

Revision of the Oecanthinae (Gryllidae: Orthoptera) of America South of the United States¹

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ABSTRACT

Thirty-one species of Oecanthinae occur in America south of the United States. Of the 11 species of *Neoxabea*, 9 are known only from South America; the other 2 are found in both the United States and Mexico. Seven of the 20 species of *Oecanthus* are known only from South America, 2 range from northern South America into the U.S., 3 are restricted to Central America and Mexico, 7 occur in Mexico and the U.S. but not in South America, and 1 is known only from the West Indies. Features of the pretarsal claws and wing venation separate *Neoxabea*

and *Oecanthus*, and features of the male metanotum and the cerci are useful in distinguishing the species of *Neoxabea*. The calling songs of *O. allardi* T. Walker and Gurney, *O. varicornis* F. Walker, and *O. immaculatus* Bruner are characterized from audiospectrographic analysis. New species described are *Neoxabea astales*, *N. enodis*, *N. femorata*, *N. leptia*, *N. quadrula*, *Oecanthus comma*, *O. major*, *O. nanus*, and *O. prolatus*. Keys are given to the 2 genera and to the species of each occurring in the Neotropical region.

Recent revisions of New World Oecanthinae have dealt only with the fauna of the United States and Canada (Walker 1962, 1963). Bruner (1916) was the last to summarize the taxonomy of the more southern New World Oecanthinae. Subsequently, several authors published descriptions of new species found in that region, and Walker (1966) has compiled a checklist of Oecanthinae of the World. The need for a revision of southern New World Oecanthinae is apparent when Bruner's list of 11 species is contrasted with the 31 in the present work.

The present revision is unlikely to remain adequate for long. Except for the University of Michigan Museum of Zoology collections from Mexico and Central America, it is based on meager and casually collected material. Furthermore, little is known of the biology of any of the species, and, with a few exceptions, nothing is known of the calling songs. Consequently, many species undoubtedly are still uncollected, and some of those recognized in this revision will surely prove to be species complexes.

In this revision, the nomenclature and taxonomy of previously described species are clarified, 9 new species are described, significant previous work is brought together, new characters for separating *Neoxabea* and *Oecanthus* are described, and the male metanotum is shown to be useful in separating species of *Neoxabea*.

The following abbreviations are used in listing the specimens studied: ANSP, Academy of Natural Sciences of Philadelphia; BM, British Museum (Natural History), London; CAS, California Academy of Sciences, San Francisco; DCR, David C. Rentz collection; FSCA, Florida State Collection of Arthropods, University of Florida, Gainesville; UCV, Universidad Central de Venezuela, Maracay; UMMZ, University of Michigan Museum of Zoology, Ann Arbor; USNM, U.S. National Museum, Washington, D.C.

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KEYS TO NEW WORLD OECANTHINAE SOUTH OF THE UNITED STATES

Oecanthinae are distinguished from all other Gryllidae by their slender bodies, almost horizontal heads, very slender posterior legs, and bifid pretarsal claws. The males have large metanotal glands that are involved in mating.

New World species are separated into 2 genera—*Neoxabea* and *Oecanthus*. These have been distinguished hitherto primarily on the basis of the armature of the hind tibiae. In this study, new distinguishing characters were noted in the tegminal venation and tegminal folding of the male, and in the pretarsal claws. Except for *Neoxabea leptia*, the species of the 2 genera proved easily separable also by the gross structures of the male cerci and metanotal gland.

KEY TO GENERA

1. Pretarsal claws cleft to midpoint or less, median lobes acute (Fig. 1, 2); hind tibiae unarmed except for terminal spurs; male tegmina with principal longitudinal veins curving into lateral fields (Fig. 4); male cerci usually stout; metanotal gland usually with complex posterior piece (Fig. 20-26) *Neoxabea*
- 1'. Pretarsal claws cleft beyond midpoint, median lobes truncate (Fig. 3); hind tibiae armed with many spines; male tegmina with principal longitudinal veins parallel to axis of folding (Fig. 5); male cerci slender; metanotal gland without complex posterior piece..... *Oecanthus*

KEY TO NEOXABEA SPECIES SOUTH OF THE UNITED STATES

1. Tarsal claws shallowly cleft (Fig. 1); cerci stout (length less than 15 times midpoint diameter); length of terminal joint of maxillary palpus less than 5 times its greatest diameter..... 2
- 1'. Tarsal claws cleft to midpoint (Fig. 2); cerci slender (Fig. 6); length of terminal joint of maxillary palpus more than 7 times its greatest diameter..... *leptia*
- 2 (1). Male abdominal terga 2-10 each with median knob; female tegminal pattern usually as in Fig. 10; first antennal segment always,

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- and second sometimes, with small, prominent tubercle on distal border; Central America and Mexico..... 3
- 2'. Male abdominal terga without median knobs (but terga 6-8 may have conspicuous specializations); female tegminal pattern usually not as in Fig. 10; first antennal segment often without tubercle, second never with tubercle; South America..... 4
- 3 (2). Stridulatory file with fewer than 30 teeth; southern Mexico and Central America..... *bipunctata*
- 3'. Stridulatory file with more than 50 teeth; Tamaulipas and Veracruz..... *formosa*
- 4 (2'). Males..... 5
- 4'. Females (females of *enodis*, *trimodosa*, and *quadrula* unknown)..... 12
- 5 (4). Terga of abdominal segments 7 and 8 (and sometimes 6) with conspicuous specializations..... 6
- 5'. Abdominal terga without conspicuous specializations..... 10
- 6 (5). Abdominal tergum 6 with conspicuous specialization; stridulatory file less than 1.2 mm long..... *meridionalis*
- 6'. Abdominal tergum 6 without conspicuous specialization; stridulatory file more than 1.2 mm long..... 7
- 7 (6'). Stridulatory file with more than 75 teeth; metanotum as in Fig. 20..... *trimodosa*
- 7'. Stridulatory file with fewer than 55 teeth; metanotum as in Fig. 21, 22, or 23..... 8
- 8 (7'). Pronotal length less than 3.0 mm; specialization on tergum 8 broadly rounded (Fig. 17); metanotum as in Fig. 23..... *obscurifrons*
- 8'. Pronotal length more than 3.0 mm; specialization on tergum 8 triangular or quadrate (Fig. 18, 19); metanotum as in Fig. 21 or 22..... 9
- 9 (8'). Metanotum as in Fig. 21; specialization of tergum 8 triangular (Fig. 18)..... *brevipes*
- 9'. Metanotum as in Fig. 22; specialization on tergum 8 quadrate (Fig. 19)..... *quadrula*
- 10 (5'). Pronotal length less than 3.1 mm; cerci as in Fig. 8 or 9; stridulatory file with fewer than 35 teeth..... 11
- 10'. Pronotal length greater than 3.2 mm; cerci as in Fig. 7; stridulatory file with more than 40 teeth..... *enodis*
- 11 (10). Cerci tapering to tip (Fig. 9); metanotum as in Fig. 25..... *femorata*
- 11'. Cerci swollen near tip (Fig. 8); metanotum as in Fig. 26..... *astales*
- 12 (4'). First antennal segment with small, prominent tubercle on distal border..... 13
- 12'. First antennal segment without tubercle, though sometimes with a pimblelike swelling.... 15
- 13 (12). Pronotal length greater than 3.0 mm; tegmina and/or vertex with conspicuous pattern.... 14
- 13'. Pronotal length less than 3.0 mm; tegminal pattern similar to Fig. 13 but with much less contrast; vertex with poorly defined pattern..... *obscurifrons*
- 14 (13). Vertex with obscure pattern having no central light area; dorsal field of tegmina dark except for lighter edges (Fig. 13)..... *brevipes*
- 14'. Vertex with pattern as in Fig. 16 (the female of *enodis* is unknown, but the cephalic pattern is assumed to be like that of the male; the tegminal pattern of the female may be similar to that of *brevipes*, as the males of the 2 species resemble each other in this respect)..... *enodis*
- 15 (12'). Most conspicuous feature of tegminal pattern 1 or more pairs of lateral dark spots (Fig. 10, 11)..... 16
- 15'. Most conspicuous feature of tegminal pattern

- well-defined, oblique lines (Fig. 12)..... *meridionalis*
- 16 (15). Tegmina without anterior dark spots (Fig. 11)..... 17
- 16'. Tegmina with anterior dark spots (Fig. 10) (1 ♀ from Colombia)..... probably *trimodosa* or *quadrula*
- 17 (16). Anterior face of hind femur with conspicuous, longitudinal, dark stripe; Venezuela. *femorata*
- 17'. Hind femur without conspicuous stripe; Peru..... *astales*

KEY TO OECANTHUS SPECIES SOUTH OF THE UNITED STATES

- 1. From north of the equator..... 2
- 1'. From south of the equator..... 15
- 2 (1). First and second antennal segments without ventral dark marks..... 3
- 2'. First, and usually second, antennal segments with ventral dark marks..... 4
- 3 (2). Pronotal length less than 1.5 times caudal width of pronotal disk..... 13
- 3'. Pronotal length more than 1.5 times caudal width of pronotal disk..... *immaculatus*
- 4 (2'). First antennal segment with an inner, elongate longitudinal mark and an outer, transverse mark; these marks sometimes confluent..... 5
- 4'. First antennal segment usually with a single mark; if with 2, the marks not as above.. 7
- 5 (4). Outside and inside marks on second antennal segment separated by width of outside mark..... 6
- 5'. Outside and inside marks on both first and second antennal segments contiguous or nearly so..... *argentinus*
- 6 (5). Outside mark on first antennal segment often a dot; outside marks on both first and second segments usually paler than inside marks; stridulatory file with more than 50 teeth..... *quadripunctatus*
- 6'. Outside mark on first antennal segment never a dot, never paler than inside mark; stridulatory file with fewer than 50 teeth..... *celerimictus*
- 7 (4'). Principal mark on first antennal segment a round or oval dot..... 8
- 7'. Principal mark on first antennal segment not round or oval, at least twice as long as broad..... 9
- 8 (7). Known only from West Indies; song a very slow (22 chirps/min at 25°C), rhythmic chirp with pulses grouped 2-3-3-3-... .. *allardi*
- 8'. Not known from West Indies; song otherwise (complex of at least 8 species, including *fultoni* and *rileyi*).
- 9 (7'). Mark on second antennal segment no broader or darker than mark on first antennal segment..... 10
- 9'. Mark on second antennal segment at least twice as broad and at least as dark as mark on first segment (Fig. 14)..... *prolatus*
- 10 (9). Antennal marks on ivorylike swellings; third antennal segment never much darker than second; mark on second segment distinct. 11
- 10'. Antennal marks not on ivorylike swellings; third antennal segment often much darker than second; mark on second segment often indistinct or lacking..... 13
- 11 (10). Mark on first antennal segment nearly as long as segment, of approximately uniform width; stridulatory file sometimes with less than 37 teeth..... 12
- 11'. Mark on first antennal segment not more than half as long as segment, sometimes tear- or comma-shaped (Fig. 15); stridulatory file with more than 37 teeth..... *comma*

- 12 (11). Tegminal length more than 12 mm; stridulatory file with fewer than 33 teeth...20
 12'. Tegminal length less than 12 mm; stridulatory file with more than 33 teeth....
*tenuis* (in part)
 13 (3, 10'). Fewer than 40 teeth in stridulatory file, more than 27 teeth/mm of length; calling song a rapid trill, approximately 75 pulses/sec at 25°C; ovipositor less than 10 mm long; Mexico, Central America, northern South America....
*varicornis*
 13'. Usually more than 40 teeth in stridulatory file, sometimes less than 27 teeth/mm of length; calling song less than 60 pulses/sec at 25°C; ovipositor sometimes more than 10 mm long; northern and central Mexico14
 14 (13). Male pronotal length less than 2.8 mm; ovipositor less than 12 mm long; more than 30 teeth/mm of stridulatory file; Sonora and Coahuila to Sinaloa and Zacatecas*californicus*
 14'. Male pronotal length 2.8 mm or more; ovipositor often 12 mm long or longer; often less than 30 teeth/mm of stridulatory file; Sinaloa and Guanajuato to Guerrero and Puebla.....*major*
 15 (1'). Second (and usually first) antennal segment without dark marks.....16
 15'. Second and first antennal segments with ventral dark marks.....18
 16 (15). Tegminal length less than 10 mm.....17
 16'. Tegminal length more than 10 mm.....
*peruvianus*
 17 (16). Robust; greatest width of female more than $\frac{1}{4}$ of tegminal length; of male, more than $\frac{1}{2}$ of tegminal length; stridulatory file with more than 50 teeth; Ecuador*nanus*
 17'. Slender; greatest width of female less than $\frac{1}{4}$ of tegminal length; of male, less than $\frac{1}{2}$; stridulatory file with fewer than 50 teeth; Brazil and Argentina....*minutus*
 18 (15'). Tegminal length more than 9 mm; stridulatory file with fewer than 47 teeth; antennal flagellum, femora, and postocular region unmarked.....19
 18'. Tegminal length less than 9 mm; stridulatory file with more than 49 teeth; antennal flagellum with dark rings, femora with dark spots or flecks, usually a pair of dark marks behind each eye....*pictipes*
 19 (18). Known from Amazon basin...*tenuis* (in part)
 19'. Known from south of Amazon basin....
*lineolatus*
 20 (12). Male metanotal gland with pair of vertical, bent-tip, setal bundles on scutum at scutoscutellar suture (Walker and Gurney 1967, Fig. 7).....
*exclamationis* (discussed below under*leptogrammus*
 20'. Male metanotal gland without setal bundles at scutoscutellar suture....*leptogrammus*

Genus *Neoxabea* Kirby

Only 110 specimens of *Neoxabea* were examined, but these provided a surprising amount of new information. Males of 2 species (*brevipes* and *obscurifrons*) were recognized for the first time; *N. formosa*, long considered a synonym of *N. bipunctata*, proved to require specific status; and 5 new species were discovered.

Compared with *Oecanthus*, all *Neoxabea* males except those of *N. lepta* have unusually complex metanotal glands. In all but 3 species, the males have peculiar specializations of the abdominal terga. The cerci are generally stout, and in 3 species they are specialized in peculiar ways. These specializations of metanotal glands, abdominal terga, and cerci have proved useful in separating the species of *Neoxabea*, but the adaptive significance of none is known. Nothing is known of the mating behavior of any species of *Neoxabea*.

Neoxabea bipunctata (De Geer)

Fig. 1, 4, 10, 28

Gryllus bipunctatus De Geer, 1773, p. 523. Type-locality: PENNSYLVANIA. Type: ♀, Naturhistoriska Riksmuseet, Stockholm. Further synonymy is given by Walker (1962).

This species and the closely related *N. formosa* are the only North American species of *Neoxabea*. They also share a distinctive male abdominal specialization—a median knob occurs on the tergum of abdominal segments 2–10. The metathoracic alinota of the 2 are similar, and somewhat resemble those of *N. femorata* and *N. astales* (Fig. 25, 26).

The most striking difference between *bipunctata* and *formosa* is the stridulatory file (Fig. 28). The calling song of *bipunctata* evidently has a much faster pulse rate than that of *formosa*.

N. bipunctata has a peculiar distribution: Central America and southern Mexico, and the deciduous forest area of Eastern United States. *N. formosa* occurs in the area between. The northern and southern populations of *bipunctata* may be specifically distinct. Males from Eastern United States can be separated from those from Central America by the height of the projections on either side of the posterior piece of the metanotal gland. However, 2 ♂ from southern Mexico have projections of intermediate height, and the file characteristics of these 2 ♂ are also distinctive (Fig. 28). The shape of the posterior piece of the metanotal gland of United States *bipunctata* is slightly different than in Latin American *bipunctata*.

Specimens Examined.—United States: See Walker 1962, Fig. 3. The Brownsville, Texas, record is in error, and the Victoria, Texas, record requires confirmation. A male from Tyler County, Texas, is definitely *bipunctata* (FSCA). MEXICO: (identity of females uncertain) 2♀, betw. Zacapu and Zamora, Michoacan, 7500 ft (ANSP); 2♂, 4♀, Finca Victoria, Sierra Madre del Sur [Guerrero?], 700 m (ANSP); Amula, Guerrero, 6000 ft (BM); 1♀, Vergel, Chiapas, 700 m (ANSP). GUATEMALA: 5♀ (USNM), 2♀ (UMMZ), 1♀ (BM). NICARAGUA: 2♀ (ANSP). COSTA RICA: 1♂, Azahar, Cartago (ANSP); 1♂, Turrialba (ANSP); 4♀ (ANSP). PANAMA: 1♂, 2♀, Barro Colorado Island (ANSP); 1♀, ibid. (USNM); 2♂, 1♀, Bugaba, 800–1500 ft (BM); 1♀, Pantaleón, 1700 ft (BM); 1♀ Boquete, Chiriquí (UMMZ).

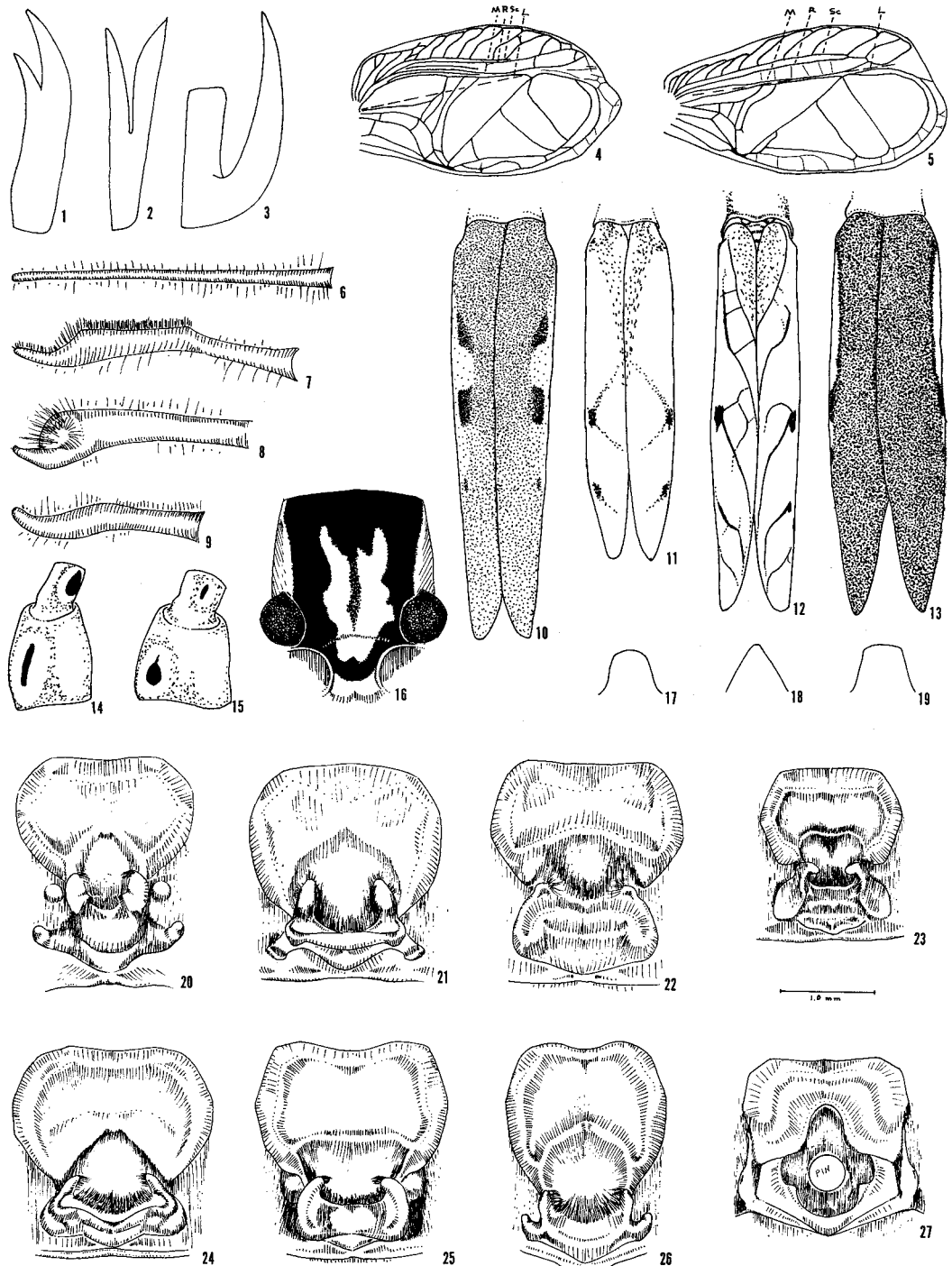


FIG. 1-3.—Pretarsal claws of mesothoracic legs; median lobe on left. 1, *Neoxabea bipunctata*; 2, *N. lepta**; 3, *Oecanthus niveus*. FIG. 4-5.—Right tegmen; dashed line (labeled L) shows axis of folding. 4, *N. bipunctata*; 5, *O. niveus*. FIG. 6-9.—Dorsal view of right cercus. 6, *N. lepta**; 7, *N. enodis**; 8, *N. astales**; 9, *N. femorata**. FIG. 10-13.—Female tegminal patterns. 10, *N. bipunctata*; 11, *N. femorata***; 12, *N. meridionalis*; 13, *N. brevipipes**. FIG. 14-15.—Ventral view of first 2 segments of left antenna. 14, *O. prolatus**; 15, *O. comma**. FIG. 16.—Vertex of *N. enodis**. FIG. 17-19.—Outlines of process on male eighth abdominal tergite. 17, *N. obscurifrons*; 18, *N. brevipipes*; 19, *N. quadrula**. FIG. 20-27.—Metathoracic alinotum (scale beneath Fig. 23). 20, *N. trimodosa**; 21, *N. brevipipes*; 22, *N. quadrula**; 23, *N. obscurifrons*; 24, *N. enodis**; 25, *N. femorata**; 26, *N. astales**; 27, *N. lepta**.
 *Holotype **allotype.

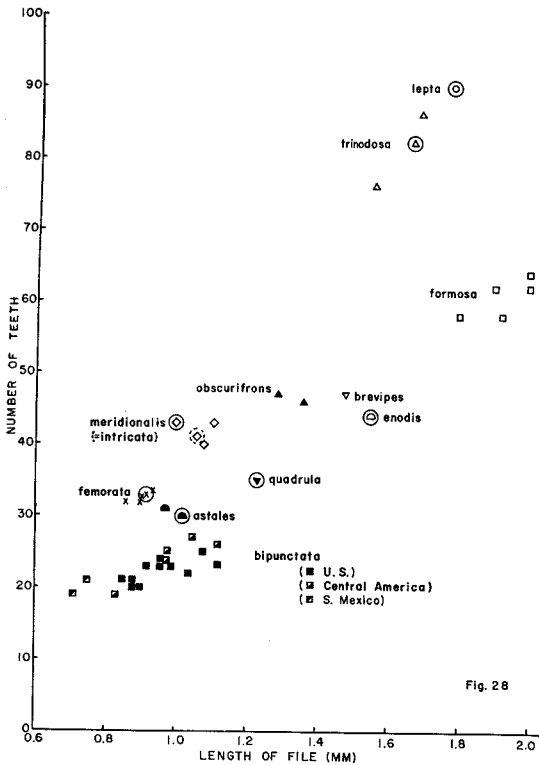


Fig. 28

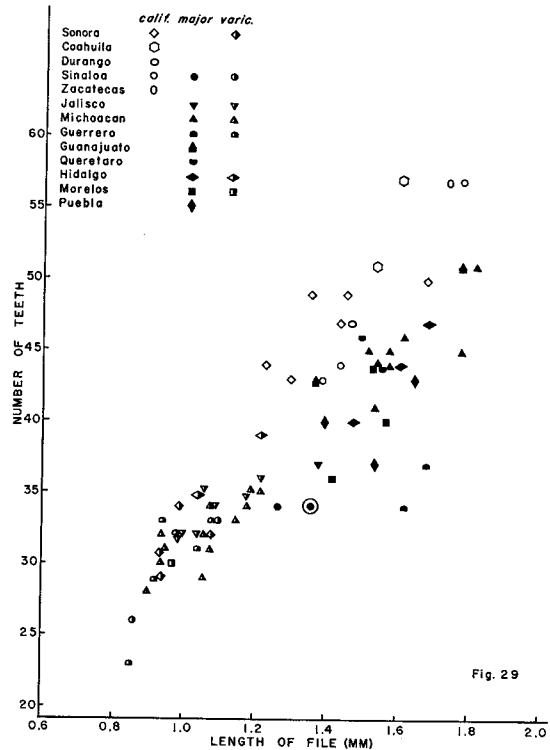


Fig. 29

FIG. 28-29.—Number of teeth and length of stridulatory file. Data for type-specimens are circled. See Walker (1962, p. 304) for method of measuring. FIG. 28, *Neoxabea* spp. FIG. 29, *Oecanthus varicornis*, *O. californicus*, and *O. major*.

Neoxabea formosa (F. Walker)

Fig. 28

Oecanthus formosus F. Walker, 1869, p. 94. Type-locality: MEXICO. Type: ♀, lost.

Kirby (1906) treated *formosa* as a synonym of *bipunctata*, and subsequent authors have concurred. The present study revealed 2 species among the specimens that had been regarded as *bipunctata*. One of these species occurs only in Mexico and southernmost Texas, and is presumed to be *formosa*. In Mexico, the type-locality of *formosa*, *bipunctata* is known only from the southern States.

Kirby (1906) indicated that the type of *formosa* was in the British Museum, but it cannot be found. The British Museum has a female from Mexico that is labeled "Type?," but as long as there is the least doubt of its being the type, it should not be regarded as such. Females of *formosa* cannot now be distinguished from those of *bipunctata*. This particular female might eventually prove to be *bipunctata* rather than what is here treated as *formosa*.

Specimens Examined.—United States: 2♂, 2♀, Brownsville, Texas (ANSP); 2♂, *ibid.* (FSCA). MEXICO (identity of females uncertain): 1♂, swamp country 6 mi. N. Ciudad Victoria, Tamaulipas (ANSP); 2♂, Atoyac, Veracruz (BM); 2♀, Veracruz (ANSP); 1♀, *ibid.* (UMMZ); 1♀, *ibid.* (FSCA).

Neoxabea meridionalis Bruner

Fig. 12, 28

Neoxabea meridionalis Bruner, 1916, p. 400. Type-locality: Valparaiso, 4500 ft, Dep. Magdalena, COLOMBIA. Type: ♂, ANSP.

Neoxabea intricata Hebard, 1928, p. 99. Type-locality: summit of Sierra San Lorenzo, 8500 ft, Magdalena, COLOMBIA. Type: ♂, ANSP.

The male of *meridionalis* is easily distinguished by the specializations on abdominal terga 6, 7, and 8 (figured by Hebard 1928, pl. 15, Fig. 3). The male metanotal specializations resemble those of *obscurifrons* (Fig. 23), but the anterior lobes of the posterior piece are more like those of *quadrula* (Fig. 22). Both males and females may be identified by the tegminal pattern—a light background with darkening along certain major veins (♀, Fig. 12).

Specimens Examined.—COLOMBIA: 5♂, 1♀, type-locality (ANSP); 1♂, 1 juv., Vista Nieve, San Lorenzo Mt. (ANSP); 2♂, 2♀, *ibid.* (UMMZ); 1♀, Cincinnati Ranch, Sierra Nevada de Santa Marta (UMMZ). BOLIVIA: 1♀, El Palmar, Depto. Cochabamba, 920 m, at light, forested region (UMMZ).

Neoxabea trinodosa Hebard

Fig. 20, 28

Neoxabea trinodosa Hebard, 1928, p. 98. Type-locality: San Antonio, Cauca, COLOMBIA. Type ♂, ANSP.

Males of *trinodosa* and the following 3 species

(*brevipes*, *quadrula*, and *obscurifrons*) have abdominal specializations on segments 7 and 8. The specializations of *trinodosa* were figured by Hebard (1928, pl. 15, Fig. 2); those of the other 3 species are similar. Nevertheless, males of the 4 species can be identified by features of the abdominal specializations. In *trinodosa*, *brevipes*, and *obscurifrons*, the specialization of the seventh segment is roughly triangular, with broadly rounded corners. In *trinodosa* and *brevipes*, it has lateral, broadly rounded projections; these are less prominent in *trinodosa*. The specialization of the seventh segment in *quadrula* is trapezoidal, and the lateral projections are more acute than in *trinodosa* or *brevipes*. The specialization of the eighth segment is also diagnostic (Fig. 17-19), that of *trinodosa* being approximately intermediate between those of *brevipes* and *quadrula*. The metanotum (Fig. 20-23) is diagnostic, and the stridulatory file (Fig. 28) is useful in separating males of the 4 species.

No females can be associated with *trinodosa* or *quadrula*. A female (ANSP) from Muzo, Boyaca, Colombia, may be 1 of these 2 species. Its tegminal pattern resembles that of *bipunctata*.

Specimens Examined.—COLOMBIA: 3♂, type-locality (ANSP).

Neoxabea brevipes Rehn

Fig. 13, 18, 21, 28

Neoxabea brevipes Rehn, 1913, p. 377, Fig. 34-36. Type-locality: Misiones, ARGENTINA. Type: ♀, ANSP.

Until the present study, *brevipes* was known only from the type female. The male here attributed to *brevipes* was collected at the same locality as 4♀ which have the same striking pattern as the type of *brevipes* (Fig. 13).

The features of the limbs thought by Rehn (1913) to be diagnostic of *brevipes* have proved to be of no taxonomic value. Separation of the male of *brevipes* from closely related species is discussed under *trinodosa*. The females have a characteristic tegminal color pattern, and are more robust than those of other members of the genus.

Specimens Examined. — ARGENTINA: 1♀, type (ANSP). BRAZIL: 2♀, Teutonia, Santa Catarina, 27°11'S, 52°23'W, 29 Aug. 1961 (UMMZ); 1♂, *ibid.*, 5 Sep. 1961 (UMMZ); 1♀, *ibid.*, 13 Oct. 1961 (UMMZ); 1♀, *ibid.*, 29 Oct. 1961 (UMMZ). VENEZUELA: 1♀ (not as robust as other specimens), Km 109, El Dorado-Santa Elena, Bolivar (UCV).

Neoxabea obscurifrons Bruner

Fig. 17, 23, 28

Neoxabea obscurifrons Bruner, 1916, p. 399. Type-locality: Rio de Janeiro, BRAZIL. Type: ♀ lectotype (Walker 1966), ANSP.

The females of *obscurifrons* have the same color pattern as *brevipes* (Fig. 13); however, the median portion of the dorsal field of the tegmina is not nearly so dark, and there is little contrast between it and the lighter lateral areas. Consequently, *obscurifrons* is as drab as *brevipes* is striking. Furthermore, *obscuri-*

frons is 1 of the smaller, more slender species of *Neoxabea*, while *brevipes* is large and robust.

The males here ascribed to *obscurifrons* are small, slender, and drab and come from near the type-locality. Their distinguishing features are discussed under *trinodosa*.

Specimens examined.—BRAZIL: 2♀, type-locality, Oct. and Nov. (ANSP); 1♂, Viçosa, Minas Gerais (UMMZ); 1♂, *ibid.*, Nov. 1937 (ANSP); 1♀, Espirito Santo (ANSP); 1♀, Obidos, Pará, 2 Sep. 1919 (ANSP).

Neoxabea quadrula, new species

Fig. 19, 22, 28

This species belongs to the same group of species as *trinodosa*, *brevipes*, and *obscurifrons*. It differs from them in the male metanotum, stridulatory file, abdominal specialization, and cerci. It is described from a unique male. The name (*quadrula* = little square) refers to the structure on the eighth abdominal tergite.

Holotype.—Male, "COLOMBIA (A. Maria)," "Pacho, 1917" (ANSP). Coloration as in paler specimens of *bipunctata* and *formosa*. First antennal segment with poorly developed tubercle on the medioventrodistal margin; second segment with broadly rounded ventral swelling. Stridulatory file with 35 teeth, 1.23 mm long. Metanotum as in Fig. 22. Abdominal tergum 7 with posterior margin indented and bearing narrow, trapezoidal swelling with pronounced, rounded, lateral lobes projecting upward. Abdominal tergum 8 with projection as in Fig. 19; posterior of projection concave. Cerci similar to those of *astales* (Fig. 8).

Measurements (mm): Length of body 14; length of pronotum 3.0; caudal width of pronotal disk 2.5; length of tegmen 10.5; greatest width of dorsal field of tegmen 3.5; length of hind femur 9.0; length of cercus 1.6.

Neoxabea enodis, new species

Fig. 7, 16, 24, 28

N. enodis differs from all other species of *Neoxabea* in its bold cephalic pattern and peculiarly modified cerci. It is the largest of the 4 species that lack conspicuous abdominal specializations. The name (*enodis* = without knots) refers to its unadorned abdominal terga. The species is known from a single male.

Holotype.—Male; Dos Rios, 2 km NE. Terra, Napo-Pastaza Province, ECUADOR, 800 m, 9 May 1963, T. H. Hubbell, L. E. Peña G., Coll. no. 164 (UMMZ). Tegminal pattern as in *brevipes* (i.e., like dark *bipunctata* but with apical area darker); occiput black; vertex as in Fig. 16; third segment of maxillary palp with dorsal black line; antennal flagellum, posterior coxae, and abdominal tergite 10 infuscated. First antennal segment with acute tubercle; second with pimplelike swelling. Stridulatory file with 44 teeth, 1.55 mm long. Metanotum as in Fig. 24. Abdomen without tergal specializations. Cerci as in Fig. 7, straight portions parallel and opposed.

Measurements: Length of body 17; length of pronotum 3.5; caudal width of pronotal disk 2.5; length

of tegmen 11.1; greatest width of dorsal field of tegmen 3.8; length of cercus 2.8.

Neoxabea femorata, new species

Fig. 9, 11, 25, 28

This species and *astales* are superficially similar, and neither has conspicuous abdominal specializations. However, *femorata* differs from *astales* in the male cercal and metanotal characters. The name refers to the striped hind femora, characteristic of no other species of *Neoxabea*.

Holotype.—Male, Rancho Grande, Aragua, VENEZUELA, 21 July 1956, F. H. Test, Coll. no. 81 (UMMZ). General coloration similar to *bipunctata*. Occiput fuscopiceous. Each tegmen with 2 fuscous spots on inner margin and apex of dorsal field with fuscous border. Hind femur with prominent, longitudinal, dark stripe on anterior face. First antennal segment with medioventral swelling marked with fuscous band. Second segment with weak swelling with longitudinal fuscous mark. Stridulatory file with 33 teeth, 0.92 mm long. Metanotum as in Fig. 25. Tergites of abdominal segments 7 and 8 each with inconspicuous median swelling. Cerci as in Fig. 9.

Allotype.—Female, same locality as holotype, 1100 m, 21 May 1963, C. J. Rosales (UMMZ). Coloration similar to holotype, except tegmina as in Fig. 11. First 2 antennal segments and cerci similar to holotype.

Measurements of holotype and allotype: Length of body ♂ 13, ♀ 13; length of pronotum ♂ 2.9, ♀ 3.1; caudal width of pronotal disk ♂ 2.3, ♀ 2.0; length of tegmen ♂ 9.4, ♀ 10.7; greatest width of dorsal field of tegmen ♂ 3.0, ♀ 1.8; length of hind femur ♂ 7.4, ♀ 7.1; length of cercus ♂ 1.8, ♀ 1.7; length of ovipositor 5.2.

Paratypes.—4♂, 6♀. VENEZUELA: 1♂, 1♀, Rancho Grande, 1100 m, Aragua, 25 Apr. 1942, F. Fernandez Y. (UCV); 1♀, *ibid.*, 17 Nov. 1951, F. H. Test (UMMZ); 1♀, *ibid.*, 13 May 1955, C. J. Rosales (UCV); 1♀, *ibid.*, 13 Mar. 1956 (UCV); 1♂, 1♀, *ibid.*, 14 Sep. 1956, F. Fernandez Y. (UCV); 1♂, vicinity of Portachuelo Pass, near Rancho Grande, Aragua, 14 June 1960, F. H. Test (UMMZ); 1♀, Carret, Maracay, Choroni, Aragua, 27 May 1955, F. Fernandez Y. (UCV); 1♂, below Choroni Pass, S. side, 1300 m, Aragua, 16 Jan. 1952, F. H. Test (UMMZ).

Neoxabea astales, new species

Fig. 8, 26, 28

This species differs from *N. femorata* in having specialized male cerci and lateral projections on the rear of the posterior piece of the metanotal gland. The name (*astales* = unarmed) refers to the smooth abdominal terga.

Holotype.—Male; Chanchamayo, PERU (ANSP). Coloration as in *femorata*, except hind femur with inconspicuous stripe and first 2 antennal segments without fuscous marks. First segment of antenna with medioventral, pimplelike tubercle; second seg-

ment with slight swelling. Stridulatory file with 30 teeth, 1.02 mm long. Metanotum as in Fig. 26. Abdominal tergites without swellings. Cerci as in Fig. 8.

Allotype.—Female; Peru (ANSP). Coloration similar to that of *femorata*. Antennae as in holotype. Cerci similar to those of *femorata*, but with more acute apex.

Measurements of holotype and allotype: Length of body ♂ 16, ♀ 14; length of pronotum ♂ 2.8, ♀ 2.9; caudal width of pronotal disk ♂ 2.3, ♀ 2.0; length of tegmen ♂ 10.4, ♀ 11.0; greatest width of dorsal field of tegmen ♂ 3.5, ♀ 2.1; length of hind femur ♂ 7.5, ♀ 6.9; length of cercus ♂ 2.2, ♀ 2.0; length of ovipositor 5.2.

Paratype.—PERU: 1♂, Quiroz, Rio Paucartambo, 5 Nov. 1933, "found in cotton upon plantation" (ANSP).

Neoxabea lepta, new species

Fig. 2, 6, 27, 28

This species is placed in *Neoxabea* because the hind tibiae have no spines and the principal longitudinal veins of the male tegmina curve down into the lateral field. The uniform coloration, cerci, and male metanotal gland offer similarities with *Oecanthus*. The pretarsal claws are not like those of either *Neoxabea* or *Oecanthus*, and the stridulatory file contains more teeth than in any other species of oecanthine. When a generic revision of Oecanthinae is undertaken, *lepta* could be the basis of a new genus. The name (*leptos* = thin, delicate) describes the delicate appearance of the species.

Holotype.—Male, Hacienda Cincinnati, Sierra San Lorenzo, Magdalena, COLOMBIA, 4500 ft, 16–25 July 1920, Hebard (UMMZ). No dark markings; uniformly light brown, perhaps pale green in life. Antennal segments without markings or swellings. Maxillary palpus and fore tibia long and slender. Pretarsal claws as in Fig. 2. Stridulatory file with 90 teeth, 1.78 mm long. Metanotum as in Fig. 27. Abdomen without tergal specialization. Cerci as in Fig. 6.

Allotype.—Female, same data as holotype (ANSP). Similar to holotype.

Measurements of holotype and allotype: Length of body ♂ 14, ♀ 15; length of pronotum ♂ 3.0, ♀ 3.0; caudal width of pronotal disk ♂ 1.8, ♀ 1.6; length of tegmen ♂ 9.7, ♀ 11.1; greatest width of dorsal field of tegmen ♂ 3.1, ♀ 1.2; length and diameter of terminal joint of maxillary palpus ♂ 1.1, 0.1, ♀ 1.1, 0.1; length of fore tibia ♂ 4.6, ♀ 4.4; length of fore tibia from tympanum to apex ♂ 3.0, ♀ 3.1; length of hind femur ♂ 6.8, ♀ 7.0; length of cercus ♂ 3.0, ♀ 4.0; length of ovipositor 4.8.

Paratypes.—COLOMBIA: 1♀, same data as holotype (UMMZ); 1 juv., *ibid.* (ANSP).

Genus *Oecanthus* Serville

Whereas most species of *Neoxabea* are South American, the majority of New World species of *Oecanthus* are restricted to North America. Many more specimens of *Oecanthus* were available for study

than of *Neoxabea*, principally because of extensive UMMZ material from Mexico and Central America.

Useful taxonomic characters are scarcer in *Oecanthus* than in *Neoxabea*. Species of *Oecanthus* do not have specialized abdominal terga or cerci in the male, and the metanotal glands are generally of no aid in separating closely related species (Walker and Gurney 1967). However, in many species of *Oecanthus*, marks on the first 2 antennal segments are reliable identifying characters.

Oecanthus rileyi complex

The *rileyi* complex includes only 3 species that have been described: *rileyi* and *fultoni* from the United States, and *allardi* from the West Indies. The complex is characterized by a round or oval dark mark on each of the first 2 antennal segments, and by calling songs that are chirps or short trills produced with a highly regular, rhythmic tempo. The chirp rate is characteristic for the species, and varies from 22 to 270 chirps/min. Other features of the calling song that may be taxonomically and behaviorally important are the grouping or lack of grouping of pulses within the chirps, the pulse rate, the group rate, and the chirp duration. Most species of the *rileyi* complex have closely similar pulse rates. Consequently, it is not surprising that the stridulatory file has little taxonomic value. (Some of this information about calling songs in the *rileyi* complex is from unpublished work by R. D. Alexander.)

In studying approximately 200 specimens of the *rileyi* complex from Latin America, I could not resolve any new species or recognize with certainty *rileyi* or *fultoni*. Subsequent to my studies, R. D. Alexander did field work in Mexico and found at least 8 species of oecanthines belonging to the *rileyi* complex (unpublished). At present, specimens of the *rileyi* complex from south of the United States cannot be identified to species. Material from the West Indies is an exception, as only 1 species, *allardi*, occurs there.

The distribution of the *rileyi* complex includes Mexico (specimens from nearly all states, but very few from the northern, desert-scrub states), Guatemala, Honduras, Nicaragua, and Costa Rica. Records from South America are these: VENEZUELA: 1 ♀, E. Barinas, Barinas, Jan. 1943 (ANSP); 1 ♂, Caracas, D.F., 25 June 1950 (UCV); 4 ♂, 4 ♀, Magdaleno, Aragua, 20 Mar. 1957 (UCV). Throughout this range, specimens have stridulatory files with 40–49 teeth. In Nayarit, Jalisco, Michoacán, and Guerrero, Mexico, specimens with 29–33 teeth occur also. Three specimens from Michoacán bridge this gap, with 35, 36, and 38 teeth, respectively.

Oecanthus rileyi Baker

Oecanthus rileyi Baker, 1905, p. 81. Type-locality: near Claremont, CALIFORNIA. Type: ♂, USNM.

This species occurs on the west coast of the United States (Walker 1962), and most likely extends into Mexico. Its song at 25°C has approximately 112 chirps/min; within the chirps, the pulses are grouped

2–3–3–3–, with 8–14 pulses/chirp. At 25°C the frequency is approximately 2.5 kc, and the pulse rate 50 pulses/sec (Walker 1962).

Oecanthus allardi T. Walker and Gurney

Oecanthus allardi T. Walker and Gurney, 1960, p. 9, Fig. 1. Type-locality: St. Croix, VIRGIN ISLANDS. Type: ♂, USNM.

O. allardi is known from these islands in the West Indies: St. Kitts, St. Croix, St. Thomas, Puerto Rico, Mona, Hispaniola, Cuba, and Jamaica. Tape recordings of 3 individuals at Kingston, Jamaica, show the song to have these characteristics at 25°C: 22 chirps/min (same as Allard's 1957 data from Dominican Republic), 2.7 kc, 32–54 pulses/chirp, pulses grouped 2–3–3–3–, 13.5 trios/sec, 50 pulses/sec within the trios.

Oecanthus fultoni T. Walker

Oecanthus fultoni T. Walker, 1962, p. 309, Fig. 7D. Type-locality: Franklin County, OHIO. Type: ♂, UMMZ.

This species occurs throughout the United States, except for the Southeast, and probably extends into Mexico. Its song at 25°C is approximately 170 chirps/min, with the frequency, pulse rate, and grouping of pulses about the same as in the songs of *rileyi* and *allardi*. The number of pulses in a chirp is usually 8 or 5 (Walker 1962).

Oecanthus comma, new species

Fig. 15

Distinctive antennal markings separate this species from its closet relatives—the members of the *rileyi* complex. The name refers to the mark on the first antennal segment.

Holotype.—Male, 1 mi. W. Mil Cumbres, Michoacán, MEXICO, 9100 ft, 29 Aug. 1948, P. P. Dowling, Coll. no. 35 (in broadleaved trees in mixed forest) (UMMZ). General appearance and coloration like *fultoni*. Antennal markings (Fig. 15) on ivorylike swellings. Sensory area on terminal segment of maxillary palpus slightly more than $\frac{2}{3}$ length of segment. Stridulatory file with 44 teeth, 1.81 mm long.

Allotype.—Female, same data as holotype (UMMZ). Similar to holotype, except marks on first antennal segments narrower.

Measurements of holotype and allotype: Length of body ♂ 12, ♀ 11; length of pronotum ♂ 2.6, ♀ 2.3; caudal width of pronotal disk ♂ 2.3, ♀ 2.0; length of tegmen ♂ 13.5, ♀ 9.7; greatest width of dorsal field of tegmen ♂ 6.3, ♀ 1.9; length of hind femur ♂ 8.4, ♀ 7.5; length of ovipositor 4.9.

Paratypes.—19 ♂, 10 ♀. MEXICO: 12 ♂, 6 ♀, same data as holotype (UMMZ); 3 ♂, 9 rd. mi. NE. Taxco, Guerrero, 5700 ft, 17 Sept. 1959, I. J. Cantrall, T. J. Cohn, Coll. no. 137 (apparently thinned-out good woods now in scattered to grouped trees with thick growth of weeds, vines and bushes beneath) (UMMZ); 1 ♂, 1 ♀, Telolóapan, Guerrero, 1200± m, 3–6 Nov. 1947, H. O. Wagner (UMMZ); 1 ♂, 1 juv., San Cristóbal Las Casas, Chiapas, 11 Sep. 1947, H. O. Wagner (UMMZ); 1 ♀, W. edge Palmito,

Durango, 25 Oct. 1958, 6500 ft, T. J. Cohn, Coll. no. 226 (pine saplings, bracken, bushes, tall flowering weeds) (UMMZ). GUATEMALA: 3♂, 2♀, 4.5 mi. SW. Villa Nueva on Hwy. 3, Guatemala, 9 Oct. 1961, Hubbell, Cantrall, Cohn, Coll. no. 146 (weedy, grassy, bushy areas to open oak woodland) (UMMZ); 1♂, 1♀, 3.6 rd. mi. SE. San Jerónimo on Hwy. 19, Baja Verapaz, 17 Sep. 1961, Hubbell, Cantrall, Cohn, Coll. no. 107 (fairly heavy but thinned pine-sweetgum forest; trees with epiphytes; good understory of tall bushes and weeds) (UMMZ).

Study of stridulatory files of 8 paratypes showed 38–47 teeth and lengths of 1.53–1.82 mm. The 3 specimens with files less than 1.60 mm long were the only 3 from Guatemala that were examined.

Oecanthus leptogrammus T. Walker

Oecanthus leptogrammus T. Walker, 1962, p. 309, Fig. 7C. Type-locality: Brownsville, TEXAS. Type: ♂, ANSP.

O. leptogrammus is closely related to the United States species *exclamationis*. Further study is required to clarify their relationships, and to analyze the variation within what here is called *leptogrammus*. Most specimens of *leptogrammus*, including all those that are geographically closest to *exclamationis*, are easily distinguished from the latter by antennal markings and characteristics of the stridulatory file. However, specimens from southern Mexico cannot always be distinguished from *exclamationis*, and the *leptogrammus* of this revision may include some distinct *exclamationis* or an undescribed species.

Indeed, Walker and Gurney (1967) have showed recently that *exclamationis* and *leptogrammus* can be distinguished by characteristics of the metanotal gland, and on this basis the series recorded below from Oaxaca is *exclamationis*. No other doubtfully identified specimens from southern Mexico were available for re-examination. Specimens from Veracruz, Panama, and Guatemala, already positively identified as *leptogrammus*, were further confirmed as *leptogrammus* upon examination of the metanotal glands.

The habitat of *leptogrammus* is broad-leaved trees and shrubs. The calling song is similar to that of *O. niveus* (Walker 1962).

Specimens identified as *leptogrammus* come from the Atlantic and Pacific states of Mexico, the Central American countries, Colombia, and Venezuela. Details of distribution follow.

Specimens Examined.—MEXICO: 1♀, 5.4 rd. mi. S. Villa de Santiago, Nuevo León (UMMZ); 1♀, Salto del Agua, San Luis Potosí (UMMZ); 5♂, 2♀, Veracruz (ANSP, BM, UMMZ); 1♂, Venvidio, Sinaloa (ANSP); 1♀, Nayarit (ANSP); 1♀, Jalisco (ANSP); 2♂, 2♀, Michoacán (ANSP, UMMZ); 1♂, 29♀, Oaxaca (UMMZ); 2♀, Chiapas (ANSP, UMMZ). GUATEMALA: 2♀ (BM, USNM). HONDURAS: 3♀, 5 juv. (ANSP). NICARAGUA: 2♀ (ANSP). COSTA RICA: 1♀ (ANSP). PANAMA: 2♂, 2♀ (BM, UMMZ). COLOMBIA: 1♂, Aracataca, Magdalena (ANSP); 1♀, Hacienda Bolívar, Santa

Marta (ANSP). VENEZUELA: 1♂, San Esteban, Carabobo (ANSP).

Walker (1962) recorded 34 additional specimens, from localities between Brownsville, Texas, at the north, and the Sierra Nevada de Santa Marta, Colombia, at the south.

Oecanthus prolatus, new species

Fig. 14

This species resembles *leptogrammus*, but has a more elongate head and pronotum, a longer stridulatory file, and strikingly different antennal markings. The name (*prolatus* = elongate) refers to the unusually long pronotum. The males of *O. prolatus* have distinctive cerci, and the apex of the subgenital plate is broadly rounded rather than acute.

Holotype.—Female, Barro Colorado Island, Canal Zone, PANAMA, June 1940, Jas. Zetek, no. 4669, Lot no. 4022219 (USNM). Body uniformly pale, with slightly darker median areas on pronotum and vertex. Antennal marks (Fig. 14) on ivory swellings. Sensory area on terminal segment of maxillary palpus less than 1/3 length of segment. Cerci slender, with slightly thickened bases; each such base with slight constriction.

Allotype.—Male, V. de Chiriquí, 25–4000 ft, Champion (BM). Similar to female. Cerci with basal thickening more pronounced and constriction more evident. Stridulatory file with 28 teeth, 1.33 mm long.

Measurements of holotype and allotype: Length of body ♀ 19, ♂ 16; Length of pronotum ♀ 4.1, ♂ 3.5; caudal width of pronotal disk ♀ 2.0, ♂ 2.1; length of tegmen ♀ 15.0, ♂ 14.6; greatest width of dorsal field of tegmen ♀ 2.2, ♂ 4.6; length of terminal segment of maxillary palpus ♀ 1.3, ♂ 1.1; length of hind femur ♂ 11.1; length of cercus ♀ 6.1; length of thickened cercal base ♀ 1.2, ♂ 1.2; length of ovipositor 4.9.

Paratypes.—1♂, 3♀, 2 juv. PANAMA: 1♀, Barro Colorado Island, Sep.-Oct. 1940, at light, Jas. Zetek no. 4691 (USNM); 1♀ *ibid.*, Apr. 1941, no. 4777 (USNM); 1♀, *ibid.*, Nov. 1941, no. 4915 (USNM). COSTA RICA: 1♂, Cachí, 29 Apr. 1916, C. H. Lankester (ANSP); 1 juv., Rio María Aguilar, near San José, 3620 ft, 30 Aug. 1923, Rhen and Tristan (ANSP); 1 juv., Pacayas, SE. slopes of Volcán de Irazú, 6000–6250 ft, 6 Sep. 1923, Rehn and Lankester (ANSP).

The male from Costa Rica has a 1.39-mm stridulatory file with 27 teeth.

Oecanthus tenuis F. Walker

Oecanthus tenuis F. Walker, 1869, p. 95. Type-locality: Santarem, BRAZIL. Types: 2 ♀ syntypes, BM.

The relationship of *tenuis* and *lineolatus* is uncertain. Both are small and have the inner ventral edge of each of the first 2 antennal segments marked with a black line on an ivory swelling. The lines in the types of *tenuis* are thinner than the lines in the type of *lineolatus*; however, the variation within populations of *lineolatus* (as recognized here) is greater than that between the types of the 2 species. In the absence of the information necessary to decide upon

the distinctness of the 2 species, I shall call specimens from the Amazon basin northward *tenuis*, and specimens from farther south *lineolatus*. The type-locality of *tenuis* is on the Amazon River and that of *lineolatus* is the southernmost state of Brazil.

Specimens Examined.—VENEZUELA: 1 ♂, El Limón, Aragua, 450 m, 19 Nov. 1960, F. Fernández Y. (UCV). SURINAM: 1 ♀, Zandorij I. Boven, Paramaribo Dist., at light, 27 Apr. 1927 (ANSP).

The male from Venezuela has a 1.04-mm stridulatory file with 42 teeth.

Oecanthus lineolatus Saussure

Oecanthus lineolatus Saussure, 1897, p. 254. Type-locality: Rio Grande do Sul, BRAZIL. Type: ♂, Muséum d'Histoire Naturelle, Genève, Switzerland.

The status of *lineolatus* is discussed under *tenuis*.

The stridulatory files of 10 specimens of *lineolatus*, including the type, were examined. The number of teeth averaged 42 (32–48), and the average length was 1.23 mm (0.94–1.42). The type had a 1.42-mm file with 48 teeth.

Specimens Examined.—BRAZIL: 2 ♀, Independencia, Parahyba (ANSP); 2 ♂, 1 ♀, Chapada, Apr. and May (ANSP); 1 ♀, Lassance, Minas Gerais, 9–19 Nov. 1919 (ANSP); 1 ♀, Rio de Janeiro, Oct. (ANSP). ARGENTINA: 1 ♂, 2 ♀, 1 juv., Jujuy, Feb. 1920 (ANSP); 1 Rio Bermejo, Salta, 400 m (ANSP); 1 ♂, Carayate, Salta, Feb.–Mar. 1950 (FSCA); 3 ♂, 1 ♀, Tucumán, Mar.–May (FSCA); 1 ♂, San Ramón, Tucumán, Nov. 1947 (FSCA); 1 ♂, Cosquín, Sierra de Córdoba, 1–9 Mar. 1920 (ANSP).

Oecanthus varicornis F. Walker

Fig. 29

Oecanthus varicornis F. Walker, 1869, p. 94. Type-locality: MEXICO. Type: ♂, lost or destroyed.

Oecanthus marcosensis Baker, 1905, p. 81. Type-locality: San Marcos, NICARAGUA. Type: ♂, USNM.

This is the most widely distributed member of a complex of 4 species: *varicornis*, *californicus*, *major*, and *latipennis*. Whereas the other 3 species are allopatric, *varicornis* occurs throughout the range of *major* and overlaps slightly the range of *californicus*. Males of *varicornis* are distinguished by their short stridulatory files and fast-pulsed calling songs. Females cannot always be identified.

Specimens Examined.—MEXICO: *Baja California*: 1 ♂, 2 ♀, Sierra el Taste (CAS); 1 ♂, Espíritu Santo Isla (CAS); 1 ♂, 6.4 mi. N. Todos Santos (CAS); 1 ♂, 7 mi. N. Santa Anita (CAS); 1 ♂, 18.5 mi. from LaPaz airport (CAS). *Sonora*: 2 ♂, 1 ♀, San Carlos Bay, 10 Aug. 1960 (DCR); 1 ♂, 5 mi. E. Navojoa, 11 Aug. 1960 (DCR). *Sinaloa*: 2 ♂, Chele, 300 ft, 3 Apr. 1953, I. J. Cantrall, Coll. no. 78 (weedy field) (UMMZ). *Nuevo León*: 5 ♂, 7 ♀ (ANSP, CAS, FSCA, UMMZ). *Tamaulipas*: 4 ♂ (UMMZ). *San Luis Potosí*: 7 ♂, 3 ♀ (ANSP, UMMZ). *Aguascalientes*: 2 ♂ (UMMZ). *Jalisco*: 6 ♂, 4 ♀ (ANSP, UMMZ). *Colima*: 2 ♂, 5 ♀ (UMMZ). *Michoacán*: 18 ♂, 1 ♀ (ANSP, UMMZ). *Hidalgo*: 4 ♂, 1 ♀

(ANSP, UMMZ). *Mexico*: 1 ♂ (UMMZ). *Morelos*: 1 ♂, 6 ♀ (ANSP, CAS). *Guerrero*: 5 ♂, 5 ♀ (ANSP, CAS, UMMZ). *Veracruz*: 5 ♂, 1 ♀ (ANSP, CAS, DCR, UMMZ). *Oaxaca*: 16 ♂, 10 ♀, 1 juv. (ANSP, UMMZ, USNM). *Chiapas*: 4 ♂, 9 ♀ (ANSP, UMMZ). GUATEMALA: 4 ♂ (UMMZ, USNM). EL SALVADOR: 1 ♂, 1 ♀ (UMMZ). HONDURAS: 8 ♂, 13 ♀ (ANSP, UMMZ). COSTA RICA: 6 ♂, 4 ♀ (ANSP, UMMZ). PANAMA: 2 ♂ (ANSP, UMMZ). VENEZUELA: 3 ♂, El Limón, Aragua, 450 m, 9–15 Mar. 1951 (UCV); 1 ♂, El Valle, D.F., 20 June 1950 (UCV).

The stridulatory files of 91 specimens from localities throughout the range of *varicornis* were examined. Only those from areas of geographic overlap with *californicus* and *major* are plotted in Fig. 29. However, those from other areas had nearly the same range of values for length of file and number of teeth.

Specimens from Panama and Venezuela and most of those from Costa Rica have no marks on the basal segments of the antennae, and their flagella are not darker than the basal segments. In the specimens from Venezuela, the flagellum is consistently lighter than the basal segments—the exact opposite of the character that gave *varicornis* its name.

Oecanthus californicus Saussure

Fig. 29

Oecanthus californicus Saussure, 1874, p. 462. Type-locality: CALIFORNIA. Type: ♂, Muséum d'Histoire Naturelle, Genève, Switzerland.

O. californicus is distinguished from *major* primarily by its small size, short ovipositor, and closely spaced file teeth. It is characteristic of the desert scrub areas of northern Mexico, and is not known to overlap geographically with *major*. Where the 2 species are geographically closest (in Sinaloa), they are easy to distinguish. Specimens of *major* from farther south are sometimes difficult to distinguish from *californicus*. Data on the stridulatory file (Fig. 29) illustrate this point.

Specimens Examined.—MEXICO. *Sonora*: 2 ♂, 1 mi. NW. Alamos, 11 Nov. 1959, T. J. Cohn, Coll. no. 236 (grass, weeds, mesquite) (UMMZ); 1 ♂, 4.2 mi. N. Guaymas, 12 Nov. 1959, T. J. Cohn, Coll. no. 237 (UMMZ); 3 ♂, 40 mi. N. Hermosillo, 8 Aug. 1960 (DCR); 2 ♂, Alamos, 12 Aug. 1960 (DCR). *Sinaloa*: 2 ♂, 2 ♀, 20 mi. S. Guamuchil, 17 Dec. 1963 (DCR); 1 ♂, 26 mi. N. Pericos, 13 Aug. 1960 (DCR). [*Durango*.] 1 ♂, Lerdo, Nov. (ANSP). *Coahuila*: 1 ♂, 35 mi. S. Castaños, 25 Sep. 1958, T. J. Cohn, Coll. no. 139 (heavy weeds and bushes) (UMMZ); 1 ♂, Higueros, 14 Sep. 1936 (ANSP). *Zacatecas*: 1 ♂, 24 mi. SE. Sombrerete, 20 Oct. 1958, T. J. Cohn, Coll. no. 216 (bush desert).

Two specimens from Baja California may be *californicus*, but the stridulatory file data are so close to *varicornis* as to make the identification doubtful: 1 ♂, 7 mi. N. Santa Anita, 7 Jan. 1959, H. B. Leech (CAS) (43 teeth, 1.18 mm); 1 ♂, Espíritu Santo Isla, 23 Mar. 1953, P. H. Arnaud (CAS) (43 teeth, 1.03 mm).

Oecanthus major, new species

Fig. 29

O. major has the largest individuals and the longest ovipositors known for oecanthines. It deserves its specific name (*major* = larger).

Holotype.—Male, 37 mi. SE. Culiacan, Sinaloa, MEXICO, 100 ft, 28 Oct. 1958, T. J. Cohn, Coll. no. 233 (flatland near hills, low small trees, good growth of weeds) (UMMZ). Coloration like that of *varicornis*; first 2 antennal segments reddish-brown, antennal flagellum black at base, lighter apically. Sensory area of terminal segment of maxillary palpus slightly more than ½ length of segment. Stridulatory file with 34 teeth, 1.36 mm long.

Allotype.—Female, same data as holotype (UMMZ). Similar to male. First segment of antenna with indistinct dark line on medioventral edge.

Measurements of holotype and allotype: Length of body ♂ 18, ♀ 20; length of pronotum ♂ 3.2, ♀ 3.6; caudal width of pronotal disk ♂ 2.9, ♀ 2.7; length of tegmen ♂ 14.0, ♀ 14.1; greatest width of dorsal field of tegmen ♂ 7.2, ♀ 3.2; length of hind femur ♂ 11.6, ♀ 13.0; length of ovipositor 16.0.

Paratypes.—38♂, 14♀, 2 juv. MEXICO: *Sinaloa*: 1♀, same data as holotype (UMMZ); 1♀, 66 mi. SE. Culiacan, 200+ ft, 6 Nov. 1958, T. J. Cohn, Coll. no. 258 (UMMZ); 1♂, 1♀, *ibid.*, 8 mi., 16 Nov., Coll. no. 289 (weedy field, some bushes) (UMMZ); 1♀, *ibid.*, 2 mi. W., 150 ft, Coll. no. 290 (UMMZ); 1♀, *ibid.*, 73 mi. SE., 18 Nov., 300± ft, Coll. no. 296 (edge of woods) (UMMZ). *Jalisco*: 1♂, 5.7 mi. N. Tecalitlan, 3900 ft, 28 Sep. 1959, I. J. Cantrall, T. J. Cohn, Coll. no. 189 (UMMZ); 2♀, 13 mi. SW. Guadalajara, 5300 ft, 24 Nov. 1958, T. J. Cohn, Coll. no. 310 (weeds and bushes) (UMMZ). *Michoacán*: 2♂, 4 rd. mi. W. Jiquilpan, 6100 ft, 25 Nov. 1958, T. J. Cohn, Coll. no. 312 (UMMZ); 2♂, 3 mi. S. Carapan, 6800 ft, 24 Sep. 1959, I. J. Cantrall, T. J. Cohn, Coll. no. 172 (UMMZ); 6♂, 1♀, between Zacapu and Zamora, 7500 ft, 6 Sep. 1938, H. R. Roberts (UMMZ); 1♂, Morelia, 6–8000 ft, 4–5 Sep. 1938, H. R. Roberts (UMMZ); 1♂, 5 mi. S. Chilchota, 6–7000 ft, 15 Aug. 1940, H. R. Roberts (UMMZ). *Guerrero*: 1♂, 1♀, 6 rd. mi. NE. Arcelia, 3100± ft, 8 Dec. 1958, T. J. Cohn, Coll. no. 361 (dense mat of tall weeds) (UMMZ); 1♂, 3 mi. N. Chilpancingo, 18 Nov. 1946, F. E. Skinner (CAS). *Morelos*: 1♂, Oct., Koebele (CAS); 3♂, Nov., Koebele (CAS); 2♀, Cuernavaca, 20–25 Nov. 1902, Koebele (CAS). *Guanajuato*: 5♂, 11 rd. mi. E. San Luis de la Paz, 6900 ft, 29 Aug. 1959, I. J. Cantrall, T. J. Cohn, Coll. no. 46 (UMMZ). *Queretaro*: 5♂, 2♀, 9 mi. SE. Queretaro, 6300 ft, 15 Oct. 1958, T. J. Cohn, Coll. no. 191 (weeds, bushes, pear cactus) (UMMZ). *Hidalgo*: 2♂, 1♀, 7 mi. SE. Zimapan, 6300± ft, 30 Aug. 1959, I. J. Cantrall, T. J. Cohn, Coll. no. 52 (weeds and bushes) (UMMZ). *Puebla*: 4♂, 2 juv., Km 266 NW. Tehuacan, 6500 ft, 23–25 Aug. 1936, H. R. Roberts (UMMZ); 2♂, *ibid.*, 16 Aug. 1938 (UMMZ).

Among the paratypes, pronotal length varies from

2.8 to 3.2 in the males and from 2.8 to 3.7 in the females. The ovipositor length ranges from 6.2 to 17.

Most specimens of *major* are too robust to be mistaken for any species other than *latipennis* of eastern United States. *O. major* has a thicker pronotum than *latipennis*, and there is almost no overlap in ovipositor length. The Mexican species closest to *major* is *californicus*. All series of specimens in this study could be identified by size, stridulatory files, and ovipositors. Individual specimens, especially females, were sometimes not identifiable.

Oecanthus argentinus Saussure

Oecanthus argentinus Saussure, 1874, p. 460. Type-locality uncertain (T. Walker 1963). Type: ♀, Museum d'Histoire Naturelle, Genève, Switzerland. *Oecanthus rehmii* Baker, 1905, p. 82. Type-locality: Santa Clara County, CALIFORNIA. Type: ♂, USNM.

This species and the following 2 belong to the *nigricornis* group, a complex of species centering in the United States (Walker 1963). The 3 Mexican species have the greater portion of the ranges within the United States. Mexican specimens do not differ significantly from their United States counterparts.

Specimens Examined.—MEXICO. *Sonora*: 2♂, 2♀, Nainari (ANSP); 1♂, 2♀, 42 km S. Nogales (CAS); 1♀, Hermosillo (DCR). *Coahuila*: 1♂, 20 mi. W. Saltillo (ANSP). *Sinaloa*: 1♂, 2♀, Los Mochis (ANSP); 1♀, Villa Unión (ANSP); 1♂, 7.6 mi. N. Culiacan (UMMZ); 2♂, 3♀, 2 juv., Culiacan (UMMZ); 1♀, Mazatlan (DCR). *Durango*: 1♀, Tlahuililo (USNM); 1♀, San Jacinto (UMMZ). *San Luis Potosí*: 1♂, 15 mi. NE. San Luis Potosí (ANSP).

Oecanthus quadripunctatus Beutenmuller

Oecanthus quadripunctatus Beutenmuller, 1894, p. 250. Type-locality: Ellenville, NEW YORK. Lectotype: ♂, USNM.

Specimens Examined.—MEXICO. *Coahuila*: 1♀, 29 rd. mi. SE. Arteaga (UMMZ). *Tamaulipas*: 2♂, 1♀, Matamoros (ANSP).

Oecanthus celerinictus T. Walker

Oecanthus celerinictus T. Walker, 1963, p. 773, Fig. 18F. Type-locality: Gainesville, FLORIDA. Type: ♂, USNM.

Specimens Examined.—MEXICO. Nuevo León: 6♂, 4♀, 15 mi. N. Linares (UMMZ); 3♂, 2♀, 1 mi. S. Monterrey (UMMZ); 1♀, China (UMMZ); 1♀, 10 mi. S. Linares (ANSP). *Tamaulipas*: 1♂, 4♀, 17 mi. N. Victoria (UMMZ); 1♀, Matamoros (USNM). *Veracruz*: 1♀, Vera Cruz (ANSP).

Oecanthus pictipes Rehn

Oecanthus pictipes Rehn, 1917, p. 131, pl. 3, Fig. 19–21. Type-locality: Natal, Rio Grande do Norte, BRAZIL. Type: ♂, ANSP.

This is a conspicuously marked, tiny oecanthine, with a stridulatory file crowded with teeth. The file of the type has 51 teeth in 0.90 mm; 2♂ from Argentina and Paraguay have 50 and 53 teeth, in 0.97 and 1.08 mm, respectively. *O. pictipes* is known from the following localities.

Specimens Examined.—BRAZIL: *Rio Grande do Norte*: 2♂, type-locality (ANSP). *Minas Gerais*: 1♀, Lassance, 9–19 Nov. 1919 (ANSP). PARAGUAY: 1♂, Estancia Primera, Caaguazú, 27 Nov. 1931, R. F. Hussey (UMMZ). ARGENTINA: *Misiones*, 2♂, Dec. (ANSP).

***Oecanthus minutus* Saussure**

Oecanthus minutus Saussure, 1878, p. 454. Type-locality: Pernambuco, BRAZIL. Type: ♂, lost or destroyed. *Oecanthus brasiliensis* Bruner, 1916, p. 397. Type-locality: Corumbá, BRAZIL. Type: ♀, ANSP.

This tiny species has an ivorylike swelling on the medioventral surface of the first antennal segment. Three of 4 specimens from Chapada have the swelling marked with a dark line. The remaining specimens assigned to *minutus*, including the type of *brasiliensis*, lack the dark line.

The stridulatory files of 2 Chapada males, 1 with and 1 without antennal marks, each have 37 teeth, and are 1.18 and 1.16 mm long, respectively. A male from Teutonia has a 1.68-mm file with 45 teeth.

Specimens Examined.—BRAZIL: *Mato Grosso*: 3♂, 1♀, Chapada, April (ANSP); 1♀, Corumbá highland, March (type of *brasiliensis*; ANSP). *Santa Catarina*: 1♂, Teutonia, 27°11'S, 52°23'W, 28 Nov. 1959 (UMMZ). *Rio de Janeiro*: 1♀, Petropolis, 2800 ft, 16 Dec. 1962, T. H. Hubbell, Coll. no. 5 (UMMZ). ARGENTINA: *Misiones*: 1♀, 29 Mar. 1910 (ANSP).

***Oecanthus immaculatus* Bruner**

Oecanthus immaculatus Bruner, 1906, p. 184. Type-locality: TRINIDAD, W.I. Type: ♀, Univ. of Nebraska State Museum, Lincoln.

The calling song of *immaculatus* in Trinidad is a series of trills of irregular duration, with brief intervals—much like the song of *exclamationis* in eastern United States. Analysis of 3 tapes shows a pulse rate of approximately 65/sec and a frequency of 2.7 kc at 25°C.

Specimens Examined.—TRINIDAD, W.I.: 1♀, type (Univ. Nebr. State Mus.); 2♂, Simla, Arima Valley, 800 ft, abandoned cocoa plantation, 28–29 June 1966 (FSCA). COLOMBIA: 2♀, Vista Nieve, Sierra Nevada de Santa Marta, 5200 ft, at light, 6–7 Aug. 1926 (UMMZ); 1♀, San Antonio, 14 Apr. 1908 (ANSP).

The 2 Trinidad males have stridulatory files measuring 0.94 and 0.98 mm, respectively, each with 24 teeth. Lengths and caudal widths of the pronotum of both these males are 2.9 and 1.8 mm, respectively; of the 2 Vista Nieve females, 3.1 and 1.9 mm; of the San Antonio female, 2.9 and 1.9 mm; and of Bruner's type, 3.0 and 1.6 mm. In all specimens, the pronotum is conspicuously flared above the coxae.

***Oecanthus peruvianus* F. Walker**

Oecanthus peruvianus F. Walker, 1869, p. 95. Type-locality: PERU. Type: ♂, lost or destroyed.

A male from Peru in the UMMZ collection fits F. Walker's description and is distinct from other species recognized in this revision. It has immaculate antennae, its pronotal length and width are 2.6 and

2.1 mm, respectively, and its 1.28-mm stridulatory file has 35 teeth. A similar female has the pronotum 2.3 mm long and 1.7 mm wide.

Specimens Examined.—PERU: 1♂, Utcuyacu Prov., Tarina, Dep. Junin, 1600–3000 m, 15 Feb. 1948 (UMMZ); 1♀, 11°8'S, 75°17'W, May 1909 (USNM).

Chopard's (1954, 1956) records of *peruvianus* from 3 localities in Peru may or may not refer to the same species as the one called *peruvianus* here. Hebard's (1928) record of *peruvianus* from San Antonio, Colombia, is based on a specimen here assigned to *immaculatus*.

***Oecanthus nanus*, new species**

This species is the only short oecanthine that is broad. It gives the general impression of a miniature *O. latipennis* (*nanus* = dwarf).

Holotype.—Male, Guayaquil, Guayas, ECUADOR, 20 Apr. 1963, T. H. Hubbell, L. E. Peña G., Coll. no. 140 (UMMZ). Background color like that of *quadripunctatus*; no dark marks on antennae. First segment of antenna with medioventral swelling. Sensory area of terminal segment of maxillary palpus more than 1/2 length of segment. Stridulatory file with 51 teeth, 1.11 mm long.

Allotype.—Female, same data as holotype (UMMZ); similar to holotype.

Measurements of holotype and allotype: Length of body ♂ 9, ♀ 10; maximum width of ♀ 3.5; length of pronotum ♂ 1.9, ♀ 2.0; caudal width of pronotal disk ♂ 2.2, ♀ 1.8; length of tegmen ♂ 9.9, ♀ 8.2; greatest width of dorsal field of tegmen ♂ 4.7, ♀ 1.8; length of hind femur ♂ 7.3, ♀ 7.5; length of ovipositor 4.3.

Paratypes.—5♂, 6♀. ECUADOR: 4♂, 5♀, same data as holotype (UMMZ); 1♂, Guayaquil, F. Campos (ANSP); 1♀, Duran, 9 June 1914, H. S. Parish (ANSP).

The stridulatory files of 2 paratypes have 53 and 54 teeth, and measure 1.19 and 1.18 mm, respectively.

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