., Brazil.	
external	internal	external	internal	external	internal
16	13	16	15	12	14
				13	13

Giglio-Tos gave the spinulation of the two margins as eleven to fifteen, but it is evident that in the material before him the minimum was as low as eight and the maximum as high as sixteen. With an intra-specific range in the number of spines on one margin of from eight to twenty-one in the same sex, and from eleven to twenty-one in individuals from the same locality, it is evident that the number of spines is an extremely unreliable specific criterion in this group.

In his recent key to the species of this genus, Bruner[33] has misinterpreted this species, as he has placed it in a section of the genus having the apex of the rostrum blunt, when as a matter of fact it is distinctly acuminate. The male of this species can be immediately separated from the closely allied *T. bihastatus* Rehn, from Corumbá, Brazil, by the much shorter and less acuminate subgenital plate.

Stiphra tuberculata Brunner

1890. *Stiphra tuberculata* Brunner, Verhandl. K.-K. Zool.-bot. Gesell. Wien, xl, p. 108. [Theresopolis, State of Santa Catharina, Brazil.]

Baturite Mountains, State of Ceará. (W. M. Mann.) One male, two immature females.

Ceará Mirim, State of Rio Grande do Norte. (W. M. Mann.) One female, one immature female.

Independencia, State of Parahyba. (Mann and Heath.) Two males, one female.

[33] Ann. Carneg. Mus., viii, p. 435, (1913).

As far as can be told from Brunner's description these specimens represent the species named *tuberculata* by him, differing as they do only in the apparently less rugose meso- and metanotum. This difference is one of uncertain value, as its importance depends on the exact degree of interpretation of Brunner's, "Meso- et metanotum punctis impressis, profundis scabra." Our female specimens are all more or less distinctly but hardly decidedly scabrose on those areas. We are inclined to believe this feature is individual or environmental to a considerable degree. The exact number of spines on the dorsal margins of the caudal tibiae is of relatively little systematic value in this group, as we have shown above under *Tetanorhynchus humilis*. In the specimens before us the number of spines on the external margin ranges from nine to twelve and on the internal margin from ten to thirteen. Brunner gives eleven to thirteen external and fourteen to fifteen internal spines.

We have concluded that of the females before us but one, that from Independencia, is fully adult and that from Ceará Mirim and one from the Baturite Mountains are what Bruner calls "subimagoes,"[34] while the other Baturite Mountains females are distinctly young. Our reason for so considering them, aside from mere size, is that the first mentioned specimen has the rostrum greatly developed and slightly longer than the dorsal postocular portion of the head, faintly clavate and much blunted at the extremity, with the form in section tetragonal. Those considered "subimagoes" are similar to the material described by Brunner, and have the rostrum not at more or but little more than twice the length of the eye. Those considered young have the rostrum quite abbreviate and similar in relative length to that of the adult male but always blunter and broader distad. The young male has the rostrum of similar general form to that of the adult male but much shorter with a less decidedly acute apex.

The measurements of the adult female are: length of body (apex of rostrum to apices of the ovipositor jaws), 124 mm.; length of head, 23; length of rostrum, 10.7; length of pronotum, 20.4; length of meso- and metanotum and median segment, 16.7; length of cephalic femur, 12.4; length of caudal femur, 33.2; length of caudal tibia, 36.

[34] Ann. Carneg. Mus., viii, pp. 431, 439, (1913).

A feature found in all the specimens, but less marked in the adult female than in the others, is the presence of a blackish annular section proximad on the cephalic and median femora.

ACRIDINAE (Truxalinae of authors)

Truxalis brevicornis (Johannson)

1764. *Gryllus brevicornis* Johannson, Amoen. Acad., vi, p. 398. [Pennsylvania.[35]]

Pará, Pará. (C. F. Baker.) One male.

This specimen is in the green phase.

Paratruxalis filatus (Walker) (*Orphula pagana* of authors, but not of Stål.)

1870. *Chrysochraon filatus* Walker, Catal. Derm. Salt. Brit. Mus., iv., p. 785. [Santarem, Brazil.]

Pará, Pará. (C. F. Baker.) One male, two females.

These specimens agree with Walker's description and are inseparable from Argentine and Paraguayan specimens. They do not approach *P. f. minor* (Giglio-Tos) of the more elevated regions of central-southern Bolivia and northwestern Argentina. The typical form is now known to range from Resistencia, Chaco and Misiones, Argentina northward over the central riverine areas to the Amazon valley, being absent, as far as known, from the eastern more elevated and coastal regions.

By an unfortunate misidentification, which has been universally followed, Giglio-Tos considered a member of the group Hyalopteryges to represent Stål's *Gomphocerus paganus*,[36] described from Rio de Janeiro. The genus *Orphula* was erected by Stål subsequent to his specific description, to contain *paganus* and another species, to the former of which Giglio-Tos, in the paper here referred to, restricts it by his comment, "Species typica: O. pagana Staol." As a matter of fact Giglio-Tos was completely in error in his association of material, but his mistake is quite pardonable, as until the present time, as far as our knowledge goes, no topotypes of Stål's species have been examined.

We have recently had an opportunity to study such material, which we will report upon elsewhere, and we can say with authority what Stål's species really is, our series fully agreeing with his rather rambling description. We also have before us a suffi-

[35] Proc. Acad. Nat. Sci. Phila., 1913, p. 313, (1913).

[36] Boll. Mus. Zool. Anat. Comp. Torino, ix, no. 184, p. 9, (1894).

ciently large series of the "*Orphula pagana*" of authors to make a proper disposition of that form.

From Stål's description we should pick out as important essentials the following: "Prothorax basi obtuse angulatus . . . carinis lateralibus ante impressionem posticam parallelis, pone eandem retrorsum distincte divergentibus. . . . Tegmina apicem versus levissime angustata, apice truncata . . . femorum posticorum apices attingentia (♂) vel vix attingentia (♀). Tibiis posticis apicem versus interdum infuscatis. . . ." These features are those of important difference in the two species and genera, as they belong to distinct genera. The Rio de Janeiro specimens, now before us, fully agree with these characters, while the "*Orphula pagana*" of authors differs in the caudal margin of the pronotal disk being subrotundate; in the lateral carinae of the pronotum being as a whole very faintly divergent, or broken mesad and then parallel cephalad and very faintly divergent caudad; in the tegmina not being narrowed distad and in both sexes the length of the same being so great they surpass the extremities of the caudal femora, and in the caudal tibiae never being as strongly infuscate as in true *pagana*.

For this genus and species, so long misidentified by authors, it is necessary we should find names. From our available material we are able to determine that Walker's *Chrysochraon filatus*,[37] described from Santarem, Brazil, is the same as "*Orphula pagana*" of authors. Giglio-Tos's *minor*, as we have already shown,[38] is a geographic race of "*pagana*," or as it should be known, *filatus*. As a new generic name is required, in the absence of any available one, we propose the name **Paratruxalis,** with *Chrysochraon filatus* Walker as the type. The forms would stand as follows:

Paratruxalis Rehn
Orphula Giglio-Tos and most authors, not of Stål
Paratruxalis filatus (Walker)
Orphula pagana Giglio-Tos and most authors, not of Stål
Paratruxalis filatus minor (Giglio-Tos)
Metaleptea minor Giglio-Tos
Orphula pagana minor Rehn

[37] Catal. Dermapt. Salt. Brit. Mus., v, p. 785, (1870).
[38] Proc. Acad. Nat. Sci. Phila., 1906, p. 17, (1906); Ibid., 1913, p. 314, (1913).

Orphulella punctata (DeGeer)

1773. *Acrydium punctatum* DeGeer, Mém. Hist. Ins., iii, p. 503, pl. 42, fig. 12. [Surinam.]

Maranguape Mountains, Ceará. (W. M. Mann.) One female.

Ceará-Mirim, Rio Grande do Norte. (W. M. Mann.) One female.

Independencia, Parahyba. (Mann and Heath.) Six males, two females.

This series exhibits a number of the phases and variations of this plastic and widespread species.

Orphulella boucardi (Bruner)

1904. *Linoceratium boucardi* Bruner, Biol. Cent.-Amer., Orth., ii, p. 84. [Rio Sarstoon, British Honduras; Panama; San Diego, Department of Magdalena, Colombia.]

1906. *Orphullela* [sic] *chipmani* Bruner, Journ. N. Y. Entom. Soc., xiv, p. 149. [Interior of island of Trinidad.]

1911. *Linoceratium australe* Bruner, Ann. Carneg. Mus., viii, p. 20. [Corumbá, Brazil.]

Pará, Pará. (C. F. Baker.) Five males, three females.

Igarapé-Assu, Pará. Feb. 1, 1912 (one specimen only). (H. S. Parish.) Six males, two females. [A. N. S. P.]

Porto Velho, Rio Madeira. (Mann and Baker.) One female.

At the present moment we have before us the selected type (♂) of *Linoceratium boucardi* from Panama, now belonging to the Hebard Collection, quite a full series of topotypic *Orphulella chipmani* and a topotypic male of *Linoceratium australe*. It is clearly evident that all three names belong to the same species, and it is equally certain that *Linoceratium* is not a valid genus. Our series fully agrees with the description of *chipmani*, is inseparable from the type of *boucardi* and the Corumbá male fully agrees with the description of *australe*, but nevertheless is not separable from the others. The characters given for the genus *Linoceratium* are not of generic worth, as there is sufficient variation in a series of any size to discount the value of the subobsolete character and arcuate, straight or faintly converging form of the prozonal lateral carinae. The infuscation of the caudal genicular lobes is purely individual, depending on the depth of the general pattern. To us the species appears to be a well marked form of

the genus *Orphulella*, but not generically separable from *O. punctata*, the type of the older genus.[39]

When compared with the well known and more common *punctata* the present widely distributed form is distinguishable by the rounded caudal margin of the pronotal disk, by the more uniformly subparallel prozonal sections of the lateral carinae of the pronotal disk, the much narrower and more acute festigium, the more deeply sinuate ventral margin of the lateral lobes and the narrower tegmina. A minor but apparently constant color difference is the absence in *boucardi* of black punctations on the ventro-lateral carina of the caudal femora, a feature which appears to be invariably indicated in *punctata*.

All the Igarapé-Assu males show no green, one of the females from the same place being in the full green and the other in the half green phase. Of the Pará males one is brown, four are in or approaching the half green phase; of the females one is full green, the other two full brown. The Porto Velho female is brown with the tegmina as thickly, though finely, sprinkled as in some individuals of *punctata*.

The Porto Velho female has the fastigium narrower than in the others of the same sex from Brazil, but in this respect it is equalled in material from British Guiana.

The range of *boucardi* is now known to extend from British Honduras, Colombia, Trinidad and British Guiana, south to Corumbá, Matto Grosso, Brazil (one male now before us), east to the eastern part of the State of Pará and west at least as far as the upper Madeira region.

In 1906, we mentioned[40] two specimens from Gualaquiza and Valle de Zamora, Ecuador, previously reported by Giglio-Tos as *O. olivacea*,[41] being in our hands. We then referred them provisionally to *O. punctata*, but now are able to say they represent a form very closely related to, if distinct from, *boucardi*. They agree with *boucardi* in its important features, but have a more robust form, the female particularly showing this feature. Until more material in more satisfactory condition is available, we do

[39] It is quite possible that Walker's *Stenobothrus concinnulus* (Catal. Dermap. Salt. Brit. Mus., iv, p. 759, (1870)), described from Pará, is the same as *boucardi*.

[40] Proc. Acad. Nat. Sci. Phila., 1906., p. 27.

[41] Boll. Mus. Zool. Anat. Comp. Torino, xiii, no. 311, p. 39, (1898).

not feel warranted in making any more definite deductions, as variation may cover the apparent differences. This Upper Amazon type is clearly Scudder's *Zonocerus ? bilineatus*, described from the eastern slope of the Peruvian Andes.[42] Bruner has renamed this form *peruna*,[43] as *bilineatus* is preoccupied in the genus. In the original description Scudder rather curiously transposed the measurements of the antennae and the caudal tibiae.

Compsacris pulcher Bolivar

1890. *Compsacris pulcher* Bolivar, Anales Soc. Españ. Hist. Nat., xix, p. 315. [Villa Bella, Peru.[44]]

1911. *Staurorhectus intermedius* Bruner, Ann. Carneg. Mus., viii, p. 31. [Pará, Santarem and Chapadá, Brazil.]

Manaos, Amazonas. (Mann and Baker.) Two females.

These specimens are inseparable from a female from eastern Peru, all of which fully agree with the original description of this striking insect. Our specimens, however, have the tegmina and caudal femora slightly longer than the original measurements of the same sex.

This genus combines features of the Orphulellae and the group of genera represented by *Staurorhectus* and *Amblytropidia*, showing particular affinity to *Staurorhectus*. The general form of the female sex and to a lesser degree that of the fastigium, the frontal costa and of the lateral lobes of the pronotum of both sexes suggests the Orphulellae, while the general proportions of the pronotal disk and the form of the limbs are much as in *Staurorhectus*, the ovipositor jaws being similar to those of *Staurorhectus glaucipes*. The genus *Compsacris* also includes *Staurorhectus brevipennis* Rehn,[45] from Corumbá, Brazil, the female of which we have not seen, but which appears to differ, on the basis of opposite sexes, in the more rounded fastigium, when seen from the side, and in the absence of pale antennal tips.

When compared with *Staurorhectus longicornis*, the genotype of *Staurorhectus*, the female sex of *Compsacris* differs in the much

[42] Proc. Boston Soc. Nat. Hist., xvii, p. 268, (1874).

[43] Ann. Carneg. Mus., viii, p. 16, (1911).

[44] Villa Bella, Bolivia at the junction of the Beni and Mamoré Rivers is probably the locality.

[45] Proc. U. S. Nat. Mus., xxx, p. 377, (1906).

narrower, acute fastigium, the more retreating face with more compressed frontal costa, the proportionately more abbreviate pronotal metazona, the complete structural absence of prozonal lateral carinae and in the distant instead of attingent or subattingent metasternal lobes. Bruner's *intermedius*, at least as far as the female sex is concerned, is clearly this species. The male sex of *Staurorhectus glaucipes* closely resembles *Compsacris*, with no trace of the lateral carinae, however, but the female sex, while agreeing in the distant metasternal lobes, the form of the ovipositor jaws and that of the caudal genicular lobes, differs in the form of the fastigium, the general type of the pronotum, which is without any traces of lateral carinae, the general form of the tegmina and the more slender type of caudal femora. For the present at least it seems advisable to permit *glaucipes* to remain in the genus *Staurorhectus*, which, however, is closely related to *Compsacris* through the medium of that species.

The two Manaos females agree in having the lateral pronotal carinae structurally obsolete on the elongate prozona, but in coloration one has these marked briefly cephalad by diverging pale lines, which are completely lost in the other specimen.

The species is known to range over the Amazonian region from eastern Peru and Bolivia (Villa Bella and Santa Cruz de la Sierra) to Pará and south to Chapadá, Brazil.

Peruvia nigromarginata (Scudder)

1875. *Machacrocera nigromarginata* Scudder, Proc. Boston Soc. Nat. Hist., xvii, p. 268. [Eastern slopes of the Peruvian Andes.]

1890. *P[eruvia] nigromarginata* Scudder, Psyche, v, p. 439. (December, 1890.)

1891. *Toxopterus miniatus* Bolivar, Anal. Soc. Españ. Hist. Nat., xix, p. 314. (February 28, 1891.[46]) [Cumbase, Peru.]

Porto Velho, Rio Madeira. (Mann and Baker.) One male.

We regret very much having to substitute generic and specific names relatively little known for the rather familiar ones of *Toxopterus* and *T. miniatus*, but this course is unavoidable. We have before us, from the collection of the Museum of Comparative Zoology, the unique female type of *Machacrocera nigromarginata* Scudder, for which the same author later erected the genus *Peruvia*. This specimen is identical with Bolivar's later genus and species. The specific name *nigromarginata* has

[46] For exact date see sheet at end of volume.

fifteen years priority and the generic name antedates *Toxopterus* by at least two months. Scudder, when erecting the genus, erroneously associated it with *Acrolophitus*, a proceeding he later[47] concluded was unwarranted, there quite correctly placing *Peruvia* near *Toxopterus*, from which he separated it by several characters. The latter for *Toxopterus*, however, were apparently gleaned from Bolivar's description and not from material, as the type of *nigromarginata* is identical with the rather extensive available series from over the extended range of the species. The type has been dried from alcohol, has in consequence the orange red wing disk turned to yellow and is now lacking the antennae and all the limbs.

The Porto Velho specimen is larger than individuals of the same sex from south-central Brazil (Chapadá), Paraguay and northern Argentina (Misiones). Additional material and further study will probably make necessary racial separation of the southern form.

Scyllina pratensis (Bruner)

1904. [*Plectrotettix*] *pratensis* Bruner, Biol. Cent.-Amer., Orth., ii, p. 100. [Pernambuco, Brazil.]

Ceará-Mirim, Rio Grande do Norte. (W. M. Mann.) One male.

This species is only known from the two localities.

OEDIPODINAE

Paulinia acuminata (DeGeer)

1773. *Acrydium acuminatum* DeGeer, Mém. Hist. Ins., iii, p. 501, pl. 42, fig. 10. [Surinam.]

Independencia, Parahyba. (Mann and Heath.) One male.

Pará, Pará. (C. F. Baker.) One female.

Manaos, Amazonas. (Mann and Baker.) Six males, sixteen females.

The Manaos series shows an appreciable amount of variation in the fastigial width in both sexes, more pronounced, however, in the female. The chromatomorphs are very strikingly different and appear to us to be genetic combinations, probably much like those illustrated by Nabours in his paper on heredity in *Paratettix*. The male sex shows much greater uniformity in coloration than the female, but this may be due to the smaller

[47] Proc. Boston Soc. Nat. Hist., xxvii, p. 207, (1896).

size of the male series. We have been permitted to examine the unique female type of *Coelopterna stalii* Scudder, from the Peruvian Marañon, and find it to be identical with DeGeer's species. This position has been assigned by some workers, but no one has done so previously from a type examination.

The species is wide spread in tropical America, and is generally referred to in the literature as *Coelopterna acuminata*, but the generic name *Paulinia* has priority.

OMMEXECHINAE

Ommexecha giglio-tosi Bolivar

1899. *O[mmexecha] giglio-tosi* Bolivar, Revista Chilena Hist. Nat., iii, p. 54, 55. [Caiza, Aguarenda and San Francisco, Bolivian Chaco.]

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) Two males.

These specimens are not specifically separable from individuals of this species previously recorded by us from northern Argentina.

PYRGOMORPHINAE

Algete brunneri Bolivar

1905. *Algete brunneri* Bolivar, Boletin R. Soc. Españ. Hist. Nat., v, p. 214. [Pernambuco, Brazil.]

Baixa Verde, Rio Grande do Norte, Brazil. (W. M. Mann.) One female.

Ceará Mirim, Rio Grande do Norte, Brazil. (W. M. Mann.) One female.

These specimens are perfectly typical of this peculiar genus and species, which is known only from extreme eastern Brazil.

Omura congrua Walker

1870. *Omura congrua* Walker, Catal. Derm. Salt. Brit. Mus., iii, p. 504. [Pará, Brazil; Amazon Region; Archidona, Ecuador.]

Manaos, Amazonas. (Mann and Baker.) One female.

Pará, Pará. (C. F. Baker.) One male.

Peixe, Boi, east of Pará, Pará. November to December. (H. B. Merrill.) One female, two immature females.

The variety *brunneri*, described by Bruner[48] from Demerara, is clearly no more than an individual variation. The general size and antennal size differences given as diagnostic are of no

[48] Ann. Carneg. Mus., viii, p. 42, (1911).

taxonomic value, as extremes of these conditions and intermediates are in a series of fifteen males and four females from Bartica, British Guiana, now before us. We are unable to find in our series any appreciable difference in the surface of the body, which is said to be smoother in *brunneri*. The immature females are in different instars.

LOCUSTINAE

Prionolopha serrata (Linnaeus)

1758. [*Gryllus* (*Bulla*)] *serratus* Linnaeus, Syst. Nat., X ed., p. 427. ["Indiis."]

Pará, Pará. (C. F. Baker.) One male.

Diedronotus angulatus (Stål)

1873. *T*[*ropinotus*] *angulatus* Stål, Öfv. Kong. Vet.-Akad. Förh., 1873, no. 4, p. 52. [Bahia, Brazil.]

Ceará, Ceará. (W. M. Mann.) One male.

Baturite Mountains, Ceará. (W. M. Mann.) One male, one female.

Natal, Rio Grande do Norte. (W. M. Mann.) One male.

Ceará-Mirim, Rio Grande do Norte. (W. M. Mann.) Two males, three females, one juv. male.

Baixa Verde, Rio Grande do Norte. (W. M. Mann.) One female, one juv. female.

Independencia, Parahyba. (Mann and Heath.) Three males, four females.

These specimens have all been immersed in alcohol and in consequence have lost much of their original coloration. Certain individuals—all of the Independencia males, one of the Ceará-Mirim males and the males from Ceará and Baturite Mountains, and one Ceará-Mirim and one Independencia female—have a strongly contrasted pattern sprinkled with umber points, more or less thickly according to the individual. The broad infuscate bars along the lateral portions of the pronotal disk are indicated in several of the pale females, as is frequently the case in *D. discoideus*.

Brunner's *D. mexicanus* is closely related to *angulatus*, more so than to *D. discoideus*. The present records, with that of the typical material and one from Bonito, Pernambuco, Brazil, are the most eastern for the species, which ranges southward to Paraguay and northern Argentina and westward to Peru.

Chromacris stolli Pictet and Saussure

1887. *R[homalea] stolli* Pictet and Saussure, Mitth. Schweiz. Entom. Gesell. vii, p. 351. [Bahia, Brazil.]

Baixa Verde, Rio Grande do Norte. (W. M. Mann.) One female.

Pará, Pará. (C. F. Baker.) One male.

Titanacris albipes (DeGeer)

1773. *Acrydium albipes* DeGeer, Mém. Hist. Ins., iii, p. 487, pl. 40, fig. 7. [Surinam.]

Igarapé de Candelaria, 8° 45′ S, 63° 54′ W, Rio Madeira. (E. A. Smith.) One female. [A. N. S. P.]

This specimen, which is in perfect condition except for the antennae and one tarsal joint, has the original coloration completely preserved. The colored spur of the wing is not greenish as is the apex, but instead is dull dusky violet (Ridgway), well contrasted with the remaining areas of the wing.

The previous definite records are from Surinam and Pará, Rio de Janeiro and Lago Alexo, Brazil.

Tropidacris latreillei (Perty)

1830. *Acrydium latreillei* Perty, in Spix and Martius, Delect. Anim. Art., p. 123, pl. XXIV, fig. 4. [Amazon River.]

Igarapé de Candelaria, 8° 45′ S, 63° 54′ W, Rio Madeira. (E. A. Smith.) One female. [A. N. S. P.]

Porto Velho, Rio Madeira. (H. N. Benton.) One female.

The remarks previously made by us regarding the relationship of *T. dux* and *latreillei*[49] hold true regarding this material.

Tropidacris collaris (Stoll)

1813. *Gryllus (Locusta) collaris* Stoll, Natuurl. Afb. Beschyr. Spooken. etc., Trek-Springhaanen, pp. 39, register 13, pl. xxiB, fig 80. [No locality.]

Ceará-Mirim, Rio Grande do Norte. (W. M. Mann.) Three males.

Independencia, Parahyba. (Mann and Heath.) One male.

Pará, Pará. (C. F. Baker.) One male.

Manaos, Amazonas. (Mann and Heath.) One female. 1905. (Bicego.) Two males. [Submitted by Dr. H. von Ihering.]

This species generally figures in the literature as *T. cristata*. All of the above specimens except the Pará and the two Manaos

[49] Proc. Acad. Nat. Sci. Phila., 1913, pp. 88 to 89, (1913).

males have been immersed in a liquid preservative, and in consequence their coloration is practically gone.

The species has been recorded from a number of Brazilian localities.

Leptysma filiformis (Serville)

1839. *Opsomala filiformis* Serville, Hist. Nat. Ins., Orth., p. 593. [The North of the State of São Paulo, Brazil.]

Ceará, Ceará. (W. M. Mann.) One male.

Independencia, Parahyba. (Mann and Heath.) Three males, one female.

Pará, Pará. (C. F. Baker.) One male, one female.

The Ceará and Independencia specimens show some features of difference from the Pará and other determined individuals, particularly in the male sex, but there is so much individual variation in this genus in certain features, as the form of the fastigium, we wish to defer any detailed comment until larger series than those now in hand are available. The identification should be considered provisional.

Stenacris cylindrodes (Stål)

1860. *Opsomala cylindrodes* Stål, Köng. Svenska Freg. Eugenies Resa, Ins., p. 325. [Rio de Janeiro, Brazil.]

Pará, Pará. (C. F. Baker.) One male.

Oxyblepta xanthochlora (Marschall)

1835. *Gryllus xanthochlorus* Marschall, Ann. Wiener Mus., i, p. 215, pl. XVIII, fig. 7. [Brazil.]

Pará, Pará. (C. F. Baker.) Two females.

These specimens are only provisionally referred to this species, as the northern South American forms of this genus are very poorly understood.

Cornops longicorne (Bruner)

1911. *Paracornops longicorne* Bruner, Ann. Carneg. Mus., viii, p. 82. [Pará, Brazil.]

Pará, Pará. (C. F. Baker.) Two males, one female.

We have been fortunate enough to have for comparison, in connection with this species, two very interesting specimens; one, the type of Scudder's *Cornops bivittatum*, and the other a topotype (Surinam) of DeGeer's *longipenne;* belonging to species both of which have perplexed students for some time. Unfortunately the decisions most favored in the past have been errone-

ous in both cases. The type of Scudder's genus *Cornops* is ***bivittatum,*** based on a unique female from the eastern slope of the Peruvian Andes. This specimen has been dried from alcohol and in consequence all of the coloration except the striking black pattern is missing, but the structural features are completely preserved. A most casual examination shows that the species does not belong to the genus *Cornops* as restricted by Giglio-Tos,[50] but instead it is fully typical of *Paracornops* there described by him. In consequence *Paracornops* falls as a synonym of *Cornops*. At the present writing I am not acquainted with the insect called *Cornops* by Giglio-Tos.

The Pará specimens are fully typical of *longicorne,* which is a close relative of *longipenne* (DeGeer), described from Surinam. Bruner has erroneously determined as *longipenne* a species from São Paulo, Brazil,[51] material of both sexes of which, as well as a topotypic (Paramaribo, Surinam; K. Mayo) female of *longipenne,* is now before us. We have elsewhere named the species erroneously determined by Bruner, while a comparison of the female of *longipenne* and the same sex of *longicorne* show the following important differences: fastigium in *longipenne* broader than long and transverse, instead of subtrigonal and hardly broader than long as in *longicorne,* margins of the same thickened and incrassate in *longipenne,* sharper and more narrow in *longicorne;* fastigio-facial angle of *longipenne* more rounded than in *longicorne;* facial line not as straight in *longipenne* as in *longicorne,* faintly arcuate; frontal costa distinctly broader in *longipenne,* distinctly constricted at the ocellus instead of non-constricted as in *longicorne,* hardly sulcate dorsad of ocellus instead of distinctly so as in *longicorne;* lateral ocelli larger and more circular in *longipenne,* smaller and elliptical in *longicorne.* Tegmina of *longipenne* with apex more regularly rounded and less acuminate than in *longicorne.* Prosternal spine of *longipenne* blunt, subcylindrical, slightly transverse; of *longicorne* sharply acuminate, rising from a transverse pyramidical structure. Dorsal ovipositor jaws of *longipenne* with about eleven rather fine marginal teeth and fine discal teeth; of *longicorne* with four to five large and other small marginal teeth and coarse discal teeth. Cerci of *longipenne* thick, short, tapering, blunt; of *longicorne*

[50] Boll. Mus. Zool. Anat. Comp. Torino, ix, no. 184, p. 31, (1894).

[51] Proc. U. S. Nat. Mus., xxx, p. 662, (1906).

more slender, hardly tapering. Genicular lobes of caudal femora of *longipenne* sharply acuminate, lanceolate produced; of *longicorne* but moderately acute-angulate, not sharply produced. Caudal tibiae of *longipenne* strongly expanded distad, markedly lamellate and with the marginal fringe well developed; of *longicorne* much less expanded distad, but little lamellate and marginal fringe very weak. Caudal tarsi of *longipenne* much elongate; of *longicorne* shorter, both actually and proportionately. The coloration is of the same general type in both species.

When the type of *Cornops bivittatum* Scudder is compared with the female of *longicorne* the two are seen to be very closely allied, in fact much more closely than *longicorne* and *longipenne*. The antennae of *bivittatum* are somewhat longer than in *longicorne*, the interspaces between the sternal lobes are broader, the ovipositor jaws are proportionately shorter and broader and the caudal tibiae are slightly more expanded and sublamellate distad, although much less so than in *longipenne*. The coloration of *bivittatum* was, apparently, the same as that of *longicorne*, before it was damaged by liquid preservative.

Copiocera prasina new species (Plate XV, figs. 39 and 40.)

A striking new species of this interesting genus, differing from all the other forms in the abdomen having no decided yellow, red or orange lateral patches, in the caudal femora lacking the distinctive dorsal yellow area found in the other species and in the annulate cephalic femora and tibiae. It is nearer to *laeta* Gerstaecker than any other species, but it also differs from that in the slightly broader body, the broader eye, the practically non-sulcate frontal costa, the narrower tegmina and in the less infuscate periphery of the wings.

Type.—♀; Pará, State of Pará, Brazil. (C. F. Baker.) [Acad. Nat. Sci. Phila., Type no. 5285.]

Size rather large; form as usual in the genus, less robust than in *C. austera*, not as slender as in *laeta*, very similar to *C. erythrogastra;* surface of face, lower genae, pronotum and pleura finely cribroso-punctate. Head with the exposed dorsal surface four-fifths as long as that of the pronotum; occiput very faintly arcuate, not elevated dorsad of the pronotum, slightly declivent on the vertex, the interocular width slightly exceeding the greatest width of the frontal costa; fastigium slightly depressed below the level of the occiput, in form moderately acute with the immediate apex blunted, a delicate medio-longitudinal sulcus present; fastigio-facial angle, when seen from the lateral aspect, rounded obtuse-angulate, face regularly and considerably retreating; frontal costa

subequal in width, strongly constricted dorsad at its junction with the fastigium, slightly expanded around the ocellus, subobsolete ventrad on the face, irregularly biseriate punctate dorsad, roughly excavato-sulcate for a short distance dorsad and a great distance ventrad of the ocellus; lateral facial carinae well elevated, strongly diverging ventrad, sinuate: eyes moderately prominent, ovoid in basal outline, slightly flattened cephalad, in length about one-half again as long as the infra-ocular portion of the genae: antennae elongate, two and one-half times as long as the dorsal length of the pronotum, slightly depressed proximad, apex weakly acuminate. Pronotum subcylindrical, the greatest caudal width of the dorsum contained one and two-thirds times in the dorsal length of the same, the dorsal line straight when seen from the side; cephalic margin of the disk subarcuate, slightly flattened mesad, caudal margin obtusely rounded: median carina low but precurrent, very weak mesad and more decided on the metazona, lateral angles rather broadly rounded; metazona equal to two-thirds the length of the prozona; transverse sulci well indicated, deeper on the lateral lobes than on the dorsum: lateral lobes with their greatest dorsal length one and one-half times as long as the greatest depth of the lobes; cephalic margin of the lobes nearly vertical, truncate, ventral margin rather shallow arcuato-emarginate cephalad, truncate caudad with a bulbous thickening of the extreme caudal section of the same, caudal margin weakly sinuate, subtruncate, ventro-caudal angle rounded. Tegmina reaching to the apex of the abdomen, slender: costal margin distinctly and regularly arcuate distad to the narrowly rounded apex, which is more sutural in position. Wings reaching to the tegminal tips: greatest width contained two and one-quarter times in the greatest length of the same; apex of anterior field narrowly rounded. Prosternal process of the broadly transverse type found in the genus, thick, distal margin hardly emarginate, lateral angles blunt, rounded; interspace between the mesosternal lobes narrow, hour-glass shaped, the narrowest point hardly more than a fourth of the length of the same interspace, the internal margins of the lobes roundly obtuse-angulate; metasternal lobes subcontiguous caudad. Cerci and ovipositor valves elongate, simple, the former tapering on distal portion, the latter blunt and faintly bulbous at the tips, without marginal teeth. Cephalic and median limbs small. Caudal femora slightly more than half the length of the tegmina, pattern of the paginae regular and well impressed: caudal tibiae about four-fifths as long as caudal femora, armed on the external margin with seven to eight spines,[52] internal margin with nine to ten spines; caudal tarsi with the second joint about three-fifths as long as the metatarsus, the third joint but slightly shorter than the first and second joints together.

General color of dorsal and lateral surfaces cedar green, the abdomen pale cendre green. Head with the margins of the fastigium and of the fastigial angles blackish; ocelli orange-yellow; eyes auburn; mandibles bay, touched with ox-blood red proximad; clypeus and labrum sanford's brown, the ventral margin of the genae weakly and unevenly lined with wax yellow; antennae black, the proximal joint and a dorsal edging on the next five to six joints dragon's-blood red, six distal joints ochraceous-orange. Pronotum with the

[52] On one limb there is present in the unique type a distal external spine, a condition not normal in the group.

thickened ventral margin of the lateral lobes and the contiguous prosternal lobe edged with wax yellow, median line of pronotum weakly lined with zinc orange, stronger cephalad. Tegmina smoky fuscous with the venation of the general color. Wings largely weakly washed with fuscous, the proximal section of the disk washed with pale methyl blue. Prosternal process dull buckthorn brown, ventro-cephalic section of the mesopleura and cephalic section of the mesosternum washed with madder brown. Abdomen apparently uniform pale cendre green without the usual dark rings and yellow, orange or red areas of other species of the genus. Cephalic and median limbs of the general color, but the proximal half of the femora and also the same section of the tibiae, as well as a wash on the tarsi, nopal red. Caudal femora of the general color with the internal genicular arch and a portion of the lobe blackish; caudal tibiae nopal red, the internal face of the proximal extremity washed with blackish, spines orange-buff tipped with black; caudal tarsi washed with nopal red.

Length of body, 41 mm.; length of pronotum, 6.9; greatest dorsal (caudal) width of pronotum, 4.2; length of tegmen, 31.2; length of caudal femur, 18; length of caudal tibia, 15.

The type of this handsome species is unique.

Copiocera erythrogastra (Perty)

1834. *Xiphicera erythrogastra* Perty, Delect. Anim. Articul., p. 122, pl. XXIV, fig. 2. [Mountains of the Province of Minas Geraes, Brazil.]

Abuna, Rio Madeira. (Mann and Baker.) One female.

This specimen has been compared with a Goyaz, Brazil, individual of the species and it is not separable. It is, however, somewhat larger and has the black areas on the sides of the abdomen smaller, less bar-like and of little vertical extent, while the bluish is absent from the base of the wing. The latter condition can be accounted for by the specimen having been in a liquid preservative, which has destroyed or seriously injured other features of the coloration.

The species was recorded by Gerstaecker from Olivença, Brazil and Pebas and Iquitos, Peru, in the upper Amazon basin.

Copiocera surinamensis Rehn

1913. *Copiocera surinamensis* Rehn, Proc. Acad. Nat. Sci. Phila., 1913, p. 94, figs. 7 and 8. [Surinam.]

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) One male.

This is the first record of the species from Brazil, or in fact since the original description. The abdomen of this specimen has the lateral patches aniline yellow, the antennal tips of the same shade.

Copiocera austera Gerstaecker

1889. *Copiocera austera* Gerstaecker, Mitth. Naturwissen. Ver. Neu-Vorpomm. und Rügen, Greifswald, xx, p. 36. [Iquitos, Peru.]

Madeira-Mamoré Railroad Camp 41, Rio Madeira. (Mann and Baker.) One female.

This specimen agrees with the description excepting in the absence of bluish from the base of the wing. As the individual has been in a liquid preservative, has the usual position of the bluish area pale, and we have material of *erythrogastra* in the same series with bluish removed from the same region by the preservative, we can safely assume this has happened in the present specimen.

Walker's *nigricans*,[53] from Nauta, is either very close to or identical with *austera*.

Coscineuta sordida new species

A dull colored species, which differs from *C. coxalis* in the more shallowly impressed transverse sulci of the pronotum, the proportionately shorter cephalic and median femora, the absence of red from the coxae, the ochraceous wash on the strumosities of the head, pronotum and pleura, and other color features. From *virens* the new species differs in the deep glaucous caudal tibiae, the differently colored caudal tarsi, and numerous other color features. From *cicatricosa* the new form differs in the deeper general coloration and the color pattern of the caudal femora. Unfortunately, so little in the way of structural characters are given in the descriptions of *virens* and *cicatricosa*, we have to resort to color differences as diagnostic. Bruner's *olivacea* is a much smaller insect and appears to be so different as to require no comparison.

Type.—♀; Peixe Boi, east of Pará, State of Pará, Brazil. November to December, 1907. (H. B. Merrill.) [Acad. Nat. Sci. Phila., Type no. 5313.]

Size rather large; form robust; surface of head, pronotum and pleura rugulose to rugoso-cicatricose, of the venter and abdomen glabrous to glabroso-punctulate. Head no wider than the cephalic section of the pronotum; occiput gently rounded, gently descending to the interocular space, rugulosopunctulate; interocular space hardly as wide as the frontal costa at the infraocellar constriction, weakly sulcate; fastigium short, strongly transverse, the disk deeply ruguloso-punctate; fastigio-facial angle rather narrowly rounded when seen from the side, the face slightly retreating from between the antennal

[53] Catal. Dermapt. Salt. Brit. Mus., iv, p. 653, (1870).

bases; frontal costa broad dorsad, not sulcate but sparsely biseriate punctate, ventrad of ocellus sharply narrowed, lineato-sulcate, the margins strumose and merging with the strumose ventral border of the face; laterad of the frontal costa, ventrad of the ocellus, rectangulate strumosities join the costal margins; supplementary facial carinae distinct, strumose, irregular, moderately diverging; remaining surface of the face and genae rugoso-strumose: eyes not decidedly prominent, flattened ovate in basal outline, their greatest depth twice that of the infra-ocular portion of the genae: antennae elongate, two and one-quarter times as long as the dorsum of the pronotum, slender. Pronotum short, robust, rugoso-cicatricose: greatest dorsal (caudal) width of disk contained one and two-fifths in the greatest length of the same; cephalic margin of disk faintly emarginate mesad, caudal margin of disk rounded obtuse-angulate, the immediate angle flattened; median carinae weakly indicated cephalad, obsolete mesad, distinct but low and connected with the strumose pattern on the metazona; transverse sulci broadly and continuously indicated, all severing the median carina, relatively shallow: lateral lobes with their greatest depth subequal to their greatest dorsal length; cephalic margin of lobes nearly straight, very faintly sinuate; ventro-cephalic angle sub-rectangulate; ventral margin arcuato-truncate oblique emarginate cephalad, median angle broad obtuse, caudal section of same margin subtruncate, obtusely ascending; ventro-caudal angle rounded obtuse; caudal margin faintly oblique, truncate. Tegmina surpassing the caudal femoral apices by about the length of the pronotum, rather narrow, the greatest width contained five and one-half times in the greatest length: costal margin with a low but elongate proximal lobation, thence straight to the distal two-fifths, where the margin is gently arcuate to the apex, which is costal in position; apical margin oblique truncate; sutural margin faintly sinuate: venation rather closely placed; intercalary vein present but irregular. Wings rather narrow, their greatest width contained about two and one-fifth times in the greatest length of the same: anterior field narrow, the margin not deeply angulate-emarginate at the junction of the anterior and axillary fields, the latter with the margin moderately arcuate: discoidal vein with three rami, the proximal of which we consider the median vein, this bifurcate. Prosternal spine broad, low, short conical, the tip slightly antrorse in trend: interspace between the mesosternal lobes subquadrate, weakly enlarging caudad; interspace between the metasternal lobes weakly transverse, narrowing caudad. Ovipositor jaws compressed, moderately elongate, apices somewhat blunted, dorso-lateral margins irregularly crenulate. Cephalic and median limbs short. Caudal femora moderately slender, greatest depth contained about four and one-half times in the greatest length of the same; caudal tibiae distinctly shorter than the femora, pilose, dorso-external margin armed with five spines, dorso-internal margin with seven spines: caudal tarsi elongate, slender, second joint nearly as long as the metatarsus, third joint but little short of the combined length of the metatarsus and second joint; arolia large.

Allotype.—♂; Same data as the type.

Differing from the description of the type in the features here mentioned. Size relatively small. Head faintly wider than the cephalic section of the pronotum: interocular space very narrow, no wider than the second antennal

segment: eyes prominent, their greatest depth more than twice that of the infra-ocular portion of the genae: antennae about three times as long as the dorsum of the pronotum. Pronotum with the lateral lobes faintly deeper in proportion to their length. Tegmina with the greatest width contained nearly six times in their greatest length. Interspace between the mesosternal lobes sublongitudinal, distinctly broadening caudad; interspace between the metasternal lobes strongly longitudinal and very narrow. Supra-anal plate large, scutellate, proximal half with the lateral margins subparallel, distal half with the margins sinuato-convergent, making the distal portion sub-rectangulate in form; an elevated double sigmoid carina crosses the plate at the proximal two-fifths, proximad of which the plate is subtectate in section, with the crest of the tectation expanded and subsulcate in the distal two-fifths of the plate: cerci elongate, reaching to the apex of the supra-anal plate, simple, tapering, acuminate, regularly inbowed: subgenital plate with the margin slightly elevated and appreciably compressed disto-dorsad. Caudal tibiae with six to eight spines on the dorso-external margin.

General color deep blue black, overlaid on the cicatricose and strumose elevations with marmorations of light cadmium to dull ochraceous-orange. Eyes amber brown (♂) to bay (♀); antennae of the general color, narrowly lined laterad on the proximal third with pyrite yellow. Tegmina with the general color more olivaceous black, the venation completely outlined in olive-ocher. Wings weakly washed with fuscous, more thickly so distad and along the periphery, heavily so along the distal two-thirds of the costa; longitudinal veins strongly pencilled with fuscous; proximal portion of the disk washed with jasper red. Abdomen dorsad and laterad garnet brown (♂) to nopal red (♀), the segments more (♀) or less (♂) strongly, broadly and completely banded proximad with black; venter of the abdomen similarly patterned but with the reddish replaced by sanford's brown; apex of the abdomen largely black, ovipositor jaws dull orange. Cephalic and median limbs of the general color, lined on the dorsal and ventral surfaces and at the extremities of the articles with dull orange. Caudal femora of the general color, the dorsal carinae, a broad bar along the ventro-external carina and the genicular lobes dull orange: caudal tibiae of the general color, weakly lined along the dorso-lateral angles with dull buffy; caudal tarsi lined on the external face with dull pale buffy.

Measurements (in millimeters)

	♂ (allotype)	♀ (type)
Length of body,	21.8	33.2
Length of pronotum,	4.8	6.9
Greatest (caudal) width of dorsum of pronotum,	3.6	5.2
Length of tegmen,	20.5	28
Greatest width of tegmen,	3.8	5.2
Length of caudal femur,	13.4	17.5

The type and allotype are all we have seen of this striking species.

Abila smaragdipes (Bruner)

1911. *Abila smaragdipes* Bruner, Ann. Carneg. Mus., viii, p. 96. [Pará and Santarem, Brazil.]

Pará, Pará. (C. F. Baker.) One female.

This specimen fully agrees with Bruner's description. In the presence of a continuous, distinctly sulcate, frontal costa this form seems to us to approach the related genus *Aristia*, but at present we are not in a position to make any more definite statement of the exact position the species should hold. It is, however, certainly not a typical *Abila*.

Abracris obliqua (Thunberg)

1824. *Gr[yllus] obliquus* Thunberg, Mém. Acad. Imp. Sci. St. Pétersb., ix, p. 414. [Brazil.]

1860. *Acridium consors* Stål, Kongl. Svenska Fregatt. Eugen. Resa, Zool., Insecta, p. 327. [Rio de Janeiro, Brazil.]

1906. *Omalotettix signatipes* Bruner, Proc. U. S. Nat. Mus., xxx, p. 673. [Sapucay, Paraguay (types); Pernambuco, Brazil; Temax, Yucatan.]

Ceará, Ceará. (W. M. Mann.) One male, two females.

Baturite Mountains, Ceará. (W. M. Mann.) One female.

Maranguape Mountains, Ceará. (W. M. Mann.) Four males, two females.

Baixa Verde, Rio Grande do Norte. (W. M. Mann.) One female.

Natal, Rio Grande do Norte. (W. M. Mann.) Three males.

Independencia, Parahyba. (Mann and Heath.) Three males, three females.

We have made a careful study of the species of this genus, having material of all except the quite different *conspersipennis* before us, and find that Thunberg's *obliquus* is clearly the oldest name for this species. For years placed in the genus *Osmilia* and recorded a number of times under that generic name, there is no question but that Thunberg had a member of this genus before him. The original description is brief, but with Stål's later comments from the typical material, and his synonymy of his *consors* with Thunberg's species[54] the above synonymy of *signatipes* is clear.

Through the kindness of Prof. Bruner we have before us a female paratype of *signatipes*, which is inseparable from the females from the Maranguape Mountains. We have recorded

[54] Recen. Orthopt., i, p. 69, (1873).

material as *signatipes* a number of times, but, in the light of the series now before us, we find that our references were correct in but a portion of one lot, i. e. the Bonito, State of Pernambuco and Espirito Santo, Brazil, representatives.[55] The other references by us of material as *signatipes* all should be placed under *chapadensis* and *caeruleipennis*.[56] The specimen supposed to be from St. Thomas, West Indies,[57] we feel is erroneously labelled, being *obliqua* probably from the State of Pernambuco, Brazil.

The specimens before us have strongly decided coloration contrast; in the case of certain of the specimens this is due to alcoholic immersion, but not in all. The size is uniformly small, as said by Thunberg similar to that of "*Gryllus apricarius*" (=*Stauroderus apricarius*). The lateral markings of the caudal femora are strongly indicated in all, while the externo-ventral face always shows some black, but this may be broken up into two areas (aside from the genicular infuscation) by a pale area.

Abracris dilecta Walker

1870. *Abracris dilecta* Walker, Catal. Dermapt. Salt. Brit. Mus., iv, p. 642. [Santarem, Brazil.]

1908. *Omalotettix meridionalis* Bruner, Biol. Cent.-Amer., Orth., ii, pp. 280, 281. [Demerara, British Guiana; Chapada, Brazil.]

Pará, Pará. (W. M. Mann.) One male. (C. F. Baker.) One male.

After careful study of the original descriptions, the present material and a cotypic pair of *meridionalis* from Demerara, loaned by Prof. Bruner, we feel the above synonymy to be correct. Kirby considered *dilecta* to be the same as *signatipes* (=*obliqua*), but its original dimensions appear to be too large for that form, to which, however, the present species is very closely related.

The range of the species extends from British Guiana south to Victoria, State of Espirito, Brazil and Santa Cruz de la Sierra, Bolivia.

[55] Proc. U. S. Nat. Mus., xxxvi, p. 149, (1909).

[56] Proc. Acad. Nat. Sci. Phila., 1907, p. 185, (1907); [*chapadensis* and *caeruleipennis*]: Ibid., 1908, p. 17, (1908); [*caeruleipennis*]: Proc. U. S. Nat. Mus., xxxvi, p. 149, (1909); [Chapada material—*caeruleipennis*]: Proc. Acad. Nat. Sci. Phila., 1913, p. 339, (1913); [*caeruleipennis*]: Ibid., 1915, p. 285, (1915); [*caeruleipennis*].

[57] Proc. U. S. Nat. Mus., xxxvi, p. 149, (1909).

Abracris caeruleipennis (Brunner)

1900. *Jodacris* (?) *caeruleipennis* Brunner, Second Rep. Merchants Loc. Invest. Comm. Buenos Aires, p. 68. [Asuncion, Paraguay; Territory of Formosa, Argentina.]

Natal, Rio Grande do Norte. (W. M. Mann.) One female.

Independencia, Parahyba. (Mann and Heath.) One male.

In a forthcoming paper we intend to make some detailed comments on this species, its relationship and distribution.

Osmilia flavo-lineata (DeGeer)

1773. *Acrydium flavo-lineatum* DeGeer, Mém. Hist. Ins., iii, p. 497, pl. 42, fig. 4. [Surinam.]

Porto Velho, Rio Madeira. (Mann and Baker.) Two males.

Manaos, Amazonas. (Mann and Baker.) One female.

Pará, Pará. (W. M. Mann.) Two females.

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) Two males, one female.

Maranguapé Mountains, Ceará. (W. M. Mann.) One female.

Independencia, Parahyba. (Mann and Heath.) Two females.

Aside from the Peixe Boi representation, all of these specimens have been immersed in alcohol and in consequence have lost much of their original color tones. The disk of the wing is either distinctly, or shows traces of being washed with yellowish in the specimens which have been in liquid preservative, while the Peixe Boi male has a pale bluish and the female a glaucous tint to the same area. One of the Pará females has a yellowish wing coloration, which apparently has had a minimum of alteration, and it is very similar in this respect to British Guianan material.

There has been so much confusion regarding the relationship of the very closely allied forms of this genus, that a good portion of the distributional data published in the past has little value on account of the strong probability of erroneous determinations. We feel that this genus is very closely related to *Abracris*, and should not be placed in the isolated position generally assigned to it.

The present species appears to range from Colombia to eastern Brazil, to the upper Amazonian region.

Locheuma brunneri (Scudder)

1875. *Elaeochlora brunneri* Scudder, Proc. Boston Soc. Nat. Hist., xvii, p. 270. [Eastern slope of the Peruvian Andes.]

1889. *Vilerna flavipennis* Gerstaecker, Mitth. Naturw. Ver. Neu-Vorpomm. Rügen, Greifswald, xx, p. 13. [Fonteboa, Amazonas, Brazil.]

Pará, Pará. (C. F. Baker.) One male, one female.

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) Four females.

Igarapé-Assu, Pará. January 17, 1912. (H. S. Parish.) One male. [A. N. S. P.]

This material fully agrees with Scudder's type, which is now before us, and with Gerstaecker's description of *flavipennis*, also with two males and one female of the species from eastern Peru (Rio Pacaya, July to September, 1912, two males; Almeria, January 17 to 18, 1913, one female).

For a proper understanding of the unfortunate complications the proper placing of Scudder's name necessitates, it will be necessary to discuss the matter chronologically. Scudder's original assignment of the species to the genus *Elaeochlora* was, of course, incorrect, the latter genus having never been seen by him. He was also in error in stating the unique type to be a male, as it is of the opposite sex. The type has been dried from alcohol and has lost almost all of the original coloration. It is labelled in Scudder's handwriting, "Elaeochlora Brunneri Scudd. type. Peruv. Andes." In his original description of *flavipennis* Gerstaecker suggests that Scudder's name may have been based on the other sex of his species, which was based on the female; as a matter of fact *brunneri* was based on a slightly smaller individual of the same sex of the same species as his *flavipennis*. In 1890, Scudder[58] decided that *brunneri* represented a new genus allied to *Catreus*, which he named *Locheuma*. As a genus it is close to *Vilerna* Stål, and provisionally, at least until we know more about the relationship of the two entities, can be considered of generic rank, but it is in no way related to *Catreus*. In 1898, Giglio-Tos[59] erected the genus *Caletodes* on two species, one of which, *C. alatus*, has been selected as the type. His genus *Caletodes* is identical with *Locheuma* and must fall for the older name, while we feel little doubt but that the species

[58] Proc. Bost. Soc. Nat. Hist., xxvii, p. 207, (1890).

[59] Bollett. Mus. Zool. Anat. Comp. Torino, xiii, no. 311 p 59

alatus from eastern Ecuador is identical with *brunneri*. There is little in the way of characters on which the genus *Lochcuma* (*Calctodes*) can be retained as distinct from *Vilerna*, as the supposedly diagnostic feature, the form of the caudal margin of the pronotal disk, is found to be individually variable in *Vilerna aeneo-oculata* and *rugulosa*, while the general pronotal form is approximated in the latter species. For the present, however, we prefer to consider *Lochcuma* a distinct genus, the species *festae* of Giglio-Tos, which unfortunately was not selected as the genotype, having a very different appearance. Further study may bring out some more salient features to clearly distinguish *Vilerna* and *Lochcuma*.

Our *Calctodes pulchripes*, from Balzapamba, Ecuador,[60] is quite close to *brunneri* and when more material is examined may prove to be the same, or, if *alatus* is distinct, the same as that species. However, *pulchripes* differs from the material of *brunneri* in being much more rugose, in having a shorter pronotum and a transverse mesosternal interspace. The characters previously supposed to be diagnostic of *pulchripes* are apparently only individual. The present species, like others of the Vilernae, is a variable one in minor features and this variation appears to be largely individual. Bruner has recorded this species as *flaripennis*) from Pará and Chapada, Matto Grosso, Brazil.

Nuciera elegantula new species (Plate XV fig. 42.)

This species is placed in this genus provisionally, as it shows certain differences from the relatively poor generic description of *Nuciera* (*Nuceria* Stål nec Walker), which may prove to be of generic importance. Of the known genera of the Vilernae, *elegantula* appears to show greater affinity with *Nuciera*, and we prefer to place it here until more is known concerning the genotype and only previously known species —*N. roscipennis* Stål. The fastigium is broader in the present insect than the description would lead one to suppose was the case in *roscipennis*, while the supplementary facial carinae are subparallel and not more divergent than in *Vilerna*, as described.

When compared with the description of *roscipennis* the present insect can be readily distinguished by its much smaller size, smoother face, blunter and more rounded vertex, in the tegmina

[60] Proc. Acad. Nat. Sci. Phila., 1913, p. 99, figs. 13 to 15, (1913).

falling considerably short of the apices of the caudal femora, in the prosternal spine being short and blunt conical, the caudal tibiae armed on the dorso-external margin with six to seven spines, in the antennae each having two pale annuli and the lateral lobes of the pronotum not marked with yellowish, although the face is.

Type.—♀; Peixe Boi, east of Pará, State of Pará, Brazil. November to December, 1907. (H. B. Merrill.) [Acad. Nat. Sci. Phila., Type no. 5314.]

Size small: form moderately slender, subcompressed: surface of head and limbs smooth but minutely shagreenous, of pronotum and pleura more or less cribroso-punctate, of venter and abdomen moderately polished. Head with the exposed dorsal length subequal to that of the prozona: occiput distinctly ascending, then declivent to the interocular space, which is hardly wider than the proximal antennal joint, and the whole dorsum of the head, from the cephalic margin of the fastigium, with a fine continuous medio-longitudinal sulcus; fastigium broad, but faintly longer than wide, the margin regularly arcuate, faintly subparallel caudad, slightly flattened meso-cephalad, the margin distinctly cingulate: fastigio-facial angle rounded rectangulate when seen from the side, the interantennal protuberance rotundato-truncate for a short distance, then passing into the regularly retreating and moderately concave facial line; frontal costa dorsad distinctly broader than the proximal antennal joint, immediately dorsad plane but biseriate punctate, ventrad of this the costa is deeply and sharply sulcate to the clypeus, the borders of the costa moderately constricted ventrad of the ocellus at the usual transverse facial sulci, thence distinctly diverging: lateral facial carinae slightly sinuate, subparallel: eyes very prominent, globose when seen from the dorsal surface, in basal outline broad ovate, their greatest depth nearly twice that of the infraocular portion of the genae: antennae slightly longer than the dorsal length of the head and pronotum, slightly and very gradually enlarging distad, the joints moniliform and from the third regularly increasing in length distad. Pronotum with the greatest dorsal (caudal) width contained one and one-half times in the greatest length of the same, when seen from the side the dorsal line is moderately impressed at the principal transverse sulcus, faintly so at the cephalic transverse sulcus; cribroso-punctation of pronotum strongest on the metazona and along the cephalic and ventral margins, weakest on the disk of the prozona of the lateral lobes; cephalic margin of disk arcuate, weakly flattened mesad, caudal margin obtuse-angulate, lateral angles of disk broadly rounded except for a weak shoulder on the metazona; median carina weak but continuous, subobsolete mesad, transverse sulci well impressed, the caudal one severing the median carina at the caudal third: lateral lobes with the greatest depth contained one and one-third times in the greatest dorsal length of the same; cephalic margin of lobes obliquely sinuate, ventro-cephalic angle obtuse, ventral margin arcuato-emarginate cephalad, gently arcuate caudad, ventro-caudal angle rounded, obtuse, caudal margin weakly oblique, truncate. Tegmina abbreviate, about one and one-half times as long as the

head and pronotum together, falling short of the femoral apices by about the length of the pronotum; form elongate lanceolate, the greatest width contained four and one-half times in the length of the same; costal margin faintly arcuate, apex rather narrowed, rounded, sutural margin gently arcuate, faintly sinuate near the apex; venation distinct, rather sparse. Wings short, broad, the distal extremity subtruncate; anterior field very narrow. Prosternal process very low, blunt conical, faintly retrorse at the apex; interspace between the mesosternal lobes strongly transverse, the lobes broadly oblique arcuate; interspace between the metasternal lobes wedge-shaped, the lobes strongly converging caudad. Ovipositor jaws strongly compressed, the tips moderately recurved, the dorso-lateral margins regularly and strongly serrato-dentate. Cephalic and median limbs relatively short. Caudal femora nearly two and a half times as long as the pronotum, moderately robust, the greatest depth contained four times in the greatest length, pregenicular region slender; dorsal carina very minutely serrulate;[61] pattern of the paginae regular, well spaced; genicular lobes bluntly acute; caudal tibiae distinctly shorter than the femora, faintly sinuate; dorso-external margins armed with six to seven spines, dorso-internal margins with eight spines; caudal tarsi with the third joint faintly longer than the first and second united; arolia rather small, compressed.

General color ecru-olive, paling to isabella color on the tegmina and darkening to buffy olive on the dorsum of the abdomen, ventral surface heavily washed with fuscous. Head with the genae and face ventrad of the ocellus mustard yellow, the fastigium and adjacent portion of the frontal costa margined with the same, the dorsum of the head and the postocular region blotched with dusky olive-green; eyes deep russet; antennae blackish, lineato-annulate proximad on the dorsal surface, and completely biannulate with antimony yellow distad. Pronotum mottled dorsad and laterad with dusky olive-green; pleura more clearly of the base color. Tegmina with three large blotches and numerous points of dark olive. Wings weakly infuscate, proximad faintly glaucous. Cephalic and median limbs of the general color annulate with dusky olive-green. Caudal femora on the dorsal and lateral surfaces much blotched with dusky olive-green, the carinae more or less regularly beaded with the same; ventral sulcus washed with russian green; scattered over the carinae and paginae of the caudal femora are numerous rounded areas of the general color, outlined by a dark annulus and containing a smaller dark annulus;[62] caudal tibiae cinnamon brown proximad passing into blackish distad, the spines of the same tone, both the dorsal and ventral carinae of the tibiae bear proximad some annular areas similar to those on the femora; dorso lateral, but particularly dorso-external, margins strongly ciliated; caudal tarsi blackish with some ecru olive.

Length of body, 20.4 mm.; length of pronotum, 4.5; greatest (caudal) width of pronotal disk, 2.7; length of tegmen, 10.5; length of caudal femur, 12.

The type of this remarkable species is unique.

[61] As seen at certain angles this would be called smooth.

[62] It is possible these areas may be analogous to the tubercles described by Brunner as occurring in the same region in the peculiar but allied *Aphoecras margaritatus* Biol. Cent.-Amer., Orth., ii, p. 286, (1908)).

Sitalces madeirensis new species (Plate XV, fig. 41.)

A very peculiar species, which can be immediately recognized from the others of the genus by the completely developed tegmina and wings.

Type.—♀; Porto Velho, Rio Madeira, Brazil. (Stanford Expedition; Mann and Baker.) [Acad. Nat. Sci. Phila., Type no. 5289.]

Size small; surface smooth, except for the regularly punctate metazona of the pronotum and irregularly rugoso-punctate remaining section of the lateral lobes and faintly punctate pleura. Head with the dorsal line moderately declivent from the rounded occiput to the apex of the fastigium; vertex with the interspace between the eyes very narrow, not more than one-half that of the interocular portion of the frontal costa, very narrowly sulcate; fastigium slightly transverse, trigonal, apex narrowly arcuato-truncate, surface strongly excavate mesad; fastigio-facial angle obtuse, the interantennal region vertical, truncate when seen from the lateral aspect, facial line ventrad of the angle moderately retreating; frontal costa at fastigio-facial angle moderately wider than the interocular space of the vertex, between the antennae expanding to twice as wide as the ocular interspace then narrowing to the dorsal width, thence ventrad subequal in width until it become subobsolete immediately dorsad of the clypeal suture, interocular space plane, biseriate punctate, sulcate for about two-thirds of its length ventrad of the ocellus; supplementary facial carinae decided, moderately and regularly diverging ventrad, a narrow area ventro-cephalad of eye and involving the supplementary carinae callose; eyes moderately prominent, broad-ovate in basal outline, about one and one-third times as long as the infra-ocular portion of the genae; antennae filiform, short, about twice as long as the pronotum. Pronotum sellate, slightly but appreciably narrowed mesad, the dorsal line appreciably concave, cephalic section subequal in width to the inserted portion of the head; disk with the greatest caudal width contained one and one-fifth times in the greatest length of the same; cephalic margin of the disk considerably produced, bisarcuate, the median dividing emargination very broad and relatively shallow; caudal margin of disk arcuato-truncate with a decided broad V-shaped median emargination; median carina broad but low, continuous but decidedly severed by all the transverse sulci except the cephalic one; transverse sulci broad, pronounced, decidedly impressed, the cephalic one weaker, the second sulcus not continuous over the lateral lobes as is the case with the others, metazona comprising one-third of the dorsal length of the pronotum; lateral lobes with the greatest depth equal to two-thirds of the greatest dorsal length of the same, cephalic margin of lobes oblique, faintly sigmoid, ventro-cephalic angle subrectangulate, ventral margin quadrantiform-emarginate, median angle rounded sub-rectangulate, caudal section of ventral margin sinuato-truncate, weakly ascending dorso-caudad, ventro-caudal angle rounded sub-rectangulate. Tegmina surpassing the tips of the caudal femora by nearly the pronotal length, sublanceolate; costal margin with shallow, very elongate proximal lobe, distal portion of the same margin rather strongly arcuate to the narrowly rounded apex, which is nearer the sutural margin; venation rather sparse, somewhat

irregular, interspaces of distal section irregular in size and shape; texture coriaceous. Wings subhyaline, reaching to the tegminal apices, rather narrow. Prosternal process a broad, low swelling bearing on its apex a short, sharp, cephalad recurved tooth; interspace between the mesosternal lobes subquadrate, in width slightly less than one of the lobes, internal margins of lobes subparallel, appreciably arcuate, caudal angles well rounded; mesosternal lobes narrowly separated caudad. Supra-anal plate elongate, sublanceolate, in transverse section arcuate, lateral margins gently arcuate, convergent to the narrowly rounded apex, proximal half of the plate with distinct lateral inter-marginal low carinae, a distinct medio-longitudinal, elongate-elliptical sulciform impression and a faint transverse division separating the proximal from the distal section of the plate; ovipositor valves elongate, considerably compressed, the tips of both sets of valves strongly hooked, the external margins of the dorsal valves crenulato-dentate. Cephalic and median limbs quite slender. Caudal femora of average build, not markedly slender, subcompressed, in length equal to two-thirds that of the tegmina, greatest depth contained three and one-third times in its greatest length; dorsal carina very faintly serrulate, regularly supplied with long hairs, dorso-external and ventro-external carinae simple, pattern of the paginae regular, open, dorso-genicular margin with a faint median tooth; genicular lobes with their apices faintly acute, ventral margin of the lobes sigmoid, deepest proximad; caudal tibiae slightly shorter than the femora, faintly sigmoid in outline, slender, armed on the external margin with six spines, on the internal margin with nine spines; caudal tarsi with the proximal joint about twice as long as the second joint; third joint subequal to the first and second joint together.

General color (specimen dried from liquid preservative) olive-yellow, a pair of broad lateral bars of fuscous black extending from caudad of the eyes, over dorsal two-thirds of the lateral lobes of the pronotum, dorsal section of the pleura, metanotum, dorsum of the three proximal abdominal segments and over the tegmina, becoming fuscous on the latter. Head with the dorsal section of the antennal grooves, occiput, vertex and on the fastigium weakly fuscous black, regular disposed series of dots of the general color in diverging lines extending from the fastigium around the eyes, a line of callose areas margining the eyes ventro-cephalad and the postocular bar ventrad, these strikingly cream-buff; eyes mars brown clouded with fuscous; antennae of the general color. Pronotum with the median and the position of the lateral carinae distinctly of the general color, the base tone of the dorsum more ceruolive, the pale lateral dorsal lines contrasted mesad by a wash of fuscous; lateral lobes with the greater portion of the pale ventral section callose and cream-buff in color. Pleura with the callose cream-buff line represented by two oblique dashes, one dorso-cephalad of the insertion of each limb. Tegmina with the region of the anal vein narrowly marked with the general color. Wings washed with fuscous, longitudinal veins strongly lined with fuscous-black, transverse veins paler. Caudal femora with the genicular region and proximal extremity of the tibiae washed with ferruginous, the genicular lobes with several fuscous spots, tibial spines black tipped.

Length of body, 15 mm.; length of pronotum, 3; greatest (caudal) width of pronotal disk, 2.7; length of tegmen, 13.1; length of caudal femur, 8.7.

The type of this remarkable species is unique. It may require generic separation when more is known of the other species of *Sitalces*, but its affinity is most certainly with that genus.

Cocama tripunctata new species

Allied to *C. trivittata* Giglio-Tos, the type of the genus, having the general form similar, the proportions in the same ratio and the lateral lobes of the pronotum with pale callose areas, but differing in the striping being reduced to a blackish postocular line continued over the pronotum to the apices of the tegmina, in the lateral lobes having two instead of one yellow callose area and in a similar one being placed on the metapleura, in the frontal costa being broader at its junction with the fastigium, in the deep red of the greater portion of the caudal femora and in the green caudal tibiae and distal extremity of the femora.

Type.—♀; Pará, State of Pará, Brazil. (C. F. Baker.) [Acad. Nat. Sci. Phila., Type no. 5290.]

Size medium; form robust, subfusiform; surface of head, pronotum and pleura more or less rugulose, of abdomen, venter and caudal limbs smooth or sparsely punctate. Head with the exposed dorsal surface equal to about two-thirds the length of the dorsum of the pronotum; occiput arcuate inflated, moderately elevated dorsad of the pronotal disk, regularly arcuate declivent to the fastigium; interocular portion of the vertex narrow, no wider than the proximal section of the second antennal joint, faintly sulcate; fastigium subhorizontal, faintly declivent, moderately produced, trigonal in outline, as broad as long, very faintly impressed within its margins, very weakly and shallowly broad sulcate; fastigio-facial angle rounded when seen from the side, the cephalic section of the interantennal protuberance arcuato-truncate and ventrad regularly arcuate into the decidedly retreating and concave facial line; frontal costa between the antennae no wider than the proximal antennal joint, subequal in width, plane and sparse punctate, except immediately dorsad of ocellus where it is irregularly sulcate, briefly constricted ventrad of the ocellus and indicated to the clypeal suture, but the margins, which are subcarinate, are irregular and broken, this section irregular sulcate; genae with some irregular, low, strumose ridges and points; eyes prominent, moderately exserted when seen from the dorsum, hardly elevated above the dorsal line of the head when seen from the side, in basal outline elliptico-ovate, slightly flattened, in depth nearly half again that of the infra-ocular portion of the genae; antennae as long as the head and pronotum together, rather heavy, subdepressed. Pronotum subcylindrical, moderately enlarging caudad on the metazona, prozona subequal in width, weakly sellate when seen from the side, surface of prozona coarsely rugose impresso-punctate, on metazona closely and finely cribroso-punctate; cephalic width of pronotum no narrower than the caudal section of the head; cephalic margin of pronotal disk weakly arcuate with a very faint median sinuation, caudal margin of disk very broadly and bluntly obtuse-angulate, faintly

sinuate laterad of the rounded angle; median carina subobsolete, well indicated at cephalic margin; no lateral carinae, the disk broadly rounding into the lateral lobes; transverse sulci well marked, the caudal one deeply impressed, metazona one-half as long as the prozona; lateral lobes with the dorsal length slightly greater than the maximum depth of the same; cephalic margin moderately oblique, faintly sigmoid; ventro-cephalic angle rotundato-rectangulate; ventral margin with cephalic half strongly arcuato-emarginate, declivent cephalad, nearly straight; ventro-caudal angle obtusely rounded; caudal margin of lobes nearly vertical, straight; surface of lateral lobes bearing on ventral half two callose areas, one semi-elliptical and cephalad of the other, which is roughly circular. Tegmina slightly more than twice as long as the disk of the pronotum, acuminate, the venation finely and regularly patterned, the anal area appearing cribroso-punctate; costal margin with a distinct but not very high lobe at distal third, thence distad the same margin is straight, the tegmen narrowing to the narrowly rounded apex. Wings reaching to the extremities of the tegmina. Prosternal spine erect, acute, faintly recurved cephalad at the apex; interspace between the mesosternal lobes very faintly transverse, slightly narrower than one of the lobes; metasternal lobes subattingent caudad; metapleura with a nearly circular callose area proximad, similar in character to those on the lateral lobes. Abdomen moderately compressed, carinate dorsad; supra-anal plate slightly elongate trigonal, carinate and tectate distad, with a distinct medio-longitudinal impressed area proximad; cerci short, conical; ovipositor jaws slightly compressed, dorso-external margins of the dorsal valves crenulate, apices moderately curved. Cephalic and median limbs rather short. Caudal femora in length subequal to that of the pronotum and tegmina together, surpassing the apex of the abdomen by less than the length (cephalo-caudad) of the head, in form moderately robust, the greatest depth contained about three and one-half times in the greatest length of the same; dorsal carina rather finely serrulate, the distal extremity of the same with a small blunt tooth, external paginae regularly sculptured, apex of genicular lobes rounded acute-angulate; caudal tibiae slightly shorter than the femora, appreciably expanded distad, the lateral margins crenulato-carinate, most apparent distad, dorso-external margin armed with seven spines, the dorso-internal one with eight spines; caudal metatarsi slightly shorter than the third joint, second joint about five-eighths the length of the metatarsus.

General dorsal color ceru-olive, this being limited laterad by a pair of distinct but not wide fuscous lines, which extend from the dorso-caudal portion of the eyes across the pronotum, in the usual position of lateral carinae, and margining on the sutural side the humeral trunk of the tegmina to the apex. The head has the remainder of its surface ceru-olive to light yellowish olive, with the strumose points more olive-ocher. Pronotum and pleura, meso and metasternum and caudal femora garnet brown, the callose areas on the lateral lobes and pleura bright lemon yellow. Abdomen washed proximad with garnet brown, bronze brown distad, the ovipositor jaws sulphine yellow edged with blackish. Eyes olive-citrine with traces of fuscous; antennae dark russian green proximad, becoming blackish mesad and distad. Tegmina with marginal field bister, costal margin from the lobe distad broadly edged with fuscous. Caudal femora with genicular extremity dark russian green, the arches washed

with blackish and the lobes largely dark dull yellow-green: caudal tibiae dark dull yellow-green, the proximal portion washed with dark russian green, the spines black tipped: caudal tarsi dark dull yellow-green dorsad.

Length of body, 21 mm.; length of pronotum, 4.2; greatest (caudal) width of pronotal disk, 3.4; length of tegmen, 9.7; length of caudal femur, 13.

The type of this most striking species is unique.

Schistocerca desiliens Scudder

1899. *Schistocerca desiliens* Scudder, Proc. Amer. Acad. Arts and Sciences, xxxiv, pp. 443, 455. [Rio de Janeiro and Victoria, Brazil.]

Independencia, Parahyba. (Mann and Heath.) Three females.

This species is now known to range from Santarem and Pará, State of Pará, east to Independencia and Pernambuco, south to Rio de Janeiro, Brazil, and Asuncion, Paraguay, west to Chapadá, State of Matto Grosso, Brazil.

Schistocerca flavofasciata (DeGeer)

1773. *Acrydium flavo-fasciatum* DeGeer, Mém. Hist. Ins., iii, p. 489, pl. 40, fig. 8. [Surinam.]

1899. *Schistocerca aequalis* Scudder, Proc. Amer. Acad. Arts and Sciences, xxxiv, pp. 444, 458. [Demerara.]

Manaos, Amazonas. March, 1908. (H. B. Merrill.) One female. [Acad. Nat. Sci. Phila.]

Igarapé-Assu, Pará. (H. S. Parish.) One male. [Acad. Nat. Sci. Phila.]

As intimated by us some years ago,[63] the acquisition of Surinam material enables us to definitely associate Scudder's *aequalis* with the true *flavofasciata* (DeGeer). A female from Paramaribo, Surinam (K. Mayo; A. N. S. P.) fully agrees with DeGeer's description and figure, possessing the very broad pale costal border of the proximal section of the tegmina which is indicated in the original description. Scudder undoubtedly followed Stål's error in considering *flavofasciata* a purely Brazilian species, as Surinam is clearly given as the locality by DeGeer. In consequence Scudder naturally indicated the more strikingly, although narrowly, flavo-fasciate *fimbriata*[64] as DeGeer's species. Stål states that DeGeer's type was missing from the series before him. The unique type of Scudder's *aequalis* is now before us and it is identical with the Surinam specimen and other material now in our hands.

[63] Proc. U. S. Nat. Mus., xxxvi, p. 157 footnote, (1909).

[64] The present author will shortly discuss this name in detail elsewhere.

In coloration this species varies as much as all the others of this and the related *vaga-zapoteca* complexes of the genus. In addition there is a considerable degree of variation in the coloration of the proximal section of the marginal field of the tegmina. This may be broadly yellowish, may have this color weak along the costal margin or may have no yellow at all. In no case have we seen the yellow as brilliant, as clear and as strongly contrasted as in *fimbriata* (=*flavofasciata* of Stål and Scudder). Structurally this species differs from *fimbriata* in the distinctly greater width of the proximal portion of the marginal field of the tegmina and the broader cerci, which have their distal margin truncate or emarginate, instead of being of the tapering character of *fimbriata*.

Regarding the relationship of the eastern South American forms of this species complex, it seems that *desiliens* indicates a tendency toward the *vaga-vitticeps-zapoteca* complex, somewhat away from the *flavofasciata-fimbriata-infumata* group. However, this conclusion is based largely on the evidence of the extreme *desiliens* condition as found in material from extreme eastern Brazil, while these tendencies are not so decided in specimens from the Rio de Janeiro region. This statement is made chiefly on the basis of general coloration and not on genital characters, as there *desiliens* holds a peculiar position on account of the more tapering cerci. The importance of this feature is, however, not as great as one would imagine from Scudder's comment on the same; *fimbriata* approaches very close to *desiliens* in cereal form and a sufficient series from localities in southeastern Brazil will probably show the typical forms connected up in this feature. The relationship of *desiliens*, *fimbriata* and *infumata* as geographic races of the same species may be proven when sufficient material is in hand. Returning to the coloration, after due allowance has been made for the recessive and intensive features of the general color pattern, it would seem that the pattern is more truly phylogenetic in certain species of this and numerous related, considerably diversified genera, such as *Melanoplus, Dichroplus,* etc., than is usually supposed to be the case. To properly appreciate pattern, its fixed and transitory features in the scale of individual, dimorphic and environmental variation must be understood. When these are fully weighed and given their proper value we will probably find in color pattern clues as

valuable for affinities as those becoming evident in numerous groups of birds, when studied from that point of view.

The range of this species extends from British Guiana south to central Amazonia (Manaos), east to the eastern part of the State of Pará (Igarapé-Assu).

Schistocerca pallens (Thunberg)

1815. *G[ryllus] pallens* Thunberg, Mém. Acad. Imp. Sci. St. Pétersb., v, p. 237. [No locality.]

Peixe Boi, east of Pará, Pará. November to December, 1907. (H. B. Merrill.) One female.

Natal, Rio Grande do Norte. (W. M. Mann.) One male, two females.

These specimens have the tegmina more pantherine maculate than material of this species from the Greater Antilles and Mexico, in this respect resembling individuals from Barbados. The general size is less than in the other material seen.

The range of the species extends from eastern Mexico and the Greater Antilles, south to the Uruguay River and northern Argentina, east to Natal, Brazil, and west in South America to the eastern slopes of the Andes in Peru.

EXPLANATION OF PLATES

Plate XIV

Fig. 1.—*Pyragropsis emarginata* new species. Outline of pronotum, tegmina and wings of type, showing color pattern. (× 5)

Fig. 2.—*Anaplecta analisignata* new species. Venation and pattern of tegmen of type. (× 6)

Fig. 3.—*Anaplecta analisignata* new species. Anterior field of wing of type. (Greatly enlarged.)

Fig. 4.—*Ischnoptera amazonica* new species. Pronotal outline and pattern of type. (× 6)

Fig. 5.—*Ischnoptera amazonica* new species. Dorsal view of apex of abdomen of male (*type*). (Greatly enlarged.)

Fig. 6.—*Ischnoptera amazonica* new species. Outline of subgenital plate of male (*type*). (Greatly enlarged.)

Fig. 7.—*Ischnoptera amazonica* new species. Caudal aspect of apex of abdomen of male (*type*). (Greatly enlarged.)

Fig. 8.—*Ischnoptera amazonica* new species. Supra-anal plate of female (*allotype*). (Greatly enlarged.)

Fig. 9.—*Cariblatta personata* new species. Pattern of pronotum of type. (Greatly enlarged.)

Fig. 10.—*Cariblatta personata* new species. Supra-anal plate of type. (Greatly enlarged.)

Fig. 11.—*Dendroblatta sobrina* new genus and species. Head, pronotum, tegmen and wing of male (*type*). (× 2)

Fig. 12.—*Dendroblatta sobrina* new genus and species. Ventro-cephalic aspect of cephalic femur of type. (Greatly enlarged.)

Fig. 13.—*Dendroblatta sobrina* new genus and species. Ventral aspect of subgenital plate of male (*type*). (Greatly enlarged.)

Fig. 14.—*Dendroblatta sobrina* new genus and species. Dextral aspect of subgenital plate of male (*type*). (Greatly enlarged.)

Fig. 15.—*Eurycotis manni* new species. Dorsal outline of male (*type*). (Natural size.)

Fig. 16.—*Schistopeltis peculiaris* new genus and species. Dorsal view of head and pronotum of type. (× 2)

Fig. 17.—*Schistopeltis peculiaris* new genus and species. Venation of tegmen of type. (Natural size.)

Fig. 18.—*Chorisoneura polita* new species. Venation of tegmen and portion of wing of female (*type*). (× 5)

Fig. 19.—*Chorisoneura polita* new species. Outline of dorsum of head and pronotum of female (*type*). (× 6)

Fig. 20.—*Chorisoneura polita* new species. Subgenital plate of female (*type*). Plate slightly tilted to show more of supra-anal plate. (Greatly enlarged.)

Fig. 21.—*Chorisoneura albonervosa* new species. Ventral aspect of apex of abdomen of male (*type*). (Greatly enlarged.)

Fig. 22.—*Chorisoneura albonervosa* new species. Venation of tegmen of male (*type*). (× 1)

Plate XV

Fig. 23.—*Chorisoneura pulcherrima* new species. Outline of tegmen and portion of wing of female (*type*). (× 5)

Fig. 24.—*Chorisoneura pulcherrima* new species. Outline and pattern of pronotum of female (*type*). (Greatly enlarged.)

Fig. 25.—*Chorisoneura pulcherrima* new species. Subgenital plate of female (*type*). (Greatly enlarged.)

Fig. 26.—*Chorisoneura tessellata* new species. Venation of tegmen and portion of wing of male (*type*). (× 4)

Fig. 27.—*Chorisoneura tessellata* new species. Ventral aspect of apex of abdomen of male (*type*). (Greatly enlarged.)

Fig. 28.—*Chorisoneura lata* new species. Outline of portion of wing of male (*type*). (× 4)

Fig. 29.—*Chorisoneura lata* new species. Outline of pattern of pronotum of male (*type*). (× 6)

Fig. 30.—*Chorisoneura lata* new species. Ventral aspect of apex of abdomen of male (*type*). (Greatly enlarged.)

Fig. 31.—*Chorisoneura personata* new species. Venation of tegmen and portion of wing. (× 5)

Fig. 32.—*Metriomantis planicephala* new species. Cephalic aspect of head of female (*type*). (× 3)

Fig. 33.—*Metriomantis planicephala* new species. Dorsal aspect of pronotum of female (*type*). (× 3)

Fig. 34.—*Cardioptera minor* new species. Dorsal aspect of pronotum of female (*type*). (× 2)

Fig. 35.—*Cardioptera minor* new species. Median and caudal femora and tibiae of female (*type*). (× 2)

Fig. 36.—*Paurotarsus insolitus* new species. Lateral outline of head of female (*type*). (× 5)

Fig. 37.—*Paurotarsus insolitus* new species. Cephalic margin of pronotal disk of female (*type*). (Greatly enlarged.)

Fig. 38.—*Paurotarsus insolitus* new species. Caudal tarsus of female (*type*). (Greatly enlarged.)

Fig. 39.—*Copiocera prasina* new species. Dorsal view of fastigium of female (*type*). (× 5)

Fig. 40.—*Copiocera prasina* new species. Lateral outline of head of female (*type*). (× 3)

Fig. 41.—*Sitalces madeirensis* new species. Outline of tegmen and wing of female (*type*). (× 2)

Fig. 42.—*Nuciera elegantula* new species. Dorsal outline of fastigium of female (*type*). (× 5)

CONTRIBUTIONS TOWARD A MONOGRAPH OF THE MUTILLIDAE AND THEIR ALLIES OF AMERICA NORTH OF MEXICO

BY JAMES CHESTER BRADLEY

III. THE MUTILLIDAE OF THE EASTERN UNITED STATES

A Key to the Genera and Subgenera of Mutillidae known to occur in the Eastern United States

Males

1. Eyes deeply emarginate ..... (2)
   Eyes not deeply emarginate ..... (3)
2. Petiole short, transverse, nearly cylindrical, not at all sessile with the second; third to seventh dorsal segments with a median longitudinal keel.
   Ephuta Say
   Petiole enlarged at apex and sessile with the second segment, or nearly so; dorsal segments without or only the last one with a median keel.
   Mutilla Linnaeus, subgenus **Timulla** Ashmead
3. Head transversely quadrate, the postero-lateral angles carinate; petiole enlarged posteriorly and sessile with the second segment. Color entirely black . . **Pseudomethoca** Ashmead, subgenus **Pseudomethoca** Ashmead
   Head sometimes very long behind the eyes, but with the postero-lateral angles always rounded, never carinate ..... (4)
4. Mandibles robust and of peculiar shape, forming with the concave clypeus and labrum a basin,[1] usually they are truncate and tridentate, sometimes deflexed at apex and often with a deep notch on the inferior margin . . (5)
   Mandibles slender and of normal shape, never with an external notch . . (7)
5. Ocelli very small, the posterior removed from the anterior by more than the length of their longer diameter, and from the compound eyes by many times the same (diurnal species) ..... (6)
   Ocelli large, the posterior removed from the anterior by not more than the length of their longer diameter, and from the compound eyes by two or three times the same (noeturnal species); mesosternum armed with a ridge or process . . **Photopsis** Blake, subgenus **Odontophotopsis** Viereck
6. Mesosternum simple, unarmed.
   Sphaerophthalma Blake, subgenus **Sphaerophthalma** Blake
   Mesosternum armed with a pair of tubercles, carinae or peg-like processes.
   Sphaerophthalma Blake, subgenus **Photomorphus** Viereck

[1] There are many species in the western United States to which this characterization is not applicable.

7. Petiole not nodose, much widened toward the apex and sessile with the second segment, which is but little wider than the apex of the petiole; second ventral segment never carinate.

Pseudomethoca Ashmead, subgenus **Nomiaephagus** Ashmead

Petiole only slightly enlarged at apex, constricted before the base of the second segment and often strongly nodose, the second segment much wider than the apex of the petiole. If the latter is sessile, the second ventral segment is carinate..... (8)

8. Second ventral segment with a longitudinal keel surmounted by a crest of bristles.....**Dasymutilla** Ashmead, subgenus **Bruesia** Ashmead

Second ventral segment without a keel, but often with a pit filled with bristles.....**Dasymutilla** Ashmead, subgenus **Dasymutilla** Ashmead

Females

1. Petiole evenly and greatly enlarged toward the apex,[2] not at all constricted but perfectly sessile with the second segment, which is not or but little wider than its apex; front usually with a carina between the eyes and the bases of the antennae ..... (2)

Petiole constricted at its apex, which is not greatly, sometimes not at all larger than the base; the second segment greatly wider than the first; face rarely with a carina between the eyes and the bases of the antennae; if so the postero-lateral angles of the head are carinate, or the insects are large, densely yellow or scarlet and black tomentose..... (5)

2. Inferior angles of the temples with a sharp spine; postero-lateral angles of head carinate; head very large, decidedly wider than the thorax; antennae remote from one another at base; pygidium not defined.

Pseudomethoca Ashmead, subgenus **Pseudomethoca** Ashmead

Temples without a spine, sometimes with a posterior carina; postero-lateral angles of head unarmed..... (3)

3. Eyes small and round, their width over .85 of their length..... (4)

Eyes elongate, triangularly oval, their width under .7 of their length; the margin of the clypeus with a strongly arched median elevation, margined anteriorly and with median and two lateral teeth; front with a carina between the antennae and the eyes; mandibles without a third tooth within.....**Mutilla** Linnaeus, subgenus **Timulla** Ashmead

4. Front with a carina between the eyes and the antennae; the clypeus with a transverse depressed basin above its margin, or its surface flat and smooth; mandibles with a third tooth within.

Pseudomethoca Ashmead, subgenus **Nomiaephagus** Ashmead

Front devoid of carinae; mandibles without a third tooth within.

Photopsis Blake

5. A distinctly defined pygidial area present, either striate, granulate, or rugose ..... (7)

No definite pygidial area present..... (6)

[2] This character does not apply to certain species of *Photopsis* from the western United States.

6. First abdominal segment almost sessile with the second, distinctly widened toward the apex, and fully as long as wide at the apex, without pubescence except for a median apical tuft; antennae not quite touching one another at base. . . . . **Sphaerophthalma** Blake

First segment of the abdomen much smaller than the second, petioliform, not widened toward the apex, transversely quadrate, entirely white pubescent; antennae touching one another at base. . . . . **Ephuta** Say

7. Pygidium granulate or longitudinally striate, except sometimes at apex; mandibles without a third tooth within.

Dasymutilla Ashmead, subgenus **Dasymutilla** Ashmead

Pygidium rugulose; mandibles tridentate (often worn away).

Dasymutilla Ashmead, subgenus **Bruesia** Ashmead

Keys to the Species of Mutillidae known to occur in the Eastern United States

PSEUDOMETHOCA Ashmead

Subgenus **Pseudomethoca** Ashmead

Males and Females

Only one eastern species. **canadensis** (Blake)

Subgenus **Nomiaephagus** Ashmead

Males

1. Ground color entirely coal-black, pubescence black and white or partially fiery red. . . . . (2)

At least the second abdominal segment of an orange color; pubescence almost entirely black, with a slight admixture of yellowish. . . . . (3)

2. Each dorsal segment with an apical band of fiery red pubescence. **vanduzei** n. sp.

Pubescence white, with a slight admixture of black, no red. **geryon** (Fox)

3. Clypeus narrowly notched at apex, with a very prominent papilliform tooth on each side. . . . . **oceola** (Blake)

Clypeus shallowly emarginate, with a weak angle at each side. **sanbornii** (Cresson)

Females

1. Head wider than the thorax, as wide behind the eyes as its width measured from one extreme lateral extension of the eyes to the other; narrower diameter of the eyes equal to .6 of the width of the temples behind them. . . . . (2)

Head no wider than the thorax; narrower diameter of the eyes equal to the width of the temples behind them. . . . . (3)

2. Pygidium transversely rugulose; posterior face of the propodeum at right angles with the dorsal. . . . . **hippodamia** (Fox)

Pygidium longitudinally striate; posterior face of the propodeum at an obtuse angle to the dorsal ..... **simillima** (Smith)

3. Pygidium obliquely striated ..... **aetis** (Fox)
Pygidium finely rugulose ..... **montivaga** (Cresson)

DASYMUTILLA Ashmead

Subgenus **Bruesia** Ashmead

Males

The only eastern species of which the male is known is.... **bexar** (Blake)

Females

The only eastern species of which the female is known is... **harmonia** (Fox)

Subgenus **Dasymutilla** Ashmead

Males

1. Color entirely black, with white pubescence ..... **gibbosa** (Say)
Color not entirely black ..... (2)
2. Top of head, mesonotum, and scutellum with long, dense, scarlet or yellow pubescence ..... (3)
Top of head, mesonotum, and scutellum with short, sparser, black pubescence ..... (5)
3. First and second dorsal segments with rather dense black pubescence, remaining dorsal segments with dense, scarlet or yellow, long pubescence, except sometimes for a transverse band of black pubescence, occupying the fifth and parts of the fourth and sixth segments ..... (4)
Abdomen dorsally with moderately dense black pubescence, except on the apical half of the second segment where it is yellowish... **pyrrhus** (Fox)
4. Punctuation of second dorsal segment sparse medially, so that the segment is more or less shiny in that spot, ventrally the segment has rather even strong punctures ..... **occidentalis** (Linnaeus)
Punctuation of the second dorsal segment even throughout, ventrally the punctures are not so strong or regular as in *occidentalis;* segment three and the following usually with fulvous pubescence.
comanche (Blake)
5. Abdomen entirely red or yellowish, except the petiole... **obscura** (Blake)
Abdomen black, except for the second and sometimes the third segment (6)
6. Pubescence of second dorsal segment black throughout ..... (7)
Pubescence of second dorsal segment yellow or scarlet, at least in part (9)
7. Punctuation of first abdominal segment unusually coarse and irregular; propodeum coarsely reticulate ..... (8)
Punctuation of first dorsal segment and reticulation of propodeum more shallow and less coarse. (Aberrant individuals) ..... **castor** (Blake)
8. Entire second and third abdominal segments red; legs, petiole, and venter with erect white pubescence ..... **obscura** (Blake)
Third abdominal segment and usually the second ventral, black; legs, petiole, and venter with erect black pubescence..... **canella** (Blake)

9. Second dorsal segment with long, scarlet, sometimes yellowish, pubescence, except sometimes at base; petiole rugose, but slightly enlarged at apex, as seen from the sides neither gibbous nor strongly constricted from the second segment . . . . . **macra** (Cresson)

Second dorsal segment with short, sparse, usually orange hairs confined to the apical half, the others black . . . . . (10)

10. Petiole strongly nodose, and as seen from the side constricted before the second segment, closely and coarsely punctured **castor** (Blake)

Petiole shorter and broader, as seen from the side not nodose, scarcely constricted before the second segment, weakly and sparsely punctured. **lepeletierii** (Fox)

Petiole short and broad, moderately nodose, very coarsely punctured. **agenor** (Fox)

Females[3]

1. Lateral angles of the head prominent and carinate or tuberculate; pygidium striate . . . . . (2)

Lateral angles of the head rounded, neither carinate nor tuberculate . . (9)

2. Petiole transverse or quadrate, its posterior border almost truncate and grossly punctured, as seen from the side it is only slightly thickened posteriorly and distinctly constricted from the second; second dorsal segment medially sparsely punctate; hind angles of the head subrounded and not prominently tuberculate . . . . . **rugulosa** (Fox)

Petiole not quadrate, its posterior border strongly convex, without coarse sculpture, as seen from the side strongly elevated posteriorly and not appreciably constricted before the second segment; second dorsal uniformly closely punctured. . . . . (3)

3. Front with a delicate carina on each side extending from the base of the antenna to the eye; head including the eyes, wider than the thorax, its posterior margin nearly truncate, somewhat sinuous, its occipital face with a transverse flattened tubercle at each lateral angle; the thorax narrowed posteriorly; the caudal face of the propodeum sloping. **cariniceps** (Fox)

Front without carinae between the eyes and the antennae; head no wider, often narrower than the thorax, its posterior margin either strongly concave or nearly truncate, in which case it has an oblique tubercle at the angles; the caudal face of the propodeum almost at right angles to the dorsum . . . . . (4)

4. Lateral angles of the occiput with an oblique tubercle . . . . . (8)

Lateral angles of the occiput without an oblique tubercle . . . . . (5)

5. Margins of the head behind the eyes flaring outward to the very prominent angles, which are one-third farther apart than the least distance between the eyes; base of the propodeum marked by a carina and groove, sometimes more or less interrupted . . . . . (6)

[3] *Chlamydata* Melander, known only from Illinois, is omitted from this table as I have not seen a specimen.

Margins of the head converging posteriorly behind the eyes, the angles not prominent, not over one-eighth farther apart than the least distance between the eyes, sometimes less than this; propodeum not separated from the thorax proper ..... (7)

6. Propodeum with a transverse band of dense black pubescence; color claret-brown, with a fringe of silvery pubescence at the apex of each abdominal segment..... **rubicunda** n. sp.

Propodeum without a pubescent band; color mars orange, with two large mikado orange spots on the second dorsal segment; apex of the petiole not pubescent, of the second dorsal segment black pubescent, the following three segments entirely griseous..... **anguliceps** (Fox)

7. Margins of the head behind the eyes scarcely converging posteriorly, one-eighth wider than the least distance between the eyes; the posterior margin of the head shallowly convex; the extreme width of the head, including the eyes, equal to the width of the thorax **chattahoochei** n. sp.

Margins of the head behind the eyes strongly rounded inwards to the hind angles, slightly narrower than the least distance between the eyes; posterior margin of the head deeply concave; head slightly wider than the thorax..... **arenerronea** n. sp.

8. Color ferruginous (chestnut to Sanford's brown).
cypris (Blake), variety **cypris** (Blake)

Color rufo-piceous (between bay and black).
cypris (Blake), variety **miamensis** (Rohwer)

9. A sharp carina on each side between the eye and the base of the antenna; large tomentose species, scarlet or yellow and black, the abdomen scarlet or yellow above, with a transverse black band beyond the middle..... (10)

Front not carinate; smaller species, never densely tomentose and not colored as above..... (11)

10. Color bright scarlet (English red)..... **occidentalis** (Linnaeus)
Color yellow (raw sienna)..... **comanche** (Blake)

11. Pygidium evenly granulated..... **obscura** (Blake)
Pygidium longitudinally striate..... (12)

12. Carina on venter of petiole reduced to an acute, recurved, anterior tooth, totally wanting on the apical half of the petiole... **ferrugata** (Fabricius)

Carina on venter of petiole extending its entire length, usually with both an apical and basal production, neither acute nor recurved..... (13)

13. Head and thorax with conspicuous, appressed, red or yellowish pubescence; front more closely punctured than the cheeks; legs ordinarily black.
vesta (Cresson), race **zelia** Rohwer

Head and thorax without conspicuous, appressed pubescence; front sparsely punctured like the cheeks; legs red, rarely dark..... **sappho** (Fox)

SPHAEROPHTHALMA Blake

Subgenus **Sphaerophthalma** Blake

Males

Black with the second abdominal segment yellow, the petiole and head above sometimes slightly reddish.

pennsylvanica (Lepeletier), race **scaeva** Blake

Legs, apex of the first and second dorsal and all of the remaining abdominal segments black; otherwise dark red.

pennsylvanica (Lepeletier), race **pennsylvanica** (Lepeletier)

Females

Only the one species and race is recognized in this sex.

pennsylvanica (Lepeletier), race **pennsylvanica** (Lepeletier)

Subgenus **Photomorphus** Viereck

Males

1. Head quadrate, the vertex behind the eyes very elongate; mesosternum with a long peg-like process in front of each coxa. Entirely black. **banksi** n. sp.

   Head transverse, the vertex not elongate behind the eyes; posterior part of mesosternum unarmed ..... (2)

2. Mesosternal processes transverse blunt tubercles ..... (3)

   Mesosternal processes longitudinal denticulate carinae ..... **aloga** (Viereck)

3. Vertex closely punctured; front rugose; propodeum with a double median area at base; wings with a strong fuscous cloud in the region of the stigma; head, thorax, and petiole entirely red, otherwise black. **johnsoni** (Viereck)

   Vertex sparsely, front obsoletely, punctured, not rugose; propodeum without a median area; entirely black, except scutellum and spot on propodeum are reddish yellow ..... **rubroscutellata** n. sp.

Females

The female sex of this subgenus remains unknown.

PHOTOPSIS Blake

Females

The subgeneric position of the only species of this genus known from the Eastern States in the female sex is unknown ..... **myrmicoides** (Cockerell)

Subgenus **Odontophotopsis** Viereck

Males

Petiole strongly nodose, much constricted at apex; mesosternal processes are two transverse carinae ..... **paula** n. sp.

Petiole but slightly nodose, not much constricted at apex, mesosternum with two blunt, somewhat transverse, finger-like processes ..... **spinci** n. sp.

EPHUTA Say and **MUTILLA** Linnaeus, subgenus **TIMULLA** Ashmead

For keys to the species of these groups see the revisions of the North American species in the preceding pages.[4]

A List of the Species of Mutillidae Known to Occur in the Eastern United States, with Indication of Their Probable Sexual Equivalents[5]

We have now sufficiently extended and thorough collections of Mutillidae from the Eastern States, with the exception of Florida, to make tentative conclusions concerning the correlation of the sexes possible. These conclusions as expressed in the following table, are derived from a careful comparison of the distribution of the several species, their relative abundance, local abundance and association, etc. They fall short of being conclusive and I have therefore not amalgamated the names of the species, but I am confident that they will eventually prove to be in the main correct.

Males	Females
Pseudomethoca Ashmead	
(*Pseudomethoca*) Ashmead	
canadensis (Blake)	*canadensis* (Blake)
(*Nomiaephagus*) Ashmead	
geryon (Fox)	? *simillima* (Smith)
sanbornii (Cresson)	? *montivaga* (Cresson)
?	*actis* (Fox)
occola (Blake)	*hippodamia* (Fox)
vanduzei n. sp.	?
Dasymutilla Ashmead	
(*Bruesia*) Ashmead	
bexar (Blake)	*harmonia* (Fox)
(*Dasymutilla*) Ashmead	
occidentalis (Linnaeus)	*occidentalis* (Linnaeus)
comanche (Blake)	*comanche* (Blake)
pyrrhus (Fox)	?

[4] These Transactions, xlii, pp. 192 to 193, 202 to 205.

[5] *Psammotherma ajax* Blake, described from Florida, is supposed to be identical with *Psammotherma flabellata* Fabricius, and it is thought to have been incorrectly reported from North America.

agenor (Fox) . . . . . ? *anguliceps* (Fox)
gibbosa (Say) . . . . . *cariniceps* (Fox)
? . . . . . *chattahoochei* n. sp.
? . . . . . *rubicunda* n. sp.
? . . . . . *arenerronca* n. sp.
canella (Blake) . . . . . *rugulosa* (Fox)
castor (Blake) . . . . . *cypris* (Blake)
lepeletierii (Fox) . . . . . *ferrugata* (Fabricius)
macra (Cresson) . . . . . *resta* (Cresson), race *zella* Rohwer
? . . . . . *sappho* (Fox)
obscura (Blake) . . . . . [*scaevola* (Blake)]
? . . . . . *chlamydata* (Melander)

Sphaerophthalma Blake

(*Sphaerophthalma*) Blake

pennsylvanica (Lepeletier) { race *pennsylvanica* (Lepeletier) / race *scaeva* Blake } . . [*balteola* Blake]

(*Photomorphus*) Viereck

banksi n. sp. . . . . ?
aloga (Viereck) . . . . . ?
johnsoni (Viereck) . . . . . ?
rubroscutellata n. sp. . . . . ?

Photopsis Blake

? . . . . . *myrmicoides* (Cockerell)

(*Odontophotopsis*) Viereck

paula n. sp. . . . . ?
spinei n. sp. . . . . ?

Mutilla Linnaeus

(*Timulla*) Ashmead

briaxus (Blake) . . . . . *briaxus* (Blake) [=*dubitata* pars]
rufa Lepeletier . . . . . *rufa* Lepeletier [=*dubitata* pars]
hexagona (Say) . . . . . *hexagona* Say [=*dubitata* pars]
rufosignata Bradley . . . . . ?

promethea (Blake) . . . . . *promethea* (Blake)[=*dubitata* pars]

floridensis (Blake) . . . . . ?*euterpe* (Blake)
ornatipennis Bradley . . . . . *ornatipennis* Bradley

Ephuta Say

serupea Say . . . . . *puteola* (Blake) pars ?
pauxilla Bradley . . . . . *puteola* (Blake) pars ?
battlei Bradley . . . . . ?
slossonae (Fox) . . . . . ?

A Review of the Distribution and Synonymy of the Species of Mutillidae known to occur in the Eastern United States.

In the following review the synonymy is noted only where it differs from that given by Mr. Fox in his synopsis of the family.[6]

Pseudomethoca

Pseudomethoca (**Pseudomethoca**) **canadensis** Blake, ♂, ♀.

This is a common species of the Transition Zone. It ranges from the Canadian southward into the Carolinian and, at least sparingly, into the Austroriparian Zone. The species is known from Canada, is common in New England, New York, and the Coastal Plain south to Virginia. Farther south it seems to be very scarce. I have seen one specimen each from Georgia and Texas, and two each from North Carolina and Florida. Westward I have seen specimens from Nebraska and Missouri. The southern records are as follows:

North Carolina: Lake Toxaway, 1 specimen, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]; Black Mountains, July, 1 ♀, (Wm. Beutenmuller), [Amer. Mus. Nat. Hist.]. Georgia: Spring Creek, Decatur County, 1 ♀, (the author), [Cornell Univ.]. Florida: Biscayne Bay, 2 specimens, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]. Texas: 1 ♀, [Amer. Ent. Soc.].

Mr. Melander indicates that the species is common in Central Texas, but it certainly is not in Georgia, where I have collected Mutillidae over a considerable area.

Pseudomethoca (**Nomiaephagus**) **geryon** (Fox), ♂.

1899. *Mutilla geryon* Fox, Trans. Amer. Ent. Soc., 25: 225, ♂.
1903. *Mutilla henshawi* Melander, Trans. Amer. Ent. Soc., 29: 303, ♂.
1910. *Mutilla daeckei* Rohwer, Proc. Ent. Soc. Wash., 12: 49, ♂.

[6] Trans. Am. Ent. Soc., 1899, 25: 219 to 292.

Various individuals of this species from Falls Church, Virginia, show cell R_4 either wholly absent, partially enclosed, or totally enclosed by traces of veins, as in *Nomiacphagus*.

I have examined the type of *henshawi* Melander in the Museum of Comparative Zoology, and find it identical with this species. The posterior ocelli are not rudimentary, as stated in the description of *henshawi*, but in the type specimen are as large as the anterior one, concealed somewhat by an elevated portion of the vertex, their plane being raised almost to the vertical. As in the type of *henshawi*, the mandibles of many specimens are so worn as not to show three teeth, while in others the two inner ones are quite distinct.

I have not seen the type of *daeckei* Rohwer, but the only difference indicated in its description is in the amount of white pubescence on the abdomen. A series of specimens of *geryon* shows almost complete replacement of the white pubescence of the dorsal segments, including the apical fringes, by black, as described for *daeckei*.

It is possible that *geryon* is the male of *simillima*.

MASSACHUSETTS: Forest Hills, August 31, 1898, (Mr. S. Henshaw). [Mus. Comp. Zool.], and Woods Hole, August, 1900, (A. L. Melander), types of *henshawi*. NEW YORK: Sea Cliff, Long Island, August, (N. Banks), [N. Banks]. NEW JERSEY: Lucaston, August 27, 1905, and Bamber, September 1, 1905, (E. Daecke, types of *daeckei*), [U. S. Nat. Mus.]. DISTRICT OF COLUMBIA: Washington, September 6, (N. Banks), [N. Banks]. VIRGINIA: Falls Church, August 20, 21, 24, 27, 31, September 2, 9, (N. Banks), [N. Banks], September 11, 14, 1915, (George M. Greene), [G. M. Greene]. MISSOURI: St. Louis, August 28, 1876, [Amer. Ent. Soc.].

Type: Missouri, [American Entomological Society.]

Pseudomethoca (Nomiaephagus) occeola (Blake), ♂.

This seems to be a rare Lower Austral species. The Massachusetts records given by Melander probably apply to *sanbornii* or another species. It is probably the male of either *hippodamia* or *aetis*.

GEORGIA: Albany, September 1, 1910, 1 ♀, and Bainbridge, September 3 to 7, 1910, (the author), [Cornell Univ.]. FLORIDA: 1 ♂, [Amer. Ent. Soc.].

Pseudomethoca (Nomiaephagus) hippodamia (Fox), ♀.

A rare Austroriparian species, probably the female of the preceding.

GEORGIA: Bainbridge, September 3 to 7, 1910, (the author), [Cornell Univ.]. ALABAMA: 1 ♀, [Amer. Ent. Soc.]. LOUISIANA: Shreveport, 1 ♀, [N. Banks.]; 3 ♀, [Amer. Ent. Soc.].

Pseudomethoca (Nomiaephagus) aetis (Fox), ♀.

An Austroriparian species of considerable rarity.

NORTH CAROLINA: Southern Pines, April 20, 1906, 1 ♀, (S. W. Foster), [Cornell Univ.]; same, April 22, 1913, 1 ♀, (A. H. Manee). GEORGIA: Okefenokee Swamp, June, 1912, 2 ♀, (Cornell Univ. Exped.), [Cornell Univ.]; Spring Creek, Decatur County, June 7 to 23, 1911, (the author), [Cornell Univ.]. FLORIDA: Enterprise, March 30, May 10, [Amer. Mus. Nat. Hist.]; Lakeland, March 28, 1912; Hanover, March 10, 1 ♀; and 4 ♀ without other than state record, [Amer. Ent. Soc.].

Pseudomethoca (Nomiaephagus) montivaga (Cresson), ♀.

Occasional in the Transition and Carolinian zones.

NEW YORK: Amagansett, Long Island, August 10, 1912, 1 ♀, [Brooklyn Museum]; Sea Cliff, Long Island, September, 1 ♀, (N. Banks), [N. Banks]. NEW JERSEY: Andrews, May 13, (the author), [Cornell Univ.]. VIRGINIA: Glencarlyn and Falls Church, 9 ♀, (N. Banks and G. M. Greene), [N. Banks, G. M. Greene, and Cornell Univ.]. GEORGIA: Austell, August 27, 1910, (the author), [Cornell Univ.].

Pseudomethoca (Nomiaephagus) sanbornii (Blake), ♂.

This is probably the male of *montivaga* or *simillima*.

MASSACHUSETTS: [Amer. Ent. Soc.]. NEW JERSEY: [Amer. Ent. Soc.]. DISTRICT OF COLUMBIA: [Amer. Ent. Soc.]. VIRGINIA: Falls Church and Chain Bridge, 6 ♂, (N. Banks), [N. Banks]. GEORGIA: Okefenokee Swamp, June, 1912, 1 ♂, (Cornell Univ. Exped.), [Cornell Univ.]. ALABAMA: 3 ♂, [Amer. Ent. Soc.].

Pseudomethoca (Nomiaephagus) simillima (Smith), ♀.

A rather common Carolinian and Austroriparian species, probably the female of the preceding.

MASSACHUSETTS: Chicopee, 1 ♀, [Cornell Univ.]. NEW YORK: Central Park, Long Island, July, 1 ♀, [Brooklyn Mus.]; Promised Land, Long Island, June 1, 1913, 1, ♀, (G. P. Engelhardt), [G. P. Engelhardt]; Wyandanch, Long Island, May, 1 ♀. NEW JERSEY: Andrews, May 13, (the author), [Cornell Univ.]; Lakehurst, 1 ♀, [Brooklyn Mus.]; Wenonah, June 6, 1915, 2 ♀, (G. M. Greene), [G. M. Greene]. DISTRICT OF COLUMBIA: Washington, September 6, 1 ♀, (N. Banks), [N. Banks]. VIRGINIA: Falls Church, Glencarlyn, Great Falls, April 28 to September 12, 50 ♀ (N. Banks), [N. Banks]. NORTH CAROLINA: Southern Pines, March 10, 1909, 1 ♀, (A. H. Manee). GEORGIA: Clayton, June, 1909, 1 ♀, and Rabun County, July 1910, 3 ♀, (W. T. Davis), [W. T. Davis]; Tallulah Falls, June 19 to 25, 1909, 1 ♀ (the author), [Cornell Univ.]; Austell, Aug. 27, 1910, 1 ♀, (the author), [Cornell Univ.]; Spring Creek, Decatur County, June 7 to 23, 1911, 1 ♀, (the author), [Cornell Univ.]. FLORIDA: 5 ♀, [Amer. Ent. Soc.]; Ormond, 1 ♀, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson].

Pseudomethoca (Nomiaephagus) vanduzei n. sp.

♂. Entirely coal-black, with short and sparse white pubescence, this brownish on the front, vertex, and dorsum; the second and all following dorsal segments with close, erect, and at the apex very dense, decumbent, flame-scarlet pubescence; wings deeply fuscous. Length, 14 mm.

Vertex sparsely, front rugosely, punctured, the latter obscured by vestiture; clypeus short, broad, polished, hairy, the anterior margin produced medially into a broad, short, bisinuate lobe, the sides of which are thickened; mandibles bidentate at apex, a carina from the inner tooth to the condyle; maxillary palpi compressed. Anterior surface of the scape concave, bicarinate; third segment subquadrate, shorter than the fourth.

Thorax anteriorly rounded, no line between the anterior and dorsal faces of the pronotum, the humeri entirely rounded; dorsum rather closely, somewhat irregularly punctate; mesopleura prominent, punctate; metapleura sunken, impunctate, polished; propodeum rather coarsely reticulate, with two elongate basal areas. The cell R_4 closed by a color line.

Abdomen slender, the first segment widened at apex and entirely sessile with the second, which widens comparatively little toward the apex; petiole without a noticeable ventral carina or tooth, sparsely, its disc not at all, punctate; second segment sparsely punctate; no pygidial area.

Type.—Clearwater, Florida, April 29, 1908, (E. P. VanDuzee), [American Museum of Natural History].

I take pleasure in dedicating this species to its collector, my good friend, Mr. E. P. VanDuzee. Its brilliant scarlet pubescence and shiny black ground color lend it a magnificence that is scarcely approached by any other North American mutillid, and readily distinguish it from any known species.

Despite its bidentate mandibles there can be no doubt, from its other characters, of this being a true *Nomiaephagus*, not distantly removed from such species as *aegeon* Fox.

Dasymutilla

Dasymutilla (Bruesia) harmonia (Fox), ♀.

An always scarce species of the Carolinian and Austroriparian zones.

New Jersey: Lakehurst, 1 ♀. Pennsylvania. Virginia: Falls Church and Great Falls, May 30 to September 12, 8 ♀, (N. Banks), [N. Banks]. North Carolina: Hot Springs, 1 ♀, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]. Georgia: Okefenokee Swamp, June, 1912, 2 ♀, (Cornell Univ. Exp.), [Cornell Univ.]; Spring Creek, Decatur County, June 7 to 23, 1911, 1 ♀, (the author), [Cornell Univ.]. Florida: Fort Myers, 1 ♀, and Punta Gorda, November 13, 1911, 1 ♀, (W. T. Davis), [W. T. Davis]; Atlantic Beach, 1 ♀, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]; Belleair, 1 ♀, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson.].

The male of this species is pretty certainly *bexar*. Mr. S. A. Rohwer[7] has described the supposed male, basing his conclusion upon the fact that he had received a male and a female pinned together. I have examined these specimens, and while the female is a true *harmonia*, the male is a *castor*. The collector from whom Mr. Rohwer received his specimens, while a close and careful observer, is accustomed at times to pin females with males which he suspects of belonging to each other, even though he has not actually found them in copulation, as I have learned in connection with specimens received from him. In this connection it should be noted that the males of *castor* have tridentate mandibles unless they are too much worn to display the three teeth.

Dasymutilla (Bruesia) bexar (Blake), ♂.

Equivalent in distribution and scarcity to the preceding, of which it is doubtless the male.

Virginia: Falls Church, September 14, 1915, 1 ♂, (G. M. Greene), [G. M. Greene]; Falls Church, July 21 and August 30, 4 ♂, Glencarlyn, July 26, 1 ♂, (N. Banks), [N. Banks]. Georgia: Billy's Island, Okefenokee Swamp, June, 1912, 2 ♂, (Cornell Univ. Exp.), [Cornell Univ.]. Florida: Marco, 1 ♂, (W. T. Davis), [W. T. Davis].

Dasymutilla (Dasymutilla) occidentalis (Linnaeus).

This is a very common species of the Carolinian and Austroriparian zones from Long Island to Florida and southwestward. The following is probably only a variety.

Dasymutilla (Dasymutilla) comanche (Blake).

This is probably a variety of the preceding, occurring with it in the extreme southern part of its range.

Dasymutilla (Dasymutilla) pyrrhus (Fox), ♂.

A rare species known only from central and more especially subtropical Florida.

Florida: Tampa, May 2, 1908, 1 ♂, (E. P. VanDuzee), [Cornell Univ.]; Long Boat Key near Sarasota, August 14, 1910, 1 ♂, (the author), [Cornell Univ.]; La Belle, April 27, 1912, 1 ♂, (W. T. Davis); Gulfport, (Reynolds), [N. Banks]; Clearwater, May 1, 1908, 1 ♂, (E. P. VanDuzee) and Indian River, 1 ♂, [Amer. Mus. Nat. Hist.]; Enterprise, May 11, [Amer. Ent. Soc.].

Dasymutilla (Dasymutilla) gibbosa (Say), ♂.

Massachusetts: Springfield, 1 ♂, [Amer. Ent. Soc.]. Connecticut. New York: Ithaca, July 27, 1886, 1 ♂, [Cornell Univ.]; Sea Cliff, Long Island,

[7] Proc. U. S. Nat. Mus., 1912, 41: 455.

July 23, 1874, 1 ♂, (H. F. Bassett), [Amer. Ent. Soc.]. ILLINOIS: [Amer. Ent. Soc.].

This is not a common species. It seems to belong to the Transition region, extending slightly into the Carolinian. It is one of the few Mutillidae occurring around Ithaca, New York, and is absent from the very extensive collections made by Mr. Banks at Falls Church and elsewhere in Virginia. The same distribution holds for *cariniceps*, which also occurs at Ithaca and is apparently absent from Falls Church. This parallelism in distribution applying to these two species, and to no others closely related, leads me to suspect that they are the opposite sexes of one species.

Fox's record "Texas" is based on a misidentification. The specimen on which the record was based is in the collection of the American Entomological Society, and has its mandibles deeply notched externally. It does not belong to his group *occidentalis*. A single specimen from "Mexico" in the same collection appears to be a true *gibbosa*, and therefore Texas may eventually be included in the range of the species. A specimen referred to by Melander from "Pennsylvania" in the Museum of Comparative Zoology is certainly not this species, as my notes show that the clypeus is flat, not distinctly punctured, medially polished, its apex neither thickened nor emarginate. Until I can again see the specimen, I cannot state what it is.

Dasymutilla (Dasymutilla) cariniceps (Fox), ♀.

1912. *Dasymutilla scrobinata* Rohwer, Proc. U. S. Nat. Mus., 41: 462, ♀.

MASSACHUSETTS: Great Barrington, July 24, 1910, 1 ♀, (G. P. Engelhardt), [G. P. Engelhardt]. CONNECTICUT: (type of *scrobinata*). NEW YORK: Ithaca, June 23, 1908, 1 ♀, August 7, 1889, 1 ♀, (N. Banks), [Cornell Univ.]; Ithaca, 2 ♀, (N. Banks), [N. Banks]; Sea Cliff, Long Island, 1 ♀, (N. Banks), [N. Banks]. PENNSYLVANIA: Delaware Water Gap, 1 ♀, (Mrs. A. T. Slosson). NEW JERSEY. ILLINOIS: (*scrobinata*).

As indicated above, this is probably the female of *gibbosa*. I have examined the type of *scrobinata* Rohwer, and find that it belongs to this species.

Dasymutilla (Dasymutilla) anguliceps (Fox), ♀.

This species is still known only from the unique type from Illinois.

Dasymutilla (Dasymutilla) agenor (Fox), ♂.

Illinois: type in the collection of the American Entomological Society. Possibly the male of the preceding.

Dasymutilla (Dasymutilla) chattahoochei n. sp.

♀. Mahogany red; flagellum, tips of the segments of the legs, base and apex of the second dorsal segment, and all the following segments infuscated; head, dorsum, and second dorsal segment with sparse, erect and appressed, black pubescence, the latter also with appressed yellow pubescence; remaining segments and apex of the second covered with sparse silvery pubescence, interrupted medially on the second by dense black pubescence.

Head seen from above and in front with the sides convex, the widest part broadly interrupted by the prominent eyes, behind which the sides converge to the sharp but nevertheless obtuse hind angles; posterior border shallowly concave; the carinate hind angles removed from the eyes by one-half the long diameter of the latter (.58 mm.); front closely, vertex and genae sparsely, punctate. First segment of the flagellum longer than the second, but distinctly shorter than the two following united.

Width of head including the eyes, 1.9 mm., at the hind angles, 1.37 mm., of the thorax, 1.73 mm.; length of the dorsum, 2.45 mm., to the scutellar scale, 2.01 mm. Thorax with convex margins, slightly tapered posteriorly, humeral angles moderately sharp; caudal face of propodeum vertical only at apex, broadly rounded into the dorsal, its surface rasped.

Petiole short, widened posteriorly, its basal angles strongly dentate, seen from the side it is much elevated posteriorly, not constricted before the second segment, that segment very long and comparatively slender, 2.98 mm. long by 2.3 mm. wide at the widest point, which is well toward the apex, the petiole 1 mm. long; petiole with a thin, translucent, median, ventral keel, not toothed; pygidium strongly longitudinally striate, the edges not reflexed.

Type material.—Holotype: Bainbridge, Georgia, July 15 to 27, 1909, (the author), [Cornell University, No. 114.1]; two paratopotypes: June 2, 1911 and September 3 to 7, 1910, (the author), [Cornell Univ.]; six paratypes: Spring Creek, Decatur County, Georgia, June 7 to 23, 1911, (the author), and June 16 to 29, 1912, (Cornell University Expedition); one paratype: Southern Pines, North Carolina, June 14, 1911, (A. H. Manee), [Cornell Univ.].

Dasymutilla (Dasymutilla) arenerronea n. sp.

♀. Color chestnut, the apical portion of the second dorsal segment orange-rufous; pubescence inconspicuous and sparse; the second dorsal segment with decumbent black hairs, over the orange spot with yellow hairs; the apical segment rather densely covered with yellowish pubescence. Length, 6 mm.

Head transverse, strongly narrowed behind the eyes, convex in front and strongly concave behind, the lateral angles sharp, rectangular, subcarinate;

eyes prominently gibbous, intersecting near their bases the outline of the head as seen from above or in front; vertex sparsely, forehead more closely but not coarsely, punctate; no carinae between the eyes and the antennae. Third antennal segment shorter than the fourth and fifth united.

Thorax slender, narrowed posteriorly, slightly contracted at the spiracles, the humeral angles not sharp; caudal face of the propodeum vertical, rounded above and laterally into the thorax.

Petiole with a thin carina beneath; second segment long and tapered at base; pygidium striate.

Type material.—Holotype: St. Petersburg, Florida, August 12, 1910, (the author), [Cornell Univ. No. 11541]; paratype: Cedar Keys, Florida, June 4, [American Entomological Society].

Dasymutilla (Dasymutilla) rubicunda n. sp.

♀. Claret brown, the legs and antennae black; a transverse band of black pubescence at the tip of the dorsum; petiole, second, third, fourth, and fifth segments with an apical band of silvery pubescence, interrupted medially on the second dorsal; this segment with a medial covering of appressed black hairs, replaced by white at the sides; elsewhere the pubescence is sparse and inconspicuous.

Seen from above the sides of the head are straight, parallel, broadly interrupted by the very prominent bead-like eyes, behind which they do not converge, but meet the somewhat concaved posterior border at an acute angle; these angles sub-alate, removed from the eyes by one-half (.11 mm.) the longer diameter of the latter (.21 mm.); head on the front and vertex strongly closely punctate, beneath the eyes sparsely but coarsely punctate; front without carinae between the antennae and the eyes. Scape coarsely punctate; first segment of the flagellum long, slightly exceeding the following two taken together.

Width of the head including the eyes, 2.45 mm., at the hind angles 2.04 mm., of the thorax, 2.59 mm. (this just behind the tegulae). Length of the dorsum, 3.6 mm., to the scutellar scale 2.88 mm.; the sides convex, slightly narrowed behind, the humeral angles fairly sharp; caudal surface vertical but broadly rounded into the dorsal.

Petiole as seen from above widened posteriorly, from the side strongly elevated posteriorly, not much constricted before the second, greatly smaller than the base of the same, its ventral carina weak with a rounded anterior lobe; second dorsal closely punctate; pygidium evenly and strongly longitudinally striate, its margins reflexed.

Type.—Gulfport, Florida, June, (Reynolds). Collection of Nathan Banks.

Dasymutilla (Dasymutilla) rugulosa (Fox), ♀.

? 1903. *Mutilla infensa* Melander and Brues, Biol. Bull., p. 24, ♀.

So far as collections or my experience show this is a rare species of restricted distribution within the northern limits of the Caro-

linian zone. Fox states that it is not uncommon in southern New Jersey. Venturing a guess, from distribution and elimination, it may be the male of *canella*. Melander definitely unites it with *canella* but without stating his reasons.

Massachusetts: Woods Hole. New York: Sea Cliff, Long Island, July, 3 ♀, (N. Banks), [N. Banks]. New Jersey: Westville, August 30, 1 ♀, (the author), [Cornell Univ.]; Clifton, August 11, 1912, 1 ♀, (G. M. Greene), [G. M. Greene].

Dasymutilla (Dasymutilla) canella (Blake), ♂.

Pennsylvania: Philadelphia, July, 1912, 2 ♂, (Carl Ilg), [Cornell Univ.]. New Jersey: Westville, June 13, 1901, (H. L. Viereck), [Amer. Ent. Soc.]; Gloucester County, 1 ♂, [Amer. Ent. Soc.]. Texas: 1 ♂. Nebraska: 1 ♂.

Dasymutilla (Dasymutilla) cypris (Blake), ♀.

1871. *Mutilla (Sphaerophthalma) mutata* Blake, Trans. Amer. Ent. Soc., 3: 247, ♀.

1912. *Dasymutilla mutata miamensis* Rohwer, Proc. U. S. Nat. Mus., 41: 462, ♀.

1912. *Dasymutilla allardi Rohwer*, Proc. U. S. Nat. Mus., 41: 463, ♀.

This is one of the most common eastern species in the Carolinian and Austroriparian zones from Massachusetts to Florida. It is known to extend westward to Colorado. It varies greatly in both color and size. Some specimens from southern Georgia and Florida are of a rufo-piceous color, with or without indistinct pale spots on the second dorsal segment, and with very dark or almost black legs. To these Mr. S. A. Rohwer has given the varietal name *miamensis*.

The presence of four orange spots on the second dorsal segment is a prevailing characteristic of this species, but they sometimes are reduced to two, or altogether wanting.

Dasymutilla allardi Rohwer, of which I have examined the type, can hardly be looked upon as other than an individual variation of this common and variable species. It differs from the usual form in having the hook on the under side of the petiole slightly notched at tip, although confined to the anterior part of the segment and otherwise as in typical *cypris*.

Dasymutilla (Dasymutilla) castor (Blake), ♂.

1912. *Pycnomutilla harmonia* Rohwer, Proc. U. S. Nat. Mus., 41: 455, ♂.

This is the most common species known in the male sex in the eastern United States, inhabiting the Carolinian and Austrori-

parian zones from Massachusetts to southern Florida. Westward it is known to Illinois, Oklahoma and Texas. I suspect that there are two or even three closely allied species included under the name *castor*, and hope to determine this point at a later date. *Castor* is most probably the male of *eypris* and may also include the male of *sappho*.

Dasymutilla (Dasymutilla) ferrugata (Fabricius), ♀.

1910. *Mutilla viereckі* Rohwer, Proc. Ent. Soc. Wash., 12: 49, ♀.
1912. *Dasymutilla ferrugata* var. *ballabeti* Rohwer, Proc. U. S. Nat. Mus., 41: 456, ♀.
1912. *Dasymutilla georgiana* Rohwer, Proc. U. S. Nat. Mus., 41: 456, ♀.
1912. *Dasymutilla plesia* Rohwer, Proc. U. S. Nat. Mus., 41: 456, ♀.

A common species of the Carolinian and Austroriparian zones from Massachusetts to southern Florida, westward to Nebraska and Arizona.

I have examined a large series from the eastern coastal states from Long Island to Florida, and find a surprising amount of variation in size, color, and structure. No line can be drawn between these, although the extremes are very different. Some individuals from Florida are so large and densely pubescent as to suggest *occidentalis* in appearance, and in these the eyes are less strongly gibbous, and the width of the thorax is from .17 to .30 in excess of the extreme width of the head, including the eyes. There is a more or less gradual increase in the prominence of the eyes, until the extreme represented by *georgiana* Rohwer is reached. There is great but gradual reduction in general size, and the reduction is not paralleled with an equal reduction in the size of the head, so that we find the smaller individuals with the thorax no wider than the head, eyes included, and this proportion ranging to an excess of .3, as shown in the following measurements of 33 specimens, given in millimeters.

Width of head including eyes.	Width of thorax.	Approx. excess of latter.	Width of head including eyes.	Width of thorax	Approx. excess of latter.
3.24	4.18	.3	2.23	2.45	.09
3.00	4.	.3	2.23	2.45	.09
3.00	4.	.3	2.30	2.52	.09
3.00	3.96	.29	2.27	2.37	.05
2.95	3.75	.27	1.87	1.94	.04
3.02	3.6	.19	2.08	2.08	.0

Width of head including eyes.	Width of thorax.	Approx. excess of latter.	Width of head including eyes.	Width of thorax.	Approx. excess of latter.
2.67	3.16	.19	2.08	2.08	.0
2.81	3.31	.18	2.01	2.01	.0
2.74	3.24	.18	2.05	2.01	−.02
2.70	3.24	.18	1.91	1.87	−.02
2.37	2.81	.18	2.01	1.94	−.03
2.50	2.88	.18	1.94	1.87	−.03
2.74	3.16	.16	1.87	1.80	−.04
2.67	3.09	.16	1.87	1.80	−.04
2.37	2.74	.15	1.87	1.80	−.04
2.81	3.16	.13	1.94	1.84	−.05
2.30	2.60	.13			

The male of this species is probably *lepeletierii*. Southern specimens often have the legs red, or partially so, and such have been designated by Mr. S. A. Rohwer variety *balabetei*. I have examined the types of *vicrecki*, *georgiana* and *plesia*.

Dasymutilla (Dasymutilla) lepeletierii (Fox), ♂.

1912. *Pycnomutilla harmoniiformis* Rohwer, Proc. U. S. Nat. Mus., 41: 455, ♂.

This is probably the male of *ferrugata* and is definitely united with it by Mr. Melander, who does not state his reasons.

New York: Yaphank, Long Island, July 4, 1 ♂; Wading River, Long Island, 1 ♂, [Brooklyn Museum]. New Jersey: Lakehurst, [Brooklyn Museum]; Ocean County, 3 ♂, [Amer. Ent. Soc.]; Jamesburg, July 2, 2 ♂, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]. Pennsylvania. Maryland: Bay Ridge, 1 ♂, (N. Banks), [N. Banks]. North Carolina: Nance, June 16, 1906, (S. W. Foster), [Cornell Univ.]. Georgia: Billy's Island, Okefenokee Swamp, June, July, 1912, 3 ♂, (Cornell Univ. Exped.), [Cornell Univ.]; Bainbridge, July 15 to 27, 1909 (the author), [Cornell Univ.]; Spring Creek, Decatur County, July 16 to 29, 1912, 4 ♂, (Cornell Univ. Exped.), [Cornell Univ.]. Florida: Apalachicola, July 21 to 23, 1909, 2 ♂, (the author), [Cornell Univ.]; Lanark, July 20, 1909, 1 ♂, (the author), [Cornell Univ.].

It is an interesting fact that neither *ferrugata* nor *lepeletierii* are represented in the extensive collection of Mutillidae made by Mr. Nathan Banks at East Falls Church, Virginia, although each are represented by a single specimen caught in neighboring localities.

Dasymutilla (Dasymutilla) vesta Cresson, race **zella** Rohwer, ♀.

1910. *Mutilla zella* Rohwer, Proc. Ent. Soc. Wash., 12: 50, ♀.

1912. *Dasymutilla ferrugatella* Rohwer, Proc. U. S. Nat. Mus., 41: 458, ♀.

1912. *Dasymutilla coloradella virginica* Rohwer, Proc. U. S. Nat. Mus., 41: 459, ♀.
1912. *Dasymutilla segregata segregata* Rohwer, Proc. U. S. Nat. Mus., 41: 459, ♀.
1912. *Dasymutilla segregata finni* Rohwer, Proc. U. S. Nat. Mus., 41: 459, ♀.
1912. *Dasymutilla champlaini* Rohwer, Proc. U. S. Nat. Mus., 41: 461, ♀.
1912. *Dasymutilla carolina* Rohwer, Proc. U. S. Nat. Mus., 41: 462, ♀.

The eastern specimens of *vesta* differ from the western ones by being much less pubescent and lacking the upright sparse white hairs. As this difference is apparently a constant geographical one, it may be recognized as an eastern race, under the name *zella* bestowed upon it by Mr. Rohwer.

The species is very variable in the form of its petiolar carina. Typically this is bidentate, but the posterior tooth may be reduced or wanting, thus approaching the condition found in *ferrugata*. There is, however, in *vesta* almost always a remnant of the carina on the posterior part of the petiole, wanting in *ferrugata*, and the anterior tooth while of a somewhat variable shape, is not a definitely shaped, acute, recurved tooth as in *ferrugata*.

I have examined the types of the seven species and varieties listed above, and find them all variations of *vesta*. *Carolina* is based on a single specimen with abbreviated striation of the pygidium, but I can only look upon it as abnormal in this respect.

The species is rather common in the Carolinan and Austroriparian zones from Massachusetts and eastern New York to Georgia. In South Georgia and Florida it is largely, if not entirely, replaced by the very closely allied *sappho*, which may indeed be only a race.

As suggested by Fox, *vesta* is probably the female of *macra*. Both, especially the male, were represented in greater numbers than I would have expected in the collections made by Mr. Banks in eastern Virginia.

Mutilla (Dasymutilla) macra (Cresson), ♂.

New York: Amagansett, Long Island, August 10, 1912, 1 ♂, [Brooklyn Museum]; Sea Cliff, July, 1 ♂, (N. Banks), [N. Banks]. New Jersey. Maryland: Great Falls, July 13, 1 ♂, (N. Banks), [N. Banks]. Virginia: Glencarlyn and Falls Church, July 12, to September 14, 22 ♂, (N. Banks and G. M. Greene), [collections of same.]. North Carolina: Southern Pines,

August 9, 1911, 1 ♂, (A. H. Manee), [Cornell Univ.]. GEORGIA: Toccoa, August 15, 1 ♂, (the author), [Cornell Univ.]; Atlanta, July 6, 1909, 1 ♂, (the author), [Cornell Univ.]; Spring Creek, Decatur County, July 16 to 29, 1912, 1 ♂, (Cornell Univ. Exped.), [Cornell Univ.]. ILLINOIS: Algonquin, 4 ♂, [Amer. Ent. Soc.].

Dasymutilla (Dasymutilla) sappho (Fox), ♀.

This species is a close ally, if not indeed a race, of *vesta*, replacing it in southern Georgia and Florida. The male is unknown, but may be involved in *castor*.

GEORGIA: Unadilla, June 25, 1910, 1 ♀, (the author), [Cornell Univ.]; St. Simon's Island, April 22 to May 12, June 3, 3 ♀, (the author), [Cornell Univ.]; Cumberland Island, April 29, 2 ♀, (the author), [Cornell Univ.]; Bainbridge, June, 1911, and Spring Creek, Decatur County, 7 ♀, (the author), [Cornell Univ.]. FLORIDA: Marco, April 18, 1912, 2 ♀, (W. T. Davis); Ft. Myers, March 31, 1912, 2 ♀, (W. T. Davis); Lakeland, August 16, 1910, 1 ♀, (the author), [Cornell Univ.]; Lakeland, 1 ♀, and Marco, 1 ♀, (W. T. Davis), [W. T. Davis]; Punta Gorda, November 14, 1911; Sanford, April 30, 1908, 1 ♀, (E. P. Van Duzee), [Amer. Mus. Nat. Hist.]; Indian River, 2 ♀, [Amer. Mus. Nat. Hist.]; Capron and Lake Worth, [Amer. Ent. Soc.]; Biscayne Bay, Lake Worth, 5 ♀, (Mrs. A. T. Slosson), [Mrs. A. T. Slosson]. LOUISIANA: New Orleans, August 6, 1915, 1 ♀, (Rehn and Hebard), [G. M. Greene].

Dasymutilla (Dasymutilla) obscura (Blake), ♂, ♀.

1871. *Mutilla (Sphaerophthalma) scaevola* Blake, Trans. Amer. Ent. Soc. 3:247, ♀.

I associate *scaevola* with *obscura* on the authority of Mr. Melander, who states that the Rev. Mr. Birkmann has been able to definitely associate them as sexes of one form. Eastern specimens of the female differ from the western ones in the absence of the sparse upright white and reddish pubescence, and by having darker colored legs. The female recorded by Mr. Melander from Massachusetts, in the Museum of Comparative Zoology, proves to be a specimen of *cypris*.

So far as the eastern states are concerned the species is confined, so far as known, to the Carolinan Zone, from Long Island to the mountains of northern Georgia, and is scarce.

Males. VIRGINIA: Falls Church and Great Falls, July 6 to August 2, 16 ♂, (N. Banks), [N. Banks]. NORTH CAROLINA: 1 ♂, [Amer. Ent. Soc.]. KENTUCKY: 1 ♂, [Amer. Ent. Soc.]. GEORGIA: Tallulah Falls, Rabun County, June 19 to 25, 1909, 2 ♂, (the author), [Cornell Univ.].

Females. NEW YORK: Greenport, Long Island, August 3, 1915, 1 ♀, (G. P. Engelhardt), [G. P. Engelhardt]; Wading River, Long Island, 1 ♀, [Brooklyn Museum]. VIRGINIA: Falls Church, Great Falls and Glencarlyn, July 8 to September 11, 11 ♀, (N. Banks & G. M. Greene), [collections of the same].

GEORGIA: Clayton, Rabun County, July, 1910, 3 ♀, (W. T. Davis); and Rabun County, June, 1909, 1 ♀, (W. T. Davis), [W. T. Davis and Cornell Univ.].

Dasymutilla (**Dasymutilia**) **chlamydata** Melander, ♀.

1903. *Mutilla chlamydata* Melander, Trans. Amer. Ent. Soc., 29: 299. ♀.

This species, described from Illinois, is unknown to me.

Sphaerophthalma Blake

Sphaerophthalma (**Sphaerophthalma**) **pennsylvanica** Lepeletier, ♂, ♀.

1871. *Mutilla* (*Sphaerophthalma*) *scaeva* Blake, Trans. Amer. Ent. Soc., 3: 232, ♂.

1871. *Mutilla* (*Sphaerophthalma*) *bilbaia* Blake, Trans. Amer. Ent. Soc., 3: 248, ♀.

I see no reason for treating *scaeva* as other than a northern black form of *pennsylvanica*, which occurs in the extreme south, and like so many southern Hymenoptera, has its black colors largely replaced by red. *Bilbaia* is unrecognized by the female, and in that sex there is no recognizable difference between the northern and southern forms.

Males. Race *pennsylvanica*. NORTH CAROLINA: 1 ♂, [Amer. Ent. Soc.]. GEORGIA: Rabun County, July, 1910, 1 ♂, (W. T. Davis), [W. T. Davis]; Spring Creek, Decatur County, July 16 to 29, 1912, and Billy's Island, Okefenokee Swamp, June, 1912, 3 ♂, (Cornell Univ. Exp.), [Cornell Univ.]. FLORIDA: Crescent City, April 23, 1908, 1 ♂, (E. P. VanDuzee), [Amer. Mus. Nat. Hist.]; 2 ♂, [Amer. Ent. Soc.]. TEXAS.

Males. Race *scaeva*. PENNSYLVANIA: Rockville, July 5, 1915, 1 ♂, (G. M. Greene), [G. M. Greene]; 2 ♂, [Amer. Ent. Soc.]. VIRGINIA: Falls Church, Great Falls, Glencarlyn, June 27 to September 7, 30 ♂, (N. Banks), [N. Banks and Cornell Univ.].

Females. PENNSYLVANIA: Philadelphia, June 18, 1 ♀, [Amer. Ent. Soc.]. VIRGINIA: Falls Church, 5 ♀, (N. Banks), [N. Banks]; Great Falls, June 27, 1915, 1 ♀, (G. M. Greene), [G. M. Greene]. GEORGIA: Rabun County, July, 1910, 2 ♀, (W. T. Davis), [W. T. Davis and Cornell Univ.]; Spring Creek, Decatur County, June 7 to 25, 1911, 1 ♀, (the author), [Cornell Univ.]; Billy's Island, Okefenokee Swamp, June, 1912, 1 ♀, (Cornell Univ. Exp.), [Cornell Univ.]. TEXAS.

Sphaerophthalma (**Photomorphus**) **banksi** n. sp.

♂. Coal-black, with erect white pubescence, mixed with shorter decumbent, brown pubescence on the mesonotum and second dorsal segment; wings slightly clouded, more so beyond the venation. Length 7.5 to 11.5 mm.

Head very large, as seen from above quadrate, the corners rounded, widest behind the eyes, where it is as wide as the thorax with the tegulae included; eyes small, very remote from the hind margin of the head, the temples being far broader than the eyes; head coarsely and closely punctured, rugose on the

front; ocelli minute, the posterior pair .08 mm. in diameter, .78 mm. or nine times as far from the eyes; face and clypeus with a raised, polished, and impunctate triangle with its apex between the antennae; the depressed sides of the face polished and impunctate; margins of the clypeus with a slight emargination; mandibles exceedingly robust and awry, a large tooth on the lower margin near the base. Scape hirsute, with a longitudinal keel; third segment longer than the pedicel, two-thirds as long as the fourth.

Pronotum, mesonotum, and scutellum coarsely, closely punctate, side pieces of pronotum with a sharp anterior carina; anterior portion of mesosternum on each side of the median line with a large rounded swelling, not carinate; just in front of the middle coxae is a high triserrate peg-like process on each side of the mesosternum; propodeum coarsely reticulate, with a poorly defined double basal area.

Petiole rather long and very trongly gibbous, constricted from the second, the posterior part being almost at right angles to the dorsal surface, weakly and sparsely punctured; second dorsal segment with sparse small punctures, its apex and that of the remaining segments closely punctulate and bearing numerous long white hairs; pygidium closely punctulate; the venter unarmed, its last segment broad, slightly concave and closely evenly punctate.

Type material.—Holotype: Falls Church, Virginia, July 21, (N. Banks), [Cornell Univ. No. 107.1]; six paratopotypes: June 14, July 4, 6, 28, August 30, one paratype from Great Falls, Virginia, July 7, (N. Banks), [paratypes in the collections of N. Banks, Amer. Ent. Soc. and Cornell Univ.]. One paratype taken on *Ceanothus*.

The very long head of this species and the peg-like processes on the mesosternum abundantly distinguish it from all known species. The only other described totally black species is *quintilis* Viereck.

Sphaerophthalma (Photomorphus) aloga (Viereck), ♂.

1903. *Photomorphus alogus* Viereck, Ent. News, 14: 251, ♂.

Georgia: Tifton, 1 ♂, [Amer. Ent. Soc.].

Sphaerophthalma (Photomorphus) johnsoni (Viereck), ♂.

1903. *Photomorphus johnsoni* Viereck, Ent. News, 14: 249, ♂.

New Jersey: Riverton, [Amer. Ent. Soc.]. Virginia: Falls Church, July 4, 10, 2 ♀, (N. Banks), [N. Banks]. North Carolina: Southern Pines, May 23, 1911, 1 ♂, (A. H. Manee).

Sphaerophthalma (Photomorphus) rubroscutellata n. sp.

♂. Black, the head above the eyes stained reddish, the scutellum, postscutellum, and apex of the propodeum reddish yellow; clothed with sparse, erect, white hairs, more abundant and longer on the apical part of the abdomen,

brown on the front, vertex, mesonotum, and second and sixth dorsal segments; wings hyaline, slightly infuscated apically, darkest below the stigma; stigma and veins piceous. Length, 5.5 mm.

Head sparsely punctate, somewhat rugosely above the antennae; clypeus flat, impunctate, the anterior margin slightly produced mesally, subtruncate; mandibles deeply notched and with a large tooth beneath.

Pronotum closely, shallowly, mesonotum more sparsely, scutellum rugosely, punctate; propodeum shallowly reticulate, with two small ill-defined basal areas.

Petiole nodose obsoletely sparsely punctulate; second dorsal very sparsely punctulate.

Type.—Falls Church, Virginia, July 10, (N. Banks). [N. Banks].

Photopsis Blake

Photopsis myrmicoides (Cockerell), ♀.

VIRGINIA: Falls Church, July 4 to September 1, 11 ♀, (N. Banks), [N. Banks and Cornell Univ.]. NORTH CAROLINA: Southern Pines, June 15, 1911, 1 ♀, (A. H. Manee), [N. Banks.]. GEORGIA: Clayton, July 10, 2000 to 3700 ft. elev., 1 ♀, (W. T. Davis), [W. T. Davis].

(**Odontophotopsis**)

Photopsis (**Odontophotopsis**) **paula** n. sp.

♂. Entirely rufo-ferruginous, except the legs and antennae are brown; clothed with considerable, erect, white pubescence; wings crossed by a fuscous band.

Head about as wide as the thorax, rather extended behind the eyes and ocelli; the latter very large, the posterior pair behind the supraorbital line, removed from the compound eyes by about twice and from each other by one and a half times their diameter, and from the front pair by less than their diameter; head covered with sparse, erect, rather long, white pubescence, the face below the antennae being glabrous; front with rather close, irregular, setigerous punctures, becoming well separated, round, and smaller above and on the occiput, the intervals polished, shining; on the front above and between the bases of the antennae and each eye is a small mammilliform process; occiput convex; posterior and postero-lateral angles of the head not defined, unarmed; antennae separated by distinctly less than the diameter of the ocelli, with only a poorly defined carina between and below them; face below the eyes much depressed; clypeus entirely glabrous, impunctate and polished, its anterior margin produced medially, this portion somewhat reflexed, slightly emarginate, and with its lateral angles dentate, but not pronouncedly so; the pubescent labrum largely concealed; the malar space punctured, not one-third as long as wide; mandibles gross, strongly curved, with two large blunt teeth at the apex, the inferior margin strongly notched, the superior margin formed by a strong sinuate carina bordering the scrobe, the latter slightly convex, closely punctured, hirsute. Scape short, a little longer than the first two segments of the flagellum, much curved, roughly punctulate and hirsute,

with an obscure inferior carina; pedicel about as long as broad, about two-thirds the length of the first segment of the flagellum, which is about two-thirds the length of the second; the latter a little exceeding the third; pedicel and flagellum puberulent.

Humeral angles absent; pronotum without differentiated dorsal and cephalic surfaces, more coarsely punctured than the front, the punctures not confluent; mesonotum similarly punctured, scutellum more closely; mesopleura, except for a small anterior area, with coarse round punctures; mesosternum anteriorly on each side with an oblique elevated ridge or mamilla, behind which it is concave; mesopleura without coarse punctures, except a few near the coxae, feebly polished, with sparse very minute punctulations, bearing short hairs; propodeum posteriorly with coarse shallow reticulations, and with a median, basal, smooth area, bounded laterally and traversed medially by carinae; punctate portions of the thorax, except the mesonotum, with sparse, erect, white hairs, longest on the propodeum and pronotum; mesonotum covered with shorter, suberect, sparse, reddish mixed with black hairs; most parts of the thorax with short, white, inconspicuous pubescence, giving in fortunate lights a silvery sheen.

Forewings hyaline at base, a weakly fuscous band crossing them at the region of the stigma, becoming almost hyaline again at the apex; the cell R_4 (third submarginal) not enclosed; hind wings clouded toward the apex.

Legs, except the coxae and trochanters posteriorly, dark brown; the coxae, trochanters and femora covered with erect, sparse, white hairs; the tibiae and tarsi with denser, less erect, white pubescence; longer calcarium of the posterior tibiae about two-thirds the length of the metatarsus, white.

First segment of the abdomen, seen from above, rather long, much widened apically, distinctly smaller at its apex than the basal part of the second segment, the two with an evident constriction between; as seen from the side the former is very convex, distinctly nodose above, and strongly constricted at apex, especially so dorsally; dorsally it bears a couple of short carinae at the base, and for the most part is sparsely and very shallowly punctate; ventrally it is roughly and rather coarsely punctured, the carina distinct only anteriorly, where it is rectangularly truncate; the second dorsal segment is polished and shining, with sparse, very shallow, small, setigerous punctures, along the apex with close very minute punctulations; exposed portions of the remaining dorsal segments except the last with close very minute punctulations; exposed portion of the last dorsal segment with a triangular area on each side at base coarsely punctured, and bearing erect bristles, remainder smooth and polished, except for fine punctulations at the apex; second ventral segment with sparse shallow punctures, except at apex, among these more or less minute punctulations; apex of this and exposed parts of remaining ventral segments except the last with minute punctulations; last ventral segment polished and shining, with sparse round punctures, and without processes; petiole and base of second segment with sparse, erect, white hairs, rest of second segment with shorter, suberect, whitish hairs; remaining segments with bristly, white, and some black hairs.

Length of the type, 10 mm.; of forewing, 6.5 mm.; length of paratype, 7 mm. The abdomen is distinctly longer than the head and thorax united.

Type material.- Holotype: Spring Creek, Decatur County, Georgia, July 16 to 29, 1912, (Cornell Univ. Exped.), [Cornell Univ. No. 1795.1]; one paratopotype; same date.

Photopsis (**Odontophotopsis**) **spinei** n. sp.

♂. Entirely rufo-ferruginous, except the legs, antennae, mandibles, and mouth parts, which are brown; clothed with considerable erect white pubescence; wings slightly infuscated.

Head not as wide as the thorax, rather extended behind the eyes and ocelli; the latter large, the posterior pair behind the supraorbital line, removed from the compound eyes by more than three times and from each other by less than two times their diameters, and from the front pair by a little less than their diameter's length; head covered with sparse, erect, rather long, white pubescence, with a few black hairs behind the compound eyes; with sparse, rather large and deep, setigerous punctures, smaller and sparser behind the eyes, the intervals polished; occiput convex; posterior and postero-lateral angles of the head not defined, unarmed; antennae separated by less than the diameter of the ocelli, with a sharp carina between and below them; clypeus laterally very minutely punctulate, with a median, smooth, polished and impunctate area; medially the clypeus is produced, with a somewhat reflexed anterior margin; malar space about one-third as long as broad, with close punctures; mandibles gross, elbowed, with a deep incision on their lower margin, and their anterior surface with a very strong carina bounding the scrobe and extending the entire length of the mandibles; scrobe flat, rugosely punctate and hirsute. Scape short, scarcely as long as the first two segments of the flagellum, much bent out apically, roughly punctulate and hirsute, with an infero-anterior obscure carina; pedicel scarcely as long as broad, about two-thirds the length of the first segment of the flagellum, the latter about two-thirds the length of the second, which is about equal to the third; pedicel and flagellum puberulent.

Humeral angles absent; pronotum without differentiated cephalic and dorsal surfaces, a little more closely punctured than the front; mesonotum with sparser larger punctures; scutellum punctured like the pronotum; mesopleura impunctate except medially; mesosternum on each side with a short, blunt, somewhat oblique, nipple-like tubercle; metapleura impunctate; propodeum posteriorly shallowly reticulate, with a smooth, basal, median area, bounded laterally and traversed medially by carinae; punctate portions of the thorax bearing sparse, erect, white pubescence, longest on the propodeum and pronotum, mingled with a few black hairs on the posterior part of the mesonotum; pleura in places, especially beneath the forewings, with a short silvery pubescence, giving a sheen in certain lights.

Fore wings nearly hyaline basally, a poorly defined fuscous cloud traversing them in the region of the stigma becomes obsolete at the apex; the cell R_4 (third submarginal) not enclosed. Hind wings also with a transverse cloud in the stigmatal region.

Legs except the coxae and trochanters dark brown; the coxae, trochanters, and femora covered with erect, very sparse, white hairs, the tibiae and tarsi

with denser, almost silky, sub-erect or almost depressed, white hairs; calcaria of the hind legs white, more than three-fourths as long as the metatarsus.

First segment of the abdomen, seen from above, rather long, much widened apically, not much smaller at apex than the base of the second, from which it is separated by only a slight lateral constriction; from a lateral view, it is distinctly convex above, not strongly nodose, but separated from the base of the second by well marked dorsal and ventral constrictions; dorsally it is roughly punctured at base, the apical two-thirds smooth and polished, beset only with minute, sparse, setigerous punctures; ventrally it is coarsely punctured, the carina in the form of a ridge,without dentiform prolongations, but anteriorly somewhat acutely truncate; the second dorsal segment is polished and shining, with sparse, minute, setigerous punctures, thickly set along the apical margin; the second ventral segment is beset with sparse but large punctures, about corresponding to those on the front, more minute and closer set along the apical margins; a ridge of white pile is present along the lateral margin of the second dorsal segment, and a shorter one along the second ventral; remaining dorsal and ventral segments except the last with close-set minute punctures, therefore somewhat opaque; last dorsal segment impunctate and polished, especially medially, last ventral flattened, truncate at apex, with processes, sparsely punctured, polished; two apical spines long; abdomen beset with sparse, erect, white hairs, often bristly, among which are a few black ones on the apical segments, ventral surface also with subappressed, sparse, white hairs; erect hairs of the second dorsal, except at apex, shorter than elsewhere.

Length, 7.5 mm.; forewing, 6 mm. Abdomen about equalling the combined length of the head and thorax.

Type material.—Holotype: Bainbridge, Decatur County, Georgia, July 15 to 27, 1909, (the author), [Cornell Univ. No. 109.1.]; two paratypes received from Mr. Banks, Southern Pines, North Carolina, October 27, 1908, July 26, 1910 (A. H. Manee) [N. Banks and Cornell Univ.]; one paratype: "Ga.", [Amer. Ent. Soc., included by Viereck among the type material of *subtenuis*].

This species is a very close ally of *subtenuis* Viereck, but in that species the mesosternal processes are crenulate behind, the notch on the mandibles is shallower, the subtending tooth smaller, and the clypeus is narrower at apex.

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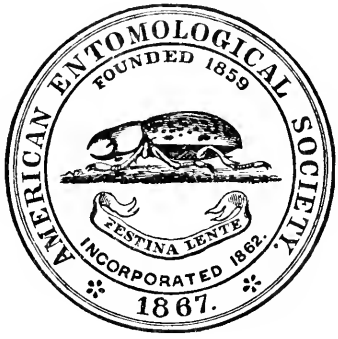

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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME

STUDIES IN THE GROUP ISCHNOPTERITES (ORTHOPTERA, BLATTIDAE, PSEUDOMOPINAE)

BY MORGAN HEBARD

In studying the Blattidae of North America north of Mexico and material of the family adventive in that region, it has been found necessary to treat fully a number of tropical American species, in order to clarify the proper relationships of the North American forms and in some cases to determine their correct nomenclatorial status.

The present paper treats those forms involved, found in the Group Ischnopterites, and is the seventh and last of this series of supplementary studies which have appeared in two publications.[1]

The Group Ischnopterites, like the Group Blattellites, is extremely large, comprehending a vast array of species. Among these, the number which should be referred to the genus *Ischnoptera* is very great, but many species which have been placed there belong properly to distinct genera. One of these, *Symploce*, here described, is represented in the United States by a single species, but to determine the characters of importance, both generic and specific, we have here fully treated all of the species represented in the series before us. The same is true of the genus *Nesloblatta*, also described in the following pages, a single species of which is represented in the material before us adventive to the United States. In addition, to locate the correct position of the remaining species of the Group found in the United States, we have considered fully the genotype of the genus *Ischnoptera* and the forms of that genus showing nearest relationship, of which *I. rufa occidentalis* Saussure, alone, is known from the United States, probably from adventive material.

In studying the forms here treated and those found in North America north of the Mexican boundary, the entire series of the group in the Philadelphia collections has been carefully examined, this including over sixty exotic species, the majority of which have as yet not been recorded.

[1] Trans. Am. Ent. Soc., and Ent. News.

The species treated in the present paper are the following:

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The number of specimens recorded is 179. Of these 117 are in the Philadelphia collections; the others have been most kindly loaned by the curators of the United States National Museum, American Museum of Natural History, Museum of Comparative Zoology and University of Kansas Collections and by Dr. Albert P. Morse. In return for the determinations, a share of the duplicate material has been retained for the author's collection.

The Porto Rican material was secured in connection with the New York Academy-Porto Rico Survey. The first set of this is in every case the property of the American Museum of Natural History.

ISCHNOPTERA Burmeister

(Plate XVI, fig. 3, A; Plate XVII, figs. 1, 2 and 3.)

1838. *Ischnoptera* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 500.

The genus was based on four species, three of which were at that time described, while an additional species was doubtfully included.

We here restrict the genus to the forms showing the features given below, which we are able to ascertain from a specimen of the type species before us; other species, which have been generally referred to *Ischnoptera*, but which do not agree in various

characters here given, are properly referable to other distinct though closely related genera.

GENOTYPE.—*I*[*schnoptera*] *morio* Burmeister, selected by Kirby in 1906.[2]

Generic Description.—Head elongate; ocelli distinct with flat surfaces of ocellar areas forming a rather sharp angle with the interocellar space.[3] Pronotum weakly convex, becoming strongly so narrowly laterad; disk in males with two distinct sulcations mesad which converge caudad, in females showing reduced tegmina and wings these sulci are usually obsolete; lateral margins of pronotum fully as chitinous as the disk, the immediate margins cingulate; caudal margin of pronotum very weakly and broadly convex.[4] Tegmina with discoidal sectors (these including the median and ulnar veins and their branches, of which the branches of the ulnar vein are the more numerous) weakly radiating so that the branches near the sutural margin are weakly oblique to that margin. Wings with area between discoidal vein and costal margin narrow throughout; mediastine vein extending more than half the distance to the apex of the wing, from which vein spring a number of the costal veins; none of the costal veins enlarged distad; discoidal vein percurrent to apex of wing, undivided, with a number of distinct, well spaced, nearly perpendicular veinlets connecting with the median vein; ulnar vein weakly curved with a number (3 to 7) of proximal incomplete rami and a number (4 to 6) of moderately arcuate distal rami extending to the distal margin of the wing; intercalated triangle small and inconspicuous.[5] Males with median segment not specialized, but with sixth and seventh dorsal abdominal segments greatly specialized. Sixth dorsal segment emarginate mesad to near its

[2] Synon. Cat. Orth., I, p. 80.

[3] As in other genera of the group, the ocellar area becomes less strongly defined as tegminal and wing reduction takes place. Where such reduction is decided the well defined ocelli are usually likewise reduced, represented by mere ocellar spots.

[4] As in many genera of the Blattidae, the caudal margin of the pronotum is seen to become more truncate and more nearly transverse in material showing decided tegminal and wing reduction.

[5] None of the species of *Ischnoptera* considered in the present paper show very great tegminal and wing reduction. That this occurs in the genus is shown by the female sex of both *I. vilis* and *I. dilatipeltiformis*.

proximal margin, with sides of emargination convex (Plate XVI, fig. 3, A), bearing beneath on each side near the apex of the emargination a minute chitinous projection armed dorso-distad with close-set delicate microscopic teeth, which are directed cephalad (Plate XVII, fig. 3); seventh dorsal abdominal segment in greater part lying under sixth segment, but with a narrow, medio-longitudinal, decidedly elevated ridge lying between the armed projections of the sixth segment. Eighth dorsal abdominal segment unspecialized. Cephalic femora with ventro-cephalic margins armed with (usually about four) heavy, elongate, well separated, proximal spines, succeeded distad by a row of minute, closely set, piliform spines, which is terminated distad by three heavy, elongate (in increasing ratio) spines. Other ventral margins of femora supplied with widely spaced, heavy, elongate spines. Median and caudal femora in addition supplied with a single elongate genicular spine. Small arolia are present.

The Morio Group

This group is very close to the Rufa Group. The two species known to us differ from those of that group in their larger size, very dark general coloration and particularly in the male supra-anal plate, which in the present group is chitinous proximad and laterad, the remaining portion occupied by an ample, soft, whitish integument.

Ischnoptera morio Burmeister (Plate XVII, figs. 1, 2, 3, 4 and 5.)

1838. *I[schnoptera] morio* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 500. [Colombia.]

Burmeister's very inadequate description agrees with the specimen before us. This insect is closely related to the new species, *I. atrata*, under which the two are compared.[6]

Characters of ♂.—(Caracas, Venezuela.) Size very large for the genus; form moderately slender. Interocular width three-fifths ocular depth, subequal to interocellar width. Ocelli large, flattened surfaces of ocellar areas forming a sharp angle with interocellar area. Maxillary palpi rather short; fourth joint slightly shorter than third, fifth (distal) joint distinctly the longest and moderately enlarged, the ventral margin weakly convex from the rather sharp apex to near the base where the convexity is more decided.

[6] We have not seen the female sex of *morio*. We feel that it will probably be found to resemble that sex of the closely related *atrata*.

Tegmina with numerous discoidal sectors; the portion of the dextral tegmen, concealed when at rest, hyaline. Sixth and seventh dorsal abdominal segments greatly specialized as given in generic description; eighth segment the same with distal margin briefly straight laterad and broadly but rather decidedly sinuato-concave mesad. Supra anal plate well produced; narrow lateral and proximal marginal portions chitinous; remaining large mesal and distal portion occupied by an ample, soft, whitish integument, its margin joining the chitinous portions forming a large part of a perfect circle, its distal margin truncate; lateral chitinous portions not enlarged but rather broadly rounded distad, their apices supplied with a number of bristles. Cerci moderately elongate, slender, tapering to acute apex, with twelve joints; dorsal surface deplanate, ventral surface decidedly convex. Subgenital plate strongly asymmetrical, produced, with rather broad produced portion concave, dextral margin oblique produced to transverse distal margin of production, on this latter margin is situated, decidedly sinistrad of the middle, the larger style, produced portion terminated rather suddenly at internal margin of sinistral cercus, there rather sharply rounded rectangulate, forming with remaining brief portion of sinistral margin, which is weakly oblique, nearly a rectangulate emargination, at the apex of which is situated the smaller style; meso-distal portion of plate internally moderately convex with surface thickly covered with short bristles directed cephalad. The larger dextral style is four times as long as broad, with distal half slightly bent sinistrad and armed with minute spines.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Caracas, Venezuela.....	17.8	4.9	7.1	22.1	5.5	7

Coloration.—Eyes, pronotum and underparts blackish brown; head, dorsal surface of abdomen and limbs very slightly paler. Ocelli buffy. Dextral tegmen dark chestnut brown fading rather abruptly at portion concealed when at rest, which is colorless hyaline; sinistral tegmen dark chestnut brown, becoming slightly paler distad. Wings and veins colorless hyaline, except area of costal veins which is tawny olive, more buffy mesad.

Specimens Examined: 1; 1 male.
Caracas, Venezuela, (E. Hartert), 1♂, [A. N. S. P.].

Ischnoptera atrata new species (Plate XVI, figs. 1 and 2.)

Closely related to *I. morio*, bearing that species a close general resemblance, but differing decidedly in the darkened veins of

the wings, distinctive male supra-anal plate and somewhat differently formed male subgenital plate and styles.[7]

Type.—♂; Caparo, Trinidad. June, 1912. (S. M. Klages.) [Acad. Nat. Sci. Phila., Type no. 5308.]

Description of Type.—Size very large for the genus; form moderately slender. Head elongate, much as in *morio* but with interocular slightly narrower than interocellar space. Pronotum with discal sulci strongly defined as in *morio*. Tegmina and wings much as in that species, but with wing veins embrowned. Dorsal surface of abdomen likewise in general similar, but with distal margin of eighth segment very broadly and evenly concave. Supra-anal plate with a meso-distal nearly circular portion, occupied by a soft integument which is much less extensive than in *morio*, leaving large proximal and lateral chitinous areas; lateral chitinous portions with distal area expanded and almost circular, bearing distad a number of bristles. Cerci elongate with thirteen apparent joints. Subgenital plate strongly asymmetrical, produced, with free margin dextrad straight transverse to slightly beyond mesal point, there directed caudad, forming slightly more than a right angle with angle rather sharply rounded, there at the apex of this produced portion is situated a heavy style of similar size and character to that found in *morio* except that it curves evenly sinistrad, thence the free margin is oblique to its sinistral base, furnished beneath the sinistral cercus with a small, slender, straight style of half the length of the conspicuous style.

Allotype.—♀; same data as the type. [Acad. Nat. Sci. Phila.]

Description of Allotype.—Similar to male except in the following features. Size slightly larger; form broader, particularly in abdominal region. Portion of dextral tegmen concealed when at rest, hyaline, but weakly embrowned, with veins embrowned. Dorsal surface of abdomen not specialized. Supra-anal plate triangularly produced with sides rather deeply angulato-concave and apex broadly rounded; the distal portion less strongly chitinous. Subgenital plate large and convex; free margin broadly convex, showing a broad weak flattening mesad and at the cerci.

Measurements (in millimeters)

Caparo, Trinidad	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂					
Type	19.8	4.8	6.5	21.9	5.5
♀					
Allotype	20.5	5.3	7.2	23.3	5.9
Paratypes (5)	20.2–23.8	5.1–5.4	6.4–6.9	22–23.1	5.3–6.1

Coloration.—General color of head, pronotum and ventral surface of abdomen polished blackish brown. Limbs and dorsal

[7] The female of *morio* is unknown to us and we are consequently unable to make comparisons with that sex.

surface of abdomen dark chestnut brown. Tegmina shining deep chestnut brown with an auburn tinge, becoming slightly paler distad; marginal field in male briefly buffy distad; area of dextral tegmen concealed when at rest, hyaline with a weak brownish suffusion, in male with veins hyaline, in females with veins embrowned, oblique channel of dextral tegmen with structural color brilliantly metallic blue and green.[8] Wings hyaline, very faintly tinged with brown; entire area of costal veins brilliant deep chestnut brown with an auburn tinge, other veins deep chestnut brown.

The Guiana specimen differs from the typical series in having the marginal field of the tegmina more extensively buffy and the limbs distinctly paler, ochraceous tawny.

Specimens Examined: 8; (probably) 2 males and 6 females.

Caparo, Trinidad, VI. 1912, (S. M. Klages), 1 ♂, 6 ♀, *type, allotype, paratypes*, [A. N. S. P.]

Chenapowu to Saweritik, British Guiana, VIII. 21, 1911, (Crampton and Lutz), 1 ♂?,[9] [A. M. N. H.].

The Rufa Group

Very close to the Morio Group. The species of the present group differ in being not as large, more reddish in general coloration and particularly in having the male supra-anal plate showing only a limited subchitinous area meso-distad.

Ischnoptera angustifrons new species (Plate XVII, fig. 7)

The female of this species is unknown. The male may be separated from this sex of *I. vulpina* by the distinctly narrower interocular space, more transverse pronotum with discal sulci less decided, less decidedly ferruginous general coloration, proportionately shorter organs of flight and different proportions of subgenital plate.

These two species show near relationship to *I. rufa rufa*, which form, however, has the interocular space decidedly wider, the organs of flight in proportion decidedly shorter and the mesal production of the male subgenital plate much more conspicuous, with styles decidedly more widely separated.

Type.—♂; Rio Pacaya, Peru. July, 1912. [Acad. Nat. Sci. Phila., Type no. 5307.]

[8] This is conspicuous only in a bright light.

[9] The abdomen is missing in this specimen.

Description of Type.—Size large for genus; form slender, nearly as slender as in *vulpina*. Head with interocular space very narrow, its width about one quarter of a millimeter, but two-fifths as wide as interocellar space which is narrower than in *vulpina*. Ocelli and maxillary palpi as in that species. Pronotum broader, approximately as broad in proportion as in *I. morio*, with discal sulci very weakly indicated. Tegmina and wings elongate, though not as decidedly so as in *morio* or *vulpina*. Supra-anal plate as in *vulpina*. Subgenital plate of similar structure (see description of *vulpina*), but with produced portion less extensive and in position situated slightly more sinistrad of mesal point; free margin dextrad strongly convex then very weakly concave; sinistral style very small, less than half as long as large dextral style and separated from it by only its own length, thus the styles are more nearly adjacent than in *vulpina* as the sinistral style is smaller in the present species.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Pacaya, Peru, *type*	15.2	4	5.2	17.7	4.2

Coloration.—Head to ventral margins of ocelli shining blackish brown, there shading to cinnamon rufous with maxillary palpi buffy. Pronotum ochraceous tawny, very faintly paler laterad and cephalad. Tegmina translucent tawny, the marginal field ochraceous buff. Limbs and underparts warm buff, the abdomen shading to ochraceous tawny distad.

The type is unique.

Ischnoptera vulpina new species (Plate XVI, fig. 8; pl. XVII, fig. 6.)

Near relationship to *I. rufa rufa* is shown by this species and to *I. angustifrons*, under which latter insect full comparisons are made.

Type.—♂, Caparo, Trinidad. August, 1913. (S. M. Klages.) [Hebard Collection, Type no. 422.]

Description of Type.—Size large for genus; form slender, more slender than in *I. morio*. Head with interocular space slightly narrower than interocellar space, both dimensions proportionately appreciably less than in *rufa rufa*. Ocelli conspicuous, with flat surfaces of ocellar areas slanting strongly mesad. Maxillary palpi more elongate than in *rufa rufa*. Pronotum less transverse than in *morio*, with discal sulci decided as in that species. Tegmina and wings much as in *morio*, proportionately decidedly more elongate than in *rufa rufa*, but, as in the latter species, with portion of dextral tegmen, concealed when at rest, not as strikingly transparent. Dorsal abdominal segments specialized as given in generic description; all of sixth segment, except the small elevated lateral portions, more delicate than in *morio*, entirely weakly chitinous. Supra-anal plate much as in *rufa rufa*, but even more

strongly produced, broader distad, with subchitinous area more extensive; lateral margins nearly straight, weakly converging distad where the plate is very broadly truncate with distal margin weakly convex; mesad the entire produced portion of the plate is subchitinous to near the heavy chitinous narrow lateral portions and more delicate chitinous narrow distal portion.[10] Subgenital plate convex except meso-distad, where it is weakly concave and weakly triangularly produced; at the apex of this production is situated a stout cylindrical style four times as long as broad, directed dorso-sinistrad with blunt apex covered with minute, short, stout, chitinous spines; sinistrad of this style and also on the free margin is situated a small cylindrical style with apex rounded, about half as long and distant from the larger style by only its own length; free margin dextrad decidedly convex to base of mesal production, where with the dextral margin of this production a distinct and broadly rounded concavity is formed; from the apex of the mesal production the sinistral portion of the free margin is nearly straight and oblique to the base of the plate.

Allotype.— ♀; same data as type. [Hebard Ch.]

Description of Allotype.—Agrees with male in ambisexual characters, differing in the following features. Size slightly larger, form slightly more robust. Interocular space very slightly broader than interocellar space, both dimensions slightly greater than in male, but distinctly less than in this sex of *rufa rufa*. Tegmina and wings proportionately very slightly shorter than in male, extending well beyond the cercal apices. Dorsal surface of abdomen unspecialized. Supra-anal plate rather strongly produced mesad, trigonal but with lateral margins strongly concave and apex rounded, the distal portion extending beyond the subgenital plate a full millimeter.[11] Subgenital plate decidedly transverse, convex, with free margin evenly and broadly convex.

Measurements (in millimeters)

Caparo, Trinidad	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂					
Type	16.5	4.4	5.3	19.7	5.3
Paratypes (2)	18.2–19.8	4.6–4.6	5.6–5.7	19.6–20.1	5–5.2
♀					
Allotype	19.6	4.9	6	20.7	5.6
Paratypes (6)	18.2–20.5	4.7–5.2	5.4–6.1	18.8–20.7	4.9–5.7

[10] Thus indicating a condition nearly intermediate between that of *morio* and that of *rufa*.

[11] Though this is the normal condition in the series before us, paratypic females also show individual differences in having the apex narrower or wider, and in the degree of concavity of the lateral margins; these latter also are occasionally strongly concave proximad, thence nearly straight convergent to the apex. The material of *rufa* here studied shows the supra-anal plate of the female to be decidedly variable in form, and of little specific diagnostic importance in the present group.

Coloration.—♂. Head shining blackish brown, ventrad shading rapidly at clypeal suture to clay color. Pronotum and tegmina kaiser brown, sometimes a shade darker at the discal sulci of the former. Wings hyaline, veins very weakly ochraceous tawny, area of costal veins and, to a less degree, distal portion of anterior field, ochraceous tawny. Coxae, cephalic limbs and median and caudal femora clay color, median tibiae very slightly darker, caudal tibiae russet. Dorsal surface of abdomen buffy, shading to tawny distad. Ventral surface of abdomen apricot orange, shading laterad and distad through hazel to chestnut brown. Female similar but with slightly deeper and more extensive darker abdominal colors.

Specimens Examined: 10; 3 males, 7 females.

Caparo, Trinidad, VIII, 1913, (S. M. Klages), 3♂, 7♀, *type*, *allotype*, *paratypes*, [Hebard Cln.].

Ischnoptera rufa rufa (DeGeer) (Plate XVII, figs. 3 and 4.)

1773. *Blatta rufa* DeGeer, Mém. l'Hist. Ins., iii, p. 539, pl. 44, fig. 7. [Surinam.]

1805. *Blatta rufescens* Beauvois, Ins. Recueil. Afr. Amér., p. 183, Orth. pl. 1 b, fig. 7. [San Domingo.]

1838. ?*I*[*schnoptera*] *fumata* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 500. [Brazil.]

1868. *Ischnoptera terminalis* Walker, Cat. Blatt. Br. Mus., p. 122. [♂, ♀, Jamaica.]

1893. *Ischnoptera conformis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 37, pl. 3, fig. 25. [♀, Nicaragua.]

We are satisfied, from the examination of the large series of Guianan roaches before us and study of the original description and figure, that DeGeer's *rufa* is correctly applicable to the present form. It is also evident that *rufescens* of Beauvois is an absolute synonym, material from San Domingo being at hand, and the same is true of Walker's *terminalis* from Jamaica, from which island we have a considerable series. This latter name has already been correctly synonymized under *rufescens* by Kirby;[12] that author, however, confused with the present, the species *capitata* and *blattoides* of Saussure, which species are widely distinct members of different genera. Burmeister's *fumata* is based on so inadequate a description that, without examination of the type, the name can not be satisfactorily located, though it is very possibly a synonym of *rufa*. Saussure

[12] Synon. Cat. Orth., I, p. 82, (1904.)

and Zehntner have described *conformis* from a single female, the only feature of distinction there given from *consobrina* (synonym of *rufa occidentalis*), being the distinctly more triangular form of the supra-anal plate. The material before us shows this feature to be surprisingly variable in the present species, occasional examples showing even greater differences in this respect, and *conformis* consequently falls as an absolute synonym of the present race.

Rehn's record of *I. rufa* from Misiones, Argentina, applies to an exceptionally pale specimen of *I. vilis*.

The present species divides into three geographic races: typical *rufa* is found throughout the West Indies (excepting Cuba) and on the continent from Nicaragua southward to British Guiana; *rufa debilis* occurs in the higher country of Costa Rica, while *rufa occidentalis* occurs from Nicaragua northward as far as New Orleans, Louisiana.[13]

The race *rufa debilis* represents an extremely depauperate condition, with tegmina and wings decidedly reduced in both sexes and other structural modifications. The production of the male subgenital plate is decidedly more conspicuous and abrupt in *rufa occidentalis* than in *rufa rufa*.

From *I. morio* this insect differs in its smaller size and reddish coloration, the male supra-anal plate is distinctive but the subgenital plate, though different, shows a development similar in many respects.

Characters of ♂.—(Old Panama, Panama.) Size medium large; form moderately stout, not as slender as in *morio*. Head with interocular and interocellar spaces subequal in width. Ocelli distinct, flattened surfaces of ocellar areas slanting rather strongly mesad. Maxillary palpi rather short. Tegmina in general much as in *morio*, but not as elongate and with portion of dextral tegmen, concealed when at rest, not as strikingly transparent. Wings colorless hyaline, except area of costal veins which is moderately embrowned, this suffusion also present to a lesser degree in the distal portion of the anterior field, veins brown. Supra-anal plate produced, with lateral margins weakly convergent and rounding sharply into the broad transverse distal margin, which is nearly as wide as the length of the plate; surface convex, except mesad where it is weakly concave, this strongest in a large, distinct, subchitinous, transverse oval area just proximad of the distal margin, ventral surface thickly covered with short stout bristles distad

[13] The records of this species from north of the state of Vera Cruz, Mexico, are based, we believe, on introduced material.

and less thickly so mesad. Subgenital plate strongly asymmetrical, convex except at production where it is very weakly concave; dextral free margin weakly convex to moderate mesal production, with which it forms a rounded obtuse-angulation, margin of production roughly convex, bearing at its blunt apex a heavy cylindrical style, directed evenly sinistrad, about three times as long as broad, with bluntly rounded apex slightly deflexed sinistrad and with dorsal and distal surface supplied with stout but minute teeth; sinistrad the free margin from the apex of the plate's production is evenly and weakly concave, with sinistral style, situated at base of production and less than half as long as dextral style, small and weakly tapering to rounded apex.

Characters of ♀.—(Bartica, British Guiana.) Similar to male in ambisexual characters. Size slightly larger, form appreciably broader with pronotum more ample. Head with interocular space slightly wider than interocellar space. Tegmina and wings proportionately somewhat less elongate than in male, scantily surpassing the cercal extremities. Supra-anal plate triangularly produced, with apex broadly rounded, showing a broad and weak concavity at the cereal bases.[14] Subgenital plate convex, very broad and weakly produced, with free margin evenly and very broadly convex.[15]

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Montego Bay, Jamaica	13.8	3.8	4.8	14.6	4.3
Sanchez, San Domingo	14.1	3.9	5	15.7	4.4
Arecibo, Porto Rico	14	3.8	5.1	14.8	4.3
Roseau, Dominica	13.5	3.7	4.8	15.1	—
Old Panama, Panama	15	3.8	4.8	15.7	4.4
♀					
Montego Bay, Jamaica	15.6	4	5.1	14.7	4.3
Ensenada, Porto Rico	14.5	4.6	5.7	16.8	4.7
St. Croix, Danish West Indies	15.2	3.9	5	14.1	—
Bartica, British Guiana	16	4.1	5.7[16]	15.4	4.6

Decidedly greater variation appears to occur in the present species in very mountainous regions (see measurements of *rufa debilis* and *rufa occidentalis*).

The variation in the present race is apparently slight; the

[14] This plate shows decided variation, being sometimes distinctly angulato-emarginate distad, or with apex acute and sharply rounded, while the lateral margins are sometimes quite decidedly concave at the cereal bases, and sometimes with no emargination there. Such differences led Saussure and Zehntner to consider that the triangular type represented a distinct species, resulting in the synonym *conformis*.

[15] Often, in the series before us, truncate, straight transverse, mesad.

[16] The pronotum of this specimen has been somewhat flattened out in being prepared.

entire series before us from Jamaica are all very similar, in size and coloration, to the pair measured above.

Coloration.—General coloration Sanford's brown to argus brown and chestnut; usually weakly suffused, Sanford's brown. Head slightly paler, with occiput to below the ocelli blackish tinged with bay. Ocelli warm buff. Pronotum of general coloration, occasionally slightly paler laterad. Tegmina translucent and of general coloration, but with portion of dextral tegmen concealed when at rest, becoming rather gradually transparent, very weakly tinged with brown. Wings hyaline with veins weakly tinged with brown, embrowned in area of costal veins and to a less degree in the distal portion of the anterior field. Limbs buffy, often tinged with ochraceous orange. Ventral surface of abdomen proximad of the same color, rapidly shading through chestnut to blackish brown distad; this individually varying in extent and intensity and usually more decided in the female sex.

Though the series before us shows no striking differences in coloration, our material of *rufa occidentalis* indicates that probably very decided individual color differences will be found also in the present race.

Specimens Examined: 38; 14 males, 16 females and 8 immature individuals.

Montego Bay, St. James Parish, Jamaica, III, 4 and 5, 1911, (J. A. Grossbeck; under dried cocoanut palm petioles in grassy area), 1 ♀, 1 juv. ♀, [A. M. N. H.]; X, 29 to XI, 4, 1913, (Hebard; under logwood on docks, under litter on limestone and near beach), 5 ♂, 5 ♀, 3 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Palm Beach, Montego Bay, Jamaica, III, 17, 1911, (J. A. Grossbeck; under logs), 1 ♀, [A. M. N. H.].

Mandeville, Manchester Parish, Jamaica, 2100 feet, XI, 6, 1913, (Hebard; under logs in upland pasture), 3 ♀, 1 juv. ♂, [Hebard Cln.].

Sanchez, San Domingo, V, 11 to 16, 1915, (F. E. Watson; about street light), 1 ♂, [A. M. N. H.].

Arecibo, Arecibo, Porto Rico, late VII, 1911, (F. E. Watson; under stones in cultivated area), 1 ♂, [A. M. N. H.].

Ensenada, Guanica Harbor, Aguadilla, Porto Rico, VI, 14 to 19, 1915, (A. J. Mutchler; under débris on alkali flat), 1 ♀, 1 juv. ♂, [A. M. N. H.].

Eveques Valley, St. Croix, Danish West Indies, VI, 4, 1911, (R. W. Miner), 1 ♂, 1 ♀, [A. M. N. H.].

Dominica, (H. M. Lefroy), 1 ♂,[17] [A. N. S. P.].

Roseau, Dominica, VII, 3, 1911, (Crampton and Lutz), 1 ♂, [A. M. N. H.].

Barbados, VII, 17, 1903, (H. A. Ballou), 1 ♀,[18] [A. N. S. P.].

[17] Recorded by Rehn as *Ischnoptera occidentalis.*

[18] Recorded by Rehn as *Ischnoptera occidentalis.*

Bartica, British Guiana, I, 7, 1913, (H. S. Parish), 1 ♀, [A. N. S. P.].

Old Panama, Panama, XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 1 ♂, [Hebard Cln.].

Ancon, Canal Zone, Panama, (A. H. Jennings), 1 ♂, [U. S. N. M.].

Zone limit five miles west of Empire, Canal Zone, Panama, XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂, [Hebard Cln.].

Empire, Canal Zone, Panama, XI, 14, 1913; (under débris on edge of jungle), 1 juv. ♂, [Hebard Cln.].

Gatun, Canal Zone, Panama, VII, 17 to VIII, 5, 1916, (D. E. Harrower), 1 ♂, 2 ♀, [Hebard Cln.].

Ischnoptera rufa debilis new subspecies (Plate XVI, figs. 5 and 6.)

The present geographic race evidently represents the response in this species to high altitudes in Costa Rica.

When compared with typical *rufa*, this race is found to differ in average decidedly smaller size, decidedly reduced tegmina and wings in both sexes, and more delicate male supra-anal plate with distal transverse portion of free margin narrower.

Type.—♂; Santa Maria de Dota, Costa Rica. Elevation 1600 meters. January, 1907. (J. F. Tristan.) [Acad. Nat. Sci. Phila., Type no. 5306.]

Description of Type.—Similar to *rufa rufa*, differing in the following features. Size very small for the group. Ocelli with flattened surfaces slanting very strongly mesad. Pronotum with caudal margin abruptly transverse.[19] Tegmina and wings decidedly reduced, leaving distal portion of abdomen, including specialized segments,[20] exposed. Supra-anal plate much as in typical *rufa* but more delicate in structure, with transverse distal portion of free margin narrower and with ventral surface supplied with fewer short, stout bristles. Subgenital plate with angle at the dextral base of production weakly obtuse angulate.

Allotype.— ♀ ; same data as type but taken in January, 1909. [Acad. Nat. Sci. Phila.]

Description of Allotype.—Agrees with male except in the following features. Size somewhat larger, form slightly more robust. Head, as in typical *rufa*, with interocular space slightly wider than interocellar space. Ocelli represented by rather weakly defined spots. Supra-anal plate triangularly produced, less than half as long as wide, with lateral margins weakly concave[21] and apex rather sharply rounded. Subgenital plate as in *rufa rufa*.

[19] This condition appears to accompany tegminal reduction frequently in the Blattidae. We have already discussed this as found in *Cariblatta lutea*. Trans. Am. Ent. Soc., xlii, p. 166, footnote 23, (1916).

[20] See generic description.

[21] This varies in the series before us to a condition in which the lateral margins are very weakly convex from the cercal bases.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Santa Maria de Dota, Costa Rica, *type*	11.2	3.7	4.3	8	3.6
Santa Maria de Dota, Costa Rica, *paratype*	11.4	3.7	4.3	7.8	3.3
Monte Redondo, Costa Rica	11.7	3.7	4.3	7.7	3.1
Azahar de Cartago, Costa Rica	12.5	3.6	4.2	7.2	3.1
Pacayas, Costa Rica	10.4	3.3	3.9	6.4	2.8
♀					
Santa Maria de Dota, Costa Rica, *allotype*	13	4.2	5	8.7	3.8
Santa Maria de Dota, Costa Rica, *paratypes* (6)	11.4–12.5	3.7–4.1	4.6–4.8	8–9.8	3–3.7
El Tablazo, Costa Rica (2)	11–11.5	3.8–3.9	4.3–4.6	7.9–8.9	3.2–3.7
Volcán Irazú, Costa Rica	12.3	3.8	4.6	6.9	3.1

The specimen from the Volcán Irazú was probably taken at a greater elevation than any of the other specimens of the series. It is exceptionally dark in coloration and shows the maximum tegminal abbreviation among the females.

Coloration.—Type. Head blackish brown to clypeal suture. Mouth parts, proximal antennal joints, palpi, limbs and cerci, ochraceous tawny. Pronotum kaiser brown washed with mars brown, this decided caudad. Tegmina translucent cinnamon brown, the marginal field and narrow area of dextral tegmen concealed when at rest, slightly paler and more nearly transparent. Abdomen with dorsal surface dark chestnut brown laterad and distad. *Allotype.* Much darker. Head, pronotum and dorsal surface of abdomen shining blackish brown, the pronotum with lateral margins narrowly Hays russet. Tegmina translucent russet. Ventral surface of abdomen Hays russet, shading to blackish brown laterad and distad. Proximal antennal joints, palpi and limbs tawny.

Specimens Examined: 15; 5 males and 10 females.

Volcán Irazú, Costa Rica, II, 22, 1902, (L. Bruner), 1 ♀, [Hebard Cln.].

Pacayas, (Atlantic drainage), Costa Rica, 1430 meters, III, 1906, (P. Biolley), 1 ♂, [A. N. S. P.].

Azahar de Cartago, Costa Rica, I, 1903, 1 ♂, [Hebard Cln.].

El Tablazo, Costa Rica, 1900 meters, (J. F. Tristan), 2 ♀, [A. N. S. P.].

Monte Redondo, Costa Rica, I, 1903, 1 ♂, [Hebard Cln.].

Santa Maria de Dota, Costa Rica, 1600 meters, I, 1907 and 1909, (J. F. Tristan), 2 ♂, 7 ♀, *type*, *allotype*, *paratypes*, [A. N. S. P.].

Ischnoptera rufa occidentalis Saussure (Plate XVI, fig. 7.)

1862. *I[schnoptera] occidentalis* Saussure, Rev. et Mag. Zool., 2e Sér., XIV, p. 170. [New [Orleans, Louisiana].]

1862. *I[schnoptera] consobrina* Saussure, ibid., p. 170. [[Cordoba, Mexico.]]

This geographic race can best be separated from typical *rufa* by differences in the form of the male subgenital plate and by the facial coloration, which in the present race is normally concolorous, pale or dark, while in *rufa rufa* the area from the occiput to below the ocelli is decidedly darker than the remaining portions.

The material before us shows great variation in size, development of tegmina and wings and in coloration. These features, to the extent found in the present series, are in part clearly due to individual variation, but may also to some extent be attributable to differences in elevation with the resultant decided environmental changes.

Characters of ♂.—(Vera Cruz, Mexico.) Similar to typical *rufa* except in the following features. Supra-anal plate with lateral margins very slightly more convergent. Mesal production of subgenital plate more decided, its dextral margin straight and forming nearly a right angle with the dextral portion of the free margin of the plate, rather broadly transverse distad, with dextral angle sharply rounded and rectangulate, sinistrad oblique to sinistral style.[22] Largest style slightly dextrad of mesal point of production.

The female sex agrees throughout with that of typical *rufa* except in the cephalic coloration discussed above; similar decided variability in the form of the supra-anal plate is shown. Decided tegminal reduction is sometimes encountered, these organs reach only to the apex of the supra-anal plate in a few specimens (1, Atoyac, Mexico; 1, Costa Rica; 1, San José, Costa Rica), and in one, only to the fifth dorsal abdominal segment (San José, Costa Rica).

[22] The Costa Rican males have the disto-dextral angle of the mesal production less sharply rounded, the one from San José also has the angle at the dextral base of the production weakly obtuse. These differences showing the condition nearly intermediate between the present race and typical *rufa*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Vera Cruz, Mexico	18.8	4.8	5.9	19.7	5.4
Atoyac, Mexico	14.7	3.8	4.7	17	4.9
La Palma, Costa Rica	13.5	3.7	4.6	16.7	4.6
Juan Viñas, Costa Rica	17.7	4.7	5.6	19.1	5.4
San José, Costa Rica	14.1	4	4.8	16.5	4.7
Monte Redondo, Costa Rica	13.4	3.8	4.8	14.8	4.3
Monte Redondo, Costa Rica	18.2	4.2	5.3	20.4	5.8
Pózo Azúl, Costa Rica	18.9	4.8	6	19.4	5.8
♀					
Gulf Coast of Texas	15.2	4.3	5.5	14.8	4.7
Atoyac, Mexico	21.5	4.8	6	17.7	5.5
Orizaba, Mexico	16.5	4	4.8	14.8	4.7
Benque Viejo, British Honduras	21	5.2	6.7	20	5.7
Juan Viñas, Costa Rica	17	4.8	5.8	20.6	5.1
San José, Costa Rica	17.9	5	6.1	12.3	4.8
Pózo Azúl, Costa Rica	19.3	4.9	6	20.4	5.7
Costa Rica	14.6	4.5	5.3	12.2	4.5

The decided size differences in the present race appear to represent responses to local environmental conditions, these found particularly in regions of decided diversity in elevation. The very large and richly colored specimens from Juan Viñas and particularly Pózo Azúl, Costa Rica, represent almost certainly the response to rich upland jungle conditions. Tegminal reduction apparently occurs at higher altitudes (see *rufa debilis*).

That more than one type is found at the same locality, though probably in distinctly different local environment, is shown by the decided differences found in the two males from Monte Redondo, Costa Rica, at which place and at Azahar de Cartago, Costa Rica, both this race and *rufa debilis* have been secured. Very large series from the mountainous sections of the race's distribution will be needed, accompanied by local environmental data, before the causes and exact significance of such diversity can be definitely ascertained.

Coloration.—Normally very close to typical *rufa* though frequently of a slightly darker shade, but with head entirely pale (usual) or entirely dark (often in dark individuals) and very rarely with the area from occiput to just below the ocelli con-

spicuously darker than the remaining portions of the face (as is normal in *rufa rufa*). A few unusually dark specimens before us have the pronotum blackish chestnut, shading to morocco red meso-cephalad (Santa Ana and San José, Costa Rica). Three specimens (Pózo Azúl, Costa Rica) are not only very large and robust, but are dark in general coloration with pronotum deep bay, in one of these strongly and in one weakly but broadly margined cephalad and even more broadly laterad with tawny, and with the marginal field of the tegmina in all ochraceous buff. These specimens would at first glance appear widely distinct from *rufa occidentalis*, but careful examination of the series clearly shows that they represent no more than the maximum intensive coloration in the series before us, accompanied by very decided size development. Decided differences in size, tegminal and wing development, with or without such variation in color, is found throughout the present inextensive series.

Specimens Examined: 28; 14 males, 13 females and 1 immature individual.

Gulf coast of Texas, (Aaron), 1 ♀,[23] [M. C. Z.].

Vera Cruz, Vera Cruz, Mexico,[24] (Rev. T. Heyde), 1 ♂, [Hebard Cln.].

Atoyac, Vera Cruz, Mexico, X, 11, 1887, (L. Bruner), 1 ♀; XII, (L. Bruner), 1 ♂, 1 ♀, [all Hebard Cln.].

Fortin, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 1 ♂, [Hebard Cln.].

Orizaba, Vera Cruz, Mexico, I, 1898, 1 ♀; XI, 1887, (L. Bruner), 1 ♀, [both Hebard Cln.].

Motzorongo, Vera Cruz, Mexico, II, 1892, (L. Bruner), 1 ♀, [Hebard Cln.].

Benque Viejo, British Honduras, VII, 1906, (W. A. Stanton), 1 ♀, [U. S. N. M.].

La Palma, Costa Rica, 1500 meters, V, 1906, (W. R. Maxon), 2 ♂, [U. S. N. M.].

Juan Viñas, Costa Rica, 1 ♂, 1 ♀, 1 juv. ♀, [Hebard Cln.].

Azahar de Cartago, Costa Rica, X, 1902, 1 ♀, [A. N. S. P.].

San José, Costa Rica, IX and XII, 1902, 1 ♂, 2 ♀, [A. N. S. P.].

Santa Ana de Escazú, Costa Rica, XI, 1902, 2 ♂, [A. N. S. P.].

Monte Redondo, Costa Rica, III, 1902, (L. Bruner), 2 ♂, [Hebard Cln.].

Pózo Azúl de Pirris, Costa Rica, V to VI, 1902, 1 ♂, [A. N. S. P.]; (M. A. Carriker Jr.), 2 ♀, [Hebard Cln.].

Costa Rica, 2 ♂, 1 ♀,[25] [A. N. S. P.].

[23] This specimen and the type described from New Orleans, Louisiana, are the only records of the species from north of Vera Cruz, Mexico. Rather extensive study and field work along the Gulf coast in the United States, leads us to be strongly of the opinion that these two northern records are based on adventive, rather than indigenous, material.

[24] One specimen labelled "Mexico", has been recorded by Rehn as the synonymous *I. consobrina*.

[25] These specimens were presented to the Academy by Saussure, who labelled them *I. consobrina*.

SYMPLOCE[26] new genus

(Plate XVII, figs. 8 and 9; pl. XVIII, fig. 4.)

This genus is closely related to *Ischnoptera*, differing in the weak but evident mesal production of the caudal margin of the pronotum,[27] even convexity of the same without discal sulci, longitudinal discoidal sectors of the tegmina,[28] strikingly bifurcate discoidal vein of both tegmina and wings, spines of cephalic femora of heavy type throughout and differently specialized distal dorsal abdominal segments in males.[29] The majority of the species also have the median segment specialized in the males, a feature not found in *Ischnoptera*.

Six American species are found in the material before us, those previously described being referred without exception in recent literature to the genus *Ischnoptera*.

GENOTYPE.—*Symploce capitata* (*Ischnoptera capitata*) (Saussure).

Generic Description.—Pronotum much as in *Ischnoptera*, except that the disk is smooth and evenly convex without sulci, and the caudal margin is weakly obtuse-angulate produced with broadly rounded apex mesad. Tegmina and wings fully developed.[30] Tegmina with discoidal sectors (these including branch of discoidal vein, median and ulnar veins and their branches; the ulnar vein normally showing more branches than the median vein) longitudinal. Wings with area between discoidal vein and costal

[26] From $\sigma\upsilon\mu\pi\lambda o\kappa\acute{\eta}$ = woven together, in allusion to the position of the present genus when compared with *Ischnoptera* and other genera of the Ischnopterites.

[27] This feature is also shared by numerous African and Asiatic forms, which should properly be assigned to a closely related genus or genera, but all of which are referred at present to *Ischnoptera*. A somewhat Epilamprine facies results, which led Saussure to describe one of the exotic forms as *Epilampra blattoides*. This distinctive species has been confused in past literature with species of *Symploce*, similar alone in general appearance, and has been incorrectly synonymized by Kirby under *I. rufescens* (=*I. rufa rufa*), a species well separated in every way.

[28] This is naturally not apparent in the female of *S. lita*, owing to the great tegminal reduction there found.

[29] The striking and peculiar specialization of the sixth and seventh dorsal abdominal segments, characteristic of the males of all the species of true *Ischnoptera*, is not found in any of the species of the present genus.

[30] Except in the female of *S. lita*.

margin moderately narrow, slightly broader than in *Ischnoptera*, the width greatest a little distad of the mesal point. Mediastine vein extending slightly more than half the distance to the apex of the wing, from which vein spring a number of the costal veins, none of these latter enlarged. Discoidal vein dividing mesad, the two portions equally decided and showing only inconspicuous distal furcations; a number of weak, well spaced, nearly perpendicular veinlets connect this vein with the median vein. Ulnar vein weakly curved, with few (1 to 3) incomplete proximal rami and more (4 to 5) distal rami extending to the margin of the wing. Intercalated triangle small. Median segment of males specialized.[31] When other specialization of the dorsal abdominal segments occurs in males, this is confined to the sixth and eighth segments; no appendages occur as in *Ischnoptera*. Male subgenital plate asymmetrical with variously highly specialized styles. Cephalic femora with ventro-cephalic margins armed with rather heavy elongate spines, which decrease gradually in length mesodistad and are terminated distad by three longer (in increasing ratio) distal spines. Other ventral margins of femora furnished with not numerous heavy elongate spines. Median and caudal femora, in addition, supplied with a single elongate, heavy genicular spine. Small arolia are present.

All of the species of this genus known to us are pale in general coloration—buffy, in some species moderately to strongly tinged with ochraceous. Distinctive characters of coloration are entirely lacking in nearly all of the forms.

With the exception of the anomalous *S. lita*, which is here described from Key West, Florida, and San José del Cabo, Lower California, the species of the genus are confined to the Bahamas, the Greater Antilles and the islands adjacent.

The Lita Group

This Group includes but a single species, known from southern Florida and San José del Cabo, Lower California. The sexes are very dissimilar, the females having the eyes very widely separated, the tegmina decidedly reduced, subquadrate, and the wings vestigial. The males show the normal tegminal and wing development and venation for the genus, but have the median

[31] Except in *S. lita*.

segment unspecialized and the supra-anal plate not produced, with lateral margins furnished with a row of minute chitinous spines.

Symploce lita[32] new species (Plate XVII, fig. 8; pl. XVIII, figs. 1, 2, 3, 4.)

The present species is very distinctive. In the interocular space and form of ocelli the males agree more closely with *S. jamaicana* than with any of the other, all widely separated, species of the present genus.

Type.—♂; [33]Key West, Florida. July 4, 1912. (M. Hebard.) [Hebard Collection, Type no. 423.]

Description of Type.—Very similar in general structure to *jamaicana*, size medium small, slightly larger than in that species; form moderately slender as in *jamaicana;* slightly more slender than in *S. capitata.* Head with eyes larger than in *jamaicana* or *capitata.* Interocular space three-fifths as wide as interocellar space. Ocelli distinct, with surfaces of ocellar areas flat and almost perpendicular to the plane of the interocellar area, their margins there sharply rounded. Maxillary palpi with third and fifth (distal) joints subequal in length, fourth joint slightly shorter. Pronotum of same form as in *capitata* but proportionately deeper. Tegmina and wings fully developed, as given in generic description, structure of same very delicate. Median segment unspecialized. Sixth dorsal abdominal segment with two small, moderately deep, meso-proximal depressions, between which it is triangularly raised with apex proximad, this portion thickly clothed with hairs, caudal margin of segment rather strongly concave; seventh segment concealed except narrowly laterad; eighth segment with narrow distal portion exposed, distal margin strongly concave. Supra-anal plate transverse, not extending to distal extremity of subgenital plate, lateral margins strongly convergent and rounding into the broadly transverse mesal portion, lateral margins furnished with a well spaced row of minute chitinous spines. Cerci slender with lateral margins crenate, with eleven and twelve distinct joints, dorsal surface flattened, ventral surface convex. Subgenital plate weakly produced, asymmetrical; dextral free margin produced oblique, nearly straight but strongly upcurved to just beyond mesal point, there supplied with a minute stout projection (style) with apex flat and margin slightly produced sinistrad, at the dextral base of which is a sharp, chitinous, curved spine of equal length, sinistrad of this point the margin is sharply and briefly concave, from which springs a projection (style) which is over twice as long but more slender than the dextral style, and curved dextrad with apex tapering and armed meso-distad with two minute, chitinous spines; beyond this the sinistral portion of the free margin is straight, transverse. Limbs and armament of same as given in generic description.

[32] From λιτή = unadorned.

[33] We have described this specimen as type, since those of the Lower California series are all dried alcoholic and complete data for them is not available.

Allotype.—♀;[34] San José del Cabo, Lower California, Mexico. [Hebard Cln.]

Description of Allotype.—Similar to type in ambisexual characters, differing very decidedly in the following features. Head with eyes decidedly reduced; interocular space very broad, slightly broader than space between antennal sockets. Ocelli but weakly defined, with area in which they are located not as deep as in male and rounding more evenly into interocellar area. Pronotum with caudal margin very weakly angulato-produced.[35] Tegmina greatly reduced, sub-rectangulate, transversely truncate at apex of anal field with a weak concavity in discoidal field, distal angle on costal margin broadly rounded, distal angle on sutural margin rectangulate and sharply rounded, sutural margins straight and overlapping. Wings shorter than tegmina, greatly atrophied, but with anterior and posterior fields still defined. Supra-anal plate triangularly produced; lateral margins nearly straight, very weakly and broadly concave; apex blunt but evenly rounded. Subgenital plate convex, very weakly produced, with free margin weakly convex except at base of cerci, where a very weak, broad concavity is apparent.

The remaining males and females from Lower California show scarcely any variation in structure from those described.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida, *type*	14	3.6	4.6	12.8	3.6
San José del Cabo, Lower California	11.5	3.2	3.7[36]	11.1	3.1
San José del Cabo, Lower California	12.7	3.7	4.2	12.7	3.7
♀					
San José del Cabo, Lower California, *allotype*	12.3	3.7	4.6	4.1	3.1
San José del Cabo, Lower California	11.4	3.7	4.3	4.8	3
San José del Cabo, Lower California	11	3.4	4.1	3.9	3.1

[34] The Lower Californian series is certainly conspecific with the Floridian example; no other species of the group is known from these extremely different and widely separated regions. It is possible that the alcoholic series has been incorrectly labelled.

[35] This condition apparently accompanies the tegminal reduction found in this sex of the present species. See footnote 19.

[36] Shrivelling, due to drying after immersion in alcohol, has caused some reduction in this dimension in a number of Lower Californian specimens.

Coloration.—Type. Translucent ochraceous tawny, eyes dark mummy brown, median portion of face ochraceous tawny. Limbs and abdomen ochraceous buff, the latter shading to tawny distad. Cerci ochraceous tawny. The males from Lower California are paler than the type, probably due to alcoholic bleaching. This must be considered likewise in the females from that locality, which are chestnut to hair brown on head and abdomen, the pronotum and tegmina slightly paler, kaiser brown to hazel. The tegmina are translucent and in two specimens very slightly paler than the pronotum.

Specimens Examined: 6; 3 males and 3 females.

Key West, Florida, VII, 4, 1915, (Hebard; in cupboard of hotel with swarms of *Blattella germanica* and a few *Supella supellectilium*), 1 ♂,[37] *type*, [Hebard Cln.].

San José del Cabo, Lower California, Mexico, 2 ♂, 3 ♀, (dried alcoholic), [Hebard Cln.].

The Capitata Group

This group includes species known only from the Bahamas and the Greater Antilles, all of which show rather general affinity except *S. bicolor*, the male genitalia of which are extraordinarily specialized. Both sexes have fully developed tegmina and wings, while the males have the median and distal dorsal abdominal segments specialized and the supra-anal plate produced.[38]

Symploce jamaicana (Rehn) (Plate XVIII, figs. 5, 6 and 7.)

1903. *Ischnoptera jamaicana* Rehn, Trans. Am. Ent. Soc., xxix. p. 264. [♂, Jamaica; ♀, [Port Antonio,] Portland [Parish], Jamaica.]

Of the species of the Capitata Group, the Bahaman *S. morsei* shows the nearest resemblance to the present species, the specialization of the dorsal surface of the male abdomen being in several respects more similar than in any of the other closely related species. The interocular space is appreciably less in *jamaicana* than in the other species of the present group, in this respect and in the ocelli, males agreeing more closely with that sex of *S. lita*.

Single type here selected.—♂; Jamaica. [Acad. Nat. Sci. Phila., Type no. 5153.]

[37] Recorded by Rehn and Hebard as *Ischnoptera rufescens* (Beauv.), (1914). At that time the nomenclatorial confusion of *rufa*, *rufescens*, *capitata* and *blattoides* was at its height.

[38] The character of this production in *S. bicolor* is, however, very different from the type found in the other species.

Characters of ♂.—Size somewhat variable but averaging smaller than in *S. capitata*, form a little more slender. Head with eyes no larger than in *capitata;* interocular space distinctly narrower than interocellar space, slightly more than three-fifths as wide. Ocelli much as in *lita* but slightly smaller.[39] Maxillary palpi with third joint rather elongate, fourth slightly shorter, fifth (distal) joint slightly shorter than fourth. Tegmina and wings as given in generic description, fully developed. Dorsal surface of abdomen with median segment distinctly specialized as in *S. morsei*, sixth and eighth segments greatly specialized as in that species, supra-anal plate of similar character but somewhat more produced mesad with margin evenly convex, this portion not as strongly defined, as the emarginate angulation of the margins at the bases of the cerci are weaker. Cerci slender, with twelve distinct joints. Subgenital plate asymmetrical: dextral free margin weakly oblique produced and weakly convex to mesal point, there the plate is suddenly produced in a small delicate scute, slightly broader than long with surface concave, this scute terminating disto-dextrad in a small chitinous thorn directed sinistrad, and terminated disto-sinistrad in a longer process with aciculate chitinous apex directed dorsad, sinistral free margin weakly oblique produced nearly straight to base of mesal scute. Limbs and armament of same as given in generic description.

Allotype by elimination.— ♀ : [Port Antonio,] Portland [Parish], Jamaica. [Acad. Nat. Sci. Phila.]

Characters of ♀.—Similar to type in ambisexual characters, differing in the following features. In form not distinctly broader than male. Interocular width nearly equal to that between ocelli. Dorsal surface of abdomen unspecialized. Supra-anal plate twice as broad as long, triangularly produced with immediate apex angulato-emarginate. Subgenital plate convex, brief, with free margin briefly but decidedly convex proximad then distinctly concave at base of cerci, thence weakly convex to mesal point, which is shallowly angulato-emarginate.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Jamaica, *type*	10.7	2.8	3.8	11.3	3.7
Montego Bay, Jamaica (3)	10.7–11	3.1–3.2	4–4.2	11.4–12.4	3.6–4.1
Palm Beach, Jamaica	11.5	3.3	4.3	13	3.9
♀					
Port Antonio, Jamaica, *allotype*	10[40]	3	3.8	11.3	3.8
Little Cayman Island	11.4	3.3	4.2	11.9	3.7

[39] The pale ocellar color is frequently obliterated in specimens when drying and in consequence the ocellar spots appear obsolete in such examples.

[40] Abdomen drawn up.

Coloration.—Head, underparts and limbs warm buff to light ochraceous buff. Eyes sepia. A dot of this color is found at the base of each coxa and laterad on the second to sixth ventral abdominal segments. Pronotum warm buff, very weakly washed with tawny on the disk. Tegmina transparent warm buff. Dorsal surface of abdomen narrowly but conspicuously bordered laterad with warm buff, mesal portion disto-laterad blackish chestnut brown, shading to cinnamon brown and dresden brown mesad and proximad; supra-anal plate of male warm buff with proximo-mesal portion blackish chestnut brown, of female warm buff.

Immature examples are very differently colored. Abdomen beneath blackish brown, limbs ochraceous tawny, the head often darker. Pronotum deep chestnut brown, paler caudad, with lateral margins rather broadly, and cephalic margin more narrowly, ochraceous buff. Mesonotum and metanotum likewise rather broadly bordered laterad and mesal portions similarly marked. Dorsal abdominal segments with lateral margins narrowly and inconspicuously pale, mesal portions blackish chestnut brown with each segment narrowly margined distad with russet.

Specimens Examined: 13; 5 males, 2 females, 6 immature examples.

Jamaica, (C. W. Johnson), 1 ♂, *type*, [A. N. S. P.].

Port Antonio, Portland Parish, Jamaica, (C. W. Johnson), 1 ♀, *allotype*, [A. N. S. P.].

Gregory Park, St. Andrew Parish, Jamaica, X, 25, 1912, (Hebard; dead leaves under acacia and other shrubs in desert tract), 2 juv. ♀, 1 small juv. ♀, [Hebard Cln.].

Montego Bay, St. James Parish, Jamaica, III, 17, 1911, (J. A. Grossbeck; under log), 1 ♂, [A. M. N. H.]; X, 28, 1912, (Hebard; under rubbish on limestone sand near beach in open), 3 ♂, 2 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Little Cayman Island, IV, 1888, 1 ♀, [M. C. Z.].

Symploce capitata (Saussure) (Plate XVII, fig. 9; pl. XVIII, figs. 8, 9, 10.)

1862. *Bl[atta] capitata* Saussure, Rev. et Mag. Zool., 2e Sér., xiv, p. 167. [♂, Cuba.]

The original description is poor, but the species was much more fully and satisfactorily described by Saussure in 1864.[41]

This distinctive species was unfortunately synonymized under *blattoides* Saussure, by that author, in 1870.[42] That species bears

[41] Mém. Mex., Blatt., p. 114, pl. I, fig. 19.

[42] Miss. Sci. Mex., Rech. Zool., Orth., p. 54.

to the present one a superficial resemblance, but belongs to an Old World division of the Ischnopterites.

The present species, which is abundant over the island of Cuba, has since 1870 been frequently recorded as *blattoides* and since 1904 as *rufescens*, both of those species being generally referred to the genus *Ischnoptera*. The change in 1904 was due to Kirby's incorrect placing in that year of *capitata* and *blattoides* under *rufescens*.

Nearest relationship is found to *S. morsei* and *S. flagellata*, both of which species, however, show distinctive and decidedly more specialized primary and secondary sexual features in the male. The present insect is normally more reddish in general coloration and the female is normally distinctly more robust than the male, representing the most robust condition found in the present genus.

Very decided size, tegminal and wing variation occurs in *capitata;* such variation, it is probable, will be found in other species of the genus when more extensive series are available.

Characters of ♂.—(Havana, Cuba.) Size (in series) extremely variable, medium small to large compared with the allied species, averaging medium large. Form moderately robust. Head with eyes large, not as large as in *S. lita*, and well separated. Interocular space slightly narrower than interocellar space. Ocelli small, with surfaces of ocellar areas slanting more weakly to, and rounding more evenly into, the interocellar area than in *lita*. Pronotum moderately transverse, surface weakly convex and moderately declivent laterad, with lateral margins cingulate; cephalic margin transverse, rounding broadly at an obtuse angle into convex lateral margins, which are divergent caudad and round broadly into the caudal margin, which is very weakly produced, forming mesad a weak but distinct rounded angle. Tegmina and wings as given in generic description; when reduction occurs this is found to affect only the distal portions; structure of tegmina (normally) slightly more corneous than in the allied species. Median segment bisulcate proximo-mesad, in and about this area clothed with numerous long hairs, and immediately caudad furnished with a large flat tuft of agglutinated hairs directed cephalad. Succeeding dorsal abdominal segments to sixth with latero-caudal angles each briefly acute-angulate produced caudad, and with a small oval convexity laterad; sixth segment little specialized, moderately depressed, with a weak medio-longitudinal carina; seventh segment concealed; eighth segment mesad with free margin bearing a fringe of short hairs, with free margin alone showing except latero-caudad, where the segment is produced in subtriangular, very deeply concave projections.[43] Supra-anal plate slightly but not strikingly raised proximo-mesad; free margin

[43] It is these projections which Saussure has described, mistaking them for part of the penultimate ventral abdominal segment. Mém. Mex., Blatt., p. 114.

concave at base of cerci, thence moderately convergent and very weakly convex, rounding into the broad transverse distal portion which is roundly angulato-emarginate mesad, thus the mesal produced portion of the plate is weakly bilobate and is over twice as broad as long. Subgenital plate convex, distad on both sides more flattened and sloping upward to free margin; free margin dextrad nearly straight produced, weakly convex to mesal point, sinistrad similar but slightly more convex; at mesal point the plate just within the margin is produced in a very small scute curving outward with apex acute and directed sinistrad, at the sinistral base of this projection is situated a chitinous spine which extends as far as the apex of the projection. Limbs and armament of same as given in generic description.[44]

Characters of ♀.—(Cabañas, Havana, Cuba.) Similar to male in ambisexual characters, differing in the following features. Form normally decidedly broader. Interocular width appreciably greater than (normal), to slightly less than (rare), that between the less distinct ocelli. Dorsal surface of abdomen not specialized. Supra-anal plate about twice as broad as long, triangularly produced with immediate apex angulate emarginate, free margin laterad weakly concave to nearly straight. Subgenital plate convex, brief, with free margin much as in *S. jamaicana* but less sinuous, the mesal point being often merely broadly and shallowly concave.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cabañas, Pinar del Rio, Cuba..	12.5	3.6	4.8	15.2	4.7
Havana, Cuba.....	10.2	2.9	3.9	11.2	3.6
Havana, Cuba.....	12	3.6	4.8	13.4	4.2
Isle of Pines.....	12.3	3.7	4.7	14.4	4.4
♀					
Cabañas, Pinar del Rio, Cuba..	13.2	3.9	4.9	12.9	4.3
Cabañas, Pinar del Rio, Cuba..	14.8	4.1	4.9	14.2	4.7
Cayamas, Cuba.....	11.2	3.4	4.4	7.9	3.3
Cayamas, Cuba.....	12.7	3.8	4.7	10.5	4
Havana, Cuba.....	10.2	3	3.8	9.7	3.1
Havana, Cuba.....	13.5	3.9	5.2	12.1	4.3

[44] Though the concealed male genitalia may afford additional specific characters, we have not sufficient material to examine these in the different species. In *capitata* they are as follows: from within two elongate processes project, just dextrad of the production on the subgenital plate; a stout, straight, chitinous process with surface shagreenous and with apex blunt, above which projects to an equal distance a slender, straight, chitinous process with apex aciculate. Within at base of dextral cereus is a chitinous process shaped like a pair of tarsal claws and directed mesad, the dorsal claw longer than the ventral. At base of sinstral cereus is a chitinous plate produced in a stout, chitinous, curved finger directed mesad.

The very decided variation, in size and in length of tegmina and wings, has evidently no geographic correlation. Though the series is not sufficiently large to determine the full range of variation, there appears to be sufficient material to show that the normal size is approximately that of the nearly largest examples measured above; that the males normally have the tegmina and wings extending beyond the apices of the cerci, while the females are normally stouter with tegmina and wings extending just beyond the apex of the abdomen. A single female has the tegmina and wings decidedly reduced, falling short of the base of the supra-anal plate, while two of this sex have these organs as fully developed as in any of the males.

Coloration.—Head warm buff to cinnamon buff, often suffused with ochraceous orange, eyes sepia. Pronotum ochraceous tawny to buff (rare), usually slightly paler laterad. Tegmina translucent, tawny to ochraceous buff (rare). Wings hyaline with a faint brownish tinge, veins brownish, the mesal area of the costal veins at the margin buffy. Dorsal surface of abdomen: (♂) suffused with brownish, with lateral margins narrowly buffy; (♀) suffused with blackish brown particularly distad, the buffy margins in consequence much more conspicuous, these continued on and often extending over the entire supra-anal plate. General color of ventral surface and limbs warm buff to cinnamon buff, rarely suffused with ochraceous salmon, and with prouts brown laterad on the abdomen; lateral dots of sepia are present at base of each coxa and laterad on the second to sixth ventral abdominal segments.

Specimens Examined: 20, 7 males and 13 females.

Vinales, Pinar del Rio, Cuba, IX, 16 to 22, 1913, (F. E. Lutz), 1 ♀, (large, caudate tegmina), [A. M. N. H.].

Cabañas, Pinar del Rio, Cuba, V, 21, (Palmer and Riley), 1 ♂, 2 ♀, (♂, 1 ♀, large, caudate tegmina), [U. S. N. M.].

Havana, Cuba, I, 26, 1904, (Hebard; cemeterio), 1 ♂, 1 ♀,[45] (depauperate), [Hebard Cln.]; (C. F. Baker), 4 ♂, 1 ♀, (normal), [Univ. of Kansas Cln.].

Cabañas, Havana, Cuba, I, 23, 1904, (Hebard), 2 ♀,[46] (normal), [Hebard Cln.].

San Antonio, Havana, Cuba, IV, 9, 1905, (G. Dimmock), 2 ♀, (normal), [U. S. N. M.].

Cienfuegos, Santa Clara, Cuba, II, 13, 1902, 1 ♀, (large), [Hebard Cln.].

[45] Recorded by Rehn as *Ischnoptera rufescens* (Beauv.).

[46] Recorded by Rehn as *Ischnoptera rufescens* (Beauv.).

Cayamas, Oriente, Cuba, II, 2 and 11, (E. A. Schwarz), 2 ♀, (1 small, abbreviate tegmina), [U. S. N. M.].

San Carlos Estate, Guantanamo, Cuba, X, 4 to 8, 1913, (F. E. Lutz), 1 ♀, (large), [A. M. N. H.].

Isle of Pines, 1 ♂, [M. C. Z.].

Symploce morsei[47] new species (Plate XVIII, figs. 11, 12, 13.)

This insect represents the Bahaman development of the present group, showing nearest relationship to *S. capitata* in the male subgenital plate, which, however, is distinctly more highly specialized. In general apparance, *S. jamaicana, morsei, flagellata* and occasionally rather slender and less reddish examples of *capitata*, are very similar.

Type.—♂; Nassau, New Providence Island, Bahamas. February 3, 1904 (M. Hebard.) [Hebard Collection, Type no. 124.]

Description of Type.—Size small, nearly as small as depauperate examples of *capitata;* form moderately slender for the group, much as in *jamaicana.* Head with eyes of normal size, as in *capitata.* Interocular space slightly narrower than that between ocelli. Ocelli small, with surfaces of ocellar areas rounding evenly into interocellar area, as in *capitata.* Pronotum as in that species. Tegmina and wings as given in generic description, structure of same delicate. Median segment decidedly specialized, exactly as in *capitata.* Sixth segment with latero-caudal angles acute-angulate produced so that the distal margin is deeply concave, entire surface deeply concave, but with a high medio-longitudinal carina and a bulbous swelling laterad on each side; seventh segment concealed; eighth segment with brief distal portion showing, distal margin deeply concave and latero-caudal angles produced to base of cerci, this segment slightly raised for a brief space mesad, where it is clothed with a heavy fringe of long hairs. Supra-anal plate with surface ascending to a distinct, rounded, proximal, transverse ridge opposite the elevation of the eighth segment, in this region supplied laterad with rather numerous short hairs; free margins straight and weakly oblique produced, then suddenly produced in meso-distal half with margins briefly straight divergent, then convex convergent to a point forming a weak mesal emargination, this produced portion more than twice as wide as long. Subgenital plate showing an evident decidedly greater specialization of the type found in *capitata;* dextral free margin moderately oblique from base of cercus to mesal point, there the plate is produced in a delicate rounded scute with ventral surface decidedly concave, this occupying half of the remaining free margin of the subgenital plate, at its dextral base

[47] We take great pleasure in dedicating this interesting species to Dr. Albert P. Morse, whose Orthopterological work stands on a plane of exceptional excellence and accuracy, and to whom we are indebted for one of the few contributions on Bahaman Orthoptera.

is situated a gently curved, chitinous, flagellate process, which is slightly longer than the mesal production, the sinistral portion of the free margin is weakly oblique and straight to this flagellate process. Limbs and armament of same as given in generic description.

Allotype.— ♀ ; same data as type. [Hebard Cln.]

Description of Allotype.—Similar to male in ambisexual characters, differing in the following features. Size larger, form a little broader. Interocular width very slightly less than that between the less distinct ocelli. Dorsal surface of abdomen not specialized. Supra-anal plate much as in *capitata*. Subgenital plate much as in that species, but with emargination at bases of cerci more decided and with scarcely any mesal emargination indicated.[48]

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Nassau, Bahamas, *type*	11.7	3	3.8	11.4	3.6
Andros Island, Bahamas	12.6	3.4	4.2	13.2	3.9
Eleuthera Island, Bahamas	12	3.1	4	11.7	3.7
♀					
Nassau, Bahamas, *allotype*	11.8	3.3	4.3	12.7	3.9
Nassau, Bahamas	13.1	3.6	4.4	14	4.2
Eleuthera Island, Bahamas	11.3	3.7	4.7	12	4

The series is not sufficiently large to determine the degree of variability which occurs.

Coloration.—Head, underparts and limbs light buff to ochraceous buff; head with interocular area often more suffused with tawny; dots on coxae and ventral abdominal segments as in *capitata*, but normally very minute. Pronotum antimony yellow to ochraceous tawny, very slightly paler laterad. Tegmina translucent, warm buff to weak ochraceous tawny. Dorsal surface of abdomen much as in *capitata*, darker markings usually not strongly defined.

A single immature example before us has the head ochraceous tawny, limbs buckthorn brown, ventral surface of abdomen blackish chestnut. Pronotum, mesonotum and metanotum mars brown becoming darker laterad, there narrowly bordered with ochraceous buff. Dorsal surface of abdomen blackish chestnut, very narrowly bordered laterad with ochraceous buff.

[48] Were two of the species of the Capitata Group present in the same locality, it would be a difficult task to separate the females, except in *capitata* and *bicolor*. In the former a different, though slight, general facies from the others is usual, in the latter this is more decided and constant.

Specimens Examined: 11; 5 males, 5 females and 1 immature individual.

Bahamas, II, 11, 1905, (E. Wright; flew to trap), 1 ♀, [Morse Cln.].

Nassau, New Providence Island, Bahamas, II, 3, 1904, (Hebard; Fort Charlotte), 1 ♂, 2 ♀,[49] *type*, *allotype*, *paratype*, 1 juv. ♀, [Hebard Cln.].

Mangrove Cay, Andros Island, Bahamas, 1904, (O. Bryant), 1 ♂,[50] [Morse Cln.].

Eleuthera Island, Bahamas, IV, 11 to 20, 1907, (C. J. Maynard), 3 ♂, 2 ♀, [M. C. Z.].

Symploce flagellata new species (Plate XVIII, figs. 14, 15, 16 and 17.)

Nearest in relationship to *S. capitata*, strikingly differing from that species in the remarkable development of the male sinistral specialized style. The present species does not show the ferruginous tone of general coloration so frequent in *capitata*, nor are the females as distinctly more robust than the males.

Type.—♂; Desecheo Island, Porto Rico, West Indies. February 18, 1914. (F. E. Lutz.) [Am. Mus. Nat. Hist.]

Description of Type.—Size medium small and form moderately slender for the group, much as in *S. jamaicana* and *S. morsei*. Head with eyes of normal size, as in *capitata*. Interocular space slightly narrower than interocellar space. Ocelli, tegmina, wings and limbs as in *capitata*. Median segment decidedly specialized as in *jamaicana*, *capitata* and *morsei*. Sixth dorsal abdominal segment with latero-caudal angles acute-angulate produced, so that the distal margin is deeply concave, entire surface deeply concave, but with a high medio-longitudinal carina and a bulbous swelling proximo-laterad on each side, this segment as in *jamaicana* and *morsei*; seventh segment concealed; eighth segment with free margin mesad bearing a fringe of short hairs, with free margin alone showing except at the latero-caudal angles, which are produced in subtriangular very deeply concave projections, this segment as in *capitata*. Supra-anal plate with surface ascending to a moderately distinct, rounded, proximal, transverse ridge opposite the hairs on the eighth segment, in this region supplied laterad with rather numerous short hairs; this plate almost exactly intermediate in contour and form between that of *capitata* and of *morsei*. Subgenital plate moderately convex, free margin convex but in places somewhat flattened, at mesal point the plate just within the margin is produced in a very small scute curving outward with apex rounded, at its dextral base is situated a minute knob (dextral style), at the sinistral base a tremendously elongate, chitinous, flagellate production over half as long as the width of the subgenital plate, curving gently dextrad, with distal portion curved dorsad and projecting slightly beyond the distal margin of the supra-anal plate (sinistral style).

[49] Recorded by Rehn as *Ischnoptera blattoides*.

[50] Recorded by Morse as *Ischnoptera blattoides*.

Allotype.— ♀ ; same data as type. [Am. Mus. Nat. Hist.]

Description of Allotype.—Similar to male in ambisexual characters, differing in the following features. Size very slightly larger, form appreciably broader. Interocular width very slightly less than that between the less distinct ocelli. Dorsal surface of abdomen unspecialized. Supra-anal plate much as in *capitata*. Subgenital plate much as in that species, but with emargination at bases of cerci more decided and without a mesal emargination.[51]

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Desecheo Island, *type*	10.9	3.4	4.3	11.2	3.8
Mona Island	12.5	3.6	4.6	11.7	3.8
Mona Island	12.3	3.6	4.6	12.3	3.8
♀					
Saona, Haiti	10.5	3.6	4.7	11.8	3.8
Desecheo Island, *allotype*	12	3.8	4.8	12.2	4
Desecheo Island	11.6	3.7	4.5	11.9	3.9
Aguas Claras, Porto Rico	12	3.4	4.6	12.6	3.9
St. John, Danish West Indies	12.2	3.7	4.7	12.2	4.1

Coloration.—Head light buff to ochraceous buff, rarely washed with ochraceous tawny between the eyes. Limbs and underparts of same general coloration, the ventral surface of the abdomen occasionally ochraceous tawny, the segments and coxae with lateral dots of sepia as in *capitata*, these sometimes represented by large spots on the abdominal segments, while one female has a dark brown spot mesad on the subgenital plate. Pronotum ochraceous buff to ochraceous tawny, usually distinctly paler and buffy laterad. Tegmina translucent, pale buckthorn brown. Dorsal surface of abdomen suffused to varying degrees with dark brown, narrowly margined laterad with buffy, supra-anal plate blackish brown proximad with produced mesal portion buffy.

Specimens Examined: 17; 3 males, 6 females[52] and 8 immature individuals. Saona, Hayti, VII and VIII, (N. L. Orme Jr.), 1 ♀, [A. M. N. H.].

[51] One paratype shows a very slight emargination at this point; the female subgenital plate can hardly be said to afford differential features between this and the closely allied species of this group.

[52] As we have no males from Hayti, Porto Rico proper and the Danish West Indies, there is a possibility that other species are included. These specimens agree so closely with unquestioned females of *flagellata*, however, that we believe additional material will substantiate their proper assignment here.

Desecheo Island, Porto Rico, II, 18 and 19, 1914, (F. E. Lutz; dead leaves in sea-grape thicket and under low trees on hillside at 100 feet elevation), 1 ♂, 2 ♀, *type*, *allotype* and *paratype*, 4 juv. ♂, 3 small juv. ♂, 1 small juv. ♀, [A. M. N. H.].

Mona Island, Porto Rico, II, 22 and 24, 1914, (F. E. Lutz), 2 ♀, *paratypes*, [A. M. N. H.].

Aguas Claras, Porto Rico, I, 19, 1914, 2 ♀, [U. S. N. M.].

St. John, Danish West Indies, 1 ♀, [M. C. Z.].

Symploce bicolor (Beauvois) (Plate XVIII, figs. 18, 19, 20 and 21.)

1805. *Blatta bicolor* Beauvois, Ins. Rec. Afr. Amér., p. 183, pl. 11., fig. 6. [San Domingo.]

Beauvois' figure is very rough and the line intended to show the natural size of the specimen was omitted; his description is also decidedly unsatisfactory. With a considerable series of roaches before us from San Domingo, however, we find that the material, here assigned to the species, alone agrees in every way.

The present insect and *S. lita* are much the most distinctive of the genus; this is particularly shown here by the remarkable and very unusual specialization of the male supra-anal plate.

Characters of ♂.—(San Francisco Mountains, San Domingo.) Size rather small and form moderately slender for this genus of moderately robust species. Head with eyes not as large as in *lita*. Interocular space slightly narrower than that between the ocelli, agreeing in this respect and in the ocelli with *S. capitata*.[53] Pronotum very slightly more transverse than in that species. Median segment specialized as in *capitata*, and with succeeding dorsal abdominal segments to sixth as in that species; sixth segment as in *S. flagellata* but without any median elevation; seventh segment concealed; eighth segment with entire distal margin fringed with hairs, otherwise as in *flagellata*. Supra-anal plate with distal portion produced mesad in a very slender, elongate, tapering structure, which is considerably longer than the remaining proximal portion of the plate and reaches to the distal margin of the subgenital plate, this structure is blunt at the apex, its lateral margins are briefly upcurled, between which it is subchitinous; the remaining lateral portions of the free margin proximad are weakly convex and almost transverse; surface of proximal portion of plate with a medio-longitudinal ridge and a similar transverse ridge proximad, between these it is weakly concave. Subgenital plate with surface more strongly convex than in the other species of the Capitata Group, free margin convex except just sinistrad of mesal point, where a brief but distinct concavity occurs, above this from the inner edge of the margin springs a recurved rounded scute, with a minute knob (dextral style) at its dextral base, and an elongate chitinous

[53] Usually with a distinctive interocular marking.

flagellate production, which is directed sinistrad at base but curves strongly dextrad and then caudad and extends beyond apex of production of supra-anal plate (sinistral style).

Characters of ♀.—(Azua, San Domingo.) Size and form, interocular width and ocelli as in male. Supra-anal plate triangularly produced with apex blunt, about as long as wide. Subgenital plate similar to that of the female of *capitata*. Inconspicuous but distinctive features of coloration present.

Measurements (*in millimeters*)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂					
San Francisco Mountains, San Domingo (5)	11.2–12.7	3–3.1	3.7–4	11.7–12.6	3.7–3
♀					
Azua, San Domingo	9.9	3	3.8	11.6	3.7

Coloration.—Head, limbs and ventral surface of abdomen cinnamon buff, sometimes shading on the male subgenital plate to ochraceous tawny. Head with a cinnamon brown suffusion at the interocellar area, rarely with merely a weak cinnamon suffusion there. Lateral dots of sepia at base of each coxa and laterad on the second to sixth ventral abdominal segments, these expanding into blackish brown areas in female. Pronotum with disk cinnamon brown to ochraceous buff, washed with ochraceous orange, lateral margins paler and areas above bases of wings distinctly transparent.[54] Dorsal surface of abdomen dark prouts brown, shading to cinnamon brown proximad, in female dark brown margined with buffy.

Specimens Examined: 6; 5 males and 1 female.

San Francisco Mountains, San Domingo, IX, 1905, (A. Busck), 5 ♂, [U. S. N. M.].

Azua, San Domingo, III, 17, 1913, (P. G. Russell), 1 ♀, [U. S. N. M.].

XESTOBLATTA[55] new genus

(Plate XIX, figs. 1, 2 and 5.)

This genus shows affinity to *Symploce*, agreeing in the weak but evident mesal production of the caudal margin of the pronotum, even convexity of the same without discal sulci, longi-

[54] This is noticeable, but to a lesser degree, in the other species of the Capitata Group.

[55] From ξεστὸς and βλαττα = polished roach.

tudinal discoidal sectors of tegmina and spines of cephalic femora of heavy type throughout. The discoidal vein of the wings, however, not only forks at slightly more than half the distance to the apex, but beyond this point shows other distinct furcations. The features of the male dorsal abdominal segments are of a different general character, as are those of the supra-anal and subgenital plates. The species are large and very broad for the Ischnopterites, the tegmina have a strongly chitinous appearance and the limbs are stout and, for the group, supplied with heavy spines. These features give the species a distinctly Epilamprine facies, a feature which, in part, led Griffini to refer his *festae* to *Epilampra*.

Three tropical American species are before us. From careful study of the literature it is clear that five species are members of the present genus, four being referred in recent literature to the genus *Ischnoptera* and one here described as new.

The species of which we have no material are:—

Xestoblatta hamata (Giglio-Tos)

1898. *I*[*schnoptera*] *hamata* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, No. 311, p. 4. [2 ♀, Santiago, Ecuador; 1 ♂, Gualaquiza, Ecuador.]

Xestoblatta sancta (Giglio-Tos)

1898. *I*[*schnoptera*] *sancta* Giglio-Tos, Ibid., p. 5. [5 ♀, San José, Ecuador.]

In sequence *hamata* would appear to follow *festae*. Until the male sex is known, the nearest relationship of *sancta* can not be accurately determined.

The characters defining the present genus are given in part by Giglio-Tos, in section I of his key before the descriptions of the species listed above, the species there associated being all referable to *Xestoblatta*.

Saussure and Zehntner's treatment in the Biologia,[56] of Saussure's previously described *Ischnoptera ignobilis*, though brief and unsatisfactory, leaves little doubt but that material of a different species is included. The position of *ignobilis* is apparently near *Ischnoptera vilis* Saussure, but the Biologia material from Guatemala apparently represents a species of

[56] Biol. Cent.-Amer., Orth., I, p. 37, (1894).

Xestoblatta, near or the same as the species later described by Griffini as *festae*.

No other species in the literature can be referred without question to the present genus.[57]

GENOTYPE.—*Xestoblatta carrikeri* new species.

Generic Description.—Structure robust. Head broad for the group. Pronotum proportionately broader than in *Ischnoptera* or *Symploce*, with disk smooth and evenly convex without sulci, latero-caudal angles situated at caudal margin, which is weakly obtuse-angulate produced with broadly rounded apex mesad. Tegmina and wings fully developed.[58] Tegmina with discoidal sectors (these including the branch of discoidal, median and ulnar veins and their branches; the ulnar vein not showing as many branches as the median vein) longitudinal. Wings with area between discoidal vein and anterior margin broad, decidedly broader than in *Ischnoptera* or *Symploce*, the width greatest a little distad of the mesal point, this area heavily suffused but with costal veins not enlarged. Mediastine vein extending slightly more than half the distance to the apex of the wing, from which vein spring a number of the costal veins. Discoidal vein conspicuously forked mesad, with succeeding irregular but decided furcations.[59] Numerous weak perpendicular veinlets connect the discoidal and median veins. Ulnar vein distinctly curved, with few (0–3 to 5) incomplete proximal rami and generally more (1–2 to 5) distal rami extending to the margin of the wing.[60] Intercalated triangle large and distinct, larger than in any other genus of the Ischnopterites. Median segment of males not, or but little, specialized. Dorsal surface of male abdomen with disto-lateral angles of sixth segment moderately or greatly produced, or with median area specialized. Male supra-anal plate little produced with brief meso-distal portion subchitinous to different degrees. Male subgenital plate

[57] Saussure's *Ischnoptera peruana*, described in 1862, may possibly be a member of this or a closely allied genus. The description does not give sufficient characters to place the species, though it is clearly not a member of *Ischnoptera*.

[58] These are much more elongate in the male than in the female of *carrikeri* and *festae*, but of subequal length in *nyctiboroides* and *hamata*.

[59] In specimens with more elongate wings, the number of forks of the discoidal vein is greater.

[60] The considerable differences here apparently due to the differences in wing length.

armed with variously elongate, inflexed, mobile, chitinous styles.[61] Limb armament as in *Symploce* but with spines heavier. Cephalic femora with ventro-cephalic margins armed with heavy elongate spines, which decrease gradually in length meso-distad and are terminated by three longer (in increasing ratio) distal spines. Other ventral margins of femora supplied with moderately numerous heavy, elongate spines. Median and caudal femora, in addition, supplied with a single heavy, elongate, genicular spine. Small arolia are present.

All of the species of this genus known to us are moderately dark in coloration with pronotum and tegmina having a decided gloss. But one species, *nyctiboroides*, has the pronotum distinctively colored; this insect is rather widely separated from the others, all four of which are closely related.

The forms of the genus will probably be found widely distributed from Costa Rica southward throughout the Amazon Basin.

Xestoblatta nyctiboroides (Rehn) (Plate XIX, figs. 1, 2, 3 and 4.)

1906. *Ischnoptera nyctiboroides* Rehn, Proc. Acad. Nat. Sci. Phila., 1906, p. 266. [1 ♀, Demerara, British Guiana.]

A specimen before us of the male sex agrees fully with the original description and color diagnosis, but is apparently somewhat darker. The insect is distinctive in coloration; the head and pronotum being solid shining blackish brown with a chestnut tinge, the pronotum narrowly margined laterad with ochraceous buff, this continued around the cephalic margin as a narrow thread of the same color. The tegmina are rich and shining russet, except the marginal fields which are ochraceous buff and the portion of the dextral tegmen concealed when at rest, which is less polished and shows, in some lights, a metallic purplish lustre along its inner margin (structural color).

As the male was previously unknown the following characters are here given.

♂; Igarapé Assu, Pará, Brazil. January 23, 1912. (H. S. Parish.) [A. N. S. P.]

[61] Consequently, as the styles, when at rest, are directed across the inner surface of the plate at the distal margin, they are almost entirely concealed from below, and the plate's convex exterior would lead one, on hurried examination, to mistake the sex.

Head broad, interocular space equal to that between the pale ocelli, ocellar areas weakly defined. Tegmina extending to apices of cerci. Wings suffused with brown, this decided between discoidal vein and costal margin. Ulnar vein with 0–1 incomplete and 1–2 complete rami. Dorsal surface of abdomen weakly modified: median segment with few minute, stout hairs in latero-proximal depressions; disto-lateral angles of proximal segments slightly acute produced, this increasing very slightly to sixth segment; seventh segment almost entirely concealed; eighth narrowly visible but moderately angulato-produced laterad and there comprehending base of supra-anal plate. Supra-anal plate transverse, not strongly rotundato-trigonal produced between cerci, this portion subchitinous and, like the cerci, supplied with a number of long slender scattered hairs. Subgenital plate transverse, broadly deplanate mesad, convex laterad; distal margin weakly and irregularly undulating, narrowly subchitinous and supplied with slender hairs between the highly specialized styles. Within, at this margin, beneath the sinistral cereus, a minute chitinous cone projects caudad with acute apex directed dextrad, and adjacent dextrad a second more slender but longer projection, with acute apex, is directed dextro-dorsad (sinistral style). The dextral margin of the plate is produced dorsad in a narrow shelf slightly proximad of the dextral cereus, which is continued in an elongate, weakly and irregularly undulating, mobile, cylindrical shaft, with its rounded apex supplied with a few minute hairs, this shaft directed sinistrad and extending along the distal margin of the plate to its mesal point.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cereus
Igarapé Assu, Brazil	17.5	4.2	5.9	16.4	4.8	3.2

Only the male here discussed is before us.

Xestoblatta carrikeri[62] new species (Plate XIX, figs. 5, 6 and 7.)

The present species is apparently nearest *X. hamata*, differing from that species and from *X. festae* in the dorsal surface of the male abdomen having the sixth[63] segment specialized mesad and its latero-caudal angles but weakly produced. The male genitalia, particularly the styles, are also very different from those of *festae* and, as far as we can determine from the description, very dissimilar also from those of *hamata*.

In the female the tegmina and wings are much more abbreviate than in *hamata*, the latero-caudal angles of the sixth seg-

[62] We dedicate this species to the collector of the type, Mr. M. A. Carriker, Jr., whose work in tropical America has been very extensive and fruitful.

[63] Giglio-Tos, in his description of *hamata*, gives this as the seventh segment, evidently counting the median segment as the first.

ment are but weakly produced and the coloration is generally paler. Compared with the description of the female of *X. sancta*, that sex of the present species is slightly smaller, with distinctly shorter tegmina and wings, and differs, as from *hamata*, in the dorsal abdominal features; also, though agreeing in the paler coloration, the anterior margin of the wing is unicolorous, dark, with no pale marking as described for *sancta*.

Type.—♂; Cincinnati, Santa Marta, Colombia. 4500 feet. July 10, 1913. (M. A. Carriker Jr.) [Hebard Collection, Type no. 427.]

Description of Type.—Size rather large, form robust. Interocular space about one and one-half millimeters wide, equal in width to interocellar space. Ocellar areas weakly defined, but ocelli strikingly pale. Pronotum much as in *festa*.[64] Tegmina and wings reaching well beyond apices of cerci, the wings have 2 incomplete and 4 complete rami of the ulnar vein.[65] Median segment unspecialized. Sixth dorsal abdominal segment with a large median depression heavily clothed with minute hairs, its latero-caudal angles weakly acute-angulate produced caudad; seventh segment concealed; eighth with latero-caudal angles more sharply and strongly produced than those of sixth, and embracing the proximo-lateral portion of supra-anal plate to near cercal bases. Supra-anal plate transverse; weakly produced and weakly bilobate between the cerci, this portion strongly subchitinous and fringed distad with fine hairs. Subgenital plate subdeplanate in large mesal portion, rounding sharply into narrow lateral portions which are nearly perpendicular; lateral margins straight to distal third, which is straight, transverse and subchitinous, these margins fringed with fine hairs. At the disto-lateral angles formed by the free margin, spring from the inner surface of the plate elongate chitinous, mobile, cylindrical arms, when at rest directed across the dorsal surface of the plate above the distal margin (specialized styles); the sinistral is slender, extending nearly to the disto-dextral angle, tapering slightly to the slightly enlarged and roughly rounded apex; the dextral extends slightly beyond the disto-sinistral angle, is moderately stout to a moderate mesal swelling, then slender to its elongate clubbed apex, which bears a sharp dorsal thorn with point directed sinistrad.

Allotype.—♀; same data as type. [Hebard Cln.]

Description of Allotype.—Agrees with male except in the following features.

[64] The general contour of the pronotum appears to be much the same in all the known species. In *X. nyctiboroides*, however, the even convexity of the inner margin of the narrow pale border gives the pronotum a false appearance of its margin being more evenly convex cephalad.

[65] From slight irregularities in the structure of these forks in the small series of the genus before us, it appears probable that considerable individual numerical diversity will be found to occur in the species.

Form slightly broader, thus interocular space is slightly wider. Tegmina and wings distinctly less elongate. The wings have 1 incomplete and 4 complete rami of the ulnar vein. Sixth dorsal abdominal segment unspecialized mesad, but with latero-caudal angles weakly acute-angulate produced caudad; seventh segment almost hidden, but with minute, conical, chitinous projections laterad at production of sixth segment; eighth segment narrowly visible with latero-caudal angles hardly produced. Supra-anal plate rotundato-trigonal produced between cerci, with traces of a medio-longitudinal sulcation strongest at the apex. Subgenital plate strongly convex; free margin convex, this weakest mesad.

Measurements (in millimeters)

Cincinnati, Colombia	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus
♂						
Type	19	4.6	6.3	20.4	5.9	3.7
♀						
Allotype	17.6	4.8	6.8	17	5.3	2.8

Coloration.—The sexes are very similar in coloration, the female having the face markings darker and the abdomen more suffused. Head dark ochraceous buff, the vertex to immediately below the clear ochraceous buff ocelli, deep chestnut brown, and below the ocelli a narrow transverse band of the same showing some ventral convexity. Pronotum buckthorn brown with disk heavily washed with russet, this fading gradually into the marginal portions. Tegmina translucent dresden brown, the marginal field slightly paler. Wings with anterior field from costal margin to discoidal vein and in area of ulnar forks, heavily washed with cinnamon brown, posterior field washed with cinnamon brown, heavily in area of axillary forks. Dorsal surface of abdomen, in male, buckthorn brown washed with chestnut brown laterad and distad, with subchitinous portion of supra-anal plate buckthorn brown; in female, much more heavily washed with blackish chestnut brown laterad and caudad, including all of supra-anal plate. Cerci above dark briefly proximad, remaining portion pale; below dark. Limbs ochraceous buff washed with russet distad. Ventral surface of abdomen, of male, chestnut becoming ochraceous tawny laterad, subgenital plate strikingly blackish brown, very narrowly margined laterad and caudad with ochraceous tawny; of female, shining blackish chestnut brown, becoming paler meso-proximad.

The species is known from the described pair.

Xestoblatta festae (Griffini) (Plate XIX, figs. 8, 9, 10 and 11.)

1896. *E[pilampra] festae* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, No. 236, p. 2. [1 ♀], Punta de Sabana, Darien.]

1898. *I[schnoptera] festae* Giglio-Tos, ibid., xiii, No. 311, p. 3. (Same material.)

The present species is closely related to the two which follow in the genus, *hamata* and *sancta*. This we are able to determine for *hamata*, from the male specimen of *festae* now before us. Compared with Giglio-Tos' description of *hamata* very close relationship is found, but in that species the male abdomen apparently shows some differences of structure, while the females apparently differ in having tegmina and wings as long as in the male, and the supra-anal plate with a medio-distal incision. Compared with the description of *sancta* the same differences for the female appear to occur, in that species a feature of different wing coloration also being remarked.

Compared with the male of X. *carrikeri* that sex of the present species is found to be very distinct; the females are less easily separated, though the present species is less robust, more reddish in general coloration, with latero-caudal angles of dorsal abdominal segments, particularly of the sixth, more produced, and longer cerci. In both sexes of the present insect the wings are less deep, and the cephalic markings, though of the same general character, show a distinctive difference, the chestnut brown of the vertex not extending below the dorsal margins of the ocelli; the ventral surface of the abdomen is pale in both sexes, suffused with darker brown distad.

As the male of this species is undescribed we here give the following characters.

Description of Male.—(Rio Machuca, Costa Rica.) Size large, form robust. Interocular space about one and one-fourth millimeters wide, slightly narrower than interocellar space. Ocellar area weakly defined and interocular space as pale as ocelli. Pronotum weakly convex to narrow lateral portions, which are rather strongly but evenly deflexed.[66] Tegmina and wings with veins more pronounced than in *carrikeri* and wings less deep, with intercalated triangle narrower.[67] Median segment with low lateral ridges which, converging, meet meso-cephalad and are supplied on their inner faces with minute hairs,

[66] The general pronotal form is the same for all the species of the genus, as given in the generic description.

[67] The ulnar vein has 5 incomplete and 5 complete rami.

the mesal area between these ridges subchitinous. Dorsal abdominal segments all with latero-caudal angles similarly acute-angulate produced to sixth segment; sixth segment narrowly visible, except laterad where the latero-caudal angles are very strongly produced, with rounded apex extending beyond median portion of eighth segment, and external margin curled over; seventh segment with apparent portion nearly as narrow as sixth but not produced laterad; eighth segment more broadly visible, with caudal margin showing a small triangular production above each cercus, and strongly concave mesad between these. Supra-anal plate weakly produced and weakly bilobate between cerci, and fringed distad with fine hairs, the structure showing only traces of a subchitinous condition along the distal margin. Subgenital plate weakly convex, narrowly but strongly reflexed along the sinistral portion of its free margin, which is heavily chitinous and armed with three widely spaced, stout, short dorsal teeth, this part extending to beneath the sinistro-distal curve of the supra-anal plate, thence the free chitinous margin is weakly oblique, nearly transverse, to beneath the dextral style, but a narrow cartilaginous mantle covered with numerous minute hairs occupies this margin, the remaining brief dextral portion of the margin is straight, longitudinal to the base of the plate, in greater part occupied by the cartilaginous integument connecting the stout chitinous base of the dextral style with the plate. From within at the base of the plate, at its sinistral margin, an elongate, stout but tapering, chitinous arm is weakly curved dextrad, extending to the distal extremity of the heavy, sinistral, marginal portion of the plate; this greatly specialized sinistral style is armed on its outer face at the extremity of its stout proximal third with a short stout tooth, the distal portion of the style is strongly curved to its acute apex. Dextrad, beneath the cercus, from the inner surface of the subgenital plate at its dextral margin, springs another heavier, elongate, chitinous arm, stout at its base, but slightly beyond bearing two elongate, slender, adjacent, dorsal, membranous cylindrical processes, which spring from a brief chitinous base and have acute chitinous apices, from this point the main shaft is more slender, slightly tapering and curving weakly caudad to the apex, which bears two minute, chitinous teeth and nearly reaches the apex of the sinistral arm. These arms (highly specialized styles) are mobile, connected with the subgenital plate at their bases by a cartilaginous integument; when at rest they lie along the inner surface of the subgenital plate at its free margin.[68]

The females before us agree closely with Griffini's description. We would note the following features.

Characters of ♀.—(On S. S. Tenadores, en route.) Similar to male, but with much shorter tegmina and wings.[69] Dorsal abdominal segments of the general character of those of *carrikeri*, but all showing a slightly greater production. Supra-anal plate convex produced between cerci, showing hardly a trace of

[68] Thus, in dried material, their form can probably seldom be seen without relaxing.

[69] The ulnar vein of the wings has 1 to 2 incomplete and 2 to 3 complete rami in the two females before us.

a medio-longitudinal sulcus.[70] Subgenital plate convex, with distal portion between cerci somewhat flattened, leaving apertures between this and the supra-anal plate at the cereal bases.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus
♂						
Rio Machuca, Costa Rica	18	4.8	7	22.7	5.8	4.4
♀						
Gatun, Panama	18.5	4.8	6.4	18	5.3	3.4
Adventive	16.3	4.3	6	17	5	3.7

The important features of coloration are discussed above.

Specimens Examined: 3; 1 male and 2 females.

Rio Machuca, Costa Rica, 150 meters, I, 1907, (P. Biolley), 1 ♂, [A.N.S.P.].

Gatun, Panama, VII, 19 to 22, 1916, (D. E. Harrower), 1 ♀, [Hebard Cln.].

S. S. Tenadores, en route New York, to Colon, Panama, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

[70] Taken in its entirety, the supra-anal plate roughly shows a somewhat trapezoidal contour, as described by Griffini.

EXPLANATION OF PLATES

Plate XVI

Figures greatly enlarged.

Fig. 1.—*Ischnoptera atrata* new species. ♂, *type*. Caparo, Trinidad. Dorsal view of supra-anal plate.[71]

Fig. 2.—*Ischnoptera atrata* new species. ♂, *type*. Ventral view of subgenital plate.

Fig. 3.—*Ischnoptera rufa rufa* (DeGeer). ♂. Arecibo, Porto Rico. Dorsal view of supra-anal plate and preceding segments.[72] A. Characteristic specialization of the sixth and seventh dorsal abdominal segments in males of *Ischnoptera*.

Fig. 4.—*Ischnoptera rufa rufa* (DeGeer). ♂. Arecibo, Porto Rico. Ventral view of subgenital plate.

Fig. 5.—*Ischnoptera rufa debilis* new subspecies. ♂, *type*. Santa Maria de Dota, Costa Rica. Dorsal view of supra-anal plate[73] and preceding segments.

Fig. 6.—*Ischnoptera rufa debilis* new subspecies. ♂, *type*. Ventral view of subgenital plate.

Fig. 7.—*Ischnoptera rufa occidentalis* Saussure. ♂. Vera Cruz, Mexico. Ventral view of subgenital plate.

Fig. 8.—*Ischnoptera vulpina* new species. ♂, *type*. Caparo, Trinidad. Dorsal view of supra-anal plate.

Plate XVII

Full figures and wing, three times natural size. Other figures greatly enlarged, except dorsal secondary sexual process which is highly magnified.

Fig. 1.—*Ischnoptera morio* Burmeister. ♂. Caracas, Venezuela. Cephalic view of cephalic femur.[74]

Fig. 2.—*Ischnoptera morio* Burmeister. ♂. Caracas, Venezuela. Diagram of wing.[75]

[71] In figures 1, 3, 5 and 8 of this plate, and figure 4 of Plate XVII, the areas of the supra-anal plates figured, which are occupied by a soft or subchitinous integument, are indicated by faint irregular lines.

[72] The specialization of the sixth and seventh dorsal abdominal segments is of the same character throughout the genus *Ischnoptera*, showing no specific diagnostic differences.

[73] The outline and extent of the subchitinous area of the male supra-anal plate shows considerable individual variation in the races of *I. rufa* and, in consequence, this feature is not of as great importance as might otherwise be inferred from consideration of figures 3 and 5.

[74] Characteristic for the genus *Ischnoptera*.

[75] Characteristic for the genus *Ischnoptera*.

Fig. 3.—*Ischnoptera morio* Burmeister. ♂. Caracas, Venezuela. Lateral outline of one of the paired secondary sexual processes of the sixth dorsal abdominal segment.[76]

Fig. 4.—*Ischnoptera morio* Burmeister. ♂. Caracas, Venezuela. Dorsal view of supra-anal plate and preceding segment.

Fig. 5.—*Ischnoptera morio* Burmeister. ♂. Caracas, Venezuela. Ventral view of subgenital plate.

Fig. 6.—*Ischnoptera vulpina* new species. ♂, *type*. Caparo, Trinidad. Ventral view of subgenital plate.

Fig. 7.—*Ischnoptera angustifrons* new species. ♂, *type*. Rio Pacaya, Peru. Ventral view of subgenital plate.

Fig. 8.—*Symploce lita* new species. ♂, *type*. Key West, Florida. Dorsal outline.

Fig. 9.—*Symploce capitata* (Saussure). ♂. Havana, Cuba. Dorsal outline.

Plate XVIII

Figures all greatly enlarged.

Fig. 1.—*Symploce lita* new species. ♂, *type*. Key West, Florida. Cephalic view of head.

Fig. 2.—*Symploce lita* new species. ♂, *type*. Dorsal view of supra-anal plate and preceding segment.[77]

Fig. 3.—*Symploce lita* new species. ♂, *type*. Ventral view of subgenital plate.

Fig. 4.—*Symploce lita* new species. ♂, *type*. Cephalic view of cephalic femur.[78]

Fig. 5.—*Symploce jamaicana* (Rehn). ♂, *type*. Port Antonio, Jamaica. Dorsal view of supra-anal plate and preceding segment.

Fig. 6.—*Symploce jamaicana* (Rehn). ♂, *type*. Lateral outline of dorsal contour of supra-anal plate and preceding segment.

Fig. 7.—*Symploce jamaicana* (Rehn). ♂, *type*. Ventral view of subgenital plate.

Fig. 8.—*Symploce capitata* (Saussure). ♂. Havana, Cuba. Dorsal view of supra-anal plate and preceding segment.

Fig. 9.—*Symploce capitata* (Saussure). ♂. Havana, Cuba. Lateral outline of dorsal contour of supra-anal plate and preceding segment.

Fig. 10.—*Symploce capitata* (Saussure). ♂. Havana, Cuba. Ventral view of subgenital plate.

Fig. 11.—*Symploce morsei* new species. ♂, *type*. Nassau, Bahamas. Dorsal view of supra-anal plate and preceding segment.

[76] Characteristic for the genus *Ischnoptera*.

[77] The figures of the supra-anal plate are, as in the other plates of the present paper, placed with outline of free caudal margin directed toward the bottom of the plate.

[78] Characteristic for the genus *Symploce*.

Fig. 12.—*Symploce morsi* new species. ♂, *type*. Lateral outline of dorsal contour of supra-anal plate and preceding segment.

Fig. 13.—*Symploce morsi* new species. ♂, *type*. Ventral view of subgenital plate.

Fig. 14.—*Symploce flagellata* new species. ♂, *type*. Desecheo Island, Porto Rico. Dorsal view of supra-anal plate and preceding segment.

Fig. 15.—*Symploce flagellata* new species. ♂, *type*. Lateral outline of dorsal contour of supra-anal plate and preceding segment.

Fig. 16.—*Symploce flagellata* new species. ♂, *type*. Ventral view of subgenital plate.

Fig. 17.—*Symploce flagellata* new species. ♂, *type*. Caudal view of sub-genital plate showing greater portion of flagellate production.

Fig. 18.—*Symploce bicolor* (Beauvois). ♂. San Francisco Mountains, San Domingo. Dorsal view of supra-anal plate and preceding segment.

Fig. 19.—*Symploce bicolor* (Beauvois). ♂. San Francisco Mountains, San Domingo. Lateral outline of dorsal contour of supra-anal plate and preceding segments, showing the very decided declivity cephalad.

Fig. 20.—*Symploce bicolor* (Beauvois). ♂. San Francisco Mountains, San Domingo. Ventral view of subgenital plate.

Fig. 21.—*Symploce bicolor* (Beauvois). ♂. San Francisco Mountains, San Domingo. Caudal view of subgenital plate showing flagellate production.

Plate XIX

Specialized styles highly magnified.

Fig. 1.—*Xestoblatta nyctiboroides* (Rehn). ♂. Igarapé Assu, Brazil. Dorsal outline of pronotum.[79] (× 7)

Fig. 2.—*Xestoblatta nyctiboroides* (Rehn). ♂. Igarapé Assu, Brazil. Cephalic view of cephalic femur.[80] (× 5)

Fig. 3.—*Xestoblatta nyctiboroides* (Rehn). ♂. Igarapé Assu, Brazil. Caudal view of subgenital plate showing specialized styles.

Fig. 4.—*Xestoblatta nyctiboroides* (Rehn). ♂. Igarapé Assu, Brazil. Dorsal view of distal portion of abdomen. A. Sixth dorsal abdominal segment. (× 3¼)

Fig. 5.—*Xestoblatta carrikeri* new species. ♂, *type*. Santa Marta, Colombia. Diagram of wing.[81] (× 4)

[79] The contour of this figure is characteristic for the species of the genus *Xestoblatta*. The dotted line indicates the inner margin of the pale border in the species.

[80] Characteristic for the species of the genus *Xestoblatta*.

[81] Characteristic for the genus *Xestoblatta*.

Explanation of diagram of wing in *Nesoblatta*.

C. M. Costal Margin.

C. Costal Veins. These are simple, not clubbed, in the species of the Group Ischnopterites, the proximal costal veins springing from the Mediastine Vein.

I. T. Intercalated Triangle. Weakly indicated in the majority of species of the Group Ischnopterites, this area shows its greatest development in *Nesoblatta* of the known genera.

M. Median Vein. This vein very rarely divides distad as shown. Normally undivided in the Group Ischnopterites, such inconspicuous distal division as here figured is attributable to individual variation only. In this portion of the wing, similar individual variation in the adjacent veins is frequently found.

Ax. Axillary Vein.

A. Anal Vein. This vein becomes subobsolete at the apex of the Intercalated Triangle.

F. D. Fork of Discoidal Vein. Characteristic of *Nesoblatta* and *Symploce*.

D. Discoidal Vein. The branches of the distal divisions of this vein are heavier and more striking in *Nesoblatta* than in *Symploce*; in that genus, the arms of the first fork alone are equally heavy and conspicuous.

U. Ulnar Vein. The number of rami of this vein is greatly reduced in individuals of *Nesoblatta* showing wing reduction.

Ms. Mediastine Vein.

P. Peripheral Margin. Into which run; the Axillary Vein, its rami and the Radiate Veins.

R. Radiate Veins.

Fig. 6.—*Nesoblatta carrikeri* new species. ♂, *type*. Santa Marta Colombia. Caudal view of portion of subgenital plate showing specialized styles.

Fig. 7.—*Nesoblatta carrikeri* new species. ♂, *type*. Dorsal view of distal portion of abdomen. A. Depressed median specialization of sixth dorsal abdominal segment.

Fig. 8.—*Nesoblatta festae* (Griffini). ♂. Rio Machuca, Costa Rica. Dorsal view of sinistral specialized style.

Fig. 9.—*Nesoblatta festae* (Griffini). ♂. Rio Machuca, Costa Rica. Caudal view of sinistral specialized style and sinistral margin of subgenital plate, showing the armament of that margin. ×3.

Fig. 10.—*Nesoblatta festae* (Griffini). ♂. Rio Machuca, Costa Rica. Caudal view of dextral specialized style.

Fig. 11.—*Nesoblatta festae* (Griffini). ♂. Rio Machuca, Costa Rica. Dorsal view of distal portion of abdomen. A. Latero-caudal production of sixth dorsal abdominal segment. ×3.

NEW EASTERN ANTHOMYIIDAE (DIPTERA)

BY O. A. JOHANNSEN

In arranging the Anthomyiidae of the Cornell University Collection, for the purpose of listing the New York State species in the forthcoming "Catalogue of the Insects of New York," I found ninety species from this state, about three-fourths of which have already been recorded from the eastern United States. Of the remainder, which cannot be satisfactorily identified with known forms, eight are published herewith as new. The others, since they are represented either by poorly preserved specimens or by females only, it is inexpedient to describe.

The assignment of the species to genera is in accordance with the recent classification of Schnabl and Dziedzicki, and practically that of Stein in the "Katalog der palaearktischen Dipteren," Vol. 3. The terminology of the setae of the legs given by Stein has been adopted as being the most natural. The insect is assumed to be standing with the fore and hind femora parallel with the body, the former turned forward, the latter backward, the middle femora at right angles to the body, and the tibiae vertical. When in this position the sides of femora and tibiae turned cephalad are called anterior, those turned caudad are called posterior. The terms extensor and flexor sides are self-explanatory. Thus an outer lateral extensor seta of the fore tibia is one which is on the side of the tibia outward and forward from the body.

For the benefit of those who do not have access to the work of Schnabl and Dziedzicki, it has been thought useful to give an adaptation of their key to the subfamilies (exclusive of the Muscinae), as well as a short diagnosis of each of the genera, to which species in this paper have been referred.

Key to the Subfamilies

A. Sterno-pleural setae arranged in an equilateral triangle; d. c. 4, rarely 3 or 5; the seta on the posterior median extensor surface (calcar of Schnabl) of the hind tibia placed very low, becoming preapical in position; eyes of both male and female usually widely separated; anal vein abbreviated; wing not rilled;

abdomen often with four to eight spots; caudal margin of the fifth ventral sclerite of the male deeply notched on the median line usually to beyond the middle; the fulcrum of the hypopygium produced caudad . . . . **Coenosinae**

AA. Sternopleurals, if three are present, arranged in the order 1:2 in a right triangle (except in *Lispocephala, Limnospila,* and *Dialyta*); eyes of the male usually more or less approximate, often contiguous; anal vein sometimes produced to the margin (in the *Anthomyiinae*); wings often rilled; caudal margin of the fifth ventral sclerite of the male usually with a shallow median notch, in some genera deeply two or three notched; fulcrum of the hypopygium produced cephalad (except in *Euryomma, Limnospila* and *Coenosites*).

B. Underside of the scutellum more or less sparsely covered with fine hairs; anal vein (with very rare exceptions) produced to the margin of the wing; squamae often small and equal, and not contiguous at the base. . . . . **Anthomyiinae**

BB. Underside of the scutellum bare; anal vein does not reach the margin of the wing.

C. First anal vein short, second anal suddenly flexed upwards; sternopleurals often arranged in the order 1:1; posterior extensor surface of the hind tibiae with one or two setae . . . . . **Fanninae**

CC. Anal veins parallel or divergent.

D. Seta on the posterior median extensor surface of the hind tibiae absent (except in the exotic *Limnaricia* and *Coenosites,* in which the anterior supra-alar seta ("pra" of Stein) of both sexes and the cruciate setae on the front of the female are wanting, the former genus with 6, the latter with 7 pairs of d. c.).

E. Thorax with an uneven number of dark stripes, or unmarked; scutellum with only the larger basal and subapical setae; face and oral margin usually produced; R_{4+5} and M_{1+2} parallel or slightly convergent, more rarely divergent; no cruciate setae on the front of the female; "pra" minute or wanting; usually sparsely and short-setose species . . . . . **Limnophorinae**

EE. Thorax with an even number of dark stripes or rarely unmarked; scutellum with stout discal, prebasal and preapical setae in addition to the basals and subapicals (except in the exotic *Enoploptcryx* and *Linmaricia*): face usually vertical, rarely produced; R_{4+5} and M_{1+2} usually diverging or parallel; cruciate frontals usually absent; "pra" often present; usually strongly setose species . . . . **Mydaeinae**

DD. One (rarely more) seta on the posterior median extensor surface of the hind tibiae present; the cruciate frontal setae in the female and the anterior supra-alar bristle (pra) not simultaneously wanting, except in *Dialyta* in which "pra" is very small and may be absent, and in *Trichopticus* in which the eyes are hairy. . . . . **Aricinae**

Coenosinae

The genera *Schoenomyza, Hoplogaster, Phyllogaster* and *Coenosia* are represented in New York State.

ANTHOMYIINAE (= *Hylemyiinae-Pegomyiinae* Schn.-Dz.)

The genera thus far found in New York are *Hammomyia*, *Hylephila*, *Hylemyia*, *Chortophila* (= *Phorbia*), *Hydrophora*, *Eustalomyia*, *Eremomyia*, *Anthomyia* and *Pegomyia*.

HAMMOMYIA Rondani

In this genus the head is strongly inflated or buccate, the front projecting out from between the eyes, with broad genae and buccae; the arista plumose or long pubescent; the frontal stripe is narrow in both sexes and cruciate setae on the front of the female are present. If *Hylephila* is to be maintained then both *H. maculata* and *unilineata*, assigned to *Hammomyia* in Aldrich's Catalogue, should be transferred to the former genus.

Hammomyia setigera n. sp.

Male. Length 6 mm. Head black, silvery gray pruinose with black reflections; in profile the genae are about half, the buccae nearly as broad as the width of one eye; setae of the vertex, front, lateral oral margin and the lower margin of the buccae rather dense; frontal setae about ten in number, closely set, the lowermost about on line with base of the antennae. Face concave in profile; oral margin rather prominent; antennae black, third joint twice as long as the second, not reaching the oral margin; arista thickened at the base, short plumose. Front and frontal stripe dull black, at the narrowest point but little broader than the diameter of the anterior ocellus; orbits gray pruinose, at narrowest point about half as wide as the frontal stripe; proboscis and palpi piceous. Thorax black, bluish gray pruinose, with three narrow vittae, the laterals on line with the dorso-central setae. Dorso-centrals 2+3; sternopleurals 1+2 mingled with a number of long fine hairs; "pra" nearly as long as the seta which follows it. Scutellum with a pair of strong basals, strong subapicals, small apicals, a pair of slender discals, beside some finer discal hairs; the pubescence of the lower surface restricted to a few fine pale hairs. Abdomen gray pruinose, viewed from the side showing indistinct darker triangular reflecting spots, which when viewed from behind are usually bisected by a gray longitudinal line. The abdomen is narrow, elongate, each segment with numerous slender setae both dorsally and ventrally; setae of the sternites short, dorsal marginal setae somewhat stronger than the discal setae; fifth sternite and the hypopygium as figured (figs. 1, 2). Legs black; middle femur with three or four strong setae on the underside and an oblique row of three or more near the apex on the hinder side. Fore tibia with two or three small setae on the front (extensor) side beyond the middle, and one large outer lateral at the middle; middle tibia with two setae on the front side beyond the middle, two or three on the posterior extensor and two on the posterior flexor side; hind tibia with three on the outer flexor, three to five on the outer extensor and three to five on the inner extensor side. Tarsal claws strongly setulose, not

much curved except at the tip, shorter than the rather elongate whitish pulvilli. Wings grayish hyaline, more yellowish at the base; veins yellow, darker apically; costal spine distinct; veins R_{4+5} and M_{1+2} parallel or slightly converging; R_1 ends opposite the r-m crossvein; m-cu crossvein sinuous, perpendicular to Cu_1 but oblique to M_{1+2}; penultimate to ultimate section of M_{1+2} as 11 to 17; m-cu crossvein 1.5 times as long as the last section of Cu_1. Squamae yellowish white, upper one covers the lower; halteres yellowish. McLean, Tompkins County, New York. May.

Type and paratypes in Cornell University Collection. Two paratypes in the collection of the American Entomological Society of Philadelphia.

HYLEPHILA Rondani

This genus differs from *Hammomyia* in having the arista nearly or quite bare. In the "Katalog der palaearktischen Dipteren" the genus is merged with *Hammomyia*. Two species are found among the New York State material, one is *Hylephila maculata* Stein, the other, unfortunately represented by female specimens only, is but 4 mm. in length and differs from other species in chaetotaxy.

HYLEMYIA R. D.

Schnabl and Dziedzicki place the species of the genus *Hylemyia* (*sensu auct. nec.* Schn. *et* Dz.) that have no cruciate setae on the front in the female, in the genus *Pegomyia* (subgenera *Pegoplata* and *Pegomyza*). On the other hand certain species, such as *radicum, cilicrura* (=*fusciceps*), *ceparum, brassicae*, et al., which heretofore have been placed in *Anthomyia* or *Phorbia*, have been transferred to *Hylemyia*.

Hylemyia tenax n. sp.

Male. Length 7 mm. Orbits contiguous for a distance nearly equal to the length of the frontal triangle, the latter black, margined with five or six pairs of orbital setae; front and genae projecting but slightly in profile, oral margin not prominent; buccae slightly wider in profile than the length of second antennal segment, the latter reddish, less than half as long as the elongate, blackish, third segment; arista long plumose; palpi yellow; proboscis black; genae, buccae, and occiput light grayish pruinose; frontal lunule reddish. Thorax black, thick yellowish-gray pruinose, with scarcely a trace of longitudinal lines; inner dorso-centrals strong; outer dorso-centrals 2+3; "pra" distinct but less than a third as long as the following seta; sterno-pleurals 2+2, the lower anterior long, but slender. Abdomen somewhat depressed, elongate oval, narrower than the thorax; the basal segments more or less translucent yellowish except at the immediate base, the other segments more grayish,

yellowish-gray pruinose, anterior margins of the segments and a trace of a median line, darker gray; six or eight pairs of depressed marginal setae on each segment. Hypopygium (figs. 3, 4) inconspicuous, reddish yellow; fifth ventral selerite of the same color. Legs reddish yellow, tarsi black, pulvilli and claws long; fore tibia with one outer lateral and one anterior extensor seta, both on the same level distad of the middle; middle tibia with one seta on the anterior extensor, two or three on the posterior flexor, and one or two on the posterior median surface; hind tibia with two long bristles on the median extensor surface, three or four on the outer extensor, three small ones on the outer flexor, and three or four small ones on the inner flexor surface. Fore and hind femora each with a sparsely placed longitudinal row of long setae on the flexor surface and a row of shorter ones, of increasing length distally, on the outer extensor surface. Wing yellowish, more grayish toward the apex; costal spine shorter than the r-m crossvein; R_1 ends slightly distad of this crossvein; the m-cu crossvein distinctly flexed; R_{4+5} and M_{1+2} slightly divergent. Squamae not large, the lower scale covered by the upper; yellow in color, as are also the halteres. Ithaca, New York, August. Four specimens.

This species closely resembles *H. alcathoe* but differs in the chaetotaxy of the legs, in the structure of the hypopygium, and in having the abdominal markings less distinct.

Type and paratypes in Cornell University Collection. One paratype in the collection of the American Entomological Society of Philadelphia.

Hylemyia (Crinura) trichodactyla Rondani (=*Chortophila trichodactyla*, =*Phorbia platura* Meigen in part)

The collection contains specimens of this species from various localities in New York, as well as from Sandford, Ontario and Truro, Nova Scotia. This species has doubtless frequently been confused in American collections with *Phorbia fusciceps* (=*P. cilicrura* Rondani) and is probably the *P. platura* Meigen referred to in Aldrich's Catalogue. *P. platura* of Rondani[1] is a different species. *H. trichodactyla* resembles *fusciceps* in having the flexor surface of the hind tibia ciliated, but differs in having long bristly hairs on the extensor surface of the first segment of the middle tarsus.

Fanninae

This subfamily is represented in the State of New York by the genera *Fannia* and *Azelia*.

[1] Prodrome VI, 228.

FANNIA R. D.

The more or less approximate eyes of the male and the relatively short second abdominal segment are characteristics of this genus.

Fannia parallela n. sp.

Male. Length 4.5 to 5 mm. Head in profile hemispherical, genae and buccae scarcely visible from the side; frontal triangle small; orbits silvery, separated by a narrow, black, frontal line about as wide as one of the orbits; eyes bare; antennae two-thirds as long as the face, fuscous, the third segment grayish pruinose, arista with a pubescence just visible under twenty diameters; palpi black. Thorax black, shining, only faintly pruinose when viewed from the side; inner d. c. (acrostichals) in two rows, small, except the posterior pair; "pra" long. Abdomen narrow, more distinctly tapering than in *F. canicularis*, shining black, the three basal segments somewhat translucent yellow at the sides, as in the species just mentioned but less conspicuously. Hypopygium as figured (figs. 5, 6). Legs black, the knees more or less yellowish; fore tibia with a short seta on the extensor surface at the apical fifth; basal two-thirds of middle femur on flexor side with three rows of setae, of which the setae of the anterior and the median rows gradually increase in length, suddenly interrupted for a short space, then both rows continued in six or seven closely set setae; middle tibia but slightly thickened on the apical third, ciliate on inner side, the hairs gradually increasing in length at the apex where they are about as long as the diameter of the segment; on the apical fourth anteriorly are three or four setae and posteriorly there is another one; hair on the inner side of the hind femur even less conspicuous than in *F. canicularis*; the setae on the outer flexor surface with about ten in the row, those on the outer extensor surface more numerous and more irregularly placed; hind tibia usually with two setae on the outer extensor side at three-fifths and four-fifths of the tibial length from the base respectively, and one longer one on the median extensor side at the apical third. Wing with a strong smoky tinge, more yellowish at the base; costal spine scarcely differentiated; R_{4+5} and M_{1+2} parallel or slightly converging; the penultimate section of M_{1+2} about half as long as the ultimate; the last segment of Cu_1 a little over half as long as the m-cu crossvein. Squamae yellowish with a smoky tinge, the upper covering the lower. Halteres yellowish. Ithaca, New York, August 30. Four males.

This species goes to *F. difficilis* in the key given by Stein.[2] It differs chiefly in the arrangement of the setae of the middle femur and in lacking the dense hair on the inner surface of the hind pair. From *F. canicularis* it may readily be distinguished by the narrower front and darker thorax and abdomen.

[2] Die Anthomyidengruppe Homalomyia, 1895.

Type and paratypes in the Cornell University Collection. One paratype in the collection of the American Entomological Society of Philadelphia.

LIMNOPHORINAE

Lispa, Hebecnema and *Limnophora* are genera of this subfamily represented in the fauna of New York State.

LIMNOPHORA R. D.

The more or less narrowed front of the male, the paired abdominal spots, and weak setae of the body characterize this genus.

Limnophora torreyae n. sp.

Male. Length 4 to 4.5 mm. Head black, orbits brownish-black, contiguous; frontal triangle and antennae dull black, antennae black, about two-thirds the length of the face, arista pubescent, black; palpi black; face black with grayish reflections, concave; oral margin somewhat produced, genae blackish, barely visible in profile; buccae grayish pruinose, in profile nearly as wide as the length of the third antennal joint. Mesonotum subopaque brownish-black with indications of a divided median, black line; scutellum subopaque brownish-black; pleura and metanotum grayish pruinose; inner dorso-centrals in two rows, setulae-like except a larger pair in front of the scutellum; dorso-centrals 2+3; sterno-pleurals 1+1; "pra" and the second post-sterno-pleural not differentiated from the setulae; scutellum with the usual two pairs of macrochaetae. Abdomen ovoid, yellowish-gray pruinose, if but four segments are counted, the first wholly black except for the immediate base and the median stripe; the second and third with large black triangles, the posterior corners of which are more or less produced along the posterior margins of the segments; fourth with a median triangle, sometimes divided, extending the full length of the segment; abdominal setae slender, sparse and depressed. Hypopygium as figured (figs. 10, 11). Coxae gray; legs black, claws and pulvilli small. Fore tibia with a fine seta on the outer lateral extensor side near the middle and another, sometimes wanting, a little more distad on the outer lateral flexor side; the middle tibia with two on the posterior extensor side; hind tibia with two on both outer lateral extensor and flexor surfaces, sometimes one or the other wanting. Wings grayish hyaline; costal spine very small; R_1 ends about opposite the r-m crossvein; m-cu crossvein slightly flexed, nearly perpendicular to M_{1+2}, the penultimate section of M_{1+2} half as long as the ultimate section; m-cu crossvein about one-fourth longer than the last section of Cu_1. Squamae yellowish-white, margin more yellow, lower scale projecting one-half its width beyond the upper. Halteres yellow.

Female. Front a little broader than one eye, dark brown; frontal triangle a velvety seal brown, deeply notched almost to the base of the antennae; ocellar spot of the same texture as the frontal stripe; face, genae and buccae whitish-gray pollinose; genae in profile as wide as the width, buccae nearly as

wide as the length, of the third antennal joint. Mesonotum and scutellum subshining seal brown, with scarcely a trace of stripes; pleura, metanotum and a basal triangle on the scutellum grayish-white pollinose with a brassy tinge. Abdomen grayish-white pollinose with a brassy tinge, with three pairs of large seal brown triangles and an elongate median spot on the fourth segment. Setae of the legs as in the male, except that the seta on the flexor surface of the fore tibia and one of the setae of the extensor surface of the hind tibia may be wanting. Ithaca, New York, June.

Type (male) and paratypes in the Cornell University Collection. Paratypes (two males and one female) in the collection of the American Entomological Society of Philadelphia.

Mydaeinae

The subgenera *Mydaea*, *Spilogaster*, and *Spilaria* of the genus *Mydaea* are represented in the New York fauna.

Mydaea (Spilaria) pectinata n. sp.

Male. Length 9 mm. Head black with grayish bloom, eyes separated on the front by the rather narrow silvery-gray orbits and a still narrower black frontal stripe which expands over the front at the base of the antennae; front buccate; genae black, silvery pruinose, at the base of the antennae in profile nearly twice as wide as the width of the third antennal joint; buccae in profile nearly as wide as the length of the third antennal joint; antennae black, elongate but not attaining the oral margin; third joint three times the second in length; arista long plumose; second joint with two or three strong, and several smaller setae; eyes quite hairy; palpi black. Thorax black, grayish pruinose; mesonotum with four black stripes, the two median narrower; two inner dorso-centrals in front of the scutellum; dorso-centrals 2+4; "pra" fine, about a third as long as the seta which follows it; sterno-pleurals 1+2, below the posterior pair sometimes with one additional, but more slender, bristle. Abdomen ovate, black, with a coarse or flaky yellowish-gray bloom; second and third segments (if but four are counted) each with a pair of large, rather narrowly divided, rounded, brownish-black spots; long fine discal setae on the third and fourth segments, the marginal setae of each segment rather depressed; hypopygium inconspicuous (figs. 12, 13). Legs yellow, the fore femur except the tip, the basal two-thirds of the middle femur, the immediate base and a spot on the extensor side at the tip of each hind femur, and all the tarsi, black. Fore femur with a close row of long fine setae on the outer flexor side and another on the extensor side, the latter scarcely differentiated from the long setulae which cover this member; middle femur covered with long setulae, especially long near the base on the anterior side, with a row of long slender setae extending for two-thirds the length from the base on the posterior flexor side, a tuft of six to eight long stout setae or spines at the base, and a few stout ones apically on the posterior extensor side; hind femur with a

row of long fine setae of decreasing length on the basal three-fourths on the outer lateral extensor surface, a row of increasing length on apical half on the outer lateral flexor side; fore tibia with two setae on outer lateral side, middle tibia with a row of long setae not of uniform length on the posterior extensor side; posterior tibia with two strong setae on outer lateral extensor side at the middle and distad; and two rows of long, closely spaced, slender setae on the flexor side, one of which is outer lateral and the other is inner lateral in position. Claws and pulvilli long. Wings rilled, hyaline with a smoky tinge, veins yellowish-brown, crossveins conspicuously clouded; costal spine distinct but not large; R_1 ends slightly distad of the r-m crossvein; R_{4+5} and M_{1+2} distinctly divergent; penultimate section of M_{1+2} is half as long as the ultimate section; m-cu crossvein slightly flexed, about a tenth longer than the last section of Cu_1; squamae yellow tinged, lower one projects over one-third its width beyond the upper; halteres yellow. Ithaca, New York, June. Millville, Nova Scotia.

This species goes into the couplet 35 on page 429 in Schnabl's key to *Aricia* sens lat.,[3] but is readily distinguished from the two species of that couplet.

The type (from New York) is in the Cornell University Collection. The paratype (from Nova Scotia) is in the collection of the American Entomological Society of Philadelphia.

Aricinae

Dialyta, *Hydrotaea*, *Orphyra*, *Pogonomyia*, *Allocostylus* and *Phaonia* are genera of this subfamily represented in New York.

DIALYTA Meigen

The species of this genus are very few in number and all seem to be exceedingly rare. Following Schnabl and Dziedzicki the genus may be characterized as follows: Habitus Tachinid-like; front broad in both sexes, in the female a little more than a third of the head in width, in the male either equally broad or somewhat more narrowed. Face receding, sometimes greatly; buccae moderately narrow to broad; antennae elongate, either hanging free or in contact with the face; arista pubescent or short plumose; palpi somewhat broadened toward the apex; cruciate frontal setae absent; outer verticals and post verticals well developed; orbitals of the female in a single row on each side; eyes bare, or sparsely and short pubescent below. Sternopleurals three, the posterior pair wide apart, the three thus nearly forming an equilateral triangle, almost as in the Coenosinae.

[3]Horae Soc. Ent. Ross., vol. xx.

The anterior supra-alar ("pra" of Stein) very minute, differing in this respect from *Phaonia*. Abdomen with four segments subequal in length, the male with a deeply notched fifth sternite as with the Coenosinae and the Hylemyiinae. Hind tibiae each with but one seta on the median posterior extensor side (calcar of Schnabl) beside the preapicals, but with three to six stout, short setae on the outer flexor side at the middle third. Wings not rilled, costal spine present; last section of Cu_1 as long or longer than the m-cu crossvein; squamae unequal.

The color, the position of the lower sterno-pleural seta, the position and number of the scutellar setae, the presence of two anterior dorso-centrals, the shape of the abdomen, the absence of the frontal cruciate setae in the female, and the elevated position of the median posterior seta on the extensor surface of the hind tibia offer a combination of characters which will distinguish the members of this genus from the forms with which they are most likely to be confused.

Because of the rarity of the species of this genus and the presence of well marked characters, I venture here to erect a species upon a single female specimen, a procedure not recommended in general for members of this family.

Dialyta flavitibia n. sp.

Female. Length 7 mm. Black, shining; the trochanters, knees, tibiae, and halteres reddish-yellow, wings and squamae strongly yellow tinged.

Head in profile, oval, viewed in front broader than high; front wider than one eye, with parallel sides gradually widening a little on the lower third, in profile produced at the base of the antennae about a third the width of the eye; genae but slightly produced; buccae broader than the width of the third antennal joint; face black, with a silvery sheen, somewhat receding, oral margin not prominent; orbits subshining black, about one-fourth the width of the dull black frontal stripe; ocellar triangle and the occiput subshining black. Orbital setae in one row descend to the base of the antennae; cruciate setae wanting; antennae nearly as long as the face; arista black, short plumose to the tip, the longer hairs over twice as long as the diameter of the arista at the base; palpi black, almost linear; proboscis normal, black, labellae reddish; eyes very sparsely pubescent below. Thorax black, shining, when viewed obliquely very thinly whitish pruinose; inner dorso-centrals and "pra" not differentiated from the setulae which are found among the macrochaetae; dorso-centrals 2+3; sterno-pleurals 1+2, the posterior pair rather more widely separated than is usual with the Phaoninae; four strong and four weaker scutellar setae besides several setulae; the subapical setae shorter than the basal pair. Abdomen shining black, longer than the thorax, tapering,

the four segments subequal in length; first segment with a small lateral marginal seta, the second, third and fourth segments each with four pairs of strong marginals, the third and fourth each also with four pairs of strong discals arranged in a transverse row. The ventral sclerite of the first segment only is visible, the remaining segments have the margins of the dorsal sclerites in contact along the venter. Legs black, the trochanters, all tibiae, the tips of all femora, reddish-yellow; the setae of the femora rather long and slender, but few in number, arranged in longitudinal rows; fore femur with four or five in the upper row, about ten in the row on the outer lateral extensor surface and seven in the lower row on the outer lateral flexor surface; hind femur with about twelve in the upper outer lateral, and six in the lower outer lateral row; fore tibiae each with two anterior (extensor) and one outer lateral seta; middle tibia with one anterior (extensor) and one or two posterior extensor setae; hind tibia with three stronger setae on the apical half and three weaker setae on basal half of outer lateral flexor surface, two stout setae on outer lateral extensor surface and one (characteristic of the Phaoninae) on the median line of the extensor surface, at two-thirds of the distance from base of the tibia. Besides these, all tibia provided with a number of apical setae. Claws rather short, pulvilli as long as the claws. Wings hyaline, yellow tinged, base and veins strongly yellowish tinged, the m-cu crossvein faintly clouded with brownish; two costal spines of moderate length; R_1 ends before the r-m crossvein; the m-cu crossvein straight, makes a right angle with M_{1+2} and enters Cu_1 at a point approximately its own length from the wing margin; no setae at the base of the radial veins. Squamae pale yellowish, unequal, moderate, lower projects half its width beyond the upper; halteres reddish yellow. Adirondack Mts., New York, July.

Type in the Cornell University Collection.

PHAONIA R. D.

Phaonia (Aricia) nigricans n. sp.

Male. Length 10 mm. Head black, with pruinose reflections, angular, width in profile at base of antennae and at the vibrissae about equal; the grayish orbits contiguous on the front; genae in profile wider than the width, buccae nearly as wide as the length of the third antennal joint; antennae black, shorter than the face, second joint with three strong setae; arista long plumose on basal half; face slightly concave, oral margin prominent; eyes moderately hairy; palpi black. Thorax black, thinly gray-pruinose, mesonotum when viewed from above with four black vittae separated by three equally broad grayish dividing stripes; scutellum black, tinged with yellowish-brown toward the tip; anterior spiracle pale yellow; two pairs of inner dorso-centrals in front of the scutellum; dorso-centrals 2+1, a stout bristle placed in front and slightly laterad of the first anterior dorso-central; "pra" nearly as long as the first supra-alar; sterno-pleurals 1+2; scutellum with its full complement of setae. Abdomen short ovate, black, tessellate with silvery-gray reflecting spots; three or four irregularly spaced discals on the second, five or six on the

third, and a larger number on the fourth segment; the marginals of the first and second somewhat depressed and not conspicuous, those of the third and fourth as large as the discals; conjunctiva of the venter visible. Hypopygium not prominent (figs. 14, 15). Legs black, knees tipped with red; fore femur with long hairs and three rows of slender setae on the outer lateral surface, two of which are on the extensor and one on the flexor surface; middle femur with a row of six or seven stout, spine-like setae on the lower (flexor) side on basal half; hind femur with a row of eight or ten spine-like setae on the lower (flexor) side and a closer row of long setae on the dorsal (extensor) surface; fore tibia without, middle tibia with three setae on the posterior surface, hind tibia with three on the outer lateral flexor surface, two on the outer lateral extensor surface and one (the calcar) placed nearly a fourth the length of the tibia above the preapical setae on the median extensor surface; tarsal claws and pulvilli large. Wings rilled, smoky hyaline, smoky tinge deeper along the course of the veins, crossveins conspicuously clouded, veins black; costal spine small; R_1 extends distinctly beyond the r-m crossvein; m-cu crossvein oblique and strongly flexed; penultimate section of M_{1+2} slightly over half as long as the ultimate; m-cu crossvein about a fourth longer than the last section of Cu_1. Squamae whitish with a smoky tinge, large, lower one projects nearly half its width beyond the upper. Halteres pale yellow. One male specimen.

Type in Cornell University Collection.

Female. Front a little wider than one eye; fronto-orbitals in a single row on each side, with lateral setulae; frontal cruciate setae wanting; scutellum sometimes without a tinge of yellow at the tip; no discals on the second, but two or three on the third abdominal segment. Hairs on the fore femora shorter than in the male, setae of the legs otherwise as in the male. Claws and pulvilli somewhat smaller than in the male. Penultimate section of M_{1+2} from three-fifths to three-fourths as long as the ultimate.

Ithaca, New York, May.

Paratypes in the Cornell University Collection, and one in the collection of the American Entomological Society of Philadelphia.

This species will go into couplet 17, page 425 in Schnabl's key.[4]

Phaonia (Euphemia) apicata n. sp.

Male. Length 6 to 6.5 mm. Head black, grayish pruinose, angular, width in profile at base of the antennae equal to width at the vibrissae; eyes moderately pubescent, large, so that front and genae in profile show but little; buccae in profile broader than half the length of the third antennal joint; face slightly concave, oral margin not prominent; palpi blackish, sometimes yellow at the base; antennae black, almost reaching the oral margin, second joint and the base of the third, yellow; arista long plumose; frontal triangle narrow over the antennae, black, orbits contiguous below the ocelli for a short

[4]Horae Soc. Ent. Ross., vol. xx.

distance. Thorax black, thinly gray pruinose, the four narrow black longitudinal stripes more or less distinctly visible; scutellum gray at the base, translucent, yellow apically; one pair of inner dorso-centrals in front of the transverse suture present, though but small in some specimens and absent in one, dorso-centrals 2+3; "pra" about as long as the first dorso-central; sterno-pleurals 1+2; basal and subapical setae of the scutellum long, prebasals and discals shorter. Abdomen ovate, as long as the thorax and scutellum combined, black, gray pruinose, a median black stripe visible when viewed from behind; third and fourth segments with a few slender discals and more numerous slender marginals; hypopygium inconspicuous (figs. 16, 17). Legs yellow; tarsi black; femoral setae sparse and slender, rows on the flexor side no stronger than those on the extensor side; fore tibia without, middle tibia with two posteriorly, one in the middle and one between the middle and the apex; hind tibia with one (calcar) on the median extensor surface about a fifth of the tibial length from the preapical; two on outer lateral extensor and three on outer lateral flexor surface; claws and pulvilli moderate. Wings yellowish hyaline, yellow tinged at the base, feebly rilled, veins yellow; costal spine small; R_1 ends opposite the r-m crossvein; R_{4+5} and M_{1+2} diverge; penultimate section of M_{1+2} about half as long as the ultimate section; m-cu crossvein is somewhat flexed and oblique and is 1.5 times as long as the last section of Cu_1. Squamae strongly tinged with yellow, large; the lower projects half its width beyond the upper. Halteres yellow.

Female. Front nearly a fourth wider than one eye; frontals in a single row on each side sparsely placed; no cruciate setae on the front; in immature specimens third antennal joint, palpi, and humeri yellowish; anterior inner d. c. wanting; abdomen shorter and broader than in the male, less pruinose with median line less conspicuous or entirely wanting; costal spine large and the claws and pulvilli smaller than in the male. Hind tibia sometimes with but two setae on the outer lateral flexor surface. Ithaca, New York, May to September. Truro, Nova Scotia, August.

This species has been assigned to the subgenus *Euphemia*, even though the anterior inner dorso-centrals are rather small in some individuals, absent in the females and in one of the males. It bears much resemblance to *P. apicalis* Stein.[5]

Type (male) and paratypes in the Cornell University Collection. Two paratypes (one of each sex) in the collection of the American Entomological Society of Philadelphia.

[5]Archiv für Naturg., vol. 79, page 46.

EXPLANATION OF FIGURES

PLATE XX

Magnification × 30. The figures marked "ventral" show the hypopygium in ventral aspect when but slightly relaxed, the superior forceps thus turned under with its dorsal side directed ventrad. In fig. 7 both forceps are shown more relaxed and in ventral aspect. s = superior forceps. i = inferior forceps. f = fulcrum. v = fifth sternite.

Fig. 1.—*Hammomyia setigera.* Side.
Fig. 2.—*Hammomyia setigera.* Ventral.
Fig. 3.—*Hylemyia tenax.* Side.
Fig. 4.—*Hylemyia tenax.* Ventral.
Fig. 5.—*Fannia parallela.* Ventral.
Fig. 6.—*Fannia parallela.* Side.
Fig. 7.—*Limnophora discreta* Stein. Ventral.
Fig. 8.—*Limnophora discreta* Stein. Superior forceps (a = anterior end).
Fig. 9.—*Limnophora discreta* Stein. Side.
Fig. 10.—*Limnophora torreyae.* Side.
Fig. 11.—*Limnophora torreyae.* Ventral.
Fig. 12.—*Mydaea (Spilaria) pectinata.* Ventral.
Fig. 13.—*Mydaea (Spilaria) pectinata.* Side.
Fig. 14.—*Phaonia (Aricia) nigricans.* Side.
Fig. 15.—*Phaonia (Aricia) nigricans.* Ventral
Fig. 16.—*Phaonia (Euphemia) apicata.* Side.
Fig. 17.—*Phaonia (Euphemia) apicata.* Ventral.

NEW SPECIES OF HYMENOPTERA OF THE SUPERFAMILY SPHECOIDEA

BY CLARENCE E. MICKEL

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It has been the privilege of the writer during the past few months to work over the material of the superfamily Sphecoidea in the entomological collection of the University of Nebraska. Since the publication of "The Sphegoidea of Nebraska"[1] by H. S. Smith in 1908, a great deal of new material has been added to the University collection. A number of new species were found in this material as well as a great many forms new to the state list. It is the purpose of this paper to present the descriptions of the new species and some notes concerning the more important forms. Additional notes and a complete list of the Nebraska Sphecoidea will appear in a future paper now in course of preparation. The writer also received a number of specimens from Mr. O. A. Stevens of the North Dakota Agricultural College and the new species in that material are included in the present paper. The nomenclature of the thoracic sclerites used herein is that of Mr. Robert E. Snodgrass.[2] A binocular microscope was used in identifying all specimens and in interpreting the characters used in the descriptions. The types of all the species described herewith are in the entomological collection of the University of Nebraska, and paratypes, so far as possible, have been deposited in the collection of the American Entomological Society.

[1] University of Nebraska Studies, viii, pp. 323–410, October 1908.

[2] Proceedings of the United States National Museum, xxxix, pp. 37–91

Family NYSSONIDAE

Subfamily ASTATINAE

Brachystegus maculipes sp. nov.

♀. Length 4 to 5 mm. Head black, front finely and closely punctured, sparsely covered with short silvery pubescence, clypeus with pubescence somewhat longer; mandibles rufous, black at base; antennae black. Thorax entirely black, sparsely covered with short silvery pubescence; mesoscutum finely punctured medially, more coarsely so toward the sides; episterna and mesoscutellum finely reticulate; upper surface and sides of propodeum coarsely reticulate. Abdomen entirely black, sparsely covered with silvery pubescence; abdominal tergites one to four with a small whitish spot laterally; abdomen dorsally, finely and closely punctured, ventrally with the punctures more sparse and interspersed with a few coarse ones; pygidium a little longer than wide, margined laterally. Legs black; front tibiae and tarsi somewhat rufous; front and median femora with an elongated whitish spot at the tips.

♂. Unknown.

Type, a female taken at Omaha, Nebraska, June 26, 1914, (L. T. Williams). Three paratypes, Omaha, Nebraska, June 15, one female; and June 26, two females, (L. T. Williams).

Similar to *opulentus* but differs in being entirely black except abdominal markings and in its much smaller size.

Brachystegus trichrus sp. nov.

♀. Length 3 to 4 mm. Head black; front finely and closely punctured, sparsely covered with silvery pubescence; apex of clypeus sparsely punctured, without pubescence; mandibles rufous; antennae black. Thorax black, sparsely covered with short silvery pubescence; mesoscutum and mesoscutellum finely punctured; a longitudinal median furrow on the anterior portion of the mesoscutum; episterna more coarsely punctured than the mesoscutum and with more dense pubescence; propodeum finely reticulate with a dense spot of silvery pubescence on each side near the spine; sides of propodeum finely punctured; posterior lobes of pronotum white. Abdomen rufous; last four abdominal tergites black; each tergite with an apical silvery fascia; first two abdominal tergites with a whitish spot on each side posteriorly; pygidium a little longer than wide. Front legs more or less rufous; middle and posterior legs black.

♂. Unknown.

Type, a female taken at Omaha, Nebraska, August 18, 1914, (L. T. Williams); paratype, Omaha, Nebraska, July 5, 1913, (L. T. Williams)

Similar to *basilaris* but differs in being more finely punctured, smaller in size, and in the abdominal markings.

Hoplisus rufocaudatus sp. nov.

♂. Length 10 to 11 mm. Black with red and yellow markings. Head black; covered with a sparse silvery pile; eyes converging below; space between the eyes at the base of the antennae equal to about twice the median length of the clypeus; front and vertex impunctate; ocelli situated on a slight prominence, the distance between the posterior ones greater than the distance between the lateral ocelli and the nearest eye margin; clypeus, labrum, mandibles except the tips and front except the median third, yellow; median third of front, vertex and cheeks black; scape beneath rufous, flagellum beneath piceous, scape and flagellum above black; flagellar joints one to seven strongly rounded out beneath, eight to ten slightly spinose, and joints eight to eleven somewhat lengthened. Thorax black, covered with a sparse silvery pile; mesoscutum impunctate, episterna and sides of propodeum with large, sparse, shallow punctures; suture between mesoscutum and mesoscutellum foveolate; enclosed space of propodeum longitudinally striate at the base; pronotum, posterior lobes of pronotum, spot beneath tegulae, large spot on anterior portion of episterna, and mesoscutellum, yellow; tegulae, a small spot on each side of mesoscutum near the tegulae, and a large spot on each side of the propodeum rufo-testaceous. Abdomen black, covered with a sparse silvery pile; first tergite impunctate, remaining tergites with large, sparse, rather deep punctures; sternites glabrous; first abdominal tergite with a broad yellow fascia posteriorly which is deeply emarginate medially; second and third abdominal tergites with a broad yellow fascia posteriorly, although the second is broader than the third, and both are dilated laterally; fourth abdominal tergite with a posterior, narrow yellow fascia; second and third sternites with a narrow, posterior yellow fascia which is almost interrupted medially and much dilated laterally; first tergite medially and the sixth and seventh abdominal segments entirely, rufo-testaceous. Anterior, intermediate and posterior legs entirely rufo-testaceous except the front and intermediate coxae, which have a yellow spot anteriorly. Wings hyaline, somewhat yellowish basally, with the usual fuscous cloud; stigma yellowish; cubital cell in hind wings terminating a very little beyond the origin of the cubital nervure, almost interstitial.

♀. Unknown.

Type, a male taken at Mitchell, Nebraska, August 12, 1915, (E. M. Partridge).

Runs in Fox's table to *decorus* from which it differs in having the propodeum punctured, in the enclosure of the propodeum being striated only at the base, in the yellow of the interior orbits, in the number of fasciae on the abdomen, and in the sixth and seventh abdominal segments being entirely rufo-testaceous; by which latter character it is easily distinguished.

Pseudoplisus infumatus sp. nov.

1908. *Pseudoplisus smithii* H. S. Smith, Univ. Nebr. Studies, viii, p. 350, (nec Cresson).

1908. *Pseudoplisus floridanus* H. S. Smith, Univ. Nebr. Studies, viii, p. 350, (nec Fox).

♂. Length 14 to 16 mm. Black with red and yellow markings. Head black, very sparsely covered with golden pubescence; eyes distinctly converging below; front and clypeus sparsely punctate; clypeus convex; apex of clypeus slightly ferruginous; mandibles except the tips, labrum and inner eye margins, yellow; scape and base of flagellum rufous; remainder of flagellum black. Thorax impunctate, covered with very sparse golden pubescence; mesosternum distinctly carinate; suture between mesoscutum and mesoscutellum foveolate; enclosure of propodeum well defined by foveolate sutures, and divided by a longitudinal, foveolate suture; line on pronotum, posterior lobes of pronotum, tegulae and a narrow line on the metanotum fulvous; a wide fascia on the mesoscutellum yellow; two longitudinal lines on the mesoscutum and a spot on each side of the propodeum obscure ferruginous. Abdomen subpetiolate; piceous black; first two tergites impunctate, remainder of abdomen dorsally and ventrally sparsely punctate; covered with fine, sparse, golden pubescence; first tergite, except extreme base, entirely yellow and a narrow apical fascia on the second tergite yellow. Coxae black, trochanters and femora blackish above, rufous below; tibiae and tarsi rufous. Wings entirely fuliginous, stigma testaceous; cubital cell in hind wings terminating far beyond the origin of the cubital vein; second recurrent nervure in front wings not interstitial, originating before the second transverse cubital vein.

♀. Unknown.

Type, a male taken at Haigler, Nebraska, August 19, 1909, (C. H. Gable). Two paratypes taken at West Point, Nebraska, June 1887. One of these differs from the type in having a narrow yellow fascia on the third, fourth and fifth abdominal tergites, and in having the fascia on the second tergite very broad, covering almost all of the apical half of the segment.

Related to *bipartitus* from which it is easily distinguished by the large size, by the yellow of first tergite of the abdomen and by the uniform dark coloration of the wings.

Mellinogastra williamsi sp. nov.

♂. Length 8 mm. Head black; eyes parallel, not converging or diverging towards the clypeus; front very finely and closely punctate, appearing granulate; vertex and cheeks finely but more sparsely punctured; clypeus slightly convex; clypeus and lower half of front covered with silvery pubescence; antennae long, slender; mandibles except the tips, labrum, clypeus except two small basal spots and a narrow apical margin, inner eye margins, spot between the antennae, scape and pedicellum beneath, yellow; flagellum beneath testaceous. Thorax black, finely punctured, with sparse, silvery pubescence; mesosternum carinated anteriorly but episternum and epimeron

of mesothorax not separated; a crenulate furrow between the mesoscutum and mesoscutellum; enclosure of propodeum distinct, with a median longitudinal furrow and striated on the basal two-thirds; broad line on the prothorax, posterior lobes of pronotum, spot on the episterna above and a broad fascia on the mesoscutellum, yellow. Abdomen black, apical segments with a very fine, sparse pile; very finely punctate interspersed with a few large punctures, except on the second sternite where the large punctures are quite numerous and deep; first segment coarctate; last sternite with four short, yellowish bristles at the apex; apical fascia on the first tergite dilated at the sides, oblique lateral spot on the second tergite, narrow apical fasciae on the third and fourth tergites, wide apical fascia on the second sternite narrowly interrupted in the middle and emarginate at the sides, and a narrow apical fascia on the third sternite widely interrupted in the middle, all yellow. Coxae, trochanters, femora and tibiae of front and middle legs yellow beneath, black above; hind legs black, coxae with a yellow apical spot beneath, and trochanters, femora and tarsi with a yellow stripe beneath; all the tarsi more or less reddish. Wings hyaline, with a fuscous cloud in the marginal, second cubital and a part of the third discoidal cells; cubital vein originating at or slightly beyond the transverse median nervure.

♀. Unknown.

Type, a male taken at Omaha, Nebraska, August 17, 1914, (L. T. Williams).

Similar to *mellinoides* from which it differs in the smaller size, in being marked with yellow to a much greater degree and in the eyes being parallel rather than diverging towards the clypeus. Named for Mr. L. T. Williams in recognition of his excellent collecting of Hymenoptera.

Hypomellinus venustus sp. nov.

♂. Length 11 to 12 mm. General color rufous. Head rufous; covered with a very fine, subtle, whitish pile; eyes slightly converging towards the clypeus; clypeus convex, margined at the apex, base with large shallow punctures; front, vertex and cheeks, somewhat glabrous, with coarse, sparse punctures; distance between the posterior ocelli slightly greater than the distance between them and the nearest eye margin; antennae long and slender, reaching beyond the mesoscutellum; joints eight to ten of the flagellum slightly emarginate; clypeus, mandibles except the tips, front below the insertion of the antennae, inner and outer eye margins, a short, longitudinal line directly below the anterior ocellus, and scape below, yellow; scape above and flagellum entirely rufous; ocellar region black. Thorax rufous; with coarse, sparse punctures; episternum and epimeron of mesothorax separated; suture between mesoscutum and mesoscutellum foveolate; enclosed space of propodeum distinct, divided by a foveolate channel, striated throughout, the striae coarse and slightly oblique; posterior face of propodeum rugoso-punctate; line on the pronotum, wide fascia on the mesoscutellum, and metanotum yellow;

mesoscutum at the apex, a narrow median line on the mesoscutum, narrow basal margins of the episterna, wide line above the intermediate coxae, enclosed space of propodeum, and a small triangular spot at the apex of the propodeum, black. First segment of abdomen coaretate; all the tergites and sternites with deep, sparse punctures; last sternite terminating in a short spine; first segment entirely rufous, second sternite rufous, second tergite piceous, remaining segments black; fascia at the apex of the first tergite deeply emarginate medially, wide fascia at the apex of the second tergite slightly emarginate medially; fasciae at the apex of the third, fourth and fifth tergites, a large spot on the last tergite, narrow fascia at the apex of the second sternite, and small lateral spots on the third sternite, yellow. Legs rufous; spot at the apex of anterior and intermediate femora, anterior and intermediate tibiae below, and anterior tarsi, yellow. Wings hyaline, except a fuscous cloud which covers the marginal, the second and third submarginal, and the first discoidal cells; submedian cell longer than the median; cubitus of hind wings interstitial with the transverse median nervure; stigma yellow.

♀. Unknown.

Type, a male collected at Harrison, Nebraska, August 12, 1912, (R. W. Dawson). One paratype, a male collected at Omaha, Nebraska, July 14, 1914, on *Chamaecrista fasciculata*, (L. T. Williams). The paratype differs from the type in having the legs entirely rufous, no yellow line below the anterior ocellus and in having the basal portion of the second abdominal tergite more reddish than piceous.

This species is allied to *rufocinctus*, but may easily be distinguished by the general color being rufous, while that of the former is black.

Hypomellinus tricinctus sp. nov.

♀. Length 13 to 14 mm. General color rufous; body covered with a fine, subtle pile. Head rufous; eyes slightly converging towards the clypeus; clypeus very convex, basally and laterally with sparse silvery pubescence, basally with coarse punctures, margined at the apex; front, vertex and cheeks with coarse, sparse punctures interspersed with very minute punctures; distance between posterior ocelli slightly greater than the distance between them and the nearest eye margin; antennae long, slender, reaching beyond the mesoscutellum, entirely rufous. Thorax rufous, with large, deep punctures; propodeum rugose; suture between the mesoscutum and mesoscutellum foveolate; episternum and epimeron of mesothorax separated; enclosed space of propodeum distinct, channelled medially, with coarse, slightly oblique striae; wide fascia on the mesoscutellum, and metanotum, yellow. First segment of abdomen coaretate, with large, deep punctures like those of the mesoscutum; remaining segments with finer, deep punctures; pygidium margined at the sides with sparse shallow punctures; first and second segments rufous, remaining segments black; pygidium reddish; narrow fascia at the apex of first tergite

slightly emarginate medially, a wide fascia at the apical half of the second tergite, a narrow fascia at the apex of the third tergite and a small lateral spot on the second sternite, yellow. Legs rufous; anterior femora somewhat broadened; anterior and intermediate tibiae yellow beneath. Wings hyaline; except a fuscous cloud which covers the marginal, second and third submarginal and first discoidal cells; submedian cell longer than the median; cubitus in hind wings interstitial with the transverse median nervure; stigma yellow.

♂. Unknown.

Type, a female collected at Omaha, Nebraska, August 5, 1913, on *Chamaecrista fasciculata*, (L. T. Williams). Two female paratypes taken at Omaha, Nebraska, August 5, 1913, (L. T. Williams), and August 3, 1914 on *Chamaecrista fasciculata*, (L. T. Williams).

Related to *venustus*, but may easily be distinguished from that species by having only three yellow fasciae on the abdominal tergites, and by the larger size.

Mellinus wolcotti H. S. Smith

1908. *Mellinus wolcotti* H. S. Smith, Ent. News, xix, p. 299.

On account of the obscure, hand-written label on the type specimen the locality was erroneously cited as Beaver, Indiana. The collector (Dr. R. H. Wolcott) informs the writer that the correct type locality is Beaver Island, Michigan.

Family PHILANTHIDAE

Subfamily PHILANTHINAE

Philanthus barbiger sp. nov.

1908. *Philanthus albopilosus* H. S. Smith, Univ. Nebr. Studies, viii, p. 355, (in part), (nec Cresson, nec Packard).

♂. Length 8 to 10 mm. Black, covered with rather long, sparse, whitish pubescence. Head black; clypeus, cheeks and lower part of front finely but not closely punctate; vertex and occiput finely punctate; clypeus and sides of face to the emargination of the eyes whitish; a large spot between and above the antennae and a spot behind the eyes lemon-yellow in color; spot on scape beneath and first two joints of flagellum beneath whitish; pedicellum entirely black; flagellum black above, dark testaceous beneath; face on the sides and below the antennae covered with long, conspicuous, silvery pubescence; on the rest of the head the pubescence much thinner and not so obvious, but rather long. Thorax black, shining, sparsely punctured, covered with long, thin, whitish pubescence; mesoscutum impressed medially, and at the sides above the tegulae; mesoscutellum impressed medially; upper surface of propodeum channelled medially; pronotum, posterior lobes of pronotum, spot on

episterna above, tegulae, large transverse spot on mesoscutellum and metanotum, yellowish. Abdomen black, covered with long, thin, whitish pubescence; dorsally with large, sparse, shallow punctures; ventrally with the punctures somewhat smaller and closer; first tergite with large lateral yellow spots; second tergite with a rather broad yellowish band which is deeply and narrowly emarginate medially, and squarely emarginate on each side posteriorly; sometimes this band is completely interrupted so that the segment has the appearance of having two large lateral spots with a medial transverse spot apically; tergites two to five with an apical yellowish band, which is rather widely emarginate anteriorly at the sides; apical tergite and venter immaculate. Coxae, trochanters and basal two-thirds of femora, of front, middle and hind legs, entirely black; apical third of femora, tibiae and tarsi, of front, middle and hind legs, lemon-yellow. Wings hyaline, irridescent. Submedian cell of anterior wings shorter than the median; base of wings yellowish; stigma and nervures testaceous.

♀. Differs from male as follows; yellow on front extends only slightly above the base of antennae; front strongly striato-punctate; mandibles yellowish except the tips; scape beneath entirely yellowish; only a minute spot on basal joint of flagellum beneath yellowish; flagellum beneath rufous. Yellow line on pronotum narrowly interrupted and no yellow on the mesoscutellum. Abdomen more sparsely punctate; second tergite with two large yellow spots laterally and a narrow transverse apical spot medially; sixth tergite with two yellowish spots. Apical joints of tarsi rufous.

Type, a male taken at Harrison, Nebraska, August 15, 1908, (C. H. Gable). Allotype, a female collected at Ute Creek, Colorado, August 9 on *Chrysothamnus* sp., (R. W. Dawson). Twenty paratypes collected at Harrison, Nebraska, August 4, 1908; nine paratypes, Harrison, Nebraska, August 9, 1908; three paratypes, Harrison, Nebraska, August 15, 1908; one paratype, Glen, Nebraska, August 17, 1906; one paratype, Ute Creek, Colorado, August 9; collected on *Helianthus* sp., *Solidago* sp. and *Chrysothamnus* sp

Related to *pulcher*, from which it is distinct by the long, whitish, conspicuous pubescence on the face below the antennae, by the different sculpture of the propodeum and by the larger punctures on the abdomen.

Philanthus siouxensis sp. nov.

1908. *Philanthus albifrons* H. S. Smith, Univ. Nebr. Studies, viii, p. 356, nec Cresson, nec Viereck and Cockerell).

♂. Length 8 to 10 mm. Black, covered with very short, sparse, whitish pubescence. Head black; clypeus, occiput and cheeks very sparsely punctate; front below the ocelli strongly striato-punctate; mandibles except the tips, clypeus, front to the emargination of the eyes except a wide black line reaching down from the back of the occiput to the base of each antenna, scape

beneath and at the tip above, pedicellum beneath, first joint of flagellum beneath, a line behind the eyes and sometimes two spots back of the ocelli, lemon-yellow; flagellum entirely rufo-testaceous but darker above than below. Thorax black, sparsely punctured; mesoscutum anteriorly and mesoscutellum, impressed medially; upper surface of propodeum inclined to be finely rugose medially; line on pronotum, posterior lobes of pronotum, spot on episterna above, four spots on the anterior part of the mesoscutum (sometimes obsolete), and metanotum, lemon-yellow; (in one paratype there are two yellow spots on the mesoscutellum; in another the mesoscutellum is entirely yellow). Abdomen black, a little more closely punctured than the thorax; ventrally with the large punctures closely interspersed with very minute ones; first tergite with two large lateral spots and a narrow transverse apical spot lemon-yellow; second tergite with a wide yellow band which is somewhat narrowed medially, and with very small, lateral, black spots near the apex of the tergite; tergites three to five with a narrow, apical, yellow band, suddenly and much dilated at the sides; apical tergite usually immaculate, sometimes with lateral yellow spots; venter immaculate. Coxae and trochanters black, tinged with rufous beneath and usually with a very small yellow spot at the apex beneath; basal half of front femora, basal two-thirds of intermediate femora and all of hind femora except the tips, rufous; remainder of femora lemon-yellow; tibiae lemon-yellow and tarsi yellowish at the base, the color becoming rufous on the apical joints. Wings tinged with fuscous, yellow at the base; stigma and nervures testaceous; submedian cell in anterior wings slightly shorter than the median.

Type, a male collected at Harrison, Nebraska, August 4, 1908, (R. W. Dawson); one paratype, Glen, Nebraska, August 8, 1905; one paratype, Glen, Nebraska, August 13, 1906 on *Cleome serrulata*, (M. H. Swenk); one paratype, Glen, Nebraska, August 17, 1906, (H. S. Smith); one paratype, Warbonnet Canyon, Nebraska, July 20, 1901, on *Petalostemum* sp., (M. Cary); two paratypes, Mitchell, Nebraska, July 17, 1916, on *Melilotus alba*, (C. E. Mickel); two paratypes, Mitchell, Nebraska, July 21, 1916, (C. E. Mickel) and three paratypes, Mitchell, Nebraska, July 22, 1916, (C. E. Mickel).

This is a very distinct species and can easily be distinguished by the rufous femora, the coloration and puncturation of the abdomen and the wings being tinged with fuscous rather than hyaline.

Ocoelites bicinctus sp. nov.

♀. Length 18 to 23 mm. Black, shining, clothed with rather long, yellowish pubescence (very sparse on abdominal segments two to six). Head black; clypeus rather sparsely punctate, apical margin ciliate; front finely and rather closely punctate; vertex and cheeks very sparsely punctate, appearing almost impunctate; mandibles except the tips, clypeus entirely front up to the emar-

gination of the eyes except a small black spot immediately above the insertion of the antennae, scape below and first joint of flagellum below, lemon-yellow; a ferruginous spot back of the eyes. Thorax entirely black, shining; pronotum, mesoscutum, mesoscutellum and metanotum very sparsely punctate, appearing almost impunctate; episterna and propodeum entirely with fine, rather sparse punctures; tegulae yellowish. Abdomen above, black, shining, with a few scattered punctures, the apical tergite closely and minutely punctured interspersed with a few larger, scattered punctures; venter finely and minutely punctured with a few larger, scattered punctures; basal segment of abdomen entirely ferruginous except a narrow, apical margin above, black; the basal two-thirds of the second abdominal sternite ferruginous, the second tergite with the narrow, basal margin ferruginous, a transverse, broad, yellow band and the narrow, apical margin, black; remainder of the abdomen entirely black. All the coxae and trochanters black; the femora black on the basal half, ferruginous on the apical half; tibiae and tarsi ferruginous. Wings yellowish, darker at the tips; nervures testaceous; cubitus in posterior wings interstitial with the transverse median nervure.

Type, a female taken at Fort Garland, Colorado, August 9, (L. Bruner). This specimen is 18 mm. long. It is over cyanided so that the yellow on the head and abdomen appears reddish. One paratype, Ute Creek, Colorado, Sage Flats, August 14, (L. Bruner). This specimen is 23 mm. long.

A very distinct species. The shining, almost impunctate body, the entirely black thorax and the coloration of the abdomen will serve to distinguish it.

Subfamily CERCERINAE

Cerceris cognata sp. nov.

♀. Length 12 to 14 mm. Black; spot on the base of the clypeus (sometimes almost covering the clypeus), large spot each side of the face, small spot on the mandibles basally, sometimes two small spots on the vertex, two spots on pronotum, tegulae entirely, two spots on metanotum (sometimes metanotum entirely), and broad bands, widely and deeply emarginate, on abdominal tergites two to five, all yellow; venter black, coxae and trochanters black, femora reddish black, except the anterior and intermediate ones tipped with yellow, tibiae largely yellowish with a black spot at the tip behind, anterior and intermediate tarsi reddish, posterior tarsi black. Body with moderate, deep, close punctures, finer and closer than in *fumipennis;* clypeus simple, not produced; enclosure of propodeum with longitudinal striae curved and becoming transverse at the sides, almost obsolete medially; pygidial area about three times as long as broad, slightly narrowed basally, very much narrowed and rounded at the tip, rugose; fifth abdominal sternite with a deep impression medially, slightly emarginate and reflexed medially at the apex; wings yellowish, darker in the marginal cells.

♂. Unknown.

Type, a female taken at Worland, Wyoming, July 10, 1911, (L. Bruner); one paratype from Logan, Utah.

Rather closely related to *fumipennis* by lacking the clypeal process, by the markings of the face, and by the structure of the fifth abdominal sternite; distinct from that species in the finer and closer puncturation, markings of the abdomen, and much lighter wings.

Cerceris flavofasciata H. S. Smith

1918. *Cerceris flavofasciata* H. S. Smith, Univ. Nebr. Studies, viii, p. 364.

The male differs from the female as follows: Length 9 to 11 mm.; clypeus simple, face entirely yellow below the antennae; usually two yellow spots on mesoscutellum (sometimes wanting); first abdominal tergite either entirely black or slightly marked with yellow at the apex; second tergite with a broad yellow band as in the female; remaining tergites with a narrow apical yellow band widened at the sides; wings subhyaline, quite dark on the costal margin. Enclosed area of propodeum and puncturation same as in the female.

Allotype, South Bend, Nebraska, July 4, 1915, on *Ceanothus americanus*, (E. G. Anderson).

Cerceris architis sp. nov.

♀. Length 16 mm. Black; spot on the clypeal process above, spot beneath the process, a large spot each side of the face, small spot each side on the pronotum, tegulae, metanotum, two spots on first abdominal tergite (nearly connected), broad band on the second tergite, deeply emarginate medially, narrow bands on tergites three to five, all yellow; venter black; legs black, except femora tipped with yellow, tibiae and tarsi of anterior and intermediate pair yellow, and tibiae of hind pair largely yellowish. Body rather finely but not closely punctate; clypeal process about twice as broad as long, slightly emarginate medially; enclosure of propodeum large, mostly smooth but with fine striations basally; pygidial area a little more than twice as long as broad, narrowed and rounded at the tip. Wings fuliginous (much as in *fumipennis*), stigma black.

♂. Unknown.

Type, a female collected at South Bend, Nebraska, July 2, 1915, on *Melilotus alba*, (E. G. Anderson).

Very distinct in the shape of the clypeal process, the sculpture of the enclosure of the propodeum, the black stigma, dark wings and yellow markings of the abdomen.

Cerceris arbuscula sp. nov.

♀. Length 10 to 11 mm. Black; spot on the clypeal process, large spot on each side of the face, two spots on pronotum, tegulae, metanotum, two small lateral spots on first abdominal tergite, rather broad band on the second tergite, narrowed medially, narrow bands on tergites three to five, widened at the sides, all yellow; venter black; legs black, except femora tipped with yellow, tibiae and tarsi of anterior and intermediate pairs yellow, hind tibiae yellowish, hind tarsi dusky. Body moderately punctured, clypeal process low, broader than long, broader at the base, rounded beneath (much as in *psamathe*); enclosure of propodeum small, rather coarsely striated longitudinally; pygidial area about twice as long as broad, sides nearly parallel, rounded at the tip, with deep punctures basally. Wings subhyaline, dark in the marginal cell and at the tips; stigma yellowish.

♂. Unknown.

Type, a female collected at Omaha, Nebraska, July 23, 1913, (L. T. Williams).

In Banks' table this runs out near to *psamathe*, but differs from that species in having the mandibles, interantennal carina, occiput and propodeum entirely black, and in the differently sculptured enclosure of the propodeum.

Cerceris conifrons sp. nov.

1908. *Cerceris rufinoda crucis* H. S. Smith, Univ. Nebr. Studies, viii, p. 370, (in part), (nec Viereck and Cockerell).

♀. Length 8 to 9 mm. Black; mandibles at base, spot above base of mandibles, produced portion of clypeus, spot between clypeus and insertion of antennae, large spot each side of the face, scape beneath, small spot behind the summit of the eyes, two spots on pronotum, spot on episterna beneath the tegulae, tegulae, two spots on mesoscutellum, metanotum and narrow subequal bands on abdominal tergites two to five, all creamy white; propodeum except the enclosed space, first and second abdominal segments, all red; venter except first two sternites, black; anterior and intermediate legs black, except femora tipped with whitish, tibiae largely whitish and tarsi yellowish; hind legs red, except tibiae and tarsi blackish; flagellum fulvous beneath. Body moderately and closely punctured; clypeus produced so that it forms a cone; the apex of the clypeus very strongly bidentate, the two teeth about as far apart as the length of the scape; episterna with a spine before the intermediate coxae; enclosed space of propodeum transversely rugose (much as in *rufinoda*); pygidial area narrow at the base, convex at the sides and truncate at the tip. Wings hyaline, dark at the tips, stigma black.

♂. Unknown.

Type, a female collected at Harrison, Nebraska, August 4, 1908, on *Helianthus* sp., (C. H. Gable). Four paratypes from Harrison, Neligh and Glen, Nebraska, and Worland, Wyoming.

Related to *rufinoda crucis*, but distinct in having the clypeus produced and in the color markings which are indicated above.

Cerceris intractibilis sp. nov.

♀. Length 8 to 9 mm. Black; tiny spot on clypeal projection, tiny spot at base of interantennal carina, large spot each side of the face, scape beneath, two large spots on the pronotum, band on the mesoscutellum, stripe each side on the propodeum, broad bands on the first and third abdominal tergites, that on the third tergite slightly narrowed medially, and narrow bands on tergites four and five, all yellow; tegulae reddish, second tergite immaculate; venter black; legs black, tips of anterior and intermediate femora and apical half of hind femora reddish, all the tibiae largely yellowish, anterior and intermediate tarsi yellowish, hind tarsi blackish. Body moderately but not closely punctate; clypeus slightly produced subconically with a broad depression between the tip of the projection and apex of the clypeus, the depression shining, with a few large punctures; enclosed space of propodeum with a median groove and punctured at the sides; pygidial area about two and one-half times as long as broad, narrowed at the base and the tip. Wings subhyaline, dark on the costal margin, stigma yellowish.

♂. Unknown.

Type, a female collected at Child's Point, Nebraska, July 14, 1915, (E. M. Partridge).

In Banks' table this runs out at *sclica* but differs from that species in the yellow markings of the head, thorax and abdomen, in its smaller size and in the different pygidial area. It is like *insolita* in having the second abdominal tergite immaculate but differs from that species in having the clypeus produced and different markings of the thorax.

Cerceris squamulifera sp. nov.

♀. Length 10 to 11 mm. Black; mandibles except the tip, large spot at the base of the mandibles, clypeus except a narrow transverse mark at the apex, a large spot each side of the face connected below the insertion of the antennae, interantennal carina, scape entirely, long, narrow line on the cheeks, two tiny spots on the vertex, pronotum clear across, tegulae, spot behind the posterior lobes of the pronotum, band on the mesoscutellum, a broad stripe on each side of the propodeum produced on the inner side above along the margin of the enclosure, broad bands on abdominal tergites one to three, broad bands on tergites four and five much narrowed medially, and lateral spots on sternites two to four, all yellow; venter black, except spots on sternites connected by reddish bands; legs largely reddish, anterior and intermediate tibiae and tarsi yellowish. Body moderately but not closely punctured; clypeus produced so as to form a small, yellowish, semitranslucent scale parallel with the face. Enclosure of propodeum smooth, shining, with a median groove and one or two fine striae at the sides; pygidial area about twice as long as broad, much narrowed at the base, slightly narrowed and truncate at the tip, punctured at the base, reddish at the tip. Wings hyaline, slightly darker at the apex, stigma yellow.

♂. Unknown.

Type, a female collected at Imperial, Nebraska, July 2, 1911, (J. T. Zimmer).

A very distinct species in the peculiar clypeal projection, in the shape of the propodeal stripes, which are produced inwardly to form sort of a hook, and in being profusely marked with yellow.

Cerceris argia sp. nov.

♀. Length 9 to 10 mm. Black; base of mandibles, clypeal projection above except the tip, spot at base of interantennal carina, large spot each side of the face, scape beneath, spot behind the summit of the eyes, two spots on pronotum, spot behind the posterior lobes of the pronotum, tegulae, two spots on mesoscutellum, metanotum and rather wide bands much narrowed medially on abdominal tergites two to five, all yellow; propodeum except enclosure, and first segment of abdomen red; venter except first and basal part of second abdominal sternites, black; anterior legs black, except the tips of femora, tibiae and tarsi yellowish; intermediate and posterior legs largely fulvous; flagellum fulvous beneath, black above; body very moderately and not closely punctate (not nearly so coarsely and closely punctured as in *rufinoda*); clypeal projection about as long as it is broad at the base, narrowed at the tip, concave beneath the tip (much the same shape as in *irene*); episterna with a spine before the intermediate coxae; enclosure of propodeum transversely rugose, channelled medially; pygidial area about twice as long as broad, narrowed at the base, narrowed and rounded at the tip. Wings subhyaline, slightly darker at the tips, stigma blackish.

♂. Unknown.

Type, a female collected at Lincoln, Nebraska, August 5, 1904, on *Solidago* sp., (M. H. Swenk).

Related to the following species, but distinct from that in having a different clypeal projection, in the different puncturation of the body, and in having a differently shaped pygidial area.

Cerceris echo sp. nov.

1908. *Cerceris rufinoda crucis* H. S. Smith, Univ. Nebr. Studies, viii, p. 370, (in part), (nec Viereck and Cockerell).

♀. Length 7 to 10 mm. Black; base of mandibles, large spot on each side of the face, small spot behind the summit of the eyes, two spots on the pronotum, tegulae, two spots on the mesoscutellum, metanotum, broad band on second abdominal tergite, narrower bands on tergites three to five, all yellow; propodeum except enclosure, and first abdominal segment, red; venter except first and basal part of second abdominal sternites, black; all the coxae and trochanters blackish, anterior and intermediate femora blackish with the apical third reddish yellow; posterior femora reddish, blackish at the base, all the tibiae and tarsi yellowish; flagellum fulvous beneath, black above. Body moderately and quite closely punctate; clypeus swollen so as to form a raised, glabrous ridge above the apex, this ridge is slightly raised at the sides so as to

be almost dentiform; beneath the ridge the clypeus is slightly concave and impunctate; episterna with a spine before the intermediate coxae; enclosure of propodeum transversely rugose; pygidial area about twice as broad as long, narrow at the base, narrowed and truncate at the apex. Wings subhyaline, dark at the apex, stigma brownish.

♂. Unknown.

Type, a female collected at Monroe Canyon, Sioux County, Nebraska, August 4, 1908, (C. H. Gable). Thirty-seven paratypes collected at Omaha, Mitchell, Harrison, Glen, and Monroe Canyon, Nebraska; visits flowers of *Chamaecrista fasciculata*, *Melilotus alba*, *Helianthus* sp., *Solidago* sp. and *Cleome serrulata;* taken from July 13 to August 29.

Related to *rufinoda crucis* from which it is distinct by the structure of the clypeus, by the different puncturation of the body, by the spined episterna and by the somewhat differently shaped pygidial area.

Eucerceris elegans Cresson

1879. *Eucerceris elegans* Cresson, Trans. Amer. Ent. Soc., vii, Proc. p. xxiii.

1882. *Eucerceris elegans* Cresson, Trans. Amer. Ent. Soc., x, Proc. p. vii.

Two female and two male specimens; collected at Halsey, Nebraska, July 25 to August 29. The female differs from the male as follows; Length 11 to 13 mm. Head, except ocellar space, entirely ferruginous; no yellow on the mesoscutum; middle lobe of clypeus produced so as to form a low, cone-shaped projection; pygidial area about two and one-half times as long as broad, sides slightly convex, truncate at the tip; no fringes of bristles on ventral segments; otherwise similar to the male.

Subfamily Larrinae

Tachysphex granulosus sp. nov.

1908. *Tachysphex tarsatus* H. S. Smith, Univ. Nebr. Studies, viii, p. 381, (in part), (nec Say).

♀. Length 10 to 11 mm. Rather stout. Anterior margin of clypeus slightly rounded out, with a fairly strong lateral tooth, and very slightly emarginate medially; apical half of clypeus polished, shining, with a few scattered punctures; basal half with close, deep, separate punctures; antennae normal, not thickened medially, joint two about half as long as joint three, which is about three-fourths as long as four; interocular space at vertex about equal to the combined length of antennal joints two and three. Front closely and densely punctured, appearing granulate; the interocular area is punctured

likewise but the punctures are much finer; on the vertex the punctures are separated, not appearing granulate; mesoscutum closely and finely punctured, the episterna very finely granulate; mesoscutellum with fine separate punctures, the latter about their own diameter apart; disc of propodeum finely rugose medially, granulate at the sides; the sides of the propodeum granulate and the posterior face rather coarsely, transversely rugose; the fovea smooth, moderately deep and longer than wide; legs strongly spinose; the longer spur of the hind tibiae shorter than the basitarsus; wings large, subfuscous; the marginal cell quite broadly and obliquely truncate, the second submarginal cell slightly wider on the radial vein than the third submarginal; abdomen stout, about the length of the head and thorax combined; pygidial area well defined, about twice as long as it is broad at the base, narrowly truncate at the apex, with a few scattered, shallow punctures; sternites two to five each with a transverse row of large shallow punctures near the apex. Black; tarsi slightly reddish, tegulae dark testaceous, two basal segments of abdomen reddish, third segment obscurely reddish. Front with rather fine, thin, silvery pile; remainder of body with a sparse silvery pile; the abdominal tergites not silvery fasciate.

♂. Unknown.

Type, a female taken at Glen, Nebraska, August 15, 1906, (P. R. Jones).

Probably related to *tarsatus*, from which it differs in punctuation, in the sculpture of the propodeum, in the color of the wings and in the coloration of the abdomen.

Tachysphex sanguinosus sp. nov.

♀. Length 12 to 14 mm. Medium stout. Anterior margin of clypeus rounded, with a strong lateral tooth, and emarginate medially; apical half of clypeus polished, shining; the clypeus throughout with a number of large, shallow punctures; on the basal half these large punctures are interspersed with close, fine punctures; antennae normal, not thickened medially, joint two less than one-half as long as joint three, which is about three-fourths as long as joint four; the interocular space at the vertex is about equal to the combined length of antennal joints two and three; front finely and densely punctured, appearing granular; interocellar space with close, minute but separate punctures; vertex with fine, separate punctures; mesoscutum and mesoscutellum with fine, very close punctures, the episterna granulate; disc of propodeum granulate throughout; sides and posterior face of propodeum strongly, transversely striate; a strong carina separates the disc of the propodeum from the posterior face; fovea wedge-shaped, large and smooth; legs strongly spinose, the longer spur of the hind tibiae shorter than the basitarsus; wings large, hyaline, the marginal cell broadly and obliquely truncate at the apex, the second and third submarginal cells about equal in length on the radial vein; abdomen moderately stout, about as long as the combined length of the head and thorax; pygidial area not well defined; about twice as long as it is broad at the base, with a few obscure scattered punctures. Black; tarsi slightly

reddish, abdomen entirely bright red. Body thinly clothed with short, silvery pubescence, most prominent on the front; the abdomen not silvery fasciate.

♂. Unknown.

Type, a female taken at Omaha, Nebraska, September 8, 1913, (L. T. Williams).

Related to *tarsatus*, but distinct from that species in the different relative lengths of the antennal joints, different sculpture of the propodeum and the larger size.

Tachysphex zimmeri sp. nov.

♀. Length 11 to 12 mm. Rather stout. Anterior margin of clypeus rounded, with a strong lateral tooth; apical half of clypeus polished, shining, with a few scattered punctures; basal half of clypeus with close, fine punctures; antennae normal not thickened medially; joint two less than half as long as joint three, which is about three-fourths as long as joint four; interocular space at the vertex about equal to the combined length of antennal joints two and three; front finely and densely punctured, appearing granulate; punctures of interocellar space somewhat finer and separated, vertex with the punctures separated as much as their own diameter; mesoscutum closely and finely punctured, the mesoscutellum with fine, well separated punctures; the episterna granulate; disc of propodeum granulate; sides of propodeum finely striate; posterior face of propodeum coarsely striate; the fovea moderately large and smooth; disc of propodeum separated from the posterior face by a strong carina; legs strongly spinose; longer spur of hind tibiae shorter than the basitarsus; wings large, subhyaline; the marginal cell broadly and obliquely truncate, the second and third submarginal cells about equal in length on the radial vein; abdomen moderately stout; the pygidial area more than twice as long as its width at the base, fairly well defined, finely reticulate, with sparse shallow punctures. Black; tarsi reddish, abdomen entirely red. Body thinly clothed with short, silvery pubescence, the abdomen silvery fasciate.

♂. Unknown.

Type, a female collected at Monroe Canyon, Sioux County, Nebraska, August 20, 1908, (J. T. Zimmer).

Belongs to the *tarsatus* group, but is distinguished by the different clypeus, different puncturation, and different pygidial area. Named for Mr. J. T. Zimmer, who collected the specimen.

Tachysphex erythraeus sp. nov.

♀. Length 8 to 9 mm. Moderately stout. Clypeus slightly rounded or subtruncate, very narrowly margined anteriorly (much less margined than in *tarsatus* or *semirufus*); not emarginate medially and without lateral teeth; apical half of clypeus polished, with a few large scattered punctures; basal half of clypeus with small, separated punctures; antennae normal, not thickened medially; joint two about one-third the length of joint three, which is slightly shorter than joint four; interocular space at vertex equal to the combined

length of antennal joints two and three; front densely punctured, appearing granulate; interocellar space with fine, separated punctures; on the vertex the punctures are small, shallow and slightly more than their diameter apart; mesoscutum with small, shallow, well-separated punctures; mesoscutellum polished, with a shallow, sparse puncturation; episterna granulate; disc of propodeum granulate throughout; sides of propodeum finely striato-granulate; posterior face moderately rugose; with a medium-sized, shallow, wedge-shaped fovea; legs moderately spinose; the longer spur of the hind tibiae shorter than the basitarsus; wings large; marginal cell fairly broadly and squarely truncate; the second and third submarginal cells about equal in length on the radial vein; abdomen moderately stout, not as long as the head and thorax combined; pygidial area well defined; not twice as long as it is broad at the base; finely reticulate throughout and with a number of fine, scattered punctures Black; tarsi somewhat reddish; three basal segments of the abdomen reddish. Body with a thin, sparse, silvery pubescence, that on the front somewhat heavier; the abdomen not silvery fasciate.

♂. Unknown.

Type, a female collected at Warbonnet Canyon, Sioux County Nebraska, June 6, 1901, on *Erysimum* sp., (M. Cary).

Belongs to the *tarsatus* group; is distinct by the marginal rim of the clypeus being very narrow, while on others of that group it is rather wide; also differs in the puncturation of the body, in the sculpture of the propodeum and in the sculpture of the pygidium.

Tachysphex angularis sp. nov.

♂. Length 5.5 to 6 mm. Slender. Clypeus extended anteriorly so as to form a triangular projection, the apical middle of the clypeus forming the apex of the triangle; apical half of the clypeus polished, with a few large, deep punctures; basal half of clypeus closely and finely punctured; joint two of antennae more than one-half as long as joint three which is slightly shorter than joint four; interocular space at vertex about equal to the combined length of antennal joints three and four; front densely punctured, appearing granulate; vertex with fine, well separated punctures; mesoscutum and mesoscutellum with fine, well separated punctures; episterna closely punctured; disc of propodeum finely rugose; sides of propodeum strongly, transversely striate; posterior face of propodeum coarsely striate; the disc separated from the posterior face by a strong carina; fovea deep, long, smooth, wedge-shaped; eighth ventral segment broadly emarginate; legs moderately spined; longer spur of hind tibiae shorter than the basitarsus; wings subhyaline; marginal cell broadly and obliquely truncate at the apex; second and third submarginal cells about equal in length on the radial vein. Black; tarsi somewhat reddish; tegulae more or less testaceous; first three segments of abdomen reddish. Body clothed with thin, short, silvery pubescence; the abdomen silvery fasciate.

♀. Unknown.

Type, a male collected at Sowbelly Canyon, Sioux County, Nebraska, June 23, 1911, (R. W. Dawson). Four paratypes collected at the same place on the same date.

Allied to *nigrocaudatus*. The triangular clypeal projection, sculpture of the propodeum and punctured episterna will serve to distinguish it from that species.

Tachytes austerus sp. nov.

♀. Length 8 to 9 mm. Moderately slender. Anterior margin of clypeus narrowly and deeply emarginate medially, with three obtuse, lateral teeth; second joint of antennae about three-fourths the length of the third, which is equal in length to the fourth; interocular space at the vertex about equal to the combined length of antennal joints three and four; front with moderately close punctures; the space between the punctures finely reticulate; vertex with intermingled punctures of varying size; mesoscutum and episterna punctured like the front; mesoscutellum shining, sparsely punctate; disc of propodeum very closely punctate, appearing granulate, shining and impunctate on the posterior margin; sides of propodeum finely and rather closely punctate; posterior face closely and deeply punctate, the punctures almost touching, channelled medially; longer spur of hind tibiae about equal in length to the basitarsus; wings subhyaline; marginal cell narrowly and obliquely truncate; second submarginal cell about a third wider on the radial vein than the third submarginal; abdomen dorsally finely and sparsely punctured; ventrally the punctures are larger and more variable in size. Black; first and basal half of the second abdominal segments reddish; leg spines pale; body clothed with sparse silvery pile; bristles of pygidium bronzed.

♂. Unknown.

Type, a female taken at Omaha, Nebraska, August 5, 1914, (L. T. Williams).

Related to *abdominalis*, but differs from that species by having the anterior margin of the clypeus strongly emarginate, in the different puncturation, smaller size, and the recurrent veins not proximate on the cubitus.

Tachytes maestus sp. nov.

♀. Length 6 to 7.5 mm. Slender. Anterior margin of clypeus slightly emarginate medially, with three lateral teeth; second antennal joint about three-fourths the length of the third, which is subequal in length to the fourth; interocular space at the vertex about equal to the combined length of antennal joints three and four; front with rather sparse, shallow punctures; vertex more closely and finely punctured; mesoscutum, episterna and mesoscutellum with rather sparse, deep punctures; disc of propodeum granulate, with a shallow fovea medially on the posterior margin; sides of propodeum punctate; posterior face quite closely punctate; longer spur of hind tibiae shorter than the basitarsus; wings subhyaline; marginal cell obliquely truncate at the apex;

second submarginal cell much wider on the radius than the third submarginal; abdomen with fine, sparse, punctures dorsally; ventrally the punctures of moderate size, deep and fairly close. Entirely black; pygidium clothed with golden pubescence; body clothed with sparse, thin, silvery pile.

♂. Unknown.

Type, a female collected at Omaha, Nebraska, July 31, 1914, (L. T. Williams); five paratypes from Omaha, Nebraska, August 18 and August 25, (L. T. Williams).

Belongs to the group composed of *parvus*, *minutus*, and *minor*. It may possibly prove to be the female of one of these.

Larropsis picina sp. nov.

♀. Length 13 mm. Clypeus broadly and shallowly emarginate medially, lateral angles strong, forming a tooth, with a small tooth just inside; clypeus apically with large, sparse, shallow punctures, basally with fine, close punctures; front with medium sized, close punctures; vertex with fine, close punctures; interocular space at the vertex less than the length of antennal joints two and three united; joints three and four subequal; mesoscutum with fine punctures, well separated; mesoscutellum rather shiny, with sparse, fine punctures; episterna very densely punctate; disc of propodeum strongly striate, the striae diverging from near the base; a shallow fovea at the apex; sides of propodeum strongly transversely striate; the posterior face very coarsely transversely striate, with a large wedge-shaped fovea at the base; abdomen shining; pygidium sparsely punctured; legs strongly spined. Entirely black; wings fuscous, venation black; pubescence of pygidium dark brownish; body nearly bare, a slight grayish pile on the abdomen.

♂. Length 10 to 11 mm. Clypeus more narrowly rounded out, lateral angles strong, slightly emarginate medially; puncturation of front stronger, that of the mesoscutum and mesoscutellum a little stronger and much closer than in the female; sculpture of propodeum same as in the female; abdomen with fine, well separated punctures; legs strongly spined. Entirely black; tarsi somewhat reddish; wings fuscous; head, thorax and abdomen with silvery pile, that of the face quite prominent.

Type and allotype collected at Harrison, Nebraska, August 9, 1908, (C. H. Gable). Three paratypes, males, from Harrison, Nebraska, and one paratype male from Fort Garland, Colorado.

Closely related to *aurantia*, from which it differs mainly in the different sculpture of the propodeum and by being entirely black.

Family Bembicidae

Stictia spinifera sp. nov.

1908. *Monedula speciosa* H. S. Smith, Univ. Nebr. Studies, viii, p. 383, (in part), (nec Cresson).

♂. Length 20 to 22 mm. Body finely, closely punctate; head narrower than the thorax; first joint of flagellum almost as long as joints two and three

united; second abdominal sternite with two approximate, strong tubercles on the posterior margin; eighth sternite terminating in three spines, without a discal spine; fore femora much flattened; apical joint of fore tarsi greatly enlarged and flattened, as long as the combined length of tarsal joints two, three and four; apical joints of intermediate and hind tarsi also considerably enlarged; intermediate femora beneath with a longitudinal row of short, sharp spines (much as in *speciosa*); basal point of intermediate tarsi curved, spined basally. Head yellow; large spot on front, extending to the vertex on each side of the anterior ocellus, interocellar area, vertex, occiput and post-genae, all black; thorax yellow; mesoscutum, posterior portion of mesosternum, mesoscutellum (except a narrow, arcuate fascia) and metanotum (except a narrow, arcuate fascia), narrow transverse spot above on propodeum, and large lateral spots on the posterior face of the propodeum, all black; abdomen black; two large lateral spots and two small, rounded medial spots on the first tergite, a basal sinuate fasciae, broadly excavated anteriorly, on the second tergite, subapical, sinuate bands on tergites three to six, apical portion of last tergite, first sternite almost entirely, and large, lateral spots on sternites two to five, all yellow (sometimes the abdominal markings are much reduced); legs entirely yellow; a line on the femora above and apical joint of all the tarsi black (in one paratype the three apical joints of the hind tarsi are black).

♀. Unknown.

Type, a male collected at McCook, Nebraska, July, 1902, (M. H. Swenk); two paratypes, McCook, Nebraska, July, 1902, (M. H. Swenk), and Glen, August 17, 1906, on *Cleome serrulata*, (M. H. Swenk).

Runs to *pulchella* in Fox's table, but is distinct from that species in the much larger size, spinose femora and greatly enlarged apical joint of the fore tarsi; by the latter character it may be related to *speciosa*, where it was doubtfully placed by H. S. Smith, but differs from that species in the bituberculate second ventral segment, in the lack of a discal spine on the eighth ventral segment and in the different color markings of the body.

Stictia exigua (Fox)

1895. *Monodula exigua* Fox, Proc. Acad. Nat. Sc. Phila., p. 370.

Specimens examined: 6♀, 2♂, collected at Glen, Nebraska; visits flowers of *Solidago* sp. and *Melilotus* sp.; taken from July 12 to August 17.

♂. Length 13 to 14 mm. Head as wide as the thorax; body moderately punctate; first joint of flagellum one-fourth longer than the second; last joint curved and obliquely truncate; second sternite strongly bituberculate on the posterior margin; fourth sternite with two, rather widely separated, slight tubercles on the posterior margin; eighth sternite terminating in three spines, without a discal spine; intermediate femora with a very strong carina beneath,

the carina broadly and shallowly concave; all the joints of the fore tarsi broadened and flattened; basal joint of intermediate tarsi flattened, not spined basally; pulvilli large and distinct. Head yellow; front and vertex (except a transverse irregular spot before the anterior ocellus), occiput and post-genae, all black; flagellum dark testaceous above; thorax yellow; mesoscutum (except a line above the tegulae), transverse spot on pronotum anteriorly, mesoscutellum (except an apical fascia which is much broader at the sides), metanotum (except a narrow apical fascia), propodeum (except a narrow curved fascia basally and a large spot on each side), all black; abdomen black; rather narrow subapical, sinuate fascia (sometimes interrupted medially) on tergites one to six, tip of seventh tergite, first and second sternites (except lateral spots basally), sinuate bands on sternites three to six (that on the second sternite rather wide and deeply emarginate each side of the middle, the rest narrow), and apical half of middle spine of eighth sternite, all yellow; legs almost entirely yellow. Wings hyaline, reaching past the third abdominal segment.

Allotype, one male, collected at Glen, Nebraska, July 12, 1910, (J. T. Zimmer).

Family PSENIDAE

Subfamily PSENINAE

Mimesa dawsoni sp. nov.

♂. Length 6.5 mm. Front and clypeus densely silvery pubescent; clypeus slightly emarginate medially on the anterior margin; vertex shining, with sparse, very fine punctures; space between the posterior ocelli a little greater than the distance between them and the margin of the eyes; antennae almost as long as the head and thorax combined, clavate; none of the joints of the flagellum prominent beneath; mesoscutum, mesoscutellum and episterna, sparsely, finely punctate; enclosure of propodeum small, very poorly defined, finely rugose; posterior face and sides of propodeum smooth, impunctate; posterior face with a deep, longitudinal sulcus medially; petiole of abdomen about two-thirds the length of the hind femur; somewhat convex above, flattened apically, smooth, without sulci; flagellum entirely, tegulae, apex of first abdominal segment, second segment, anterior and intermediate tibiae, posterior tibiae basally, and all the tarsi, testaceous; first recurrent nervure interstitial with the second transverse cubitus; a proximal pale spot on the stigma.

♀. Unknown.

Type, a male collected at Harrison, Nebraska, August 12, 1912, (R. W. Dawson).

This species is readily recognizable by having the posterior face of the propodeum smooth and impunctate. It runs to "group 5" in Fox's paper and is apparently nearest to *unicinctus*. I take pleasure in naming this species for my friend Mr. R. W. Dawson, who collected the specimen.

Mimesa cressoni Packard

1867. *Mimesa cressonii* Packard, Proc. Ent. Soc. Phila., vi, p. 405.
1898. *Psen cressonii* Fox, Trans. Amer. Ent. Soc., xxv p. 12.
1908. *Mimesa conica* H. S. Smith, Univ. Nebr. Studies, viii, p. 389.

Specimens examined: 27 ♀, 59 ♂; collected at Lincoln, Fairmont, West Point, Broken Bow, Oxford, Haigler, Imperial, Ogallala, Brown County, Mitchell, Glen, Harrison, Monroe Canyon and Warbonnet Canyon, Nebraska; visits flowers of *Helianthus* sp., and *Gutierrezia sarothrae;* taken from June 10 to October.

Smith's type and paratypes of *conica* are all males of *cressoni*. They are not females as stated in his paper. His group of *granulosus* and *conica* was founded on what he described as females of these two species; inasmuch as all of his specimens of both species were males the grouping, of course, has no systematic value.

Family CRABRONIDAE

Thyreopus (**Biepharipus**) **utensis** sp. nov.

♀. Length 7 mm. Clypeus feebly carinate medially; anterior margin of produced portion of clypeus truncate; frontal depression shallow, glabrous the impressed line running to the fore ocellus deep; vertex, occiput and cheeks sparsely, microscopically punctate; ocelli in an equilateral triangle, the space between the two posterior ocelli distinctly less than the space between them and the nearest eye margins; first joint of flagellum distinctly longer than the second; pronotum apparently impunctate, deeply, transversely impressed before the apical margin, slightly, longitudinally impressed medially; mesoscutum, episterna and mesoscutellum very finely, sparsely punctate; episternum with a short carina which originates at the coxal cavity and terminates in a small sharp tubercle; impressed lines forming enclosed space of propodeum indistinct, not foveolate; medial furrow shallow, moderately wide, running the entire length of the propodeum; enclosed space with four very strong striae on each side of the medial furrow; sides of propodeum for the most part glabrous, indistinctly striate posteriorly; posterior face of propodeum transversely rugose, stronger on the apical portion; lateral ridges of posterior face distinct; first two abdominal segments almost impunctate, the remaining segments distinctly, microscopically punctate; pygidium narrowed at the apex, deeply excavated; wings slightly fuscous; first transverse cubitus received distinctly before the middle of the marginal cell. Entirely black; tegulae dark brownish; tibial spurs testaceous.

♂. Unknown.

Type, a female collected at Ute Creek, Colorado, July 19, 1907, (L. Bruner).

Related to *ater*, from which it differs as follows: the produced portion of the clypeus squarely truncate; puncturation of the

head and thorax finer and sparser; and the impressed lines forming the enclosure of the propodeum indistinct.

Thyreopus (Subgenus?) **stygius** sp. nov.

♀. Length 7.5 mm. Clypeus very feebly carinated; the anterior margin with the produced portion squarely truncate; frontal depression shallow, glabrous, distinct; impressed line running to the fore ocellus deep; ocelli in an equilateral triangle, the space between the posterior pair slightly less than the space between one of them and the nearest eye-margin; front, vertex, occiput and cheeks sparsely, microscopically punctate; first joint of flagellum very slightly longer than the second; pronotum transversely impressed before the apical margin, very slightly, longitudinally impressed medially; mesoscutum with distinct, well-separated punctures, more strongly and closely punctured than the head; mesoscutellum apparently impunctate; episterna punctured like the mesoscutum; episterna with a short carina originating at the coxal cavity and terminating in a short, sharp tubercle; enclosed space of propodeum distinct, the impressed lines forming it strongly foveolate; medial furrow running the entire length of the propodeum, the portion in the enclosed space strongly foveolate; enclosed space with several, short, distinct striae at the base; sides of the propodeum, finely, obliquely rugose; lateral ridges of posterior face distinct, foveolate outwardly; posterior face evidently transversely rugose; abdomen microscopically punctate, more so on the apical segments; pygidium narrowed at the apex, excavated; tibiae spinose; wings hyaline; first transverse cubitus received by the marginal cell distinctly before the middle. Black; tegulae brownish; apical abdominal segment somewhat rufous; apices of tibiae, intermediate and posterior tarsi somewhat reddish; tibial spurs testaceous

♂. Unknown.

Type, a female collected in the Bad Lands at the Mouth of Monroe Canyon, Sioux County, Nebraska, May 28, 1901, on *Astragalus* sp., (L. Bruner).

In Fox's table this species runs out at *nigrior*, but is distinct from that species in the feebly carinate and truncate clypeus, the different sculpture of the propodeum and the larger size.

Thyreopus (**Synothyreopus**) **bruneri** sp. nov.

1908. *Crabro vernalis* H. S. Smith. Univ. Nebr. Studies, viii, p. 400, (nec Packard).

♀. Length 7 to 9 mm. Head finely granulate with sparse, shallow punctures; distance between the two posterior ocelli about equal to the distance between one of them and the nearest eye margin; impressed line running from front to anterior ocellus moderately deep; a rather indistinct impressed line running backward from the anterior ocellus; flagellum (exclusive of the pedicellum) more than twice the length of the scape; first joint of flagellum about equal in length to the two following joints united; pronotum not furrowed at the sides, slightly impressed medially, the lateral teeth small and blunt; meso-

scutum sculptured like the head; mesoscutellum with sparse, shallow punctures, slightly longitudinally striate on the posterior margin; episterna with sparse, shallow punctures; finely, transversely striate above; propodeum above finely, longitudinally striate, on the lateral and posterior sides finely rugose; abdomen microscopically punctate except the first segment which is rather glabrous and almost impunctate; pygidium broad, flat, not excavated, very strongly punctured. Black; scape at the tip, four small spots on the pronotum (sometimes only two are present), posterior lobes of pronotum, metanotum, two small, lateral, sinuate spots on first tergite, large, wedge-shaped, lateral spots on tergites two and three, large, sinuate lateral spots on tergite four, band on tergite five which is very slightly interrupted medially, fore and intermediate tibiae except a line within, posterior tibiae except at the apex, and the first joint of all the tarsi, light yellow; stigma and nervures of the wings, yellowish. Clypeus, inner orbits and tergites of the abdomen with silvery pubescence; head and thorax with very long, thin, pale hairs.

♂. Length 6 to 8 mm. Head finely granulate with sparse, shallow punctures; distance between the two posterior ocelli about equal to the distance between one of them and the nearest eye margin; flagellum about three times the length of the scape; first joint of flagellum about equal in length to the two following joints united; apical joint of flagellum distinctly curved and much flattened; pronotum not furrowed laterally, slightly depressed medially, the lateral teeth small and blunt; mesoscutum sculptured like the head; mesoscutellum with a few, sparse punctures; episterna sparsely punctured, finely, transversely striate above, propodeum longitudinally rugose above, channelled medially; sides of propodeum transversely striated; the posterior face transversely rugose; tergites of abdomen microscopically punctate; anterior trochanters about half as long as the femora, much broadened before the apex; anterior femora much flattened with a long, slender, sharp spine at the base; tibial shield broader than long; first joint of anterior tarsi much flattened. Black; apical three-fifths of scape, two elongate spots on the pronotum, posterior lobes of pronotum, broad band on the mesoscutellum narrowly interrupted medially, metanotum, lateral spots on tergites one to three (those on the first tergite almost touching), broad bands on tergites four, five and six, tergite seven almost entirely, fore and intermediate femora at the apex, all the tibiae except the apex of the intermediate and posterior, and first joint of all the tarsi, light yellow; basal half of tibial shield light yellow, apical half creamy, translucent. Clypeus, inner orbits and tergites of abdomen with silvery pubescence; head and thorax with very long, thin, pale hairs. Stigma and nervures of wings yellowish.

Type, a male collected in Sioux County, Nebraska, in May, (L. Bruner); allotype, a female collected in Sioux County, Nebraska, in May, (L. Bruner); three female paratypes and four male paratypes collected in Sioux County, Nebraska, in May, (L. Bruner); one female paratype collected at Warbonnet Canyon, Sioux County, Nebraska, May 26, 1901, (M. Cary); one female

paratype collected at Warbonnet Canyon, Sioux County, Nebraska, May 27, 1901, (M. A. Carriker, Jr.); one female paratype without data.

Closely related to *vernalis*, but quite distinct and may be distinguished as follows: the distance between the posterior ocelli is about equal to the distance between them and the nearest eye margins, in both sexes. In the female the mesoscutellum is black and punctured, and the markings on the pronotum differ from that of *vernalis*. In the male the abdominal markings differ, the venter is entirely black, and the tibial shield is quite differently shaped and colored from that in *vernalis*. The species is named for Prof. Lawrence Bruner who collected most of the specimens.

Thyreopus (subgenus?) **knoxensis** sp. nov.

♂. Length 7.5 mm. Anterior margin of clypeus truncate; impressed line of front deep; front appearing striato-punctate, remainder of head moderately punctate; space between the two posterior ocelli about equal to the space between one of them and the nearest eye margin; the two posterior ocelli behind a line drawn across the vertex at the posterior margin of the eyes; first joint of flagellum slightly longer than the second; flagellum with short, sparse, curled hair beneath; pronotum strongly toothed laterally; mesoscutum and mesoscutellum with distinct, well-separated punctures, episterna with somewhat sparse, fine punctures; propodeum above strongly channelled medially, with two distinct enclosed spaces which are more or less rugose within; the medial channel continues on the posterior face, narrowing and terminating on the apical half; lateral ridges of posterior face distinct; the sides and posterior face of the propodeum finely, transversely rugose; abdomen dorsally, microscopically punctate; fore femora not spined; intermediate tibiae without a spur; first joint of hind tarsi distinctly longer than the longer spur of the hind tibiae. Black; two small lateral spots at the base of the clypeus, scape slightly at the tip and behind, posterior lobes of pronotum, lateral spots on tergites one to four (those on segment four quite narrow), minute, lateral spots on second sternite, anterior femora in front, intermediate femora at the tip, anterior tibiae, intermediate tibiae (except a line within), posterior tibiae at the base and first joint of anterior and intermediate tarsi, yellowish (in the type the color is reddish from being over-cyanided); tegulae, stigma and nervures of wings brownish. Clypeus and inner orbits silvery pubescent.

♀. Unknown.

Type, a male collected at Knox, North Dakota, July 13, 1911, on *Sium cicutaefolium*, (O. A. Stevens).

Related to *opuana* Rohwer, by the absence of the spurs on the intermediate tibiae, but is quite distinct from that species.

In Fox's table it runs out at *hilaris*, but differs from any of the species in that group by the lack of a spur on the intermediate tibiae, antennal characters, the sculpture of the propodeum and other minor characters.

Crabro (**Prototh**y**reopus**) **crassiceps** sp. nov.

♀. Length 13.5 mm. Anterior margin of clypeus slightly rounded out, not dentate laterally; head rather finely and evenly punctured throughout; line from anterior ocellus rather indistinct; ocelli in a low triangle, the space between the posterior pair slightly less than that between one of them and the nearest eye margin; facial basin smooth; first joint of the flagellum about equal in length to the following two joints united; clypeus, frontal orbits widely and posterior orbits densely silvery pubescent; remainder of head with short, sparse pubescence, except on the vertex before the ocelli where the pubescence is rather long (about as long as the first flagellar joint); pronotum strongly ridged anteriorly, very slightly dentate laterally, strongly emarginate medially; anterior face of pronotum longitudinally striated; mesoscutum and mesoscutellum with moderate, close, more or less confluent punctures; episterna strongly, transversely striated above, striato-punctate below; mesosternum with large, sparse punctures; propodeum obliquely striate above, channelled medially, the channel rather narrow; sides of propodeum very finely transversely striate; posterior face of propodeum more strongly, transversely striate than the sides, with a rather deep channel medially; entire thorax with sparse, fairly long, silvery pubescence; dorsal abdominal segments finely, closely punctured, the punctures on the first segment slightly larger than those on the following segments; pygidium flat, triangular, with a lateral fringe of stiff hairs; second and third ventral segments with finely, closely punctured areas laterally; the second ventral segment sparsely punctate throughout; sternites two to five with an apical, transverse line of rather large punctures; sternite six strongly punctured; all the femora more or less triangular, the anterior ones strongly so. Color black; mandibles (except apices), scape entirely, pedicellum and first joint of flagellum beneath, pronotum above except the emargination, posterior lobes of pronotum, tegulae anteriorly, large rectangular spot on the episterna just behind the posterior lobes of pronotum, two small lateral spots in front of the mesoscutellum, a narrow band on the mesoscutellum anteriorly, interrupted medially, metanotum, two lateral, irregularly triangular spots on the lower portion of the posterior face of the propodeum, two large spots on first abdominal tergite almost touching medially, broad bands, slightly narrowed medially on abdominal tergites two to five, that on tergite five the widest, spot on the posterior coxae beneath, all the femora above at the apex and extending about two-thirds of the way to the base, all the tibiae entirely, and the basal two or three joints of all the tarsi, yellow; posterior portion of tegulae testaceous; apical joints of tarsi blackish; wings slightly yellowish; nervures and stigma yellowish; first recurrent nervure received near the apex of the first submarginal cell.

♂. Unknown.

Type, a female taken at Ute Creek, Colorado, August 7, 1907 (R. W. Dawson).

Closely related to *megacephalus* Rohwer, but differs in the sculpture of the propodeum, puncturation of the ventral segments and other minor characters. In having the propodeum marked with yellow it is similar to *bigeminus* Patton, but differs in the markings on the abdomen and in the coloration of the femora.

Crabro (Xestocrabro) proletarius sp. nov.

♂. Length 5.5 mm. Clypeus truncate medially, with a small lateral tooth; facial basin smooth, distinctly margined above; head with very fine, shallow, well separated punctures; line running from anterior ocellus faint but distinct; ocelli in a low triangle, the distance between the two posterior ones slightly less than the distance between them and the nearest eye margins; first joint of flagellum about one-fourth longer than the second, the first four joints more or less emarginate basally, beneath, and somewhat produced at the tip; clypeus and lower orbits covered with dense silvery pubescence, remainder of head with very fine, sparse, silvery pubescence, pronotum margined anteriorly and posteriorly forming a transverse furrow, broken medially by a shallow emargination; not at all dentate laterally; mesoscutum closely, confluently punctate giving it the appearance of being finely, transversely striato-punctate anteriorly and finely, longitudinally striato-punctate posteriorly; mesoscutellum longitudinally striato-punctate; episterna transversely striate above, transversely striato-punctate below; mesosternum with fine, well separated punctures; propodeum above shallowly reticulate, with a shallow, slightly foveolate channel medially; a row of rather large, shallow foveae between the upper surface and the posterior face of the propodeum, the latter rather strongly, transversely striate and channelled medially; sides of propodeum moderately, transversely striate; abdomen apparently impunctate, the first tergite more or less microscopically punctate; fore femora produced beneath at the base; fore tarsi very much flattened; first joint of intermediate tarsi not angulate, very slightly longer than the following three joints united. Color black; small spot on the mandibles, scape (except at the base in front and extending upward on the inner side, black), band on the pronotum above, widely interrupted medially, posterior lobes of the pronotum, metanotum, lateral spots basally on tergites two to five (those on tergite two the largest), basal band on tergite six somewhat narrowed medially, fore femora at the tip and a stripe in front and on outer side, intermediate femora on the apical fourth, front and intermediate tibiae except a spot within, hind tibiae except a spot within at the apex, and first two joints of anterior tarsi, all yellow; anterior femora behind, and spot on anterior tibiae within, reddish; wings subhyaline, veins and stigma dark testaceous.

♀. Unknown.

Type, a male collected at Lisbon, North Dakota, June 5, 1913, on *Zizia aurea*, (O. A. Stevens)

Related to *drymocallidis* Rohwer in the structure of the front femora and other characters.

Crabro (Solenius) planaris sp. nov.

♂. Length 6 mm. Anterior margin of clypeus produced into a narrow, truncated process, distinctly ridged medially; facial basin smooth, shining; head with very strong, more or less confluent punctures, those on the cheeks more shallow, smaller and sparser; line from anterior ocellus to facial basin very faint; ocelli in a rather low triangle, the distance between the posterior pair about equal to the distance between one of them and the nearest eye margin; first joint of flagellum slightly shorter than the second; clypeus and lower orbits covered with dense, silvery pubescence; remainder of head covered with sparse, silvery pubescence, pronotum closely punctured, the punctures smaller than those on the head, margined anteriorly and distinctly dentate laterally; mesoscutum with large, deep, more or less confluent punctures; mesoscutellum sculptured similarly; episterna slightly striato-punctate above, with fairly large, well separated punctures throughout; upper and posterior faces of the propodeum strongly rugoso-reticulate throughout, the sides of the propodeum strongly, transversely striate; first abdominal tergite basally much flattened, the flattened area bounded posteriorly by an obtuse elevation; second abdominal tergite with a strong, transverse depression basally; third abdominal tergite slightly depressed basally; abdominal tergites with distinct, well separated punctures; second and third abdominal sternites with a strongly impressed apical line; fore femora with a sharp tooth near the base beneath; fore tarsi slightly flattened, intermediate tibiae not spined at the tip. Color black; scape (except a line behind), two very small, transverse spots on the anterior face of the pronotum, posterior lobes of the pronotum, narrow, medial, transverse bands widely interrupted medially on tergites one to four, narrow sinuate bands on tergites five and six, anterior femora at the tips and below, intermediate femora at the tips, anterior tibiae entirely, intermediate and posterior tibiae except a line within, and all the tarsi, yellow; flagellum above blackish, beneath testaceous; tegulae testaceous; wings subhyaline, veins and stigma testaceous.

♀. Unknown.

Type, a male collected at Monroe Canyon, Sioux County, Nebraska, August 17, 1908, (R. W. Dawson).

Distinct from the other species of *Solenius* in the flattened area on the first abdominal tergite, the transverse, basal depressions on tergites two and three, and the impressed, apical lines on sternites two and three.

Lindenius buccadentis sp. nov.

1908. *Lindenius armaticeps* H. S. Smith, Univ. Nebr. Studies, viii, p. 404, (nec Fox).

♀. Length 4.5 to 5 mm. Clypeus truncate anteriorly with a lateral tooth; facial basin smooth; line between fore ocellus and facial basin distinct; ocelli in a low triangle, the distance between the two posterior ocelli very much

greater than the distance between one of them and the nearest eye margin; head very shining, polished, with sparse, distinct punctures; gula with a short, blunt tooth; first and second joints of the flagellum about equal in length; clypeus, inner orbits, and cheeks with prominent, silvery pubescence, that on the clypeus and orbits denser; pronotum prominently, transversely ridged anteriorly, not toothed laterally, distinctly lower than the mesoscutum; mesoscutum and mesoscutellum shining, polished, with sparse, distinct punctures; episterna more finely and closely punctured than the mesoscutum, the foveolate furrow slightly curved, and a prominent fovea above, below the tegulae; the two convexities of the enclosed space on upper surface of propodeum smooth, shining; propodeum channelled medially, the channel connecting with a transverse, foveolate furrow at the base of the upper surface; posterior face of propodeum shining, indistinctly sculptured near the sides; sides of propodeum smooth and shining; episterna and mesosternum with prominent silvery pubescence; abdomen sparsely, microscopically punctate, covered with short, fine, not dense silvery hairs; the apical margins of the tergites narrowly testaceous; pygidium flat, acute at the apex, about one and one-third times as long as broad, with large, close distinct punctures. Color black; mandibles except the reddish apical half, scape except a blotch behind, flagellum beneath at base, pronotum above, posterior lobes of pronotum, anterior femora at the tips, anterior and intermediate tibiae except a blotch within, posterior tibiae on the basal third, all the tarsi except the apical joint, very pale lemon yellow; flagellum testaceous beneath, wings hyaline, iridescent, veins and stigma brownish.

♂. Very similar to the female. The tooth on the gula is somewhat stronger and the flagellum and fore femora are entirely black.

Type, a female collected at Omaha, Nebraska, July 9, 1914, on *Chamaecrista fasciculata*, (L. T. Williams); allotype, a male collected at Omaha, Nebraska, July 25, 1914, (L. T. Williams); five female and one male paratypes collected at Omaha, West Point and Glen, Nebraska.

The female is very similar to *errans* (Fox), but differs by having the gula toothed, the mesoscutellum black, and in the sparser puncturation of the head and thorax. The male in having the gula toothed seems related to *armaticeps* (Fox), but is distinct in having the clypeus and scape posteriorly black, the posterior tibiae yellow at the base only, and the convexities of the enclosed space of propodeum smooth and shining.

Family OXYBELIDAE

Notoglossa minor sp. nov.

♂. Length 2.75 mm. Clypeus five-toothed; head very strongly punctured throughout; occiput finely striato-punctate (i. e. the punctures strong as on the rest of the head, but the striae very fine); distance between the two posterior ocelli about twice the distance between one of them and the nearest eye-

margin; thorax strongly punctured like the head; pronotum strongly margined anteriorly; episterna finely striato-punctate; mesoscutellum and metanotum with a strong, median, longitudinal carina; squamae with a lateral point which does not exceed the tip; metanotal spine short, about as long as the scape, narrowed at the base, broad at the tip, deeply and roundly emarginate; upper surface of propodeum obliquely striate; posterior face, except the small, triangular median area, transversely striate; sides of the propodeum very finely, shallowly and closely punctate, appearing somewhat granulate; abdomen strongly punctured throughout, without any evident spines on the sides. Color black; mandibles except the reddish tips, minute lateral spots on first tergite, anterior and intermediate tibiae and tarsi, stripe outwardly on the posterior tibiae, and hind tarsi, all yellowish; flagellum except the basal three or four joints, and the tegulae, testaceous; wings hyaline, stigma and nervures brownish; front, clypeus and apical margins of abdominal segments with conspicuous silvery pubescence, remainder of body with thin, sparse, silvery pubescence.

♀. Unknown.

Type, a male collected at Omaha, Nebraska, July 16, 1914, on *Chamaecrista fasciculata*, (L. T. Williams).

Related to *emarginata*, but differs from that species in the much smaller size, the striato-punctate episterna, the peculiarly sculptured sides of the propodeum and in the shape of the metanotal spine.

Notoglossa striatifrons sp. nov.

♂. Length 7.5 to 9 mm. Clypeus shining, three-toothed but not strongly so; front strongly, longitudinally striato-punctate; vertex and occiput coarsely, transversely striato-punctate; space between the two posterior ocelli about two and one-half times the distance between one of them and the nearest eye-margin; pronotum strongly margined anteriorly; mesoscutum strongly and coarsely punctate; episterna coarsely reticulate; mesoscutellum strongly punctured; mesoscutellum and metanotum with a distinct, longitudinal, median carina; squamae with a very strong lateral point which does not reach to the tip; metanotal spine about as long as the mesoscutellum, broadened at the tip and roundly emarginate; upper surface of propodeum obliquely rugose, reticulate beneath the spine; posterior face of propodeum transversely rugose except the median area, which is triangular, smooth and shining within; sides of propodeum finely, transversely rugose; abdomen distinctly punctate, the punctures on the first segment stronger than those on the following segments; hind tibiae with three rows of stout, sharp spines on the outer face, the space between the rows strongly rugose. Color black; spot on the squamae, narrow apical bands on tergites one to four narrowly interrupted medially, apical bands on tergites five and six, line on anterior tibiae in front, spot at base of intermediate and posterior tibiae, all very light yellowish; anterior tibiae and tarsi, and flagellum beneath at the apex reddish brown; tegulae, nervures and stigma of wings testaceous; front and clypeus with conspicuous, silvery pubescence.

♀. Unknown.

Type, a male collected at Newcastle, Wyoming, in June, (M. Cary). One paratype collected at the same time and place.

This species is very distinct in its striato-punctate front, vertex and occiput, the strongly reticulate episterna and the markings of the abdomen.

Notoglossa incisura sp. nov.

♂. Length 3.75 to 5 mm. Clypeus five-toothed; head strongly punctate throughout; distance between the two posterior ocelli about three times the distance between one of them and the nearest eye-margin; pronotum margined anteriorly; mesoscutum, mesoscutellum and episterna strongly punctate; posterior portion of mesoscutum, mesoscutellum and metanotum with a strong, longitudinal carina; squamae with a lateral point reaching beyond the tip; metanotal spine about as long as the mesoscutellum, sides almost parallel, not narrowed at the base; spine about twice as long as wide, deeply, widely, and roundly emarginate; upper surface of propodeum obliquely striate, reticulate beneath the spine; posterior face of propodeum except median area which is triangular and finely rugose within, transversely striato-punctate; sides of propodeum transversely striato-punctate; abdomen strongly punctate. Color black; mandibles except the tips, small lateral spots on abdominal tergites one and two, front and intermediate tibiae in front, posterior tibiae at the base, anterior tarsi, intermediate and posterior tarsi basally, all yellowish; flagellum beneath at the tip, and tegulae testaceous; apical half of postscutellar spine concolorous with the squamae; wings hyaline, nervures and stigma testaceous; front and clypeus with conspicuous, silvery pubescence.

♀. Unknown.

Type, a male collected at Harrison, Nebraska, August 9, 1908, (R. W. Dawson). Eight male paratypes collected at Harrison and Monroe Canyon, Sioux County, Nebraska, on August 4 and 9; visits flowers of *Helianthus* sp.

This species is quite distinct in the form of the squamae, the metanotal spine and the sculpture of the propodeum as given in the description above.

Notoglossa decorosa sp. nov.

♀. Length 4.5 mm. Anterior margin of the clypeus truncate, with a distinct lateral tooth; head strongly punctured throughout, appearing somewhat striato-punctate on the occiput; distance between the posterior ocelli about three times the distance between one of them and the nearest eye-margin; pronotum margined anteriorly, mesoscutum, mesoscutellum and episterna strongly punctured; posterior portion of the mesoscutum, the mesoscutellum and the metanotum with a strong, longitudinal, median carina; squamae large, the lateral points long, about half the length of the squamae and much exceeding the tips of the latter; metanotal spine about as long as the mesoscutellum, rather narrow, the dorsal surface strongly fluted, widely and roundly emarginate at the tip; upper surface of propodeum obliquely striate,

reticulate beneath the spine; posterior face of propodeum finely rugoso-punctate except the triangular median area which is rugose within; sides of propodeum finely, transversely striato-punctate; abdomen rather strongly punctate throughout, the longitudinal, median furrow of the first dorsal segment very distinct. Color, black; mandibles except the tips, pronotum entirely above and extending to the posterior lobes, the posterior lobes of the pronotum, two spots on anterior face of the pronotum, spot at the base of each squama, wide apical band on the first abdominal tergite widely interrupted medially, lateral spots on apical margins of tergites two to four (the spots narrow and transverse), apical third of the anterior femora outwardly, anterior tibiae and tarsi, tips of the intermediate femora, line on the intermediate tibiae in front, and base of posterior tarsi, all deep yellow; flagellum beneath and at the tips, testaceous; tegulae and apical abdominal segment red; clypeus and front without conspicuous silvery pubescense, the whole body covered with thin, short silvery pubescence; wings hyaline, nervures and stigma testaceous.

♂. Unknown.

Type, a female collected at Omaha, Nebraska, July 9, 1914, on *Chamaecrista fasciculata*, (L. T. Williams).

This species may be recognized at once by the deep yellow pronotum and the wide, interrupted, apical yellow band on the first abdominal tergite.

Oxybelus argentarius sp. nov.

♀. Length 6.5 to 7 mm. Clypeus shining, impunctate on anterior margin, the lateral angles prominent, and with a very obtuse angulation medially; head closely, moderately punctate throughout, covered with silvery pubescence, which is densest on the clypeus, front and cheeks; distance between the posterior ocelli a little more than twice the distance between one of them and the nearest eye-margin; first joint of flagellum slightly longer than the second; pronotum distinctly carinate anteriorly, the carina forming a small sharp tooth at the sides; mesoscutum and mesoscutellum closely, moderately punctate; mesoscutellum and metanotum indistinctly, longitudinally carinate medially; episterna sparsely, moderately punctate; squamae apparently joined at the base (this is caused by the metanotum being yellow), lateral points of the squamae rather long, slightly curved inwardly; metanotal spine about as long as the mesoscutellum, narrow, channelled on the basal two-thirds, slightly widened apically, squarely truncate at the tip; upper surface of propodeum with a few weak, oblique striae, granulate between the striae; beneath the spine reticulate and granulate; median area of posterior face of propodeum triangular, rather small, glabrous within; sides of propodeum very finely rugoso-punctate; thorax with thin, silvery pubescence, denser and very conspicuous on the mesoscutum, very dense on the upper surface of the propodeum laterally; abdomen with fairly small, well separated punctures; first four abdominal tergites with a narrow, silvery fascia apically; two apical tergites covered with blackish pubescence; pygidium triangular, shallowly emarginate

at the apex. Color black; two small, lateral spots on the pronotum, posterior lobes of the pronotum, two spots on the mesoscutellum, metanotum, inner margins of the squamae, two small, lateral spots on the apical portion of the first abdominal tergite, anterior tibiae within, apex of intermediate and posterior femora, line on the basal portion of the intermediate and hind tibiae outwardly, and apical joints of anterior and intermediate tarsi, all pale yellowish; anterior tibiae within reddish; flagellum bright fulvous except the basal two or three joints; mandibles piceous; eyes (dry) reddish; abdomen entirely ferruginous except the first abdominal tergite; tegulae testaceous; wings hyaline, nervures and stigma testaceous.

♂. Unknown.

Type, a female collected at Harrison, Nebraska, August 9, 1908, (C. H. Gable). One paratype, a female collected at Glen, Nebraska, August 13, 1906, on *Cleome serrulata*, (M. H. Swenk).

Related to *glenensis* H. S. Smith, but differs by having the abdomen almost entirely ferruginous, two yellow spots on the mesoscutellum and other minor characters.

Oxybelus umbrosus sp. nov.

♂. Length 4 to 4.5 mm. Clypeus tridentate; mandibles with a tooth within; head strongly punctured, the punctures finer on the front; distance between the posterior ocelli about three times the distance between one of them and the nearest eye-margin; clypeus, front and cheeks covered with silvery pubescence; pronotum carinate anteriorly; mesoscutum and mesoscutellum strongly punctured; episterna strongly punctured throughout; mesoscutellum and metanotum with a distinct, longitudinal, median carina; squamae with the lateral points strongly curved inwardly; metanotal spine about as long as the mesoscutellum, narrow, channelled, slightly broadened on the apical third, and shallowly, angulately emarginate at the tip; upper surface of propodeum obliquely striate; reticulate immediately beneath the spine; median area of posterior face wedge-shaped, glabrous within; remainder of posterior surface finely striato-punctate; sides of propodeum distinctly, transversely striate; abdomen with moderate, well separated punctures. Color, black; mandibles except the tips, minute lateral spots on the pronotum, posterior lobes of the pronotum, line on anterior and intermediate tibiae outwardly, spot at base of hind tibiae, all pale yellowish; flagellum fulvous, darker above; squamae and metanotal spine except basal fourth, pale, translucent; first abdominal segment, all the remaining abdominal tergites (except the median half which is black), and abdominal sternites, all ferruginous; all the femora and tibiae (except as noted above) dark reddish; tegulae testaceous; wings hyaline, nervures and stigma testaceous.

♀. Unknown.

Type, a male collected at Harrison, Nebraska, August 4, 1908, on *Helianthus* sp., (C. H. Gable). One paratype, a male collected at Harrison, Nebraska, August 9, 1908, (R. W. Dawson).

A very distinct and easily recognizable species. The abdomen is not at all marked with yellowish, and is peculiarly colored in that the median portion of the tergites is black and the sides of all the tergites are ferruginous.

Oxybelus fastigatus sp. nov.

♂. Length 6 to 7 mm. Clypeus tridentate; head strongly, closely punctate; distance between the two posterior ocelli about two and one-half times the distance between one of them and the nearest eye-margin; first joint of flagellum slightly longer than the second; pronotum carinate anteriorly; mesoscutum and mesoscutellum very strongly, closely punctate; episterna punctured likewise; mesoscutellum and metanotum with a distinct, longitudinal carina; lateral points of squamae short, slightly curved inwardly; metanotal spine a little shorter than the length of the mesoscutellum, about half as wide as long, shallowly channelled, slightly dilated towards the apex, slightly emarginate at the tip; propodeum above obliquely striate, punctate towards the lateral margins; reticulate below the spine; median area of posterior face small, triangular, slightly rugose and shining within; remainder of posterior face closely punctate with a few striae near the margins; sides of propodeum distinctly, transversely striato-punctate; abdomen strongly punctate, apical portions of tergites narrowly, silvery fasciate; tergites four to six with a well developed spine on each side; clypeus and front with rather dense silvery pubescence; remainder of body with thin, silvery pubescence. Color, black; a linear, apical spot on each side of abdominal tergites one to four (those on the fourth tergite very narrow and inconspicuous), pale yellowish; flagellum fulvous, slightly darker above; tegulae, abdominal segments five to seven, anterior tibiae and tarsi, all ferruginous; squamae pale, translucent; wings hyaline, nervures and stigma testaceous.

♀. Length 7 mm. Differs from the male as follows: metanotal spine about two-thirds the length of the mesoscutellum, apical portion translucent; median area of posterior face of propodeum a little larger and finely, transversely rugose; two minute spots on the pronotum, posterior lobes of the pronotum, small spot at the tip of the intermediate femora, small spot at the base of the intermediate and hind tibiae, all pale yellowish; the abdominal spots are more extended and almost united into bands; abdominal segments five to six ferruginous.

Type, a male collected at Harrison, Nebraska, August 4, 1908, (C. H. Gable). Allotype, a female collected at Ogallala, Nebraska, June 24, 1913, (R. W. Dawson). Four male paratypes taken at Harrison, Nebraska, on August 4, 1908, (C. H. Gable), and August 9, 1908, (R. W. Dawson). Visits flowers of *Helianthus* sp.

This species may be distinguished by the ferruginous apical abdominal segments in both the male and female, by the strongly

punctured abdomen, the sculpture of the propodeum and the form of the metanotal spine.

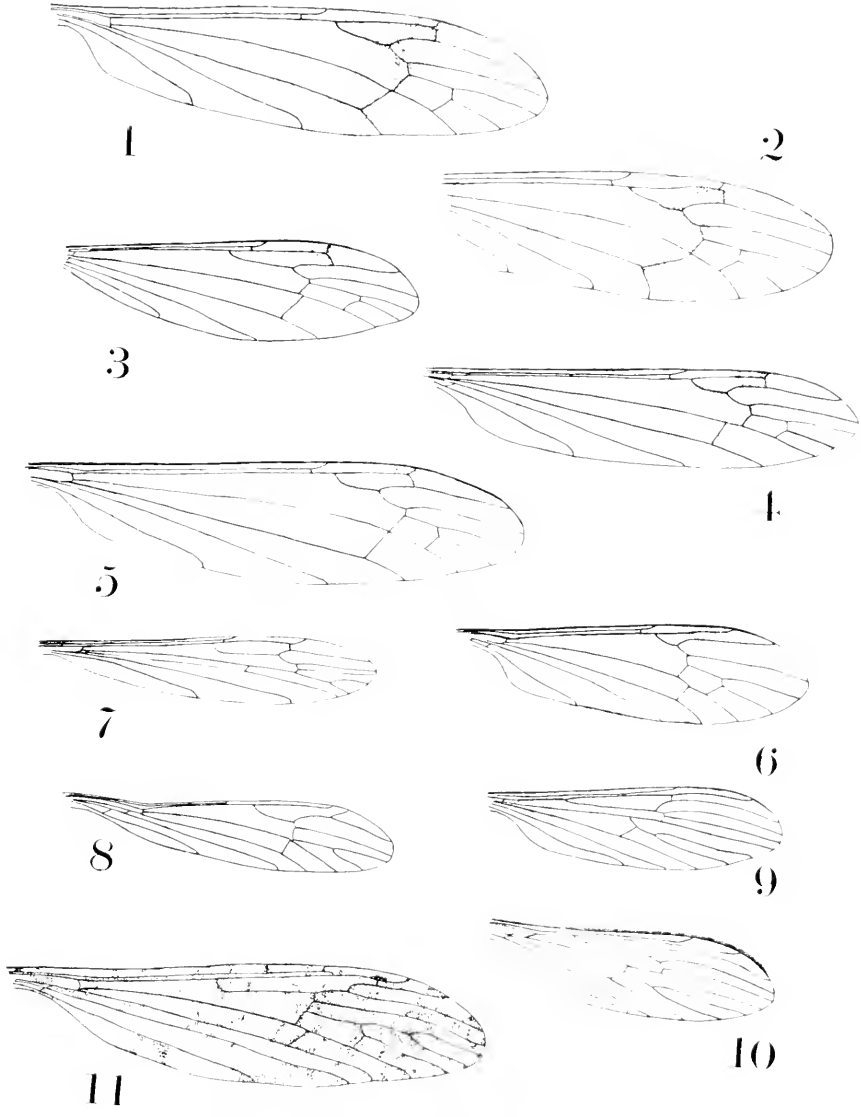
Oxybelus major sp. nov.

♂. Length 12.5 mm. Clypeus strongly tridentate; head with very strong, well separated punctures, those on the front much finer than those on the vertex; distance between the two posterior ocelli about twice the distance between one of them and the nearest eye-margin; first joint of the flagellum distinctly longer than the second; clypeus and front with long, rather thick, silvery pubescence; remainder of head with short, sparse, silvery pubescence; pronotum not carinate its entire width, striato-punctate laterally; posterior lobes of the pronotum carinate anteriorly, appearing dentate; mesoscutum with large deep punctures, a longitudinal, median line anteriorly, and a distinct, linear fovea laterally near the tegulae; mesoscutellum and metanotum punctured like the mesoscutum, with a distinct, longitudinal, median carina; episterna strongly punctate above, the punctures distinctly smaller toward the posterior margin; episterna below coarsely, longitudinally rugoso-punctate; episterna on the lower anterior margin and at the point of juncture with the mesosternum, produced so as to form a very prominent ridge; very strongly ridged before the intermediate coxae; lateral points of squamae rather short, rounded, not sharp; spine narrow, deeply channelled (tip of spine broken off, but evidently acute); upper surface of propodeum coarsely striato-punctate, the striae becoming finer and closer towards the lateral margins; median area of posterior face small, almond-shaped, deep, rugose within; remainder of posterior face coarsely, transversely striato-punctate; sides of propodeum strongly, transversely striate; abdomen with coarse, well separated punctures, without any indication of lateral spines; first abdominal tergite with a longitudinal, median depression; last tergite widely emarginate apically. Color, black; small lateral spots on pronotum, posterior lobes of pronotum, narrow line from postero-lateral angle of mesoscutellum to base of anterior wings, line from metanotum to base of posterior wings, bands on the apical portion of abdominal tergites one to four, wide at the sides, dilated and widely interrupted medially, large spot on anterior and intermediate femora at the tips outwardly, line on all the tibiae outwardly, not reaching to the tips, all very pale yellowish; flagellum black; anterior tibiae dark ferruginous within; tegulae testaceous; wings tinged with yellowish, nervures and stigma light brown.

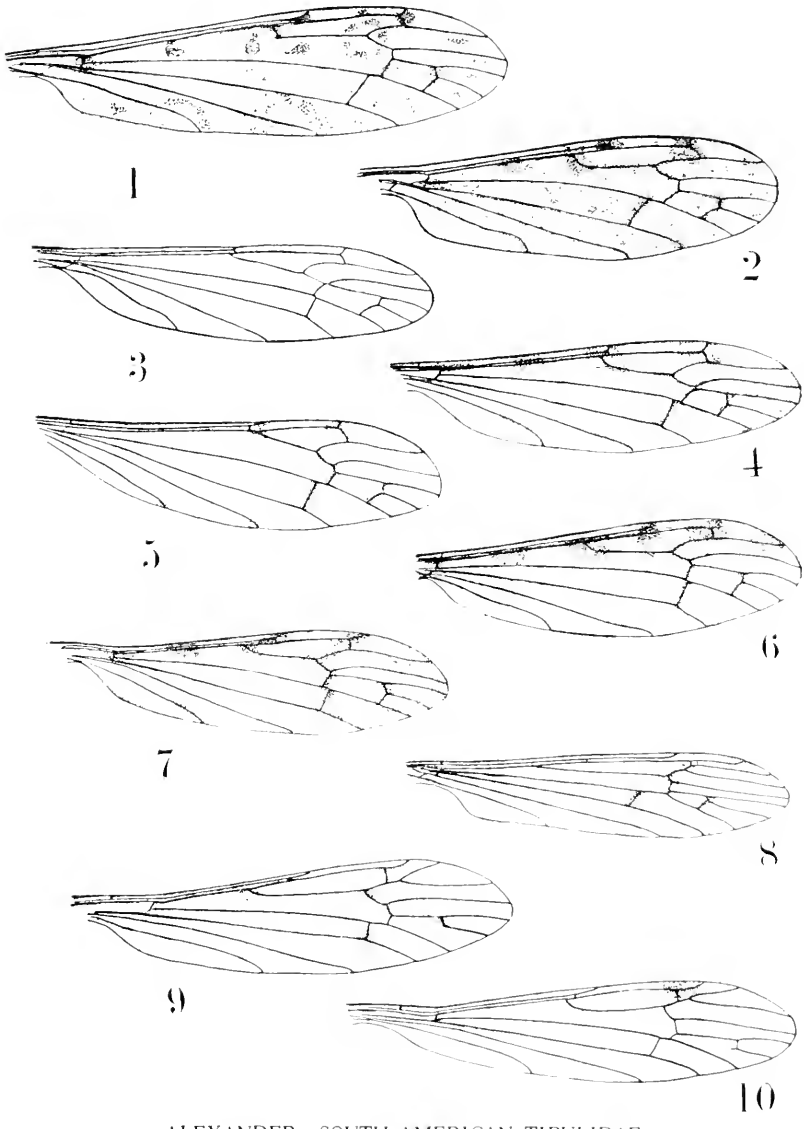
♀. Unknown.

Type, a male collected at South Bend, Nebraska, July 14, 1915, on *Melilotus alba*, (E. M. Partridge).

Related to *albosignatus*, but differs from that species in the much larger size, the structure of the lower half of the episterna, the sculpture of the posterior face of the propodeum and the yellowish tinge to the wings.



ALEXANDER SOUTH AMERICAN TIPULIDAE



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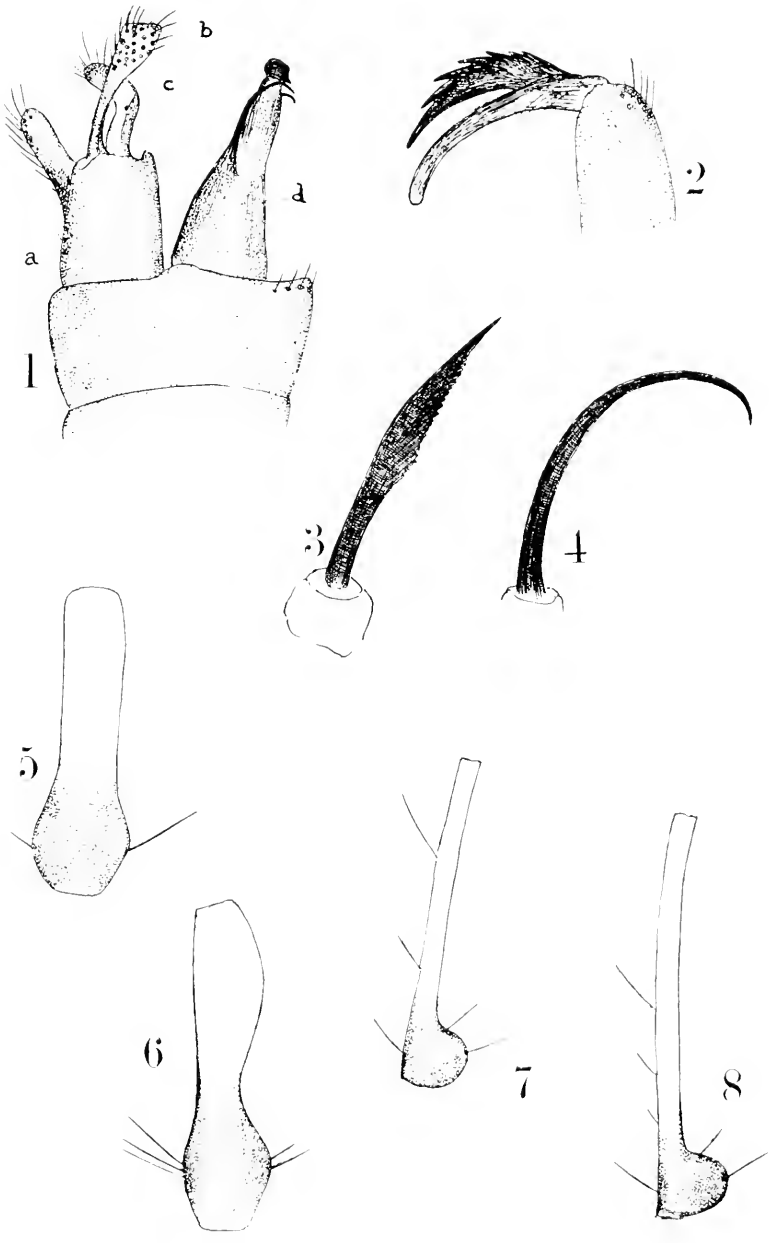
ALEXANDER—SOUTH AMERICAN TIPULIDAE



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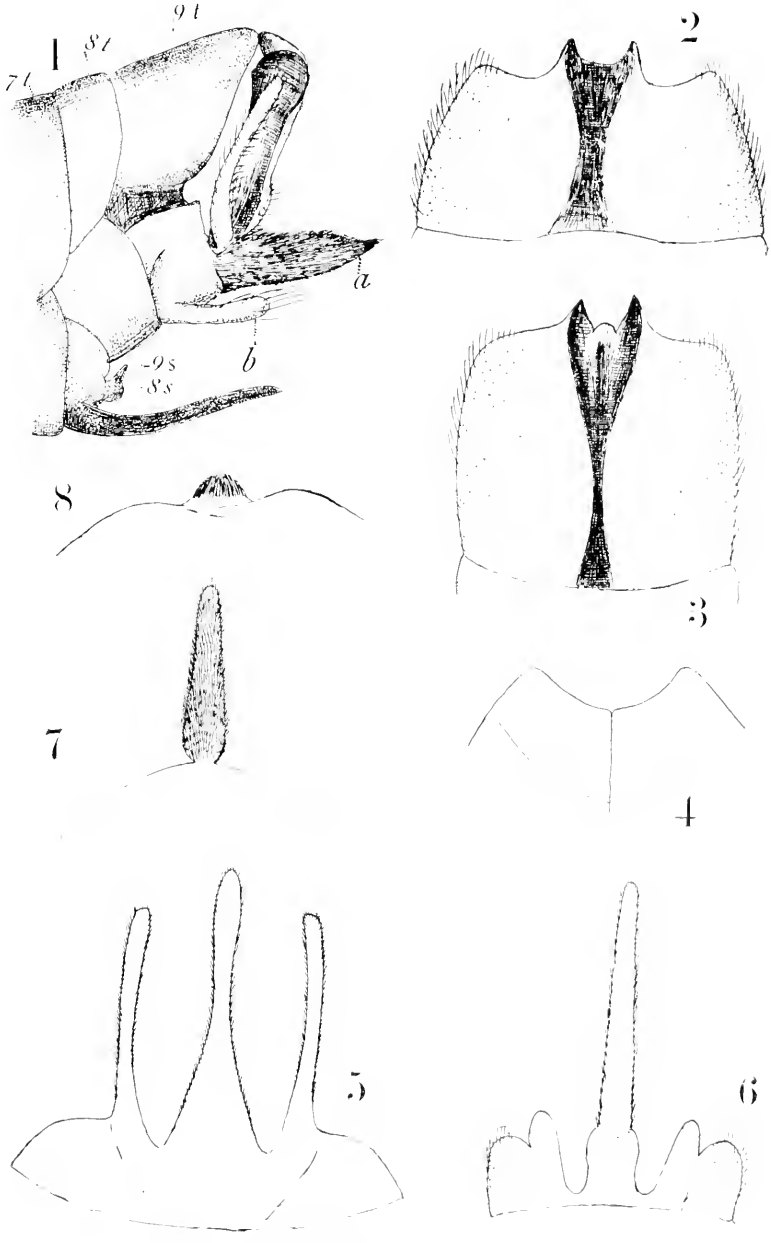
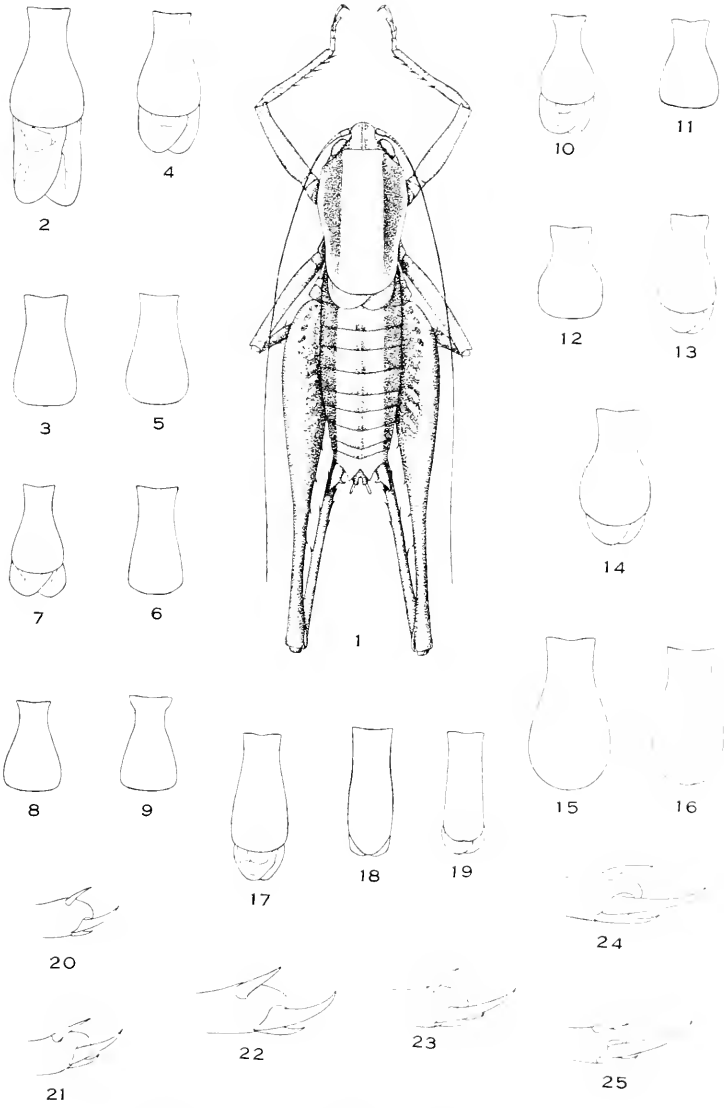
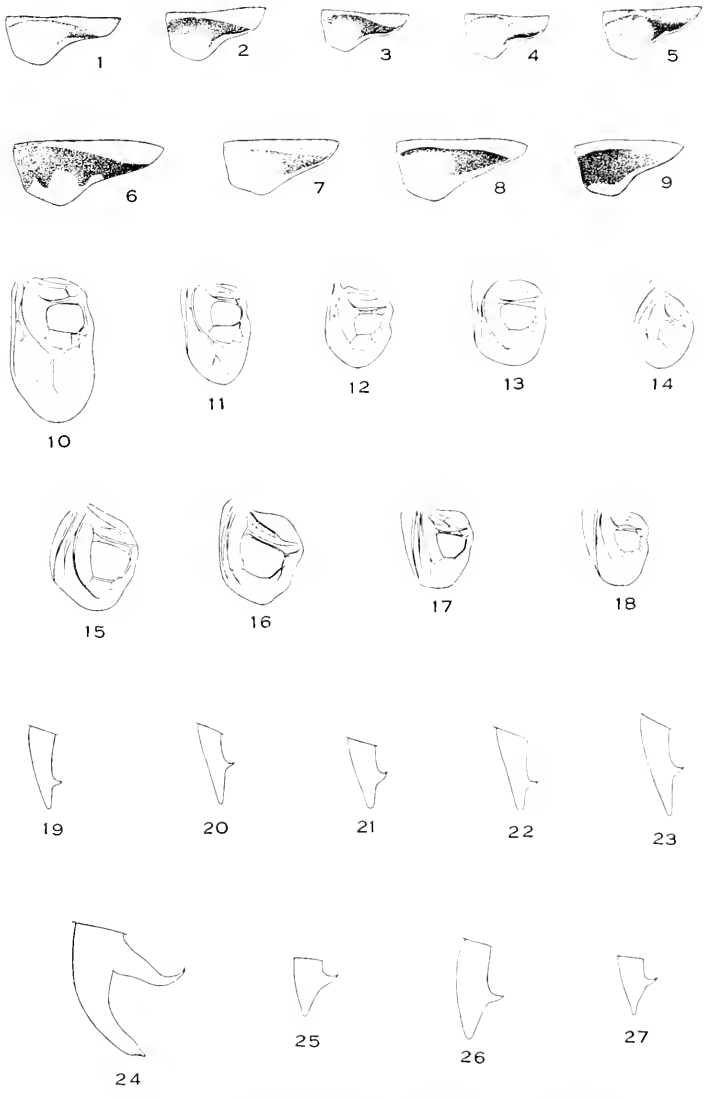


ALEXANDER—SOUTH AMERICAN TIPULIDAE



REHN AND HEBARD AMERICAN TETTIGONIIDAE



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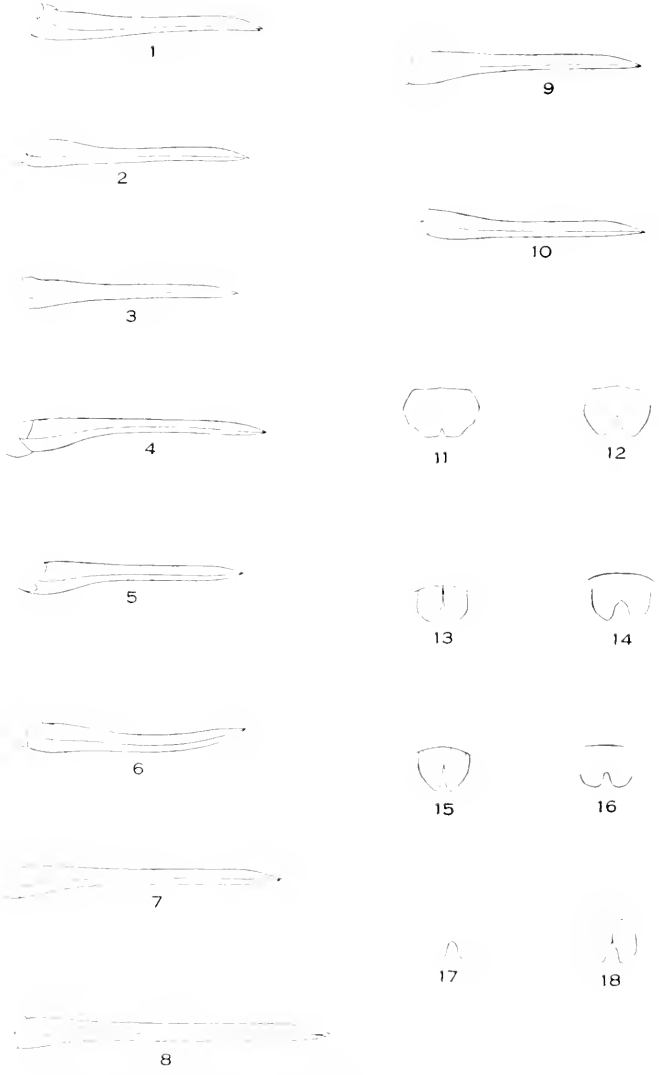

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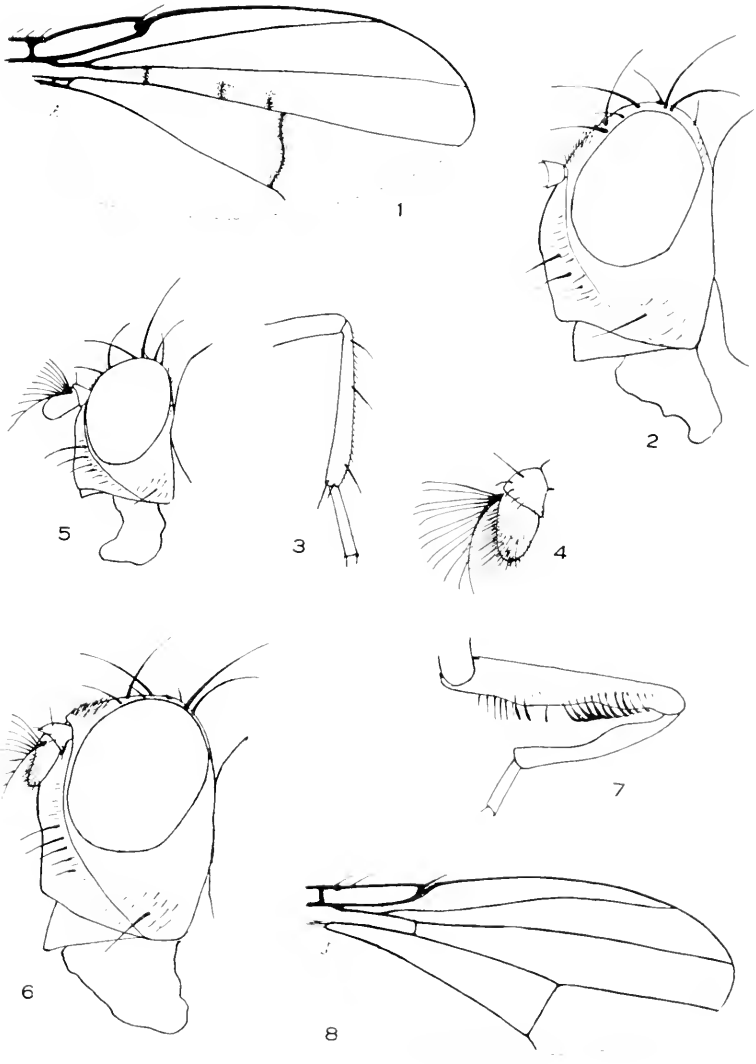
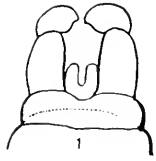


E. T. CRESSON, JR. AMERICAN EPHYDRIDAE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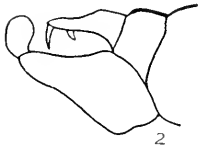
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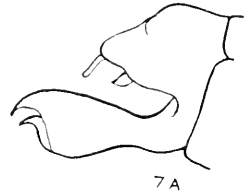
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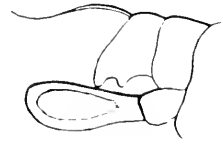
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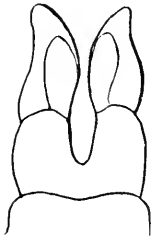
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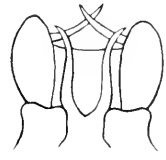
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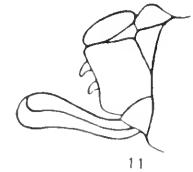
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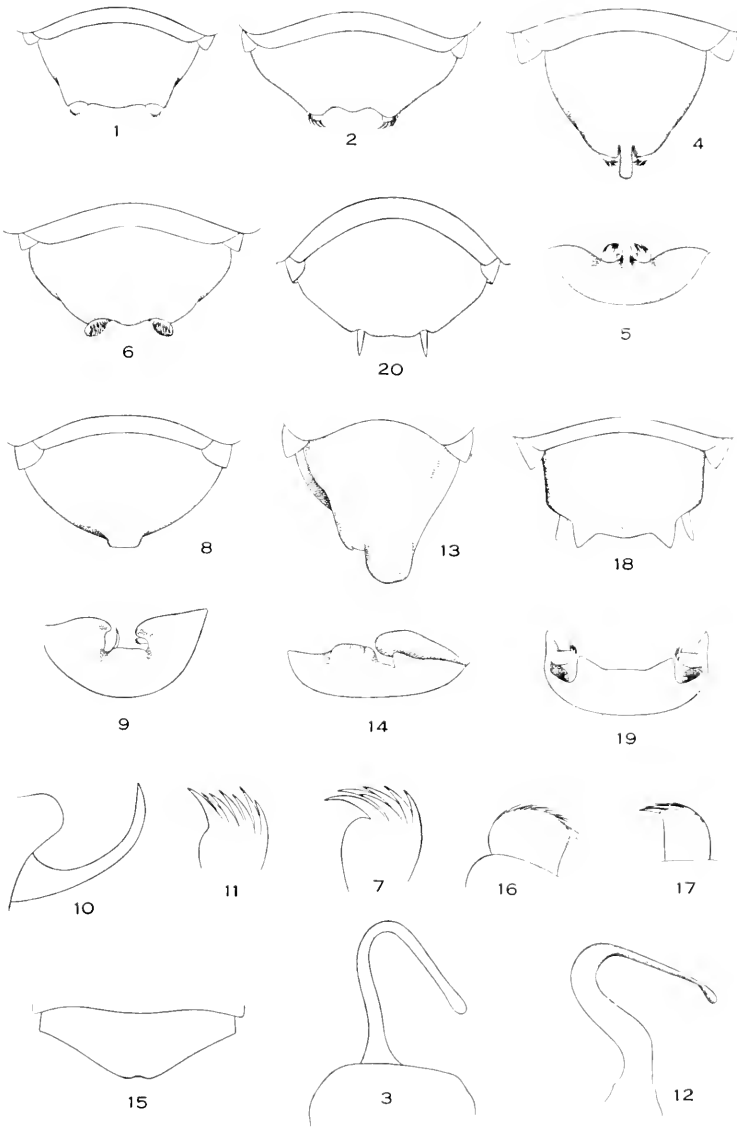

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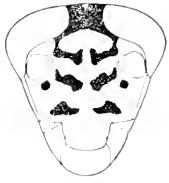
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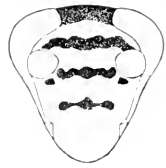
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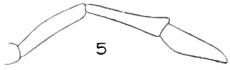
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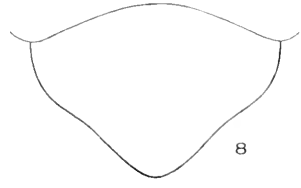
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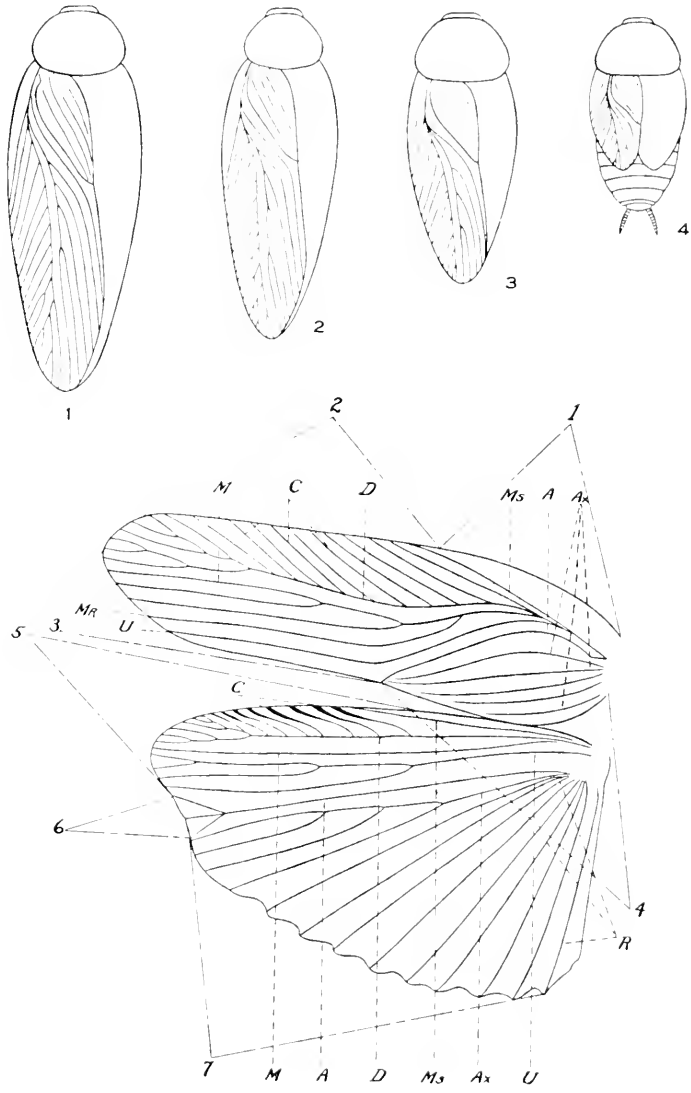

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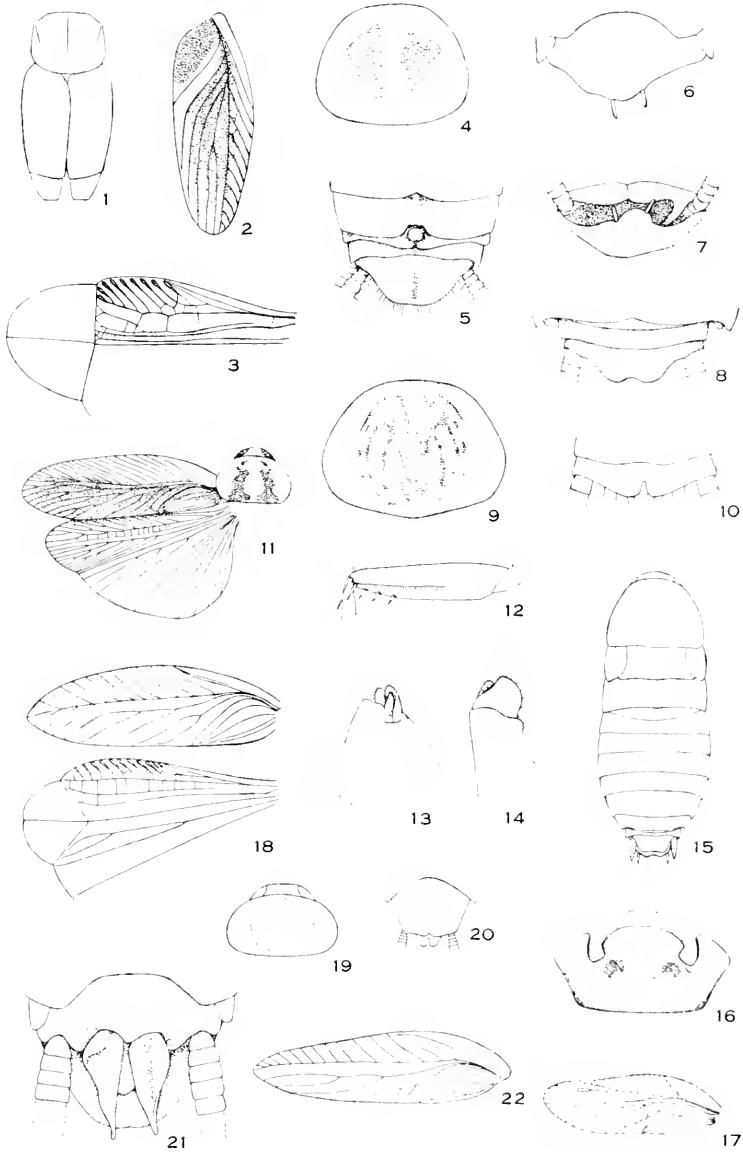

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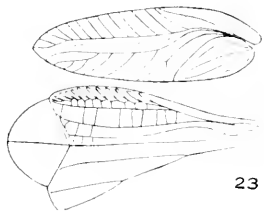
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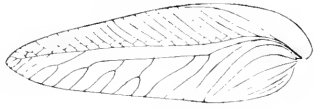


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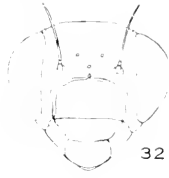
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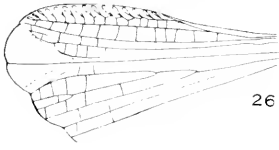
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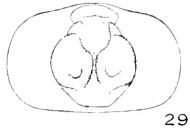
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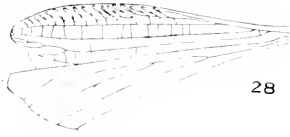
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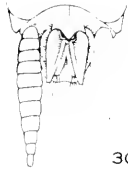
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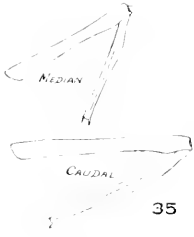

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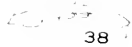
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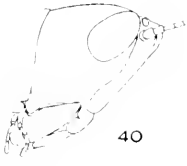
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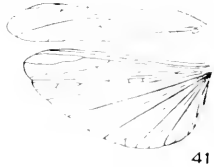
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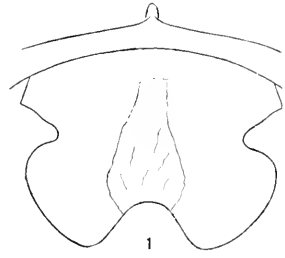
REHN BRAZILIAN ORTHOPTERA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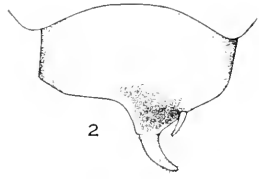
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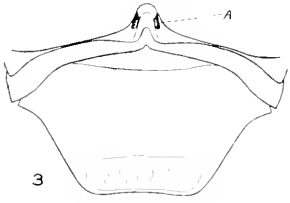
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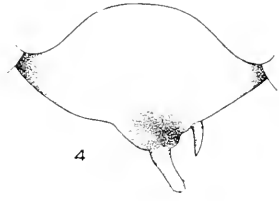
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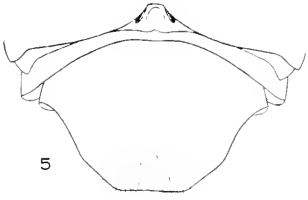
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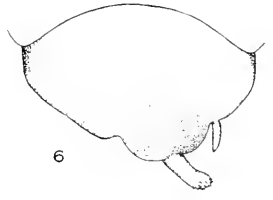
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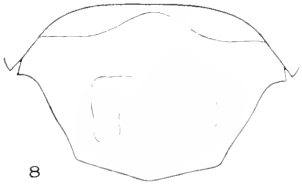
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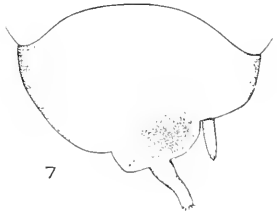
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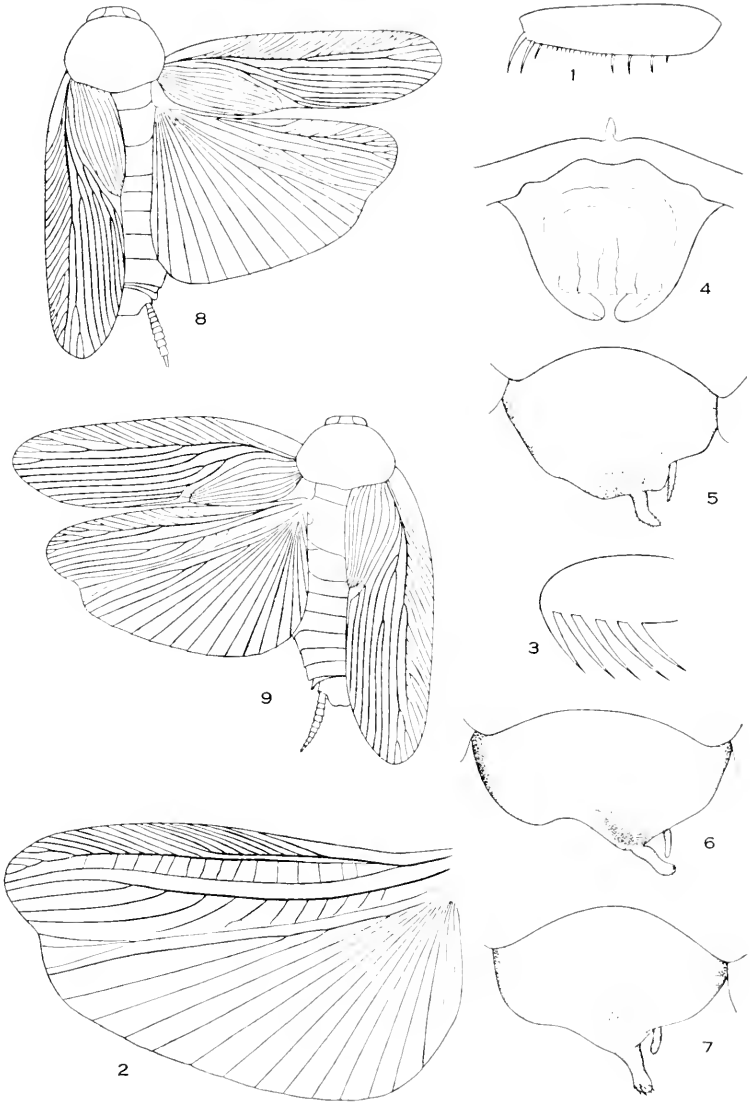
HEBARD — ISCHNOPTERITES (BLATTIDAE)



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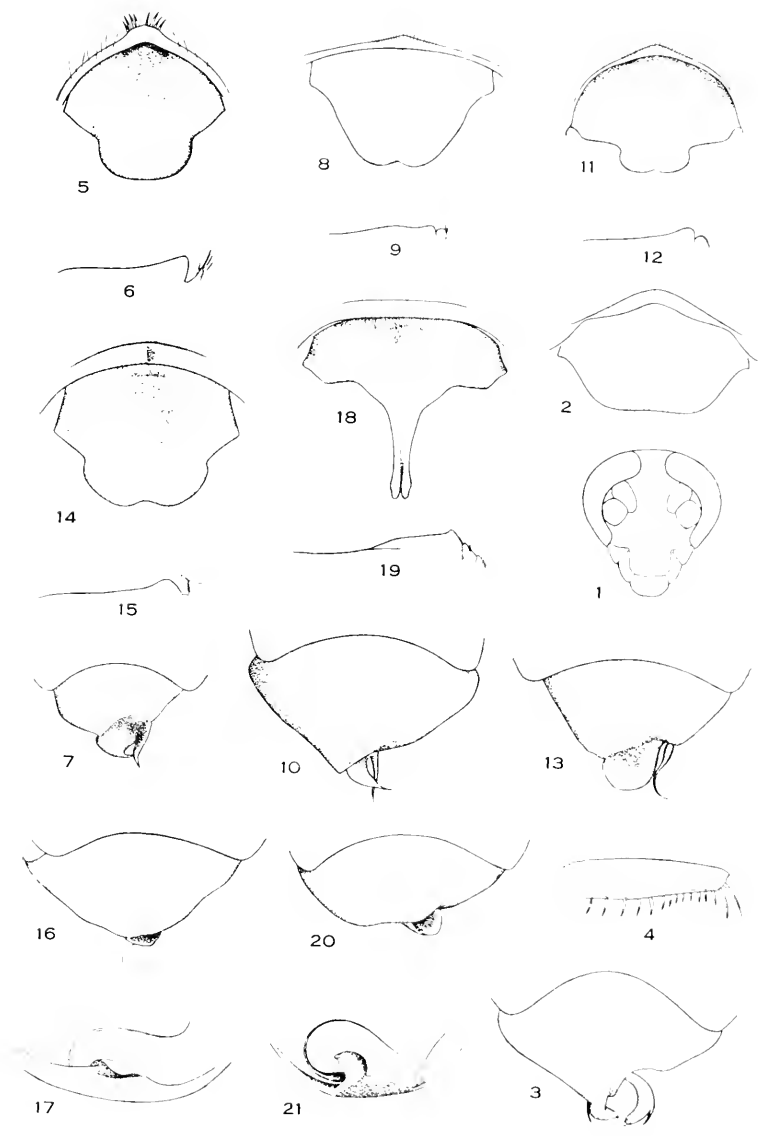

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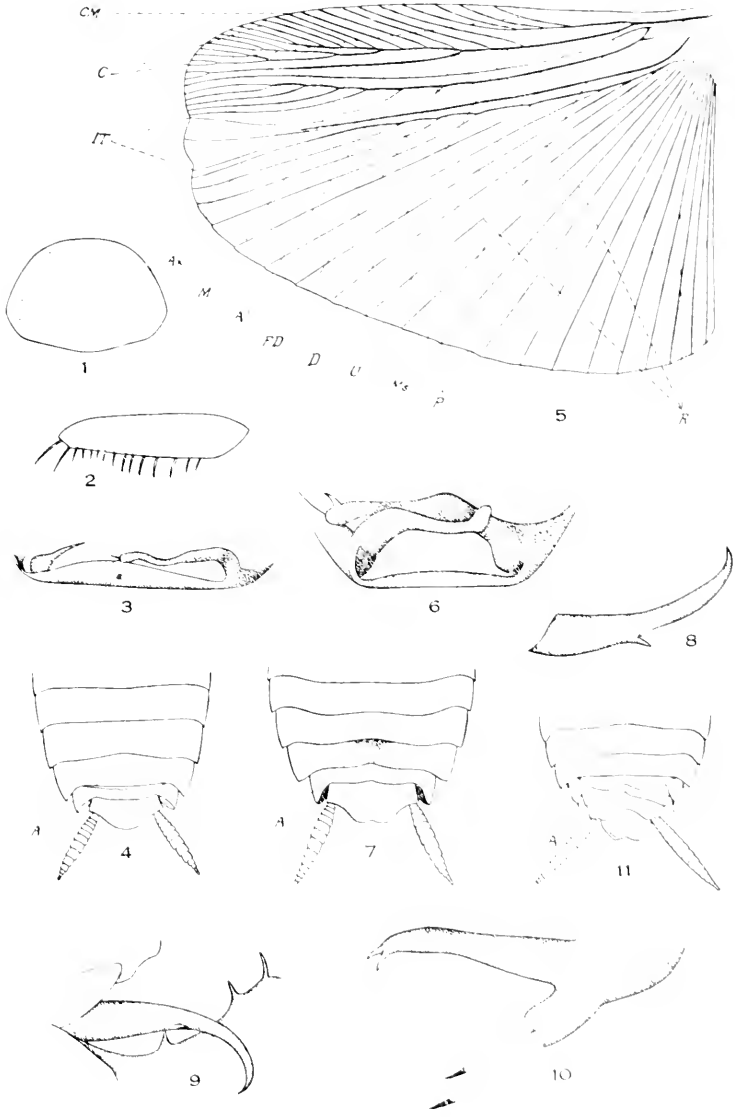

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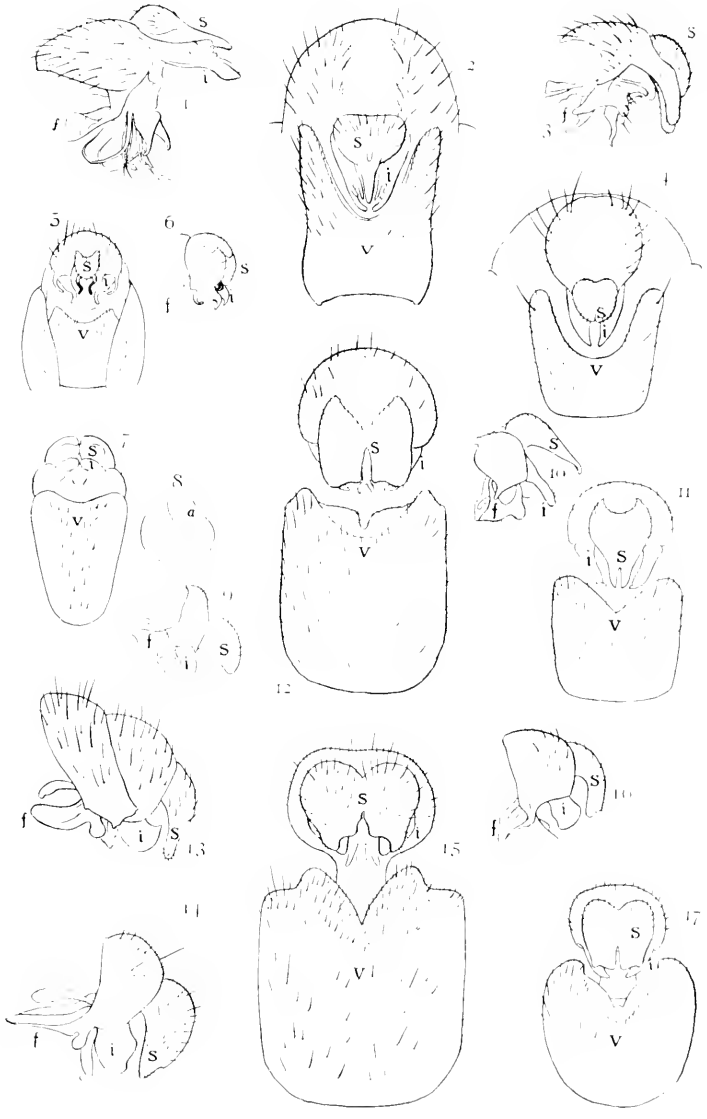

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