

STUDIES IN ORTHOPTERA WHICH OCCUR IN NORTH AMERICA NORTH OF THE MEXICAN BOUNDARY

PARTS X and XI

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(Plates VIII to X)

Reference is made to previous parts of this series which have already appeared,¹ and in which the general plan for the same is set forth. The chief purpose of the present contribution is to make available information accumulated largely in connection with extensive geographic studies which have been under way for some time.

The following descriptions, notes and figures were prepared by me during the winter of 1937-1938, but had not been given final attention or the plates prepared. It is now possible to publish this paper through the great kindness of my friends James A. G. Rehn and John W. H. Rehn, who have since done the necessary finishing work, as from that time I have been wholly incapacitated by very severe rheumatoid arthritis. I have been assured I will eventually be able to resume my work in a year or so.

X. NEW AND CRITICAL NOTES ON PREVIOUSLY-KNOWN TETTIGONIIDAE

PHANEROPTERINAE

BRACHYINSARA Rehn and Hebard²

It is of considerable interest to add this genus to those known from the United States, the addition of a second species requiring

¹ All parts have appeared in these Transactions as follows: LIX, p. 363, I on *Psychomastax*, p. 371, II on *Cyphoderris*; LX, p. 31, III on the Decticinae, p. 281, IV on *Diapheromera*, p. 284, V on the Pachymorphinae; LXII, p. 231, VI on *Arethaea*; LXIII, p. 347, VII on *Timema* and supplementary information on *Diapheromera*, p. 354, VIII on new Acridinae, p. 361, IX on new and previously-known Oedipodinae.

² Trans. Amer. Ent. Soc., XL, p. 97.

modification of the characters originally given to distinguish it from *Insara* F. Walker. The distinctive contour of the lateral margins of the pronotal disk holds only for the genotype of *Brachyinsara* and the organs of flight must be given as decidedly to greatly reduced.

Outstanding features shown by the present genus are the peculiarly irregular and sulcate fastigium which is in contact with the facial fastigium, the dilated abdomen with exposed tergites acute-angulate produced mesad at their caudal margins and very large male supra-anal plate (distal tergite).

***Brachyinsara hemiptera* new species** (Plate VIII, figs. 1 and 2.)

This is the second known species of the genus, of which the genotype *magdalenae* Rehn and Hebard,³ was described from Magdalena Island, Baja California. From that insect it differs in being definitely less robust, the pronotum with lateral margins of disk not divided into as strongly arcuate sections and so less conspicuously different from those of certain species of *Insara*, and the much greater production of tegmina and wings.

Type.—♂; Tia Juana, San Diego County, California. September 11, 1922. (M. Hebard.) [Hebard Collection, Type no. 1328.]

Size small, form moderately robust for the group, the abdomen very plump (but usually much shrivelled in dried material). Face with greatest width contained nearly one and four-fifths times in depth. Eyes globose, strongly exerted, much shorter than infra-ocular portion of genae. Pronotal disk with length considerably more than its greatest (caudal) width, longitudinally feebly concave so that it is slightly elevated cephalad and caudad; lateral margins moderately divergent in cephalic fourth, thence parallel in half remaining distance (occasionally slightly sinuous), then strongly divergent in caudal section; cephalic margin faintly concave, caudal margin very broadly convex (not as truncate as in *magdalenae*). Pronotal lateral lobes with length greater than depth, appreciably longer than in *magdalenae*, humeral sinus very shallow.

Organs of flight decidedly reduced but slightly surpassing end of abdomen (when that is full, as in life), portions beyond stridulating area of tegmina very narrow, wings slightly more produced than tegmina, the very narrow apices of these organs rather sharply rounded. Exposed abdominal tergites produced mesad on caudal margin in a stout spine, this merely suggested on penultimate tergite.

³ Trans. Amer. Entom. Soc., XL., p. 97, figs. 22 and 31, (1914).

Genitalia much as in *magdalenae*. Supra-anal plate very large, broad, its surface depressed and medio-longitudinally sulcate, the median portion of its distal margin transverse; thus two large lobes are formed with disto-lateral margins flattened convex, nearly enveloping the cerci. Cercus short, rather strongly curved inward with angulation indicated, tapering slightly to the flattened apex which terminates in a tooth directed meso-dorsad. Subgenital plate very short and broad, medio-longitudinally sulcate, free margins convex to minute nodes (the vestigial styles which are preceded by carinae on the ventral surface of the plate), between which the distal margin is truncate.

Cephalic and median femora slender, pinched and carinate dorso-distad and rectangulate produced at apex; genicular lobes produced in a broad (finely spined or blunt) tooth which (normally) bears a minute spine on its ventral margin; ventral margins lamellate distad, smooth (but occasionally bearing one or two minute teeth). Caudal femora moderately heavy for the group, with proximal portion enlarged; genicular lobes broad, strongly acute-angulate produced.

Allotype.—♀; same data as type but taken by J. A. G. Rehn. [Hebard Collection.]

Very similar to male in ambisexual characters. Size slightly larger, caudal limbs noticeably more elongate. Organs of flight very slightly less reduced, projecting to (or slightly beyond) apex of ovipositor; marginal field not narrowing as strongly in median section.

Ovipositor small, considerably shorter than cephalic femur, deep, lamellate, sharply bent dorsad before median point, margins thence convergent then rounding to meet at apex, distad with dorsal margin extensively and ventral margin briefly evenly serrulate; lateral surfaces of valves thickly supplied distad with low nodules, these joining to form raised striae ventrad. Subgenital plate triangular with surface convex, the convergent lateral margins broadly convex to the narrowly blunted apex.

Coloration.—Generally dirty buff, light to moderately dark brown, or gray, but occasional specimens are tinged with light to slightly yellowish green and individuals of many series have flecks and dashes of darker brown, a few with sides and abdomen showing a reddish brown tinge. Antennae pale, in flecked individuals often having widely spaced brown flecks. Abdomen immaculate in pallid individuals, but in darker specimens dorso-laterad near base of exposed portion with a large dark brown suffusion invaded by a broad whitish marking and dorso-distad again darkened with a whitish line on each side. The specimens from Campo are exceptionally pale, light gray and immaculate.

Measurements.—Those of the type and allotype are followed by those of the smallest individuals in the series, from La Jolla Hills. Length of body, ♂, 15.7 to 10.7; ♀, 14.1 to 12.1: length of pronotum, ♂, 3.4 to 3.2; ♀, 3.4 to 2.8: caudal width of pronotum, ♂, 2.8 to 2.2; ♀, 2.7 to 2.1:

length of tegmen, ♂, 9.7 to 8.3; ♀, 11.7 to 10.3; median width of tegmen, ♂, 1.4 to 1.3; ♀, 1.7 to 1.2; length of caudal femur, ♂, 16.7 to 13.9; ♀, 19.2 to 16.6 mm. The majority of specimens in the present series approach the minimum measurements.

Specimens examined: 44; 22 males, 18 females and 4 immature individuals.

CALIFORNIA: La Jolla Hills, VIII, 20, 1931, (E. R. Tinkham), 4♂, 2♀, [Hebard Cln.]. Murray Canyon above Mission Valley, VIII, 19, 1937, (Rehn, Rehn & Pate; on hill slopes in chaparral, local, inactive and scarce), 1♂, 4♀, *paratypes*, [A.N.S.P.]. San Diego, VIII, 7, 1935, (R. H. Beamer), 1 medium small and 1 small juv. ♀, [Univ. of Kansas]; VIII, 10, 1916, (E. P. Van Duzee), 1 medium large juv. ♀, [Cal. Acad. Sci.]. Palm City, VIII, 7, 1933, (R. H. Beamer), 2♂, 2♀, [Univ. of Kansas and Hebard Cln.]. Port El Ysidro, VIII, 22, 1931, (E. R. Tinkham), 5♂, 3♀, *paratypes*, [Hebard Cln.]. Tia Juana, IX, 11, 1922, (Rehn & Hebard; beaten from brush, *Adenostoma fasciculatum*, near crest of hills at 200 feet, two hours further search failed to locate other specimens), 1♂, 1♀, *type* and *allotype*, [Hebard Cln.]. Campo, VIII, 23, 1931, (E. R. Tinkham), 5♂, [Hebard Cln.].

BAJA CALIFORNIA: Two miles south of Tijuana, VIII, 31, 1931, (E. R. Tinkham), 3♂, 6♀, [Hebard Cln.].

This inconspicuous but distinctive insect is evidently widespread through the dry chaparral of the hills and mountains in southwestern California and adjacent northwestern Baja California. With *Horesidotes cinereus saltator* Hebard and *Cycloptilum distinctum* Hebard the presence of a fauna very distinct from that of the Los Angeles region is plainly indicated. Another faunistic change is also soon met when going southward on the peninsula of Baja California.

Though often very difficult to locate, *hemiptera* is, for the Tettigoniidae, probably a fairly abundant species. The grasshopper *Horesidotes cinereus saltator* though undoubtedly more abundant and more readily located, is probably much more local in distribution. The cricket *Cycloptilum distinctum* may be also more abundant and as generally distributed as well, the fact that intensive search was not made for it (as we did not realize it was an undescribed species at the time) and that its very small size and secretive habits make it so easy to overlook probably accounts for so few specimens having been captured.

Like the species of *Insara*, the present insect is doubtless nocturnal and probably sings with a whirring stridulation not audible at any considerable distance.

Microcentrum louisianum new species

(Plate VIII, fig. 3; pl. X, figs. 23 and 26.)

The single male before me shows this species to be nearest *M. retinerve* (Burmeister), agreeing with males of that insect in general form, pronotal contour, tegminal venation, enlarged apices of the cerci and elongate styles of the subgenital plate.

It differs in having the vertex more dimpled than medio-longitudinally sulcate, the cephalic margin of the pronotum not evenly concave (this, however, possibly due to an individual distortion), the tegmina with stridulating field less ample and very differently and less conspicuously marked and stridulating vein less heavy and less elongate and the cercal apices definitely more strongly bilobate with the tooth smaller. For comparison with this species representative males of both *M. retinerve* (pl. X, figs. 24 and 27) and *M. rhombifolium* are here shown, pl. VIII, fig. 4; pl. X, figs. 25 and 28).

Compared with the Mexican species nearest resemblance is shown to the actually widely distinct *M. stylatum* Hebard.

Type.—♂; Shreveport, Louisiana. August 19, 1915. (J. A. G. Rehn.) [Hebard Collection, Type no. 1331.]

Size small and form moderately robust for the genus. Head with lateral ocelli moderately large; vertex convex declivent, scarcely longer than broad, its surface dimpled and with medio-longitudinal sulcation barely indicated, its width at transverse sulcus (separating it from the frontal fastigium) appreciably more than twice that of a proximal antennal joint. Pronotum smooth, disk rounding sharply into lateral lobes and showing faint indication of broad transverse impression near cephalic margin and before metazona, the discal sulci weak but the principal sulcus prominent laterad on disk and dorsad on lateral lobes and cutting the lateral margins of the former; cephalic margin concave but showing a trace of broad and very feeble convexity mesad; lateral lobes deep, humeral sinus small but deep. Metasternal lobes with angles rounded rectangulate (broader than in *retinerve*).

Tegmina and wings fully developed, the former distinctly widest just beyond stridulating area, the sutural margin thence straight and gently oblique descendent to the rather broadly rounded apex; median vein sinuous with branches running to the sutural margin, veins at costal margin not thickened. Wings well surpassing tegmina.

Supra-anal plate vertical, strongly medio-longitudinally sulcate proximad, elongate triangular with lateral margins very weakly convex. Cerci elongate, cylindrical, slender, tapering slightly and incurved, with apex swollen

and bilobate,⁴ the inner lobe only moderately flattened (instead of strongly flattened as is the case in *retinerve*); the triangular chitinous tooth at disto-internal point on external lobe very small (proportionately smaller than in that species). Subgenital plate with weakly convergent rounded lateral carinae which are produced a distance equal to the width of each production, these productions each surmounted by socketed styles, each of which is nearly six times as long as broad, the intervening space narrowly U-emarginate, preceded by a medio-longitudinal carina.

Coloration.—General tone light green (kildare green in dried specimen). Eyes russet. Pronotal disk with minute microscopic dots of brown and under the microscope seen to be washed with lighter brown at the cephalic angles, mesad on the cephalic and caudal margins and at the shoulders, the sulci also tinged with brown. Tegmina with minute intervals between veinlets laterad and particularly caudad of the stridulating field embrowned, but with no trace of brown marking before and including the stridulating vein (which is apparently always shown by this sex of *retinerve*). Tibiae proximad, caudal femora meso-proximad and meso-distad tinged with brown and with microscopic darker flecks. In this insect all the dark markings are inconspicuous.

Length of body, 21.1; length of pronotum, 5.2; caudal width of pronotal disk, 3.7; length of tegmen, 34.8; greatest width of tegmen, 10.8; length of caudal femur, 18.8 mm.

The definite affinity shown to *retinerve* suggests that this is a species of the deciduous tree-tops, possibly distributed through the forests of the central and southern area west of the Mississippi. The type was taken in the undergrowth of a mixed deciduous and conifer forest.

PSEUDOPHYLLINAE

Lea floridensis divergens new subspecies (Plate X, fig. 29.)

1906. *Lea floridensis* Caudell, Jour. N. Y. Ent. Soc., xiv, p. 42, 2 text-figs. and pl. I, fig. 5. [♀, "Florida"; Pablo Beach, Florida.] (Description of genus and of female.)

1907. *Cyrtophyllus (Lea) floridensis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 302. [♂, ♀; Pablo Beach and St. Augustine, Florida.]

This race, known only from the northern portion of the east coast of Florida, and which has not been found any considerable

⁴ From study of other species of this and allied genera I believe that cercal differences have much more significance than is often the case with depth and degree of angulation of the emargination of the subgenital plate or with length of the styles.

distance inland, occurs from Pablo Beach south to La Grange. It is supplanted by the nominate race on the southern portion of the east coast from opposite Grant on the Indian River south to Coral Gables.

It may be distinguished by its average smaller size, moderately constricted pronotum with lateral carinae definitely more divergent caudad and less broadly defined in color, and simple acute apices of the ventral arm of the male cercus.

Type.—♂; Pablo Beach, Florida. August 13, 1905. (Rehn and Hebard.) [Hebard Collection, Type no. 1336.]

Generally similar to *floridensis floridensis* (Beutenmuller) except as stated above. Appearance of pronotum definitely more constricted; the lateral margins of the disk defined by weak coarse carinae caudad only but outlined throughout in brown, slightly divergent caudad to principal sulcus, then slightly more divergent but weakly convex in curvature. Ventral arm of cercus terminating in a single acute tooth.

Allotype.—♀; St. Augustine, Florida. (C. W. Johnson.) [Academy of Natural Sciences of Philadelphia.]

No larger than the largest male, agrees with type except as follows. Tegmina narrower and without stridulating field. Ovipositor as in the nominate race; of moderate length, curved broadly dorsad to the acute apex, its ventral margin very finely serrulate distad, the lateral surface with two vertical short heavy ridges distad, of which the proximal is decidedly the heavier.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Width of pronotum at principal sulcus	Caudal width of pronotum	Length of tegmen	Length of caudal femur
<i>f. divergens</i>							
Pablo Beach		30-40.	6.4-7.5	3.9-4.7	6.3-7.	32.-35.	23.1-24.2
La Grange		35.5	8	4.3	6.7	36.7	24.8
<i>f. floridensis</i>							
Indian River, <i>type</i> ..		35.	8.2	—	—	—	27.5
Coral Gables		38.-41.	8.5-9.	5.-5.7	6.4-6.8	34.7-35.	27.7-28.2
	♀						
<i>f. divergens</i>							
St. Augustine		38.5	7.5	4.8	6.6	34.2	26.
La Grange		36.3	7.3	4.	5.8	35.3	24.
<i>f. floridensis</i>							
Juno		40.	8.4	5.2	6.3	38.8	26.8
Coral Gables		42.5-44.7	8.2-8.9	4.9-5.8	6.-6.6	32.6-34.7	27.9-28.8

The extremes in the series of ten male paratypes is given above. The ovipositor length of *floridensis divergens* ranges from 18.2 to 18.8 mm., and in *floridensis floridensis* from 18. to 18.8 mm.

Coloration.—Generally green; disk of pronotum with lateral margins defined in dark pinkish brown, this narrowly (and less conspicuously than in the nominate race) margined externally with buffy. The antennae are found to be annulate with brown distad or wholly immaculate in both races.

Specimens examined: 21; 19 males and 2 females.

FLORIDA: Pablo Beach, VIII, 13, 1905, (Rehn and Hebard; colony in bushes eight to ten feet high on land face of sand dunes back of beach), 11 ♂, *types* and *paratypes* [Hebard Cln., A.N.S.P., U.S.N.M.J.]. St. Augustine, (C. W. Johnson), 1 ♀, *allotype*, [A.N.S.P.]. Pomona, IX, 7, 1917, (Rehn and Hebard; moderately common on Cabbage Palmettos and in bushes in pine flatwoods at night, "fearlessly giving their peculiar wooden 'grck' until approached within two or three feet"), 6 ♂, [Hebard Cln. and A.N.S.P.]. DeLeon Springs, IX, 8, 1917, (Rehn and Hebard; moderate numbers in high hammock, usually up fifteen to twenty feet but some only a few feet from the ground: "song regular, usually about thirty-eight per minute but when excited an individual increases the frequency up to nearly sixty a minute"), 1 ♂. La Grange, IX, 12, 1913, (W. T. Davis; in oaks and Cabbage Palmettos but not in the pine woods), 1 ♀; I, 1914, 1 ♂, (both in Cabbage Palmettos; song accurately described by Davis as "chluck"), [both Davis Cln.⁵].

At De Leon Springs *Pterophylla camellifolia camellifolia* (Fabricius) was heard after dark in large numbers in the tops of the lofty oaks in the high hammock. We noticed that the song of *Lea* is decidedly weaker and of lower pitch.

In a letter from H. F. Strohecker I learn that he has heard this species at Ocala and Orlando where the present race is almost certainly the one represented.

***Lea floridensis floridensis* (Beutenmuller)**

1903. *Cyrtophyllus floridensis* Beutenmuller, Bull. Amer. Mus. Nat. Hist., xix, p. 637, 2 text-figs. [♂; Indian River opposite Grant, Florida.]

Recently at my request my colleagues Messrs. James A. G. Rehn and John W. H. Rehn made a comparison of the type of *L. floridensis*, in the American Museum of Natural History, with male material of both races of the species here recognized. The following comments have been taken from the notes made by them. The unique type ("Indian River, Florida", without further data) has been dried from alcohol and is in consequence

⁵ Recorded as *Lea floridensis* by Davis in 1914.

somewhat shrivelled and the coloration destroyed. The wings are poorly spread, one antenna is lacking distad of the second article, while the right cephalic limb, the right caudal tarsus and most of the left one are also missing. The chief measurements of the type have been given in the preceding table. The type closely approximates a Coral Gables male with which it was compared, but in a few points it shows that it is from the southern border of the transitional area between the two races. The lateral rugosities (or carinae) of the pronotum are virtually as concave and as divergent as in typical *L. f. divergens*, the lateral lobes of the pronotum are less massive than in Coral Gables *L. f. floridensis* and somewhat near *L. f. divergens* in consequence, while the tegmina have the marginal field as broad and the ulnar vein as straight as in Coral Gables *L. f. floridensis*. The limbs are all proportionately longer than in the type of *L. f. divergens*, and as in the Coral Gables male compared. To sum up, in the bulk of its features the type of *L. floridensis* is distinctly nearer the southern form (i.e. that here termed *floridensis floridensis*) than it is to the more northern race (*L. f. divergens*) here described.

Davis in 1914 heard an individual of what was certainly the present race near Miami, stridulating every evening late in September in the Spanish Moss of a large oak in a clearing. This insect took immediate alarm at the approach of a light and so could not be captured.⁶

The undescribed female of the nominate race (Caudell's description of a female in 1906 was based on the female of *floridensis divergens* here described) may be separated from that sex of *divergens* by the ambisexual features of difference discussed here under that race.

I find that all females of the North American Pseudophyllinae have a tooth at the apex of the cercus. In *Paracyrtophyllus* and *Pterophylla* it is situated on the inner margin of the bluntly rounded cercal apex, but in *Lea* forms an apical fork with the more sharply rounded apex as has been described by Caudell.

⁶ Recorded as *Lea floridensis*. I also have noted that western species such as *Aglaothorax armiger* and *Capnobotes occidentalis*, proved to be very much more alert and wary at night when very few were to be heard stridulating, than when present in larger numbers and answering each others' calls.

Specimens examined: 12; 6 males and 6 females.

FLORIDA: St. Lucie, 1 ♀ (dried alcoholic), [U.S.N.M.]. Juno, IX, 5, 1936, (Rehn and Rehn; climbing Saw Palmetto leaf in dense coastal sand dune scrub), 1 ♀, [A.N.S.P.]. Miami, VIII, 9, 1937, (H. F. Strohecker), 1 ♀, [Hebard Cln.]. Coral Gables, VI, 14 to VIII, 2, 1937, (H. F. Strohecker), 5 ♂, 2 ♀ (one female light pinkish brown (apricot buff to sayal brown), others of the normal green color phase), [Hebard Cln.]. Homestead, XI, 1919 and 1920, (C. A. Mosier), 1 ♂, 1 ♀, [U.S.N.M.].

COPIPHORINAE

BUCRATES Burmeister

1838. *Bucrates* Burmeister; Handb. Ent., II, abth. II, pt. 1, p. 708.

GENOTYPE (by monotypy as originally the only definitely included species), *Locusta capitata* DeGeer, 1773.

Described from an unknown locality, probably Brazil as suggested by Burmeister, material of the widespread tropical American genotypic species is before me showing a range from Panama to the River Amazon.

The genus is distinguished by the fastigium of the vertex being in strong contact with that of the frontal costa (particularly in the genotype with apex of the latter grooved to accommodate the apex of the former), and the slightly but distinctly lamellate dorsal margins of the caudal tibiae distad. The ovipositor is much as in many species of *Homorocoryphus* Karny and *Neoconocephalus* Karny, elongate, very feebly but appreciably decurved distad, slightly broadest meso-distad, the dorsal and ventral margins converging and showing feeble convexity to the acute apex.

From it *Parabucrates* Scudder is separated only by the shorter, moderately recurved ovipositor which tapers evenly distad to the acute apex (as characteristic of certain genera referred to the *Agraeiinae*).

The best sequence for the related American genera appears to be *Neoconocephalus*, *Homorocoryphus*, *Bucrates* and *Parabucrates*. The other American genera belong to distinct phyla, though *Caulopsis* may be considered an extreme development from the present in one direction and *Belocephalus* an extreme development from the same on a very different tangent.

A single species of this genus occurs in the United States.

Bucrates malivolans (Scudder)

1879. *Conocephalus malivolans* Scudder, Proc. Boston Soc. Nat. Hist., xx, p. 90. [♂; Cedar Keys, Florida.]
1905. *Conocephalus hoplomachus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, pl. I, figs. 10 and 11. [♀; Chokoloskee, Florida.]
1914. *Homorocoryphus malivolans* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 405. [♂; Detroit, Florida (and the above synonymy established).]

This insect was subsequently recorded from Tappahannock, Virginia, and Wilmington, North Carolina.

No differences of generic value from the genotype, *capitatus*, can be found, though *malivolans* is a decidedly more slender species, superficially rather suggesting *Neoconocephalus velox* Rehn and Hebard in general appearance. Prior assignment to *Homorocoryphus* was due to failure to note the slight but important generic difference in the lamellation of the dorsal margins of the caudal tibiae.

Both *capitatus* and *malivolans* are found to have the organs of flight either decidedly abbreviate or fully caudate, often at the same locality. Such dimorphism also occurs in *Parabucrates brevicauda* (Scudder), but not in any of the American species of *Neoconocephalus* or *Homorocoryphus*.

Though both brown and green color phases occur in this species, the latter is apparently much less often developed.

The immature stages show several features of decided phylogenetic importance. All have the fastigium of the vertex separated by a brief interval from that of the frontal costa, and the caudal tibiae do not show lamellation of their dorsal margins distad. Thus immatures of this species are indistinguishable from those of *Neoconocephalus* except by specific differences. Moreover the vertex is slenderly conical with sharply rounded apex in the very early stages, becoming progressively shorter and blunter to the adult condition.

Specimens examined: 74; 44 males, 14 females and 16 immature individuals.

VIRGINIA: Tappahannock, VI, 12, 1916, 3 medium large to medium small juv. ♂, 1 large juv. ♀ (2 males green, others brown); VII, 13 to VIII, 9, 1916, 11 ♂, 9 ♀ (3 brown males and 2 green females macropterous, others brown and brachypterous); VIII, 19, 1916, 6 very small juv. (brown); IX,

19, 1916, 2 small juv. (brown), (all H. Fox; in *Spartina cynosuroides*), [Hebard Cln. and A.N.S.P.].

GEORGIA: Eastern border of Okefenokee Swamp, VII, 30, 1934, (J. D. Beamer), 1 ♂ (green, brachypterous).

FLORIDA: Citrus Center, V, 2, 1912, (W. T. Davis), 1 ♂, (brown, brachypterous). Chokoloskee, V, 1903, *type* of synonymous *hoplomachus*, 1 ♀ (brown, brachypterous). Coconut Grove, III, 2, 1916, (M. Hebard; moderate numbers in reeds and bushes of salt marsh, only occasionally singing and then often only a single note), 1 ♂ (brachypterous), 1 medium juv. ♀ (both brown). Florida City (Detroit), VII, 12, 1912, (Rehn and Hebard; in saw grass in knee-high water on edge of Everglades), 1 ♂ (brown, brachypterous).

ARKANSAS: Hope, VII, 5, 1926, (L. Knobel; in light trap, only one of this species seen), 1 ♂.

LOUISIANA: Spanish Fort, VIII, 5 and 7, 1915, (Rehn and Hebard; in high grass of freshwater marsh, generally distributed and moderately abundant), 22 ♂, 2 ♀ (7 males and 2 females macropterous, others brachypterous, all brown), 1 medium juv. ♀ (brown), [Hebard Cln. and A.N.S.P.]. Orleans Canal near Spanish Fort, VIII, 5 and 7, 1915, (Rehn and Hebard; in high grass of fresh-water marsh), 3 ♂, 1 ♀ (macropterous, brown), 2 medium juv. ♀ (brown). Morgan City, VIII, 8, 1915, (Rehn and Hebard; small colony in group of bananas and in low grass at station), 1 ♀ (macropterous, brown), 1 small juv. ♂ (brown). Lafayette, VIII, 9, 1915, (Rehn and Hebard; in heavy broad-leaved swamp grass in "branch"), 1 medium large juv. ♀ (brown). Lake Charles, VIII, 10, 1915, (Rehn and Hebard; undergrowth and short grass in oak "hammock"), 3 medium to medium small juv. ♂ (brown).

There is considerable size variation, apparently having only slight geographic significance. Though the Virginia series averages smallest, the male from Florida City, Florida is smaller than the largest males from Tappahannock, Virginia. The female from Chokoloskee, Florida and the majority of the Louisiana specimens are the largest.

At Orleans Canal the song was noted as a "dzeeeeee-dzeeeeee-dzeeeeee-dzeeeeee", the notes being given eight times in five seconds, often preceded by a rustling sound audible at only a very short distance.

Present on or near the sea coast from central Virginia to western Louisiana, this insect inhabits salt and fresh-water marshes and swamps and in the low country invades adjacent woodlands. Lack of field work in its preferred environment accounts for the very wide gaps in its known distribution.

DECTICINAE

Idiostatus hendersoni ? new species (Plate VIII, figures 5 and 7.)

This species, coming from the desert hills south of the Great Salt Lake in central Utah, is nearest *I. variegata* Caudell, (see plate VIII, figs. 6 and 8) described from a female from Pocatello, Idaho. Material of the genus is also before me from southwestern Idaho (one immature female, Gooding; one male, twenty miles south of Boise), northeastern Utah (two males and two females, Jensen) and extreme western central Utah (one female, Trout Creek). Though additional specimens can alone solve the problem as to how many species are represented, I can say definitely that those from Idaho are very near if not fully representative of *variegata*. The others are closely related but may represent distinct races or even species in each case.

To these species are related *I. magnificus* Hebard (Warner Mountains in northeastern California), to a less degree *I. elegans* Caudell ("Nevada") and to an even lesser degree *I. inermis* (Scudder) (just east of the Sierras from Oregon to central Nevada).

From my Idaho male, this sex of the present insect is easily distinguished by the shorter and heavier limbs, narrower median emargination of the penultimate tergite and the extremely elongate and very distinctive cercal spine. Though paler with less extensive markings, the extremes of coloration of the species in question are probably decided and so can not be determined for each without much more material.

Type. — ♂; Leamington, Utah. July 19, 1918. (W. W. Henderson.) [Hebard Collection, Type no. 1334.]

Size medium large and form robust for the genus. Fastigium with width one and one-third times that of proximal antennal joint, showing merest trace of medio-longitudinal sulcation. Pronotum smooth, disk rounding evenly into lateral lobes except in the produced caudal portion where distinct though broadly rounded shoulders occur; caudal production brief with caudal margin truncate (in paratype mesad appreciably but very feebly concave mesad as in *variegatus*, this margin very feebly convex in

[?] In honor of my friend, Dr. W. W. Henderson, the well known Utah entomologist, through whose kindness I have been enabled to study this remarkable new species.

magnificus); lateral lobes considerably longer than deep, much as in *magnificus* except that there is here the merest trace of a humeral sinus, convex callosity obsolete but bounding that area internally is a definite oblique impression.

Prosternum unarmed. Tegmina very greatly reduced, extending beyond pronotum about two-thirds pronotal length, largely exposed (to near proximal oblique portion of sinistral tegmen when at rest); median area meso-caudad in stridulating field rounded (rounded-quadrate in one paratype, similar but slightly longer than wide in the other).

Tenth tergite with a small broad meso-distal area of soft integument which has its inner margin convex. Penultimate tergite with a very broad meso-distal area of soft integument which is hirsute with distal margin bilobate, and having a small median emargination as deep as it is wide (the convex lateral sections decidedly less convex and the median emargination broader in *variegatus* and *magnificus*). Cercus stout, moderately elongate, shaft of subequal width and evenly moderately incurved; apex short and sharply conical, inner margin with a subapical conical but more swollen projection from which springs an exceedingly elongate spine which curves gently to its aciculate apex, is directed at slightly less than a right-angle to the shaft and is slightly longer than the distance from its base to the base of the shaft. Subgenital plate broad and ample, without a median carina but with sharply rounded lateral carinae which are weakly convergent (and straight to very faintly convex) to the small style sockets, between which the distal margin is emarginate at distinctly less than a right-angle, the sides of this emargination very feebly convex. Styles very small, simple, approximately three times as long as broad (slightly longer in a paratype), separated by a distance about one and one-third times the length of one of them.

Limbs rather short (shorter than in *variegatus*, longer than in *magnificus*). Genicular lobes with cephalic of cephalic (on one side with two spines in one paratype) and both of median with a minute short spine. Femoral margins armed with very minute spines (as follows: cephalic internal 0 to 5, cephalic external 0, median internal 1 to 4, median external 0, caudal internal 4 to 6, caudal external 1 to 8). Cephalic tibiae with dorsal surface armed on outer margin only with a proximal, median and distal spine.

Coloration.—Generally light buff (more or less discolored but not by alcoholic immersion). Occiput with a very fine line of dark brown which becomes broad caudad (reduced to a dot caudad in one paratype). Face, ventral margins of lateral lobes fairly broadly and caudal femora very light buff. Body otherwise immaculate except caudad; penultimate tergite with irregular proximal shining blackish brown margin which is broadest dorso-laterad. Cercal spine very dark brown. Femora almost immaculate, in one paratype with a dorso-proximal patch of inconspicuous brown dots and external surface with similar even weaker marking below median line mesad and a larger fleck of brown above that line distad (mere traces of but

homologous to the markings shown in *variegatus*). Spines of limbs dark distad but on caudal femora entirely blackish brown surrounded at bases with small areas of the same color. Only in the type are the apices of the cephalic and median tibiae very light green.

(Measurements (in millimeters))

	Length of body	Length of pronotum	Caudal width of pronotum	Exposed length of tegmen	Length of caudal femur	Greatest width of caudal femur
Type	23.8	6.3	4.7	3.9	18.2	3.8
Paratype	23.2	6.7	4.7	4.4	18.4	3.9
Paratype	20.3	6.4	4.5	3.8	18.	3.8

Two male paratypes are before me, bearing the same data as the type.

METRIOPTERA Wesmael 1838

GENOTYPE: *Gryllus brachypterus* Linnaeus 1773, by monotypy.

An established synonym is *Platypleis* Fieber 1852, with genotype *Decticus intermedius* Serville 1839, fixed by Herman in 1874.⁸ Splitting into other genera would appear to me to be less feasible than Uvarov has intimated, the large tessellate species (including *intermedia*), small tessellate species (including *tessellata*) and more solidly marked small species (including *brachyptera*) on examination being seen to agree much more closely than their appearance would suggest. On the other hand such aberrant species as *alticola* Tarbinsky and the Japanese *bonneti* and *japonica*, both described by Bolívar, may possibly require subgeneric or even generic separation. Their most striking differences are the ovipositor with dorsal margin faintly but definitely subserrulate in the first two of the above, but the ventral margin is serrulate in the first, smooth in the second and the pronotum has a faint but sometimes almost percurrent medio-longitudinal carina in the third.

⁸ See Uvarov, Trans. Ent. Soc. London, 1923, p. 528, (1924). Discussion of the genus is there given and explanation of Kirby's incorrect use of *Chelidoptera*.

The single North American species, *sphagnorum*, discussed below, belongs to the section which includes *brachyptera*. Of the species included there it is the most aberrant, but the eastern Asiatic *ussuriana* Uvarov, though distinctive, plainly represents a condition intermediate between it and *brachyptera*.

A very distinctive but related species, originally described as *Eremopedes brevicauda* by Caudell, must be generically separated, and the new genus including it and a new species is here described. These two species are confined to California.

The two genera in question may be separated as follows,—

Vertex normal but large, its width distinctly greater than the depth of the normal eye (in the genotype, but as large as in the alternate category in some of the species of *Metrioptera*). Pronotum with medio-longitudinal carina in metazonal portion only (but in *japonica* weak but often practically percurrent), (disk in genotype with weakly defined lateral carinae, these obsolete in some species, very decided in a very few species). Organs of flight fully developed to greatly reduced (fully developed to very decidedly reduced in genotype) but always with greater portion of stridulating field of male exposed beyond the proportionately definitely shorter pronotum. Limbs short to elongate, caudal femora scarcely over twice to over three times as long as pronotum. Caudal tibiae with disto-ventral pair of spurs larger than in *Decticita*, but differing in proportionate size in different species. Penultimate tergite of male not to very strongly produced above cerci (the latter condition shown only by the boreal American *sphagnorum*). Male subgenital plate normal. Female with sternites unspecialized (in genotype, *sphagnorum* and other species) or specialized (in many species). Ovipositor very short to moderately elongate (of medium length in genotype) and moderately thickened proximad and mesad, curved (usually evenly and not strongly) to the acute apex; dorsal margin smooth (in genotype and many species), armed distad in very few species; ventral margin never broad just beyond base, smooth or distad thickly irregularly subdentulate (in genotype and *sphagnorum*) or there definitely, evenly serrulate (in only a few species). *Metrioptera* Wesmæl

Vertex exceptionally large, its width distinctly greater than the depth of the large eye. Pronotum with medio-longitudinal carina percurrent (disk with weak to very decided lateral carinae). Organs of flight very greatly reduced, with narrow caudal margin of stridulating area of male alone exposed beyond the more elongate pronotum. Limbs short; caudal femora very robust proximad, slightly more than (male) to slightly less than (female) twice as long as the pronotum. Caudal tibiae with disto-ventral pair of spurs very small, inconspicuous. Penultimate tergite of male not produced above cerci. Male subgenital plate strongly emarginate distad, the lateral portions bearing the styles rotated into an almost vertical

(instead of the normal almost horizontal) plane. Female with sternites unspecialized. Ovipositor very short and very decidedly thickened proximad, deep proximad and mesad, curved dorsad to the acute apex, dorsal margin unarmed, ventral margin broad just beyond base and there finely transversely ridged, this surface becoming oblique distad.

Decticita new genus

These genera share the following characters. Pronotal lateral lobes deep (normal for subfamily), not perpendicular, being slightly to definitely divergent ventrad. Prosternum unarmed. Ventral femoral margins unarmed. Cephalic coxae armed with a large slender spine. Cephalic tibiae with dorso-external margin armed with three spines and dorso-internal margin unarmed; auditory foramina rimate. Free plantula (beneath and at base of caudal metatarsus) moderately large, elongate ovate.

In *Metrioptera* the male cerci, though differing widely in different species, are in the great majority slender and armed with a single spine distad on the inner margin. In *ussuriana* Uvarov, however, they are short, armed proximad on the inner margin with a very elongate spine, and in *sphagnorum* they are large, straight, elongate conical, tapering to the rounded apex and armed proximad on the inner margin with a very small spine. Considering certain other genera of the North American Decticinae (*Ateloplus* and *Idiostatus*) two or even three distinctive cercal types are shown by unquestionably congeneric species, and such differences consequently do not have the phylogenetic significance which might be assumed.

The large number of alternate features given for *Metrioptera* are due to the very large size of that genus. Twenty-six Old World species in my collection and one additional in that of the Academy enable me to make a much more general study of that genus than has hitherto been published. Material of the genotype, *brachyptera*, both brachypterous and macropterous, is before me from France, Hungary and Siberia.

Metrioptera sphagnorum (F. Walker)

1869. *Decticus sphagnorum* F. Walker, Cat. Dermapt. Saltat. British Mus., II, p. 258. [♂, ♀; St. Martin's Falls, Hudson Bay.]

1909. *Idionotus brevipes* E. M. Walker, Canadian Entom., XLI, p. 143, pl. 7, figs. 3 and 3a. [♂; Fort William, Ontario (and notes on habits).]

Established synonyms are *Idionotus brevipes* based on a male from "Arctic America" and *Platycleis fletcheri* based on a female from Millarville, south of Calgary, Alberta, both of which Caudell described in 1907 and recognized as sexes of the same species the following year. The final synonymy was published by both E. M. Walker and Caudell in Blatchley in 1920.

Uvarov figured the genitalia of the male type in 1930, at which time he correctly stated that, though the male penultimate tergite is even more produced, closest affinity is plainly shown to *ussuriana*, a very similar appearing species which occurs in the Ussuri Region of far eastern Siberia, and of which I have four males and one female. The two are almost identical in coloration, *ussuriana* differing most decidedly in the male genitalia, but also in the much shorter ovipositor, much longer caudal limbs, strikingly more ample male stridulating area and longer female tegmina.

The present species has been recorded as *Idionotus brevipes* from Aweme, Manitoba, as common at Fort William, Ontario (when its soft trilling song was described and its habitat discussed), from Cold Lake, Alberta, and from Fort St. John and Rolla in the Peace River Block of British Columbia east of the Rocky Mountains.

The following material is in my collection unless otherwise noted.

MANITOBA: Marchand, VII, 9, 1936, (R. H. Handford), 4♂ [part Canadian Nat. Cln.]. Aweme, VIII, 17, 1908, (N. Criddle), 1♂.

ALBERTA: Cold Lake, IX, 6, 1930, (E. R. Tinkham), 1♀. MacLeod, VII, 26, 1926, (E. R. Buckell), 2♂.

BRITISH COLUMBIA: Fort St. John, VII, 29, 1927, (P. N. Vroom), 1♂ (compared with type by B. P. Uvarov). Rolla, VII, 2, 1927, (P. N. Vroom), 1♂.

The present insect occurs over a very extensive region, in most portions of which it is the only dectid known, reaching from Hudson Bay to the Rocky Mountains north at least to latitude 56°, and south to near the southern boundary of Canada. In the southern portions of its range it is undoubtedly limited to the more boggy boreal spots, and it is therefore probably both scarce and local in southern Manitoba, southern Saskatchewan and southeastern Alberta.

DECTICITA new genus

This genus is erected to include *Eremopedes brevicauda* Caudell and *balli* here described, of which the former is designated as genotype. Closely related to *Metrioptera* Wesmael, though in appearance differing very widely from any of the many species of that genus, the species of *Decticita* are known only from the Pacific drainage of central and southern California.

The fact that both of these species appear adult in June and have largely disappeared by early August partially explains the great scarcity of these insects in collections. They are apparently largely terrestrial, living in grasses both in dry and damp environment, but have most often been found in dry wild oats.

Outstanding features when compared with other North American Decticinae are the broad and bluntly rounded vertex, almost wholly concealed organs of flight in both sexes, almost vertical lateral produced portions of male subgenital plate and extremely short stout ovipositor, which is curved dorsad to its acute apex. The other diagnostic characters are here given in the comparison with *Metrioptera* under that genus on pages 176 and 177.

Decticita brevicauda (Caudell)

(Plate VIII, fig. 9; pl. IX, figs. 21 and 22.)

1907. *Eremopedes brevicauda* Caudell, Proc. U. S. Nat. Mus., xxxii, p. 336, fig. 39. [♀; Napa County, California.]

The previously unknown male, as shown by one from Monte Diablo, California, differs from the female as follows:

Size decidedly smaller, form less robust. Pronotum slightly more produced caudad and showing some inflation (convexity of the dorsal surface) above the tegmina. The weakly defined lateral carinae are not truly parallel, being usually very feebly divergent cephalad in the brief cephalic section, then showing a trace of convexity throughout and so slightly widest meso-caudad; these features usually more prominent in the male.⁹ Pronotal disk with lateral portions of crescent-shaped sulcus evident, this sulcus obsolete mesad (as is often the case in females). Tegmina reduced to stridulating area, all but the very narrow rounded apical area concealed by the pronotum. Penultimate tergite strongly transverse, lateral margins feebly oblique and very weakly concave to between the cerci with distal

⁹ In both sexes the median carina is coarse and percurrent, often low and not conspicuous (I do not feel that Caudell's statement "scarcely noticeable" describes this feature quite as satisfactorily).

margin of this portion showing shallow concavity. Supra-anal plate vertical, small, shield-shaped. Cercus moderately elongate cylindrical but with internal surface strongly concave to near the apical tooth, about three times as long as median width, almost straight, widening very slightly proximad, thence of almost equal width to the bluntly rounded apex, with a very small short moderately recurved subapical spine surmounting a flattened triangular base on internal margin. Subgenital plate elongate, lateral portions almost vertical, median portion pinched into a decidedly fine medio-longitudinal carina which terminates at apex of the large subrectangulate distal emargination, disto-lateral portions almost vertical, elongate, with margins broadly convex to apex which is surmounted by a small straight simple style about three times as long as broad, these disto-lateral portions each with a heavy rounded medio-longitudinal carina.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Caudal width of pronotum	Ventral total width of pronotum	Length of caudal femur	Greatest width of caudal femur
Monte Diablo	13.3 ¹⁰	7.	2.7	4.2	13.4	3.
♀						
Napa County, <i>type</i> ¹¹	20.	6.5	—	—	18.5	—
Monte Diablo	16.8	7.1	3.	5.1	16.	3.3
Lindsay	19.	7.8	3.2	5.7	19.6	3.7

In the series before me the length of the ovipositor ranges from 6.9 to 7.9 mm. It is 6 mm. in length in the type. The species is probably subject to considerable size variation, my evidence indicating that more or less favorable conditions of immediate environment and amount and character of available food are important factors.

Coloration.—Ranging generally from ochraceous buff tinged with tawny to buckthorn brown. The broad lateral medio-longitudinal blackish streak on the caudal femora is always conspicuous but becomes diffused in the distal section of the enlarged portion and then disappears. The other features of coloration, here described under *balli*, are all similarly indicated in the present species, of which, however, I do not have any specimens showing anything like as much intensification.

¹⁰ In the male not including the produced subgenital plate.

¹¹ These measurements of the female type, in the American Museum of Natural History, were made for me by my colleagues Messrs. James A. G. Rehn and John W. H. Rehn.

Specimens examined: 18; 4 males, 11 females and 3 immature individuals.

CALIFORNIA: Lagunitas, V, 30, 1915, (J. W. Rich), 1 juv. ♀ in instar preceding maturity, [Hebard Cln.]. Sonoma County, III, 28, 1919, (T. B. Urbahns), 1 small juv. ♂, 1 medium juv. ♀, [U.S.N.M.]. Lindsay, San Joaquin County, V, 31, 1910, (J. R. Horton; in wild oats), 3 ♀, [U.S.N.M. and Hebard Cln.]. Clayton, VII, 20, 1935, (J. Beamer; in dry wild oats on hillside), 2 ♀, [Univ. of Kansas and Hebard Cln.]. Monté Diablo, VII, 21, 1935, (J. and R. H. Beamer; in dry wild oats about one mile from summit), 4 ♀, 5 ♀, [Univ. of Kansas and Hebard Cln.]. San Ramon, VI, 26, 1903, (in bird stomach), 1 ♀, [U.S.N.M.].

Decticita balli¹² new species

(Plate VIII, fig. 10.)

This interesting insect supplants *D. brevicauda* (Caudell) throughout the southern portion of the range of the genus. It is known from the western slopes of the Sierra Nevada from the Yosemite to the Sequoia National Park west to the Coast from Santa Cruz to Oxnard.

It is easily distinguished in the male sex by the strikingly prominent pronotal carinae and the very much shorter, stouter, blunter cerci. Females differ, however, only in having the pronotal carinae slightly more prominent than in that sex of *brevicauda*. In the early stages the pronotal carinae are often very weakly indicated.

Type.—♂; San Luis Obispo, California. June 14, 1934. (E. D. Ball.) [Hebard Collection, Type no. 1335.]

Generic characters given above. Agrees closely with this sex of *brevicauda* as here discussed under that species except as follows. Pronotum with medio-longitudinal and lateral carinae of disk¹³ very coarse, rounded and very prominent; the latter weakly convergent briefly toward cephalic margin, thence weakly divergent caudad but becoming feebly convex mesocaudad so that they are again weakly convergent (or parallel) in brief portion near caudal margin; the intervening spaces of the disk thus narrow and in transverse section strongly concave. Cercus short, stout, cylindrical but with internal surface strongly concave to near the apical tooth, from

¹² Named in honor of Dr. E. D. Ball of the University of Arizona, who collected the type, and has aided me greatly in my studies by securing many little known Southwestern species of Orthoptera during the past eight years.

¹³ Only in the southern Russian *Metrioptera medvedevi* Miram, of the species of that genus before me, do the lateral carinae of the pronotal disk show similar decided development, suggesting those of the present species but much less pronounced.

above appearing less than twice as long as wide but from below seen to be slightly more than twice as long as the median width, shaft weakly but definitely curved inward, scarcely narrowing to the very bluntly rounded apex with a very small short and moderately recurved subapical spine surmounting a flattened triangular base on internal margin. The cerci are apparently usually directed dorso-mesad, instead of horizontal and parallel as is the case in *brevicauda*.

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

Very similar to this sex of *brevicauda* except that the pronotal carinae are more prominent, sometimes as well defined as in the males of that species but much weaker than in the males of the present insect.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Greatest (meso-caudal) width of pronotum	Ventral total width of pronotum	Length of caudal femur	Greatest width of caudal femur
Huckleberry Meadows		13.2 ¹⁴	5.7	2.	3.9	11.	2.3
Monterey		15.4 ¹⁴	6.7	2.3	4.1	15.7	2.9
Lockwood		15.3	7.8	3.	4.8	14.8	3.2
San Luis Obispo, <i>type</i>		13.7 ¹⁵	7.8	2.6	3.9	15.7	2.8
	♀						
Huckleberry Meadows		16.7	6.1	2.7	5.	14.	2.9
Monterey		16.8 ¹⁵	6.4	2.8	4.9	18.3	3.4
Lockwood		20.	7.7	3.2	5.8	19.6	3.8
San Luis Obispo, <i>allotype</i> ..		16.8	7.2	3.	5.3	18.	3.7

In the series the ovipositor length ranges from 6.8 to 7 mm. Size is apparently greatly influenced by conditions of local environment.

Coloration.—Agrees throughout with *brevicauda*. Different series show wide differences in recession and intensification, the general coloration ranging from ochraceous buff tinged with ochraceous tawny to mars brown. The ventral and caudal margins of the pronotal lateral lobes are broadly buffy, inconspicuous in pale individuals but striking in dark specimens. The abdomen dorsad and laterad is darker, separated by moderately broad dorso-lateral paler longitudinal bands. The caudal femora have a broad blackish medio-longitudinal external band which becomes diffused and dis-

¹⁴ Abdomen extruded.

¹⁵ Abdomen retracted.

appears at the end of the enlarged portion. Two specimens show a dark brown fleck before the pale margin of the pronotal lateral lobes opposite the shallow humeral sinus.

Specimens examined: 32; 14 males, 10 females and 8 immatures.

CALIFORNIA: Yosemite Valley, 3880 to 4000 feet, VI, 7, 1928, (E. O. Essig), 1 juv. ♀ in last instar, [Hebard Cln.]. Huckleberry Meadows, Giant Forest, IX, 5, 1932, (P. H. Timberlake; on *Senecio clarkianus*), 2 ♂, 2 ♀, [Univ. Cal. Coll. Agr. and Hebard Cln.]. Giant Forest, 6000 feet, VII, 21 to 26, 1907, (J. C. Bradley), 1 medium small juv. ♂, [Cornell Univ.]. Coalinga, VI, 1 to 3, 1907, (J. C. Bradley), 1 ♀, [Hebard Cln.]. Santa Cruz, VI, 6, 1922, (E. O. Essig; in tall grass of damp meadow), 1 ♂, 1 ♀, 5 juv. ♂, 1 juv. ♀, [U.S.N.M. and Hebard Cln.]. Langley Canyon, Gavilan Range, near Prunedale, 250 feet, VIII, 10, 1937, (Rehn, Rehn and Pate; pair seen in tall yellow grass near ground, quite active), 1 ♀, [A.N.S.P.]. Monterey, VII, 22, 1935, (J. and R. H. Beamer; in wild oats with much poison oak and frequent oak trees), 1 ♀, 2 ♀, [Univ. of Kansas and Hebard Cln.]. Lockwood, VII, 24, 1935, (Beamer and Russell; in wild oats and one singing at night in wild buckwheat, *Eriogonum* sp.), 2 ♂, 1 ♀, [Univ. of Kansas and Hebard Cln.]. San Luis Obispo, VI, 14, 1934, (E. D. Ball), 5 ♀, 1 ♀, *type*, *allotype* and *paratypes*, [Hebard Cln.]; VI, 26, 1935, (C. C. Wilson; beaten from grasses), 1 ♂, 1 ♀, *paratypes*, [U.S.N.M.]. La Panza, V, 27, 1935, (C. C. Wilson), 1 ♀, [U.S.N.M.]. Oxnard, V, 12, 1914, (J. E. Graf), 1 ♀, [Hebard Cln.].

XI. NEW GENERA AND SPECIES OF AND CRITICAL NOTES ON PREVIOUSLY-KNOWN GRYLLACRIDIDAE

SALISHELLA new genus

This genus is erected to include the single species, *mirabilis* here described. In general appearance it agrees closely with *Pristoceuthophilus* Rehn, but may be readily distinguished by the very different, more ceuthophiloid, vertex; the extraordinary specialization of the male abdomen, and the remarkable development of the first two tarsal joints, in this latter feature agreeing only with the otherwise very different Central American *Phoberopus* Saussure & Pictet.

Presence of a small pre-median spine on the dorso-internal margin of the cephalic tibiae in one of the two specimens before me (the paratype) is a very surprising feature. Comparable armament, a post-median but otherwise homologous spine, in the also widely distinct *Udeopsylla* Scudder alone of the North





