

NOTES ON THE ORTHOPTERA OF COSTA RICA, WITH DESCRIPTIONS  
OF NEW SPECIES.

BY JAMES A. G. REHN.

The following notes and descriptions are based on a study of over three hundred and fifty specimens, representing one hundred species, of which eleven are here described as new. This material is distributed through the collections of the Academy of Natural Sciences of Philadelphia, the United States National Museum and the private collection of Mr. Morgan Hebard, of Chestnut Hill, Philadelphia.

The writer is much indebted to Prof. P. Biolley, of San José, Costa Rica, who courteously supplied some very valuable material accompanied by full notes and remarks, and also to Dr. William H. Ashmead, of the United States National Museum, and Mr. Hebard for permission to study the collections mentioned above.

The number of records here published which extend the range of species is rather remarkable, and clearly shows the lack of definite information regarding the Orthoptera of northern South America.

The Forficulidæ, Blattidæ, Mantidæ, Phasmidæ and Acrididæ of the greater portion of these collections have already been studied and reported by the author.<sup>1</sup>

Family **BLATTIDÆ**.

**ANAPLECTA** Burmeister.

**Anaplecta fallax** Saussure.

1862. *Anaplecta fallax* Saussure, *Revue et Magasin de Zoologie*, 2e ser., XIV, p. 163. [Guatemala.]

Surubres river at San Mateo, altitude 250 meters. Under stones on the borders of the river. February, 1905. [No. 7.] (P. Biolley.) Two specimens.

<sup>1</sup> Studies in American Forficulidæ, *Proc. Acad. Nat. Sci. Phila.*, 1903, pp. 299-312.

Studies in American Blattidæ, *Trans. Amer. Ent. Soc.*, XXIX, pp. 259-290. Studies in American Mantids or Soothsayers, *Proc. U. S. Nat. Mus.*, XXVII, pp. 561-574.

Studies in the Orthopterous Family Phasmidæ, *Proc. Acad. Nat. Sci. Phila.*, 1904, pp. 38-107.

Studies in the Orthopterous Subfamilies Aerydiinæ (Tettiginæ), Eumastacinæ and Proscopinæ, *Proc. Acad. Nat. Sci. Phila.*, 1904, pp. 658-683.

A Contribution to the Knowledge of the Acrididæ (Orthoptera) of Costa Rica, *Proc. Acad. Nat. Sci. Phila.*, 1905, pp. 400-454.

**Anaplecta decipiens** Saussure and Zehntner.

1893. *Anaplecta decipiens* Saussure and Zehntner, Biol. Cent.-Amer., Orth., 1, p. 27, tab. III, fig. 5, tab. IV, figs. 10 and 11. [States of Vera Cruz and Tabasco, Mexico.]

La Palma, altitude 1,600 meters. May, 1905. In decayed leaves. [No. 11.] (P. Biolley.) Two females.

These specimens are slightly larger than the original measurements and approach *A. lateralis* Burmeister from South America, but in the absence of material from that region and in the broader pronotum and thicker form of *decipiens*, characters shared by the material in hand, I prefer to use the name applied by Saussure and Zehntner.

**BLATTELLA** Caudell.**Blattella azteca** (Saussure and Zehntner)?

Reventazon river, plains of Santa Clara, altitude 200 meters. December, 1904. [No. 4.] (P. Biolley.) One male.

Referred here with some doubt.

**Blattella zapoteca** (Saussure).

1862. *Blattella zapoteca* Saussure, Revue et Magasin de Zoologie, 2e ser., XIV, p. 166. [Tropical Mexico.]

Surubres river at San Mateo, altitude 250 meters. Under stones on the border of the river. February, 1905. [No. 9.] (P. Biolley.) One female.

This is the most southern record for this beautiful species.

**PSEUDOPHYLLODROMIA** Brunner.**Pseudophyllodromia peruana** (Saussure).

Reventazon river, plains of Santa Clara, altitude 200 meters. December, 1904. [No. 5.] (P. Biolley.) One female.

This specimen is similar in coloration to the one described by the author from San Carlos, Costa Rica.<sup>2</sup>

**PSEUDOMOPS** Serville.**Pseudomops grata** Rehn.

1903. *Pseudomops grata* Rehn, Trans. Amer. Ent. Soc., XXIX, p. 260 [San Carlos, Costa Rica.]

Reventazon river, plains of Santa Clara, altitude 200 meters. December, 1904. [No. 6.] (P. Biolley.) One male.

This specimen differs from the type in the possession of a broad blackish bar on the caudal margin of the pronotum and a pair of circular blackish dots slightly cephalad of the middle of the same plate.

<sup>2</sup> Trans. Amer. Ent. Soc., XXIX, pp. 261-262.

The other characters, both structure and color, are similar to the type.

**PELMATOSILPHA** Dohrn.

*Pelmatosilpha rotundata* Scudder.

1900. *Pelmatosilpha rotundata* Scudder, Proc. Davenport Acad. Nat. Sci., VIII, p. 93, Pl. II, fig. 5. [Texas; Panama.]

Reventazon river, plains of Santa Clara, altitude 200 meters. December, 1904. [No. 3.] (P. Biolley.) One femal .

**CHORISONEURA** Brunner.

*Chorisoneura flavipennis* Saussure and Zehntner.

Surubres river at San Mateo, altitude 250 meters. Under stones on the border of the river. February, 1905. [No. 8.] (P. Biolley.) One female.

La Palma, altitude 1,600 meters. May, 1905. In decayed leaves. [No. 11a.] (P. Biolley.) One male.

Slightly darker, but otherwise inseparable from a female from Turrialba, Costa Rica.

**HOLOCOMPSA** Burmeister.

1838. *Holocompsa* Burmeister, Handb. d. Entom., II, Abth. II, Pt. I, p. 491.

Included *Corydia cyanea*, *collaris* and *fulva* Burmeister, of which *collaris* (= *Blatta nitidula* Fabricius) has been selected as the type by Kirby.

*Holocompsa cyanea* (Burmeister).

1838. *C[orydia] cyanea* Burmeister, Handb. d. Entom., II, Abth. II, Pt. I, p. 169. [St. Thomas.]

Surubres river at San Mateo, altitude 250 meters. In house. February, 1905. [No. 10.] (P. Biolley.) One specimen.

This species has previously been recorded in America only from the West Indies.

**BLABERUS** Serville.

*Blaberus thoracicus* Saussure and Zehntner.

Reventazon river, plains of Santa Clara, altitude 200 meters. December, 1904. [No. 1.] (P. Biolley.) One female.

This individual is larger than the measurements given in the original description, and has the pattern of the disk of the pronotum slightly different.

*Blaberus biolleyi* n. sp.

Type: ♀; Reventazon river, plains of Santa Clara, Costa Rica. Altitude 200 meters. December, 1904. [No. 2.] (P. Biolley.) [A. N. S. Phila.]

Closely allied to *B. thoracicus*, but differing in the slightly smaller size, narrower and longer anal area of the tegmina as well as the less distinct and more numerous nervures of the same area, the subtruncate and narrowly incised supra-anal plate, the broader subgenital plate and rather different coloration.

Size medium; form elongate ovoid. Head with the narrowest portion of the interspace between the eyes about equal to the greatest dorso-ventral depth of the eyes; antennæ about a fourth again as long as the width of the pronotum. Pronotum subovate, transverse, half again as broad as long; cephalic margin subangulate, caudal margin arcuate, cephalo-lateral sections moderately deflected. Tegmina elongate, costal margin arcuate, more distinctly so proximad than distad; apex narrowly rounded; sutural margin arcuate in the distal third rounding to the apex; venation distinct, the costal area only irregular reticulate; anal area about two-fifths the length of the tegmen, the anal vein slightly but evenly arcuate. Supra-anal plate rather broad, bilobate, the median emargination V-shaped, rather shallow and broad. Cerci short, very slightly exceeding the supra-anal plate, tapering. Subgenital plate large, broad, slightly produced, the apex blunt and rather narrowly rounded. Femora without spines on the ventral margins. Cephalic tarsi with the distal joint slightly longer than the proximal; median tarsi with the proximal and distal joints subequal; caudal tarsi with the proximal joint slightly longer than the distal.

General color pale clay-color, the pronotum with the ground color ochraceous. Head pale ochraceous, with the region between the eyes, between the paired ocelli, except a median spot of the base color, and a median line on the lower face burnt umber; eyes blackish; antennæ blackish-brown. Pronotum with a broad bar of blackish on the caudal margin, tapering laterad and disappearing before the angles of greatest width, two pairs of irregularly rounded spots of the same color situated before the middle and in pairs with the space between them slightly greater than their distance from the cephalic margin, caudad of these a pair of rather large comma-shaped spots of the same color and caudad of these a pair of roughly trigonal spots.

Limbs with the tarsi, tibiæ and distal sections of the femora suffused with burnt umber. Abdomen with the lateral marks of the dark

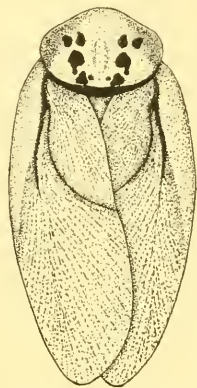


Fig. 1. *Blaberus biolleyi* n. sp. Type. Natural size.

brown color united at, and suffusing the greater portion of, the subgenital plate, as is usual in species of the genus.

*Measurements.*

Length of body, . . . . .	42 mm.
Length of pronotum, . . . . .	11.5 "
Breadth of pronotum, . . . . .	16.6 "
Length of tegmen, . . . . .	42 "
Width of tegmen, . . . . .	15.7 "

The type is unique.

I take pleasure in dedicating this species to Prof. P. Biolley, of San José, Costa Rica, who collected the type and supplied a portion of the material on which this paper is based.

Family **MANTIDÆ**.

**ACONTISTA** Saussure.

**Acontista mexicana** Saussure and Zehntner.

Carrillo. (Hebard Collection.) One female.

**STAGMOMANTIS** Saussure.

**Stagmomantis nahua** Saussure.

Carrillo. (Hebard Collection.) One male, one female.

The facial scutellum of the female is not narrowly emarginate dorso-mesad as in a female from Chinandega, Nicaragua, while all three specimens examined have the cephalic limbs unspotted.

**Stagmomantis tolteca** (Saussure).

Surubres river at San Mateo, altitude 250 meters. February, 1905. [No. 13.] (P. Biolley.) One male.

**Stagmomantis venusta** Saussure and Zehntner.

1894. *Stagmomantis venusta* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 145, Pl. VII, figs. 4 and 5. [Sinanja, Panina and Telemán, Vera Paz, Guatemala.]

Surubres river at San Mateo, altitude 250 meters. February, 1905. [No. 15.] (P. Biolley.) One male.

**Stagmomantis androgyna** Saussure and Zehntner.

1894. *Stagmomantis androgyna* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 147, Pl. VII, fig. 1. [Belize, British Honduras.]

Surubres river at San Mateo, altitude 250 meters. February, 1905. [No. 14.] (P. Biolley.) One male.

This specimen has the black stigma very small, and the pronotum shorter (19.5 mm.) than the original measurements (23.5 mm.). The maculations of the wings are practically absent, those organs being

weakly suffused with reddish brown as is the case with the tegmina. The shape and proportions of the pronotum readily separate this species from *S. montana*.

**PSEUDOMIOPTERYX** Saussure.

*Pseudomiopteryx infuscata* Saussure and Zehntner.

Caché, altitude 1,000 meters. May, 1905. In forest. [No. 16.] (P. Biolley.) One male.

Family **PHASMIDÆ**.

**BOSTRA** Stål.

*Bostra turgida* (Westwood).

1859. *Bacteria turgida* Westwood, Catal. Orthopt. Ins. Coll. Brit. Mus., Phasm., p. 28, Pl. VIII, figs. 4 and 9. [Venezuela.]

Caché, altitude 1,000 meters. May, 1905. [No. 24.] (P. Biolley.) One male.

As far as can be determined from the broken male figured and described by Westwood, this appears to be the same species. It is, however, somewhat smaller, and has the antennæ longer than in Westwood's figure and equal to the body in length, instead of reaching "rather beyond the middle of the metathorax."


The species of the genus *Bostra* in hand for study are four: *incompta* Rehn,<sup>3</sup> *jalisensis* Rehn,<sup>4</sup> *jugalis* Rehn<sup>5</sup> and *turgida* Westwood. The males of all these species are now before me and can be separated by the following key:

- a.—Cerci not exceeding the subgenital opercule proper (*i.e.*, the eighth ventral segment) in length.
- b.—Ninth dorsal abdominal segment somewhat bullate, the caudal margin bilobate, with the median emargination subtrigonal. Subgenital opercule without a distinct claw-like process.
- c.—Median segment in length not exceeding one-half the remaining portion of the metanotum. Cerci slightly tapering, . . . . . *B. turgida* (Westw.).
- cc.—Median segment in length nearly equal to the remaining portion of the metanotum. Cerci not tapering. . . . . *B. incompta* Rehn.
- bb.—Ninth dorsal abdominal segment longitudinal, subequal, not bullate, the caudal margin laterad acute-angulate and brace-shaped<sup>6</sup> between. Subgenital opercule with a distinct claw-like process ventrad of the caudal margin, . . . . . *B. jalisensis* Rehn.

<sup>3</sup> *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 57. [San Carlos, Costa Rica.]

<sup>4</sup> *Ibid.*, 1904, p. 514. [Tuxpan, Jalisco, Mexico.]

<sup>5</sup> *Invertebrata Pacifica*, I, p. 72. [Chinandega, Nicaragua.]

<sup>6</sup> Shaped thus .



*aa.*—Cerci exceeding the subgenital opercule in length, very distinctly bent arcuate proximad and compressed in the distal half,

*B. jugalis* Rehn.

Stål's *B. dorsuaria*<sup>7</sup> and Scudder's *B. exigua*<sup>8</sup> are known from the males, while *B. remiformis* Rehn<sup>9</sup> is based on the female sex. The latter has the median segment two-thirds the length of the metanotum itself, which fact would associate it with *jalisensis*, *incompta* and *jugalis*. As the female of *jugalis* is known it is certainly not that species, while the other two species are very much larger in the male sex than the female type of *remiformis*. Accordingly I think it a good species of which the male is unknown.

#### LIBETHRA Stål.

1875. *Libethra* Stål, *Recensio Orthopterorum*, III, pp. 20, 74.

Type.—*L. nisseri* Stål.

*Libethra auritus* n. sp.

Type: ♀; San José, Costa Rica. Altitude, 1,160 meters. August, 1904. [No. 22.] (P. Biolley.) [A. N. S. Phila.]

Allied to *L. ignavus* Westwood, but differing in the ear-like cephalic appendages, the reduction of the lobes on the median and caudal limbs, the absence of especially pronounced lobes on the second abdominal segment and the presence of such on the fifth segment, and the shorter caudal limbs.

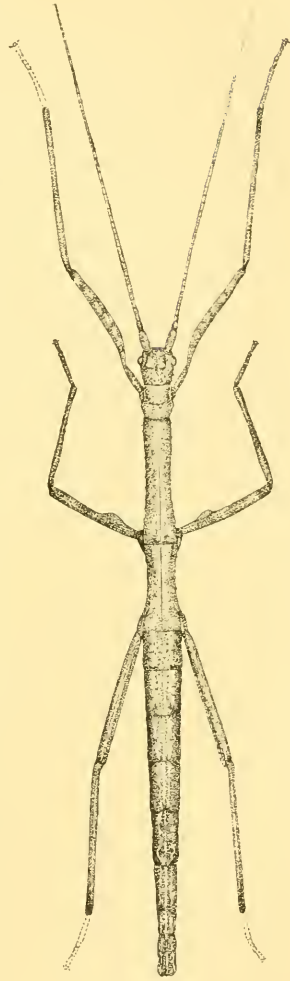
Size rather small; form moderately robust; surface closely supplied with tubercles of several sizes, the larger size arranged in parallel longitudinal rows. Head slightly longer than broad, supplied between and slightly caudad of the eyes with a pair of erect subrotundate foliaceous lobes, about twice as high as the eye is deep, margins of the lobes irregularly crenulate; eyes short ovate; antennæ about equal to the head and thorax in length, proximal joint large, considerably depressed. Pronotum slightly longer than broad. Mesonotum about twice as long as the head and pronotum together, a longitudinal median carina present but subobsolete cephalad, the large tubercles irregularly paired laterad of the median carina with a regularly placed pair caudad. Metanotum with the median segment about two-thirds the length of the mesonotum with the median carina distinct through the entire length; median segment subquadrate, slightly narrowed cephalad,

<sup>7</sup> *Recensio Orthopterorum*, III, p. 79. [Chiriqui.]

<sup>8</sup> *Proc. Boston Soc. Nat. Hist.*, XVII, p. 278. [Eastern slope of Peruvian Andes.]

<sup>9</sup> *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 58. [Piedras Negras, Costa Rica.]

length about two-thirds of the remaining portion of the metanotum. Abdomen considerably longer than the remaining portion of the body, with a distinct longitudinal median carina and a pair of supplementary lateral carinæ, which latter on the caudal margins of the first and second proximal segments are developed with distinct boss-like tubercles, the general surface tubercles of the abdomen are mostly resolved into longitudinal series; fifth segment with the caudal section bearing two erect foliaceous lobes similar to those found on the head, but with the margins more regular and not crenulate; first, second and third segments increasing distad in length, fourth, fifth and sixth subequal in length, seventh slightly more than half the length of the sixth, eighth very short, ninth about equal to the seventh in length and with the caudal margin with a very broad shallow median emargination; subgenital opercule reaching to the caudal margin of the eighth dorsal segment, produced, the apex semicircularly emarginate, carinate ventrad. Cephalic femora slightly shorter than the pronotum and mesonotum, strongly depressed, proximal flexure distinct; cephalic tibiæ slightly longer than the femora, carinate, in section irregularly pentagonal; cephalic tarsi with the first proximal joint (metatarsus) slightly longer than the remaining tarsal joints. Median femora slightly shorter than the mesonotum, slightly arcuate, subquadrate in section, with the ventral carinæ supplied at about the proximal third with subtrigonal foliaceous lobes; median tibiæ very slightly longer than the femora; median tarsi with the proximal joint very slightly longer than the second, third and fourth united. Caudal femora reaching to about the middle of the



Figs. 2 and 3. *Libethra auritus* n. sp. Dorsal view and lateral view of head. ( $\times 1\frac{1}{2}$ .)



fourth abdominal segment; caudal tibiae slightly longer than the femora.

General color raw umber, washed and stained with vandyke brown, the cephalic femora and tibiae and median femora irregularly annulate and sprinkled with ecru drab. Head bister, lighter around the mandibles and on the labrum and clypeus.

#### Measurements.

Length of body, . . . . .	63	mm.
Length of pronotum, . . . . .	4.5	"
Length of mesonotum, . . . . .	12.5	"
Length of metanotum (including median segment), . . . . .	9.5	"
Length of abdomen, . . . . .	35.	"
Length of cephalic femur, . . . . .	14.5	"
Length of cephalic tibia, . . . . .	17.	"
Length of median femur, . . . . .	11.	"
Length of caudal femur, . . . . .	14.	"

The type is unique.

#### HETERONEMIA Gray.

##### *Heteronemia ignava* Rehn.

1904. *Heteronemia ignava* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 54. [Piedras Negras, Costa Rica.]

San José, altitude 1,160 meters. August, 1904. [No. 22.] (P. Biolley.) One male.

#### OLCYPHIDES Griffini.<sup>10</sup>

1875. *Phocylides* Stål, Recensio Orthopterorum, III, pp. 57, 96. [Not of Pascoe, 1872.]

1899. *Olecyphides* Griffini, Zoolog. Anz., XXII, p. 90.

Type.—*Olecyphides bicarinatus* (Stål).

##### *Olecyphides viridipes* n. sp.

Type: ♀; Caché, Costa Rica, altitude 1,000 meters. May, 1905. [No. 25.] (P. Biolley.) [A. N. S. Phila.]

Allied to *O. venilia* Westwood from Bogota, but differing in the shorter mesothorax and metathorax, the slenderer abdomen and limbs, the shorter subgenital opercule, the absence of distinct blackish spots on the sutural portions of the tegmina and other features of the coloration. The relationship to *O. venilia* is great, as such structures as the

<sup>10</sup> Kirby (A. *Synon. Catal. Orth.*, I, p. 411) has placed *Pseudophasma cryptochlore* Rehn as a species of *Olecyphides*. After examining a typical specimen I find this is erroneous, as the species is a *Pseudophasma* as originally described.

sulcate mesonotum, weakly ridged tegmina, long metatarsi and elongate antennal joints show.

Size medium; form very slender; surface not polished. Head longitudinal, subequal; occiput with three impressed longitudinal lines caudad; ocelli present, the cephalic large, elliptical, placed between the insertions of the antennæ, caudal pair smaller, placed diagonally at about the cephalic third of the occiput; eyes slightly elliptical, projecting, slightly flattened; antennæ composed of about twenty-five joints, some very poorly defined, and, except the proximal two and the terminal joints, the segments are very slender and elongate, the whole antennæ laid back exceeding the tip of the abdomen, second joint somewhat inflated. Pronotum nearly twice as long as broad, narrow, transverse line slightly in advance of the middle. Mesonotum over twice the length of the pronotum, subequal in width, fine longitudinal median sulcus present, dorso-lateral angles with distinct carinæ, accompanied dorsad by longitudinal sulci which are rounded contiguous caudad; mesosternum without longitudinal median carina. Metathorax very slightly longer than the mesothorax. Tegmina about equal to the mesonotum in length, apex rounded; tubercle longitudinal, low and weak. Wings in repose reaching to the caudal margin of the fifth abdominal segment. Abdomen with the six proximal segments longitudinal, the first to fourth subequal in length, the fifth and sixth decreasing, seventh about two-thirds the length of the sixth, eighth about two-thirds the length of the seventh, ninth subequal to the eighth in length, the caudal margin truncate; cerci compressed, tapering, acute, slightly longer than the ninth dorsal

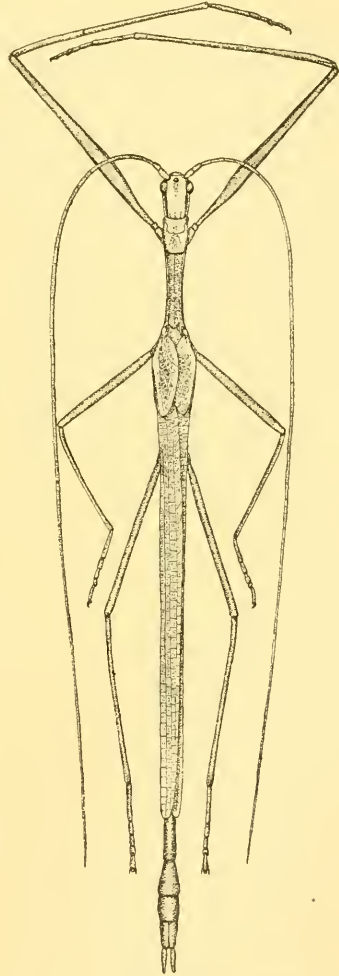


Fig. 4. *Glycyptoides viridipes* n. sp. Dorsal view of type. ( $\times 2$ .)

segment; subgenital opercule moderately produced, scoop-like, reaching to the caudal margin of the eighth dorsal segment. Cephalic femora equal to the mesothorax and metathorax together in length, compressed, basal flexure slight; cephalic tibiae about equal to the femora in length; tarsi with the proximal joint very slightly shorter than the remaining joints. Median femora slightly longer than the metathorax; tibiae slightly shorter than the femora; tarsi with the proximal joint equal to the second, third and fourth in length. Caudal femora about equal to the head, prothorax and mesothorax united in length, extending, when stretched parallel to the abdomen, to slightly caudad of the caudal margin of the second segment; tibiae slightly longer than the femora; tarsi with the proximal joint about equal to the remaining tarsal joints in length.

General color wood brown becoming russet on the mesothorax and cephalic limbs. Head, prothorax and mesothorax with a pair of lateral lines of bistre extending from the olive eyes to the base of the tegmina.



Fig. 5. *Olcypoides viridipes* n. sp. Lateral view of apex of abdomen of male type. ( $\times 2$ .)

Venter of the thorax pale mauve. Tegmina with a line through the "boss" greenish-yellow, the dorsal section with the areas between the longitudinal and transverse nervures finely sprinkled with blackish. Wings with the yellow of the tegmina extended on them for a considerable distance. Abdomen pale drab. Median and caudal limbs

oil green.

#### Measurements.

Length of body, . . . . .	54 mm.
Length of head, . . . . .	3.2 "
Length of pronotum, . . . . .	2.2 "
Length of mesonotum, . . . . .	5.2 "
Length of metathorax, . . . . .	7.8 "
Length of tegmen, . . . . .	5.7 "
Length of wing, . . . . .	32 "
Length of cephalic femur, . . . . .	14.3 "
Length of cephalic tibia, . . . . .	14.2 "
Length of median femur, . . . . .	8.3 "
Length of caudal femur, . . . . .	11.2 "

The type is unique.

#### PSEUDOPHASMA Kirby.

*Pseudophasma menius* (Westwood).

Carrillo, altitude 400 meters. February, 1904. [No. 21.] (P. Biolley.) One male.

Family **ACRIDIDÆ**.**OCHETOTETTIX** Morse.

1900. *Ochetotettix* Morse, Biol. Cent.-Amer., Orth., II, p. 9.

Included *O. barretti* (Hancock) and *O. volans* Morse, of which the former may be selected as the type.

**Ochetotettix volans** Morse.

1900. *Ochetotettix volans* Morse, Biol. Cent.-Amer., Orth., II, p. 9, fig. [Dos Arroyos, Chilpancingo, Venta de Zopilote, Xucumanatlan and Omilteme, Guerrero, Mexico, 1,000 to 8,000 feet.]

San José, altitude 1,160 meters. September, 1904. [Nos. 85 (part), 86 (part) and 87.] (P. Biolley.) One male, four females.

**Ochetotettix barretti** (Hancock).

1899. *Neotettix barretti* Hancock, Ent. News, X, p. 277. [Tizapan, D. F., Mexico.]

San José, altitude 1,160 meters. September, 1904. [No. 86 (part).] (P. Biolley.) One female.

In addition to the type locality this species has been recorded from Chilpancingo, Guerrero, and Atoyac, Vera Cruz, Mexico.

**PARATETTIX** Bolivar.**Paratettix toltecus** (Saussure).

1861. *T[ettix] tolteca* Saussure, Revue et Magasin de Zoologie, 2e ser. XIII, p. 401. [Tropical Mexico.]

San José, altitude 1,160 meters. September, 1904. [No. 85 (part) and 87.] (P. Biolley.) One male, one female.

**ALLOTETTIX** Hancock.**Allotettix peruvianus** (Bolivar).

La Palma, altitude 1,600 meters. May, 1905. [No. 90.] (P. Biolley.) One female.

This specimen has the pronotum abbreviate, not extending beyond the tips of the caudal femora.

**TETTIGIDEA** Seudder.**Tettigidea nicaraguæ** Bruner.

1895. *Tettigidea nicaraguæ* Bruner, Bull. Labor. Nat. Hist. Univ. Iowa, III, Pt. 2, p. 62, Pl. III, figs. 3a and 3b. [Nicaragua.]

San José, altitude 1,160 meters. September, 1904. [No. 84.] (P. Biolley.) One female.

This species has also been recorded from Atoyac, Vera Cruz, and Teapa, Tabasco, Mexico. The specimen examined is short-winged.

**EPISACTUS** Burr.

1899. *Episactus* Burr, Anal. Soc. Esp. Hist. Nat., XXVIII, p. 254.

Type.—*E. brunneri* Burr.

**Episactus brunneri** Burr.

1899. *Episactus brunneri* Burr, Anal. Soc. Esp. Hist. Nat., XXVIII, p. 254. [Guatemala.]

Side of Tablazo, at 1,350 meters. October, 1904. [No. 69.] (P. Biolley.) Male and female taken in coitu.

These specimens constitute the first record of the species since the original description.

**TRUXALIS** Fabricius.**Truxalis brevicornis** (Johansson).

La Palma, altitude 1,600 meters. May, 1905. [No. 89.] (P. Biolley.) One female.

**ORPHULELLA** Giglio-Tos.**Orphulella punctata** (De Geer).

San José, altitude 1,160 meters. August, 1904. [No. 81.] (P. Biolley.) One male.

Santa Clara. (P. Biolley.) One male.

**Orphulella costaricensis** Bruner.

San José, altitude 1,160 meters. August, 1904. [Nos. 75 (part), 76, 77, 78, 79, 80 and 81.] (P. Biolley.) One male, ten females.

Surubres river at San Mateo, altitude 250 meters. February, 1905. [No. 74.] One female.

Side of Tablazo, at 1,350 meters. October, 1904. [No. 71.] (P. Biolley.) One male.

**Orphulella meridionalis** Bruner?

1904. *Orphulella meridionalis* Bruner, Biol. Cent.-Amer., Orth., II, p. 81. [Costa Rica.]

San José, altitude 1,160 meters. August, 1904. [No. 76.] (P. Biolley.) One female.

Side of Tablazo, at 1,350 meters. October, 1904. [No. 70.] (P. Biolley.) One male.

These specimens are referred to the species with a query.

**PLECTROTETTIX** McNeill.**Plectrotettix calidus** Bruner.

1904. *Plectrotettix calidus* Bruner, Biol. Cent.-Amer., Orth., II, p. 101. [Cuernavaca, Morelos and Guerrero, Mexico; Nicaragua; Costa Rica.]

Side of Tablazo, at 1,350 meters. October, 1904. [No. 60.] (P. Biolley.) One male, two females.

These specimens agree fairly well with Cuernavaca specimens, but have the caudal tibiae with the colors much richer. One female without exact data, but presumably from Costa Rica as it was sent by Biol-



ley, has the ventral face of the caudal femora and the caudal tibiæ red as in Walker's poorly described *nobilus* from Oaxaca, Mexico. This specimen also has the tegmina and wings shorter than in the Tablazo specimens and similar in this respect to individuals from Tacubaya, Mexico, which appear to be referable to *P. excelsus* Bruner.

**CHORTOPHAGA** Saussure.

**Chortophaga meridionalis** Bruner.

1905. *Chortophaga meridionalis* Bruner, Biol. Cent.-Amer., Orth., I, p. 136.  
[Slopes of the Volcan de Irazu, at an elevation of 7,500 to 9,000 feet, Costa Rica.]

Side of Tablazo, altitude 1,700 meters. October, 1904. [No. 65.] (P. Biolley.) One female.

On comparison with specimens of *Chortophaga viridifasciata* from the eastern United States, I find great difficulty in separating this specimen. The pronotal carina is slightly less arched, but the size is considerably greater than given in the original description. The sulcation of the frontal costa appears deeper than in *viridifasciata* instead of shallower, but as the specimen in hand appears to have been in alcohol, preparation may have caused this. Several races of *C. viridifasciata* of value equal to this exist in the United States.

**LACTISTA** Saussure.

**Lactista punctatus** (Stål).

Side of Tablazo, at 1,700 meters. October, 1904. [No. 68.] (P. Biolley.) One female.

**HELIASTUS** Saussure.

**Heliastus venezuelæ** Saussure.

1884. *H[eliastus] Venezuelæ* Saussure, Prodr. CEdipodiorum, p. 213. [Venezuela; Colombia; Panama.]

Mouth of the Jesus Maria river, Pacific side.<sup>11</sup> April, 1905. [No. 88.] (P. Biolley.) Two females.

These specimens are referred here with some little doubt. They are unquestionably closely allied to *H. sumichrasti*, but have the fastigium broader and shallower than in that species, while the frontal costa is broader and has a slight constriction ventrad of the ocellus. The two in hand are larger than Guadalajara and Jalapa individuals of *sumichrasti*, and about equal in size to a female from Alta Mira, Tamaulipas.

<sup>11</sup> This locality is between Punta Arenas and the mouth of the Rio Grande de Tarcoles.

**LEPTYSMA** Stål.

*Leptysma obscura* (Thunberg).

1827. *Truxalis*] *obscurus* Thunberg, Nova Acta Reg. Soc. Scient. Ups., IX, p. 79. [Tropical America, Brazil.]

Surubres river at San Mateo, altitude 250 meters. February, 1905. [No. 82.] (P. Biolley.) One male.

This species has been recorded from Nicaragua.

**CORNOPS** Scudder.

1875. *Cornops* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 276.

Type.—*Cornops bivittatum* Scudder.

*Cornops longipenne* (De Geer)?

1773. *Acrydium longipenne* De Geer, Mem. d. Hist. Ins., III, p. 501, Pl. 42, fig. 9. [Surinam.]

Surubres river at San Mateo, altitude 250 meters. Esparta, altitude 50 meters. February, 1905. [No. 83.] (P. Biolley.) Male and female.

As far as can be determined from the descriptions these specimens appear referable to this species, but probably will represent a closely allied form when compared with typical Surinam individuals. The lateral bars are not sharply separated from the wine-color of the dorsum, but present a strong contrast with the yellowish of the ventral portions.

The genus *Cornops* as defined by Stål<sup>12</sup> appear to agree better with these specimens than does Scudder's description. This may be due to the fact that Stål's description was based on *longipenne*.

**SCHISTOCERCA** Stål.

*Schistocerca pyramidata* Scudder.

San José, altitude 1,160 meters. November, 1904. [Nos. 72 and 73.] (P. Biolley.) Four males, four females.

Side of Tablazo, at 1,700 meters. October, 1904. [Nos. 61, 62, 63 and 64.] (P. Biolley.) Seven males, seven females.

Some of the above recorded individuals have the tegmina considerably longer than others, while the variation in the intensity of the coloration is quite striking.

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<sup>12</sup> Bihang K. Svenska Vetensk.-Akad. Handl., V, No. 4, p. 39, 1878.

**DICHRPLUS** Stål.**Dichroplus morosus** Rehn.

1905. *Dichroplus morosus* Rehn, Proc. Acad. Nat. Sci. Phila., 1905, p. 442.  
[Monte Redondo, Costa Rica.]

Side of Tablazo, at 1,350 meters. October, 1904. [No. 67.] (P. Biolley.) Two males, two females.

As the male of this species has never been described its characters are given herewith.

♂. Size small. Head with the interspace between the eyes moderately narrow, shallowly sulcate; fastigium declivent, passing into the frontal costa without interruption of the shallow sulcus; costa narrowed dorsad, regularly but slightly expanding ventrad, more distinctly sulcate ventrad of the ocellus; eye about half again as long as the infra-ocular groove. Pronotum with the caudal margin subrectangulate. Interspace between the mesosternal lobes subquadrate; metasternal lobes subcontiguous. Tegmina exceeding the tips of the caudal femora by about half the length of pronotum. Furcula present as extremely minute knobs; supra-anal plate with a longitudinal median groove, outline slightly narrowed with the apex abruptly rounded except for a slight median angle; cerci with the proximal section broad, strongly tapering in the proximal half, the distad section very narrow, styliform and subequal, tip slightly incurved, decurved and acute; subgenital plate produced, longer than broad, the apex narrowly rounded.

*Measurements.*

Length of body, . . . . .	16 mm.
Length of pronotum, . . . . .	3.5 "
Length of tegmen, . . . . .	12.5 "
Length of caudal femur, . . . . .	8.5 "

The specimens examined exhibit considerable variation in the shade of the ground color and the intensity of the pattern.

**AIDEMONA** Brunner.**Aidemona azteca** (Saussure).

Side of Tablazo, at 1,700 meters. October, 1904. [No. 66.] (P. Biolley.) One female.

**TETTIGONIDÆ.****APHIDNA** Stål.

1874. *Aphidna* Stål, Recensio Orthopterorum, II, pp. 13, 28.

Type.—*Phaneroptera alipes* Westwood ♂.

*Aphidna simplicipes* Brunner.

1878. *A[phidna] simplicipes* Brunner, Monogr. d. Phaneropt., p. 157. [Mexico.]

San José, altitude 1,160 meters. July, 1904. [No. 43.] (P. Biolley.) One male.

This is the first record of the species since the original description.

#### **HORMILIA** Stål.

1873. *Hormilia* Stål, Öfversigt Kongl. Vetens.-Akad. Förhandl., 1873, No. 4, p. 41.

Type.—*Phanoptera tolteca* Saussure.

*Hormilia intermedia* Brunner.

1878. *H[ormilia] intermedia* Brunner, Monogr. d. Phaneropt., p. 232. [Cordova, Mexico; Guatemala.]

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Four males, one female, one nymph.

Guatel. (C. F. Underwood.) One nymph.

Piedras Negras. (Schild and Burgdorf.) [U. S. N. M.] One male, three females.

This series of specimens exhibits considerable variation in color, both in the ground color and the intensity of the pattern. Some individuals are without a trace of greenish, while others have the base color, very pale apple green; the pattern of the tegmina in some is a complicated subscalariform arrangement, in others only an irregular mottling. In all the specimens examined, including the nymphs, the dorsal abdominal markings are distinct.

The species has been recorded once before from Costa Rica, from Caché, by Saussure and Pictet.

#### **CERAIA** Brunner.

1891. *Ceraia* Brunner, Verhandl. k.-k. Zool.-botan. Gesellsch. Wien, XLI, p. 18, 127.

Included nine species,<sup>13</sup> of which the first, *tibialis* (which is the species figured), may be considered the type.

*Ceraia cruenta* (Burmeister).

1838. *Ph[anoptera] cruenta* Burmeister Handb. d. Entom., II, Abth. II, Pt. I, p. 691. [Rio Janeiro, Brazil.]

San José, altitude 1,160 meters. July, 1904. (P. Biolley; No. 42.) [A. N. S. Phila.] One female.

This striking species is recorded for the first time north of Brazil. The only definite records previously published are from the type locality.

<sup>13</sup> *Ceraia tibialis* Brunner, *maxima* Brunner, *punctulata* (Brunner), *suri-namensis* Brunner, *dentata* (Brunner), *cornuta* Brunner, *atrosignata* Brunner, *zebrata* Brunner and *cruenta* (Burmeister.)

**STILPNOCHLORA** Stål.**Stilpnochlora marginella** (Serville).

1839. *Phylloptera marginella* Serville, Orthoptères, p. 405. [Cape of Good Hope; erroneous.]

San José. September, 1902. (C. F. Underwood.) [A. N. S. Phila.]  
One male.

**Stilpnochlora tolteca** (Saussure).

1859. *Phylloptera tolteca* Saussure, Revue et Magas. de Zool., 2e ser., XI, p. 203. [Mexico.]

Ateñas. (Schild and Burgdorf.) [U. S. N. M.] One female.

San José. September, 1902. (C. F. Underwood.) [A. N. S. Phila.]  
Three males, five females.

**Stilpnochlora azteca** (Saussure).

San José. September, 1902. (C. F. Underwood.) [A. N. S. Phila.]  
One female.

Tarbacá. October, 1902. (C. F. Underwood.) [A. N. S. Phila.]  
One female.

**STEIRODON** Serville.

1831. *Stiroidon* Serville, Ann. Sci. Nat., XXII, p. 140.

Type.—*Phyllophora citrifolia* Thunberg = *Stiroidon validum* Stål.<sup>14</sup>

**Stiroidon validum** Stål.

1815. *Phyllophora citrifolia* Thunberg, Mém. l'Acad. Imp. Sci. St. Pétersb., V, p. 286. (Not *Gryllus* (*Tettigonia*) *citrifolius* Linnæus and authors.)

1874. [*Stiroidon*] *validum* Stål, Recensio Orthopterorum, II, p. 44. (Based in part on Thunberg's material.) [Locality unknown.]

Costa Rica. (C. F. Underwood.) [A. N. S. Phila.] One female.

This Brazilian and Guianan species is here recorded for the first time from Central America.

**OROPHUS** Saussure.

1859. *Orophus* Saussure, Revue et Magas. de Zoolog., 2e ser., XI, p. 204.

1878. *Anepsia* Brunner, Monogr. der Phaneropt., p. 269.

1897. *Paragenes* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 338.

<sup>14</sup> The genus *Stiroidon* was based on three forms: *citrifolius*, *prasinus* and *thoracicus*. The second was removed to *Trigonocorypha* in 1874; the third to *Posidippus* the same year. The first, *citrifolius*, was based wholly on references as follows:

*Locusta citrifolia* Fab., Ent. Syst., No. 1.

De Geer, Mém., t. III, p. 437, Pl. 37, fig. 3.

Stoll, Sauter., Pl. 4, fig. 12.

*Phyllophora citrifolia* Thunb., Mém. de l'Acad. Imp. des Sc. de Saint-Pétersb., t. V, p. 286.

The references of Fabricius and De Geer were based on Linné's *Gryllus* (*Tettigonia*) *citrifolius*, which was placed in *Posidippus* in 1874. Stoll's figure was considered a *Peucestes* the same year, leaving Thunberg's misidentification, later named by Stål, who examined the Thunberg material, as the type.



Included *mexicana*, *otomia*, *salicifolia*, *rhombifolia*, *totonaca*, *salvifolia* and *huasteca*. Of these *otomia*, *salicifolia*, *rhombifolia*, *totonaca* and *salvifolia* belong to the genus *Microcentrum*, 1873; *huasteca* to *Amblycorypha*, 1873; and *mexicana* remains as the type.

**Orophus mexicanus** Saussure.

1859. *Ph[ylloptera (Orophus)] mexicana* Saussure, Revue et Magas. de Zoologie, 2e ser., XI, p. 204. [Mexico.]

1905. *Paragenes conspersa* Baker, Invert. Pacifica, I, p. 78. (Not of Brunner.) [San Marcos, Nicaragua.]

Escazu. October, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

Guatel. (C. F. Underwood.) [A. N. S. Phila.] One male, one female.

Santa Ana. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Four females.

A San Marcos, Nicaragua, female individual, received from Baker and determined as *conspersus*, is larger than any Costa Rican specimen examined.

This species has previously been recorded from Caché, Rio Sucio, San Francisco, San José, Azahar de Cartago and Monte Redondo in Costa Rica.

**Orophus ovatus** (Brunner).

1878. *A[nepsia] ovata* Brunner, Monogr. der Phaneropt., p. 271. [Costa Rica.]

Zarzero. (Schild and Burgdorf.) [U. S. N. M.] Five males, one female.

Tarbaca. October, 1902. (C. F. Underwood.) [A. N. S. Phila.] Two females.

Escazu. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Two males.

Santa Ana. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] Two males.

This quite distinct species varies somewhat in size and from a greenish-brown to a distinct green in color, with the small fuscous annuli practically absent in some specimens.

This species is more austral than the others of the genus, having been recorded but once from outside of Costa Rica, then from San Gerónimo, Guatemala. The previous definite Costa Rican records are from Rio Sucio, Caché and Volcan de Irazu.

**Orophus conspersus** (Brunner).

1878. *A[nepsia] conspersa* Brunner, Monogr. der Phaneropt., p. 270. [Chiriquí.]

Guatel. (C. F. Underwood.) [A. S. N. Phila.] Two males.

Tucurrique. (Schild and Burgdorf.) [U. S. N. M.] One male.

Carrillo. (Schild and Burgdorf.) [U. S. N. M.] Two males.

Carrillo. [Hebard Collection.] Twenty-eight males, nine females.

This form is probably, as Brunner says, a small type of *tessellata*. The large series examined is rather uniform in size, but the coloration varies greatly, both in the general color and the presence or intensity of the fuscous annuli of the tegmina. Most of the males have the tambourine marked laterad more or less regularly with brownish, and the paler specimens which are little marked with fuscous have the femoral spines with the dark color restricted to a very slight apical touch.

The previous Costa Rican records of this species are from San José, La Uruca, El Coronal, Tucurrique, La Palma, Turrialba and Monte Redondo.

**Orophus tessellatus** Saussure.

1861. *Phylloptera (Orophus) tessellata* Saussure, Revue et Magas. de Zoolog., 2e ser., XIII, p. 129. [Mexico.]

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] Four males, four females.

Tucurrique. (Schild and Burgdorf.) [U. S. N. M.] One male.

Carrillo. [Hebard Collection.] Three females.

Guatel. (C. F. Underwood.) [A. N. S. Phila.] Two females.

Reventazon, plains of Santa Clara; altitude 200 meters. December, 1904. (P. Biolley; No. 40.) [A. N. S. Phila.] One female.

The material examined fully demonstrates the variability of this species in color, some being strongly dotted with fuscous and with the usual large annuli distinct, while others are almost uniform green. Considerable variation is also exhibited in size, and some individuals might be referred to either *tessellatus* or *conspersus*. This is particularly true of the individuals from Carrillo.

The previous Costa Rican records are from Volcan de Irazu, Caché and Santa Clara.

**ANAULACOMERA** Stål.

1873. *Anaulacomera* Stål, Öfv. Kongl. Vet.-Akad. Förhandl., XXX No. 4, pp. 41, 43.

Included *submaculata*, *nodulosa* and *opacifolia* Stål, of which the first may be considered the type.

*Anaulacomera digitata* n. sp.

Type: ♀; San José, Costa Rica, 1,160 meters. At electric light. July, 1904. (P. Biolley; No. 44.) [A. N. S. Phila.]

Allied to *A. furcata* Brunner, but differing in the sulcate fastigium, the undivided superior ramus of the radial vein, the absence of a distinct angle on the dorsal margin of the ovipositor and the broader tegmina.

Size rather small; form moderately elongate. Head with the fastigium narrow, the apex rounded and constricted proximad, moderately but distinctly sulcate, the expanded proximal section with the margins elevated, the lateral ridges being lost on the constriction; facial fastigium touching the fastigium of the vertex; eyes subglobose, quite prominent; antennæ reaching to the tips of the wings, proximal joint large, equal to the space between the basal joints, flattened. Prono-

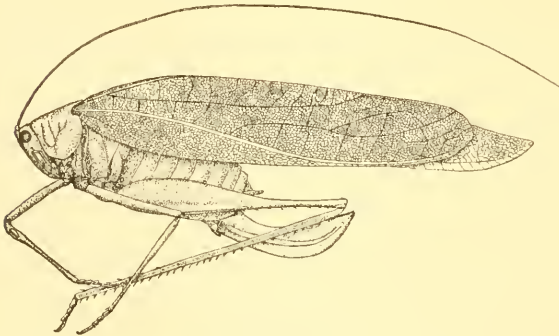


Fig. 6. *Anaulacomera digitata* n. sp. Lateral view of type. (× 2.)



Fig. 7. *Anaulacomera digitata* n. sp. Dorsal view of head. (× 3.)

tum deplanate dorsad; cephalic margin truncate-emarginate, caudal margin flattened arcuate, lateral angles narrowly rounded; lateral lobes about as long as deep, caudal margin with the sinus rather broad and deep, the margin arcuate from this to a point on the ventral section which is obtuse-angulate, the cephalic margin being arcuato-emarginate and the ventro-cephalic margin oblique. Mesosternum with the lobes subtrigonal, each longer than broad. Metasternum with the lobes rotundate, the medio-lateral section of their curve being flattened. Tegmina about half again as long as the caudal femora, extremely elongate-elliptical in outline, nearly four and a half times as long as broad, the width except proximad and distad being subequal, costal margin very gently arcuate, apex evenly rounded; radial vein with the two branches not distinctly subdivided, the division of the vein being

near the distal third of the tegmen; anterior ulnar vein reaching the sutural margin a short distance distad of the furcation of the radial vein. Wings extending beyond the closed tegmina, a distance about equal to the length of the pronotum. Ovipositor about twice the length of the pronotum, saber-like in form, the greatest width slightly less than a third the length and in the distal half, apex acute, dorsal margin straight with a slight proximal curve, ventral margin almost straight in the proximal half, strongly arcuate in the distal half, margins of the distal half crenulato-dentate; subgenital plate very deeply and triangularly emarginate, the base of the emargination rounded, lateral processes of the plate produced slender and digitiform. Cephalic tibiae moderately rounded and unarmed dorsad. Caudal femur reaching to the apex of the ovipositor, slender in the distal half.

General color apple green, the head and thorax soiled olive-yellow; abdomen pale orange-buff; sutural margins of the tegmina Naples yellow; margins of the tip of the ovipositor vandyke brown; eyes Mars brown.

#### Measurements.

Length of body, . . . . .	16	mm.
Length of pronotum, . . . . .	4.5	"
Length of tegmen, . . . . .	27.5	"
Breadth of tegmen, . . . . .	6.2	"
Length of caudal femur, . . . . .	15.8	"
Length of ovipositor, . . . . .	9	"

The specific name refers to the appendages of the subgenital plate.

In addition to the type, a badly damaged male individual from Esparta (altitude 50 meters; no. 45; P. Biolley) is referred with some doubt to this species. The tegmina are somewhat slenderer than in the type, but the venation is similar, while the head and pronotum, as well as the sternal lobes, are identical. Subgenital plate and supra-anal plate are as in *A. lanceolata* Brunner, the cerci however differ in being without a basal lobule and having a spiral twist instead of being straight and lanceolate.

#### *Anaulacomera laticauda* Brunner.

1878. *A[naulacomera] laticauda* Brunner, Monogr. der Phaneropt., p. 292. [Mexico; Orizaba; St. Jean, Colombia.]

Tucurrique, Costa Rica. (Schild and Burgdorf.) [U. S. N. M.]  
One male.

San Carlos, Costa Rica. (Schild and Burgdorf.) [U. S. N. M.]  
One female.

The male individual has the sutural margin of the tegmina narrowly areolate with blackish-brown. This is the first Costa Rican record for the species, which ranges from Orizaba to Colombia.

*Anaulacomera denticauda* Saussure and Pictet.

1898. *Anaulacomera denticauda* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 345, Pl. XVI, figs. 15 and 16. [Temax, North Yucatan, Mexico.]

Piedras Negras, Costa Rica. (Schild and Burgdorf.) [U. S. N. M.]  
One male.

This specimen agrees fully with the description of the species, which was hitherto known only from the type.

#### TURPILIA Stål.

*Turpilia oblongooculata* Brunner.

1878. *Turpilia oblongooculata* Brunner, Monogr. der Phaneropt., p. 326. [Oaxaca, Mexico; Guatemala.]

Esparta, 50 meters. February, 1905. (P. Biolley; No. 45.) [A. N. S. Phila.] One female.

This species has been recorded from Costa Rica, without definite locality, by Saussure and Pictet.

*Turpilia linearis* n. sp.

Type: ♂; Carrillo, Costa Rica. Hebard Collection.

Allied to *T. mexicana* Brunner, but differing in the deplanate dorsum of the pronotum, the narrower tegmina and the slightly longer caudal femora. As *mexicana* was based on the female sex, the comparisons are not as full as could be desired.

Size medium; form very elongate. Head with the occiput very slightly rounded; fastigium declivent, strongly compressed, proximal section narrowly sulcate, distal portion without sulcus; fastigium of the face touching the fastigium of the vertex; eyes subglobose, quite prominent; antennæ when laid back exceeding the tips of the closed wings by more than the length of the body, proximal joint not depressed. Pronotum decidedly deplanate dorsad, cephalic margin very slightly arcuato-emarginate, caudal margin arcuate, lateral angles moderately rounded cephalad, sharp caudad; lateral lobes deeper than long, sinus on the caudal margin shallow, remainder of the caudal margin and the ventral margin arcuate, cephalic margin very slightly emarginate. Mesosternal lobes transverse, angles rectangular, not produced; metasternal lobes rounded and with a narrow median fissure. Tegmina very slender, about twice the length of the body, the greatest width contained five and a half times in the length; costal mar-



gin slightly arcuate proximad, straight distad, sutural margin straight with a slight arcuation proximad, apex rounded with the costal section more arcuate than the sutural; mediastine vein very short, median vein issuing slightly proximad of the middle of the tegmen, bifurcate. Wings extending beyond the tegmina a distance slightly greater than the length of the pronotum; sutural margin straight, costal margin arcuate. Supra-anal plate not exceeding the preceding abdominal segment in length, transverse, margin truncate; cerci rather thick, blunt, with a strong curve mesad; subgenital plate longitudinal, with a U-shaped median emargination, styles as long as the processes of

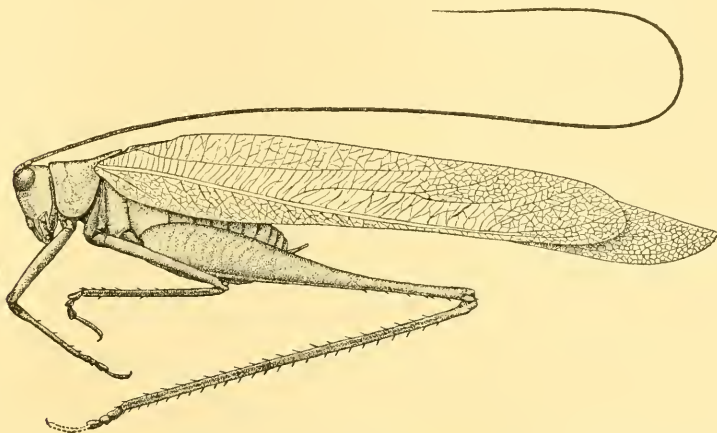


Fig. 8. *Turpilia linearis* n. sp. Lateral view of type. ( $\times 2$ .)

the plate surrounding the median emargination and on which they are placed. Cephalic tibiae with the dorsal face unarmed, the cephalic ventral margin with several spines. Median tibiae with several spines on the dorsal face. Caudal femora slightly more than three times the length of the head and pronotum, inflated proximad and regularly decreasing to the slender distal two-fifths; caudal tibiae slightly longer than the femora, the dorsal margins strongly and closely spined, ventral margins with the spines much fewer, smaller and adpressed.



Fig. 9. *Turpilia linearis* n. sp. Dorsal view of head. ( $\times 3$ .)

General color oil green; eyes mars brown; antennae suffused with blackish; sutural margins of the tegmina and weakly on the wings marked with brownish-black, the areas between nervures alone being colored.

*Measurements.*

Length of body, . . . . .	16.5 mm.
Length of pronotum, . . . . .	4.5 "
Length of tegmen, . . . . .	33.5 "
Greatest breadth of tegmen, . . . . .	6 "
Length of exposed portion of wing beyond tegmen, . . . . .	6.5 "
Length of caudal femur, . . . . .	22 "

The type is the only specimen of the species seen.

**MICROCENTRUM** Scudder.

**Microcentrum syntecnoides** Rehn.

1903. *Microcentrum syntecnoides* Rehn, Trans. Amer. Ent. Soc., XXIX, p. 23. [Cuernavaca, Morelos, Mexico.]

San José, altitude 1,160 meters. July, 1904. (At electric light.) (P. Biolley; No. 41.) [A. N. S. Phila.] One male.

This individual is inseparable from the type, and is separated from *M. lanceolatum* by the slenderer tegmina and caudal limbs.

**SYNTECHNA** Brunner.

1878. *Syntechna* Brunner, Monogr. d. Phaneropt., p. 30, 347.

Included *olivaceo-viridis* Brunner and *tarasca* (Saussure), of which the first may be considered the type.

**Syntechna caudelli** Rehn.

1901. *Syntechna caudelli* Rehn, Trans. Amer. Ent. Soc., XXVII, p. 224. [Orizaba, Vera Cruz, Mexico.]

San José. September and October, 1902. (C. F. Underwood.) [A. N. S. Phila.] Two females.

Tarbaca. October and December, 1902. (C. F. Underwood.) [A. N. S. Phila.] One male, one female.

Escazu. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

Not separable from the type specimen. Apparently separated from *tarasca* by the form of the lateral lobes of the pronotum and the tegmina.

**LICHENOCHRUS** Karsch.

1890. *Lichenochrus* Karsch, Entom. Nachr., XVI, p. 268.

Type.—*L. crassipes* Karsch.

**Lichenochrus marmoratus** n. sp.

Type: ♀; Carrillo, Costa Rica. (Hebard Collection.)

Allied to *L. modestus* Brunner and *brevistylus* Saussure and Pietet, but differing from the former in the marmorate tegmina, the number

of spines on the median femora and the larger size, and from *brevistylus* in the form of the lateral lobes of the pronotum, the number of femoral spines and the curved ovipositor.

Size medium; form robust. Head with the occiput arched; fastigium declivent, slightly produced, acuminate, the margins elevated and the apex an acute horizontally directed process; facial fastigium touching the fastigium of the vertex; eyes subovate, the greatest length dorso-ventral, very prominent when viewed from the dorsum; antennæ with the proximal joint large, cylindrical, margins of the insertion of the antennæ placed close together, the facial fastigium being narrow, joints of the antennæ slightly nodose distad. Pronotum saddle-shaped, depressed mesad, elevated cephalad and caudad; cephalic margin arcuato-truncate, elevated mesad at an angle of about 45°; caudal section slightly elevated into a rather flattened transverse structure with the surface lineato-rugose and the outline strongly constricted cephalad with the cephalic angles rounded, caudal margin subtruncate; dorsal section between the first and second transverse sulci with a pair of erect rather blunt diverging processes which form part of the rather broken lateral margins of the dorsal surface; lateral lobes nearly quadrate, the margins nearly straight, transverse sulci distinct and carried well down on the lobes. Mesosternal lobes with a pair of lateral erect trigonal processes. Tegmina about two and a half times the length of the head and pronotum, lanceolate, the greatest width contained four times in the length; costal margin straight except for a strong proximal arcuation, sutural margin evenly arcuate, apex rather blunt, rounded; costal field with the mediastine vein short and soon lost in the general caudo-ventral trend of the veins, median vein issuing slightly distad of the middle of the tegmen, bifurcate, the principal branch reaching the sutural margin near the apex, ulnar vein with one ramus, anal vein with a ramus on the dorsal field. Ovipositor equal to the length of the pronotum and twice the length of the head, acuminate, the proximal half straight and subequal, the distal pronotum moderately bent arcuate and tapering, with the dorsal margin nearly straight distad of the curve, apex acute, ventral margin of the apex serrulate; subgenital plate transverse, the margin with a deep brace-shaped emargination, the lateral processes acute. Cephalic femora slightly more than twice the length of the head, the distal portion with a very slight curve, genicular lobes acute, dorsal margins unarmed, cephalo-ventral margin with four dentate lobes; cephalic tibiæ slightly shorter than the femora, dorsal margins each with three trigonal lobes, ventral margins with five to six spines; terminal joint of the cephalic

tarsi slightly shorter than the remaining joints together. Median limbs about equal to the cephalic in size; femora shaped in the cephalic limbs but with three instead of four lobes; tibiae with three lobes on each of the dorsal margins and six to seven spines on the ventral margins. Caudal limbs missing.

General color tawny-olive. Head marked around the eyes, fastigium,

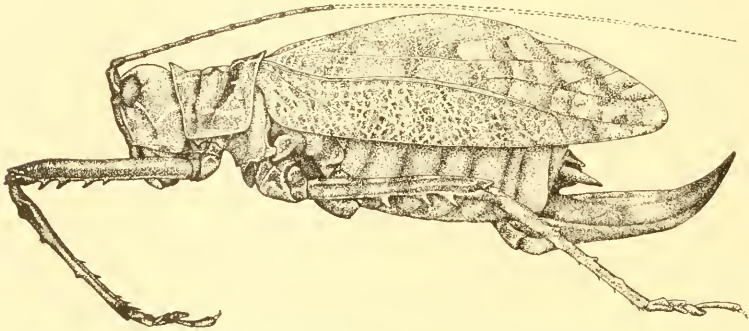


Fig. 10. *Lichenochrus marmoratus* n. sp. Lateral view of type. ( $\times 2$ .)

lateral ridges and clypeus and irregular annulations of the antennae, bister; lateral ridges and cephalic face of mandibles also indian yellow; eyes walnut brown. Pronotum washed on the lateral ridges with, and small scattered patches of color on the ventral portion of the lateral

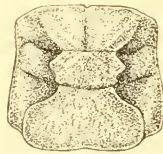


Fig. 11. *Lichenochrus marmoratus* n. sp. Dorsal view of pronotum. ( $\times 3$ .)

lobes, indian yellow; the first transverse sulcus on the dorsal section of the lateral lobes are slightly washed with blackish-brown, the second sulcus is bordered caudad through two-thirds the depth of the lobes by a broad blotch of the same color; caudal section of the dorsal face faintly washed with apple green. Tegmina marbled and blotched with several colors: mummy brown, chrome yellow and apple green, the brown being solid in subquadrate blotches, the yellow faint and only suffusing some veins, the green weak and filling quadrate blotches as well as being irregularly distributed. Ovipositor with the distal half blackish-brown. Limbs irregularly mottled and annulate with vandyke

brown and very weak greenish, the femoral lobes being touched with blackish-brown.

*Measurements.*

Length of body, . . . . .	30.5 mm.
Length of pronotum, . . . . .	6.2 "
Length of tegmen, . . . . .	37 "
Greatest width of tegmen, . . . . .	9 "
Length of ovipositor, . . . . .	14.2 "

The type is unique.

**GONGROCNEMIS** Brunner.

1895. *Gongrocnemis* Brunner, Monogr. der Pseudophyll., p. 18, 163.

Included thirteen species, of which the only species figured, *pallidespinosa*, may be selected as the type.

**Gongrocnemis nigrospinosa** Brunner.

1895. *Gongrocnemis nigrospinosa* Brunner, Monogr. der Pseudophyll., p. 167. [Mexico.]

Surubres river, by San Mateo, altitude 250 meters. February, 1905. (P. Biolley; No. 49.) [A. N. S. Phila.] One female.

This specimen has the number of femoral spines slightly different from the formulæ given in the original description and the cephalic tibæ have the fuscous annuli incomplete.

**DREPANOXIPHUS** Brunner.

1895. *Drepanoxiphus* Brunner, Monogr. der Pseudophyll., p. 18, 173.

Type.—*D. minutus* Brunner.

**Drepanoxiphus minutus** Brunner?

1895. *Drepanoxiphus minutus* Brunner, Monogr. der Pseudophyll., p. 174. [Chiriqui.]

Carrillo. [Hebard Collection.] One female.

San José. (Schild and Burgdorf.) [U. S. N. M.] One female.

These specimens are referred to this species with some doubt, as the cephalic femora of the San José specimen measure nearly eight millimeters in length, instead of five and a half as given in the original description. These parts are missing in the Carrillo individual. The latter has the tegmina and wings shorter than the San José representative, the limbs are distinctly annulate and the size is slightly less. The wings are infusate in both specimens.

**COCCONOTUS** Stål.

1873. *Cocconotus* Stål, Öfver. Kongl. Vetensk.-Akad. Förhandl., XXX, No. 4, p. 46.

Type.—*Meroncidium degeeri* Stål.



**Cocconotus degeeri** (Stål).

1860. *Meroncidium De Geeri* Stål, Kongl. Svenska Fregat. Eugenies Resa, Zool. I, Ins., p. 322. [St. Joseph Island, Bay of Panama.]

Surubres river at San Mateo, altitude 250 meters. February, 1905. (P. Biolley; No. 50.) [A. N. S. Phila.] One male, one female.

Pirrus. (C. F. Underwood.) [A. N. S. Phila.] One male.

These specimens have the faces solid black without evident stripes, and the costal region of the tegmina is more or less strongly washed with pale greenish. The departure from the typical form in the coloring of the face has already been noticed by Griffini.<sup>15</sup>

Specimens of this species have been recorded from Matachin, Panama, Rio Cianati; lagoon of Pita and Punta de Sabana, Darien, and Volcan de Chiriqui.

**Cocconotus ravus** n. sp.

Types: ♂ and ♀; San José, Costa Rica. September, 1902. (C. F. Underwood.) [A. N. S. Phila.]

Allied to *C. castus* Brunner, from Mexico, but differing in the larger size, the shape of the emargination of the male anal segment, and the shape of the supra-anal and subgenital plates. It can be separated from *C. ignobilis* Brunner, a near ally, by the shape of the anal segment, the supra-anal plate and the undilated styles.

Size medium; form moderately robust. Head transversely rounded, strongly declivent toward the fastigium; fastigium short, acuminate, narrow, horizontal, sulcate proximad with the lateral margins elevated into rather low rounded processes, apex acute, compressed, about reaching to the margins of the antennal scrobes; facial fastigium contiguous with the fastigium of the vertex; eyes short ovoid, the point directed ventrad, prominent; antennæ contained two (♂) to two and a half times (♀) in the length of the body. Pronotum scabrose, slightly flattened dorsad; cephalic margin arcuate, caudal margin truncate-arcuate, no lateral angles marked except faintly on the "shoulders," two transverse sulci distinctly marked, the caudal more distinct than the cephalic; lateral lobes distinctly longer than deep, the ventral margin nearly straight, the angles subrectangulate, caudal transverse sulcus extending to the ventral margin in a ventro-cephalic direction, a supplementary sulcus being present caudad of this and extending ventro-caudad to the angle. Tegmina very slightly exceeding the body in length elongate lanceolate, the greatest width being contained about four and a half times in the length; costal and sutural margins very slightly arcuate, the apex rather narrowly rounded; mediastine vein

<sup>15</sup> Bollett. Mus. Zool. ed Anat. Comp. Torino, X, No. 232, p. 21.

very short and lost in the general vein structure of the costal field, the trend of the principal veins of which is ventro-caudal; median vein diverging before the distal third of the tegmen and reaching the apical margin; ulnar vein rather irregular and indirect in its course. Male with the last abdominal segment transverse, margin subtruncate

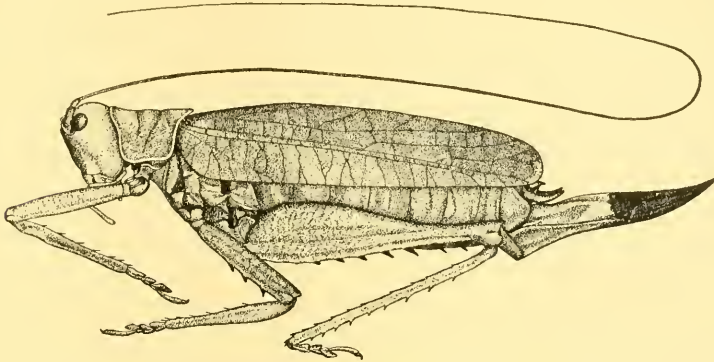


Fig. 12. *Cocconotus rarus* n. sp. Lateral view of female type. ( $\times 2$ .)

with a strong incurved hook present on each side; supra-anal plate subquadrate excavated mesad, caudal margin with a broad median and two slender lateral acute processes; cerci short, thick, blunt, recurved, the internal margin of the apex with a strong claw-like tooth; subgenital plate longitudinal, produced, the apical margin with a V-shaped emargination, styles slightly longer than the plate, depressed, subequal, tips rather blunt. Ovipositor about two and a half times the length of the pronotum, slightly sinuate, the tip with a slight dorsal elevation, the proximal half subequal, the distal half tapering to the very acute apex, ventral margin slightly arcuate, dorsal margin except for the proximal third and a short space near the apex dentato-serrate, ventral margin feebly serrate near the apex; subgenital plate trigonal with a narrow V-shaped median emargination. Cephalic femora about equal to the head and pronotum in length, the ventro-cephalic margin with four heavy dentiform spines distad; cephalic tibiae very slightly longer than the femora, unarmed dorsad; each ventral margin armed with seven spines; tarsi with the third joint very broad, the entire length nearly two-thirds that of the tarsi. Me-

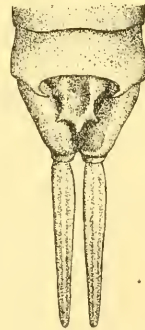


Fig. 13. *Cocconotus rarus* n. sp. Dorsal view of apex of male abdomen. Type. ( $\times 3$ .)

dian femora slightly larger than the cephalic and similarly armed; tibiæ similar in armament to the cephalic. Caudal femora reaching nearly to the apex of the abdomen, the proximal portion (two-thirds) considerably inflated and tapering to the slender distal fourth, genicular lobes rounded, ventro-lateral margins with eight to ten spines ranging from a mere tubercle proximad to large dentiform structures distad; tibiæ about equal to the femora in length, all margins regularly spined, those of the dorsal margins closer together and more numerous than on the ventral face.

General color russet, the limbs and venter more wood brown and fawn color. Principal thoracic sutures, coxæ, all femoral spines, lateral and median areas of the subgenital plate of the male and the distal half of the ovipositor marked with blackish. Tegmina with a weak suffusion of apple green. Tympanum of the male blackish.

*Measurements.*

	♂	♀
Length of body, . . . . .	34.5 mm.	40 mm.
Length of pronotum, . . . . .	7 "	7.8 "
Length of tegmen, . . . . .	26.3 "	31.2 "
Length of caudal femur. . . . .	18.5 "	21.5 "
Length of ovipositor, . . . . .		19 "

A series of seventeen specimens, five males, twelve females, of this species have been examined. The localities represented are: San José, September, 1902, three males, six females; Monte Redondo, January, 1903, one male; Tarbaca, October and November, 1902, one male, three females; Cizahar de Cartago, October, 1902, one female; Tablazo, November, 1902, one female; Guatel, August, 1902, one female.

This series exhibits considerable variation in size and a slight amount in color, but in this regard chiefly in the strength of the greenish suffusion of the tegmina. In a few specimens the tegmina are somewhat tessellated by the infuscation of veins, but usually this is not pronounced. The pronotum is in several specimens rather dark, while the cingulate margin is light colored, producing a decided contrast. The most striking variation, however, is in size, one male and several females being considerably smaller than the types of their respective sexes.

**CECENTROMENUS** Brunner.

1895. *Cecentromenus* Brunner, Monogr. der Pseudophyll., pp. 20, 220.

Type.—*C. marmoratus* Brunner.

**Cecentromenus marmoratus** Brunner.

1895. *Cecentromenus marmoratus* Brunner, Monogr. der Pseudophyll., p. 221, taf. VIII, fig. 97. [Chiriqui.]

Carrillo. [Hebard Collection.] One female.

This individual agrees very well with the original description and figure except that the caudal femora are shorter, forty-two instead of fifty millimeters in length.

This species has definitely been recorded from the Volcan de Chiriqui by Saussure and Pictet.

**EUACRIS** Saussure and Pictet.

1898. *Euacris* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 440.

Type.—*E. pictipennis* Saussure and Zehntner.

**Euacris richmondi** Rehn.

1903. *Euacris richmondi* Rehn, Trans. Amer. Ent. Soc., XXIX, p. 30. [Escondido river, fifty miles from Bluefields, Nicaragua.]

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] One male.

This specimen appears to fully represent *richmondi*, the type of which is not available for examination, but is slightly larger than the original measurements.

The typical species, *pictipennis*, was described from Volcan de Irazu, Costa Rica, at an elevation of 7,000 feet.

**SCOPIORUS** Stål.

1873. *Scopiorus* Stål, Öfv. Kongl. Vetén.-Akad. Förhandl., XXX, No. 4, pp. 45, 48.

Type.—*S. sutorius* Stål.

**Scopiorus mucronatus** Saussure and Pictet.

1898. *Scopiorus mucronatus* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 443, tab. XXI, fig. 15. [Azahar de Cartago, Costa Rica.]

Tarbaca. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] Male and female.

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] One female.

San José. (Schild and Burgdorf.) [U. S. N. M.] One male.

The annulations of the antennæ are more distinctly marked than one would infer from the original description, particularly in the San Carlos female.

**MIMETICA** Pictet.

1888. *Mimetica* Pictet, Mém. Soc. Phys. et d'Hist. Nat. Genève, XXX, No. 6, p. 30.

Type.—*M. mortuifolia* Pictet.

**Mimetica brunneri** Saussure and Pictet.

1898. *Mimetica brunneri* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 453, tab. XXII, fig. 8. [Las Mercedes, Guatemala; Rio Sucio, Costa Rica; Costa Rica; Bugaba, Volcan de Chiriqui and Tolé, Panama; Chiriqui.]

Tucurrique. (Schild and Burgdorf.) [U. S. N. M.] One male.

This specimen is referred to this species with some doubt as the tegmina are slightly more caudate and the costal emarginations are of a slightly different shape.

**COPIPHORA** Serville.

1831. *Copiphora* Serville, Ann. Sci. Nat., XXII, p. 147.

Type.—*C. longicauda* Serville.

**Copiphora cultricornis** Pictet.

1888. *[Copiophora] cultricornis* Pictet, Mém. Soc. Phys. et d'Hist. Nat. Genève, XXX, No. 6, p. 47, Pl. 2, fig. 23. [Central America.]

Guatel. August, 1902. (C. F. Underwood.) [A. N. S. Phila.] One immature female.

Carrillo. [Hebard Collection.] One male.

The male specimen has the rostrum shorter and deeper than the female. The size is also rather less than the measurements given by Saussure and Zehntner,<sup>16</sup> while the face is suffused with brownish-red.

This species has been definitely recorded from Bugaba and Volcan de Chiriqui, Panama.

**Copiphora rhinoceros** Pictet.

1888. *[Copiophora] rhinoceros* Pictet, Mém. Soc. Phys. et d'Hist. Nat. Genève, XXX, No. 6, p. 48, Pl. 2, fig. 25. [Central America.]

Turrialba. (Schild and Burgdorf.) [U. S. N. M.] One male.

This specimen is about the same size as the male measured by Redtenbacher<sup>17</sup> and agrees fully with his description, except for the presence of but one spine on the dorsal face of the right median tibiae and absence of brownish-black coloring on the terminal tarsal joints. The left median tibiae bears three spines dorsad as mentioned by Redtenbacher.

This species has been recorded from Nicaragua and Volcan de Chiriqui, Panama.

**LIROMETOPUM** Scudder.

1875. *Lirometopum* Scudder, Proc. Bost. Soc. Nat. Hist., XVII, p. 457.

Type.—*L. coronatum* Scudder.

**Lirometopum coronatum** Scudder.

1875. *Lirometopum coronatum* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 458, figs. 1 and 2. [Greytown, New Grenada.<sup>18</sup>]

Tucurrique. (Schild and Burgdorf.) [U. S. N. M.] One male.

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] One male.

<sup>16</sup> *Biol. Cent.-Amer.*, Orth., I, p. 377.

<sup>17</sup> *Verhandl. k.-k. Zool.-bot. Gesell. Wien*, XLI, p. 342, 1891.

<sup>18</sup> Greytown, Nicaragua.



Turrialba. (Schild and Burgdorf.) [U. S. N. M.] Two females.

This extraordinary species varies considerably in size, the specimens here tabulated measuring in the order given: breadth of face 10.5, 12, 11.2, 10; length of pronotum 12.9, 14, 12.1, 11.3; length of tegmina 31, 35.5, 31, 29.5; length of caudal femora 15.8, 18, 17, 14.6.

The previously known records for this species are Greytown, Caché, Costa Rica, and Colombia.

**ERIOIUS** Bolívar.

1888. *Eriolus* Bolívar, Mém. Soc. Zool. France, I, p. 150.

Type.—*E. caraibeus* Bolívar.

***Eriolus spiniger*** Redtenbacher.

1891. *Eriolus spiniger* Redtenbacher, Verhandl. k.-k. Zool.-bot. Gesell. Wien, XLI, p. 349. [Cayenne.]

Tarbaca. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

This specimen presents some points of difference from the description of *spiniger*, and may represent the female of *E. longipennis* Redtenbacher from Costa Rica, known only from the male; but that species is said to have the "meso- et metasternum lobis rotundatis," while the specimen in hand has the lateral margins of the mesosternum elevated and developed into rather blunt flattened spines. On the other hand the fastigium is flattened above, while in *spiniger* this is "superne haud deplanatum," and in *longipennis* "superne planum." The ovipositor is typical of *spiniger*.

This species was previously known only from the type locality.

**PYRGOCORYPHA** Stål.

1873. *Pyrgocorypha* Stål, Öfver. K. Vetén.-Akad. Förhandl., XXX, No. 4, p. 50.

Type.—*Conocephalus subulatus* Thunberg.

***Pyrgocorypha rogersi*** Saussure and Pictet.

1898. *Pyrgocorypha rogersi* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 387, tab. XIX, figs. 13 and 14. [Caché, Costa Rica.]

Escazu. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] One female.]

Tablazo. October, 1902. (C. F. Underwood.) [A. N. S. Phila.] One nymph.

***Pyrgocorypha hamata*** (Seudder).

1879. *Conocephalus hamatus* Scudder, Proc. Boston Soc. Nat. Hist., XX, p. 87. [Guatemala.<sup>19</sup>]

Guatel. (C. F. Underwood.) [A. N. S. Phila.] One male, one female.

<sup>19</sup> Saussure and Pictet (*Biol. Cent.-Amer.*, Orth., I, p. 387) consider this locality probably an error for Costa Rica.

San José, altitude 1,160 meters. September, 1904. [Nos. 53 and 55.] (P. Biolley.) Two males, two females.

These specimens are somewhat larger than individuals from Cuernavaca, Morelos, Mexico.

This species has also been recorded from Cuernavaca, Morelos and Michoacan, Mexico, and Salvador.

**CONOCEPHALUS** Thunberg.

***Conocephalus guttatus*** Serville.

1839. *Conocephalus guttatus* Serville, Orthoptères, p. 518. [Cuba.]

Guatel. (C. F. Underwood.) [A. N. S. Phila.] Three males, six females, one nymph.

Carrillo. [Hebard Collection.] One female.

Tucurrique. (Schild and Burgdorf.) [U. S. N. M.] One male.

Pozo Azul de Pirris. June, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

Surubres river at San Mateo, altitude 250 meters. February, 1905. (P. Biolley; Nos. 51 and 52.) [A. N. S. Phila.] Two females.

Some of the specimens here listed differ considerably from others in the form of the fastigium, the subeonic typical form with the rounded apex being connected with one with a more rounded, inflated type with parallel sides. Both color phases are represented in the series, which also exhibits considerable variation in size.

***Conocephalus muticus*** Redtenbacher.

1891. *Conocephalus muticus* Redtenbacher, Verhandl. k.-k. Zool.-bot. Gesell. Wien, XLI, p. 393. [Cuba; St. Vincent, Lesser Antilles.]

Carrillo. [Hebard Collection.] One female.

This form appears rather questionably distinct from *guttatus*. It has been previously recorded from Punta de Sabana, Darien.

***Conocephalus mexicanus*** Saussure.

1859. *Conocephalus mexicanus* Saussure, Revue et Magasin de Zoologie, 2e ser., XI, p. 208. [Mexico.]

Tarbaca. October, 1902. (C. F. Underwood.) [A. N. S. Phila.] One female.

Escazu. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] One female.

San José. September, 1902. (C. F. Underwood.) [A. N. S. Phila.] Four females.

This species had previously been recorded from Caché, Costa Rica.

***Conocephalus obscurellus*** Redtenbacher.

Tarbaca. October, 1902. (C. F. Underwood.) [A. N. S. Phila.] One male.

***Conocephalus diversus* n. sp.**

Type: ♀; Guatel, Costa Rica. August, 1902. (C. F. Underwood.)  
[A. N. S. Phila.]

Allied to *C. laticeps* Redtenbacher, but differing in the very much shorter tegmina and ovipositor, the shorter caudal femora and the reduction of the number of femoral spines.

Size rather small; form aborted, thick-set, robust, limbs rather short;

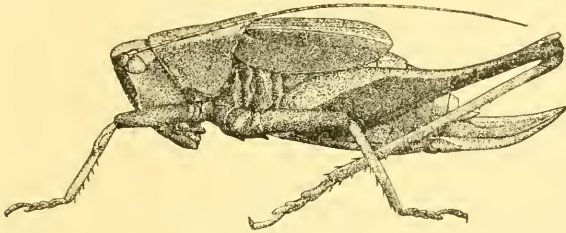


Fig. 14. *Conocephalus diversus* n. sp. Lateral view of type. (× 2.)

surface rugose. Head with the face distinctly but not strongly flattened; occiput transversely arched, slightly elevated to very broad fastigium, which is as broad as the exposed portion of the head, with the cephalic margin regularly arcuate, ventral point placed against the facial fastigium; eyes subtrigonal in basal outline, hardly prominent; antennæ nearly reaching to the tip of the ovipositor. Pronotum moderately flattened dorsad, cephalic and caudal margins arcuate, lateral angles only moderately distinct caudad, rounded cephalad, a subobsolete, broken median carina present on the caudal section of the dorsum; lateral lobes of the pronotum longer than deep, the caudal sinus very slight, ventro-cephalic and ventro-caudal angles obtuse, the former much broader than the latter. Tegmina equal to the head and pronotum in length, greatest breadth much more than half the length; costal and sutural margins broadly arcuate; apex rounded dorsad, obliquely truncate ventrad; dorsal field of the tegmen distinctly broader than the lateral; humeral, discoidal and anal veins apparent, others fused in an irregular network of nervures. Wings minute, not functional, hidden under the tegmina. Abdomen somewhat compressed, slightly carinate dorsad; ovipositor slightly shorter than the head and pronotum together, rather thick,



Fig. 15. *Conocephalus diversus* n. sp. Dorsal view of head, pronotum and tegmina. (× 3.)

the dorsal margin straight, ventral margin arcuate, apex acute, proximal half subequal, margins entire; subgenital plate subtrigonal, apex very shallowly emarginate. Cephalic and median limbs short, rather weak. Caudal femora slightly shorter than the length of the body, the proximal half strongly inflated tapering to the slender subequal distal third, ventral margins with three spines at the distal third; tibiae somewhat shorter than the femora, dorsal margins with numerous spines, ventral margins with several on the distal section.

General color vandyke brown, washed and sprinkled with bister and black. Head with the face solid black margined laterad with a narrow ochre line, antennae annulate with black. Pronotum with a pair of broken longitudinal blackish lines on the disk, the caudal margin alternately black and ochre, and the lateral lobes suffused with bister. Tegmina with the lateral fields blackish-brown. Abdomen with the dorsum ochre yellow sprinkled with brown, venter and lateral aspects dark brown. Ovipositor hazel. Cephalic and median femora bister, the tibiae ranging from russet to ferruginous. Caudal femora with the sections ventrad of the medio-lateral line blackish, dorsad of this line mingled prout's brown and wood brown; caudal tibiae and tarsi bister.

Measurements.

Length of body, . . . . .	20	mm.
Length of pronotum, . . . . .	8	"
Length of tegmen, . . . . .	10	"
Length of caudal femur, . . . . .	19.2	"
Length of ovipositor, . . . . .	9.3	"

The type is the only specimen of this striking and distinct species seen.

XIPHIDION Serville.

1831. *Xiphidion* Serville, Ann. Sci. Nat., XXII, p. 159.

Included *X. fuscum* (Fabricius) and *fasciatum* (De Geer), of which the former, *fuscum*, can be considered the type.

*Xiphidion fasciatum* (De Geer).

1773. *Locusta fasciata* De Geer, Mém. d'Hist. Ins., III, p. 458, Pl. 40, fig. 4. [Pennsylvania.]

San José, altitude 1,160 meters. June, 1904. (P. Biolley; Nos. 47 and 48.) [A. N. S. Phila.] Two females.

Guatel. (C. F. Underwood.) [A. N. S. Phila.] One male.

This species has been recorded from Caché, Costa Rica, and Punta de Sabana, Darien, Panama.

**PHLUGIS** Stål.

1860. *Phlugis* Stål, Kongl. Svenska Fregat. Eugenies Resa, Zool. I, Ins., p. 324.

Type.—*Locusta teres* De Geer.

1874. *Thysdrus* Stål, Recens. Orth., II, pp. 102, 116.

1903. *Alogopteron* Rehn, Ent. News, XIV, p. 141.

**Phlugis virens** (Thunberg).

1815. [*Onocephalus*] *virens* Thunberg, Mém. l'Acad. Imp. Sci. St. Pétersb., V, p. 274.

1903. *Alogopteron carribbeum* Rehn, Ent. News, XIV, p. 141. [Turrialba, Costa Rica.]

San José, altitude 1,160 meters. June, 1904. (P. Biolley; No. 46.)  
Two females.

Guatel. (C. F. Underwood.) One female.

These specimens are inseparable from the type of *A. carribbeum*.

**GRYLLACRIS** Serville.

1831. *Gryllaeris* Serville, Ann. Sci. Nat., XXII, p. 138.

Included *gryllacris maculicollis* (Stoll), *G. ruficeps* and *personata* Serville, of which *maculicollis* can be considered the type.

**Gryllacris maculata** Brunner.

1888. *Gryllaeris maculata* Brunner, Verhandl. k.-k. Zool.-bot. Gesell. Wien, XXXVIII, p. 364. [Chiriqui, Panama; Costa Rica.]

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Male and female.

The femora of these individuals are suffused distad with carmine.

**ANABROPSIS** Rehn.

1859. *Schanobates* Saussure, Revue et Magasin de Zoologie, 2e ser., XI, p. 209. (Not of Blackwall, 1850.)

Type.—*S. mexicanus* Saussure.

1901. *Anabropsis* Rehn, Canad. Ent., XXXIII, p. 272. " "

**Anabropsis marmorata** n. sp.

Type: ♀; Carrillo, Costa Rica. [Hebard Collection.]

Allied to *A. mexicana* (Saussure), but differing in the fully developed tegmina and wings, the rotundate caudal margin of the pronotum, the more rotundate ventral margin of the lateral lobes and the different coloration. The new form appears to be closely related to *A. alata* (Brunner),<sup>20</sup> which was very poorly described and based on a mutilated specimen, but which appears to differ in the roundly inserted lateral lobes of the pronotum.

Size rather large; form moderately robust. Head with the occiput

<sup>20</sup> Verhandl. k.-k. Zool.-bot. Gesell. Wien, XXXVIII, p. 274. [Ecuador.]



arched and bearing a narrow longitudinal median carina extending down to the base of the fastigium; fastigium compressed, depressed with the outline arcuate, constricted proximad, bearing a very shallow longitudinal median sulcus, and carrying the paired ocelli on its lateral faces; facial fastigium touching the fastigium of the vertex; eyes reniform in basal outline, the greatest diameter dorso-ventral and nearly twice the greatest width, quite prominent when viewed from the dorsum; mouth-parts produced ventrad, in depth equal to the remainder of the head, maxillar palpi with the distal joint elongate, slender, with the apex slightly expanded into a crudely trumpet-shaped structure, penultimate joint strongly compressed; antennæ apparently exceeding the tips of the tegmina when in perfect condition, insertion of the antennæ broad and occupying all the section between the facial fastigium and the eyes. Pronotum faintly saddle-shaped, dorsum arched except for a semicircular caudal section which is deplanate; cephalic margin sinuato-truncate, caudal margin gently arcuate, lateral angles obsolete cephalad, distinct, but not sharp, caudad, and diverted ventro-cephalic on the lobes caudad of the last transverse sulcus; distinct transverse sulci two in number, the cephalic situated immediately caudad of the cephalic margin, and the caudal situated in its usual place laterad, but on the dorsum extending caudad and crudely following the outline of the caudal margin; lateral lobes longer than deep, the ventral margin evenly arcuate, cephalic margin very slightly arcuate with the ventro-cephalic angle obtuse, caudal margin arcuato-emarginate, the ventro-caudal angle subrectangulate, surface depressed along the line of the sulci and on the ventro-caudal section, the deflected angle being roundly arched. Prosternum unarmed; mesosternum with a pair of erect blunt spines; metasternum with a pair of broad flat trigonal diverging spines. Tegmina long, nearly reaching to the tips of the caudal femora, greatest width contained about three times in the length (apexes damaged); costal margin arcuate proximad; mediastine vein straight, humeral vein with three rami, discoidal with two rami, median with two, the dorsal of which again divides, ulnar vein undivided. Wings equal to the tegmina in length. Ovipositor slightly longer than the pronotum, regularly arched and falciform, apex acute, margins unarmed; subgenital plate produced mesad into an elongate sagittate process with needle-like apex, and a deep median sulcus through the greater part of its length. Cephalic femora equal to the head and pronotum in length, ventro-cephalic margin with three small spines, ventro-caudal margin unarmed; cephalic tibiae about equal to the femora in length, armed with long slender spines, four apical, one

mesad on the dorso-cephalic margin, four on each ventral margin; cephalic tarsi with the distal joint very slightly shorter than the remaining joints. Median femora slightly longer than the cephalic, compressed as in them, with two slight spines on the ventro-cephalic margin; median tibiae slightly longer than the cephalic tibiae, armed

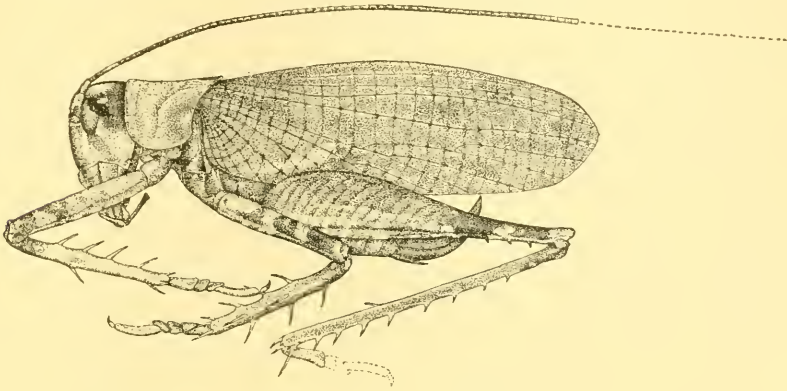


Fig. 16. *Anabropsis marmorata* n. sp. Lateral view of type. ( $\times 2$ .)

distad and on the ventral margins the same, but bearing dorsad two spines on the cephalic and three spines on the caudal margin; median tarsi similar to the cephalic. Caudal femora elongate, about three-fourths the length of the body, moderately inflated proximad, external pagina strongly marked with an overlapping lamellate pattern, the ridges being ventro-cephalic in direction, genicular lobes rounded, ventral margins each with three to four short spines; caudal femora about equal to the femora in length, trigonal in section, armed with eight or nine spines on the dorsal margins, ventral margin armed with several distad.

General colors bister and cream-buff, the two colors mingled and marbled on the head, to a slight extent on the tegmina and the limbs annulate and dotted with the same. Head with the eyes walnut brown, a broad poorly defined postocular bar of seal brown present, extending toward mesad on the caudal section of the head, uniting and suffusing that portion; fastigium and median carina colored with the darker shade; antennae obscurely annulate. Pronotum clear walnut brown

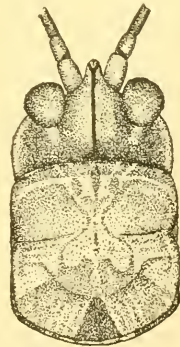


Fig. 17. *Anabropsis marmorata* n. sp. Dorsal view of head and pronotum. ( $\times 3$ .)

with a very fine but irregular pattern of lines and blotches of vandyke brown covering the surface, a distinct median hour-glass shaped figure present on the cephalic portion of the dorsum, and a median caudal spot of velvety black. Tegmina with the darker color predominating, but usually broken up and confined to veins, except an indistinct proximal spot and several distinct but irregular spots on the apical half. Cephalic and median femora distinctly annulate thrice with dark; tibiae light with only one dark annulus. Caudal femora clouded dorsad with vandyke brown, a clear light section along the ventral carina of the pagina, the carina itself proximad alternately light and dark, dark distad with the genicular region except the lobes light and one light pregenicular annulus; caudal tibiae light, dark distad.

*Measurements.*

Length of body, . . . . .	22	mm.
Length of pronotum, . . . . .	6.5	"
Length of tegmen (approximately), . . . . .	26.5	"
Length of caudal femur, . . . . .	21.5	"
Length of ovipositor, . . . . .	9	"

The type is unique.

*Anabropsis costaricensis* n. sp.

Type: ♂; Carrillo, Costa Rica. [Hebard Collection.]

Closely allied to *A. aptera* (Brunner) from Guatemala, but smaller and with distinct subtruncate tegmina half as long as the abdomen present.

Size medium; form rather slender; surface glabrous. Head with the occiput arched, median longitudinal carina extending to the fastigium present; fastigium similar to that of *A. marmorata* but not sulcate; eyes elongate reniform in basal outline, the elongation being ventrad, moderately prominent when viewed from the dorsum; palpi with the terminal joint as *A. marmorata*, but penultimate joint much less compressed and nearly cylindrical; antennae four times the length of the body. Pronotum slightly less than three times the length of the head, dorsum arcuate; cephalic margin truncate, caudal margin regularly arcuate, lateral angles obsolete cephalad, distinct but not acute caudad, extending down along the caudal transverse sulcus on the lateral lobes; median carina present but weak; transverse sulci two in number, cephalic immediately caudad of the cephalic margin, caudal rather poorly defined dorsad and more evident on the lobes where it has a ventro-cephalic trend; lateral lobes with the ventral and caudal margins from the dorso-caudal margin to the ventro-cephalic angle one continuous and regular

arcuation, ventro-cephalic angle rounded rectangular. Prosternum armed with a pair of erect slender spines; mesosternum with a pair of heavier spines but of the same general form; metasternum with the coxal lobes produced into blunt trigonal lobes. Tegmina slightly shorter than the pronotum, about half again as long as broad; distal margin

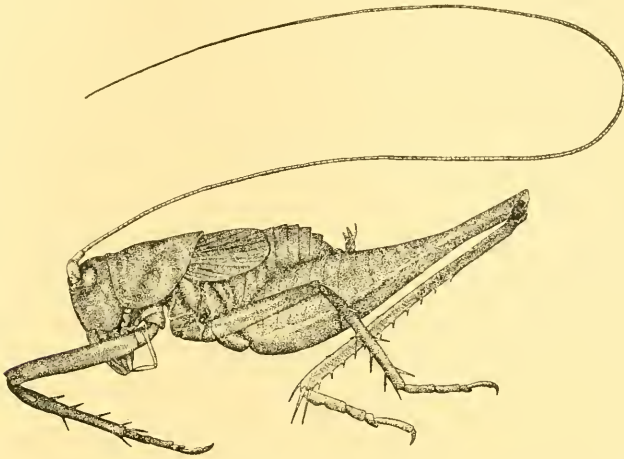


Fig. 18. *Anabropsis costaricensis* n. sp. Lateral view of type. ( $\times 2$ .)

rotundato-truncate; veins moderately distinct. Wings extremely small, completely hidden under the tegmina. Abdomen compressed, carinate dorsad; supra-anal plate distorted and true form not ascertainable; cerci arcuate, moderately long, somewhat compressed, apex acute; anal filaments longer than cerci, tapering; subgenital plate produced, apical margin very shallow and broadly emarginate, styles short, thick, simple, blunt. Cephalic femora slightly longer than the pronotum, unarmed, cephalic tibiae about equal to the femora in length, each dorsal margin armed with one spine mesad and four on each ventral margin; tarsi with the distal joint shorter than the remainder. Median femora of equal length and similar character as the cephalic; median tibiae with two cephalic and three caudal spines on the dorsum and four on each ventral margin; median tarsi with the distal joint shorter than the remainder. Caudal femora slightly longer than the body, strongly inflated proximad and quite slender in the distal

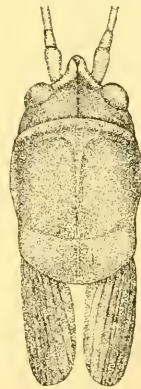


Fig. 19. *Anabropsis costaricensis* n. sp. Dorsal view of head, pronotum and tegmina. ( $\times 3$ .)

third, genicular lobes rounded, the internal spined, internal ventral margin with a few weak spines distad, pagina sculptured as in *A. marmorata* but much weaker; caudal tibiae very slightly longer than the femora, compressed, dorsum armed with eleven to twelve external and eight internal spines, venter with several weak adpressed spines, spurs on the external face shorter than those of the internal; caudal tarsi with the distal and proximal joints subequal.

General color vandyke brown, becoming tawny-olive on the venter, the proximal portions of the femora, the distal section of the caudal tibiae and the tarsi. Antennae, ocelli and mouth-parts tawny-olive.

#### Measurements.

Length of body, . . . . .	19.5 mm.
Length of pronotum, . . . . .	7.1 "
Length of tegmen, . . . . .	6.2 "
Length of caudal femur, . . . . .	20.5 "

The type of this species is the only specimen examined.

### GRYLLIDÆ.

#### GRYLLOTALPA Latreille.

*Gryllotalpa hexadactyla* Perty.

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] Two females.

This species has been recorded from Caché, Costa Rica.

#### SCAPTERISCUS Scudder.

*Scapteriscus didactylus* (Latreille).

1804. *Gryllotalpa didactyla* Latreille, Hist. Nat. Crust. et Ins., XII, p. 122. [Cayenne; Surinam.]

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] One male, one female.

#### RIPIPTERYX Newman.

1834. *Ripipteryx* Newman, Entom. Magazine, II, No. II, p. 204, Pl. VII.

Type.—*R. marginatus* Newman.

*Ripipteryx carbonaria* Saussure.

1896. *Rhipipteryx carbonaria* Saussure, Biol. Cent.-Amer., Orth., I, p. 211. [Volcan de Chiriqui, Panama, 2,000 to 3,000 feet.]

Escazu. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Two females.

Side of Tablazo, altitude 1,500 meters. April, 1905. [No. 37.] (P. Biolley.) Thirteen specimens.



**Ripteryx limbata** (Burmeister).

1838. *X[ya] limbata* Burmeister, Handb. d. Entom., II, Abth. II, Pt. 1, p. 742. [South America.]

San Carlos. (Schild and Burgdorf.) [U. S. N. M.] One female.

Santa Clara, Reventazon river, altitude 150 meters. December, 1904. [No. 39.] (P. Biolley.) One male.

Carrillo. [Hebard Collection.] Three females.

The terminal joints of the antennæ of these specimens are solid black.

This species has been recorded from Chontales, Nicaragua, the only other Central American record.

**Ripteryx biolleyi** Saussure.

1896. *Rhipipteryx biolleyi* Saussure, Biol. Cent.-Amer., Orth., I, p. 215. [San José. Volcan de Irazu, 6,000 to 7,000 feet, Costa Rica.]

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Five males, four females, two imperfect individuals.

San José, altitude 1,160 meters. March, 1905. [No. 38.] (P. Biolley.) Twelve males, seven females.

**Ripteryx pulicaria** Saussure.

1896. *Rhipipteryx pulicaria* Saussure, Biol. Cent.-Amer., Orth., I, p. 215, tab. XI, fig. 24. [Dos Caminos, Guerrero; Atoyac, Vera Cruz; Teapa, Tabasco, Mexico; var. Tarma, Peru.]

Santa Clara, Reventazon river, altitude 150 meters. December, 1904. [No. 140.] (P. Biolley.) One male.

Mouth of the Jesus Maria river, Pacific coast. April, 1905. [No. 141.] (P. Biolley.) One female.

These specimens differ somewhat in coloration from the original specimens described by Saussure, but they are unquestionably this species.

**ANUROGRYLLUS** Saussure.

1877. *Anurogryllus* Saussure, Mélanges Orthoptér., V fasc., p. 451.

Included *A. muticus* (De Geer), *clarazianus* (Sauss.), *australis* Sauss., *antillarum* (Sauss.), *abortivus* (Sauss.), and *brevicaudatus* Sauss., of which *muticus* may be considered the type.

**Anurogryllus muticus** (De Geer).

1773. *Gryllus muticus* De Geer, Mém. d'Hist. Ins., III, p. 520, tab. 43, fig. 2. [Surinam.]

Reventazon, plains of Santa Clara, altitude 200 meters. December, 1904. (P. Biolley; No. 32.) [A. N. S. Phila.] One male, one female.

**ANAXIPHA** Saussure.

1874. *Anaxipha* Saussure, Miss. Scient. Mex. et l'Amer. Cent., part 6, pp. 363, 370.

Included *A. pulicaria* (Burmeister), *pallens* (Stål) and (?) *pumila* (Burmeister), of which *pulicaria* may be considered the type.

**Anaxipha exigua** (Say).

1825. [*Acheta*] *exigua* Say, Journ. Acad. Nat. Sci. Phila., IV, p. 309. [Missouri.]

Reventazon, plains of Santa Clara, altitude 200 meters. December, 1904. (P. Biolley; No. 34.) [A. N. S. Phila.] One male.

This individual is inseparable from specimens from the eastern United States.

**CYRTOXIPHA** Brunner.**Cyrtoxipha championi** Saussure.

1897. *Cyrtoxiphus championi* Saussure, Biol. Cent.-Amer., Orth., I, p. 236, tab. XI, fig. 41. [Bugaba, Panama]

Carrillo. [Hebard Collection.] One female.

Reventazon, plains of Santa Clara, altitude 200 meters. December, 1904. (P. Biolley; No. 33.) [A. N. S. Phila.] One male, one immature individual.

The caudal femora of these specimens are shorter than in the type specimen measured by Saussure, four and five millimeters instead of six. The female is blackish-brown in color, while the male is fulvous.

**PHYLLOSCYRTUS** Guérin-Ménéville.

1844. *Phylloscyrtus* Guérin-Ménéville, Iconogr. du Règne Anim., III, p. 333. Type.—*P. elegans* Guérin-Ménéville.

**Phylloscyrtus cæruleus** Saussure.

1874. *Phylloscyrtus cæruleus* Saussure, Miss. Scient. Mex. et l'Amer. Cent., part 6, p. 366, Pl. VII, fig. 3. [Eastern Cordillera, Mexico.]

Turrialba. (Schild and Burgdorf.) [U. S. N. M.] One female.

This species is here recorded for the first time outside of Mexico.

**HETEROGRYLLUS** Saussure.

1874. *Heterogryllus* Saussure, Miss. Scient. Mexiq. et l'Amer. Cent., part 6, pp. 430, 439.

Type.—*H. ocellaris* Saussure.

**Heterogryllus crassicornis** Saussure.

1878. *H[eterogryllus] crassicornis* Saussure, Mélanges Orthoptérologiques, VI, p. 557. [Venezuela.]

Carrillo. [Hebard Collection.] One female.

Costa Rica (exact locality unknown). [U. S. N. M.] One female.

These specimens appear to represent this long unrecognized species. Superficially the coloration resembles species of the genus *Amphiacusta*, but the peculiar rostrum and slenderer limbs readily differentiate it. The anal filaments are very long, considerably exceeding the ovipositor. The coloration of the limbs is very rich, the caudal femora being wine-color with one complete and one broken distal annulus of ochre.

**ECANTHUS** Serville.

**Ecanthus nigricornis** Walker ?

1869. *Ecanthus nigricornis* Walker, Catal. Derm. Salt. Brit. Mus., p. 93. [Illinois.]

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] One female.

This specimen is referred here with some doubt.

**XABEA** Walker.

1869. *Xabea* Walker, Catal. Derm. Salt. Brit. Mus., p. 109.

Type.—*X. decora* Walker.

**Xabea bipunctata** (De Geer).

1773. *Gryllus bipunctatus* De Geer, Mém. d'Hist. Ins., III, p. 523, tab. 43, fig. 7. [Pennsylvania.]

Turrialba. (Schild and Burgdorf.) [U. S. N. M.] Two males.

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] One female.

Previously recorded from Bugaba, Volcan de Chiriqui and Caldera, Panama.

**ENEOPTERA** Burmeister.

1838. *Eneoptera* Burmeister, Handb. d. Entom., II, Abth. II, part I, p. 736.

Included *E. brasiliensis* Fabricius (= *surinamensis* De Geer) and *E. livida* Burm., of which the former has been selected<sup>21</sup> as the type.

**Eneoptera surinamensis** (De Geer).

1773. *Gryllus surinamensis* De Geer, Mém. d'Hist. Ins., III, p. 519, tab. 43, fig. 1. [Surinam.]

Pozo Azul de Pirris. September, 1902. (C. F. Underwood.) [A. N. S. Phila.] Two females.

This widely distributed species has been previously recorded twice from Central America, from Chontales, Nicaragua, and Bugaba, Panama.

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<sup>21</sup> *Miss. Scientif. Mex. et l'Amer. Cent.*, part 6, p. 481.

**!PARÆCANTHUS** Saussure.

**Paræcanthus aztecus** Saussure.

1874. *Paræcanthus Aztecus* Saussure, Miss. Scientif. Mex. et l'Amer. Cent., Rec. Zool., part 6, p. 471. [Mexico.]

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] Two males, four females.

These specimens are smaller than the measurements given by Saussure and probably belong to his small variety *b.*<sup>22</sup>

**OROCHARIS** Uhler.

**Orocharis cayennensis** Saussure?

1897. *Orocharis cayennensis* Saussure, Biol. Cent.-Amer., Orth., I, p. 275, tab. xiii, figs. 23, 24. [Cayenne].

Monte Redondo. January, 1903. (C. F. Underwood.) [A. N. S. Phila.] One male, one female.

These specimens are referred questionably to this species on account of the form of the terminal joints of the palpi which are exactly as in *O. tibialis*, and not the funnel-shaped type found in *cayennensis*. On the other hand the male tegmina are not as in *tibialis*, but are typical of *cayennensis*, and the proportions also agree with the latter species.

**ECTOTRYPA** Saussure.

1874. *Ectotrypa* Saussure, Miss. Scientif. Mex. et l'Amer. Cent., Rec. Zool., part 6, pp. 465, 466.

Type.—*E. olmeca* Saussure.

**Eototrypa brevis** n. sp.

Type: ♀; Carrillo, Costa Rica. [Hebard Collection.]

Closely allied to *E. olmeca* Saussure, but differing in the shorter pronotum, which also has the lateral lobes with the ventral margin arcuate, and the shorter tegmina and wings.

Size medium, form moderately slender. Head slightly depressed, occiput gently rounded transversely, not arched longitudinally; fastigium bluntly angulate, the space between the internal margins of the antennal scrobes about one-fourth that between the eyes; eyes irregularly pyriform in basal outline, the greatest diameter nearly horizontal, the narrowest portion cephalad, eyes when viewed from the dorsum little prominent; maxillary palpi with the distal segment short trumpet-shaped with the apex excavated; antennæ nearly twice the length of the body, proximal joint depressed. Pronotum ar-

<sup>22</sup> *Biol. Cent.-Amer., Orth., I, p. 262.*

uate transversely, the greatest length equal to the caudal width; cephalic margin subtruncate, caudal margin very broadly obtuse-angulate, lateral angles rounded; lateral lobes very considerably longer than deep, the ventral margin truncate-arcuate both angles rounded. Tegmina very slightly shorter than the apex of the abdomen; medias-tine vein with about eleven branches, lateral field with the margin moderately arcuate distad. Ovipositor slightly more than half the length of the body, slender, with a hardly perceptible arcuation, valves finely serrate; styles slender, slightly exceeding the tip of the ovipositor; subgen-

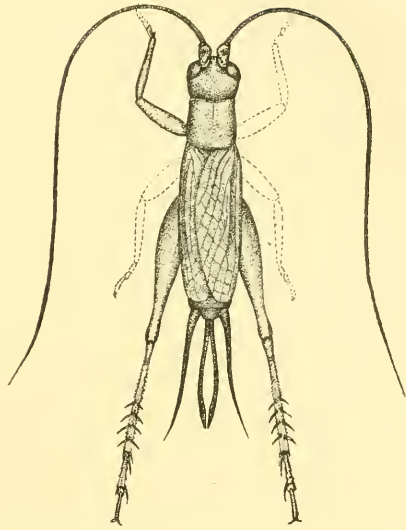


Fig. 20. *Ectotrypa brevis* n. sp. Dorsal view of type. ( $\times 2$ .)

ital plate distad with a broad, shallow subtrigonal emargination. Cephalic femora distinctly longer than the pronotum, moderately inflated; cephalic tibiae equal to the femora in length, very slightly and gradually tapering, the tympanum perforate caudad. Median limbs missing. Caudal femora very slightly shorter than the tegmina, considerably inflated, the genicular region small and with the lobes narrowly rounded; caudal tibiae about four-fifths the length of the femora, dorsal margins spinulose proximad, spinulose and spinose distad, the spines five in number on each margin, the spurs on the internal margin much longer than those of the external margins; caudal tarsi with the proximal joint nearly equal to the remaining joints in length, the distal joint but slightly shorter than the proximal.

General color cinnamon, the pronotum somewhat inclined toward umber; eyes vandyke brown; mouth-parts and antennae pale; abdomen mummy brown; styles and ovipositor vandyke brown.



Fig. 21. *Ectotrypa brevis* n. sp. Lateral view of head and pronotum. ( $\times 3$ .)

#### Measurements.

Length of body,	16 mm.
Length of pronotum,	3.5 "



Length of tegmen, . . . . .	10.2 mm.
Length of caudal femur, . . . . .	9.2 "
Length of ovipositor, . . . . .	8 "

But one specimen, the type, has been examined.

#### APHONOMORPHUS Rehn.

1874. *Aphonus* Saussure, Miss. Scientif. Mex. et l'Amer. Cent., Rec. Zool., part 6, pp. 466, 509. (Not of Leconte.)

1903. *Aphonomorphus* Rehn, Ent. News, XIV, p. 260.

Included *A. mutus*, *telskii*, *peruvianus*, *diversus* and (?) *lividus*, of which *mutus* may be considered the type.

#### *Aphonomorphus silens* (Saussure)?

1878. *A[phonus] silens* Saussure, Mélanges Orthoptérologiques, fasc. VI, p. 805. [Brazil?]

Santa Ana. November, 1902. (C. F. Underwood.) [A. N. S. Phila.] One male.

It is with some doubt that I place this specimen under this species, as it differs considerably in color and has the caudal femora slightly smaller than Saussure's measurements. The caudal metatarsi have very well developed spines, but Saussure says they are "énormes." The head (except the eyes, rostrum and antennal fossæ), pronotum and cephalic and median limbs are blackish-brown, while the tegmina are sienna.

The specimen apparently fits no other species, but may be quite distinct from the true *silens*.

#### SPECIES OF ORTHOPTERA RECORDED FROM COSTA RICA BY THE AUTHOR.

The following list of one hundred and ninety-five species represents the species recorded in this and previous papers by the author (*vide* p. 790), bearing wholly or in part on the Orthoptera of Costa Rica.

#### FORFICULIDÆ.

*Pyragra fuscata* Serville.

*Psalis americana* (Palisot).

*Psalis pulchra* Rehn.

*Labia annulata* (Fabricius).

*Labia auricoma* Rehn.

*Opisthocosmia (Sarcinatrix) anomalia* Rehn.

*Apterygida linearis* (Eschscholtz).

#### BLATTIDÆ.

*Anaplecta flabellata* Saussure and Zehntner.

*Anaplecta fulgida* Saussure.

- Anaplecta fallax* Saussure.  
*Anaplecta decipiens* Saussure and Zehntner.  
*Blattella germanica* (Linnæus).  
*Blattella nahua* (Saussure).  
*Blattella azteca* (Saussure and Zehntner)?  
*Blattella zapoteca* (Saussure).  
*Blattella pavidata* Rehn.  
*Blattella spectativa* Rehn.  
*Blattella brunneriana* (Saussure).  
*Pseudophyllodromia peruana* (Saussure).  
*Pseudophyllodromia angustata* (Latreille).  
*Pseudomops oblongata* (Linnæus).  
*Pseudomops discoidalis* (Burmeister).  
*Pseudomops crinicornis* (Burmeister).  
*Pseudomops grata* Rehn.  
*Ischnoptera inæqualis* Saussure and Zehntner.  
*Paratropes biolleyi* Saussure and Zehntner.  
*Calolampra cicatricosa* Rehn.  
*Periplaneta australasiæ* (Fabricius).  
*Pelmatosilpha rotundata* Scudder.  
*Chorisoneura flavipennis* Saussure and Zehntner.  
*Plectoptera pulicaria* Saussure and Zehntner.  
*Plectoptera hastifera* Rehn.  
*Plectoptera picta* Saussure and Zehntner.  
*Pelloblatta lata* Rehn.  
*Panchlora acolhua* Saussure and Zehntner.  
*Panchlora peruana* Saussure.  
*Panchlora punctum* Saussure and Zehntner.  
*Achroblatta luteola* (Blanchard).  
*Zetobora sublobata* Saussure and Zehntner.  
*Capucina cucullata* Saussure.  
*Holocompsa cyanea* (Burmeister).  
*Archimandrita tessellata* Rehn.  
*Blaberus trapezoides* Burmeister.  
*Blaberus thoracicus* Saussure and Zehntner.  
*Blaberus biolleyi* Rehn.

#### MANTIDÆ.

- Acontista mexicana* Saussure and Zehntner.  
*Acontista fraterna* Saussure and Zehntner.  
*Acontista vitrea* Saussure and Zehntner.

*Stagmomantis nahua* Saussure.  
*Stagmomantis heterogamia* Saussure and Zehntner.  
*Stagmomantis theophila* Rehn.  
*Stagmomantis tolteca* (Saussure).  
*Stagmomantis dimidiata* (Burmeister).  
*Stagmomantis venusta* Saussure and Zehntner.  
*Stagmomantis androgyna* Saussure and Zehntner.  
*Angela perpulchra* Westwood.  
*Pseudomiopteryx infuscata* Saussure and Zehntner.  
*Harpagonyx carlottæ* Rehn.  
*Spanionyx bidens* Saussure and Zehntner.  
*Acanthops tuberculata* Saussure.  
*Stagmatoptera insatiabilis* Rehn.

## PHASMIDÆ.

*Sermyle physconia* Rehn.  
*Heteroncmia ignava* Rehn.  
*Calynda bicuspis* Stål.  
*Bostra turgida* (Westwood).  
*Bostra incompta* Rehn.  
*Bostra remiformis* Rehn.  
*Oncotophasma martini* (Griffini).  
*Libethra auritus* Rehn.  
*Stratocles multilincatus* Rehn.  
*Stratocles costaricensis* Rehn.  
*Olecyphides viridipes* Rehn.  
*Pseudophasma phaton* Rehn.  
*Pseudophasma phthisicum* (Linnæus).  
*Pseudophasma menius* (Westwood).  
*Pseudophasma cryptochlore* Rehn.  
*Planudes crenulipes* Rehn.  
*Xerosoma glyptomerion* Rehn.  
*Metriotes agathodes* Stål.  
*Prisopus becosus* Westwood.

## ACRIDIDÆ.

*Chiriquia serrata* Morse.  
*Ochetotettix volans* Morse.  
*Ochetotettix barretti* (Hancock).  
*Paratettix mexicanus* (Saussure).

*Paratettix toltecus* (Saussure).  
*Allotettix peruvianus* (Bolivar).  
*Tettigidea nicaraguæ* Bruner.  
*Eumastax dentatus* Saussure.  
*Episactus brunneri* Burr.  
*Truxalis brevicornis* (Johansson).  
*Silvitettix communis* Bruner.  
*Amblytropidia costaricensis* Bruner.  
*Orphulella punctata* (De Geer).  
*Orphulella costaricensis* Bruner.  
*Orphulella meridionalis* Bruner?  
*Plectrotettix calidus* Bruner.  
*Chortophaga meridionalis* Bruner.  
*Lactista punctatus* (Stål).  
*Heliastus costaricensis* Rehn.  
*Heliastus venezuelæ* Saussure.  
*Prosphena scudderi* Bolivar.  
*Munatia punctata* Stål.  
*Colpolopha bruneri* Rehn.  
*Cibotopteryx variegata* Rehn.  
*Tæniopoda centurio* (Drury).  
*Tæniopoda varipennis* Rehn.  
*Chromacris trogon* Gerstaecker.  
*Rhcnoderma humile* Rehn.  
*Leptysmia obscura* (Thunberg).  
*Copiocera specularis* Gerstaecker.  
*Cornops longipenne* (De Geer)?  
*Edalomctopon petasatum* Rehn.  
*Anniceris truncatus* Rehn.  
*Dellia miniatula* Rehn.  
*Dellia bimaculata* Rehn.  
*Dellia ovalipennis* Rehn.  
*Jodacris* (?) *costaricensis* Rehn.  
*Syletria angulata* Rehn.  
*Leptomerinthoprora brevipennis* Rehn.  
*Schistocerca pyramidata* Scudder.  
*Schistocerca malachitica* Rehn.  
*Aidemona azteca* (Saussure).  
*Dichroplus morosus* Rehn.  
*Osmilia tolteca* (Saussure).  
*Rhachicreagra nothra* Rehn.

*Microtylopteryx hebardi* Rehn.

*Microtylopteryx fusiformis* Rehn.

TETTIGONIDÆ.

*Aphidna simplicipes* Brunner.

*Hormilia intermedia* Brunner.

*Ceraia cruenta* (Burmeister).

*Stilpnochlora marginella* (Serville).

*Stilpnochlora tolteca* (Saussure).

*Stilpnochlora azteca* (Saussure).

*Steirodon validum* Stål.

*Orophus mexicanus* Saussure.

*Orophus ovatus* (Brunner).

*Orophus conspersus* (Brunner).

*Orophus tessellatus* Saussure.

*Anaulacomera digitata* Rehn.

*Anaulacomera laticauda* Brunner.

*Anaulacomera denticauda* Saussure and Pictet.

*Turpilia oblongooculata* Brunner.

*Turpilia grandis* Rehn.

*Turpilia linearis* Rehn.

*Microcentrum syntecnoides* Rehn.

*Syntecna caudelli* Rehn.

*Lichenochrus marmoratus* Rehn.

*Gongreknemis nigrospinosus* Brunner.

*Drepanoxiphus minutus* Brunner?

*Cocconotus degeeri* (Stål).

*Cocconotus rarus* Rehn.

*Ischnomela pulchripennis* Rehn.

*Cecentromenus marmoratus* Brunner.

*Euacris richmondi* Rehn.

*Scopiorus mucronatus* Saussure and Pictet.

*Mimetica brunneri* Saussure and Pictet.

*Mimetica crenulata* Rehn.

*Copiphora cultricornis* Pictet.

*Copiphora rhinoceros* Pictet.

*Lirometopum coronatum* Seudder.

*Eriolus spiniger* Redtenbacher.

*Pyrgocorypha rogersi* Saussure and Pictet.

*Pyrgocorypha hamata* (Seudder).

*Conocephalus guttatus* Serville.



*Conocephalus muticus* Redtenbacher.  
*Conocephalus mexicanus* Saussure.  
*Conocephalus obscurellus* Redtenbacher.  
*Conocephalus diversus* Rehn.  
*Xiphidion fasciatum* (De Geer).  
*Phlugis virens* (Thunberg).  
*Gryllacris maculata* Brunner.  
*Anabropsis marmorata* Rehn.  
*Anabropsis costaricensis* Rehn.

#### GRYLLIDÆ.

*Gryllotalpa hexadactyla* Perty.  
*Scapteriscus didactylus* (Latreille).  
*Ripipteryx carbonaria* Saussure.  
*Ripipteryx limbata* (Burmeister).  
*Ripipteryx biolleyi* Saussure.  
*Ripipteryx pulicaria* Saussure.  
*Anurogryllus muticus* (De Geer).  
*Anaxipha exigua* (Say).  
*Cyrtoxipha championi* Saussure.  
*Symphaloxipha magnifica* Rehn.  
*Phylloscyrtus cæruleus* Saussure.  
*Heterogryllus crassicornis* Saussure.  
*Æcanthus nigricornis* Walker?  
*Xabea bipunctata* (De Geer).  
*Eneoptera surinamensis* (De Geer).  
*Paræcanthus aztecus* Saussure.  
*Orocharis cayennensis* Saussure?  
*Ectotrypa brevis* Rehn.  
*Aphonomorphus silens* (Saussure)?