
THE
MOGOPLISTINAE
OF
THE UNITED STATES
(ORTHOPTERA: GRYLLIDAE)

BY
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THE MOGOPLISTINAE (ORTHOPTERA, GRYLLIDAE) OF THE UNITED STATES

BY MORGAN HEBARD

(Plates XXIII-XXIV)

In 1912¹ Rehn and Hebard published on these insects, including all the material they had from North America south to Panama. Since that time much more material has been received and a number of tropical American species have been described. One genus there described, *Glaphyropus*, is known to be a synonym of *Cycloptiloides* Sjostedt; that genus, erected to include an African species, having been described in a paper which did not reach us until after our paper had appeared.

We find we have now sufficient material to revise fully the forms of the United States; represented by three genera, nine species and two geographic races.

Much yet remains to be done to fully delimit the areas of distribution, particularly of the races here recognized of *Cycloptilum comprehendens*, but we believe that little new will subsequently be found in the United States. The species to the south of this country are far more difficult and less well understood, and we plan to treat them from time to time as new faunistic papers are prepared.

In the present study seven hundred and thirty-nine specimens are recorded, and in addition over five hundred from the same region, previously correctly reported, have been examined. Additional material is particularly needed from Oklahoma, northern New Mexico and Arizona, southern Nevada and southern California. So small are these nocturnal insects that they are very apt to be overlooked by the collector and it is for this reason that, though probably moderately abundant through the regions mentioned above, enough material has not yet been secured there.

¹ Proc. Acad. Nat. Sci. Philadelphia, 1912, pp. 184 to 234.

Key to the Genera here Treated

Dorsal margins of caudal metatarsus serrate or serrulate. Interantennal protuberance not deeply divided.

A. Cephalic tibiae without auditory foramina. Both sexes apterous. Caudal metatarsus very feebly serrulate. (Apex of ovipositor at its base wider than shaft, sublanceolate.) (Southern Florida.)

Oligacanthopus Rehn and Hebard

AA. Cephalic tibiae with a large auditory foramen on cephalic face. Male with tegmina present. Caudal metatarsus more strongly serrulate or serrate.

B. Apex of ovipositor at its base wider than shaft, sublanceolate. Pronotum of male produced caudad so that the tegmina are wholly concealed from above or only their distal portions are visible from that angle. Caudal metatarsus of approximately subequal width beyond base, its dorsal margins serrulate. (Southern half of United States.)

Cycloptilum Scudder

BB. Apex of ovipositor no wider than shaft. Pronotum of male little produced caudad, so that only the proximal portions of the tegmina are covered. Caudal metatarsus broadest beyond base, thence narrowing to apex, its dorsal margins serrate. (Southwestern United States.)

Hoplosphyrum Rehn and Hebard

Our work has been greatly facilitated by the fact that, in reply to our requests, all of the material at the United States National Museum, the University of Michigan, the University of Kansas and from the Davis Collection has been sent for study. We have also received a few other important specimens from other Institutions. Material taken by Rehn and Hebard belongs to the Academy of Natural Sciences of Philadelphia or to the author's collection there deposited.

***Oligacanthopus prograptus* Rehn and Hebard**

1912. *Oligacanthopus prograptus* Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 219, figs. 21 to 23. [♀; Miami, Florida.]

1915. *Oligacanthopus prograptus* Hebard, Ent. News, xxvi, p. 462, pl. 18, figs. 2a and 2b. [♂, ♀, juvs.; Miami, Florida.]

In 1915 discovery of the male showed that in this very extraordinary genus that sex was also apterous and very similar in general appearance to the female.

The four vertical dark bars on the vertical face of the interantennal protuberance constitute the most striking of the color characters. The scale covering is much heavier than in *Cycloptilum* and gives a definitely silvery appearance, mottled and speckled with dark brown.

Specimens Examined: in addition to large series previously reported; six; 1 male, 1 female and 4 immature individuals.

FLORIDA: Miami, XI, 27, 1912, (F. Knab), 1 small juv., [U. S. N. M.]. Brickell's Hammock, Miami, II, 25 to III, 4, 1916 and 1919, (Hebard; under bark of trees noted below), 1 ♀ (on II, 28th), 3 juv. ♀. Royal Palm Key, III, 3, 1917, (Hebard; under loose bark of tree, *Exothea paniculata*, in jungle), 1 ♂.

The insect is nocturnal and during the day hides under loose patches of bark on trees in and near the tropical "hammocks," those most frequented being *Exothea paniculata* and *Coccolobus laurifolia*.

In 1916 we extended the known distribution to the West Coast of Florida, by finding a specimen under the bark of *Exothea paniculata* on Captiva Island at Captiva Pass.

Though, if located, series can be obtained by hard work, we consider this one of the rare species of tropical Florida.

Cycloptilum Scudder

1868. *Cycloptilum* Scudder, Proc. Boston Soc. Nat. Hist., XII, p. 142.

Genotype: *C. squamosum* Scudder (by monotypy).

In 1912 Rehn and Hebard proposed *Cryptoptilum* for related forms in which the male tegmina were wholly concealed from above by the pronotum. Additional species since discovered show the pronotum produced in widely varying degree and we agree fully with Blatchley, who in 1920 placed *Cryptoptilum* as a synonym.

The genus *Cycloptilum* is very close to *Ectatoderus* Guérin 1849 and better knowledge of the species of the Old World may oblige its being placed as a synonym. Examination of a male of *Ectatoderus kilimanjaricus* Sjostedt,² a species closely related to the genotype *Ectatoderus nigriventris* Guérin from Abyssinia, shows it to differ from all American species of *Cycloptilum* in the following respects.

Palpi with third, fourth and fifth joints elongate, third slightly longer than fourth, fifth considerably longer than third. Cephalic tibiae of equal width, showing no swelling whatever. Male concealed genitalia hardly projecting; two processes present as in the American species but these shorter, heavier and more rounded than in those species.

² From Kiboscho, Kilimanjaro, taken in March by Alluaud and belonging to the Paris Museum. We have received this specimen for the present comparison through the kindness of Dr. L. Chopard.

The male pronotum is greatly produced, but this degree of production is equalled in the South American *Cycloptilum thoracicum* Hebard. In all other features which could have generic value close similarity between *kilimanjaricus* and the New World species of *Cycloptilum* is found.

The following key gives only the features of greatest value in separating the forms of *Cycloptilum* found in the United States. Other features which aid in distinguishing these are considered under the discussions here given.

A1. Size larger (length of body 6.5 to 8.5 mm.). Male tegmina completely concealed from above by the pronotum. (Female subgenital plate without projections.)

B1. Terminal palpal joint elongate, evenly and weakly expanding distad, so that ventral margin is decidedly greater than apical diameter. Form more robust. Southeastern (coastal North Carolina to Mexican border).

BB1. Terminal palpal joint shorter, evenly and strongly expanding distad, so that ventral margin is equal to apical diameter. Form more slender. Southeastern (Maryland to eastern Texas).

AA1. Size smaller (length of body 4.9 to 7.2 mm.). Male tegmina with distal portion projecting as a broad margin or very broadly beyond caudal margin of pronotum.

B2. Female subgenital plate without projections, its disto-lateral angles broadly convex.

C1. Male pronotum moderately produced caudad, with caudal margin broadly convex. Pronotum normally immaculate; if paired darker areas are indicated cephalad, these are very weak and vague.

D1. Male pronotum usually distinctly less ample. Male tegmina strikingly marked with blackish brown. Size averaging smaller. (Extreme southern Florida.)

DD1. Male pronotum distinctly more ample (as in *squamosum* and *bidens*). Male tegmina immaculate or weakly marked with brown. Size averaging larger. (South central United States and along Gulf Coast to Cedar Keys, Florida.) *squamosum* Scudder

³ The Haytian *C. connectum* (Rehn and Hebard) is much the closest known relative of this species.

- CC1. Male pronotum decidedly produced caudad and with caudal margin more convex than in any other species here treated. Pronotum with heavy paired dark markings cephalad. (Extreme southern coastal California.) *distinctum* new species
- BB2. Female subgenital plate with disto-lateral angles produced. (Pronotal form much as in *squamosum*.)
- C2. Female subgenital plate with very minute sharp projections disto-laterad, between which emargination is shown. Male tegmina strikingly marked with blackish brown. Pronotum immaculate. Form more graceful. South-eastern (Long Island, New York to central Louisiana).
bidens new species
- CC2. Female subgenital plate with decided projections disto-laterad. Male tegmina immaculate or very feebly marked. Pronotum with heavy paired dark markings cephalad, sometimes becoming weak and occasionally obsolete. Form more robust.
- D2. Latero-caudal projections of female subgenital plate triangular, no longer than wide, with rounded apices. (Southern Great Basin.)
comprehendens interior new subspecies
- DD2. Latero-caudal projections of female subgenital plate produced in flat fingers, much longer than wide.
- E1. Latero-caudal projections of female subgenital plate decidedly broader and widening much more strongly toward base. (Southwestern Texas to southeastern California.) *comprehendens fortior* new subspecies
- EE1. Latero-caudal projections of female subgenital plate very slender. (Southwestern Nebraska to Mexican line and Farmington, New Mexico.)
comprehendens comprehendens Hebard

Two groups are represented, which we designate as the Antillarum and the Squamosum Groups; distinguished as indicated in sections A1 and AA1 of the present key. In the American tropics are numerous species of the former and many suggest the latter but may belong to an allied group, while still another very distinct group is represented by the Colombian *C. thoracicum* Hebard.

Cycloptilum antillarum (Redtenbacher)

1892. *E[ctatoderus] antillarum* Redtenbacher, Proc. Zool. Soc. London, 1892, p. 218, pl. 17, figs. 16a, 16b. [♂, ♀; St. Vincent, West Indies.]

1912. *Cryptoptilum antillarum* Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 196, figs. 5 to 8.

There are only the following notes and additional records to add to the diagnosis and figures given by Rehn and Hebard. Since then the author has recorded the species from Panama.

Comparison of series shows *antillarum* to average larger and heavier than *trigonipalpum*, with the abdomen less extensively black and less shining and the cerci and ovipositor shorter in proportion to the body length. The abdomen is of course only as noted above when the scale-covering has been rubbed off, but this is very frequently the case in museum specimens, particularly of *trigonipalpum*. The much longer and much less expanded ultimate palpal joint of *antillarum* affords, however, the most striking difference from *trigonipalpum*.

We now know that the distribution of this insect extends along the ocean shore from Beaufort, North Carolina to the Mexican Boundary and through the Florida Keys and the Dry Tortugas.⁴ It occurs inland very rarely, such records being Florence, South Carolina; Gainesville and Haines City, Florida, and Wellborn and Flatonia, Texas.

Specimens Examined (in addition to very large series previously correctly recorded): 161; 65 males, 67 females and 29 immature individuals.

GEORGIA: Tybee Island, VII, 26, 1913, 1 ♂, 1 large juv. ♂, 1 large juv. ♀, [Hebard Cln.].

FLORIDA: Pomona, IX, 1, 1917, (Rehn; on palmetto leaf in flat woods), 1 ♀. Gainesville, VIII, 1926, (T. H. Hubbell), 1 large juv. ♀, [Univ. of Michigan Cln.]. Cedar Keys, VII, 22, 1923, (F. W. Walker), 1 ♂, [Univ. of Michigan Cln.]. DeLeon Springs, IX, 8, 1917, (Rehn and Hebard; beaten from undergrowth in lofty oak hammock), 1 ♂, 1 ♀. Haines City, VIII, 21, 1925, (T. H. Hubbell), 1 ♂, [Univ. of Michigan Cln.]. Indian Beach, Sand Key, Pinellas County, IX, 17, 1917, (Rehn and Hebard; few in dense growth of bayberry and other shrubs), 1 ♂, 3 ♀. Cortez Beach, Manatee County, VIII, 24, 1925, (T. H. Hubbell), 12 ♂, 19 ♀, 3 juv. ♂, 3 juv. ♀, [Univ. of Michigan Cln.]. Manatee, VIII, 24, 1925, (T. H. Hubbell; in weedy thicket bordering marsh), 1 ♀, [Univ. of Michigan Cln.]. Snead's Island, Manatee County, VIII, 20, 1925, (T. H. Hubbell; in Cabbage Palmetto and oak hammock), 3 ♂, 1 juv. ♂, 3 juv. ♀, [Univ. of Michigan Cln.]. Lee County, VIII, 28, 1923, (Walker and Alexander), 2 ♂, [Univ. of Michigan Cln.]. Brickell's Hammock, Miami, III, 5, 1920, (Hebard; beaten from heavy hammock undergrowth), 1 ♀; III, 4, 1916, (Hebard; on mangrove in mangrove swamp), 1 ♀. Western end of Long Island, Biscayne Bay, III, 5, 1922, (Hebard), 1 ♀. Crevallo, VIII, 9, 1930, (P. W. Oman), 1 ♂, 3 ♀, [Univ. of Kansas]. Key Largo, VIII, 9, 1930, (R. H. Beamer), 9 ♂, [Univ. of Kansas]. Cape Sable,

⁴ See notes by Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1914, p. 410.

II, 28, 1919, (W. S. Blatchley), 1 ♂, [Hebard Cln.]. Carrabelle, IX, 2 and 3, 1915, (Rehn; beaten from bushes on tidal salt marsh), 4 ♀. Pensacola, VIII, 29, 1915, (Hebard; from gall-berry bushes in Long-leaf Pine woods), 1 ♀. Fort Barrancas, VIII, 28, 1915, (Rehn; beaten from scanty undergrowth in sand area), 1 ♂, 3 ♀, 3 juv.

ALABAMA: Springhill, Mobile County, VIII, 25, 1915, (Rehn; beaten from heavy bushes in dense oak forest), 1 ♂.

MISSISSIPPI: Pass Christian, VIII, 23, 1915, (Rehn and Hebard; sweeping in pine woods), 1 ♀.

LOUISIANA: Rhoda, St. Mary Parish, VIII, 8, 1915, (Rehn and Hebard; from swamp area about pond), 1 ♀, 1 juv. ♀. Lafayette, VIII, 9, 1915. (Rehn and Hebard), 3 ♂, 2 ♀, 3 small juv.

TEXAS: Sabine, VIII, 11, 1915, (Rehn and Hebard; moderately common in marsh grass on tidal flats), 5 ♂, 3 ♀, 3 juv. ♀. Houston, VIII, 12, 1915, (Rehn and Hebard; from spanish moss on oak), 1 ♂. Flatonia, VIII, 20, 1912, (Rehn and Hebard; from dense tangle of vines and weeds in stream bottom), 4 ♂, 3 ♀. Victoria, VII, 26 and 27, 1912, (Rehn and Hebard; very common in tangle of vines growing in tall weeds in stream-bottom forest), 9 ♂, 7 ♀, 4 juv. Brownsville, VII, 31 and VIII, 1, 1912, (Rehn and Hebard; beaten from vines and high weeds in river bottom), 4 ♂, 8 ♀, 2 juv. ♀; VIII, 3, 1928, (Beamer and Shaw), 1 ♂, 2 ♀, [Univ. of Kansas Cln.]. Piper Plantation near Brownsville, VIII, 3, 1912, (Rehn and Hebard), 3 ♂, 2 ♀.

Cycloptilum trigonipalpus (Rehn and Hebard)

1912. *Cycloptilum trigonipalpus* Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 204, figs. 11, 12, 15 and 16. [♂, ♀: type locality, Isle of Hope, Georgia.]

This insect has the caudal tibiae and tarsi more slender and delicate than in *antillarum*. Other differences are noted under that species.

The range of *trigonipalpus* is now known to reach from Bay Ridge, Maryland to Key Largo, Florida on the Atlantic Coast and the Bahamas, extending far inland of that of *antillarum* and reaching as far as Petersburg, Virginia; Weldon, North Carolina; Columbia, South Carolina; (north to) Stone Mountain and Warm Springs, Georgia; Dothan, Montgomery and Selma, Alabama; Strickton and Natchez, Mississippi; West Monroe and Arcadia, Louisiana, and Doucette, Texas, the last being the known westernmost point as well. Other material was recorded from within this range by Rehn and Hebard in 1914 and by Hebard in 1915 and 1916.

Specimens Examined, in addition to many previously correctly recorded: 159; 43 males, 40 females and 76 immature individuals.

MARYLAND: Bay Ridge, VIII, 20, 1 juv. ♂, [U. S. N. M.]. Piney Point, IX, 14, 1902, (Pergande), 1 ♀, recorded by Rehn and Hebard in 1912 as *squamosum*, [U. S. N. M.].

GEORGIA: Perry, Houston County, IX, 10, 1924, (T. H. Hubbell), 1 ♀, [Univ. of Michigan Cln.]. Thomasville, VIII, 3, 1903, (for Hebard), 1 large juv. ♂, recorded by Rehn and Hebard in 1912 as *squamosum*. Bainbridge, IX, 5 and 6, 1915, (Rehn and Hebard; few beaten from oak shoots in oak woods), 3 ♂.

FLORIDA: Hilliard, VIII, 19, 1930, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Waldo, VIII, 18, 1930, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Gainesville, (adults) VII to X, 17, 1923 to 1925, (Hubbell, Walker, Alexander; in leaves and spanish moss on ground in high "hammock," on oak trunk at night, in room attracted to light during night, under street light), 4 ♂, 8 ♀, 12 juv. ♂, 11 juv. ♀, [Univ. of Michigan Cln.]. Ocala, IX, 19, 1917, (Hebard; beaten from bushes in Live Oak "hammock"), 1 ♂. Cedar Keys, IX, 28, 1923 and X, 19, 1924, (F. W. Walker), 2 ♂. [Univ. of Michigan Cln.]. De Leon Springs, IX, 8, 1917, (Rehn and Hebard; beaten from undergrowth of lofty oak "hammock"), 1 ♂. Orlando, VIII, 29, 1924, (F. W. Walker), 2 ♂, [Univ. of Michigan Cln.]. Trilby, Pasco County, IX, 16, 1917, (Hebard; beaten from undergrowth in pine woods), 1 ♂. Indian Beach, Sand Key, Pinellas County, IX, 17, 1917, (Rehn and Hebard; very scarce in dense growth of bayberry and other shrubs), 1 ♂. Lakeland, IX, 11, 1917, (Rehn and Hebard; numerous in spanish moss on Live Oaks), 3 ♂, 2 ♀. Cortez Beach, Manatee County, I, 4, 1925, (T. H. Hubbell; sweeping branches of Red Mangrove at night), 1 ♂, 1 ♀, 5 juv. ♂, 2 juv. ♀, [Univ. of Michigan Cln.]. Snead's Island, Manatee County, VIII, 20, 1925, (T. H. Hubbell; in Cabbage Palmetto and oak "hammock"), 1 juv. ♂, 3 juv. ♀, [Univ. of Michigan Cln.]. Fort Myers, IX, 13 and 15, 1917, (Rehn and Hebard; hidden in fronds of Saw Palmetto in pine woods), 3 ♂, 2 ♀, 4 juv. Deerfield, III, 1, 1916, (Hebard), 1 ♀. Boca Raton, III, 1, 1916, (Hebard; from scrub oak in sand area), 1 ♂. Brickell's Hammock, Miami, II, 18 to III, 2, 1916 and 1919, (Hebard; beaten from heavy hammock undergrowth and foliage),⁵ 2 ♂, 2 ♀, 3 juv. Western end of Long Island, Biscayne Bay, III, 5, 1922, (Hebard), 2 ♂, 1 ♀, 1 juv. Snapper Creek Hammock, Biscayne Bay, II, 29, 1916, (Hebard; very scarce in "hammock," two from bromeliads growing on Live Oaks on edge of "hammock"), 1 ♂, 1 ♀, 3 juv. Royal Palm Key, III, 3, 1917, (Hebard; from epiphytes in heaviest jungle), 1 very small juv. Woodville, IX, 1, 1915, (Rehn; beaten from oak shoots), 1 ♂. Carrabelle, IX, 2 and 3, 1915, (Rehn and Hebard; beaten from oak shoots in scrub and from bushes in swamp area), 2 ♂, 3 ♀. Chaires, Leon County, VIII, 4, 1925, (T. H. Hubbell; beaten from foliage of Sweet Gum), 1 juv. ♀, [Univ. of Michigan Cln.]. Chattahoochee, VII, 28, 1925, (T. H. Hubbell; beating in flood plain forest,) 1 juv. ♂, 1 juv. ♀, [Univ. of Michigan Cln.]; IX, 1, 1915, (Hebard; on bare sandy border of river in

⁵ See comments by Hebard, Ent. News, xxvi, p. 461, (1915).

open), 1 ♀. Camp Torreya, Liberty County, VII, 25 and 28, 1925, (T. H. Hubbell; on sandy, oak dotted, hillside), 2 juv. ♀.

ALABAMA: Dothan, IX, 6 and 7, 1915, (Rehn and Hebard), 1 ♂, 1 ♀. Montgomery, IX, 8, 1915, (Rehn and Hebard; in tangle of raspberry and other vines), 5 ♀. Selma, IX, 9, 1915, (Rehn and Hebard; occasional on Sweet Gum shoots and vines in woods), 4 ♂, 5 ♀. Greenville, VIII, 3, 1915, (Hebard; immatures abundant and widely distributed on ground through forest), 9 juv. Evergreen, VIII, 4, 1915, (Hebard; immatures moderately common in dead leaves and pine needles on ground in forest), 1 juv. ♀. Flomaton, VIII, 27, 1915, (Rehn; beaten from oak shoots in oak woods on sandy hillside), 1 juv. ♀.

MISSISSIPPI: Strickton, Rankin County, IX, 12, 1915, (Hebard; rare in undergrowth of mixed forest on higher ground), 1 ♂, 1 ♀. Brookhaven, IX, 15, 1915, (Rehn; beaten from brush in woods), 1 ♂, 1 ♀. Natchez, IX, 13 and 14, 1915, (Rehn; beaten from oak), 1 ♀.

LOUISIANA: Arcadia, VIII, 20, 1915, (Rehn and Hebard; in low bushes and under bark of dead bush on edge of forest), 5 juv. West Monroe, VIII, 21, 1915, (Rehn and Hebard; occasional in heavy bushes in forest on river bank), 2 ♂, 1 large juv. ♂. Alexandria, VIII, 22, 1915, (Rehn and Hebard; few in low bushes of "branch" forest of Sweet Bay, oaks etc.), 2 ♀, 2 large juv. ♀.

TEXAS: Doucette, VII, 24, 1912, (Hebard; very scarce in low bushes, particularly Sweet Gum shoots, in forest of deciduous trees and pines), 4 juv.

Cycloptilum zebra (Rehn and Hebard) (Pl. XXIII, figs. 1 to 3.)

1905. *Liphophus zebra* Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1905, p. 49, pl. 1, fig. 12. [♂; Miami, Florida.]

This species was fully diagnosed and figured and new records of Long Key and Key West were given by Rehn and Hebard in 1912. A series was reported from Ocean Beach near Miami by Davis and from Key West, Florida, by Rehn and Hebard in 1914 and from Brickells Hammock near Miami by Hebard in 1915.

It is the smallest and most delicate of the species here treated, agreeing with *bidens* in the striking marking of the male tegmina, but with *squamosum* in the simple female subgenital plate. Males are distinguished from this sex of both those species by the usually distinctly less ample pronotum.

The species is known from Lake Worth⁶ to Key West, Florida. It is rarely encountered but Davis has reported finding a great many under and in the folds of an old pair of trousers lying on the up-beach. As a result it would apparently best be searched for under litter in such environment.

⁶ This material, secured by Mrs. Annie T. Slosson on sand, was recorded by her as *Cycloptilum squamosus* in Ent. News, XII, p. 11, (1901). The record was referred to *zebra* by Rehn and Hebard in 1912, after examination of the male upon which it was based.

Cycloptilum squamosum Scudder (Pl. XXIII, figs. 4 to 6.)

1868. *Cycloptilum squamosum* Scudder, Proc. Boston Soc. Nat. Hist., XII, p. 142. [♂; [north-central] Texas.]

In 1912 we correctly diagnosed and figured this species and placed *C. borealis* Bruner as a synonym, but included seven references and numerous records actually representative of other species. In our remarks there we described the female subgenital plate as found in Eastern material (*bidens*) but considered that difference a matter of individual variation, due to the fact that in that series were included several females (now known to represent other species) which did not show it. Much larger series and a better understanding of the regions in which the species of the Squamosum Group occur, enables us now to see clearly that in the United States it is represented by five species and two more geographic races.

Distinguished by the general pallid coloration and simple female subgenital plate, this species is apparently subject to more individual variation than any of the others. Usually averaging slightly larger and more robust than *bidens*, specimens from Galveston, Virginia Point (males but not females), Katherine and Lyford (males but not females) are exceptionally small. Two males of the Virginia Point series, all from Katherine and to a less degree the males from Galveston and Lyford are also exceptionally pallid.

The measurements of the smallest pair, from Katherine, are given below. We also give the measurements of a Columbus male in which the pronotum is unusually elongate and the tegmina less exposed in consequence (this normally about .9 mm. in *squamosum*).

	Length of body	Length of pro- notum	Caudal width of pro- notum	Length of caudal femur	Width of caudal femur	Exposed length of tegmen
♂						
Texas. <i>Type</i>	6.3	3.4	2.9	3.5	1.5	—
Columbus, Texas	6.3	3.9	2.9	3.9	1.42	.43
Katherine, Texas	5	3.2	2.4	3.3	1.27	.53
♀						
Dallas, Texas. <i>Allotype</i> .	7.2	2.2	2.1	4.2	1.8	3.6
Katherine, Texas	5.8	1.56	1.58	3.5	1.25	3.3

Though average differences are found in series of different species, it is evident that size is of very little value in distinguishing these.

Though the male tegmina normally have their caudal margins almost immaculate in the present insect, brown suffusions, similar to but not as heavy as those found in *zebra* and *bidens*, are present in most of the Brownsville specimens. This is probably a response to a darker environment, but it is evident that this feature of coloration is not of as much value in distinguishing these species as would be supposed from examination of the balance of the series.

In our 1912 report only the nineteen specimens from eastern Texas and the sixteen from Lincoln, Nebraska, actually represent *squamosum*. Upon the Nebraskan series Bruner's synonym *borealis* was based, and since that time the species has not been found in Nebraska, Kansas or Oklahoma. There is evidently a question as to whether Bruner's material was correctly labelled, but we do know that *comprehendens comprehendens* occurs as far north as Sidney, Nebraska, so that *squamosum* may simply have been generally missed by collectors in the States mentioned. This is possible due to the very small size of the insect coupled with the fact that it is nocturnal, hiding in the recesses of foliage, under bark or beneath litter on the ground during the day and at night when the males are stridulating they are extremely difficult to locate.

One of the most interesting of distributional discoveries is the finding of this species in the salt marshes at Cedar Keys, Florida. It has evidently been able to extend its distribution so far East along the border of the Gulf of Mexico through adaptation to that type of immediate environment. We found it moderately common in the salt marshes at Virginia Point and Sabine, Texas, but exhaustive search was required to secure the series at Cedar Keys, Florida. Hubbell had recognized the insect as distinct from *bidens* and his field notes give "silver brown gray, no trace of bands etc., when fresh."

Specimens Examined: 85; 29 males, 32 females and 24 immature individuals.

FLORIDA: Cedar Keys, VII, 12, 1925 and X, 18, 1924, (Hubbell and Walker; beaten from salt marsh grass about one foot tall) 2 ♂, 6 ♀, 1 large juv. ♂, [Univ. of Mich. Cln.].

LOUISIANA: Alexandria, VIII, 22, 1915, (Rehn and Hebard; in oak leaves in mixed forest), 1 ♂, 1 ♀. Shreveport, VIII, 19, 1915, (Rehn and Hebard; in forest undergrowth), 1 large juv. ♀.⁷

TEXAS: Bowie County, VIII, 20, 1928, (R. H. Beamer), 1 ♂, [Hebard Cln.]. Sabine, VIII, 11, 1915, (Rehn and Hebard; very common in marsh grass on tidal flats, secured, as is usual, only by beating), 3 ♂, 5 ♀, 1 large juv. ♀. Longview, VIII, 18, 1915, (Rehn and Hebard; moderate numbers in undergrowth of heavy deciduous forest), 1 juv. ♂. Palestine, VIII, 16, 1915, (Hebard; scarce in woodland undergrowth), 1 juv. ♂, 1 juv. ♀. Elkhart, VIII, 16, 1915, (Hebard), 1 ♂. Navasota, VIII, 14, 1915, (Hebard; in scant grasses under oaks of bottom land), 1 juv. ♀. Houston, VIII, 12, 1915, (Rehn and Hebard; adults in spanish moss on oaks, immatures in undergrowth also), 1 ♂, 2 ♀, 3 juvs. Virginia Point, VII, 21, 1912 and VIII, 12, 1915, (Rehn and Hebard; in marsh grass on tidal flats), 3 ♂, 3 ♀, 1 large juv. ♂. Galveston, VI, 1900, 1 ♂, [Hebard Cln.]. Brazoria County, VIII, 9, 1928, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Hearne, VIII, 14 and 15, 1915, (Hebard), 1 juv. ♂. Dallas, VIII, 14 to 16, 1915, (Rehn; by beating on prairie and brush land), 1 ♀, 2 juv. ♂, 1 large juv. ♀. Temple, IX, 24, 1912, (Rehn and Hebard; on edge of tree bordered stream), 1 ♀. Shovel Mount in Burnet County, IX, 5, 1901, (F. G. Schaupp), 1 ♂, [A. N. S. P.]. Austin, X, 12, 1901, (A. L. Melander), 1 ♀, [Hebard Cln.]. Victoria, VI, (A. N. Caudell), 1 ♀, [U. S. N. M.]. Brooks County, VII, 25, 1928, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Sarita, XII, 1, 1911, (C. A. Hart; on sandy prairie), 1 ♀, [Hebard Cln.]. Aransas County, VIII, 6, 1928, (R. H. Beamer), 1 ♀, [Hebard Cln.]. Katherine, XII, 3, 1911, (C. A. Hart; on sand and under dead weeds on sand), 2 ♂, 3 ♀ (very small), [Illinois State and Hebard Clns.]. Lyford, VIII, 7, 1912, (Rehn and Hebard; beaten from weeds in field), 3 ♂ (very small), 1 ♀ (normal size), 1 juv. ♂, 1 juv. ♀. Brownsville, VII, 31, 1912 and VIII, 3, 1921, (Rehn and Hebard; beaten from high weeds in river bottom), 1 ♂, 1 ♀, [Hebard and Ill. State Clns.]. Piper Plantation near Brownsville, XII, 19, 1910, (C. A. Hart), 1 ♀ (unusually small),⁸ [Hebard Cln.]. Mission, Hidalgo County, VIII, 5 and 6, 1912, (Rehn and Hebard), 1 juv. ♀. Hidalgo County, VII, 28 and 30, 1928 and 1929, (R. H. Beamer), 5 ♂, 1 ♀, 2 juv. ♂, 1 juv. ♀, [Univ. of Kansas]. Kerrville, VIII, 17, 1912, (Rehn and Hebard; on ground among plants and grasses and under bushes on hillside), 2 ♂, 1 ♀, 1 large juv. ♂, 1 juv. ♀. San Antonio, VIII, 15, 1912, (Rehn; only one seen, under dead eaves under oaks), 1 large juv. ♀. Starr County, VII, 30, 1928, (L. D. Beamer), 1 ♀, [Hebard Cln.].

The species is known to occur on the Gulf Coast from Sabine to Brownsville, Texas, northern limits being Alexandria, Louisiana, and Longview and Dallas, Texas,⁹ its western limits reaching

⁷ We believe we can distinguish this specimen from *bidens* in the same instar by the more robust build and more prominent interantennal protuberance.

⁸ In this specimen the latero-caudal portions of the subgenital plate are less roundly produced than is usual in *squamosum*.

⁹ We omit the Nebraska record for the reasons given above.

Shovel Mount, Kerrville, San Antonio and Mission in the latter State.

Cycloptilum bidens new species (Pl. XXIII, figs. 7 to 11.)

This is the eastern insect which invariably in the past has been recorded as *squamosum*. In 1912 Rehn and Hebard described the differences in the female subgenital plate, but due to confusion in the material (five species or races were there included) it was incorrectly supposed that such was attributable to individual variation. Though some variation does occur in the size and form of the minute angles which project disto-laterad as well as in the normally emarginate area between them, all females here recorded show such differentiation distinctly and are thereby easily separated from all other known species of the genus.

The striking tegminal markings readily distinguish the male sex from the other species found in the United States except the differently proportioned *zebra*, known only from southern Florida.

Type.—♀; St. Simon's Island, Georgia. August 30, 1911. (Rehn and Hebard.) [Hebard Collection, Type No. 1175.]

Size and form much as in *squamosum* (but series often averaging slightly smaller and a little more graceful). Fastigium similar but proportionately smaller; less prominent and more transverse. Palpi with fifth joint slightly longer than third and evenly moderately expanding distad as in all the species of this Group. Pronotum simple, tubular, lateral margins weakly convex, caudal width almost equal to length. Ovipositor much as in *squamosum*, straight (in series often slightly decurved, rarely very slightly recurved), its apex lanceolate. Subgenital plate scoop-shaped, lateral margins broadly convex-convergent, terminating on each side of the apical portion in a minute sharp tooth, the apical portion shallowly emarginate, concave on each side but convex mesad.¹⁰ Limbs, their armament and auditory foramen on cephalic face of cephalic tibiae as in *squamosum*.

Allotype.—♂; same data as type. [Hebard Collection.]

Apparently indistinguishable from males of *squamosum* except in size and form as noted for the opposite sex. Similar but proportionately smaller, less prominent and more transverse

¹⁰ The margins of the subgenital plate individually vary in outline. Often the lateral margins are quite strongly convex, this making the diameter of the distal emargination narrower, while that portion is then usually wholly concave. In other specimens the distal emargination has its median convexity much more decided than usual. No geographic correlation appears to exist.

fastigium (a feature showing only slight degree of difference). Tegmina with distal portions exposed, the margins there very strikingly marked with blackish brown as here figured. Genitalia apparently as in *squamosum*.

General coloration light reddish brown, deepening distad on abdomen. Head and pronotum immaculate; a single male from River Junction, Florida, showing darker suffusions latero-cephalad on the latter. Such pronotal marking is very rarely found in *squamosum*, but is usually very conspicuous in *distinctum* and in the races of *comprehendens*. Tegmina of male clay color, marked as here figured.

As Rehn and Hebard stated in 1912 "Individuals from the Atlantic Coast [*bidens*] are similar to western specimens [*squamosum*] in body coloration, but their scale covering is usually composed chiefly of blackish or slate-colored scales which gives the specimens a dark and somewhat mottled appearance [thus differing] from that of western representatives [*squamosum*]."

In 1912¹¹ we gave numerous measurements under *squamosum*. Of these the Nebraska and Texas specimens represent that species, but those from North Carolina and Georgia are referable to *bidens*. It is evident that measurements are of little value in distinguishing these species.

The measurements of the allotype and type of *bidens* are as follows; length of body ♂ 5.4, ♀ 6; length of pronotum ♂ 3.2, ♀ 1.7; caudal width of pronotal disk ♂ 2.6, ♀ 1.77; length of caudal femur ♂ 3.8, ♀ 3.9; width of caudal femur ♂ 1.52, ♀ 1.49; exposed length of tegmen ♂ .85; length of ovipositor 3.1 mm.

Size variation in the series before us is not very great, still the smallest specimens (one female Pomona, Florida and one male Indian Beach, Florida and a number of the more western individuals) are no larger than the largest specimens of *zebra*, though all such males have the pronotum considerably longer.

Specimens Examined: 122; 53 males, 53 females and 16 immature individuals.

NEW YORK: East Marion, Long Island, VIII, 2, 1913, (W. T. Davis; under log on sand on up-beach), 1 juv. ♂, (reported by Davis as *squamosum* in 1914), [Davis Cln.].

NEW JERSEY: Lakehurst, X, 3, 1909, (Davis and Sleight; in pine woods undergrowth), 1 ♂, 1 ♀, (reported by Davis as *squamosum* in 1909), [Davis Cln.].

¹¹ Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 211.

NORTH CAROLINA: (Reported by Rehn and Hebard as *squamosum*) from Raleigh, Wilmington, Winter Park, Wrightsville (in 1912) and Goldsboro (in 1916). Southern Pines, VIII, 28, 1928, (T. H. Hubbell), 1 ♀, [Univ. of Michigan Cln.].

SOUTH CAROLINA: (Reported by Rehn and Hebard as *squamosum*) from Spartanburg, Columbia (in 1916) and Yemassee (in 1912).

GEORGIA: (Reported by Rehn and Hebard as *squamosum*) from Thompson's Mills, Isle of Hope, St. Simons Island,¹² Cumberland Island, Brunswick (in 1912), Toccoa, Jasper, near Stone Mountain, Macon, Warm Springs and Albany (in 1916). Bainbridge, IX, 5, 1915, (Rehn and Hebard; few on ground in Long-leaf Pine forest undergrowth), 1 ♂, 3 ♀.

FLORIDA: (Reported by Rehn and Hebard as *squamosum*) from Atlantic Beach, San Pablo, Gainesville, Live Oak (in 1912) and Lakeland (in 1914). Pablo Beach, VIII, 13, 1905, (Rehn and Hebard), 1 juv. ♂. Pomona, IX, 7, 1917, (Rehn and Hebard; sweeping near edge of lake), 1 ♀. Gainesville, V, 14 and 15, 1925, (T. H. Hubbell; on branches of Turkey Oak, *Quercus catesbaei*, with *Atlanticus dorsalis*), 2 ♂, 1 ♀,¹³ [Univ. of Michigan Cln.]. Orlando, adults V, 10 to IX, 21, 1924, juvs. all IX, (Hubbell, in sandy scrub area; Walker; Alexander), 3 ♂, 6 ♀, 2 juv. ♂, 1 juv. ♀, [Univ. of Michigan Cln.]. Trilby, IX, 16, 1917, (Hebard; undergrowth in sandy scrub area), 1 juv. ♂. Indian Beach, Sand Key, Pinellas County, IX, 17, 1917, (Hebard; very scarce in dense brush characteristic of the Florida coast), 1 ♂. Tampa, I, 5, 1925, (T. H. Hubbell; in Turkey Oak woods), 2 ♂, [Univ. of Michigan Cln.]. Cortez Beach, Manatee County, I, 4, 1925, (T. H. Hubbell; in tidal debris on upper levels of beach), 2 juv. ♂. Tallahassee, IX, 2, 1915, (Hebard; very few in upland forest of Water Oaks), 1 ♀,¹⁴ 1 juv. ♀. Carrabelle, IX, 2, 1915, (Rehn and Hebard; on ground in sandy scrub), 1 ♀. River Junction, VIII, 31, 1915, (Rehn and Hebard), 7 ♂, 3 ♀, 3 juv. ♀. Camp Torreya, Liberty County, VII, 30, 1925, (T. H. Hubbell; on tall shrub along margin of *Torreya* ravine), 1 juv. ♀, [Univ. of Michigan Cln.]. Fort Barrancas, VIII, 28, 1915, (Hebard; in dead leaves under Water Oaks), 1 ♀.

ALABAMA: Dothan, IX, 6 and 7, 1915, (Rehn and Hebard), 1 ♀. Evergreen, VIII, 4, 1915, (Hebard; in dead leaves and pine needles of mixed forest), 1 ♂, 1 juv. ♂, 1 juv. ♀. Selma, IX, 9, 1915, (Rehn and Hebard; few in dead pine needles in Short-leaf Pine woods), 1 ♂, 1 ♀. Springhill, Mobile County, VIII, 25, 1915, (Hebard; in great numbers on ground through pine forest), 1 ♂, 2 ♀.¹⁵

¹² In addition to the type and allotype, thirty-two males and twenty-five females bearing the same data and now before us are designated paratypes. These belong to the Davis Cln., U. S. N. M., Univ. of Kansas, Cornell Univ., Univ. of Michigan, California Acad. of Sci. and the Philadelphia Collections.

¹³ "Stridulating a series of rapid, tinkling musical notes at the rate of one hundred and ten per minute. The note is high pitched but not penetrating, distinct and clear at ten feet but hardly distinguishable at thirty. Many were heard in a small group of trees but none elsewhere."

¹⁴ Lateral projections of subgenital plate extremely small, emargination scarcely indicated.

¹⁵ Lateral projections of subgenital plate extremely small, emargination weak.

MISSISSIPPI: Meridian, IX, 10, 1915, (Rehn and Hebard; moderate numbers in dead pine needles and oaked leaves in mixed valley forest), 2 ♀. Strickton, Rankin County, IX, 12, 1915, (Hebard; common, undergrowth of mixed forest on higher land), 1 ♂. Brookhaven, IX, 15, 1915, (Rehn; beaten from forest undergrowth), 1 ♀.

LOUISIANA: Alexandria, VIII, 22, 1915, (Rehn and Hebard; among dead oak leaves in mixed forest), 2 ♀, 1 large juv. ♀.

Cycloptilum distinctum new species (Pl. XXIV, figs. 1 to 3.)

This diminutive species is clearly a member of the Squamosum Group, but differs widely from the other known species in the production of the male pronotum, which is exceeded in the described American species only in the Colombian *C. thoracicum* Hebard.

The female subgenital plate is simple, as in *squamosum*, but is more produced and much more strongly rounded distad than in that species.

The pronotal markings are very prominent in the present insect.

Type.—♂; Tia Juana, San Diego County, California. September 11, 1922. (Rehn and Hebard.) [Hebard Collection, Type No. 1172.]

Size as in *C. squamosum* Scudder, form appearing broader, due to the greater amplitude of pronotum and tegmina caudad. Fastigium similar but, as in *C. comprehendens* Hebard, slightly less strongly transverse in dorsal aspect; medio-longitudinal and proximal transverse sulcus distinct. Palpi with third and fifth joints moderately elongate, the latter faintly the longer and moderately and evenly expanding distad; fourth joint slightly shorter than third. Eyes as in *squamosum*. Pronotum decidedly more produced and widened caudad, its caudal margin curving to form less than a semicircle (see Pl. XXIV, fig. 1). Tegmina dorsad exposed in broad distal marginal portion (this broader than in *comprehendens*) and laterad in extensive distal portion of lateral fields. Genitalia much as in *squamosum*. Limbs, their armament and auditory foramen of cephalic face of cephalic tibiae as in *squamosum*.

Allotype.—♀; same data as type. [Hebard Collection.]

Size and form much as in this sex of *squamosum*. Pronotum similar, simple, tubular, the lateral margins weakly convex and weakly convergent cephalad; caudal width, however, slightly greater than length. Tegmina and wings absent. Ovipositor

as in *squamosum*, but with apex apparently slightly narrower;¹⁶ shaft showing a very faint curvature ventrad. Subgenital plate truncate-triangular, scoop-shaped, embracing base of ovipositor; lateral margins very broadly convex-declivent to the narrow transverse apex beneath the ovipositor shaft.

Head buffy, with almost all of the occiput and interocular area suffused blackish brown, the small paler areas there reddish brown. Pronotum pale reddish brown, in male deepening caudad to warm sepia but paler, clay color, along the caudal margin; in both sexes with an oval blackish brown marking on each side of disk near cephalic margin, and in female and immature with weak dark suffusion between, cephalad and latero-caudad. Tegmina of male clay color with marginal portion of dorsal field mottled with warm sepia (this marking not striking as it is in the eastern species). Abdomen blackish dorsad; ventral surface of male and subgenital plate of female paler. Cephalic and median limbs buffy. Caudal femora suffused externally with warm sepia particularly distad but with a pale pre-genicular area; generally paler and more streaked in the female. Tibiae irregularly but distinctly annulate, this only partially due to light and dark scales.

The described pair measure: length of body ♂ 7, ♀ 6.2; length of pronotum ♂ 4.4, ♀ 1.7; caudal width of pronotal disk ♂ 2.8, ♀ 2.11; length of caudal femur ♂ 4.5, ♀ 4.8; width of caudal femur ♂ 1.5, ♀ 1.56, exposed length of tegmen ♂ .92; length of ovipositor 3.7 mm.

Specimens Examined: 3; 1 male, 1 female and 1 immature individual.

CALIFORNIA: San Diego, VIII, 10, 1916, (E. P. VanDuzee), 1 large juv. ♂, [Cal. Acad. Sci.]. Tia Juana, IX, 11, 1922, (Rehn and Hebard; beaten from chaparral in which *Adenostoma fasciculatum* was predominant on hillside where *Horesidotes cinereus saltator* and a species of *Brachyinsara* were also found), 1 ♂, 1 ♀, type, allotype.

Cycloptilum comprehendens interior new subspecies (Pl. XXIV, fig. 4.)

In the present species decided individual variation in degree of production of the male tegmina is found; see Pl. XXIV, figs. 5 and 8.

This race is distinguished from the more southern *comprehendens fortior*, with which we believe it will be found to intergrade in extreme southern Nevada and along the northern border of the Mojave Desert in California, in the lateral projections of the

¹⁶ This is possibly due to distortion in this unique female.

female subgenital plate, which are much smaller, triangular, with apices sharply rounded.

Type.—♀; Leeds, Washington County, Utah. 3200 feet. September 5, 1926. (M. Hebard.) [Hebard Collection, Type No. 1174.].

Generally as here described for *comprehendens fortior*, except the subgenital plate which is scoop-shaped, embracing base of ovipositor, with latero-caudal portions briefly triangularly produced, but reaching to upper portion of ovipositor shaft and broader than long.

Allotype.—♂; same data as type. [Hebard Cln.].

This sex is possibly indistinguishable from males of the other races of the species. The males before us, however, have a distinctly shorter pronotum.

Coloration as here described for *comprehendens fortior*. In the few adults before us the occiput is little darkened, but the pronotal disk has the latero-cephalic darker markings heavy and extensive though suffused. These latter markings are much weaker but present in the two immature individuals here recorded.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronotum	Length of caudal femur	Width of caudal femur	Exposed length of tegmen
♂						
Leeds, Utah. <i>Allotype</i> ...	6.4	3.2	2.9	4.3	1.5	1.63
Grapevine Mts., Cal.....	6.7	3.1	2.8	3.8	1.42	1.45
♀						
						Length of ovipositor
Leeds, Utah. <i>Type</i>	7.9	1.98	2.3	4.5	1.58	3.6
Washington, Utah.						
<i>Paratype</i>	8	1.91	2.2	4.8	1.7	4.7
Grapevine Mts., Cal....	7	1.88	2.24	4.5	1.63	3.5

We believe that it was this race which we heard on all sides in the desert brush while camping the night of September 5, 1924 on Millers Flat at the west base of Lone Peak, Esmeralda County, Nevada, at 4270 feet elevation. We later noted the similarity of the song of *comprehendens fortior* near Snyders Hill, Arizona

(here given in footnote 18) and said that there it was likewise easily the most noticeable and general insect stridulation to be heard after dark.

Though probably generally distributed and moderately abundant through the desert valleys of extreme southwestern Utah, southern Nevada and the adjacent eastern section of California, we found this insect extremely difficult to secure. Even at Millers where, from the singing it was evidently abundant, none could be captured, though in Texas and Arizona, particularly on the Creosote Bush, large series of *comprehendens fortior* could sometimes be assembled by beating.

We believe that the northern limits of the species as well as the race are little north of the localities given below. Southward the area of intergradation with *comprehendens fortior* is unknown. Unfortunately no females have been secured on the Mojave Desert. It is very interesting to note that whereas females from Prescott, Arizona, are typical of *comprehendens fortior*, the single female from the Hualapai Mountains in that State, though strongly atypical, shows stronger divergence toward typical *comprehendens* than toward the present race. Much collecting remains to be done in Oklahoma, New Mexico, northern Arizona, southern Nevada and southeastern California before the distribution of the three races of *comprehendens* can be at all accurately outlined.

Specimens Examined: 7; 2 males, 3 females and 2 immature individuals.

UTAH: Leeds, Washington County, 3200 feet, IX, 5, 1926, (Hebard; numerous, stridulating at dusk and for a short time after dark in desert bushes, one taken stridulating near ground on stem of Creosote Bush), 1 ♂, 1 ♀, *type, allotype*. Washington, 3000 feet, IX, 6, 1916, (Hebard; beaten from desert brush), 1 ♀, *paratype*.

CALIFORNIA: Daylight Spring, Grapevine Range, 4350 feet, VIII, 13, 1919, (Rehn and Hebard; beating Creosote Bush and other desert bushes), 1 ♂, 1 ♀, *paratypes*, 2 juv. ♂.

Cycloptilum comprehendens fortior¹⁷ new subspecies (Pl. XXIV, figs. 5 to 7.)

This race is mainly distinguished from typical *comprehendens* by the lateral projections of the subgenital plate, which are very much broader, gradually tapering to their broadly rounded

¹⁷ In allusion to the heavier projections of the female subgenital plate.

extremities. The length and form of these projections is subject to some individual variation, but in none of the material here listed are they nearly as slender as in typical *comprehendens* nor as small or as nearly triangular as in *comprehendens interior*.

Type.—♀; Ajo, Pima County, Arizona. 1500 feet, September 18, 1922. (Rehn and Hebard.) [Hebard Collection, Type No. 1173.]

Generally much as in typical *comprehendens*, excepting the subgenital plate. Size (average) larger and form (average) slightly more robust than in *squamosum*. Fastigium similar but slightly less strongly transverse in dorsal aspect. Palpi with third and fifth joints moderately elongate, the latter very slightly the longer, fourth joint slightly shorter. Pronotum simple, tubular, caudal width almost equal to length. Ovipositor much as in *squamosum*, straight (often slightly decurved, rarely slightly recurved), (averaging shorter than in typical *comprehendens*). Subgenital plate scoop-shaped, embracing base of ovipositor, latero-caudal portions broadly triangularly produced, decidedly longer than wide beyond base, with apices broadly rounded and reaching upper portion of ovipositor shaft, the basal width of one of these approximating its length. Limbs and their armament and foramen of cephalic face of cephalic tibiae as in *squamosum*.

Allotype.—♂; six miles North of Ajo, Pima County, Arizona. 1600 feet. September 16, 1922. (Rehn and Hebard.) [Hebard Cln.].

Very similar to this sex of typical *comprehendens*. Tegmina much more extensively exposed than in allotype of that race, but series show them to vary in that insect to fully as much exposed as in *comprehendens fortior*. Genitalia similar.

Males and immature individuals of these races show no features by which we can separate them.

Head pale reddish brown paling ventrad, occiput often suffused or with several suffused darker longitudinal markings. Antennae not at all or very faintly annulate. Pronotum pale reddish brown, with a darker suffusion on each side of disk near the cephalic margin, this marking often striking, blackish brown. Tegmina clay color, with distal margin sometimes very faintly tinged with brownish. Abdomen dorsad blackish, becoming reddish brown at base in females.

Measurements (in millimeters)

	Length of body	Length of pro- notum	Caudal width of pro- notum	Length of caudal femur	Width of caudal femur	Exposed length of tegmen
♂						
Chinati Mts., Texas.....	7-8	3.8-4	2.8-3.1	4.4-4.9	1.6-1.7	1.34-1.45
Coyote Mts., Ariz.....	6.8	4	3.2	5	1.9	1.27
Batamote Well, Ariz.						
<i>Paratype</i>	7	3.8	2.7	3.8	1.49	.99
Near Ajo, Ariz. <i>Allotype</i> .	6.7	3.6	2.8	4.2	1.5	1.63
Cottonwood, Cal.....	7.2	3.7	2.8	4.7	1.63	1.45
♀						
Chinati Mts., Texas.....	7.8-8	2.08-2.13	2.34-2.27	4.9-5.1	1.84-1.86	4.7-4.9
Tumamoc Hill, Ariz.....	8.2	2.2	2.48	5.2	1.9	4.7
Ajo, Ariz. <i>Type</i>	7.4	2.2	2.58	5	1.91	4
Prescott, Ariz.....	7.4	1.84	2.15	4.3	1.5	3.8

The series from the Big Bend region in Texas and from southern Arizona average distinctly larger than the others.

We are unable to assign racially a male and immature specimens of this species from Uvalde, Del Rio, Langtry, and the Davis Mountains in Texas. As noted under *comprehendens interior*, no females of the species have been secured in the Mojave Desert and there is therefore some uncertainty as to whether the Californian material here recorded is typical or atypical of *comprehendens fortior*, though the longer pronotum of males strongly suggests that *comprehendens interior* does not occur so far South.

Specimens Examined: 137; 55 males, 47 females and 35 immature individuals.

TEXAS: Carrizo Springs, X, 1884, (A. Wadgymar), 1 ♀, (previously reported by Rehn and Hebard as *squamosum*), [Hebard Cln.]. Sanderson, VIII, 25, 1912, (Rehn and Hebard; fairly common in Black Brush, *Flourensia cernua*, moderate numbers on Creosote Bush, *Covillea tridentata*, and in dry water course, occasional on hillside up to 2950 feet), 14 ♂, 2 ♀ (projections of subgenital plate slightly narrower than normal), 4 large juv. ♂, 4 large juv. ♀. Two miles North of Bone Spring, Brewster County, IX, 9, 1912, (Rehn and Hebard), 1 ♂, 1 ♀ (projections of subgenital plate normal), 1 large juv. ♀. Persimmon Gap, Brewster County, IX, 10, 1912, (Rehn and Hebard; on desert hills), 4 ♂, 3 ♀ (projections of subgenital plate normal in two females, distinctly narrower in one female). Moss Well, Chisos Mountains, 4500 to 5000

feet, IX, 5 to 8, 1912, (Rehn and Hebard), 1 ♂, 4 ♀ (projections of subgenital plate normal in three females, much more acute in one female). Canyon behind Pulliam Bluff, Chisos Mts., 4600 to 5000 feet, IX, 7, 1912, (Rehn and Hebard), 19 ♂, 12 ♀ (projections of subgenital plate very blunt in one female, normal in seven females, more acute in one female, much more acute in one female, similar but shorter in two females). Hills West of Ord Mountains, Brewster County, VIII, 22 to 31, 1926, (O. C. Poling), 1 ♂, 1 ♀ (projections of subgenital plate of female normal), [Hebard Cln.]. Midway, Chinati Mountains, IX, 30, 1928, (E. R. Tinkham; on Creosote Bush), 3 ♂, 3 ♀ (projections of female subgenital plate normal in two, shorter but more acute in one), [Tinkham and Hebard Clns.].

ARIZONA: Mescal, VII, 28, 1927, (R. H. Beamer), 1 ♂, [Univ. of Kansas]. Santa Rita Mountains, 4500 feet, IX, 9, 1925, (A. A. Nichol), 2 ♂, 1 ♀ (projections of female subgenital plate normal), [Univ. of Kansas]. Tucson, VIII, 14 to 17, 1916, (Rehn and Lutz,) 1 ♂, 1 ♀ (projections of female subgenital plate narrower than normal), 2 large juv. ♀, [Acad. Nat. Sci. Phila. and Amer. Mus. Nat. Hist.]. Tumamoc Hill, Tucson Mountains, 2400 to 3000 feet, X, 4, 1910, (Rehn and Hebard; beaten from Creosote Bush), 2 ♀ (projections of subgenital plate normal), (recorded by Rehn and Hebard previously as *squamosum*). Snyders Hill, Pima County,¹⁸ 2500 feet, X, 11, 1910, (Rehn and Hebard), 1 ♀ (projections of subgenital plate more acute), (reported previously as *squamosum* by Rehn and Hebard). San Xavier, VII, 25 and 26, 1916, (Rehn and Lutz), 1 juv. ♂, [Amer. Mus. Nat. Hist.]. Black Dike Prospect, Sierrita Mountains, VII, 26 to 28, 1916, (Rehn and Lutz), 1 juv. ♂, 2 juv. ♀, [Acad. Nat. Sci. Phila. and Amer. Mus. Nat. Hist.]. Bear Valley, Pajaritos Mountains, IX, 22, 1922, (Rehn; beating), 1 ♀ (projections of subgenital plate unusually narrow, almost intermediate between this race and typical *comprehendens*). Coyote Mountains, VIII, 4 to 7, 1916, (Rehn and Lutz), 1 ♀ (projections of subgenital plate normal), 2 juv. ♂, 7 juv. ♀, [Acad. Nat. Sci. Phila. and Amer. Mus. Nat. Hist.]. Roadside Mine, Coyote Mountains, 2800 feet, IX, 14, 1924, (Rehn and Hebard), 1 ♀ (projections of subgenital plate normal). Kits Peak Rincon, Baboquivari Mountains, (Rehn and Lutz), 3 juv. ♂, 2 juv. ♀, [Acad. Nat. Sci. Phila. and Amer. Mus. Nat. Hist.]. Kvitak, East of Quijotoa Mountains, 1530 feet, IX, 15, 1924, (Rehn and Hebard; taken at light at night, heard numerous in desert brush), 1 ♂, 1 ♀ (projections of female subgenital plate normal). Quijotoa, VIII, 26, 1927, (J. C. Bradley), 1 juv. ♀, [Cornell Univ.]. Quitobaquita Hills, IX, 19, 1922, (Rehn and Hebard), 2 ♀ (projections of subgenital plate normal in one, slightly longer in the other). Fortification Rock, Baboquivari Valley, 2900 to 3300 feet, IX, 14, 1924, (Hebard; beaten from dense hillside shrubbery), 1 ♂, 1 ♀ (projections of subgenital plate of female slightly narrower than usual). Batamote Well, Valley of the Ajo, 1500 feet, IX, 16, 1924, (Rehn and Hebard; attracted to camp light at night), 1 ♂, 1 ♀, *paratypes*. Six miles North of

¹⁸ While camping nearby on September 27, 1924, we noted "After dark *Cycloptilum* heard everywhere on arboreal desert. The song is a high-pitched trilling dee-dit-dee-dit-dee-dit- and is often continued over a considerable period. The pitch was noted to vary slightly individually. The sound was easily the most noticeable and general to be heard after dark.

Ajo, 1600 feet, IX, 18, 1922, (Rehn; beaten from Creosote Bush), 1 ♂, *allotype*. Ajo, 1800 feet, IX, 18, 1922, (Rehn and Hebard; beaten from desert hillside shrubbery), 4 ♀, *type* and *paratypes* (subgenital plate normal in all). Kingman, VIII, 2, 1919, (Hebard; beaten from rabbit-weed, *Chrysothamnus* sp.?), 2 juv. ♂, 1 juv. ♀; VIII, 20, 1920, (O. C. Poling), 1 ♂, [Hebard Cln.]. Sawmill Canyon, Hualapai Mountains, VIII, 31, 1920 and IX, 10, 1919, (O. C. Poling), 1 ♂, 1 ♀ (projections of female subgenital plate very narrow, about intermediate between this race and typical *comprehendens*), [Hebard Cln.]. Prescott, VIII, 21 and 24, 1917, (J. A. Kutsche), 2 ♀ (projections of subgenital plate normal), 1 juv. ♂, [Hebard Cln.]. Senator, VIII, 12, 1917, (J. A. Kutsche), 1 ♂, [Hebard Cln.]. Tinajas Altas, 1905, (W. J. McGee), 1 ♀ (projections of subgenital plate normal), (previously reported by Rehn and Hebard as *squamosum*), [Hebard Cln.].

CALIFORNIA: Needles, 650 feet, VIII, 4 and 5, 1919, (Rehn and Hebard), 1 small juv. Goffs, 2584 feet, VIII, 5, 1919, (Rehn and Hebard; from desert brush and dead yucca trunk), 2 small juvs. Newberry, 1831 feet, IX, 9, 1924, (Rehn and Hebard), 1 ♂. Cottonwood, Mojave Desert, 2274 feet, IX, 9, 1907, (Hebard; from Creosote Bush), 1 ♂ (previously reported by Rehn and Hebard as *squamosum*).

Cycloptilum comprehendens comprehendens Hebard (Pl. XXIV, figs. 8 to 10.)

1929. *Cycloptilum comprehendens* Hebard, Proc. Acad. Nat. Sci. Philadelphia, LXXXI, p. 421, pl. 11, figs. 3 to 5. [♂, ♀, juvs.; type locality, Baculite Mesa, Pueblo County, Colorado at 5000 to 6200 feet.]

In distinguishing this handsome species from *squamosum* we stated that it "may be separated by the very strikingly specialized, instead of simple, female subgenital plate." In *squamosum* the pronotum dorsad is normally immaculate, but in the present insect two dark suffusions occur there latero-cephalad.

The possibility of racial relationship with *squamosum* is disproven by the series from Kerrville, Texas, at which place both of these species were found typical.

The species was described from one hundred and eight specimens. Its range is known to extend East to Kerrville, Cotulla and Canadian, Texas, and Hugoton in Stevens County, Kansas. Northern limits are Julesburg, Colorado and Sidney, Nebraska and the Rocky Mountains constitute a barrier westward. In the Southwest we have it typical as far as Farmington, Melena and Carlsbad, New Mexico and Kent, Marathon and Starr County, Texas, but it there intergrades over a considerable area with the western *comprehendens fortior*, that insect being also represented in the Carrizo Springs and Sanderson, Texas series

and intermediates to individually varying degrees being found in the material from the Chisos Mountains and regions immediately to the north, though those series are in very large part closer to *comprehendens fortior*.

These races both average larger and sturdier than *squamosum*.

Only the following material has been received since the original description, based on a series of one hundred and eight specimens.

KANSAS: Hugoton in Stevens County, VIII, 10 and 15, 1911, (F. X. Williams), 2 ♂, 3 juv. ♂, [Univ. of Kansas and Hebard Clns.].

TEXAS: Starr County, VII, 30, 1928, (L. D. Beamer), 1 ♀, [Hebard Cln.].

HOPLOSPHYRUM Rehn and Hebard

1912. *Hoplosphyrum* Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 222.

Genotype: *H. occidentale* (Scudder), (by original designation).

Chopard has suggested to us that this genus might be the same as *Ornebius* Guérin 1844, with genotype the Mauritian *xanthopterus* Guérin. Without material of that species a definite decision can not be made, but we believe that two distinct genera are represented.

In the present genus the ovipositor is very unusual in not enlarging at all at its apex and the medio-internal spur of the caudal tibiae is very long.

We have before us specimens of the Philippine *Ornebius abdominalis* (Stål) which differ further very strikingly in having the caudal metatarsi of even depth to near the base instead of gradually but distinctly widening to that point, while the male titillators project as two very elongate straight spines, these organs being wholly concealed in *Hoplosphyrum*.

Hoplosphyrum boreale (Scudder)

1902. *Ectatoderus borealis* Scudder, Proc. Davenport Acad. Sci., ix, p. 58, pl. 4, fig. 4. [♂, ♀: La Cueva and Dripping Springs, Organ Mountains, New Mexico; Julian, California.]

The species was recorded from Claremont, California, by C. F. Baker in 1905; from between Alamogordo and Dry Canyon and the Florida Mountains, New Mexico by Rehn and Hebard in 1909, and from Los Angeles, California and numerous localities in Lower California by Rehn and Hebard in 1912.¹⁹

¹⁹ See Proc. Acad. Nat. Sci. Phila., 1912, p. 227, fig. 28 and table of measurements.

In the Baboquivari Mountains, Arizona, we made the following notes. "The song is a high-pitched continuous cree-cree-cree-cree-, higher and more rapid than that of *Gryllus*. Individuals stop stridulating when still distant and are very difficult to locate. If once seen, however, they are very easy to catch, making little effort to escape." The species is nocturnal.

Specimens Examined (in addition to the previously reported series): 56; 20 males, 18 females and 18 immature individuals.

TEXAS: Brownsville, VIII, 5, 1912, (Hebard; common immature in nests of pack rats, *Neotoma* sp., made of debris under piled cactus, *Opuntia* sp.), 4 juv. ♂, 3 juv. ♀. Piper Plantation near Brownsville, VIII, 3, 1912, (Rehn and Hebard; moderately numerous in debris under palms in heavy jungle), 9 ♂, 6 ♀, 1 juv. ♂, 2 juv. ♀. Mission, Hidalgo County, VIII, 6, 1912, (Hebard; from nest of pack rats), 1 small juv. ♂. Uvalde, 1000 feet, VIII, 21 and 22, 1912, (Rehn and Hebard; from nests of pack rats), 2 small juv. ♂, 4 small juv. ♀. Moss Well, Chisos Mountains, 5300 feet, IX, 5 to 8, 1912, (Rehn and Hebard), 1 ♂. Kent, IX, 17, 1912, 3900 to 4100 feet, (Rehn and Hebard; few heard in evening, found in dead sotol and under dead yucca), 3 ♀. Maguires Ranch, Upper Limpia Canyon, Davis Mountains, 5000 to 5600 feet, VIII, 29, 1912, (Rehn and Hebard; under loose bark on Alligator-bark Juniper, one female under board nailed to oak at camp), 3 ♂, 3 ♀. Franklin Mountains, 4000 feet, IX, 16, 1912, (Rehn and Hebard; on mesa), 1 ♂, 2 ♀.

ARIZONA: South base of Atascosa Mountain, Santa Cruz County, 5100 feet, IX, 22, 1924, (Rehn; attracted to light in camp), 1 ♀. Upper Madera Canyon, Santa Rita Mountains, 4900 feet, IX, 24, 1924, (Hebard; frequent in dead oak leaves where these were interspersed with fragments of rock), 2 ♂. Schaeffer Canyon, Baboquivari Mountains, 5160 to 5250 feet, IX, 18, 1924, (Hebard; found at night common under fragments of granite at bases of ledges along wash), 2 ♂, 2 ♀.

CALIFORNIA: Indian Joe Spring, Argus Range, 2600 feet, IX, 9, 1922, (Rehn; on bare rock of canyon bed), 1 ♀. Mill Creek Canyon, San Bernardino Range, IX, 23, 1923, (E. P. Van Duzee), 2 ♂, [Cal. Acad. Sci. and Hebard Cln.]. Dulzura, 1500 feet, IX, 12, 1922, (Hebard; under boulder), 1 small juv. ♀.

EXPLANATION OF PLATES

PLATE XXIII

Fig. 1.—*Cycloptilum zebra* (Rehn and Hebard). Dorsal view of male. *Type*. Miami, Florida. (× 6.)

Fig. 2.—*Cycloptilum zebra* (Rehn and Hebard). Ventral view of female subgenital plate. Key West, Florida. (Greatly enlarged.)

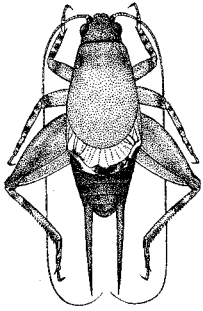
Fig. 3.—*Cycloptilum zebra* (Rehn and Hebard). Lateral outline of female subgenital plate. Key West, Florida. (Same scale as fig. 2.)

- Fig. 4.—*Cycloptilum squamosum* Scudder. Dorsal view of male. Sabine, Texas. ($\times 6$).
- Fig. 5.—*Cycloptilum squamosum* Scudder. Ventral view of female subgenital plate. Sabine, Texas. (Same scale as fig. 2.)
- Fig. 6.—*Cycloptilum squamosum* Scudder. Lateral outline of female subgenital plate. Sabine, Texas. (Same scale as fig. 2.)
- Fig. 7.—*Cycloptilum bidens* new species. Dorsal view of male. Cumberland Island, Georgia. ($\times 6$.)
- Fig. 8.—*Cycloptilum bidens* new species. Ventral view of female subgenital plate. Cumberland Island, Georgia. (Same scale as fig. 2.)
- Fig. 9.—*Cycloptilum bidens* new species. Lateral outline of female subgenital plate. Cumberland Island, Georgia. (Same scale as fig. 2.)
- Fig. 10.—*Cycloptilum bidens* new species. Ventral view of female subgenital plate.²⁰ Bainbridge, Georgia. (Same scale as fig. 2.)
- Fig. 11.—*Cycloptilum bidens* new species. Lateral outline of female subgenital plate.²⁰ Bainbridge, Georgia. (Same scale as fig. 2.)

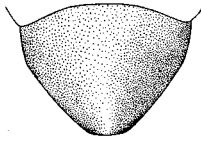
PLATE XXIV

- Fig. 1.—*Cycloptilum distinctum* new species. Dorsal view of male. *Type*. Tia Juana, California. ($\times 6$.)
- Fig. 2.—*Cycloptilum distinctum* new species. Ventral view of female subgenital plate. *Allotype*. Tia Juana, California. (Greatly enlarged.)
- Fig. 3.—*Cycloptilum distinctum* new species. Lateral outline of female subgenital plate. *Allotype*. Tia Juana, California. (Same scale as fig. 2.)
- Fig. 4.—*Cycloptilum comprehendens interior* new subspecies. Lateral outline of female subgenital plate. *Type*. Leeds, Utah. (Greatly enlarged.)
- Fig. 5.—*Cycloptilum comprehendens fortior* new subspecies. Dorsal view of male. *Allotype*. Six miles north of Ajo, Arizona. ($\times 6$.)
- Fig. 6.—*Cycloptilum comprehendens fortior* new subspecies. Ventral view of female subgenital plate. *Type*. Ajo, Arizona. (Same scale as fig. 4.)
- Fig. 7.—*Cycloptilum comprehendens fortior* new subspecies. Lateral outline of female subgenital plate. *Type*. Ajo, Arizona. (Same scale as fig. 4.)
- Fig. 8.—*Cycloptilum comprehendens comprehendens* Hebard. Dorsal view of male. *Allotype*. Lubbock, Texas. ($\times 5$.)
- Fig. 9.—*Cycloptilum comprehendens comprehendens* Hebard. Ventro-caudal outline of female subgenital plate. *Type*. Baculite Mesa, Pueblo County, Colorado. (Greatly enlarged.)
- Fig. 10.—*Cycloptilum comprehendens comprehendens* Hebard. Lateral outline of female subgenital plate. *Type*. Baculite Mesa, Pueblo County, Colorado. (Greatly enlarged.)

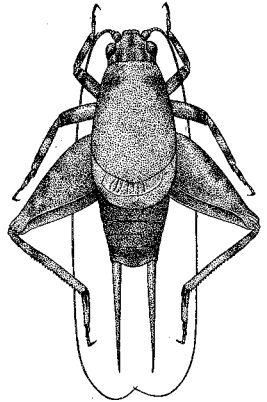
²⁰ Showing extreme of individual variation in production of meso-distal portion of plate.



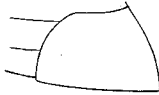
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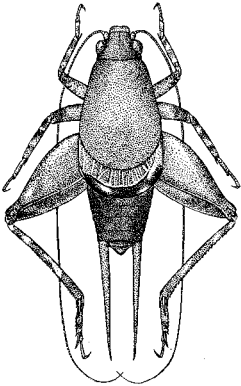
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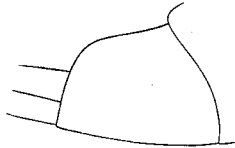
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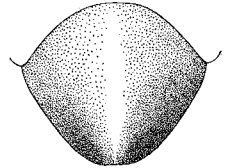
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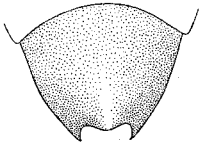
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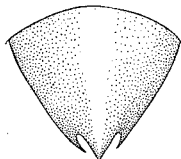
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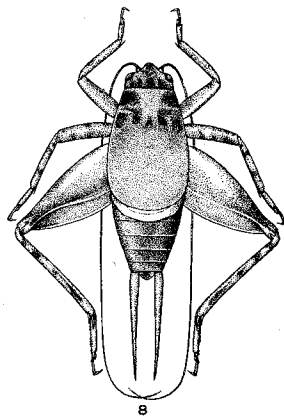
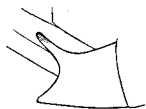
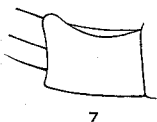
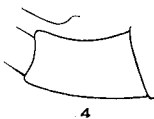
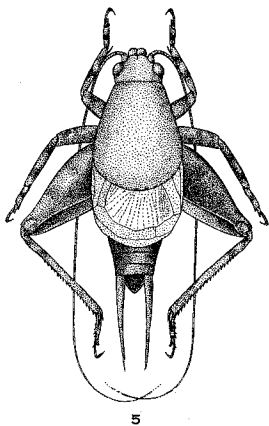
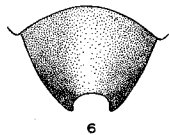
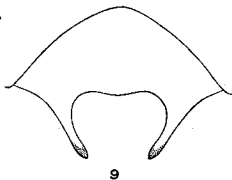
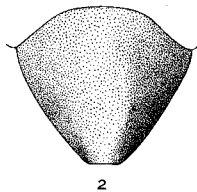
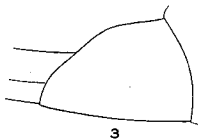
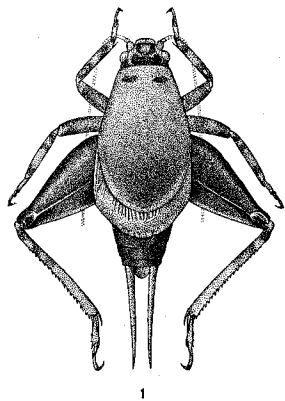


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11

HEBARD—MOGOPLISTINAE



HEBARD—MOGOPLISTINAE