

## STUDIES IN THE MANTIDAE AND PHASMIDAE OF PANAMA (ORTHOPTERA)

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The present paper represents the third of our studies in the Dermaptera and Orthoptera of Panama.<sup>1</sup> That section dealing with the Blattidae required more general discussion and revisionary treatment, due to the larger percentage of undescribed forms among the one hundred and six species now known<sup>2</sup> to occur in the region. The sources of the material for the present studies, acknowledgements, a brief discussion of the character of the country, and a map showing the localities where the material in question was taken, were therefore published in that paper.

In the first section of the present study the Mantidae are treated, the collection again showing a high percentage of the forms known from Panama. We are less fortunate, however, in the second section, which deals with the Phasmidae, as but sixteen species are represented, twenty-four other species having been reported from this region. This decided deficiency, in collections otherwise highly representative, is probably due in part to the close resemblance of many walking-sticks to their surroundings and their slow habit of movement, in part to the fact that many live in the twigs and vine tangles of the forest, where beating is most difficult and, as a rule, unproductive in those orders of insects which were particularly sought by the collectors of the greater portion of the material before us.

In this paper two hundred and eight Panamanian specimens are treated, two new genera and four new species being described.

<sup>1</sup> The other papers are:

"A Contribution to the Knowledge of the Dermaptera of Panama," *Trans. Am. Ent. Soc.*, XLIII, pp. 301-334, (1917).

"The Blattidae of Panama," *Mem. Am. Ent. Soc.*, no. 4, pp. 1-148, (1920).

<sup>2</sup> The small series, personally collected in 1920 and reported on during the following year (*Ent. News*, XXXII, pp. 161-169), increased the total by three species.

All material collected by Busck, Jennings and Schwarz belongs to the United States National Museum, all collected by Harrower and Hebard to the author's collection.

### MANTIDAE

Of the twenty-three species and one geographic race which we recognize as valid, now known from Panama, eighteen are represented in the one hundred and forty-nine specimens here recorded. Those not included are:<sup>3</sup> *Phyllomantis laurifolia* Saussure (Mantinae), *Tauromantis championi* (Saussure and Zehntner) (Mantinae), *Acontiothespis cordillerae* (Saussure) ("Acontistinae"), *Acontiothespis cordillerae vitrea* (Saussure and Zehntner) ("Acontistinae"), *Antemna rapax* Stål (Epaphroditinae) and *Vates pectinicornis* Stål (Vatinae).

We have followed the arrangement of Giglio-Tos, feeling that, though by no means final, it is a decided improvement over any previous classification. That author's concept of genera and species, however, is extremely unsatisfactory.

One new genus is described, but no new genera or species are represented in the material here recorded. The Mantidae is undoubtedly the smallest of the families of Orthoptera in Panama.

### EREMIAPHILINAE

#### **Mantoida maya** Saussure and Zehntner

1894. *Mantoida maya* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 125, pl. x, figs. 26 and 27. [♀; Temax, Yucatan, [Mexico].]

Rio Trinidad, Panama, III, 14, 1912, (A. Busck), 1♂.

The colorless stigma and immaculate limbs are given as characters to distinguish this species, known from Sinaloa, Yucatan and southern Florida, from the very closely allied South American *M. fulgidipennis* Westwood.

The measurements of this male, are: length of body, 15; length of pronotum, 2.1; length of tegmen, 14.5; greatest tegminal width, 3.2; length of caudal tibia, 5.7; length of caudal metatarsus, 2.4 mm.

<sup>3</sup> All but *Antemna rapax*, however, are at present represented in the Philadelphia Collections.

## PSEUDOMIOPTERYGINAE

**Pseudomiopteryx infuscata** Saussure and Zehntner

1894. *Pseudomiopteryx infuscata* Saussure and Zehntner, Biol. Cent.-Amer., Orth., 1, p. 163, pl. IX, figs. 10, 11 and 12. [♂: Presidio and Cordova, Mexico; San Juan in Vera Paz, Las Mercedes, Volcan de Atitlan and Zapote, Guatemala; Chontales, Nicaragua; Bugaba, Caldera and Volcan de Chiriqui, Panama.]

Gold Hill, Canal Zone, Panama, XI, 14, 1913, (Hebard; from dead leaves on ground under bushes heavily overgrown with a dense tangle of vines), 1 juv. ♂.

As we have already stated,<sup>4</sup> *infuscata* may prove to be a synonym, or at best a geographic race, of *P. bogotensis* Saussure, described from Colombia. Additional series of both sexes are needed before more can be said.

**MUSONIA** Stål

As has been pointed out by Rehn,<sup>5</sup> the type of *Musonia* was first selected by that author as *surinama*, and as a result, Giglio-Tos' *Promusonia*, having *surinama* as genotype, is an absolute synonym of *Musonia*.

The species assigned by Giglio-Tos to what he incorrectly considered *Musonia* (*conspersa* (Saussure) and *major* Saussure and Zehntner) form a generic unit, differing from *Musonia* as properly restricted in the features given below. To this genus we give the name *Macromusonia*, designating the genotype as *Macromusonia* [*Musonia*] *major* (Saussure and Zehntner).<sup>6</sup> We believe that *major* is very probably a synonym of *conspersa*, but until the type of that species is examined, this will be difficult to decide.

A. Size small, very elongate, juxta-ocular portions of vertex only slightly convex and raised above median portion. Cephalic tibiae with ventro-internal margin armed with eight spines, of which the first to fourth and fifth to eighth form two series regularly increasing in size distad, the fifth being decidedly

<sup>4</sup> Trans. Am. Ent. Soc., XLV, p. 134, 1919.

<sup>5</sup> Proc. Acad. Nat. Sci. Phila., 1918, p. 167, footnote 21, (1918).

<sup>6</sup> We have selected *major* as genotype, as that species alone is fully described and figured.

shorter than the fourth; ventro-external margin armed with five spines, of which the first is well separated from the others, the first four rather small but increasing regularly in size distad, the fifth very large.

**Musonia** Stål

AA. Size large, very elongate, juxta-ocular portions of vertex well raised and angulato-convex. Cephalic tibiae with ventro-internal margin armed with eight spines, regularly increasing in size distad, except that the fifth is very slightly shorter than the fourth; ventro-external margin armed with five spines, the interval between the first and second being only slightly greater than the succeeding intervals, the first four spines very small and increasing only slightly in size distad, the fifth very large.

**Macromusonia** new genus

We note that *Macromusonia* is very closely related to *Paramusonia* Rehn, of which *cubensis* (Saussure) is the type. That genus differs only in having the vertex with dorsal margin convex between the eyes and therefore more elevated mesad than elsewhere (in *Musonia* and *Macromusonia* the dorsal margin of the vertex is transverse between the raised juxta-ocular portions) and with no juxta-ocular elevation, while the cephalic tibiae have the ventro-internal margins armed with eleven to twelve spines which increase regularly in size distad.<sup>7</sup>

**Musonia surinama** (Saussure)

1869. *Th[epis] surinama* Saussure, Mitth. Schweiz. Ent. Ges., III, p. 70. [♂, Surinam.]  
 1894. *Musonia femorata* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 166, pl. x, figs. 20 and 21. [♀; Chontales, Nicaragua.]  
 1911. *M[ionyx] fuscescens* Chopard, Ann. Soc. Ent. France, LXXX, p. 333. [♂, ♀; St. Laurent, La Forestiere and Nouveau-Chantier, French Guiana.]

After careful comparison of the numerous females of this species before us, with the original description of *femorata* Saussure and Zehntner, we find so exact agreement that we are obliged to place that name in the present synonymy. It is possible that the type specimen may have been incorrectly labelled, as the species is not represented in the large Costa Rican series before us, though we have a male labelled "Central America," collected by the Rev. T. Heyde.

<sup>7</sup> Comparison is made with material of *cubensis* in the Philadelphia Collections, from Cuba.

Through the kindness of its sponsor, a paratypic male of *fuscescens* Chopard, from St. Laurent du Maroni, French Guiana, is in the author's collection. Comparison satisfies us of the synonymy of this name as well. Specimens in the series here recorded are in every way similar, the general darkening being slight and representing merely a weak intensification of the normal coloration. In many species of the Mantidae, the difference between the extremes of recessive and intensive coloration are much greater.

Alhajuela, Panama, III, 8, to IV, 18, 1911 and 1912, (Busck; Zetek), 25♂, (7 intensive in coloration, 2 moderately so).

Paris Field, Cristobal, Canal Zone, Pan., VII, 7, 1920, (Hebard), 1♂.

Zone limit, five miles west of Empire, C. Z., Pan., XI, 14, 1913, (Hebard; among dead palm fronds, opening in jungle), 1♀, (moderately intensive in coloration).

Gold Hill, C. Z., Pan., IX, 14, 1913, (Hebard), 1♂; 1912, (Zetek), 1♂, [Hebard Cln.].

Paraiso, C. Z., Pan., I, 19 to IV, 24, 1911, (Busck), 3♂.

Corozal, C. Z., Pan., III, 12 and 25, 1911, (Busck), 4♂, 1♀, (1♂ moderately intensive in coloration).

Ancon, C. Z., Pan., (Jennings), 1♂; 1912, (Zetek), 1♂, [Hebard Cln.]; XI, 12 and 16, 1913, (Hebard; climbing about in short grass and low vines in semi-open areas), 2♂, 2♀.

La Chorrera, Pan., V, 17, 1912, (Busck), 1♀, (strongly intensive in coloration).

Though the size variation is considerable, the extremes here measured are connected up by a complete gradation in the large series at hand.

♂	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Width of tegmen
Alhajuela.....	23.2	5.7	1.3	13.9	3.4
Paraiso.....	32.5	8	1.9	18.8	4.3
♀	Length of body	Length of pronotum	Greatest width of pronotum	Length of supra-anal plate	Length of caudal metatarsus
Ancon.....	30.3	8.5	2.3	1.9	3.4
Near Empire.....	35	9.3	2.4	2	3.5

The species is common and widely distributed in Panama. It frequents grasses and vine tangles in the open, but usually near the jungle, and when approached scrambles about hastily, much as does the North American *Oligonyx scudderi* Saussure. It is apparently very widely distributed over northern South America, having been recorded from Colombia, Venezuela, Dutch Guiana and French Guiana, while Chopard has recorded a specimen, referred to the synonymous *Mionyx fuscescens*, from the Gran Chaco, Argentina.

"THESPINAE"<sup>8</sup>

**Angela subhyalina** (Chopard)

1913. *Thespis subhyalina* Chopard, Ann. Soc. Ent. France, LXXXII, p. 754. [♂, ♀; Mapiri, Bolivia.]

Porto Bello, Panama, II, 25, 1911, 1 ♀, [U. S. N. M.]; III, 2, 1911, (Busck), 1 juv. ♀.

Gatun, Canal Zone, Pan., VIII, 6 to 22, 1916, (Harrower), 1 juv. ♂.

Rio Trinidad, Pan., III, 15 to 30, 1911, (Busck), 1 juv. ♂.

The adult female before us, except for being somewhat larger and having the membranous anal area of the tegmina dark, agrees in all respects with the female described by Chopard. The end of the abdomen was missing in that specimen. In the present female the merest traces of meso-distal tuberculation are suggested on the three tergites preceding the triangular supra-anal plate. This plate is as long as its basal width, with lateral margins showing exceedingly faint convexity to the almost acute apex.

So closely does this insect resemble *A. quinquemaculata* (Olivier) that we believe it may eventually be found to represent merely a depauperate, under-developed phase of that species. It differs only in the much weaker tuberculation of the distal abdominal tergites, the non-denticulate margins of the pronotal collar in the male, the much shorter organs of flight in the female and smaller size.

<sup>8</sup> This name falls, as *Angela* Serville must be used for the genus incorrectly recognized by Giglio-Tos as *Thespis*. The genus *Thespis* as correctly limited belongs to the eighth of Giglio-Tos' subfamilies and, as a result, no name is available for this, the ninth. We believe, however, that the present is an artificial group, not even representing a cohesive series of genera and, therefore, do not propose a name to take the place of the "Thespinæ."

Length of body, 99.3; length of pronotum, 43.7; length of pronotal collar, 7.7; length of tegmen, 12; greatest tegminal width, 3.7; length of wing, 11.2; length of cercus, 4.8; width of cercus, 2 mm.

## OLIGONICINAE

**Thrinaconyx fumosus** Saussure and Zehntner

1894. *Thrinaconyx fumosus* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 179, pl. x, figs. 4 to 10. [♂; Volcan de Chiriqui, Panama.]

Porto Bello, Panama, VIII, 18 to 22, 1916, (Harrower), 1 ♀.

Alhajuela, Pan., IV, 8, 1911, (Busck), 1 juv. ♂; IV, 18, 1911, (Busck), 1 ♂.

Rio Trinidad, Pan., V, 4, 1911 and VI, 6, 1912, (Busck), 1 ♂, 1 ♀.

The female of this species was previously unknown. We note the following features for the specimen from Porto Bello.

Similar to male except as follows. Apterous. Size no larger, form slightly heavier except that the abdomen is decidedly heavier, this greatest meso-distad. Head slightly broader, vertex with dorsal margin less concave between the eyes, very weakly concave, with sulci weak; ocelli present but only half as large, the ventral ocellus with dorsal margin not acutely produced, as is the case in the male. Facial scutellum with height about two-fifths basal width as in male, convex dorsal margin not as distinct. Pronotum with surface and margins heavily dentate-tuberculate. Cephalic coxae with cephalic margin bearing nine distinct denticulations, the lateral margins with more numerous but not as heavy denticulations, caudal surface irregularly denticulate, all of these the bases of minute, microscopic hairs. Armament of cephalic femora and tibiae as in male but slightly heavier, the larger tibial spines all distinctly denticulato-serrulate under the lens. Supra-anal plate short, shield-shaped, length three-quarters of proximal width, medio-longitudinally carinate, lateral margins moderately convex-convergent to the rather sharply rounded apex; in male similar but with apex broadly rounded. Cerci very short, stout proximad, tapering decidedly to the terminal joint which is very slender and elongate; shorter and heavier proximad, with terminal joint more elongate than

in male. Caudal metatarsus nearly twice combined length of succeeding joints.

The cephalic tibiae are dark brown, distinctly tri-annulate with buffy, these colors being carried on to the distal portion of the femora, adjacent when the limbs are flexed, and contrasting strongly with the remaining internal portions of the femora and coxae, which are rich tawny. The other limbs are also decidedly annulate. This is also true for the additional female and immature male at hand. The adult males, however, have these features less strongly defined, the markings on the cephalic femora and tibiae being almost completely obscured.

*Measurements (in millimeters)*

♂	Length of	Length of	Greatest	Length of	Width of
	body	pronotum	width of pronotum	tegmen	tegmen
Alhajuela . . . . .	12.7	3.4	1.3	10.8	3.7
Rio Trinidad . . . . .	12.5	3.4	1.3	10.7	3.9

  

♀	Length of	Length of	Greatest	Length of	Length of
	body	pronotum	width of pronotum	caudal tibia	caudal metatarsus
Porto Bello . . . . .	11.4	3.9	1.7	4.8	2.3
Rio Trinidad . . . . .	12.1	4.1	1.7	5.2	2.6

***Pseudomusonia*<sup>9</sup> *lineativentris* (Stål)**

1877. *M[usonia] lineativentris* Stål, Bih. till K. Svenska Vet.-Akad. Handl. v, no. 10, p. 66. [♂, Colombia.]

1894. *Mionyx saevus* Saussure and Zehntner, Biol. Cent.-Amer., Orth., 1, p. 167, pl. x, figs. 12 to 14. [♂; Bugaba and Volcan de Chiriqui, Panama.]

Though the only Colombian specimen before us is immature, the series at hand agrees so closely in all characters of real specific value that we feel fully justified in indicating the above synonymy. This series, however, shows the species to be subject to very decided size and color variation. As a result the very dark examples have a decidedly different facies from the paler individuals, while in the smallest specimens the tegmina are not only reduced in proportion but show no widening meso-distad.

Porto Bello, Panama, II, 19 to V, 3, 1911, (Busck), 1 ♂, 3 ♀; II, 21, 1911, (Schwarz), 1 ♂.

<sup>9</sup> Werner has proposed this generic name to take the place of *Mionyx* Saussure and Zehntner, preoccupied by *Mionyx* Cope, 1886, a genus of lizards Verh. K.-K. Zool.-Bot. Ges., Wien, LIX, p. 78, (1909).

Paris Field, Cristobal, Canal Zone, Pan., VII, 7 and VIII, 18, 1920, (Hebard; in low wet area of palms, vines and brush, 3 at night), 2 ♂, 2 ♀.

Gatun, C. Z., Pan., VIII, 6 to 22, 1916, (Harrower), 1 ♂; (Jennings), 1 ♂.

Paraiso, C. Z., Pan., I, 30, 1911, (Busck), 1 ♀.

Alhajuela, Pan., IV, 19, 1911, (Busck), 1 juv. ♀.

In the male sex the following cephalic limb armament is found. Femora with four discoidal spines, ventro-external margin with four moderately elongate spines, all genicular lobes with a very small conical spine, ventro-internal margin with the formula I II I III I. Cephalic tibiae with ventro-external margin showing three minute and one large distal spine, the first separated a greater distance from the others than they are from each other; ventro-internal margin with six or seven spines, the first two or three minute, the next large, the next half as large, the last two very large and elongate, the last above the ventral margin and adjacent to the side of the apical claw. In the female this armament is similar except that the tibial spines are microscopically serrulate and proportionately heavier, while the third spine from the end of the ventro-internal margin is scarcely a third as long as the preceding spine.

Compared with the male sex, females are seen to be decidedly larger and heavier and apterous. The ocelli are exceedingly minute, the pronotum with lateral margins very slightly more heavily denticulate, the supra-anal plate similarly medio-longitudinally carinate, linguliform, but slightly over twice as long as proximal width, instead of being less than twice as long as that dimension as found in the male.

*Measurements (in millimeters)*

♂	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Proximal width of tegmen	Greatest distal width of tegmen
Porto Bello	28.5	7.8	1.8	14.2	3	2.8
Porto Bello	29.3	8.1	2	15.2	3.2	3
Gatun . . . .	—	7.8	1.8	16.2	3.7	3.9
Gatun . . . .	34.8	8.9	1.8	19	3.7	4.4
Paris Field	31.7	8	1.8	18	—	4.1
Paris Field	35.6	9.3	1.9	18.7	3.7	4.3

♀	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Length of caudal tibia	Length of caudal metatarsus
Porto Bello	42	12.3	2.7	—	9.9	3.6
Porto Bello	42	12.9	2.8	—	9.8	3.7
Porto Bello	44	12.8	2.7	—	9.9	3.7
Paris Field	38.7	12	2.5	—	9.3	3.2
Paris Field	41.8	12.4	2.7	—	10.1	3.5
Paraiso . . .	38	11.9	2.4	—	9.3	3.2

The present series shows plainly the very decided variation which occurs in the species. In the smaller individuals the less ample tegmina do not widen distad. Such disproportion is unusual within a species, but in the present case we are satisfied that it represents mere individual variation.

The recessive type of coloration in males is as follows. Yellowish, irregularly tinged and flecked with dark brown on the body. Tegmina and wings transparent, evenly and strongly tinged with sepia, the transverse veinlets, but not the veins, distinctly paler, weakly tinged with brown. Ventral surface of abdomen light brown, showing a weak and obscure medio-longitudinal line of darker brown. Cephalic tibiae yellowish, showing very broadly three obscure annuli of dark brown. Median and caudal femora immaculate greenish yellow, the tibiae and tarsi immaculate yellowish. The individuals in the series before us show varyingly more intensive types to a condition which is very dark. The darkest male before us is dark brown in general coloration. Cephalic femora with two dorsal flecks of this color and cephalic tibiae obscurely tri-annulate with the same. Median and caudal limbs snuff brown, weakly suffused and flecked with darker brown, particularly at juncture of femora and tibiae. Tegmina and wings transparent, evenly and very strongly tinged with sepia, the veins sepia, the veinlets of the same color as the intervening areas, so that these organs are distinctly more uniform in coloration than in the recessive males. Ventral surface very dark brown, of abdomen heavily overlaid with blackish flecks and with a much obscured medio-longitudinal line of black.

The females also vary considerably in coloration. One was apparently pale green in life, another is light ochraceous-tawny, one is ochraceous-buff spotted with blackish, one is sayal brown

with a longitudinal line of dark brown on each side, running from back of the head to the apex of the abdomen, while two are warm sepia heavily suffused with bone brown.

## LITURGUSINAE

**Liturgusa cayennensis** Saussure

1869. *L[iturgusa] cayennensis* Saussure, Mittheil. Schweizer Ent. Ges., III, p. 62. [♀, Cayenne (= French Guiana).]

Porto Bello, Panama, III, 13, 1911, (Busck), 1 ootheca, 4 recently emerged juv.

Alhajuela, Pan., IV, 10, 1911, (Busck), 1 ootheca, 12 recently emerged juv.

Cabima, Pan., V, 17 to 29, 1911, (Busck), 1 ♂, 1 ♀, 2 juv., 1 ootheca.

Gatun, Canal Zone, Pan., 1913, (Zetek), 1 ♀, [Hebard Cln.].

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; on trunks of trees in clearing, much like *Gonatista* in actions, very rapid and alert), 1 ♀, 2 juv.

The streaked tegmina and much shorter caudal tarsi serve to separate this insect from the more slender but generally similar *L. annulipes* Serville.

The species of this genus live on the trunks of trees, when not in motion resting closely pressed to the bare surface. At such a time they blend astonishingly with their surroundings. Adults of the present species from Costa Rica, Panama and Trinidad agree closely in coloration of the tegmina, but a pair from French Guiana are of a more reddish brown, with the series of short gray or gray-green streaks on the principal veins missing. Such color variation would appear to be due to adaptation to immediate environment.

The ootheca of this insect is a small, smooth, gourd-shaped receptacle, its neck curved upward and affording the only exit for the young. These at the time of emergence are slightly less than 4 mm. in length.

## PHOTININAE

**Macromantis ovalifolia** (Stoll)

1813. [*Mantis*] *ovalifolia* Stoll, Natuur. Afbeeld. Beschryv. Spookten, etc., Spookten, p. 58, pl. XIX, fig. 72, register p. 78. [♀, no locality given.]

Rio Trinidad, Panama, III, 18, and V, 9, 1911, (Busck), 2 small juv.

Compared with Colombian and Brazilian adults,<sup>10</sup> these immature individuals, only 24 and 26.5 mm. in length, agree closely in general form, the peculiar parallel sides of the pronotal supra-coxal expansion being distinctive. As in the adults, minute black flecks are found on the inner face of the cephalic trochanters and proximad on the same face of the cephalic femora, while the first discoidal spine is also marked with black.

#### CHOERADODINAE

##### **Choeradodis rhombicollis** (Latreille)

1833. *Mantis rhombicollis* Latreille, in Humboldt and Bonpland, Obs. Zool., II, p. 103, pl. XXXIX, figs. 2 and 3. (No locality given.)

1880. *Choeradodis servillei* Wood-Mason, Ann. Mag. Nat. Hist., (5), VI, p. 161. [♀; Caché, Costa Rica: juv.; Chiriqui, Panama.]

1882. *Choeradodis brunneri* Wood-Mason, Journ. Asiatic Soc. Bengal, LI, pt. 2, p. 21. [♀; Bogotá, New Granada (= Colombia).]

A series of twenty-four specimens now before us, representing localities from Nicaragua to Ecuador, are clearly referable to but a single species. This species varies somewhat in size, pronotal outline, tegminal width, and decidedly in the extent of the black spot at the unguicular sulcus on the internal surfaces of the cephalic femora. Differences in these features led Wood-Mason to describe *servillei*<sup>11</sup> and *brunneri*. After comparison of the material at hand with the original descriptions, we do not hesitate to indicate the above synonymy. The individuals before us show many different gradations between the conditions which Wood-Mason believed to represent distinct species.<sup>12</sup>

Bocas del Toro, Panama, 1911, (Zetek), 2 ♂, [Hebard Collection].

Porto Bello, Pan., II, 18, to V, 4, 1911, (Busck), 2 ♂, 1 large juv. ♀, 1 small juv.

<sup>10</sup> Recorded and measured, Trans. Amer. Ent. Soc., XLV, p. 133, (1919).

<sup>11</sup> We have already stated that Saussure and Zehntner's separation of *servillei* and *rhombicollis* had no value. Trans. Amer. Ent. Soc., XLV, p. 130, (1919).

<sup>12</sup> Kirby, in his catalogue, places *rhombicollis* of Wood-Mason and subsequent authors (not of Latreille) under *peruwiana* Serville. We do not believe he had sufficient evidence to warrant such action, but should it prove correct, *peruwiana* also would fall as a synonym of *rhombicollis* (Latreille).

Cabima, Pan., V, 18 and 28, 1911, (Busck), 3 ♂.

In the adult males before us the pronotal proportions vary as follows: median length, 21.4 to 22.5; greatest width, 26.9 to 31.8 mm.

## MANTINAE

### STAGMOMANTIS Saussure

1869. *Stagmomantis* Saussure, Mittheil. Schweizer Ent. Ges., III, p. 56. Genotype.—*Gryllus carolinus* Johansson.  
 1917. *Stauromantis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 54. Genotype.—*Stagmomantis theophila* Rehn.  
 1917. *Auromantis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 55. Genotype.—*Mantis limbata* Hahn.  
 1917. *Oromantis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 56. Genotype.—*Stagmomantis nahua* Saussure.  
 1917. *Uromantis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 56. Genotype.—*Stagmomantis heterogamia* Saussure and Zehntner.

The four synonyms indicated above have resulted from Giglio-Tos' designation as genera the phyla recognizable in the genus *Stagmomantis*. One alone of the genera so separated, *Isomantis* Giglio-Tos, appears to have validity, or to be at least worthy of subgeneric rank.

All of the others, as material now before us including all the genotypes satisfactorily demonstrates, are based on characters which, we are convinced, have at best no higher than group value within the genus.

#### **Stagmomantis tolteca** (Saussure)

1861. *Mantis* (*Stagmatoptera*) *tolteca* Saussure, Rev. et Mag. de Zool., (2), XIII, p. 127. [[♀], "Mexico calida."]

Porto Bello, Panama, III, 15, 1911, (Busck), 1 ♀, (medium size, green).

Gatun, Canal Zone, Pan., VIII, 6 to 22, 1916, (Harrower), 1 ♀, (large size, green).

Paraiso, C. Z., Pan., II, 1911, (Busck), 1 ♀, (medium small size, green).

Balboa, C. Z., Pan., 1921, (Zetek), 1 ♂, [Hebard Collection].

Panama, 2 ♂,<sup>13</sup> [U. S. N. M.]; (Dr. Newcomb), 2 ♀, [M. C. Z.]; (H. E. Wetherill), 1 ♂, [A. N. S. P.].

<sup>13</sup> Recorded by Rehn, Proc. U. S. Nat. Mus., xxvii, p. 564, (1904).

Specimens of this species are before us representing localities from Mexico to Colombia.<sup>14</sup>

**Stagmomantis theophila** Rehn

1904. *Stagmomantis theophila* Rehn, Proc. U. S. Nat. Mus., xxvii, p. 563.  
[♂; Turrialba, Costa Rica.]

1904. *Stagmatoptera insatiabilis* Rehn, Proc. U. S. Nat. Mus., xxvii, p. 572.  
[♀; Turrialba, Costa Rica.]

1916. *S[tagmomantis] denticulata* Chopard, Ann. Soc. Ent. France, lxxxv,  
p. 162. [♂; Chimbo, Ecuador.<sup>15</sup>]

1917. *S[taurumantis] festae* Giglio-Tos, Boll. Soc. Ent. Italiana, xlviii, p. 55.  
[♂, ♀; Guayaquil and Vinces, Ecuador.]

Comparison of the male type of *Stagmomantis theophila* Rehn with the female type of *Stagmatoptera insatiabilis* Rehn confirms the synonymy established by Giglio-Tos.<sup>16</sup>

The coloration of *theophila* was not clearly described; this, the larger size and the widely separated locality apparently account for Chopard's *denticulata*. It would appear that Giglio-Tos had not seen the description of *denticulata* at the time he described *festae*. Distinct size variation occurs, the Ecuadorean male described by Giglio-Tos being somewhat smaller than those described by Chopard, which in turn are somewhat smaller than three Ecuadorean males before us.<sup>17</sup> These in turn also are somewhat smaller than the known Panamanian and Costa Rican males.

Porto Bello, Panama, IV, 20, 1912, (Busck), 1 ♂.

Rio Trinidad, Pan., III, 15 to VI, 6, 1912, (Busck), 5 ♂.

Cabima, Pan., V, 18, 1911, (Busck), 2 ♂.

Ancon, Canal Zone, Pan., (Jennings), 1 juv. ♂.

<sup>14</sup> We have discussed the close relationship to *S. carolina* (Johansson), Trans. Amer. Ent. Soc., xlv, p. 132, (1919). The present comparison shows further difference, in that the male of *tolteca* has the margins of the pronotal collar finely denticulate, this sometimes indicated, though even more weakly, on the cephalic portion of the pronotal shaft.

<sup>15</sup> Dr. Chopard has written us that this type is in the Bolivar Collection.

<sup>16</sup> Boll. Soc. Ent. Italiana, xlviii, p. 55, (1917).

<sup>17</sup> In the collection of the Academy of Natural Sciences of Philadelphia; two from Paramba and one from Lita, Ecuador. In these the pronotum ranges from 17.2 to 17.7, the tegmina from 37.8 to 38 mm. in length; the pronotum from 3.5 to 3.6 in greatest width.

Not only are the denticulations of the cephalic coxae<sup>18</sup> and margins of the pronotum heavier than in any other species of the genus, but the collar of the pronotum also has its dorsal surface supplied with a few minute tuberculations on each side of the medio-longitudinal sulcus. This latter condition is, among the other species of the genus, found only in *S. nahua* (Saussure), there developed to a slightly greater degree.

The feeble longitudinal carinae of the median and caudal tibiae suggest the Vatid genus *Stagmatoptera*, as Chopard has remarked. In the female sex these carinae are more prominent and led Rehn to describe a specimen of that sex as *Stagmatoptera insatiabilis*. We do not believe that these carinae are sufficiently developed, however, to warrant assignment of the species to *Stagmatoptera*.

In the adult Panamanian males the pronotum ranges from 18.3 to 20.2, the tegmina from 36.8 to 37.4 mm., in length; the former from 3.7 to 3.8 in greatest width.

In the males the marginal field of the tegmina is transparent, hyaline tinged faintly with green toward the costal margin, with a broad opaque band of white margining the mediastine vein and disappearing opposite the stigma. The latter is subobsolete, longitudinal, weakly suffused with brown. The cephalic femora show three subobsolete transverse suffusions of brown in the majority of specimens, these are wholly obsolete in one, conspicuously intensified in another individual.

**Stagmomantis heterogamia** Saussure and Zehntner

1894. *Stagmomantis heterogamia* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 142, pl. VII, figs. 2 and 3. [♂, ♀; Bugaba, Panama.]

Porto Bello, Panama, IV, 17 to 24, 1912, (Busck), 1 ♂.

The distribution of this delicate and handsome little species is known to extend northward into Costa Rica.

<sup>18</sup> These are blunt triangular teeth, much heavier than in the other species, but in our opinion insufficient for generic separation, as are the other features given by Giglio-Tos in erecting the genus *Stauromantis* to include this species. Their number is variable, five to seven in our series, given as three by Chopard. The internal surfaces of these teeth are usually dark, sometimes almost black.

**Stagmomantis vicina** Saussure

1870. *St[agmomantis] vicina* Saussure, Mittheil. Schweizer Ent. Ges., III, p. 229. [♂; America meridional.]

1917. *U[romantis] centralis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 57. [♂; San Mateo, Costa Rica.]

1917. *U[romantis] similis* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVIII, p. 57. [♂; San Mateo, Costa Rica.]

We believe that the present material should be referred to *vicina*, assuming that the specimen from Guatemala, subsequently discussed by Saussure, is the same as the type described from "America meridional." That author states that the tegmina are hyaline, while in well preserved material at hand the marginal field is opaque, buffy. In our series, however, are badly discolored specimens in which this is completely lost, the tegmina being plainly discolored but uniformly hyaline tinged with light brown. A Central American female, associated without hesitancy as the opposite sex of the males here recorded, agrees fully with a Guatemalan female described by Saussure, this strengthening our above conclusion.

It is certainly natural, under such circumstances, that Giglio-Tos considered his Costa Rican material distinct. It is, however, surprising that, at the present day, when so much more has been ascertained as to individual size variation, and the differences in color to be expected from that to which the terms recession and intensification have been applied, Giglio-Tos should have described, as two distinct species, material from the same locality representing so palpably such individual variation and nothing more.

La Chorrera, Panama, V, 11 and 27, 1912, (Busck), 4 ♂.

Corozal, Canal Zone, Pan., XI, 17, 1913, (Hebard; grassy opening in forest), 1 large juv. ♀.

Paraiso, C. Z., Pan., I, 26 and III, 25, 1911, (Schwarz; Busck), 1 ♂, 1 juv.

Ancon, C. Z., Pan., (Jennings), 1 ♂.

Balboa, C. Z., Pan., 1912, (Zetek), 1 ♂, [Hebard Cln.].

Taboga Island, Pan., II, 14 and 18, 1912, (Busck), 1 ♂, 2 juv.

Compared with *S. nahua* Saussure the present insect differs structurally most in the weaker supra-coxal expansion of the pronotum and weaker armament of the same, the males with surface of pronotal collar and its margins entirely unarmed. In

the adult males the pronotum ranges from 11 to 14.3, the tegmina from 23.7 to 26.6 mm. in length; the former from 2.4 to 2.8 mm. in greatest width.

An additional series of eight Central American specimens is before us, including a single female. The males show a brown and a green color phase, the green in the latter condition being confined to pronotum and limbs. All of the males which are in good condition, in addition to having the tegmina with marginal field opaque and strikingly buffy or whitish, have the narrow interval between the discoidal and median veins blackish brown proximad as far as the stigma. The internal surface of the cephalic femora has a blackish fleck on each side of the unguicular sulcus, these markings individually varying in size so that in one specimen the entire unguicular area is suffused with brown. In the female the wings are yellow in cephalic portion, black in caudal portion, as described by Saussure.

#### EPAPHRODITINAE

##### ***Acanthops falcata* Stål**

1877. *A[canthops] falcata* Stål, Bih. till K. Svenska Vet.-Akad. Handl., iv, no. 10, p. 90. [♂, ♀; New Granada (= Colombia).]

1896. *Acanthops erosula* Griffini (not of Stål, 1877), Bol. Mus. Zool. Anat. Comp. R. Univ. Torino, xi, no. 236, p. 6. [♀; Punta di Sabana, Darien, [Panama].]

1915. *A[canthops] griffinii* Giglio-Tos, Bull. Soc. Ent. Italiana, XLVI, p. 98. [♀; Punta di Sabana, Darien and Panama.]

The material here recorded agrees fully with Giglio-Tos' very short description and Griffini's much more satisfactory diagnosis, the references to which are noted above. No difference, however, appears to exist to warrant separation from Stål's *falcata*,<sup>19</sup> a species which Giglio-Tos apparently did not consider at the time he recognized the fact that Panamanian material was distinct from *erosula* (= *A. tuberculata* Saussure<sup>20</sup>).

Paris Field, Cristobal, Canal Zone, Panama, VIII, 18, 1920, (Hebard; in low wet area, palms, vines and brush), 1 very small juv.

<sup>19</sup> Stål stated, apparently inadvertently, that the thickening of the median and caudal tibiae in males of this and another species was beyond the middle, while in reality these members are thickened in their proximal half.

<sup>20</sup> See discussion by Chopard, Ann. Soc. Ent. France, LXXXV, p. 181, (1916).

Gatun, C. Z., Pan., (Harrower), 2 ♂, 2 ♀.

Paraiso, C. Z., Pan., I, 17, 1911, (Schwarz), 1 juv.

Calidoma Road, Pan., IV, 12, 1911, (Jennings), 1 small juv.

Ancon, C. Z., Pan., V, 8, 1911, (Dr. Greenwood), 1 ♂, [U. S. N. M.].

Unrecorded material of this species is also before us from Trinidad and British Guiana, showing that *falcata*, like several other species of the genus, has a very wide distribution in tropical America.

#### VATINAE

##### **Stigmatoptera septentrionalis** Saussure and Zehntner

1894. *Stigmatoptera septentrionalis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 186, pl. VIII, fig. 2. [♀; Bugaba, Panama.]

Porto Bello, Panama, V, 2, 1911, (Busck), 1 ♂, 2 oothecae.

Pinogana, Darien, Pan., XII, 1915, (Munoz), 2 ♂, [Hebard Cln.].

Gatun, Canal Zone, Pan., VII, 28 to VIII, 22, 1916, (Harrower), 3 ♂, 2 juv. ♀.

Panama, 3 ♂.

We have recently placed Saussure and Zehntner's variety *minor* as an absolute synonym of this species.<sup>21</sup>

The ootheca appears to be of the same general type as that deposited by species of the genus *Stagmomantis*, though much larger than any we have seen referable to that genus.

##### **Phyllovates chlorophaea** (Blanchard)

1835. *Mantis chlorophaea* Blanchard, Mag. Zool., v, Ins. pl. 135. [♀; Watertown, New York (in error).]

1894. *Theoclytes chlorophaea* variety *cornuta* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 191. (Locality for variety not given separately.)

1894. *Theoclytes maya* Saussure and Zehntner, Ibid., p. 192. [♂, ♀; Tabasco and Temax, Yucatan, Mexico.]

Bugaba, Panama, (W. Schaus), 1 ♂, [U. S. N. M.].

Bocas del Toro, Pan., 1911, (Zetek), 1 ♂, [Hebard Cln.].

Corozal, Canal Zone, Pan., 1912, (Zetek), 1 ♂, [Hebard Cln.].

Panama, VIII, 21, 1908, (P. B. Preston), 1 juv. ♀, [U. S. N. M.].

Careful comparison of a series of eighteen specimens before us, representing localities from Mexico to Colombia, offers convincing evidence of the synonymy indicated above, *cornuta*

<sup>21</sup> Trans. Am. Ent. Soc., XLVII, p. 160, (1921).

representing individuals of the optimum development, *maya* the greatest depauperation which is known to occur in the species. Giglio-Tos has given additional characters to separate these,<sup>22</sup> but the series before us shows all to be attributable to individual variation, rather than constituting diagnostic features.

Under this variable species, the names *Theoclytes azteca* Saussure and *mexicana* Saussure have already been placed, and it is probable that *Pseudovates brevicornis* Stål, described from Colombia, will also prove to be a synonym.

The measurements of selected individuals of the series before us are as follows:

♂	Length of body	Length of frontal process	Length of pronotum	Length of pronotal shaft	Length of tegmen	Length of cephalic coxa
Venvidio, Sinaloa, Mexico . . . . .	58	3	23.3	19.5	36.3	11.1
Venvidio, Sinaloa, Mexico . . . . .	65.5	3.3	29.7	25.3	44.8	14
Teocelo, Vera Cruz, Mexico . . . . .	68	2.8	28	23.7	50	12.7
Costa Rica . . . . .	56.5	2.5	25	21.2	46.5	11.8
Costa Rica . . . . .	65	2.8	27.7	23.3	49.3	12.2
Costa Rica . . . . .	67.5	3.3	29.3	25	45.2	12.7
Bugaba, Panama . . . .	65.5	2.5	27.2	23.1	44	12.2
Corozal, Panama . . . .	69.5	3.1	30.7	26	48.7	13.2
Honda, Colombia . . . .	67	3	27	23	48.8	12.2
♀						
San José, Costa Rica . .	74	3.3	35.5	29.7	43.3	16.8
Pozo Azul, Costa Rica . .	78	3.7	35.7	30	44	16.2
Siquirres, Costa Rica . .	83	5	39.8	33.8	45.3	16.9
Fusugasuga, Colombia . .	72.8	3.2	34	28.7	42.8	15.8

The frontal process is more flattened in the females than in the opposite sex, with its apices usually slightly less sharply rounded, while in the males the length of the cephalic coxae averages greater in proportion to that of the pronotal shaft.

#### **Phyllovates stolli** (Saussure and Zehntner)

1894. *Theoclytes stolli* Saussure and Zehntner, Biol. Cent.-Amer., Orth., 1, p. 192. [♀; Guiana; Brazil.]

Gatun, Canal Zone, Panama, VII, 25 to 31, 1916, (Harrower), 1 ♂.

The male of this handsome species is very rare in collections. This sex has been described and recorded only by Saussure, as *Theoclytes cingulata* (Drury).<sup>23</sup>

<sup>22</sup> Boll. Mus. Zool. Anat. Comp. R. Univ. Torino, xxix, no. 684, p. 39, (1914).

<sup>23</sup> A very distinct West Indian species, belonging to the genus *Vates*.

In the male the coloration of tegmina and wings is much like that of the same sex of *P. chlorophaea* (Blanchard), except that the opaque distal area in the discoidal field of the tegmina is even less extensive, occupying only an area of the apical portion toward the discoidal vein no wider than the marginal field.

Length of body, 61; length of frontal process, .8; length of pronotum, 25.6; length of pronotal shaft, 21.3; length of tegmen, 41; width of tegminal marginal field, 3.8; length of cephalic coxa, 11 mm.

### PHASMIDAE

Though the fifty-nine specimens here recorded represent only a small portion of the walking-sticks known from Panama, it is of interest to note that four of the sixteen species treated are new.

The following Phasmidae, already known from Panama, are not represented in the collections before us from that region. *Stratocles cinctipes* Stål (103),<sup>24</sup> *Tenerella tenerrima* Redtenbacher (109), *Agrostia amoena* Redtenbacher (110), *Brizoides nigricornis* Redtenbacher (112), *Brizoides graminea* Redtenbacher (113), *Brizoides lacteipennis* Redtenbacher (113), *Chlorophasma hyalina* Redtenbacher (114), *Perliodes grisescens* Redtenbacher (137), *Perliodes nigro-granulosus* Redtenbacher (138), *Metriotes diocles* Westwood (140), *Damasippus fuscipes* Redtenbacher (147), *Damasippus westwoodi* Stål (148), *Damasippus striatus* Redtenbacher (149). *Oncotophasma armata* (Brunner) (317), *Dyme discors* Brunner (324), *Dyme modesta* Brunner (324), *Dyme chiriquensis* Brunner (325), *Calynda bicuspis* Stål (329), *Phantasis lobata* Redtenbacher (408), *Bostra dorsuaria* Stål (408), *Bostra lobata* Redtenbacher (408), *Bostra podagrica* Stål (409), *Bacteria nodulosa* Redtenbacher (416).

Forty species of Phasmidae are now recorded from Panama. We feel, however, that it is very probable additional synonymy will be found in the genera *Dyme*, *Calynda* and *Bostra*.

<sup>24</sup> The numbers in parentheses after the names indicate the page number in the "Insektenfamilie der Phasmiden" on which the species is treated.

## ANISOMORPHINAE

**Paranisomorpha insignis** Redtenbacher

1908. *Paranisomorpha insignis* Redtenbacher, Insektenfamilie der Phasmiden, p. 90. [♂, ♀; Costa Rica.]

Boquete, Panama, II, 1919, (Zetek), 1 ♀, 1 juv. ♀, [Hebard Cln.].

The adult female of this dull black, apterous walking-stick is in all but body length smaller than the female originally described. Length of body, 41.8; length of pronotum, 4.3; length of mesonotum, 6.4; length of metanotum including median segment, 5.3; length of cephalic femur, 11.3; length of median femur, 10.5; length of caudal femur, 14.7 mm.

The thickening of the antennal segments distad is not conspicuous in the specimens before us.

## PHASMINAE

**Stratocles multilineatus** Rehn

1904. *Stratocles multilineatus* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 91. [♂; San Carlos, Costa Rica.]

1906. *Str[atocles] forcipatus* Redtenbacher, (not of Bolivar, 1896), Insektenfamilie der Phasmiden, p. 105. [♂, ♀; Chiriqui and Bugaba, Panama.]

It is plain that Redtenbacher made the misidentification noted above. The insect described as *multilineatus* by that author from the upper Amazon may represent a closely related species.

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1919, (Harrower), 8 ♂, 6 ♀.

Panama, VII, 4, (Wirt Robinson), 1 ♂.

The male cerci in *multilineatus* are directed ventrad and weakly curved, then cephalad and strongly curved, more slender, rounded and weakly tapering distad to their rounded apices, armed with an irregular, flattened finger, the apex of which is enlarged, flattened and armed with very minute, scattered denticulations.<sup>25</sup> This projection was overlooked by the original describer, probably because, directed cephalad and slightly dorsad, it can not be seen from above or the side.

The pale portions of head, pronotum, mesonotum, tegmina, anterior field of wings and limbs are usually richly oriental green. Rarely all of these markings, except those of the tegmina and wings, are naples yellow.

<sup>25</sup> Bolivar describes the male cercus for *forcipatus* as "elongati, apicem versus intus compresso-subampliatus, ante medium biramosi, ramo antico brevi, spiniformi, postico magis elongato, subcylindrico."

**Agrostia viridipes** (Rehn)

1905. *Olcypides viridipes* Rehn, Proc. Acad. Nat. Sci. Phila., 1905, p. 798.  
[♂ (nec ♀); Caché, Costa Rica.]

Cabima, Panama, V, 28, 1911, (Busck), 1 ♂.

Compared with a Colombian male of the gorgeously colored *Citrina venilia* (Westwood) shows, in addition to the features given by Redtenbacher, the following characters, which, combined, warrant the generic separation made by that author. In *viridipes* the head is decidedly longer, the eyes and ocelli smaller and less prominent, the pronotum shorter, the tegmina much longer, the cephalic femora showing distinctly greater thickening and the tarsi, though elongate, decidedly shorter.

The present species is distinctively colored, the pale green of the median and caudal limbs and of the longitudinal tegminal and wing band contrasting strongly with the light and dark browns of the other portions.

The specimen here recorded agrees fully with the type except in being somewhat smaller. Length of body, 47; length of head, 3.7; length of pronotum, 2.1; length of mesonotum, 5.8; length of tegmen, 5.8; length of wing, 30.5; length of caudal femur, 12.8; length of caudal tarsus, 5.8; length of caudal metatarsus, 3.2 mm.

**Brizoides annulicornis** new species (Plate XIV, figures 1 and 2.)

This beautiful light green walking-stick is nearest *B. graminea* Redtenbacher, described from Bugaba, Panama. It differs in the strikingly annulate antennae, granulose cephalic half of mesonotum, with a few of these granules laterad black but median sulcus immaculate, faint markings of anterior field of wings and limb annuli, shorter tegmina and longer limbs.

The carinae of the limbs are used largely by Redtenbacher to separate this and the related genera. These features are often more subtle than would be supposed. In the insect here under consideration we would describe the cephalic femora as having the dorsal carinae distinct, the dorso-internal slightly the stronger with the median carina of the ventral surface certainly present but not strongly developed. This would appear to represent a condition intermediate between *Brizoides* and *Chlorophasma* as defined by Redtenbacher. For the present we can go no further than to assign *annulicornis* to *Brizoides*, awaiting

further material to determine the validity of the genus *Chlorophasma*.

*Type*.—♀; Porto Bello, Panama. March 2, 1911. (A. Busck.) [United States National Museum.]

Size large for the genus, form slender. Ocelli small but distinct. Eyes moderately but not strongly projecting. Head and pronotum smooth, the latter with transverse sulcus decided and longitudinal sulcus weak. Mesonotum smooth in caudal portion, with a well defined transverse sulcus; cephalic portion granulose and with a few blunt lateral tubercles, longitudinal sulcus shallow but distinct. Tegmina large for the genus (but decidedly surpassed in size by those of *graminea*), ovate but showing strong distal obliquity to the rounded apex at the sutural margin, flattened but showing blunt tuberculation at the shoulders. Wings fully developed, reaching to near base of eighth tergite. Abdomen with tergites (except supra-anal plate) not carinate. Ultimate tergite truncate, weakly bilobate distad, with a minute, rounded supra-anal plate projecting beyond, which is shorter than wide and is medio-longitudinally carinate. Mesosternum alone finely granulose. Operculum elongate, extending slightly beyond median portion of ultimate tergite, smooth and not carinate, narrowing distad to the sharply rounded apex which forms an angle distinctly less than ninety degrees. Femora all bicarinulate dorsad and ventrad, the cephalic decidedly incurved at base; median carina of ventral surface weak but distinct on cephalic femora, a trace suggested distad on the median femora, absent on the caudal femora. Tibiae all pentagonal.

General coloration apple green, underparts chamois. Antennae with first two joints immaculate, succeeding joints with a heavy short distal annulus of blackish brown, these annuli becoming much longer and more widely spaced distad where the joints become compound, a number of the short sections of the compound joints there form these annuli; proximal annuli incomplete as they do not wholly encircle the antennae. Head with a very slender postocular streak of blackish brown, pronotum immaculate. Mesonotum with (three or four) lateral tubercles black and with a very slender marginal streak of blackish brown below the slender carinae, which are approximate to the lateral margins. Tegmina and anterior field of wings, with scattered angular patches which are slightly darker than the general coloration, apparently bice green, but under the lens seen to be a shade darker than the other portions with a number of microscopic irregular flecks of purplish black. Radiate field of wings transparent milky white, like ground glass. Limbs buffy tinged with green, showing very obscurely traces of a number of light brownish annuli. Femora, tibiae and tarsal joints all minutely flecked with blackish brown at their apices.

The type measurements are given first. Females. Length of body, 73 and 74; length of pronotum, 3.7 and 3.8; length of mesonotum, 7.8 and 8.7; length of tegmen, 6.8 and 6.8; length of wing, 49.5 and 49.8; length of cephalic femur, 16.9 and 16; length of caudal femur, 16.3 and 15.4; length of caudal tarsal joints, 7.4 and 7.2; length of caudal metatarsus, 3 and 3.2 mm.

A paratypic female, bearing the same data as the type, is also before us.

**Pseudophasma**<sup>26</sup> **menius** (Westwood)

1859. *Phasma menius* Westwood, Cat. Orth. Ins. British Mus., I, Phasmidae, p. 118, pl. xvii, fig. 2. [♂, Colombia.]

This species has been previously correctly reported from the Rio Cianati, Darien, Panama, by Griffini, and from Carrillo, Costa Rica, by Rehn. It is assuredly the insect which Redtenbacher has recorded from Costa Rica and Chiriqui, Colon, Panama, and Darien, Panama, as *Phasma perezii* Bolivar.<sup>27</sup>

Porto Bello, Panama, II, 27 to V, 4, 1911, (Busck; Jennings), 4 ♂, 3 ♀.

Gatun, Canal Zone, Pan., VII, 17 to VIII, 22, 1916, (Harrower), 7 ♂, 1 ♀.

Culebra, C. Z., Pan., I, 8, 1911, (Dr. Pittier), 1 ♀, [U.S.N.M.].

This plainly and somberly colored species is apparently the most abundant flying walking-stick in both Costa Rica and Panama.

**Isagoras dentipes** Redtenbacher

1906. *Isagoras dentipes* Redtenbacher, Insektenfamilie der Phasmiden, p. 134. [♂; Bugaba and Chiriqui, Panama.]

Bugaba, Panama, (W. Schaus), 1 ♂, 1 ♀, [U. S. N. M.].

In these specimens the metasternum is pale, buffy caudad, but not sulphur yellow.

The undescribed female is decidedly larger than the male with the tuberculation of the body and lamellation of the limbs intensified, while on the latter are developed larger and more numerous lobes (or blunt denticulations). In this specimen the cephalic femora are much more strongly compressed. The caudal femora have the dorso-external margin supplied with (four or five) small lobes; the dorso-internal margin with six much larger lobes; the ventro-internal margin with a long, low, horizontal lobe proximad and a similar, but vertical, lobe distad,

<sup>26</sup> The necessity of following Kirby in the use of this name for *Phasma* of authors (not of Lichtenstein as restricted) has been fully explained by Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 95, footnote 43, (1904).

<sup>27</sup> As Redtenbacher considered his material from Coca, Ecuador (the type locality of *perezii*) the same as that from Panama, it would appear very possible that *perezii* may be a synonym of *menius*.

and the ventro-external margin with a similar, but lower, distal lobe. The caudal tibiae also have (two or three) small dorsal lobes, these conspicuous only on the sinistral member.

The female before us is more lichenose in appearance than the male, the antennae grayish with suffusions of brown. In both sexes the ocelli are small but distinct, while on each side of the median ocellus, between it and the antennal socket, is a long tubercle, like a minute horn. As in other bark-like or lichen-like forms, the coloration is probably subject to very decided individual variation. The same is true of the lobes of the limbs, in such species as the present.

Length of body, ♂ (estimated) 53; ♀ 75.7; length of pronotum, ♂ 2.8, ♀ 3.9; length of mesonotum, ♂ 7.7, ♀ 10; length of tegmen, ♂ 5.3, ♀ 8.5; length of wing, ♂ 31.8, ♀ 49.2; length of cephalic femur, ♂ 11.1 ♀ 13.1; width of cephalic femur, ♂ .9, ♀ 2; length of caudal femur, ♂ 8.8, ♀ 10.8; length of caudal tibia, ♂ 7.5, ♀ 8.7; length of caudal tarsal joints, ♂ 5.4, ♀ 5.9; length of caudal metatarsus, ♂ 2.3, ♀ 2.3 mm.

**Isagoras vignieri** (Redtenbacher)

1906. *Xerosoma vignieri* Redtenbacher, Insektenfamilie der Phasmiden, p. 144. [♂; Paya, Darien, Panama.]

The species does not agree with the genotype of *Xerosoma*, the Brazilian *canaliculatum* of Serville, but shows no feature by which it can be separated from *Isagoras* Stål, as defined by Redtenbacher.<sup>28</sup> We, therefore, make the generic reassignment noted above.

Porto Bello, Panama, II, 6, 1911, (Schwarz), 1 ♂; III, 2 and 18, 1911, (Busck), 2 juv. ♂.

The adult specimen, for a lichenose form, agrees very closely with the originally described male. It differs mainly in having the mesonotal tubercles no darker than the other portions, the costal margin of the tegmina and the anterior portions of the wings without a pale marking,<sup>29</sup> while the minute lobes of the median and caudal limbs are reduced to one and two on the

<sup>28</sup> Redtenbacher has very possibly included several generic units under *Isagoras*, but we do not have material of a sufficient number of species to determine this definitely.

<sup>29</sup> The tegmina having a large, transverse, pale area at the shoulders across the dorsal surface.

dorsal surface of the caudal tibiae. The ocelli are very small and inconspicuous.

Length of body, 65; length of pronotum, 3.2; length of mesonotum, 10; length of tegmen, 9.1; length of wing, 43.3; length of cephalic femur, 14.8; width of cephalic femur, 1.8; length of caudal femur, 12.7; length of caudal tibia, 12.7; length of caudal tarsal joints, 6.3; length of caudal metatarsus, 2.7 mm.

**Metriotes iphicles** Redtenbacher

1906. *M[etriotes] iphicles* Redtenbacher, Insektenfamilie der Phasmiden, p. 140. [♂, ♀: San Pedro Sula, Honduras; Bugaba, Panama.]

Rio Trinidad, Panama, VI, 6, 1912, (Busek), 1 large juv. ♀.

**Prisopus berosus** Westwood

1859. *Prisopus berosus* Westwood, Cat. Orth. Ins. British Mus., 1, Phasmidae, p. 168, pl. xx, fig. 7. [♂ ♀; Panama.<sup>30</sup>]

Panama, (Zetek), 1 ♀, [Hebard Cln.].

This species is also represented in the collections before us from Costa Rica. The coloration of the present specimen is exactly as described, with great clarity, by Westwood.

Length of body, 59; length of pronotum, 5.2; width of pronotum, 7.8; length of mesonotum, 6; length of tegmen, 34.4; length of wing, 45.6; length of cephalic femur, 10.8; greatest width of cephalic femur, 5.9; length of caudal femur, 13.5; greatest width of caudal femur, 6 mm.

**Prisopus ariadne** new species (Plate XIV, figures 3 to 8.)

This interesting species agrees only with *P. cephus* Westwood in having the radiate field of the wings unicolorous. The numerous glossy yellowish tubercles, scattered over the proximal portions of the tegmina, afford a distinctive character. Compared with the described male of *cephus*, this sex differs further in having the head tuberculate but not spinose, the tegmina with the tuberculations noted above, and with a lamellate, acute-angulate production at the shoulders, and the five distal tergites lobate laterad, this strongest on the seventh.

The female differs in being larger and heavier, with projection at tegminal shoulders reduced to a low rounded lamella, and lateral lamellation of tergites much stronger.

<sup>30</sup> And "Litt. occid. Americae septentrionalis." The figured male from Panama is here designated the single type.

*Type*.— ♀ ; Carrillo, Costa Rica. [Hebard Collection, Type no. 869.]

Size rather small and form more slender than is usual in this genus of very broad species. Head flattened, the occiput with small scattered tubercles and two postocular rows of the same on each side (these not large and not forming small denticulations as in this sex of *P. berosus* Westwood). Pronotum polished but rugulose, slightly wider than long. Mesonotum with surface similar, shorter than pronotum, transverse but decidedly less so than in *berosus*. Tegmina large, extending as far caudad as caudal margin of fifth tergite, veins proximad forming a number of small smooth tubercles, shoulder with a low rounded lamella, apices broadly rounded. Wings fully developed, extending to apex of abdomen. Abdomen with dorsal surface tuberculate meso-laterad and distad; fourth tergite minutely and roundly lamellate produced latero-caudad, fifth, sixth and seventh tergites increasingly and much more decidedly so, eighth and ninth tergites with lateral portions lamellate and rounded produced but decreasingly so. Cerci straight, flattened cylindrical. Ventral surface strongly concave. Femora very strongly lamellate and hairy; their external surfaces weakly tuberculate; their ventro-external margins with very large waves, well separated and blunt but shaped like the teeth of a saw, these decided on the cephalic femora, subobsolete (or weak in paratype) on the median femora and very decided on the caudal femora, there six in number. Dorso-external margins of cephalic femora strongly lamellate and convex in distal half, of median femora straight and subdenticulate (or with three small denticulations), and of caudal femora straight with three blunt denticulations. Tibiae lamellate and hairy; external surfaces similarly tuberculate; the margins of the cephalic and median straight (or of median with two low undulations of the dorsal margin), of the caudal tibiae with ventral margin showing four large lamellate and rounded waves. Subgenital plate produced caudad in median section, the lateral margins in this portion very weakly convergent to the transverse and very feebly convex distal margin.

*Allotype*.— ♂ ; Alhajuela, Panama. April 17, 1911. (A. Busck.) [United States National Museum.]

Very similar to female but smaller and less robust. Tegmina similar except that they are produced in a sharp acute-angulate lamellation at the shoulders and extend to the caudal margin of the fourth tergite. Lateral lamellation of distal tergites similar but much weaker. Limbs similar.<sup>31</sup> Subgenital plate with lateral margin converging, then rounding into the obtuse-angulate emarginate distal margin, so that the plate appears almost bilobate.

General coloration brown, limbs weakly mottled. Tegmina and exposed portion of wings, when at rest, lichenose, blotched with gray-green, grayish white and brown, the proximal tubercles on the tegmina honey yellow, in the

<sup>31</sup> In such lichenose or bark-like insects, variation is probably greater than is usual in the Phasmidae. In the present male the sinistral caudal tibiae has its ventro-external margin only undulate, though the corresponding margin of the dextral limb is as described for the type.

male faintly tinged with green. Remaining portion of anterior field of wings transparent, heavily suffused with mummy brown; radiate field transparent, evenly and strongly tinged with mummy brown. Ventral surface smooth and shining, buffy with median portions of sterna suffused with blackish brown and each sternite, to subgenital plate, with a medio-longitudinal oval suffusion of blackish brown (this latter marking apparently an important specific diagnostic character).

For the female sex, the measurements of the type are given first. Length of body, ♂ 39, ♀ 49.7 and 56; length of pronotum, ♂ 3.3, ♀ 4.4 and 4.4; total width of pronotum, ♂ 4, ♀ 5.6 and 5.7; length of tegmen, ♂ 20, ♀ 28.3 and 31.4; greatest tegminal width, ♂ 4.7, ♀ 7.5 and 7.9; length of wing, ♂ 29.2, ♀ 36.8 and 42.3; length of cephalic femur, ♂ 8.1, ♀ 9 and 9.1; greatest width of cephalic femur, ♂ 2.7, ♀ 3.7 and 4; length of caudal femur, ♂ 9.1, ♀ 10.3 and 10.2; greatest width of caudal femur (between apices of projections), ♂ 3.1, ♀ 4.5 and 4.7 mm.

In addition to the type and allotype, a paratypic female, belonging to the United States National Museum, is before us, taken at Paraiso, Canal Zone, Panama, on April 4, 1912, by A. Busck.

#### HETERONEMINAE

##### **PSEUDOCEROYS** new genus

This genus is erected to include a new species, *harroweri*, here described, and *Ceroys bigibbus* Rehn, from Nicaragua and Costa Rica.

Close general resemblance is shown to the heavy type developed in the Pyghirynchine genera *Pyghirynchus* and *Ceroys*, the present genus being, however, a member of the Heteroneminae (Bacunculinae of Brunner), as the tibiae all lack a triangular impressed area disto-ventrad.

We place *Pseudoceroys* after *Parapyghirynchus* in linear arrangement. These and the related genera, as defined and arranged by Brunner, in the Insektenfamilie der Phasmiden, are so illogical and unsatisfactory that his treatment must be largely disregarded.<sup>32</sup>

Genotype.—*Pseudoceroys harroweri* new species.

The following characters serve to separate this genus, known as yet only from the female sex. Tibiae anareolate. Median segment transverse. Form moderately robust. Abdomen with latero-caudal angles of tergites not specialized, sixth tergite

<sup>32</sup> See Hebard, Trans. Am. Ent. Soc., xlv, pp. 162 and 172, (1919), for the order of the first genera of the Heteroneminae.

specialized. Antennae comparatively short, with first joint depressed, unarmed. Ocelli absent. Occiput with a pair of auriform lobes. Pronotum with a pair of median, longitudinal carinae. Mesonotum, metanotum and median segment with a heavy, medio-longitudinal carina, the abdominal tergites with this less decided. Tegmina and wings absent. Operculum lanceolate, very elongate, concealing ovipositor valves and cerci, extending beyond apex of distal tergite. Limbs short and rather heavy; femora and tibiae with margins supplied with numerous lobes or lobules; cephalic femora strongly bowed.

**Pseudoceroys harroweri** new species (Plate XV, figures 1 and 2.)

This insect, compared with *P. bigibbus* (Rehn), both known only from the female sex, differs in its very much smaller size, more robust build, decidedly smaller lobes of the head and limbs, absence of lobes on mesonotum, metanotum and sixth tergite, and distinctive operculum.

*Type*.—♀; Porto Bello, Panama. August 18 to 22, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 864.]

The following features are noted in addition to those given above and in the generic description. Surface dull, weakly rugose and subtuberculate. Head with a pair of small, elongate tubercles, like minute horns, between the eyes; auriform lobes of occiput irregular and bluntly rounded, wider than high, caudad of which are a pair of more approximate, blunt spiniform processes. Pronotum very rough, paired median carinae moderately divergent caudad and each raised in a large, blunt, conical projection at caudal margin of pronotum; a carina also indicated laterad on the roughened sides. Mesonotum rough, with medio-longitudinal carina heavy, armed with three, heavy, blunt, conical projections. Metanotum and median segment similar but lacking the projections. Abdominal tergites to sixth rough and unspecialized, sixth flattened and irregularly weakly concave on each side with a dark velvety patch proximad. Sixth, seventh and eighth tergites with medio-longitudinal carina horizontally minutely bilobate caudad on each side. Ninth tergite strongly declivent produced in two small rounded projections at the base of the small supra-anal plate, the latter with margins evenly and weakly convex-convergent to the bluntly rounded apex. Ventral surface rough, the pleura tuberculate. Operculum with surface not as rough, longitudinally tricarinate proximad but without lateral carinae distad, in that portion with lateral margins very feebly convex-convergent to the rather sharply rounded apex. Cephalic femora with dorso-internal and ventro-external margins (the latter only distad) supplied with a few very small, stout lobes; other femora with all margins and all tibiae with dorsal margins supplied with a number of slightly larger lobes, except the ventral margins of the caudal femora, which have these only distad.

General coloration dark brown, the velvety areas proximad on each side of the sixth tergite blackish brown.

Length of body, 53; length of auriform lobe of head, 1.9; length of pronotum, 4; length of mesonotum, 13; width of mesonotum, 5; length of metanotum (including median segment), 6; length of cephalic femur, 10.8; length of cephalic tibia, 10.3; length of caudal femur, 12.7; length of caudal tibia, 12; length of operculum, 10.7 mm.

The type of this somber, twig-like phasmid is unique.

***Libethra panamae*** new species (Plate XIV, figure 9; XV, figures 3 and 4)

This insect is nearest *L. venezuelica* Brunner, differing in the female in the cephalic femora being dilated dorsad and in the specialization of the second and sixth tergites; in the male in the apex of the abdomen being apparently<sup>33</sup> not as strongly inflated.

We believe it to be extremely probable that the male, recorded by Griffini as *Caulonia molita* (Westwood),<sup>34</sup> from Lake Pita, Darien, Panama, represents the present species. The male of true *molita* may be distinguished by the much smoother surface, cerci which are more slender distad, eighth tergite without a projection of the latero-caudal angles ventrad and longer and more specialized eighth sternite.

*Type*.—♂; Paraiso, Canal Zone, Panama. January 23, 1911. (E. A. Schwarz.) [United States National Museum.]

Size medium, form slender, as is usual in this sex of species of *Libethra*. Head as long as pronotum, occiput slightly swollen caudad, with scattered granules and a fine medio-longitudinal line, a slightly larger granule on each side caudad on the swollen area. Pronotum with very weak scattered granules and a fine medio-longitudinal line, the transverse sulcus distinct, on each side sending as strong a sulcus to the cephalic margin, paralleling the lateral margins. Mesonotum with weak scattered granules in cephalic two-thirds, the medio-longitudinal line subcarinate and continued on metanotum, which is otherwise smooth. Tergites showing traces of four fine longitudinal carinae, these becoming distinct on caudal portion of fifth and all of sixth tergites, the three succeeding tergites strongly medio-longitudinally carinate, the seventh expanding with sides showing additional carinae, the eighth strangulate, the ninth cucullate, slightly broader than long, on each side with surface dorso-

<sup>33</sup> Insektenfamilie der Phasmiden, p. 307, (1907). The description is, as usual in that work, thoroughly unsatisfactory, omitting any definite genitalic diagnosis and other features by which the species is probably best distinguished. As a result we believe that *panamae* actually shows decidedly more striking features of difference than we can give without material for comparison.

<sup>34</sup> Boll. Mus. Zool. Anat. Comp. Univ. Torino, XI, no. 236, p. 9, (1896).

proximad strongly swollen and convex. Cerci short, stout, irregularly flattened, curving inward and distad tapering to their bluntly rounded apices. Ventral surface smooth. Fourth and fifth sternites distad with two, short, parallel ridges; these weakly indicated on the preceding sternites. Sixth sternite short, seventh large, projecting, with surface convex, medio-longitudinally carinate with apex produced like the very narrow spout of a pitcher, enlarged portion with a sharply rounded projection on each side proximad. Limbs wholly unspecialized.

*Allotype*.—(juv.?) ♀; Old Panama, Panama. January 31, 1911. (E. A. Schwarz.) [United States National Museum.]

Agrees closely with male except as follows. Shorter (due to immaturity?), form much more robust. Granulation on mesonotum more decided and thicker, similar on metanotum. Abdomen dorsad with seven fine, nearly longitudinal carinae, the lateral margins with granules and the carinulae with these particularly on sixth and seventh tergites; second tergite with caudal extremities of four median carinae each elevated in a rounded tooth; sixth tergite elevated mesad in a small bidenticulate process with apices rounded; eighth and nine tergites tectate and showing two weak carinulae on each side, eighth with latero-caudal angles very broadly rounded, ninth minutely but deeply U-emarginate above the minute supra-anal plate, the acute projections thus formed with apices rounded. Ventral surface with subobsolete granules and carinae, a pair of the latter becoming distinct on the abdominal sternites. Operculum flattened, strongly carinate proximad on each side, distad with lateral margins convergent and weakly convex to the deeply U-emarginate meso-distal area, which leaves two slender, straight, finger-like apices. Cephalic femora dilated dorsad with dorsal margin showing a number of weak but distinct undulations. Median femora with dorso-caudal margin bearing two minute rounded-triangular lobes proximad, dorso-cephalic margin showing traces of similar development as do the dorso-caudal margins of the caudal femora.

General coloration of male saccardos umber. Antennae, caudal limbs and brief proximal portions of cephalic and median femora paler. Head with ventral surface and a suffused postocular streak of darker coloration. Female uniform clay color, showing a tawny tinge. Head with a suffused postocular darker streak feebly indicated.

Male, *type*. Length of body, 59; length of mesonotum, 7; median width of mesonotum, 1.8; length of metanotum (including median segment), 11.2; length of median segment, 1.4; length of cephalic femur, 18.6; length of median femur, 13.8; length of caudal femur, 17.8; length of cephalic tibia, 20.7 mm.

The female, *allotype*, though structurally apparently adult, is so much smaller that it may represent one of the later stages of immaturity. Length of body, 52.5; length of mesonotum, 14.3; median width of mesonotum, 3;

length of metanotum (including median segment), 9.2; length of median segment, 1.8; length of cephalic femur, 14.2; length of median femur, 10.3; length of caudal femur, 11.8; length of operculum, 5.8 mm.

This species is known to us only from the pair here described.

#### **ONCOTOPHASMA** Rehn

1904. *Oncotophasma* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 59.

1907. *Paradiapheromera* Brunner, Insektenfamilie der Phasmiden, p. 317.

The type by monotypy of *Oncotophasma* is Griffini's *martini*. We here select as genotype of *Paradiapheromera*, Brunner's *strumosa*. As that species is a synonym of *martini*, *Paradiapheromera* consequently falls as a synonym of *Oncotophasma*. Brunner's lack of knowledge of recent literature here resulted in his overlooking the work of both Griffini and Rehn.

#### **Oncotophasma martini** (Griffini)

1896. *B[ostra] martini* Griffini, Boll. Mus. Zool. Anat. Comp. Univ. Torino, XI, no. 236, p. 10, figs. a, b and c. [♂; Lake Pita, Darien, Panama.]

1907. *Paradiapheromera strumosa* Brunner, Insektenfamilie der Phasmiden, p. 317. [♂: Chiriqui, [Panama] (nec Peru); Darien.]

Porto Bello, Panama, III, 6, 1911, (Busck), 1 ♂.

Alhajuelo, Pan., IV, 18, 1911, (Busck), 1 juv. ♀.

Gatun, Canal Zone, Pan., VII, 17 to VIII, 22, 1916, (Harrower), 6 ♂.

The comparatively slender, smooth and apterous males of this insect are readily distinguished by the remarkable swelling, which occupies the caudal portion of the metanotum.

The extremes in the Gatun series of this very distinctive species measure as follows:

Length of body, 83 to 92; length of mesonotum, 21.4 to 24.9; median width of mesonotum, 1.7 to 2; length of metanotum (including median segment), 14 to 15.8; length of median segment, 4 to 4.8; width of median swelling, 5 to 5.8; length of cephalic femur, 23.8 to 28.1; length of median femur, 18.5 to 22; length of caudal femur, 26 to 29; length of cephalic tibia, 26.7 to 31.5 mm.

#### PHIBALOSOMINAE

#### **TRYCHOPEPLUS** Shelford

1908. *Pericentrus* Redtenbacher (in part), Monographie der Phasmiden, p. 351.

1908. *Trychopeplus* Shelford, Biol. Cent.-Amer., Orth., II, pl. 6, fig. 5.

Redtenbacher's *Pericentrus* clearly includes several distinct generic units. One of these includes the species *multilobatus* Redtenbacher, genotype by monotypy of Shelford's *Trychopeplus*, which species is a synonym of *Ceroys laciniatus* Westwood.<sup>35</sup> To *Trychopeplus* probably also belongs *spinoso-lobatus* (Redtenbacher).

We are, in another paper, removing from *Pericentrus*, as understood by Redtenbacher, the remaining American species, *restrictus* of Redtenbacher, described from Porto Rico.

This leaves in the genus *Pericentrus* Redtenbacher, five Asiatic and Melanesian species, of which we select as genotype, *Pericentrus möwisi* Redtenbacher, described and figured, from Sikkim.

The genus *Trychopeplus* may be distinguished from *Pericentrus*, as limited above, by the much longer tarsi, of which the metatarsus is as long as, or longer, than the combined length of the succeeding joints. The males are known for *Trychopeplus* only and in this genus have fully developed organs of flight. We are confident that comparison with material of *Pericentrus möwisi* would show a number of other, fully as important, features for generic separation from *Trychopeplus laciniatus*.

**Trychopeplus laciniatus** (Westwood) (Plate XV, figures 5 and 6.)

1874. *Ceroys laciniatus* Westwood, Thesaur. Ent. Oxoniensis, p. 174, pl. xxxii, fig. 4. [[♀], Nicaragua.]

1908. *Pericentrus multilobatus* Redtenbacher (in part), Monographie der Phasmiden, p. 352. [♂:<sup>36</sup> Chiriqui, [Panama]; [Rio Sucio], Costa Rica.]

1908. *Pericentrus laciniatus* Shelford, Biol. Cent.-Amer., Orth., II, p. 356. [♀, Nicaragua: ♂, Rio Sucio, Costa Rica; Chiriqui and Bugaba, Panama.]

1908. *Trychopeplus multilobatus* Shelford, Biol. Cent.-Amer., Orth., II, pl. vi, fig. 5. (Male.)

<sup>35</sup> Shelford has pointed out that the male of Redtenbacher's *Pericentrus multilobatus* represents the opposite sex of Westwood's *Ceroys laciniatus*. He has, however, attempted to retain the name *multilobatus* for the immature female from Peru, described by Redtenbacher. This can not be done, as that specimen was referred to *multilobatus* with a query and the type of *multilobatus* must consequently be one of the described males. We here select as type of *Pericentrus multilobatus* Redtenbacher, the male from Chiriqui, Panama. As a result, that name falls as a synonym of *Trychopeplus laciniatus* (Westwood).

<sup>36</sup> The immature Peruvian female described by Redtenbacher, represents a distinct species for which a name is, at the present time, not available.

Rio Trinidad, Panama, III, 29, 1912, (Busck), 1 small juv.; V, 1911, (Busck), 1 ♀, eggs.

The irregular, foliaceous lamellae of the body and limbs of this very remarkable insect, like the long silky hairs on its eggs, must closely resemble the mossy environment in which the species probably lives.

**Bacteria ploiaria** (Westwood)

1859. *Phibalosoma ploiaria* Westwood, Cat. Orth. Ins. British Mus., 1, Phasmidae, p. 79, pl. XIII, fig. 4. [♂; "In plagis occid. Amer. Septentrion."]

1908. *B[acteria] subvolans* Redtenbacher, Insektenfamilie der Phasmiden, p. 416. [♂, Chiriqui, Panama.]

Gatun, Canal Zone, Panama, 1912, (Zetek), 1 ♂, [Hebard Cln.].

Canal Zone, Pan., (Jennings), 1 ♂.

Panama, Pan., (Zetek), 1 ♀, [Hebard Cln.].

The two males before us are unquestionably conspecific, one having elongate wings, the other with these organs slightly surpassing the median segment. The latter condition was described as *subvolans* by Redtenbacher, the material before us showing that name to be based on such individual variation and consequently of no value.

The previously unknown female may be described as follows. Vertex weakly bituberculate, much as in male but with tuberculations proportionately not as heavy. The metatarsi are cristate, as in *B. remphan* Westwood. The mesonotum is granulose and weakly tectate. The median and caudal femora are simple, except for a low lobe proximad on the ventro-caudal margin of the sinistral median femur. The lobes of the limbs and abdomen are subject to great individual variation in many species of this and allied genera. The genitalia are much as figured by Westwood for *remphan*, except that the operculum and the ultimate tergite reach an equal distance caudad, the former not considerably surpassing the latter, while the sixth tergite has the ventro-caudal portions laterad produced in an elongate rounded lobe, which does not project beyond the caudal margin of the tergite.

Length of body, ♂ 115 and 120.5, ♀ 173; length of mesonotum, ♂ 31 and 31.8, ♀ 41; median width of mesonotum, ♂ 1.7 and

1.7, ♀ 5.7; length of metanotum (including median segment), ♂ 18 and 19, ♀ 24.8; length of median segment, ♂ 14 and 14.8, ♀ 15.7; length of tegmen, ♂ 6.2 and 5.9, ♀ absent; length of wing, ♂ 18.1 and 33.3, ♀ absent; length of cephalic femur, ♂ (missing) and 37, ♀ 39.8; length of caudal femur, ♂ 30.8 and 36, ♀ 39; length of cephalic tibia, ♂ (missing) and 46.2, ♀ 43.8; length of operculum, 14.9 mm.

**Pterinoxylus spinulosus** Redtenbacher

1908. *Pt[erinoxylus] spinulosus* Redtenbacher, Monographie der Phasmiden, p. 428, pl. xx, fig. 3. [♂; Chiriqui, Panama.]

Panama, 1 ♂, [U. S. N. M.].

The spination and lamellation of the limbs is more irregular in this insect than would be expected from Redtenbacher's figure. The specimen before us is slightly smaller, but agrees closely with the type. The pair of long sharp spines at the caudal margin of the pronotum are conspicuous.

## EXPLANATION OF PLATES

## Plate XIV

- Fig. 1.—*Brizoides annulicornis* new species. Dorsal view of female. Porto Bello, Panama. *Type*. (Natural size.)
- Fig. 2.—*Brizoides annulicornis* new species. Lateral view of distal portion of female abdomen. Porto Bello, Panama. *Type*. (Much enlarged.)
- Fig. 3.—*Prisopus ariadne* new species. Ventral view of portion of male abdomen, to show distinctive marking. Alhajuela, Panama. *Allotype*. ( $\times 3\frac{1}{2}$ )
- Fig. 4.—*Prisopus ariadne* new species. Dorsal view of base of female sinistral tegmen, to show distinctive nodes. Carillo, Costa Rica. *Type*. ( $\times 4$ )
- Fig. 5.—*Prisopus ariadne* new species. Dorsal outline of female tegminal shoulder. Carillo, Costa Rica. *Type*. (Much enlarged.)
- Fig. 6.—*Prisopus ariadne* new species. Dorsal view of male tegminal shoulder, to show diversity between sexes (compare figure 5). Alhajuela, Panama. *Allotype*. (Same scale as figure 5.)
- Fig. 7.—*Prisopus ariadne* new species. Lateral outline of female cephalic femur. Carillo, Costa Rica. *Type*. ( $\times 3$ )
- Fig. 8.—*Prisopus ariadne* new species. Lateral outline of female caudal femur. Carillo, Costa Rica. *Type*. ( $\times 3$ )
- Fig. 9.—*Libethra panamae* new species. Ventral view of distal portion of female abdomen. Old Panama, Panama. *Allotype*. Immature? (Much enlarged.)

## Plate XV

- Fig. 1.—*Pseudoceroy's harroweri* new species. Dorsal view of female. Porto Bello, Panama. *Type*. ( $\times 1\frac{1}{2}$ )
- Fig. 2.—*Pseudoceroy's harroweri* new species. Lateral view of head of female. Porto Bello, Panama. *Type*. ( $\times 4\frac{1}{2}$ )
- Fig. 3.—*Libethra panamae* new species. Dorsal view of distal portion of male abdomen. Paraiso, Canal Zone, Panama. *Type*. ( $\times 5$ )
- Fig. 4.—*Libethrae panamae* new species. Lateral view of distal portion of male abdomen. Paraiso, Canal Zone, Panama. *Type*. ( $\times 5$ )
- Fig. 5.—*Trychopeplus laciniatus* (Westwood). Dorsal view of female. Rio Trinidad, Panama. (Natural size.)
- Fig. 5.—*Trychopeplus laciniatus* (Westwood). Lateral view of egg from which the young has emerged (in unhatched eggs, the spiny portion is alone visible). Rio Trinidad, Panama. ( $\times 5$ )



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